

# City of Maroondah

## Storm and Flood Emergency Plan

A Sub-Plan of the Municipal Emergency Management Plan

For City of Maroondah  
And  
VICSES Unit Maroondah

Version 1.5  
Reviewed September 2019



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## Distribution List

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

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

Suggestions for amendments to this Plan should be forwarded to VICSES Regional Office Victoria State Emergency Service Central Region Headquarters Unit 6, 3-5 Gilda Court Mulgrave

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	09/05/2011	John Chaplain	Population of template
Version 02	15/05/2011	John Chaplain	Population of council data
Version 03	23/05/2011	John Chaplain	Populate Community Education plan
Version 04	03/06/2011	John Chaplain	Populate Comm Ed Plan/Critical Infrastructure
Version 05	14/06/2011	John Chaplain	Populate Critical Infrastructure/distribution list
Version 06	21/02/2012	Diana Ferguson	Populate into the new template
Version 07	17/07/2012	Diana Ferguson	Update the plan with VICSES and Council comments
Version 08	09/08/2012	Diana Ferguson	Update the plan with VICSES and Council comments
Version 09	30/06/2014	Ross Butler	Update Appendix Information and Mapping with addition of Catchment Schematics
Version 1	13/10/2014	Diana Ferguson And Sub Committee	Review and update Template
Version 1.1	29/11/2016	Gerabeth Abbott	Update legislative references, acronyms, inclusion of operational information
Version 1.2	8/12/2016	Maroondah Storm and Flood Subcommittee	Review plan and update affected areas
Version 1.3	14/02/2017	Gerabeth Abbott	Incorporation of Committee feedback
Version 1.4	30/08/2019	Ross Butler & Diana Ferguson	Update Appendix A, B, C, F, G & H Update legislative references, acronyms
Version 1.5	23/09/2019	Diana Ferguson And Sub Committee	Review and update Template

This Plan will be maintained on the Maroondah and SES website:

[www.maroondah.vic.gov.au](http://www.maroondah.vic.gov.au) and [www.ses.vic.gov.au](http://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
<b>Annual Recurrence Interval (ARI)</b>	The average, or expected, value of the period between exceedances of a given rainfall or flow total accumulated over a given duration
<b>Annual Exceedance Probability (AEP)</b>	The probability that a given total rainfall or flow is accumulated over a given duration will be exceeded in any one year
<b>Flash flooding</b>	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.
<b>Flood mapping</b>	The process where the extent of flooding is documented in mapping software based on flood studies and surface elevations
<b>Floodplain</b>	Area of land adjacent to a creek, river, estuary, lake, dam or artificial channel, which is subject to inundation.
<b>Hot spot</b>	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.
<b>Natural drainage system</b>	Flow paths which are largely undeveloped by human sources, these include rivers, streams, natural depressions and wetlands. All natural systems greater than 60 ha are managed by Melbourne Water.
<b>Overland flooding</b>	Flooding by local runoff caused by heavier than usual rainfall. Overland flooding can be caused by local flow exceeding the capacity of an urban stormwater drainage system or by the backwater effects of mainstream flooding causing urban stormwater drainage system to overflow. For local government areas this is over the 5 year ARI in residential or over 10yr ARI in commercial/industrial. For Melbourne Water catchment areas this is for all other ARIs up to the 100yr ARI. Note that not all overland flows cause flooding under the definition in the Knox City Service Plan Appendices.
<b>Retarding Basin</b>	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.
<b>Stormwater drainage system</b>	A series of drains and waterways into which surface and stormwater flows. Features of a stormwater drainage system can include underground pipe drains, open channels, retarding basins, floodways, waterway improvements, water sensitive urban design, integrated water management systems and environment protection measures. All drainage under 60 ha is maintained and operated by Maroondah City Council
<b>Stormwater Runoff</b>	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 Maroondah City Council and with the authority of the MEMPC pursuant to Section 20 of the Emergency Management Act 1986 (as amended).

This MSFEP is a sub plan to the Maroondah City Council MEMP. It is consistent with the EMMV and the Victoria Flood Management Strategy (DNRE, 1998a), and takes into account the outcomes of the CERA process undertaken by the MEMPC.


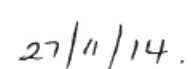
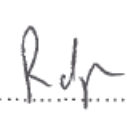
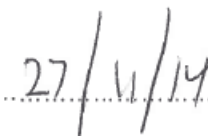
The MSFEP is consistent with the Regional Flood Emergency Plan, Regional Storm Emergency Plan and the State Flood Emergency Plan.

This MSFEP is a result of the cooperative efforts of the Maroondah MSFPC 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 Maroondah MEMPC as a sub plan of the MEMP.

### Endorsement

	
.....	.....
Chair of MEMPC	Date
	
.....	.....
Ray Jasper (Regional Manager Vic SES)	Date

## 1.2 The Municipality

An outline of the City of Maroondah 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 City of Maroondah

As such, the scope of the Plan is to:

- Identify the Storm and Flood Risk to the City of Maroondah;
- Support the implementation of measures to minimise the causes and impacts of storm and flood incidents within the City of Maroondah;
- 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 Maroondah City Council MSFPC will comprise of the following representatives from the following agencies and organisations:

- VICSES (i.e. Unit Controller & Regional Officer – Emergency Management) (**Chair**),
- Maroondah City Council (MERO, MEM, engineering department representative)
- Victoria Police (i.e. Municipal Emergency Response Co-ordinator) (MERC)),
- Catchment Management Authority, Melbourne Water as required,
- Department of Health and Human Services (DHHS) as required,
- Department of Environment , Land Water and Planning (DELWP) as required,
- Bureau of Meteorology 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 Municipal Storm and Flood Planning Committee (MSFPC) has responsibility for preparing, reviewing, maintaining and distributing this plan.

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

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

- Following any new flood or stormwater drainage study;
- 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. 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 programs and websites (VICSES and the Municipality) upon formal adoption by Maroondah MEMPC.

VICSES with the support of Maroondah 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 is developed in conjunction with the VICSES local unit. The VICSES local unit leads the delivery of the CEP with support from the Maroondah 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 Flood Emergency Plan (see <https://www.ses.vic.gov.au/em-sector/vicses-emergency-plans>) and Part 3 of 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

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

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

## Part 3. RESPONSE ARRANGEMENTS

### 3.1 Introduction

#### 3.1.1 Activation of Response

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

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

#### 3.1.2 Responsibilities

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

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

#### 3.1.3 Municipal Emergency Coordination Centre (MECC)

Where activated, the function, location, establishment and operation of the MECC will be as detailed in the Maroondah City Council MEMP.

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

#### 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.

Resourcing and event escalation arrangements are described in Part 3 of the EMMV.

## 3.2 State Emergency Management Priorities

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

1. Protection and preservation of life is paramount - this includes:
  - a. Safety of emergency response personnel, and;
  - b. Safety of community members including vulnerable community members and visitors/tourists.
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 assets that considers the cultural, biodiversity, and social values of the environment;

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

## 3.3 Command, Control and Coordination

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

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

### 3.3.1 Control

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

Part 7 of the EMMV prepared under the *Emergency Management Act 1986 (as amended)*, identifies VICSES as the Control Agency for storm and flood. It identifies DELWP as the Control Agency responsible for dam safety as well as water and waste water service disruption related incidents and other emergencies.

All flood response activities within the City of Maroondah 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 Part 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:

- Sunshine ICC
- Dandenong ICC
- Ferntree Gully ICC
- Woori Yallock 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.

Predetermined Divisional Command Locations may include:

- Knox Unit LHQ, 102 Lewis Road, Wantirna South
- Woori Yallock (CFA)

Sector Command locations are allocated on an as needs basis

### **3.3.5 Incident Management Team (IMT)**

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

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

### **3.3.6 Emergency Management Team (EMT)**

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

Organisations required within the EMT (including Maroondah 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 Part 3 of the EMMV for further guidance on EMTs.

### 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 Incident Controller/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](http://www.bom.gov.au));
- Assess Command and Control requirements;
- Review local resources and consider needs for further resources regarding personnel, property protection, storm/flood rescue and air support;
- Notify and brief appropriate officers. This includes RCC (if established), SCC (if established), Council (as outlined in the Maroondah MEMP), other emergency services through the EMT;
- Assess ICC readiness (including staffing of IMT and EMT) and open if required;
- Ensure flood bulletins and community information are prepared and issued to the community;
- Monitor watercourses and undertake reconnaissance of low-lying areas;
- Develop media and community information management strategy;
- Ensure storm and flood mitigation works are being checked by owners;
- Develop and issue incident action plan, if required;
- Develop and issue situation report, if required.

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

VICSES Central Region RDO or the 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 and storm intelligence to assess likely 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; 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 including ensuring that an appropriate warning and community information strategy is implemented including details of:

- The current storm and/or flood situation;
  - Storm and/or Flood predictions;
  - What the consequences of predicted 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 flood situation (see [www.bom.gov.au/vic/flood/](http://www.bom.gov.au/vic/flood/)).
  - Continue to conduct reconnaissance of low-lying areas.

### 3.4 Community Information and Warnings

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

Community information and warnings communication methods available include:

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

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

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

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

Other agencies such as CFA, DEPI 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. Maroondah City Council will work with the IC to ensure that consistent and timely messaging occurs.

### **3.6 Impact assessment**

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

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

### **3.7 Preliminary Deployments**

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

### **3.8 Response to Flash Flooding**

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

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

1. Determine if there are barriers to evacuation by considering warning time, safe routes and resources available;
2. Should evacuation be the adopted strategy it must be supported by public information capability and a rescue contingency plan;
3. Where its likely people will become trapped by floodwaters, safety advice needs to be provided to people at risk advising them not to attempt to flee by entering floodwater if they become trapped, and that it may be safer to seek the highest point within the building and to telephone 000 if they require rescue;
4. For buildings known to be structurally un-suitable 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 Vic Road Website for road closures (<http://alerts.vicroads.vic.gov.au>).

### 3.9 Evacuation

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

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

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

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

VicPol and/or 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 Maroondah Relief and Recovery Sub Plan to the MEMP for guidance on evacuations for flood emergencies.

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

### 3.10 Flood Rescue

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

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

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

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

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

### 3.11 Aircraft Management

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

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

### 3.12 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 and if time permits, VICSES will advise businesses and/or households that they should stock up on essential items.

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

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

### 3.13 Essential Infrastructure and Property Protection

Essential Infrastructure and Property (e.g. roads, utilities, telecommunications 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 Maroondah City Council maintains a small stock of sandbags, back-up supplies are available through the VICSES Regional Headquarters and Maroondah Unit holds approximately 2000 bags.

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. If time permits, requests for supplementary supply should be carried out in line with the Maroondah MEMP

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.

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 C** for specific details of likely disruption to services and proposed arrangements to respond to service disruptions in the City of Maroondah.

### 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.

Levees located alongside Brushy Creek have been identified in **Appendix A**.

### 3.16 Road Closures

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

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

## 3.17 Dam Failure and Landslide

### 3.17.1 Dam Failure

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

No public dams, either in or upstream of the City of Maroondah are expected to affect the Municipality from flooding. Private dams within the Municipality with the potential to cause structural or community damage have been identified within the Maroondah Flood Management Plan. A strategy is in development through the actions of the FMP

### 3.17.2 Landslide

VICSES is the Control Agency for Landslide incidents; VICSES is also 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

There are approximately 200 properties unsewered properties within Maroondah. Some of these properties may be within floodwater during flood and storm events.

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

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

It is the responsibility of the Maroondah Council Environmental Health Team and or EPA to inspect and report on any water quality issues relating to flooding.

General Public Health information and messages are provided by Maroondah City Council and DHHS and may contain information that is relevant prior to, during and following an incident. Information may also be provided in sub plans to the MEMPlan, specific health notifications and, after discussion within the EMT 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. EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS

### 4.1 General

Arrangements for emergency relief and recovery from a storm/flood incident within the City of Maroondah are detailed in the Maroondah City Council MEMP and 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 Maroondah MEMP (ERC Sub plan).

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 4.4 of the EMMV for further information.

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

Details of the relief arrangements are available in the Maroondah MEMPlan.

### 4.3 Animal Welfare

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

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

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

Refer to Maroondah Animal Welfare Plan for further details relating to livestock and companion animals, and to the State Emergency Animal Welfare Plan and Eastern Metro Councils Animal Welfare Plan for detailed arrangements.

### 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 - FLOOD THREATS FOR CITY OF MAROONDAH

## General

Three main waterways flow through Maroondah, Brushy Creek along the north eastern boundary, Mullum Mullum Creek in the west and Dandenong Creek along the southern boundary.

The terrain around Maroondah ranges from moderate to steeply sloping valleys to undulating hills and flatter plains. This can lead to swift flows in steeper areas, with slower flows and water pooling in flatter areas. The absence or blockage of overland flow paths by embankments, residential and industrial development and fencing causes most of the flooding and drainage issues within the City.

Suburbs include Bayswater North, Croydon, Croydon Hills, Croydon North, Croydon South, Heathmont, Kilsyth South, Ringwood, Ringwood East, Ringwood North and Warranwood and parts of Vermont and Wonga Park.

The Municipality contains a mix of residential, commercial and light industrial sites, as well as educational, recreational and community facilities. Scattered through the City are some large wetlands and reserves, many of which function as retarding basins to store and slow flows of stormwater, reducing the pressure on the underground stormwater system.

## Riverine Flooding

Large severe floods generally occur as a result of a moist warm airflow from northern Australia bringing moderate to heavy rainfall over a period of 12 hours or more following a prolonged period of general rainfall. The period of general rainfall “wets up” the catchments and (partially) fills both the on-stream dams and the natural floodplain storage. These combine to increase the runoff generated during the subsequent period of heavy rainfall.

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

## Flash Flooding and Overland Flows

Short Duration, high intensity rainfall (usually associated with thunderstorms) can also cause localised flooding within the municipality along overland flow paths when the local urban drainage system surcharges. Such events, which are mainly confined to the summer months, do not generally create widespread flooding since they only last for a short time and affect limited areas. Flooding from these storms occurs with little warning and localised damage can be severe.

High intensity rainfall such as associated with thunderstorms giving average rainfall rates of more than 20mm/hour for an hour or more is likely to lead to flash flooding and / or overland flows, across the urbanised parts of the municipality.

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

## Description of Major Waterways and Drains

The city of Maroondah lies within the Dandenong and Yarra catchments with a stormwater system composed of natural waterways, drains and channels. Stormwater flows are from Maroondah to Port

Phillip Bay, the northern waterways, drains and channels via the Yarra River and the southern systems via Dandenong creek and Mordialloc Creek at Mordialloc.

There are three main watercourses running through the City of Maroondah:

- Dandenong Creek Upper enters the Municipality downstream of Liverpool Road retarding basin in Boronia and forms the southern boundary of Maroondah, flowing west through Kilsyth South and Bayswater North, receiving tributaries and Old Joes Creek D.S. before receiving flows from Bungalook Creek in Heathmont. Dandenong Creek continues through Heathmont, Ringwood, where it receives Ringwood South D.S and Vermont, receiving Heatherdale Creek before exiting the Municipality at Heatherdale Road.
- Mullum Mullum Creek rises in Ringwood and flows southwest through Ringwood, receiving Beaufort Road Drain and Dublin Road Drain. After receiving Ringwood Lake Drain, flow continues west through Ringwood before entering the City of Manningham where it discharges into the Yarra River.
- Brushy Creek begins in Mooroolbark, entering Maroondah at the confluence of Brushy Creek and Five Ways Drain. The creek continues northwest through Mooroolbark and Croydon, forming the north east boundary of the City and receiving several drains. After crossing under Maroondah Highway, Brushy Creek continues north through Hughes Park, receives Warriem Road Main Drain before entering the City of Manningham near Holloway Road. Flow continues north before discharging into the Yarra River.

Schematics of these river systems can be found in **Appendix G**.

Other waterways and drains within the City of Maroondah are listed in the table below.

Waterway / Drain	Waterway / Drain
Andersons Creek	Glenvale Road Drain
Andersons Creek East Branch	Heatherdale creek
Beaufort Road Drain	Jumping Creek
Brushy Creek (Lower)	Kilsyth Main Drain
Brushy Creek (Upper)	Kilsyth Main Drain D.S.
Brushy Park Road Drain	Kilsyth West D.S.
Bungalook Creek	Kubis Drive Drain
Bungalook Creek (Lower)	Lincoln Road Drain
Bungalook Creek (Upper)	Little Bungalook Creek D.S.
Bungalook Creek D.S.	Mullum Mullum Creek (Upper)
Croydon Main Drain	Palmerston Road Drain
Dandenong Creek (Upper)	Ringwood Lake Drain
Dandenong Creek (Upstream Boronia Road)	Ringwood South D.S.
Dublin Road Drain	Warriem Road Main Drain
Garden Street D.S.	

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

## Flood Mitigation Systems

Flood mitigation in Maroondah has predominantly been developed in the form of seven Retarding Basins and one Levee. No Pumping Stations exist in the Municipality. These flood mitigation systems are as follows in the tables below. To view their locations and connecting waterway/drainage systems, see map B in **Appendix F**.

### Retarding Basins

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Height (Level)	ANCOLD Hazard Rating	Population at Risk (dam breach)	Melway Reference
Canterbury Road	Bungalook Creek (Upper)	5.30 ha	97ML	113.5m AHD	113.5m AHD	3m (113.7m AHD)	High A	Unavailable	51 D11
Colchester Road	Bungalook Creek (Upper)	4.74 ha	72.4ML (at Spillway Level)	117.4m AHD	118.1m AHD	4.0m (119m AHD)	High A	877	51 E12 F11
Croydon Main Drain	Croydon Main Drain	4.03 ha	65.4ML	N/A	103.3m AHD	2.4m (103.3m AHD)	Very Low	Unavailable	50 K6
Jubilee Park	Ringwood South D.S.	2.69 ha	4ML	N/A	98.5m AHD	98.5m AHD	High A	Unavailable	49 H11
Kilsyth Main Drain	Kilsyth Main Drain	13.89 ha	176.4ML	105m AHD	105.8m AHD	2.6m (105.8m AHD)	High A	Unavailable	51 B6
North Ringwood	Andersons Creek	1.01 ha	38.3ML	Stage1-130.5m AHD Stage2-127.8m AHD	Stage 1-130.7m AHD Stage 2-127.9m AHD	Stage 1-131.25m AHD Stage 2-Unavailable	Very Low	Road Itinerants only	49 K1
Ringwood South	Ringwood South D.S.	2.69 ha	25ML	99.5m AHD	100m AHD	2.4m (100.1m AHD)	Medium	500	49 K11

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

A number of reserves and parklands also act as retarding basins during flooding events. These include:

Reserve / Park	On Drain / Waterway	Location	Melway Reference
Naar-Maen Reserve (retarding basin wetlands)	Jumping Creek	Naar- Maen Drive, Croydon Hills	36 E10
B.J. Hubbard Reserve	Glenvale Road Drain	Burlock Avenue, Ringwood North	49 F4
Ringwood Lake Park	Ringwood Lake Drain	Maroondah Highway, Ringwood	49 J8
J.W. Manson Reserve	Wantirna North D.S	Selkirk Ave, Wantirna	63 J3
Schultz Reserve	Wantirna North D.S	Kingloch Parade, Wantirna	63 J6
H.E Parker Reserve	Dandenong Creek (U/S Boronia Road)	Heathmont Road, Heathmont	64 C2
Benson Oval	Croydon Main Drain	Taylor's Road, Croydon	50 K6
Barngeong Reserve	Lincoln Road Drain	Bambra Street, Croydon	37 D10
Jubilee Park	Ringwood South D.S.	Reilly Street, Ringwood	49 H11
Yarrunga Reserve	Jumping Creek	Croydon Hills Drive, Croydon Hills	36 G9

Table A3 – Reserves and Parkland along waterways and drains within the City of Maroondah

Retarding Basins noted below are situated directly adjacent to Maroondah and may provide some flood mitigation effect to the municipality in high intensity, short duration rainfall events

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Height (Level)	ANCOLD Hazard Rating	Population at Risk (dam breach)	Melway Reference
Anderson Creek East	Anderson Creek East Branch	2.42 ha	74ML	95.3m AHD	Unavailable	12m (97m AHD)	Significant	2.3	35 J9
Fussell Road	Bungalook Creek	11.5 ha	302.0ML	151.4m AHD	151.9m AHD	8.5m 152.2m AHD	High A	37	52 A11
Liverpool Road	Dandenong Creek (Upper) Dobsons Creek	18.9 ha	467ML	137m AHD	Unavailable	7.3m (137.8m AHD)	Extreme	6,5	65 G4

Table A4 – Melbourne Water Retarding Basins adjacent to the City of Maroondah

## Levees

Melbourne Water Levee	Reach	Side	Levee Height	Levee Length	Expected Level of Protection	ANCOLD Hazard Rating	Houses at risk behind Levee	Melway Reference
Brushy Creek	Maroondah Highway to Moana Drive	East	1.0m (77.0m AHD)	695m	100yr ARI flood level	Low	2.5	37 D9
Brushy Creek	Maroondah Highway to Barngeong Reserve	West	1.0m (77.0m AHD)	889m	100yr ARI flood level	Very Low	0	37 D9

Table A5 – Levees within or bordering the City of Maroondah

## Sewerage Infrastructure

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

### Sewer Pumping Stations

Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Operator	Location	Melway Reference
Number of unsewered properties around Willaims Road, Ringwood North	Andersons Creek	South	Yarra Valley Water	Williams Road between Athelstane Drive and Warrandyte Road, Ringwood North	49 J2
Glenvale Road Drain	Glenvale Road	-	Yarra Valley Water	Glenvale Road, Ringwood North	49 E3
Jumping Creek	Jumping Creek	West	Yarra Valley Water	Kerry Road, Warranwood	36 E7
Kerry Road Pipe Track	Local Drainage	-	Yarra Valley Water	Pipe Track at extension of Kerry Road, Croydon Hills	36 F7
Lorraine Court	Local Drainage	-	Yarra Valley Water	Easement behind Lorraine Court, Warranwood	35 K8
Quambee Reserve	Anderson Creek East Branch	-	Yarra Valley Water	Quambee Reserve, Ringwood North	36 A11
Warrandyte Road	Andersons Creek	North East	Yarra Valley Water	Warrandyte Road at Anderson Creek Retarding Basin, Ringwood North	49 J1

Table A6 – Sewer Pumping Stations within or close to the City of Maroondah

### Sewer Emergency Relief Points

Contact the Melbourne Water 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
Anderson Creek	North East	Yarra Valley Water	Warrandyte Road at Anderson Creek Retarding Basin, Ringwood North	49 J1
Anderson Creek East Branch	-	Yarra Valley Water	Quambee Reserve, Ringwood North	36 A11
Dandenong Creek	North	Melbourne Water	Ringwood Public Golf Course, Heathmont	63 E3

Glenvale Road Drain	-	Yarra Valley Water	Glenvale Road, Ringwood North	49 E3
Jumping Creek	East	Yarra Valley Water	Kerry Road, Warranwood	36 E7
Local Drainage	-	Yarra Valley Water	Mundara Drive, Ringwood	36 C12

Table A7 – Sewer Emergency Relief Points within or close to the City of Maroondah

## Flood Warning System

Within the City of Maroondah, Melbourne Water has four hydrographic monitoring sites, along Brushy Creek Mullum Mullum Creek and Dandenong Creek. These are outlined in the table below and can be monitored online through Melbourne Water at: <http://www.melbournewater.com.au/waterdata/rainfallandriverleveldata/Pages/Rainfall-and-river-level-new.aspx>. To view their locations, see mapping in **Appendix F**.

Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Brushy Creek at Mooroolbark	229249A	West side of Creek on Diane Cr, Mooroolbark	✓	✓	37 E11
Dandenong Creek at Liverpool Road Retarding Basin	228373A	At the Liverpool Road R/B outlet off Liverpool Road, The Basin	✓	✓	65 F4
Dandenong Creek at Wantirna Road, Wantirna	228357A	South side of the creek 150m east of Wantirna Road, Wantirna	✓	✓	63 H3
Ringwood	586065	Burnt Bridge Tennis Club, Ringwood		✓	50 C3

Table A8 – Hydrographic Monitoring Stations within the City of Maroondah

There are also monitors upstream from Maroondah, on Bungalook Creek at Fussell Road Retarding Basin and downstream along Mullum Mullum Creek in Doncaster East. These gauges of note in adjoining Municipalities are outlined below.

Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Bungalook Creek at Fussell Road Retarding Basin, Montrose	228369A	North bank of the creek, 50m east of R/B embankment	✓	✓	52 A11
Mullum Mullum Creek at Doncaster East	229648A	Eastern side of the Heidelberg-Warrandyte Road bridge, Doncaster East	✓		34 F3

Table A9 – Hydrographic Monitoring Stations within adjacent Municipalities to the City of Maroondah

There are no Flood Class Levels assigned for stream flow gauges within Maroondah.

As the urban surrounds in Maroondah quickly direct stormwater into drains and waterways, the Bureau does not issue formal flood warnings for Brushy Creek, Mullum Mullum Creek or Dandenong Creek due to its rapid response to rainfall and short lead time for response.

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



## Historic Floods

Significant floods (with high flood gauge levels and/or likely flooding consequences to property and infrastructure) to have occurred within the City of Maroondah are as follows in the table below. To view the locations of these floods, see maps in **Appendix F**. It is rare that a storm will affect all catchments in the municipality in the one event except in the most extreme situations. Results below highlighted in black indicate when stream level rise was significant enough to cause flooding along with the associated rainfall; while results in grey indicate stream level rise but unlikely enough to contribute to flooding at or around the gauge location. These results have been included however to show the relationship between these catchments and others that were recorded to indicate flooding.

Where available, radar loops of the storm can be accessed by clicking on the flood event date.

Event	Dandenong Creek at The Basin (228373A)		Dandenong Creek at Wantirna (228357A)		Brushy Creek at Mooroolbark (229249A)		Ringwood (586065)	Mullum Mullum Creek at Doncaster East (229648A)
	Rainfall at Gauge	Creek Level	Rainfall at Gauge	Tide Level	Rainfall at Gauge	Creek Level	Rainfall at Gauge	Creek Level
Normal Water Level		1.0m		0.15m		0.17m		0.2m
<b>Minor Flood Class</b>		Spillway – 5.86m		-		-		-
<b>Moderate Flood Class</b>		1% AEP – 6.05m		-		-		-
<b>Major Flood Class</b>		Embankment – 6.66m		-		-		-
18 <sup>th</sup> September 1984	-	-	-	2.61m	-	-	108mm / 43 hours	3.66m
29 <sup>th</sup> July 1987	-	-	-	1.12m	60mm / 27 hours	<b>3.07m</b>	58mm / 26 hours	2.87m
9 <sup>th</sup> February 1990	-	2.04m	-	2.25m	26mm / 3 hours	2.50m	21mm / 2 hours	1.59m
12 <sup>th</sup> October 1990	53mm / 33 hours	3.08m	-	1.77m	31mm / 19 hours	2.00m	53mm / 21 hours	1.87m
6 <sup>th</sup> July 1991	-	3.25m	-	2.14m	37mm / 16 hours	2.02m	44mm / 17 hours	2.38m
31 <sup>st</sup> December 1991	17mm / 3 hours	1.16m	-	2.55m	21mm / 3 hours	1.51m		2.45m
18 <sup>th</sup> November 1993	-	0.74m	-	1.26m	30mm / 2 hours	2.71m		0.93m
30 <sup>th</sup> July 1996	86mm / 36 hours	<b>4.68m</b>	53mm / 35 hours	2.08m	49mm / 34 hours	1.40m		2.23m
3 <sup>rd</sup> December 2003	20mm / 2 hours	1.15m	49mm / 4 hours	2.32m	7mm / 4 hours	1.19m		<b>3.51m</b>
13 <sup>th</sup> November 2004	59mm / 35 hours	3.28m	52mm / 35 hours	2.33m	52mm / 35 hours	0.93m	48mm / 35 hours	2.98m
3 <sup>rd</sup> February 2005	180mm / 25 hours	4.53m	129mm / 26 hours	2.72m	128mm / 25 hours	-	117mm / 25 hours	3.31m

Event	Dandenong Creek at The Basin (228373A)		Dandenong Creek at Wantirna (228357A)		Brushy Creek at Mooroolbark (229249A)		Ringwood (586065)	Mullum Mullum Creek at Doncaster East (229648A)
	Rainfall at Gauge	Creek Level	Rainfall at Gauge	Tide Level	Rainfall at Gauge	Creek Level	Rainfall at Gauge	Creek Level
Normal Water Level		1.0m		0.15m		0.17m		0.2m
<b>Minor Flood Class</b>		Spillway – 5.86m		-		-		-
<b>Moderate Flood Class</b>		1% AEP – 6.05m		-		-		-
<b>Major Flood Class</b>		Embankment – 6.66m		-		-		-
<a href="#">1<sup>st</sup> December 2010</a>	28mm / 8 hours	1.57m	28mm / 3 hours	2.32m	30mm / 3 hours	2.55m	45mm / 3 hours	2.74m
<a href="#">5<sup>th</sup> February 2011</a>	122mm / 32 hours	4.01m	121mm / 26 hours	<b>2.77m</b>	-	2.87m	121mm / 32 hours	<b>3.75m</b>
<a href="#">10<sup>th</sup> November 2011</a>	75mm / 47 hours	3.01m	48mm / 47 hours	2.46m	29mm / 2 hours	2.85m	70mm / 47 hours	2.83m
<a href="#">27<sup>th</sup> November 2011</a>	57mm / 25 hours	3.42m	48mm / 22 hours	1.86m	48mm / 23 hours	1.50m	49mm / 22 hours	2.17m
<a href="#">2<sup>nd</sup> July 2012</a>	63mm / 38 hours	3.69m	23mm / 19 hours	1.92m	36mm / 23 hours	1.73m	28mm / 17 hours	1.49m
<a href="#">1<sup>st</sup> June 2013</a>	88mm / 14 hours	2.02m	83mm / 14 hours	2.70m	52mm / 11 hours	2.17m	96mm / 11 hours	3.40m
<a href="#">29<sup>th</sup> December 2016</a>	57mm / 2 hours	1.59m	54mm / 2 hours	2.64m	47mm / 2 hours	2.60m	42mm / 2 hours	2.73m
<a href="#">1<sup>st</sup> December 2017</a>	18mm / 1 hour	2.27m	21mm / 1 hour	1.79m	13mm / 1 hour	1.88m	20mm / 1 hour	2.29m
<a href="#">22<sup>nd</sup> March 2019</a>	11mm / 1 hour	1.02m	6mm / 1 hour	0.80m	26mm / 1 hour	2.42m	16mm / 1 hour	1.24m

Table A12 – Selection of Historical Flood Events along Dandenong Creek, Mullum Mullum Creek and Brushy Creek

## Dam Failure

No public dams, either in or upstream of the City of Maroondah are expected to affect the Municipality from flooding. Private dams within the Municipality with the potential to cause structural or community damage have been identified within the Maroondah Flood Management Plan. See Dam Failure in Section 3 of this plan for more information.

## APPENDIX B - TYPICAL FLOOD PEAK TRAVEL TIMES

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

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

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

### Typical Travel Times

Location From (gauge)	Location To (gauge)	Typical Travel Time	Flood Class	Comments
<b>BRUSHY CREEK</b>				
Mooroolbark	Warrandyte	Between 5 and 9 hours	Minor Flood at Warrandyte	Inflows from Yarra River upstream of the Brushy Creek confluence likely impact on travel time.
Mooroolbark	Warrandyte	Unavailable	Moderate Flood at Warrandyte	
Mooroolbark	Warrandyte	Unavailable	Major Flood at Warrandyte	
<b>DANDENONG CREEK</b>				
The Basin	Wantirna	Between -2 and -15 hours	-	Wantirna likely to peak before The Basin due to the Liverpool Road Retarding Basin at The Basin

Table B1 – Typical Flood Travel Times between gauges on Brushy Creek and Dandenong Creek

## Historical Travel Times

Flood Event	Location From (gauge)	Location To (gauge)	Flood Peak Travel Time	Flood Class at
<b>BRUSHY CREEK</b>				<b>WARRANDYTE</b>
29 <sup>th</sup> July 1987	Mooroolbark	Warrandyte	7 hours	Minor
5 <sup>th</sup> February 2011	Mooroolbark	Warrandyte	5 hours	Minor
10 <sup>th</sup> November 2011	Mooroolbark	Warrandyte	9 hours	Below Minor
29 <sup>th</sup> December 2016	Mooroolbark	Warrandyte	9 hours	Below Minor
22 <sup>nd</sup> March 2019	Mooroolbark	Warrandyte	15 hours	Below Minor
<b>DANDENONG CREEK</b>				<b>ROWVILLE</b>
12 <sup>th</sup> October 1990	The Basin	Wantirna	Wantirna peaked 13 hours before The Basin	Minor
6 <sup>th</sup> July 1991	The Basin	Wantirna	Wantirna peaked 6 hours before The Basin	Moderate
31 <sup>st</sup> December 1991	The Basin	Wantirna	Wantirna peaked 15 hours before The Basin	Minor
30 <sup>th</sup> July 1996	The Basin	Wantirna	Wantirna peaked 8 hours before The Basin	Moderate
13 <sup>th</sup> November 2004	The Basin	Wantirna	Wantirna peaked 4 hours before The Basin	Minor
3 <sup>rd</sup> February 2005	The Basin	Wantirna	Wantirna peaked 2 hours before The Basin	Major
5 <sup>th</sup> February 2011	The Basin	Wantirna	Wantirna peaked 6 hours before The Basin	Moderate
10 <sup>th</sup> November 2011	The Basin	Wantirna	Wantirna peaked 8 hours before The Basin	Below Minor
27 <sup>th</sup> November 2011	The Basin	Wantirna	Wantirna peaked 11 hours before The Basin	Minor
2 <sup>nd</sup> July 2012	The Basin	Wantirna	Wantirna peaked 6 hours before The Basin	Below Minor
1 <sup>st</sup> June 2013	The Basin	Wantirna	Wantirna peaked 6 hours before The Basin	Minor
29 <sup>th</sup> December 2016	The Basin	Wantirna	Wantirna peaked 3 hours before The Basin	Below Minor
<b>MULLUM MULLUM CREEK</b>				<b>TEMPLESTOWE</b>
18 <sup>th</sup> September 1984	Doncaster East	Templestowe	5 hours	Minor
3 <sup>rd</sup> December 2003	Doncaster East	Templestowe	1 hour	Below Minor
3 <sup>rd</sup> February 2005	Doncaster East	Templestowe	7 hours	Moderate
5 <sup>th</sup> February 2011	Doncaster East	Templestowe	2 hours	Minor
1 <sup>st</sup> June 2013	Doncaster East	Templestowe	2 hours	Below Minor

Table B2 – Historical Flood Travel Times between gauges on the Brushy, Dandenong and Mullum Mullum Creeks

# APPENDIX C1 – BRUSHY CREEK 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 Brushy Creek and its Stormwater Tributaries

Property					
<b>Properties</b>	<b>64</b>				
Residential	63	Along Warrien Road Main Drain and Lincoln Road Drain			
Commercial	0				
Industrial	0				
Public Land	1	Park next to Croydon North Kindergarten			
Rural	0				
Community Infrastructure					
Health Facilities	0		Child Care / Kindergartens	1	Croydon North Kindergarten
Care Facilities	1	Park Lane Croydon	Community Venues	0	
Retirement Villages	0		Places of Worship	0	
Schools / Colleges	1	Village School (Primary)	Prisons	0	
Essential Infrastructure					
Major Roads	0		Police Stations	0	
Major Rail	0		Government Buildings	0	
Bus Routes	1	664	Sewerage Facilities	0	
Power Facility	0		Levees	1	Lee Ann Crescent, Croydon
Comms Services	0		Drainage Facilities	0	
Emergency Services	0		Airports / Airfields	0	
Tourism / Recreation					
Sports Facilities	0		Caravan Parks	0	
Recreation Facilities	0		Camping Grounds	0	
Government Boundaries					
Local Gov't Areas	1	Maroondah	CMA	1	Port Phillip & Westport
Adjacent LGAs	2	Manningham and Yarra Ranges	CFA District	0	
SES Unit Area	1	Maroondah	MFB District	1	Eastern

Table C1.1 – Consequence Summary of 1% AEP flood along Brushy Creek in City of Maroondah

Brushy Creek forms part of the north eastern boundary of Maroondah, with flows from the Creek and its associated drains passing through Croydon and Croydon North, entering the Yarra River in the City of Manningham. Flows along the Yarra River can have a great impact on the ability of waters from Brushy Creek to enter the Yarra.

Levees alongside Brushy Creek from Maroondah Highway to Barnggeong Reserve, Croydon mitigate much of the potential riverine flooding impacts.

High intensity, short duration rainfall events can cause local flash flooding in Croydon and Croydon South, particularly around Lincoln Road Drain and Warriern Road Main Drain affecting residences and public land.

## Warning Times

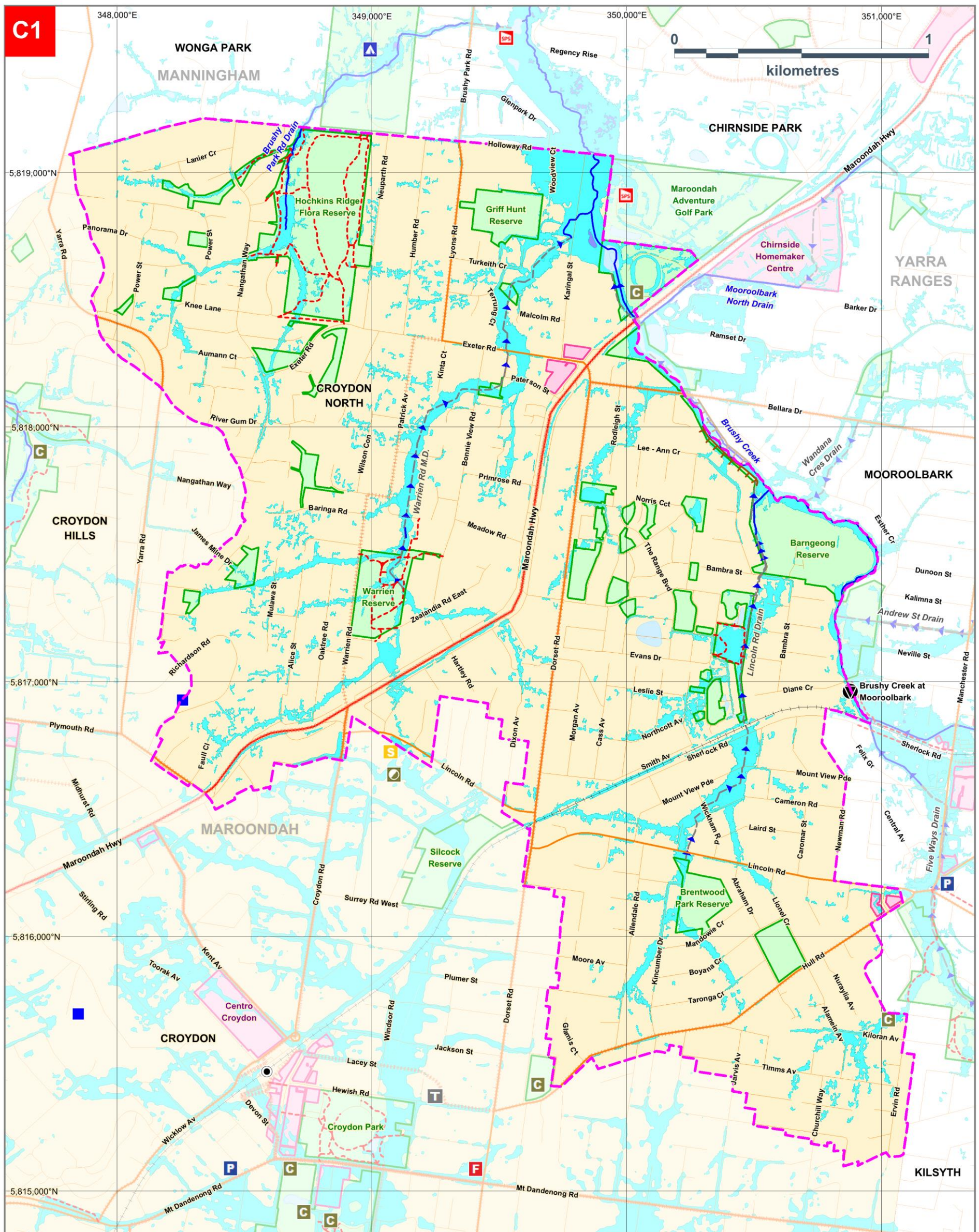
Whilst there are hydrographic/telemetry stations (river gauges) within the municipality, Melbourne Water does not provide any flood warning service at this point, due to the generally short warning times available.

Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Brushy Creek at Mooroolbark	229249A	West side of Creek on Diane Cr, Mooroolbark	✓	✓	37 E11

Table C1.2 – Hydrographic Monitoring Stations within the Brushy 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/rainfallandriverveldata/Pages/Rainfall-and-river-level-new.aspx>. It is advised that residents monitor the Bureau of Meteorology's website <http://www.bom.gov.au/> and the VicEmergency website <https://emergency.vic.gov.au/> for any thunderstorm, flood or severe weather warnings present for their area.

# Areas of Flood Risk



Map Produced by VICSES August 2019

## CITY OF MAROONDAH

Version 3. August 2019

### C1. Areas of flood risk around Brushy Creek

- |                              |                                  |                      |
|------------------------------|----------------------------------|----------------------|
| Waterbody                    | Boundary for this Appendix       | Telephone Exchange   |
| 1% AEP Riverine Flood Extent | Melbourne Water Stormwater Drain | Municipal Depot      |
| 1% AEP Flash Flood Extent    | Creek / Channel                  | Community Centre     |
| Reserve / Park               | Bicycle / Walking Trail          | Police Station       |
| Commercial Precinct          | State Emergency Service          | Rain Gauge           |
| Bus Route (PTV)              | Fire Station                     | Stream Level Gauge   |
| Levee                        | Sewer Pumping Station            | Retail Water Storage |



N

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

Figure C1 – Areas of flood risk around along Brushy Creek and its stormwater tributaries in the City of Maroondah

## Properties at Flood Risk

Properties listed in the table below are at risk from flooding along Brushy Creek and its stormwater tributaries. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Maroondah Flood Mapping (Engeny, February 2019) and the Maroondah Municipal Flood Modelling (Engeny, October 2013) 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. 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 at risk from Flooding over-floor along Brushy Creek and its stormwater tributaries in Maroondah						
Residential			Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event			Address	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
	✓	✓	5 Arkarra Court	Croydon North	Warrien Road M.D.	Flash
	✓	✓	14 Arkarra Court	Croydon North	Warrien Road M.D.	Flash
	✓	✓	88-90 Bonnie View Road	Croydon North	Warrien Road M.D.	Flash
		✓	1/101 Bonnie View Road	Croydon North	Warrien Road M.D.	Flash
		✓	103 Bonnie View Road	Croydon North	Warrien Road M.D.	Flash
		✓	5 Collins Grove	Croydon North	Warrien Road M.D.	Flash
		✓	7 Collins Grove	Croydon North	Warrien Road M.D.	Flash
		✓	44 Exeter Road	Croydon North	Warrien Road M.D.	Flash
		✓	47 Exeter Road	Croydon North	Warrien Road M.D.	Flash
		✓	49 Exeter Road	Croydon North	Warrien Road M.D.	Flash
	✓	✓	2/51 Exeter Road	Croydon North	Warrien Road M.D.	Flash
		✓	53 Exeter Road	Croydon North	Warrien Road M.D.	Flash
		✓	8 Gerard Court	Croydon North	Warrien Road M.D.	Flash
		✓	9 Gerard Court	Croydon North	Warrien Road M.D.	Flash
		✓	6/33-37 Karingal Street	Croydon North	Warrien Road M.D.	Flash
		✓	4/39 Karingal Street	Croydon North	Warrien Road M.D.	Flash
		✓	6/39 Karingal Street	Croydon North	Warrien Road M.D.	Flash
		✓	7/39 Karingal Street	Croydon North	Warrien Road M.D.	Flash
		✓	10/41-45 Karingal Street	Croydon North	Warrien Road M.D.	Flash
		✓	11/41-45 Karingal Street	Croydon North	Warrien Road M.D.	Flash
		✓	12/41-45 Karingal Street	Croydon North	Warrien Road M.D.	Flash
		✓	13/41-45 Karingal Street	Croydon North	Warrien Road M.D.	Flash
		✓	17/41-45 Karingal Street	Croydon North	Warrien Road M.D.	Flash
		✓	19/41-45 Karingal Street	Croydon North	Warrien Road M.D.	Flash
	✓	✓	9 Kinta Court	Croydon North	Warrien Road M.D.	Flash
	✓	✓	10 Kinta Court	Croydon North	Warrien Road M.D.	Flash
		✓	4 Malcolm Court	Croydon North	Warrien Road M.D.	Flash
		✓	5 Malcolm Court	Croydon North	Warrien Road M.D.	Flash
		✓	9 Malcolm Court	Croydon North	Warrien Road M.D.	Flash



Properties at risk from Flooding over-floor along Brushy Creek and its stormwater tributaries in Maroondah						
Residential			Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event			Address	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
		✓	10 Malcolm Court	Croydon North	Warrien Road M.D.	Flash
		✓	72 Mount View Parade	Croydon	Lincoln Road Drain	Flash
	✓	✓	81 Mount View Parade	Croydon	Lincoln Road Drain	Flash
		✓	1/14 Paterson Street	Croydon North	Warrien Road M.D.	Flash
✓	✓	✓	2/14 Paterson Street	Croydon North	Warrien Road M.D.	Flash
✓	✓	✓	3/14 Paterson Street	Croydon North	Warrien Road M.D.	Flash
	✓	✓	2/16 Paterson Street	Croydon North	Warrien Road M.D.	Flash
✓	✓	✓	3/16 Paterson Street	Croydon North	Warrien Road M.D.	Flash
	✓	✓	1/6 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	7/6 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	8/6 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	1/30-32 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	2/30-32 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	3/30-32 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	4/30-32 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	5/30-32 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	6/30-32 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	7/30-32 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
	✓	✓	8/30-32 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
		✓	5/42 Patrick Avenue	Croydon North	Warrien Road M.D.	Flash
		✓	12 Penrose Court	Croydon North	Warrien Road M.D.	Flash
		✓	62 Sherlock Road	Croydon	Lincoln Road Drain	Flash
		✓	64 Sherlock Road	Croydon	Lincoln Road Drain	Flash
		✓	1/66 Sherlock Road	Croydon	Lincoln Road Drain	Flash
		✓	1 Susans Court	Croydon North	Warrien Road M.D.	Flash
	✓	✓	2 Susans Court	Croydon North	Warrien Road M.D.	Flash
		✓	1 Terrung Court	Croydon North	Warrien Road M.D.	Flash
	✓	✓	2 Terrung Court	Croydon North	Warrien Road M.D.	Flash
	✓	✓	3 Terrung Court	Croydon North	Warrien Road M.D.	Flash
<b>Totals</b>						
<b>3</b>	<b>25</b>	<b>64</b>				

Table C1.3 – Properties at risk of flooding in the Brushy Creek catchment in the City of Maroondah

## Isolation

No major isolation risks exist for areas around Croydon and Croydon North. 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 Maroondah is available via the website at: [https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29\\_Maroondah\\_LAM.pdf](https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29_Maroondah_LAM.pdf)

Apart from the roads outlined below, all other essential infrastructure and services areas around Croydon and Croydon North are expected to remain predominantly dry during an intense rainfall event.

## Road Closures

The following roads are subject to closure during flooding around Croydon and Croydon North. Check the VicRoads website for more details: <https://traffic.vicroads.vic.gov.au/>

VicRoads Roads likely flooded in a 1% AEP (100yr ARI) event	
<ul style="list-style-type: none"> <li>• Nil</li> </ul>	

Table C1.4 – VicRoads Possible Road Closures during a flooding event

Maroondah City Council Roads affected in a 1% AEP event			
CROYDON	<ul style="list-style-type: none"> <li>• Gretel Court</li> </ul>	CROYDON NORTH	<ul style="list-style-type: none"> <li>• Paterson Street</li> </ul>
<ul style="list-style-type: none"> <li>• Allendale Road</li> </ul>	<ul style="list-style-type: none"> <li>• Lee Ann Crescent</li> </ul>	<ul style="list-style-type: none"> <li>• Arkarra Court</li> </ul>	<ul style="list-style-type: none"> <li>• Susans Court</li> </ul>
<ul style="list-style-type: none"> <li>• Bambra Street</li> </ul>	<ul style="list-style-type: none"> <li>• Mandowie Crescent</li> </ul>	<ul style="list-style-type: none"> <li>• Bonnie View Road</li> </ul>	<ul style="list-style-type: none"> <li>• Terrung Court</li> </ul>
<ul style="list-style-type: none"> <li>• Bellara Drive</li> </ul>	<ul style="list-style-type: none"> <li>• Mount View Parade</li> </ul>	<ul style="list-style-type: none"> <li>• Exeter Road</li> </ul>	<ul style="list-style-type: none"> <li>• Woodview Court</li> </ul>
<ul style="list-style-type: none"> <li>• Cameron Road</li> </ul>	<ul style="list-style-type: none"> <li>• Sherlock Road</li> </ul>	<ul style="list-style-type: none"> <li>• Holloway Road</li> </ul>	
<ul style="list-style-type: none"> <li>• Diane Crescent</li> </ul>	<ul style="list-style-type: none"> <li>• Wickham Road</li> </ul>	<ul style="list-style-type: none"> <li>• Karingal Street</li> </ul>	

Table C1.5 – Maroondah City Council Possible Road Closures during a flooding event

## Flood Mitigation

### Retarding Basins

No formal Retarding Basins exist around Croydon and Croydon North in the City of Maroondah.

### Levees

Melbourne Water Levee	Reach	Side	Levee Height	Levee Length	Expected Level of Protection	ANCOLD Hazard Rating	Houses at risk behind Levee	Melway Reference
Brushy Creek	Maroondah Highway to Moana Drive	East	1.0m (77.0m AHD)	695m	100yr ARI flood level	Low	2.5	37 D9
Brushy Creek	Maroondah Highway to Barnggeong Reserve	West	1.0m (77.0m AHD)	889m	100yr ARI flood level	Very Low	0	37 D9

Table C1.6 – Melbourne Water Levees in the Brushy Creek Catchment in or bordering the City of Maroondah

### Sewerage Infrastructure

There is no sewerage Infrastructure expected to impact or be impacted by floodwaters during severe flood events within the Brushy Creek catchment in Maroondah.

### 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 Brushy Creek and its stormwater tributaries at various creek heights or rain totals within Maroondah. 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:

- Brushy Creek at Mooroolbark
- Brushy Creek Stormwater Tributaries at Croydon & Croydon North

# FLOOD INTELLIGENCE CARD – MOOROOLBARK GAUGE, BRUSHY CREEK

Version 3 – August 2019



*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	West side of Creek on Diane Crescent, Mooroolbark
MELWAY REFERENCE:	37 E11
STREAM:	Brushy Creek
GAUGE NUMBER:	229249A
GAUGE ZERO:	79.95m AHD
GAUGE TYPE	Stream Level and Rain

MINOR:	Not Established
MODERATE:	Not Established
MAJOR	Not Established
LEVEE HEIGHT:	3.40m
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	3.07m (29 <sup>th</sup> July 1987)

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Consideration
2.34m	20% AEP (5yr ARI) Flood Level	<p><b>Properties at Flood Risk</b></p> <ul style="list-style-type: none"> <li>Properties on Woodview Court, Croydon North</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>Village School (Primary), Holloway Road, Croydon North (flooding to grounds and driveway)</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <ul style="list-style-type: none"> <li>Holloway Road, Croydon North</li> <li>Karingal Street, Croydon North</li> <li>Woodview Court, Croydon North</li> </ul>	
2.48m	10% AEP (10yr ARI) Flood Level	<p><b>Properties at Flood Risk</b></p> <ul style="list-style-type: none"> <li>Properties on Woodview Court, Croydon North</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>Village School (Primary), Holloway Road, Croydon North (flooding to grounds and driveway)</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <ul style="list-style-type: none"> <li>Holloway Road, Croydon North</li> <li>Karingal Street, Croydon North</li> <li>Woodview Court, Croydon North</li> </ul>	

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Consideration
2.50m	5% AEP (20yr ARI) Flood Level	<p><b>Properties at Flood Risk</b></p> <ul style="list-style-type: none"> <li>Properties on Woodview Court, Croydon North</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>Village School (Primary), Holloway Road, Croydon North (flooding to grounds and driveway)</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <ul style="list-style-type: none"> <li>Holloway Road, Croydon North</li> <li>Karingal Street, Croydon North</li> <li>Woodview Court, Croydon North</li> </ul>	
2.55m	2% AEP (50yr ARI) Flood Level	<p><b>Properties at Flood Risk</b></p> <ul style="list-style-type: none"> <li>Properties on Woodview Court, Croydon North</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>Village School (Primary), Holloway Road, Croydon North (flooding to grounds and driveway)</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <ul style="list-style-type: none"> <li>Diane Crescent, Croydon</li> <li>Holloway Road, Croydon North</li> <li>Karingal Street, Croydon North</li> <li>Woodview Court, Croydon North</li> </ul>	
2.93m	1% AEP (100yr ARI) Flood Level	<p><b>Properties at Flood Risk</b></p> <ul style="list-style-type: none"> <li>Properties on Woodview Court, Croydon North</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>Village School (Primary), Holloway Road, Croydon North (flooding to grounds and driveway)</li> </ul> <p><b>Essential Infrastructure Likely Impacted</b></p> <ul style="list-style-type: none"> <li>Levee height adjacent to Lee Ann Crescent, Croydon reached</li> <li>Bus Route 664 along Bellara Drive, Croydon</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <p><b>Brushy Creek</b></p> <ul style="list-style-type: none"> <li>Bellara Drive, Croydon</li> <li>Diane Crescent, Croydon</li> <li>Holloway Road, Croydon North</li> <li>Karingal Street, Croydon North</li> <li>Lee Ann Crescent, Croydon (localised flooding likely not from flows down Brushy Creek but from stormwater backing up around levees.)</li> <li>Woodview Court, Croydon North</li> </ul>	<p>VICSES to respond on a request by request basis.</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>

Table C1.7 – Breakdown of likely consequences at various Mooroolbark gauge level heights along Brushy Creek in Maroondah with operational considerations

# FLOOD INTELLIGENCE CARD – BRUSHY CREEK’S STORMWATER TRIBUTARIES (UNGAUGED)

Version 3 – August 2019



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	<b>Brushy Creek at Mooroolbark</b>
LOCATION	<b>West side of Creek on Diane Crescent, Mooroolbark</b>
MELWAY REF:	<b>37 E11</b>

GAUGE NUMBER	<b>229249A</b>
GAUGE TYPE	<b>Rain</b>
TELEMETRIC/MANUAL	<b>Telemetric</b>

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)	<b>Properties at Flood Risk (Over-Floor)</b> <b>3 Properties in Total</b> <b>Warrien Road M.D.</b> <ul style="list-style-type: none"> <li>2/14, 3/14 &amp; 3/16 Paterson Street, Croydon North</li> </ul>	VICSES will provide warnings using EM-COP and SMSER to Maroondah Council and VICSES units and appropriate agencies and as required based on the predictions provided by BoM regarding flood levels and the risk of Flash Flooding. The VICSES Central Duty Officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident
13mm in 10 mins; 21mm in 30 mins; 27mm in 1 hour; 33mm in 2 hours; 38mm in 3 hours; or 49mm in 6 hours  Note: rainfall depths are a	10% AEP (10 year ARI)	<b>Properties at Flood Risk (Over-Floor)</b> <b>8 Properties in Total</b> <b>Warrien Road M.D.</b> <ul style="list-style-type: none"> <li>5 &amp; 14 Arkarra Court, Croydon North</li> <li>2/14, 3/14 &amp; 3/16 Paterson Street, Croydon North</li> <li>8/6 Patrick Avenue, Croydon North</li> <li>3 &amp; 6 Terrung Court, Croydon North</li> </ul> <b>Community Infrastructure Likely Flooded</b>	VICSES will provide warnings using EM-COP and SMSER to Maroondah Council and VICSES units and appropriate agencies and as required based on the predictions provided by BoM regarding flood levels and the risk of Flash Flooding. The VICSES Central Duty Officer in conjunction with the Regional Agency Commander will maintain operational awareness and

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>		<p><b>Warrien Road Main Drain</b></p> <ul style="list-style-type: none"> <li>Croydon North Kindergarten, 90 Bonnie View Road, Croydon North</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <p><b>Warrien Road Main Drain</b></p> <ul style="list-style-type: none"> <li>Arkarra Court, Croydon North</li> </ul>	<p>form an appropriate response arrangement to suit the level of incident</p>
<p>15mm in 10 mins; 25mm in 30 mins; 31mm in 1 hour; 38mm in 2 hours; 43mm in 3 hours; or 56mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>5% AEP (20 year ARI)</p>	<p><b>Properties at Flood Risk (Over-Floor)</b></p> <p><b>25 Properties in Total</b></p> <p><b>Lincoln Road Drain</b></p> <ul style="list-style-type: none"> <li>81 Mount View Parade, Croydon</li> </ul> <p><b>Warrien Road M.D.</b></p> <ul style="list-style-type: none"> <li>5 &amp; 14 Arkarra Court, Croydon North</li> <li>88-90 Bonnie View Road, Croydon North</li> <li>2/51 Exeter Road, Croydon North</li> <li>9 &amp; 10 Kinta Court, Croydon North</li> <li>2/14, 3/14, 2/16 &amp; 3/16 Paterson Street, Croydon North</li> <li>1/6, 7/6, 8/6, 1/30-32, 2/30-32, 3/30-32, 4/30-32, 5/30-32, 6/30-32, 7/30-32 &amp; 8/30-32 Patrick Avenue, Croydon North</li> <li>2 Susans Court, Croydon North</li> <li>2, 3, 5 &amp; 6 Terrung Court, Croydon North</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <p><b>Warrien Road Main Drain</b></p> <ul style="list-style-type: none"> <li>Croydon North Kindergarten, 90 Bonnie View Road, Croydon North</li> </ul> <p><b>Water Over Road</b></p> <p><b>Lincoln Road Drain</b></p> <ul style="list-style-type: none"> <li>Mount View Parade, Croydon</li> <li>Sherlock Road, Croydon</li> </ul> <p><b>Warrien Road Main Drain</b></p> <ul style="list-style-type: none"> <li>Arkarra Court, Croydon North</li> <li>Bonnie View Road, Croydon North</li> <li>Exeter Road, Croydon North</li> <li>Paterson Street, Croydon North</li> <li>Terrung Court, Croydon North</li> </ul>	<p>VICSES will provide warnings using EM-COP and SMSER to Maroondah Council and VICSES units and appropriate agencies and as required based on the predictions provided by BoM regarding flood levels and the risk of Flash Flooding. The VICSES Central Duty Officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident</p>

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>18mm in 10 mins; 30mm in 30 mins; 36mm in 1 hour; 44mm in 2 hours; 50mm in 3 hours; or 66mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>2% AEP (50 year ARI)</p>	<p><b>Properties at Flood Risk (Over-Floor)</b></p> <p><b>62 Properties in Total</b></p> <p><b>Lincoln Road Drain</b></p> <ul style="list-style-type: none"> <li>72 &amp; 81 Mount View Parade, Croydon</li> <li>62, 64 &amp; 1/66 Sherlock Road, Croydon</li> <li>9, 9 &amp; 1/16 Wickham Road, Croydon</li> </ul> <p><b>Warrien Road M.D.</b></p> <ul style="list-style-type: none"> <li>5 &amp; 14 Arkarra Court, Croydon North</li> <li>88-90, 1/101 &amp; 103 Bonnie View Road, Croydon North</li> <li>5 &amp; 7 Collins Grove, Croydon North</li> <li>44, 47, 49, 2/51 &amp; 53 Exeter Road, Croydon North</li> <li>8 &amp; 9 Gerard Court, Croydon North</li> <li>6/33-37, 4/39, 6/39, 7/39, 10/41-45, 11/41-45, 12/41-45, 13/41-45 &amp; 17/41-45 Karingal Street, Croydon North</li> <li>9 &amp; 10 Kinta Court, Croydon North</li> <li>4, 5, 9 &amp; 10 Malcolm Court, Croydon North</li> <li>1/14, 2/14, 3/14, 2/16 &amp; 3/16 Paterson Street, Croydon North</li> <li>1/6, 7/6, 8/6, 1/30-32, 2/30-32, 3/30-32, 4/30-32, 5/30-32, 6/30-32, 7/30-32, 8/30-32 &amp; 5/42 Patrick Avenue, Croydon North</li> <li>1 &amp; 2 Susans Court, Croydon North</li> <li>1, 2, 3, 4, 5 &amp; 6 Terrung Court, Croydon North</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <p><b>Warrien Road Main Drain</b></p> <ul style="list-style-type: none"> <li>Croydon North Kindergarten, 90 Bonnie View Road, Croydon North</li> </ul> <p><b>Water Over Road</b></p> <p><b>Lincoln Road Drain</b></p> <ul style="list-style-type: none"> <li>Cameron Road, Croydon</li> <li>Mount View Parade, Croydon</li> <li>Sherlock Road, Croydon</li> <li>Wickham Road, Croydon</li> </ul> <p><b>Warrien Road Main Drain</b></p> <ul style="list-style-type: none"> <li>Arkarra Court, Croydon North</li> <li>Bonnie View Road, Croydon North</li> <li>Exeter Road, Croydon North</li> <li>Paterson Street, Croydon North</li> <li>Susans Court, Croydon North</li> <li>Terrung Court, Croydon North</li> </ul>	<p>VICSES to respond to RFAs on a request by request basis</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>



Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>21mm in 10 mins; 33mm in 30 mins; 40mm in 1 hour; 49mm in 2 hours; 56mm in 3 hours; or 74mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>1% AEP (100 year ARI)</p>	<p><b>Properties at Flood Risk (Over-Floor)</b></p> <p><b>64 Properties in Total</b></p> <p><b>Lincoln Road Drain</b></p> <ul style="list-style-type: none"> <li>72 &amp; 81 Mount View Parade, Croydon</li> <li>62, 64 &amp; 1/66 Sherlock Road, Croydon</li> <li>9, 9 &amp; 1/16 Wickham Road, Croydon</li> </ul> <p><b>Warrien Road M.D.</b></p> <ul style="list-style-type: none"> <li>5 &amp; 14 Arkarra Court, Croydon North</li> <li>88-90, 1/101 &amp; 103 Bonnie View Road, Croydon North</li> <li>5 &amp; 7 Collins Grove, Croydon North</li> <li>44, 47, 49, 2/51 &amp; 53 Exeter Road, Croydon North</li> <li>8 &amp; 9 Gerard Court, Croydon North</li> <li>6/33-37, 4/39, 6/39, 7/39, 10/41-45, 11/41-45, 12/41-45, 13/41-45, 17/41-45 &amp; 19/41-45 Karingal Street, Croydon North</li> <li>9 &amp; 10 Kinta Court, Croydon North</li> <li>4, 5, 9 &amp; 10 Malcolm Court, Croydon North</li> <li>1/14, 2/14, 3/14, 2/16 &amp; 3/16 Paterson Street, Croydon North</li> <li>1/6, 7/6, 8/6, 1/30-32, 2/30-32, 3/30-32, 4/30-32, 5/30-32, 6/30-32, 7/30-32 &amp; 8/30-32 Patrick Avenue, Croydon North</li> <li>12 Penrose Court, Croydon North</li> <li>1 &amp; 2 Susans Court, Croydon North</li> <li>1, 2, 3, 4, 5 &amp; 6 Terrung Court, Croydon North</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <p><b>Warrien Road Main Drain</b></p> <ul style="list-style-type: none"> <li>Croydon North Kindergarten, 90 Bonnie View Road, Croydon North</li> <li>Park Lane Croydon Aged Care, 295 Maroondah Highway, Croydon</li> </ul> <p><b>Water Over Road</b></p> <p><b>Lincoln Road Drain</b></p> <ul style="list-style-type: none"> <li>Allendale Road, Croydon</li> <li>Bambra Street, Croydon</li> <li>Cameron Road, Croydon</li> <li>Gretel Court, Croydon</li> <li>Mandowie Crescent, Croydon</li> <li>Mount View Parade, Croydon</li> <li>Sherlock Road, Croydon</li> <li>Wickham Road, Croydon</li> </ul> <p><b>Warrien Road Main Drain</b></p> <ul style="list-style-type: none"> <li>Arkarra Court, Croydon North</li> <li>Bonnie View Road, Croydon North</li> </ul>	<p>VICSES to respond to RFAs on a request by request basis</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>

Design Rainfall Depths (mm) – <i>Indication of Possible Flooding</i>	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> <li>• Exeter Road, Croydon North</li> <li>• Gerard Court, Croydon North</li> <li>• Paterson Street, Croydon North</li> <li>• Susans Court, Croydon North</li> <li>• Terrung Court, Croydon North</li> </ul>	

Table C1.8 – Breakdown of possible consequences at various rainfall intensities around Brushy Creek’s stormwater tributaries with operational considerations

# APPENDIX C2 – MULLUM MULLUM CREEK 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 within the Mullum Mullum Creek catchment in Maroondah

Property					
<b>Properties</b>	<b>19</b>				
Residential	18				
Commercial	0				
Industrial	0				
Public Land	1	Burnt Bridge Tennis Club			
Rural	0				
Community Infrastructure					
Health Facilities	0		Child Care / Kindergartens	1	Discovery Childcare & Education
Care Facilities	0		Community Venues	0	
Retirement Villages	1	Cherrytree Grove	Places of Worship	0	
Schools / Colleges	0		Prisons	0	
Essential Infrastructure					
Major Roads	1	Maroondah Hwy at 3 separate locations	Police Stations	0	
Major Rail	0		Government Buildings	0	
Bus Routes	2	670 & 684 along Maroondah Hwy in Croydon	Sewerage Facilities	2	1 Pumping Station; & 1 Emergency Relief Point
Power Facility	0		Levees	0	
Comms Services	0		Drainage Facilities	0	
Emergency Services	0		Airports / Airfields	0	
Tourism / Recreation					
Sports Facilities	1	Burnt Bridge Tennis Club	Caravan Parks	0	
Recreation Facilities	1	Mullum Mullum Creek Trail	Camping Grounds	0	
Government Boundaries					
Local Gov't Areas	1	Maroondah	CMA	1	Port Phillip & Westernport
Adjacent LGAs	1	Manningham	CFA District	0	
SES Unit Area	1	Maroondah	MFB District	1	Eastern

Table C2.1 – Consequence Summary of 1% AEP flood along Mullum Mullum Creek and its stormwater Tributaries in Maroondah

Mullum Mullum Creek passes through the central west of Maroondah, with the creek and its associated drains passing through Croydon, Ringwood and Ringwood East before entering the City of Manningham and joining the Yarra River.

High intensity, short duration rainfall events can cause flash flooding in Croydon, Ringwood and Ringwood East, affecting roads and properties in the flow path. Prolonged rainfall may cause Mullum Mullum Creek to flood.

## Warning Times

Whilst there are hydrographic/telemetry stations (river gauges) on other waterways within the municipality, there are none on Mullum Mullum Creek within Maroondah, though a rain gauge is present in Ringwood at Burnt Bridge Tennis Club. Melbourne Water does not provide any flood warning service at this point, due to the generally short warning times available.

Melbourne Water Hydrographic Monitoring Station	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
Ringwood	586065	Burnt Bridge Tennis Club, Ringwood		✓	50 C3

Table C2.2 – Hydrographic Monitoring Stations 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

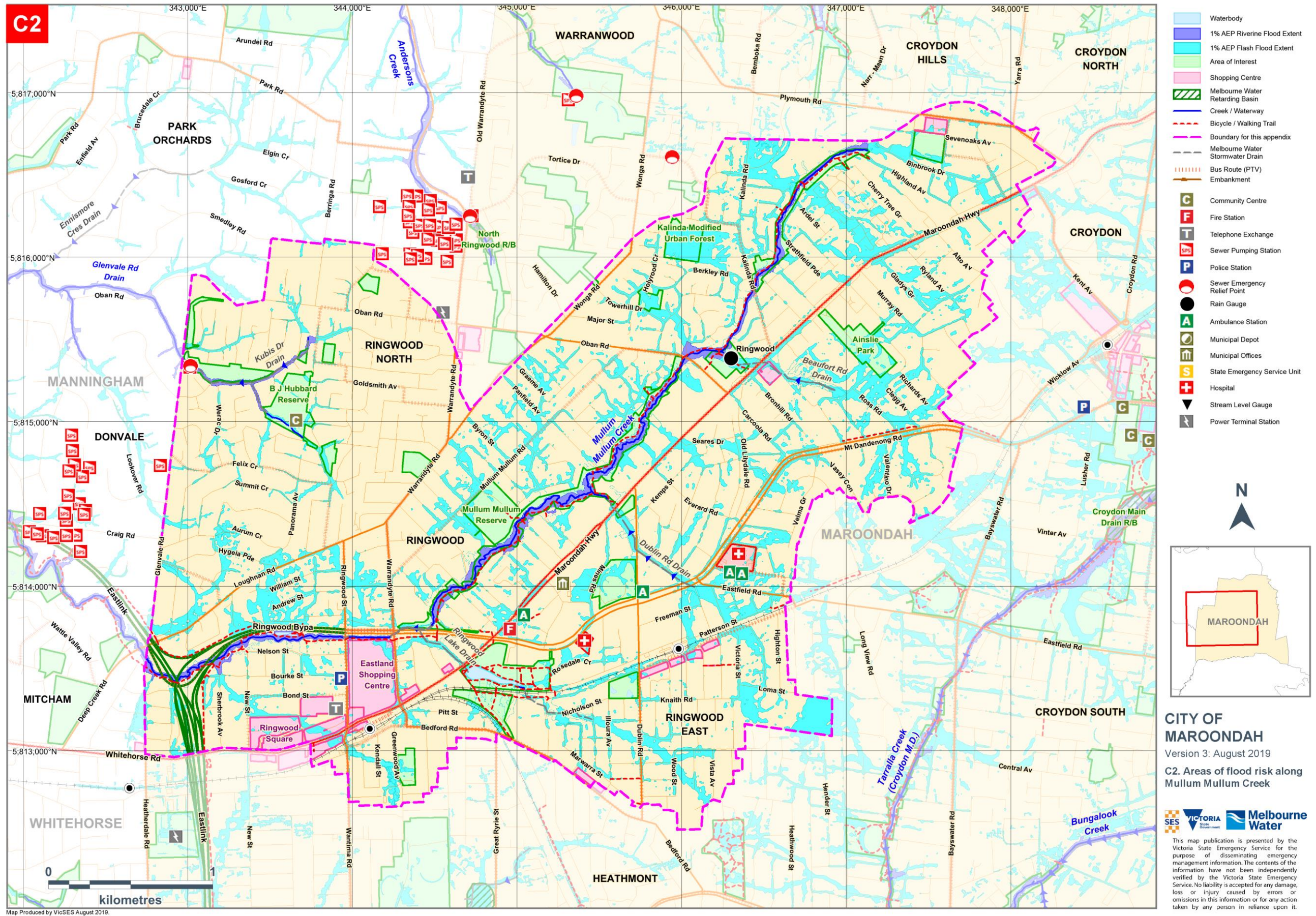


Figure C2 – Areas of flood risk within the Mullum Mullum Creek catchment in Maroondah

## Properties at Flood Risk

Properties listed in the table below are at risk from flooding along Brushy Creek and its stormwater tributaries. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Maroondah Flood Mapping (Engeny, February 2019) and the Maroondah Municipal Flood Modelling (Engeny, October 2013) 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. 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 at risk from Flooding over-floor within the Mullum Mullum Creek catchment in Maroondah						
Residential			Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event			Address	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
		✓	1/17-19 Bardia Street	Ringwood	Ringwood Lake Drain	Flash
		✓	5-7 Cutts Avenue	Croydon	Beaufort Road Drain	Flash
	✓	✓	6/4 Dublin Road	Ringwood East	Dublin Road Drain	Flash
		✓	4/6 Dublin Road	Ringwood East	Dublin Road Drain	Flash
		✓	5/6 Dublin Road	Ringwood East	Dublin Road Drain	Flash
✓	✓	✓	10 Dublin Road	Ringwood East	Dublin Road Drain	Flash
		✓	2/12 Dublin Road	Ringwood East	Dublin Road Drain	Flash
		✓	1 Marilyn Crescent	Ringwood	Mullum Mullum Creek	Riverine
		✓	2 Marilyn Crescent	Ringwood	Mullum Mullum Creek	Riverine
		✓	537 Maroondah Highway	Ringwood	Beaufort Road Drain	Flash
	✓	✓	65A Mt Dandenong Road	Ringwood East	Dublin Road Drain	Flash
		✓	5/20A Oban Road	Ringwood	Mullum Mullum Creek	Riverine
✓	✓	✓	6 Odette Court	Ringwood East	Ringwood Lake Drain	Flash
		✓	7 Odette Court	Ringwood East	Ringwood Lake Drain	Flash
		✓	21 Pratt Street	Ringwood	Ringwood Lake Drain	Flash
		✓	3/28 Pratt Street	Ringwood	Ringwood Lake Drain	Flash
		✓	16 Sherwood Avenue	Ringwood East	Ringwood Lake Drain	Flash
	✓	✓	65 Sunbeam Avenue	Ringwood East	Dublin Road Drain	Flash
	✓	✓	16 Wingrove Place	Ringwood	Mullum Mullum Creek	Riverine
<b>Totals</b>						
<b>2</b>	<b>6</b>	<b>19</b>				

Table C2.3 – Properties at risk of flooding within the Mullum Mullum Creek catchment in the City of Maroondah

## Isolation

No major isolation risks exist for areas around Croydon, Ringwood and Ringwood East. 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 Maroondah is available via the website at: [https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29\\_Maroondah\\_LAM.pdf](https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29_Maroondah_LAM.pdf)

Apart from the roads outlined below, all other essential infrastructure and services areas around Ringwood are expected to remain predominantly dry during an intense rainfall event.

## Road Closures

The following roads are subject to closure during flooding around Croydon, Ringwood and Ringwood East. Check the VicRoads website for more details: <https://traffic.vicroads.vic.gov.au/>

VicRoads Roads affected in a 1% AEP event
• Maroondah Highway, Croydon westbound lanes at Burnt Bridge Shopping Centre
• Maroondah Highway, Croydon westbound lanes at Gladys Grove
• Maroondah Highway, Ringwood westbound and eastbound lanes at Car City

Table C2.4 – VicRoads Possible Road Closures during a flooding event

Maroondah City Council Roads affected in a 1% AEP event			
CROYDON	RINGWOOD		RINGWOOD EAST
• Beaufort Road	• Abbey Court	• Larissa Avenue	• Purser Avenue
• Binbrook Drive	• Bardia Street	• Marilyn Crescent	• Railway Avenue
• Cutts Avenue	• Frederic Drive	• Odette Court	
• Edith Avenue	• Highland Boulevard	• Oliver Street	RINGWOOD NORTH
• Ross Road	• Hill Street	• Reynolds Avenue	• Debbie Place
	• Khassa Parade		• Kubis Drive
			• Melview Drive

Table C2.5 – Maroondah City Council Possible Road Closures during a flooding event

## Flood Mitigation

### Retarding Basins

No formal Retarding Basins exist around Croydon, Ringwood and Ringwood East in Maroondah. Ringwood Lake (located on Ringwood Lake Drain, Ringwood) may act as a Retarding Basin for flows along Ringwood Lake Drain, and into Mullum Mullum Creek.

### Levees

No formal Pumping Stations or Levees exist around Croydon, Ringwood and Ringwood East in Maroondah.

## Sewerage Infrastructure

Sewerage Infrastructure of note during a severe flood event located within the Mullum Mullum Creek catchment in Maroondah is contained within the following two tables.

## Sewer Pumping Stations

Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Operator	Location	Melway Reference
Glenvale Road Drain	Glenvale Road	-	Yarra Valley Water	Glenvale Road, Ringwood North	49 E3

Table C2.6 – Sewer Pumping Stations within the Mullum Mullum Creek Catchment in the City of Maroondah

## Sewer Emergency Relief Points

There are Sewer Emergency Relief Points within the Mullum Mullum Creek catchment 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
Glenvale Road Drain	-	Yarra Valley Water	Glenvale Road, Ringwood North	49 E3

Table C2.7 – Sewer Emergency Relief Points in the Mullum Mullum Creek Catchment in the City of Maroondah

## 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 and its stormwater tributaries at various creek heights or rain totals within Maroondah. 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, Doncaster East
- Mullum Mullum Creek’s stormwater tributaries, Ringwood



# FLOOD INTELLIGENCE CARD – DONCASTER EAST GAUGE, MULLUM MULLUM CREEK

Version 3 – August 2019



*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	<b>Eastern side of the Heidelberg-Warrandyte Road bridge, Doncaster East</b>
MELWAY REFERENCE:	<b>34 F3</b>
STREAM:	<b>Mullum Mullum Creek</b>
GAUGE NUMBER:	<b>229648A</b>
GAUGE ZERO:	<b>28.6m AHD</b>
GAUGE TYPE	<b>Stream Level</b>

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

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
5.25m	20% AEP (5yr ARI) Flood Level	<b>Community Infrastructure Likely Flooded</b> <ul style="list-style-type: none"> <li>Mullum Mullum Creek trail at various locations</li> </ul> <b>Water Over Road (over 300mm depth)</b> <ul style="list-style-type: none"> <li>Marilyn Crescent, Ringwood</li> </ul>	VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements
5.51m	10% AEP (10yr ARI) Flood Level	<b>Community Infrastructure Likely Flooded</b> <ul style="list-style-type: none"> <li>Mullum Mullum Creek trail at various locations</li> </ul> <b>Water Over Road (over 300mm depth)</b> <ul style="list-style-type: none"> <li>Marilyn Crescent, Ringwood</li> </ul>	VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements
5.75m	5% AEP (20yr ARI) Flood Level	<b>Properties at Flood Risk (Over-Floor)</b> <b>1 Properties in Total</b> <ul style="list-style-type: none"> <li>16 Wingrove Place, Ringwood</li> </ul> <b>Community Infrastructure Likely Flooded</b> <ul style="list-style-type: none"> <li>Mullum Mullum Creek trail at various locations</li> </ul> <b>Water Over Road (over 300mm depth)</b> <ul style="list-style-type: none"> <li>Marilyn Crescent, Ringwood</li> </ul>	VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
5.98m	2% AEP (50yr ARI) Flood Level	<p><b>Properties at Flood Risk (Over-Floor)</b>  <b>3 Properties in Total</b></p> <ul style="list-style-type: none"> <li>• 2 Marilyn Crescent, Ringwood</li> <li>• 5/20A Oban Road, Ringwood</li> <li>• 16 Wingrove Place, Ringwood</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>• Mullum Mullum Creek trail at various locations</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <ul style="list-style-type: none"> <li>• Marilyn Crescent, Ringwood</li> <li>• Oliver Street, Ringwood</li> </ul>	<p>VICSES to respond to RFAs on a request by request basis</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>
6.11m	1% AEP (100yr ARI) Flood Level	<p><b>Properties at Flood Risk (Over-Floor)</b>  <b>4 Properties in Total</b></p> <ul style="list-style-type: none"> <li>• 1 &amp; 2 Marilyn Crescent, Ringwood</li> <li>• 5/20A Oban Road, Ringwood</li> <li>• 16 Wingrove Place, Ringwood</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>• Mullum Mullum Creek trail at various locations</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <ul style="list-style-type: none"> <li>• Binbrook Drive, Croydon</li> <li>• Marilyn Crescent, Ringwood</li> <li>• Oliver Street, Ringwood</li> </ul>	<p>VICSES to respond to RFAs on a request by request basis</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>

Table C2.6 – Breakdown of likely consequences at various Doncaster East gauge level heights along Mullum Mullum Creek in Maroondah with operational considerations

# FLOOD INTELLIGENCE CARD – MULLUM MULLUM CREEK'S STORMWATER TRIBUTARIES (UNGAUGED)

Version 3 – August 2019



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	Ringwood
LOCATION	Burnt Bridge Tennis Club, Maroondah Highway Ringwood
MELWAY REF:	50 C3

GAUGE NUMBER	586065
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 43mm in 6 hours  Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungauged nature of the catchment. This should be used as a guide only.	20% AEP (5 year ARI)	<b>Properties at Flood Risk (Over-Floor)</b> <b>2 Properties in Total</b> <b>Dublin Road Drain</b> <ul style="list-style-type: none"> <li>10 Dublin Road, Ringwood East</li> </ul> <b>Ringwood Lake Drain</b> <ul style="list-style-type: none"> <li>6 Odette Court, Ringwood East</li> </ul> <b>Community Infrastructure Likely Flooded</b> <b>Local Drainage</b> <ul style="list-style-type: none"> <li>Discovery Childcare and Education, 50 Maroondah Highway, Croydon</li> </ul> <b>Water Over Road (over 300mm depth)</b> <b>Local Drainage</b> <ul style="list-style-type: none"> <li>Abbey Court, Ringwood</li> <li>Frederic Drive, Ringwood</li> <li>Maroondah Highway, Croydon near Croydon Hotel and also Car City</li> <li>Reynolds Avenue, Ringwood</li> </ul>	VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements
15mm in 10 mins; 25mm in 30 mins; 31mm in 1 hour; 39mm in 2 hours; 44mm in 3 hours; or 57mm in 6 hours	5% AEP (20 year ARI)	<b>Properties at Flood Risk (Over-Floor)</b> <b>5 Properties in Total</b> <b>Dublin Road Drain</b> <ul style="list-style-type: none"> <li>6/4 &amp; 10 Dublin Road, Ringwood East</li> <li>65A Mt Dandenong Road, Ringwood East</li> </ul> <b>Ringwood Lake Drain</b> <ul style="list-style-type: none"> <li>65 Sunbeam Avenue, Ringwood East</li> </ul>	VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>		<ul style="list-style-type: none"> <li>• 6 Odette Court, Ringwood East</li> <li><b>Community Infrastructure Likely Flooded</b></li> <li><b>Local Drainage</b></li> <li>• Cherrytree Grove Retirement Village, 67-87 Maroondah Highway, Croydon</li> <li>• Discovery Childcare and Education, 50 Maroondah Highway, Croydon</li> <li><b>Water Over Road (over 300mm depth)</b></li> <li><b>Beaufort Road Drain</b></li> <li>• Beaufort Road, Croydon</li> <li>• Cutts Avenue, Croydon</li> <li><b>Dublin Road Drain</b></li> <li>• Purser Avenue, Ringwood East</li> <li><b>Local Drainage</b></li> <li>• Abbey Court, Ringwood</li> <li>• Frederic Drive, Ringwood</li> <li>• Highland Boulevard, Ringwood</li> <li>• Maroondah Highway, Croydon near Croydon Hotel and also Car City</li> <li>• Reynolds Avenue, Ringwood</li> <li><b>Ringwood Lake Drain</b></li> <li>• Hill Street, Ringwood</li> <li>• Khassa Parade, Ringwood</li> </ul>	
<p>21mm in 10 mins; 34mm in 30 mins; 42mm in 1 hour; 51mm in 2 hours; 58mm in 3 hours; or 76mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>1% AEP (100 year ARI)</p>	<p><b>Properties at Flood Risk (Over-Floor)</b></p> <p><b>15 Properties in Total</b></p> <p><b>Beaufort Road Drain</b></p> <ul style="list-style-type: none"> <li>• 5-7 Cutts Avenue, Croydon</li> <li>• 537 Maroondah Highway, Ringwood</li> </ul> <p><b>Dublin Road Drain</b></p> <ul style="list-style-type: none"> <li>• 6/4, 4/6, 5/6, 10 &amp; 2/12 Dublin Road, Ringwood East</li> <li>• 65A Mt Dandenong Road, Ringwood East</li> <li>• 65 Sunbeam Avenue, Ringwood East</li> </ul> <p><b>Ringwood Lake Drain</b></p> <ul style="list-style-type: none"> <li>• 1/17-19 Bardia Street, Ringwood</li> <li>• 6 &amp; 7 Odette Court, Ringwood East</li> <li>• 21 &amp; 3/28 Pratt Street, Ringwood</li> <li>• 16 Sherwood Avenue, Ringwood East</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <p><b>Beaufort Road Drain</b></p> <ul style="list-style-type: none"> <li>• Burnt Bridge Tennis Club, 537 Maroondah Hwy, Ringwood</li> </ul> <p><b>Local Drainage</b></p> <ul style="list-style-type: none"> <li>• Cherrytree Grove Retirement Village, 67-87 Maroondah Highway, Croydon</li> <li>• Discovery Childcare and Education, 50 Maroondah Highway, Croydon</li> </ul> <p><b>Essential Infrastructure Likely Impacted</b></p>	<p>VICSES will provide warnings using EM-COP and SMSER to Maroondah Council and appropriate agencies where appropriate and as required based on the predictions provided by BoM regarding flood levels and the risk of Flash Flooding. The VICSES Central Duty Officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident</p> <p>VICSES to respond to RFAs on a request by request basis</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>

Design Rainfall Depths (mm) – <i>Indication of Possible Flooding</i>	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> <li>• Bus Routes 670 &amp; 684 along Maroondah Highway in Croydon</li> <li><b>Water Over Road (over 300mm depth)</b></li> <li><b>Beaufort Road Drain</b></li> <li>• Beaufort Road, Croydon</li> <li>• Cutts Avenue, Croydon</li> <li>• Edith Avenue, Croydon</li> <li>• Maroondah Highway, Croydon at Burnt Bridge Shopping Centre</li> <li>• Ross Road, Croydon</li> <li><b>Dublin Road Drain</b></li> <li>• Purser Avenue, Ringwood East</li> <li>• Railway Avenue, Ringwood East</li> <li><b>Glenvale Road Drain</b></li> <li>• Debbie Place, Ringwood North</li> <li>• Kubis Drive, Ringwood North</li> <li>• Melview Drive, Ringwood North</li> <li><b>Local Drainage</b></li> <li>• Abbey Court, Ringwood</li> <li>• Frederic Drive, Ringwood</li> <li>• Highland Boulevard, Ringwood</li> <li>• Maroondah Highway, Croydon near Croydon Hotel and also Car City</li> <li>• Reynolds Avenue, Ringwood</li> <li><b>Ringwood Lake Drain</b></li> <li>• Bardia Street, Ringwood</li> <li>• Hill Street, Ringwood</li> <li>• Khassa Parade, Ringwood</li> <li>• Larissa Avenue, Ringwood</li> <li>• Odette Court, Ringwood</li> </ul>	

Table C2.7 – Breakdown of possible consequences at various rainfall intensities around Mullum Mullum Creek’s stormwater tributaries in Maroondah with operational considerations

# APPENDIX C3 – DANDENONG CREEK & BUNGALOOK CREEK 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 the Dandenong and Bungalook Creeks in Maroondah

Property (Over-Floor)					
<b>Properties</b>	<b>18</b>				
Residential	18				
Commercial	0				
Industrial	0				
Public Land	0				
Rural	0				
Community Infrastructure					
Health Facilities	0		Child Care / Kindergartens	0	
Care Facilities	0		Community Venues	0	
Retirement Villages	0		Places of Worship	0	
Schools / Colleges	1	Heathmont College	Prisons	0	
Essential Infrastructure					
Major Roads	2	Bayswater Road; & Canterbury Road	Police Stations	0	
Major Rail	0		Government Buildings	0	
Bus Routes	1	664	Sewerage Facilities	1	Emergency Relief Point
Power Facility	0		Levees	0	
Comms Services	0		Drainage Facilities	7	Retarding Basins
Emergency Services	0		Airports / Airfields	0	
Tourism / Recreation					
Sports Facilities	2	Heathmont Golf Park; Ringwood Public Golf Course	Caravan Parks	0	
Recreation Facilities	1	Dandenong Creek Trail	Camping Grounds	0	
Government Boundaries					
Local Gov't Areas	1	Maroondah	CMA	1	Port Phillip & Westernport
Adjacent LGAs	3	Knox; Whitehorse ; & Yarra Ranges	CFA District	1	District 13
SES Unit Area	1	Maroondah	MFB District	1	Eastern

Table C3.1 – Consequence Summary of 1% AEP flood along the Dandenong and Bungalook Creeks in Maroondah

Kilsyth, Kilsyth South, Bayswater North, Bayswater, Croydon South, Heathmont, Ringwood South and Ringwood are among the southern Suburbs of Maroondah.

Bungalook Creek enters the City of Maroondah from Yarra Ranges Shire at Glasgow Road, Kilsyth and flows east through Kilsyth South, Colchester and Canterbury Road Retarding Basins, Kilsyth, Bayswater North and Heathmont, where it discharges into Dandenong Creek.

Dandenong Creek enters the Municipality downstream of Liverpool Road Retarding Basin in Boronia and forms the southern boundary of Maroondah, flowing west through Kilsyth South, Bayswater North, Heathmont and Ringwood, before exiting the City at Heatherdale Road.

High intensity, short duration rainfall events can cause flash flooding in Bayswater North, Bayswater, Croydon South, Heathmont, Kilsyth, Kilsyth South, Ringwood South and Ringwood, while prolonged rainfall events may cause Dandenong Creek and Bungalook Creek to flood.

## Warning Times

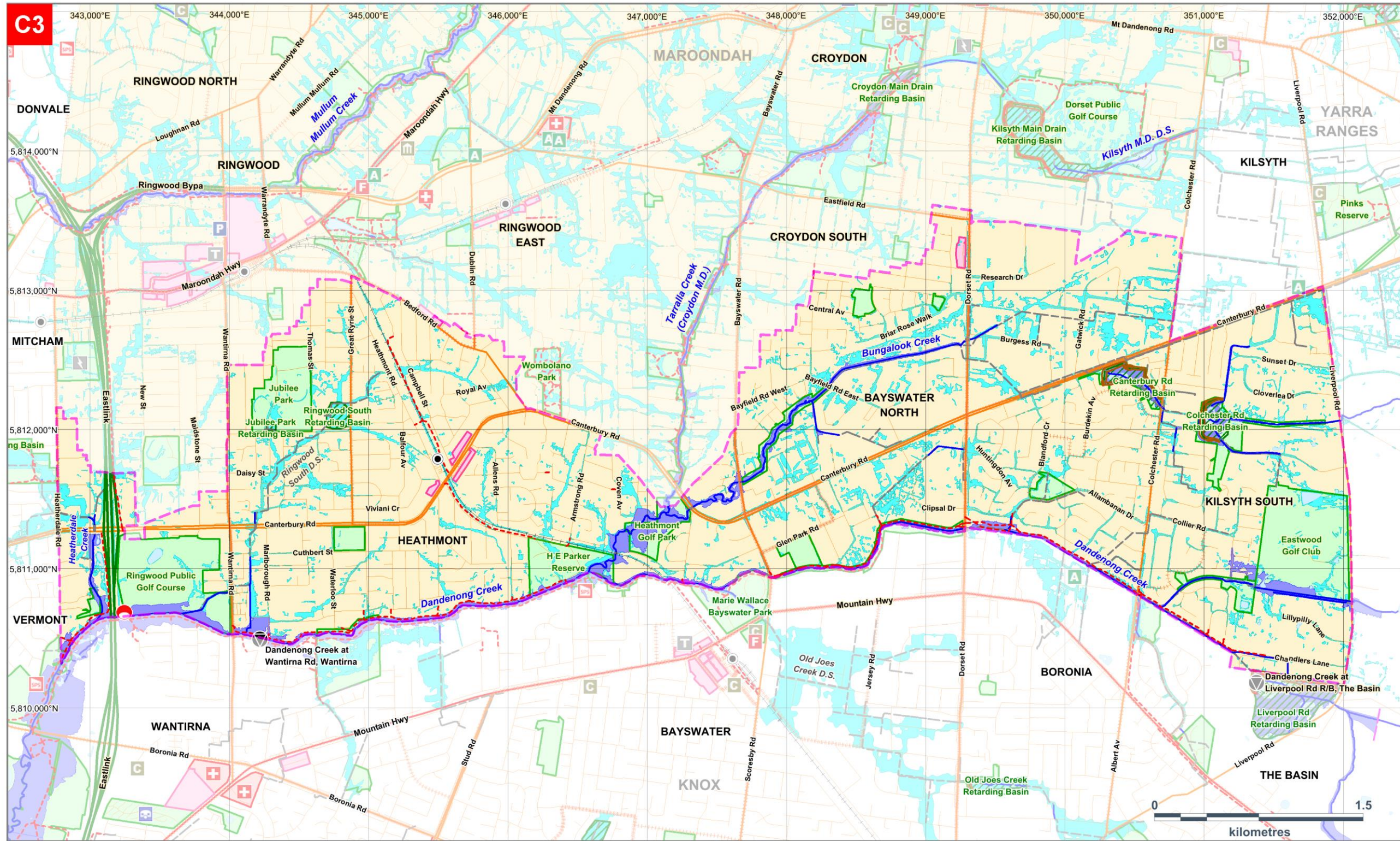
Whilst there are hydrographic/telemetry stations (river gauges) within the municipality, Melbourne Water does not provide any flood warning service at this point, due to the generally short warning times available.

Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Bungalook Creek at Fussell Road Retarding Basin, Montrose	228369A	North bank of the creek, 50m east of R/B embankment	✓	✓	52 A11
Dandenong Creek at Liverpool Road Retarding Basin	228373A	At the Liverpool Road R/B outlet off Liverpool Road, The Basin	✓	✓	65 F4
Dandenong Creek at Wantirna Road, Wantirna	228357A	South side of the creek 150m east of Wantirna Road, Wantirna	✓	✓	63 H3

Table C3.2 – Hydrographic Monitoring Stations within the Dandenong 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



Map Produced by VicSES August 2019.

**CITY OF MAROONDAH**  
Version 3: August 2019  
**C3. Areas of flood risk along Dandenong and Bungalook Creeks**

- |                                 |                                  |                              |                              |
|---------------------------------|----------------------------------|------------------------------|------------------------------|
| Waterbody                       | Creek / Waterway                 | Community Centre             | Ambulance Station            |
| 1% AEP Riverine Flood Extent    | Bicycle / Walking Trail          | Fire Station                 | Municipal Depot              |
| 1% AEP Flash Flood Extent       | Boundary for this appendix       | Telephone Exchange           | Municipal Offices            |
| Area of Interest                | Melbourne Water Stormwater Drain | Sewer Pumping Station        | State Emergency Service Unit |
| Shopping Centre                 | Bus Route (PTV)                  | Police Station               | Hospital                     |
| Melbourne Water Retarding Basin | Embankment                       | Sewer Emergency Relief Point | Stream Level Gauge           |
|                                 |                                  | Rain Gauge                   | Power Terminal Station       |

**SES VICTORIA** **Melbourne Water**

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Figure C3 – Areas of flood risk along Dandenong Creek and Bungalook Creek in the City of Maroondah



## Properties at Flood Risk

Properties listed in the table below are at risk from flooding along Dandenong Creek's stormwater tributaries. As more intelligence becomes available, this list may change. This table has been populated based on modelling work as part of the Maroondah Flood Mapping (Engeny, February 2019) and the Maroondah City Council Drains (Engeny, October 2013) 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. Information on above ground-floor properties is not available in this list.

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Properties at risk from Flooding over-floor along Dandenong Creek's stormwater tributaries						
Residential			Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event			Address	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
	✓	✓	16 Adrian Court	Heathmont	Ringwood South Drain	Flash
	✓	✓	18 Adrian Court	Heathmont	Ringwood South Drain	Flash
		✓	20 Adrian Court	Heathmont	Ringwood South Drain	Flash
		✓	4/285 Canterbury Road	Heathmont	Ringwood South Drain	Flash
✓	✓	✓	28 Daisy Street	Heathmont	Ringwood South Drain	Flash
		✓	127 Heatherdale Road	Ringwood	Heatherdale Creek	Flash
		✓	129 Heatherdale Road	Ringwood	Heatherdale Creek	Flash
		✓	22 Jarma Road	Heathmont	Ringwood South Drain	Flash
✓	✓	✓	1 Joan Court	Heathmont	Ringwood South Drain	Flash
✓	✓	✓	2 Joan Court	Heathmont	Ringwood South Drain	Flash
✓	✓	✓	3 Joan Court	Heathmont	Ringwood South Drain	Flash
	✓	✓	5 Kitson Street	Ringwood	Ringwood South Drain	Flash
	✓	✓	6 Liddle Way	Vermont	Heatherdale Creek	Flash
		✓	2/22-24 Marlborough Road	Heathmont	Ringwood South Drain	Flash
		✓	3/22-24 Marlborough Road	Heathmont	Ringwood South Drain	Flash
		✓	6 Muir Court	Ringwood	Ringwood South Drain	Flash
		✓	13 Westmore Drive	Heathmont	Ringwood South Drain	Flash
	✓	✓	15 Westmore Drive	Heathmont	Ringwood South Drain	Flash
Totals						
4	9	18				

Table C3.3 – Properties at risk of flooding along Dandenong Creek and Bungalook Creek's stormwater tributaries in the City of Maroondah

## Isolation

No major isolation risks exist for areas around Kilsyth, Kilsyth South, Bayswater North, Bayswater, Croydon South, Heathmont, Ringwood South and Ringwood. 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 Maroondah is available via the website at: [https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29\\_Maroondah\\_LAM.pdf](https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29_Maroondah_LAM.pdf)

Apart from a Sewer emergency relief structure and the roads outlined below, all other essential infrastructure and services areas around Kilsyth, Kilsyth South, Bayswater North, Bayswater, Croydon South, Heathmont, Ringwood South and Ringwood are expected to remain predominantly dry during an intense rainfall event.

## Road Closures

The following roads are subject to closure during flooding around Kilsyth, Kilsyth South, Bayswater North, Bayswater, Croydon South, Heathmont, Ringwood South and Ringwood. Check the VicRoads website for more details: <https://traffic.vicroads.vic.gov.au/>

VicRoads Roads affected in a 1% AEP (100yr ARI) event
<ul style="list-style-type: none"> <li>Bayswater Road, Bayswater North at Bungalook Creek crossing</li> </ul>
<ul style="list-style-type: none"> <li>Canterbury Road, Ringwood between Heatherdale Road and Eastlink</li> </ul>

Table C3.4 – VicRoads Possible Road Closures during a flooding event

Maroondah City Council Roads flooded in a 1% AEP (100yr ARI) event			
BAYSWATER NORTH	CROYDON SOUTH	HEATHMONT	KILSYTH SOUTH
<ul style="list-style-type: none"> <li>Allambanan Drive</li> </ul>	<ul style="list-style-type: none"> <li>Blossom Walk</li> </ul>	<ul style="list-style-type: none"> <li>Barrow Drive</li> </ul>	<ul style="list-style-type: none"> <li>Chadndra Avenue</li> </ul>
<ul style="list-style-type: none"> <li>Bayfield Road</li> </ul>	<ul style="list-style-type: none"> <li>Briar Rose Walk</li> </ul>	<ul style="list-style-type: none"> <li>Bellbird Court</li> </ul>	<ul style="list-style-type: none"> <li>Oliver Court</li> </ul>
<ul style="list-style-type: none"> <li>Burgess Road</li> </ul>	<ul style="list-style-type: none"> <li>Mountain Heath Walk</li> </ul>	<ul style="list-style-type: none"> <li>Daisy Street</li> </ul>	<ul style="list-style-type: none"> <li>Ormond Place</li> </ul>
<ul style="list-style-type: none"> <li>Dorset Road South Bound Service Lane at Huntingdon Ave</li> </ul>	<ul style="list-style-type: none"> <li>Research Drive</li> </ul>	<ul style="list-style-type: none"> <li>Jarma Road</li> </ul>	<b>RINGWOOD</b>
<ul style="list-style-type: none"> <li>Elsun Avenue</li> </ul>	<ul style="list-style-type: none"> <li>The Gateway</li> </ul>	<ul style="list-style-type: none"> <li>Joan Court</li> </ul>	<ul style="list-style-type: none"> <li>Kitson Street</li> </ul>
<ul style="list-style-type: none"> <li>Gatwick Road</li> </ul>	<ul style="list-style-type: none"> <li>Valley Court</li> </ul>	<ul style="list-style-type: none"> <li>Marlborough Road</li> </ul>	<ul style="list-style-type: none"> <li>Liddle Way</li> </ul>
<ul style="list-style-type: none"> <li>Halbert Road</li> </ul>	<ul style="list-style-type: none"> <li>Wildwood Walk</li> </ul>	<ul style="list-style-type: none"> <li>Miller Road</li> </ul>	<ul style="list-style-type: none"> <li>Reilly Street</li> </ul>
<ul style="list-style-type: none"> <li>Kelvin Road</li> </ul>		<ul style="list-style-type: none"> <li>Vale Street</li> </ul>	
<ul style="list-style-type: none"> <li>Nicole Close</li> </ul>		<ul style="list-style-type: none"> <li>Waters Grove</li> </ul>	
<ul style="list-style-type: none"> <li>Turbo Drive</li> </ul>		<ul style="list-style-type: none"> <li>Westmore Drive</li> </ul>	

Table C3.5 – Maroondah City Council Possible Road Closures during a flooding event

## Flood Mitigation

### Retarding Basins

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Height (Level)	ANCOLD Hazard Rating	Population at Risk (dam breach)	Melway Reference
Canterbury Road	Bungalook Creek (Upper)	5.30 ha	97ML	113.5m AHD	113.5m AHD	3m (113.7m AHD)	High A	Unavailable	51 D11
Colchester Road	Bungalook Creek (Upper)	4.74 ha	72.4ML (at Spillway Level)	117.4m AHD	118.1m AHD	4.0m (119m AHD)	High A	877	51 E12 F11
Fussell Road	Bungalook Creek	11.5 ha	302.0ML	151.4m AHD	151.9m AHD	8.5m 152.2m AHD	High A	37	52 A11
Jubilee Park	Ringwood South D.S.	2.69 ha	4ML	N/A	98.5m AHD	98.5m AHD	High A	Unavailable	49 H11
Liverpool Road	Dandenong Creek (Upper) Dobsons Creek	18.9 ha	467ML	137m AHD	Unavailable	7.3m (137.8m AHD)	Extreme	6,5	65 G4
Kilsyth Main Drain	Kilsyth Main Drain	13.89 ha	176.4ML	105m AHD	105.8m AHD	2.6m (105.8m AHD)	High A	Unavailable	51 B6
Ringwood South	Ringwood South D.S.	2.69 ha	25ML	99.5m AHD	100m AHD	2.4m (100.1m AHD)	Medium	500	49 K11

Table C3.6 – Melbourne Water Retarding Basins within the Dandenong Creek and Bungalook Creek catchments with impact in the City of Maroondah

No formal Pumping Stations or Levees exist around Maroondah.

## Sewerage Infrastructure

Sewerage Infrastructure of note during a severe flood event located around the Dandenong and Bungalook Creeks is contained within the following table.

### Sewer Emergency Relief Points

There is a Sewer Emergency Relief Point along Dandenong Creek 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
Dandenong Creek	North	Melbourne Water	Ringwood Public Golf Course, Heathmont	63 E3

Table C3.7 – Sewer Emergency Relief Points in the Dandenong Creek Catchment impacting the City of Maroondah

## 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 Dandenong and Bungalook Creeks and their stormwater drains at various creek heights or rain totals within the City of Maroondah. 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:

- Dandenong Creek at Liverpool Road Retarding Basin, The Basin
- Dandenong Creek at Wantirna
- Bungalook Creek
- Dandenong Creek's stormwater Tributaries, Kilsyth South to Heathmont

# FLOOD INTELLIGENCE CARD – THE BASIN GAUGE, DANDENONG CREEK

Version 1 – August 2019



*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	At the Liverpool Road Retarding Basin outlet off Liverpool Road, The Basin
MELWAY REFERENCE:	65 F4
STREAM:	Dandenong Creek
GAUGE NUMBER:	228373A
GAUGE ZERO:	131.14m AHD
GAUGE TYPE	Stream Level and Rain

MINOR:	Not Established
MODERATE:	Not Established
MAJOR	Not Established
EMBANKMENT HEIGHT:	6.66m
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	4.68m (30 <sup>th</sup> July 1996)

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
2.06m	20% AEP (5yr ARI) Flood Level	<ul style="list-style-type: none"> <li>Nil impact expected in from Liverpool Road Retarding Basin to Bungalook Creek confluence in City of Maroondah</li> </ul>	
3.10m	10% AEP (10yr ARI) Flood Level	<ul style="list-style-type: none"> <li>Nil impact expected in from Liverpool Road Retarding Basin to Bungalook Creek confluence in City of Maroondah</li> </ul>	
4.21m	5% AEP (20yr ARI) Flood Level	<p><b>Tourism / Recreation Likely Impacted</b></p> <ul style="list-style-type: none"> <li>Dandenong Creek Trail likely flooded in parts between Liverpool Road retarding basin and Bungalook Creek confluence</li> </ul>	
5.36m	2% AEP (50yr ARI) Flood Level		
5.86m		<ul style="list-style-type: none"> <li>Spillway of Liverpool Road Retarding Basin in operation</li> </ul>	
6.05m	1% AEP (100yr ARI) Flood Level		
6.66m		<ul style="list-style-type: none"> <li>Embankment level of Liverpool Road Retarding Basin</li> </ul>	

Table C3.8 – Breakdown of likely consequences at various The Basin gauge level heights along Dandenong Creek with operational considerations

# FLOOD INTELLIGENCE CARD – WANTIRNA GAUGE, DANDENONG CREEK

Version 3 – August 2019



*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 side of the creek 150m east of Wantirna Road, Wantirna
MELWAY REFERENCE:	63 H3
STREAM:	Dandenong Creek
GAUGE NUMBER:	228357A
GAUGE ZERO:	79.3m AHD
GAUGE TYPE	Stream Level and Rain

MINOR:	Not Established
MODERATE:	Not Established
MAJOR	Not Established
LEEVE HEIGHT:	N/A
TELEMETRIC/MANUAL	Telemetric
HIGHEST RECORDED FLOOD:	2.77m (5 <sup>th</sup> February 2011)

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
2.77m	20% AEP (5yr ARI) Flood Level	<p><b>Essential Infrastructure Likely Impacted</b></p> <ul style="list-style-type: none"> <li>Sewer Emergency Relief Point upstream of Dandenong Creek/ Heatherdale Creek junction within floodwaters</li> </ul> <p><b>Tourism / Recreation Likely Impacted</b></p> <ul style="list-style-type: none"> <li>Dandenong Creek Trail likely flooded in parts Bungalook Creek confluence and Heatherdale Creek</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <ul style="list-style-type: none"> <li>Marlborough Road, Heathmont</li> <li>Scott Street, Heathmont</li> <li>Waters Grove, Heathmont</li> </ul>	Maroondah Council Environmental Health team/ EPA to monitor quality of floodwater where appropriate
2.93m	10% AEP (10yr ARI) Flood Level	<p><b>Tourism / Recreation Likely Impacted</b></p> <ul style="list-style-type: none"> <li>Ringwood Public Golf Course likely flooded in parts in areas adjacent to Dandenong Creek</li> </ul>	
3.06m	5% AEP (20yr ARI) Flood Level		
3.16m	2% AEP (50yr ARI) Flood Level		
3.25m	1% AEP (100yr ARI) Flood Level		

Table C3.9 – Breakdown of likely consequences at various Wantirna gauge level heights along Dandenong Creek with operational considerations

# FLOOD INTELLIGENCE CARD – BUNGALOOK CREEK (UNGAUGED)

Version 3 – August 2019



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	<b>Bungalook Creek at Fussell Road Retarding Basin, Montrose</b>
LOCATION	<b>North bank of Bungalook Creek, 50m east of the Retarding Basin embankment</b>
MELWAY REF:	<b>52 A11</b>

GAUGE NUMBER	<b>228369</b>
GAUGE TYPE	<b>Stream Level &amp; Rain</b>
TELEMETRIC/MANUAL	<b>Telemetric</b>

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 43mm 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)	<b>Water Over Road (over 300mm depth)                      Bungalook Creek Drainage System</b> <ul style="list-style-type: none"> <li>Burgess Road, Bayswater North</li> <li>Gatwick Road, Bayswater North</li> <li>Halbert Road, Bayswater North</li> <li>Kelvin Road, Bayswater North</li> <li>Miller Road, Heathmont</li> <li>Nicole Close, Bayswater North</li> <li>Ormond Place, Kilsyth South</li> <li>Research Drive, Croydon South</li> <li>Turbo Drive, Bayswater North</li> </ul>	VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements
15mm in 10 mins; 25mm in 30 mins; 31mm in 1 hour; 39mm in 2 hours; 44mm in 3 hours; or 57mm in 6 hours  Note: rainfall depths are a very rough method of	5% AEP (20 year ARI)	<b>Essential Infrastructure Likely Impacted</b> <ul style="list-style-type: none"> <li>Bus Route 664 along Bayswater Road, Bayswater North at Bungalook Creek</li> </ul> <b>Water Over Road (over 300mm depth)                      Bungalook Creek Drainage System</b> <ul style="list-style-type: none"> <li>Bayfield Road, Bayswater North</li> <li>Bayswater Road, Bayswater North at Bungalook Creek crossing</li> <li>Blossom Walk, Croydon South</li> <li>Briar Rose Walk, Croydon South</li> <li>Burgess Road, Bayswater North</li> </ul>	VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>		<ul style="list-style-type: none"> <li>• Gatwick Road, Bayswater North</li> <li>• Halbert Road, Bayswater North</li> <li>• Kelvin Road, Bayswater North</li> <li>• Miller Road, Heathmont</li> <li>• Mountain Heath Walk, Croydon South</li> <li>• Nicole Close, Bayswater North</li> <li>• Ormond Place, Kilsyth South</li> <li>• Research Drive, Croydon South</li> <li>• Turbo Drive, Bayswater North</li> <li>• Valley Court, Croydon South</li> </ul>	
<p>21mm in 10 mins; 34mm in 30 mins; 42mm in 1 hour; 51mm in 2 hours; 58mm in 3 hours; or 75mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>1% AEP (100 year ARI)</p>	<p><b>Essential Infrastructure Likely Impacted</b></p> <ul style="list-style-type: none"> <li>• Bus Route 664 along Bayswater Road, Bayswater North at Bungalook Creek</li> </ul> <p><b>Tourism / Recreation Likely Impacted</b></p> <ul style="list-style-type: none"> <li>• Heathmont Golf Park, 341-345 Canterbury Road, Heathmont</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <p><b>Bungalook Creek Drainage System</b></p> <ul style="list-style-type: none"> <li>• Bayfield Road, Bayswater North</li> <li>• Bayswater Road, Bayswater North at Bungalook Creek crossing</li> <li>• Blossom Walk, Croydon South</li> <li>• Briar Rose Walk, Croydon South</li> <li>• Burgess Road, Bayswater North</li> <li>• Chandra Avenue, Kilsyth South</li> <li>• Elsum Avenue, Bayswater North</li> <li>• Gatwick Road, Bayswater North</li> <li>• Halbert Road, Bayswater North</li> <li>• Kelvin Road, Bayswater North</li> <li>• Miller Road, Heathmont</li> <li>• Mountain Heath Walk, Croydon South</li> <li>• Nicole Close, Bayswater North</li> <li>• Oliver Court, Kilsyth South</li> <li>• Ormond Place, Kilsyth South</li> <li>• Research Drive, Croydon South</li> <li>• The Gateway, Croydon South</li> <li>• Turbo Drive, Bayswater North</li> <li>• Valley Court, Croydon South</li> <li>• Wildwood Walk, Croydon South</li> </ul>	<p>VICSES to respond to RFAs on a request by request basis</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>

Table C3.10 – Breakdown of possible consequences at various rainfall intensities within the Bungalook Creek catchment in Maroondah with operational considerations



# FLOOD INTELLIGENCE CARD – DANDENONG CREEK’S STORMWATER TRIBUTARIES (UNGAUGED)

Version 3 – August 2019



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	<b>Dandenong Creek at Wantirna Road, Wantirna</b>
LOCATION	<b>South side of the creek 150m east of Wantirna Road, Wantirna</b>
MELWAY REF:	<b>63 H3</b>

GAUGE NUMBER	<b>228357</b>
GAUGE TYPE	<b>Stream Level &amp; Rain</b>
TELEMETRIC/MANUAL	<b>Telemetric</b>

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 43mm 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)	<b>Properties at Flood Risk (Over-Floor)</b> <b>4 Properties in Total</b> <b>Ringwood South Drain</b> <ul style="list-style-type: none"> <li>28 Daisy Street, Heathmont</li> <li>1, 2 &amp; 3 Joan Court, Heathmont</li> </ul> <b>Water Over Road (over 300mm depth)</b> <b>Local Drainage</b> <ul style="list-style-type: none"> <li>Allambanan Drive, Bayswater North</li> </ul> <b>Ringwood South Drain</b> <ul style="list-style-type: none"> <li>Kitson Street, Ringwood</li> </ul>	VICSES will provide warnings using EM-COP and SMSER to Maroondah Council and appropriate agencies where appropriate and as required based on the predictions provided by BoM regarding flood levels and the risk of Flash Flooding. The VICSES Central Duty Officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident  VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements
15mm in 10 mins; 25mm in 30 mins; 31mm in 1 hour; 39mm in 2 hours; 44mm in 3 hours; or 57mm in 6 hours  Note: rainfall depths are a very rough method of	5% AEP (20 year ARI)	<b>Properties at Flood Risk (Over-Floor)</b> <b>9 Properties in Total</b> <b>Heatherdale Creek</b> <ul style="list-style-type: none"> <li>6 Liddle Way, Vermont</li> </ul> <b>Ringwood South Drain</b> <ul style="list-style-type: none"> <li>16 &amp; 18 Adrian Court, Heathmont</li> <li>28 Daisy Street, Heathmont</li> <li>1, 2 &amp; 3 Joan Court, Heathmont</li> <li>5 Kitson Street, Ringwood</li> </ul>	VICSES will provide warnings using EM-COP and SMSER to Maroondah Council and appropriate agencies where appropriate and as required based on the predictions provided by BoM regarding flood levels and the risk of Flash Flooding. The VICSES Central Duty Officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>		<ul style="list-style-type: none"> <li>• 15 Westmore Drive, Heathmont</li> <li><b>Water Over Road (over 300mm depth)</b></li> <li><b>Heatherdale Creek</b></li> <li>• Canterbury Road, Ringwood between Heatherdale Road and Eastlink</li> <li>• Liddle Way, Ringwood</li> <li><b>Local Drainage</b></li> <li>• Allambanan Drive, Bayswater North</li> <li>• Marlborough Road, Heathmont</li> <li>• Waters Grove, Heathmont</li> <li><b>Ringwood South Drain</b></li> <li>• Bellbird Court, Heathmont</li> <li>• Canterbury Road, Heathmont east of Wantirna Road</li> <li>• Daisy Street, Heathmont</li> <li>• Kitson Street, Ringwood</li> <li>• Joan Court, Heathmont</li> <li>• Reilly Street, Ringwood</li> <li>• Westmore Drive, Heathmont</li> </ul>	<p>VICSES to respond to RFAs on a request by request basis</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>
<p>21mm in 10 mins; 34mm in 30 mins; 42mm in 1 hour; 51mm in 2 hours; 58mm in 3 hours; or 75mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>1% AEP (100 year ARI)</p>	<p><b>Properties at Flood Risk (Over-Floor)</b></p> <p><b>18 Properties in Total</b></p> <p><b>Heatherdale Creek</b></p> <ul style="list-style-type: none"> <li>• 127 &amp; 129 Heatherdale Road, Ringwood</li> <li>• 6 Liddle Way, Vermont</li> </ul> <p><b>Ringwood South Drain</b></p> <ul style="list-style-type: none"> <li>• 16, 18 &amp; 20 Adrian Court, Heathmont</li> <li>• 4/285 Canterbury Road, Heathmont</li> <li>• 28 Daisy Street, Heathmont</li> <li>• 22 Jarma Road, Heathmont</li> <li>• 1, 2 &amp; 3 Joan Court, Heathmont</li> <li>• 5 Kitson Street, Ringwood</li> <li>• 2/22-24 &amp; 3/22-24 Marlborough Road, Heathmont</li> <li>• 6 Muir Court, Ringwood</li> <li>• 13 &amp; 15 Westmore Drive, Heathmont</li> </ul> <p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>• Heathmont College, Waters Grove, Heathmont</li> </ul> <p><b>Water Over Road</b></p> <p><b>Heatherdale Creek</b></p> <ul style="list-style-type: none"> <li>• Canterbury Road, Ringwood between Heatherdale Road and Eastlink</li> <li>• Liddle Way, Ringwood</li> </ul> <p><b>Local Drainage</b></p> <ul style="list-style-type: none"> <li>• Barrow Drive, Heathmont</li> <li>• Dorset Road south bound service lane, Bayswater North</li> </ul>	<p>VICSES will provide warnings using EM-COP and SMSER to Maroondah Council and appropriate agencies where appropriate and as required based on the predictions provided by BoM regarding flood levels and the risk of Flash Flooding. The VICSES Central Duty Officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident</p> <p>VICSES to respond to RFAs on a request by request basis</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>

Design Rainfall Depths (mm) – <i>Indication of Possible Flooding</i>	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> <li>• Allambanan Drive, Bayswater North</li> <li>• Marlborough Road, Heathmont</li> <li>• Waters Grove, Heathmont</li> <li>• <b>Ringwood South Drain</b></li> <li>• Bellbird Court, Heathmont</li> <li>• Canterbury Road, Heathmont east of Wantirna Road</li> <li>• Daisy Street, Heathmont</li> <li>• Kitson Street, Ringwood</li> <li>• Jarma Road, Heathmont</li> <li>• Joan Court, Heathmont</li> <li>• Reilly Street, Ringwood</li> <li>• Vale Street, Heathmont</li> <li>• Westmore Drive, Heathmont</li> </ul>	

Table C3.11 – Breakdown of possible consequences at various rainfall intensities around Dandenong Creek’s stormwater tributaries in Maroondah with operational considerations

# APPENDIX C4 – TARRALLA CREEK (CROYDON MAIN 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 within the Tarralla Creek (Croydon Main Drain) catchment					
<b>Property</b>					
<b>Properties</b>		Over-Floor flooding information unavailable			
Residential					
Commercial					
Industrial					
Public Land					
Rural					
<b>Community Infrastructure</b>					
Health Facilities	0		Child Care / Kindergartens	0	
Care Facilities	0		Community Venues	2	Arndale Civic Shopping Centre; Springfield Hall
Retirement Villages	0		Places of Worship	0	
Schools / Colleges	1	Swinburn TAFE Croydon Campus	Prisons	0	
<b>Essential Infrastructure</b>					
Major Roads	2	Dorset Road; Mount Dandenong Road	Police Stations	0	
Major Rail	0		Government Buildings	0	
Bus Routes	5	664; 688; 689; 690; 737	Sewerage Facilities	0	
Power Facility	1	Dorset Road Terminal Station	Levees	0	
Comms Services	0		Drainage Facilities	2	Retarding Basins
Emergency Services	0		Airports / Airfields	0	
<b>Tourism / Recreation</b>					
Sports Facilities	0		Caravan Parks	0	
Recreation Facilities	1	Tarralla Creek Trail	Camping Grounds	0	
<b>Government Boundaries</b>					
Local Gov't Areas	1	Maroondah	CMA	1	Port Phillip & Westernport
Adjacent LGAs	1	Yarra Ranges	CFA District	0	
SES Unit Area	1	Maroondah	MFB District	1	Eastern

Table C4.1 – Consequence Summary of 1% AEP flood within the Taralla

Tarralla Creek is fed predominantly by the Kilsyth Main Drain Drainage System which enters Maroondah at Colchester Road and flows west, through Kilsyth, the Kilsyth Main Drain Retarding Basin and Croydon. Tarralla Creek continues through the Croydon Main Drain Retarding Basin, then southwest through Croydon South, Bayswater North and Ringwood East before discharging into

Bungalook Creek at Heathmont. Land use in the area is predominantly established residential and light industrial.

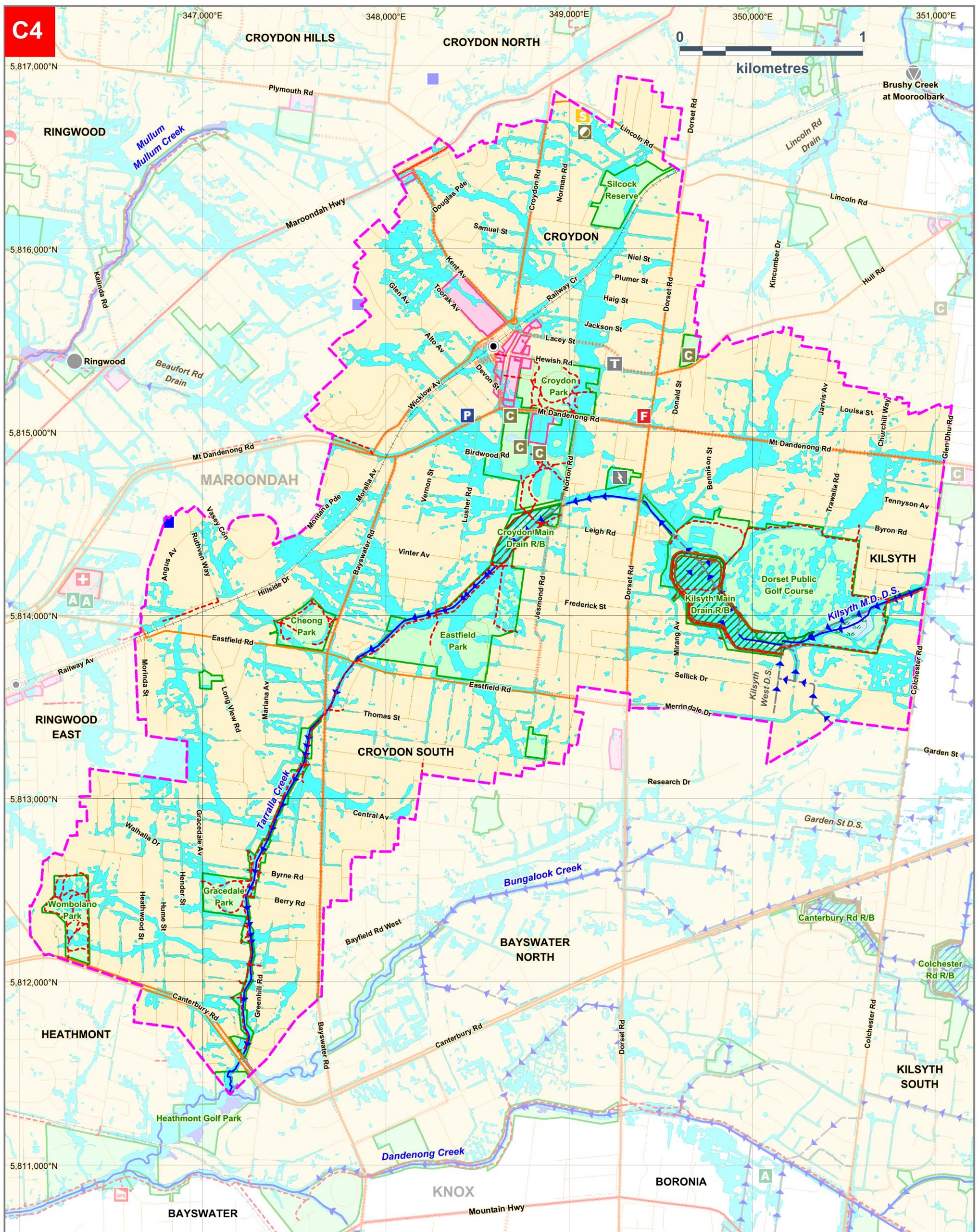
## Warning Times

Whilst there are hydrographic/telemetry stations (stream gauges) within the municipality, there are none in the Tarralla Creek catchment, therefore Melbourne Water does not provide any flood warning service at this point, due to the generally short warning times available.

Melbourne Water Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Brushy Creek at Mooroolbark	229249A	West side of Creek on Diane Cr, Mooroolbark	✓	✓	37 E11
Bungalook Creek at Fussell Road Retarding Basin, Montrose	228369A	North bank of the creek, 50m east of R/B embankment	✓	✓	52 A11
Ringwood	586065	Burnt Bridge Tennis Club, Ringwood		✓	50 C3

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



Map Produced by VICSES August 2019

**CITY OF MAROONDAH**  
Version 3, August 2019  
**C4. Areas of flood risk around Tarralla Creek**

- |  |                                 |  |                                  |  |                              |
|--|---------------------------------|--|----------------------------------|--|------------------------------|
|  | Waterbody                       |  | Boundary for this Appendix       |  | Telephone Exchange           |
|  | 1% AEP Riverine Flood Extent    |  | Melbourne Water Stormwater Drain |  | Municipal Depot              |
|  | 1% AEP Flash Flood Extent       |  | Creek / Channel                  |  | Community Centre             |
|  | Reserve / Park                  |  | Bicycle / Walking Trail          |  | Police Station               |
|  | Commercial Precinct             |  | State Emergency Service          |  | Rain Gauge                   |
|  | Melbourne Water Retarding Basin |  | Fire Station                     |  | Stream Level Gauge           |
|  | Bus Route (PTV) Embankment      |  | Sewer Pumping Station            |  | Retail Water Storage         |
|  | Hospital                        |  | Ambulance Station                |  | Sewer Emergency Relief Point |
|  |                                 |  | Power Terminal Station           |  |                              |



**SES VICTORIA** **Melbourne Water**

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

Figure C4 – Areas of flood risk within the Tarralla Creek catchment in the City of Maroondah

## Properties at Flood Risk

Floor level surveys are not yet available for properties within the Tarralla Creek catchment, so properties at risk of over-floor flooding is undetermined.

*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 at risk from Flooding Over-Floor in the Tarralla Creek catchment in Maroondah						
Residential		Commercial	Industrial	Rural	Public Use	
Street No. at Risk in AEP Event			Address	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
Totals						

Table C4.3 – Properties at risk of flooding within the Tarralla Creek catchment in the City of Maroondah

## Isolation

The Croydon Civic Centre is at risk of isolation in an intense rain event. No major isolation risks exist for areas around Croydon, Croydon South, Kilsyth, Bayswater North and Ringwood South. 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 Maroondah is available via the website at: [https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29\\_Maroondah\\_LAM.pdf](https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29_Maroondah_LAM.pdf)

Apart from the roads outlined below, all other essential infrastructure and services areas around Croydon, Croydon South, Kilsyth, Bayswater North and Ringwood South are expected to remain predominantly dry during an intense rainfall event.

## Road Closures

The following roads are subject to closure during flooding around Croydon, Croydon South, Kilsyth, Bayswater North and Ringwood South. Check the VicRoads website for more details: <https://traffic.vicroads.vic.gov.au/>

VicRoads Roads likely flooded in a 1% AEP (100yr ARI) event
<ul style="list-style-type: none"> <li>Dorset Road south bound lane in Croydon at Dorset Gardens Hotel</li> <li>Mount Dandenong Road, Croydon at Croydon Park</li> </ul>

Table C4.4 – VicRoads Possible Road Closures during a flooding event

Maroondah City Council Roads likely flooded in a 1% AEP (100yr ARI) event
---

<b>CROYDON</b>	<ul style="list-style-type: none"> <li>James Road</li> </ul>	<ul style="list-style-type: none"> <li>Railway Crescent</li> </ul>	<b>KILSYTH</b>
<ul style="list-style-type: none"> <li>Bennison Street</li> </ul>	<ul style="list-style-type: none"> <li>Jenkins Lane</li> </ul>	<ul style="list-style-type: none"> <li>The Mall</li> </ul>	<ul style="list-style-type: none"> <li>Colchester Road</li> </ul>
<ul style="list-style-type: none"> <li>Birdwood Road</li> </ul>	<ul style="list-style-type: none"> <li>Lacey Street</li> </ul>	<b>CROYDON SOUTH</b>	<ul style="list-style-type: none"> <li>Grierson Drive</li> </ul>
<ul style="list-style-type: none"> <li>Civic Square</li> </ul>	<ul style="list-style-type: none"> <li>Lusher Road</li> </ul>	<ul style="list-style-type: none"> <li>Andrew Crescent</li> </ul>	<ul style="list-style-type: none"> <li>Yolanda Court</li> </ul>
<ul style="list-style-type: none"> <li>Haig Street</li> </ul>	<ul style="list-style-type: none"> <li>Norton Road</li> </ul>		<b>RINGWOOD EAST</b>
<ul style="list-style-type: none"> <li>Hewish Road</li> </ul>	<ul style="list-style-type: none"> <li>Nyanda Court</li> </ul>		<ul style="list-style-type: none"> <li>Cheong Street</li> </ul>
<ul style="list-style-type: none"> <li>Jackson Street</li> </ul>	<ul style="list-style-type: none"> <li>Plumer Street</li> </ul>		<ul style="list-style-type: none"> <li>Wingate Avenue</li> </ul>

Table C4.5 – Maroondah City Council Possible Road Closures during a flooding event



## Flood Mitigation

### Retarding Basins

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Height (Level)	ANCOLD Hazard Rating	Population at Risk (dam breach)	Melway Reference
Croydon Main Drain	Croydon Main Drain	4.03 ha	65.4ML	N/A	103.3m AHD	2.4m (103.3m AHD)	Very Low	Unavailable	50 K6
Kilsyth Main Drain	Kilsyth Main Drain	13.89 ha	176.4ML	105m AHD	105.8m AHD	2.6m (105.8m AHD)	High A	Unavailable	51 B6

Table C4.6 – Melbourne Water Retarding Basins within the Tarralla Creek catchment in the City of Maroondah

No formal Pumping Stations or Levees exist around Croydon, Croydon South, Kilsyth, Bayswater North and Ringwood South in Maroondah.

### Sewerage Infrastructure

There is no sewerage Infrastructure expected to impact or be impacted by floodwaters during severe flood events within the Tarralla Creek catchment.

### 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 Tarralla Creek catchment at various rain totals within the City of Maroondah. 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:

- Tarralla Creek and Kilsyth Main Drains, Croydon

# FLOOD INTELLIGENCE CARD – TARRALLA CREEK & KILSYTH MAIN DRAIN, CROYDON (UNGAUGED)

Version 3 – August 2019



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	<b>Bungalook Creek at Fussell Road Retarding Basin</b>
LOCATION	<b>North bank of the creek, 50m east of R/B embankment, Glasgow Road, Montrose</b>
MELWAY REF:	<b>51 K11</b>

GAUGE NUMBER	<b>228369A</b>
GAUGE TYPE	<b>Stream Level &amp; Rain</b>
TELEMETRIC/MANUAL	<b>Telemetric</b>

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 43mm 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)	<b>Community Infrastructure Likely Flooded</b> <ul style="list-style-type: none"> <li>Tarralla Creek Trail likely flooded in parts between Town Park and Bungalook Creek</li> </ul> <b>Essential Infrastructure Likely Impacted</b> <ul style="list-style-type: none"> <li>Bus Routes 664 and 688 impacted if Lacey Street flooded</li> <li>Bus Routes 689, 690 and 737 impacted if Mount Dandenong Road flooded</li> </ul> <b>Water Over Road (over 300mm depth)</b> <b>Local Drainage</b> <ul style="list-style-type: none"> <li>Andrew Crescent, Croydon South</li> <li>Haig Street, Croydon</li> <li>Jackson Street, Croydon</li> <li>Lacey Street, Croydon</li> <li>Mount Dandenong Road, Croydon at Croydon Park</li> <li>Norton Road, Croydon</li> <li>Plumer Street, Croydon</li> </ul>	VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements
15mm in 10 mins; 25mm in 30 mins; 31mm in 1 hour; 39mm in 2 hours; 44mm in 3 hours; or 57mm in 6 hours  Note: rainfall depths are a	5% AEP (20 year ARI)	<b>Community Infrastructure Likely Flooded</b> <ul style="list-style-type: none"> <li>Arndale Civic Shopping Centre, 224-238 Mount Dandenong Road, Croydon</li> <li>Springfield Hall, 217-283 Mt Dandenong Road, Croydon</li> <li>Swinburn TAFE Croydon Campus 12-50 Norton Road, Croydon likely flooding to carpark and northern areas of premises.</li> <li>Tarralla Creek Trail likely flooded in parts between Town Park and Bungalook Creek</li> <li>Town Park including Fred Geale Oval 20 Civic Square, Croydon</li> </ul> <b>Essential Infrastructure Likely Impacted</b> <ul style="list-style-type: none"> <li>Bus Routes 664 and 688 impacted if Lacey Street flooded</li> </ul>	VICSES to respond to RFAs on a request by request basis  Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements

Design Rainfall Depths (mm) – Indication of Possible Flooding	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>		<ul style="list-style-type: none"> <li>Bus Routes 689, 690 and 737 impacted if Mount Dandenong Road flooded</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <p><b>Kilsyth Main Drain</b></p> <ul style="list-style-type: none"> <li>Colchester Road, Kilsyth at Grierson Drive</li> <li>Grierson Drive, Kilsyth</li> <li>Yolanda Court, Kilsyth</li> </ul> <p><b>Local Drainage</b></p> <ul style="list-style-type: none"> <li>Andrew Crescent, Croydon South</li> <li>Civic Square, Croydon</li> <li>Haig Street, Croydon</li> <li>Hewish Road, Croydon at the Croydon Swimming Pool</li> <li>Jackson Street, Croydon</li> <li>James Road, Croydon</li> <li>Lacey Street, Croydon</li> <li>Mount Dandenong Road, Croydon at Croydon Park</li> <li>Norton Road, Croydon</li> <li>Plumer Street, Croydon</li> <li>Railway Crescent, Croydon</li> <li>The Mall, Croydon South</li> <li>Wingate Avenue, Ringwood East</li> </ul>	
<p>21mm in 10 mins; 34mm in 30 mins; 42mm in 1 hour; 51mm in 2 hours; 58mm in 3 hours; or 75mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>1% AEP (100 year ARI)</p>	<p><b>Community Infrastructure Likely Flooded</b></p> <ul style="list-style-type: none"> <li>Arndale Civic Shopping Centre, 224-238 Mount Dandenong Road, Croydon</li> <li>Springfield Hall, 217-283 Mt Dandenong Road, Croydon</li> <li>Swinburn TAFE Croydon Campus 12-50 Norton Road, Croydon likely flooding to carpark and northern areas of premises.</li> <li>Tarralla Creek Trail likely flooded in parts between Town Park and Bungalook Creek</li> <li>Town Park including Fred Geale Oval 20 Civic Square, Croydon</li> </ul> <p><b>Essential Infrastructure Likely Impacted</b></p> <ul style="list-style-type: none"> <li>Electricity Terminal Station at 336 Dorset Road, Croydon</li> <li>Bus Routes 664 and 688 impacted if Lacey Street flooded</li> <li>Bus Routes 689, 690 and 737 impacted if Mount Dandenong Road flooded</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <p><b>Kilsyth Main Drain</b></p> <ul style="list-style-type: none"> <li>Colchester Road, Kilsyth at Grierson Drive</li> <li>Dorset Road, Croydon south bound lane at Dorset Gardens Hotel</li> <li>Grierson Drive, Kilsyth</li> <li>Jenkins Lane, Croydon</li> <li>Nyanda Court, Croydon</li> <li>Yolanda Court, Kilsyth</li> </ul> <p><b>Local Drainage</b></p> <ul style="list-style-type: none"> <li>Andrew Crescent, Croydon South</li> </ul>	<p>VICSES to respond to RFAs on a request by request basis</p> <p>Council and VicRoads (as appropriate) to provide road closure signage under predetermined arrangements</p>

Design Rainfall Depths (mm) – <i>Indication of Possible Flooding</i>	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		<ul style="list-style-type: none"> <li>• Bennison Street, Croydon</li> <li>• Birdwood Road, Croydon</li> <li>• Cheong Street, Ringwood East</li> <li>• Civic Square, Croydon</li> <li>• Haig Street, Croydon</li> <li>• Hewish Road, Croydon at the Croydon Swimming Pool</li> <li>• Jackson Street, Croydon</li> <li>• James Road, Croydon</li> <li>• Lacey Street, Croydon</li> <li>• Lusher Road, Croydon</li> <li>• Mount Dandenong Road, Croydon at Croydon Park</li> <li>• Norton Road, Croydon</li> <li>• Plumer Street, Croydon</li> <li>• Railway Crescent, Croydon</li> <li>• The Mall, Croydon South</li> <li>• Wingate Avenue, Ringwood East</li> </ul>	

Table C4.7 – Breakdown of possible consequences at various rainfall intensities within the Tarralla Creek catchment in Maroondah with operational considerations

# APPENDIX C5 – JUMPING CREEK & ANDERSONS CREEK 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 Jumping and Andersons Creeks in Maroondah

Property					
<b>Properties</b>		Over-Floor flooding information unavailable			
Residential					
Commercial					
Industrial					
Public Land					
Rural					
Community Infrastructure					
Health Facilities	0		Child Care / Kindergartens	0	
Care Facilities	0		Community Venues	0	
Retirement Villages	0		Places of Worship	0	
Schools / Colleges	0		Prisons	0	
Essential Infrastructure					
Major Roads	0		Police Stations	0	
Major Rail	0		Government Buildings	0	
Bus Routes	1	364	Sewerage Facilities	8	5 areas of pumping stations; 3 Emergency Relief Points
Power Facility	0		Levees	0	
Comms Services	0		Drainage Facilities	2	Retarding Basins
Emergency Services	0		Airports / Airfields	0	
Tourism / Recreation					
Sports Facilities	0		Caravan Parks	0	
Recreation Facilities	0		Camping Grounds	0	
Government Boundaries					
Local Gov't Areas	1	Maroondah	CMA	1	Port Phillip & Westernport
Adjacent LGAs	1	Manningham	CFA District	1	District 13
SES Unit Area	1	Maroondah	MFB District	1	Eastern

Table C5.1 – Consequence Summary of 1% AEP flood along Jumping and Andersons Creeks in Maroondah

Jumping Creek is located in Croydon Hills and Warranwood and flows north, exiting the municipality near Galtymore Close and entering Manningham. Floodwaters are likely to be fairly shallow, but fast moving due to the hilly terrain. The Jumping Creek catchment responds to short bursts of heavy rainfall, resulting in flash flooding.

Andersons Creek is located in Ringwood North, with only a small length of the creek in the City of Maroondah, flowing northwest into Manningham.

## Warning Times

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 Hydrographic Monitoring Station	Station No.	Location	Stream Level & Flow Gauge	Rain Gauge	Melway Reference
Ringwood	586065	Burnt Bridge Tennis Club, Ringwood		✓	50 C3

Table C5.2 – Hydrographic Monitoring Stations close to the Jumping Creek and Anderson

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

# Areas of Flood Risk

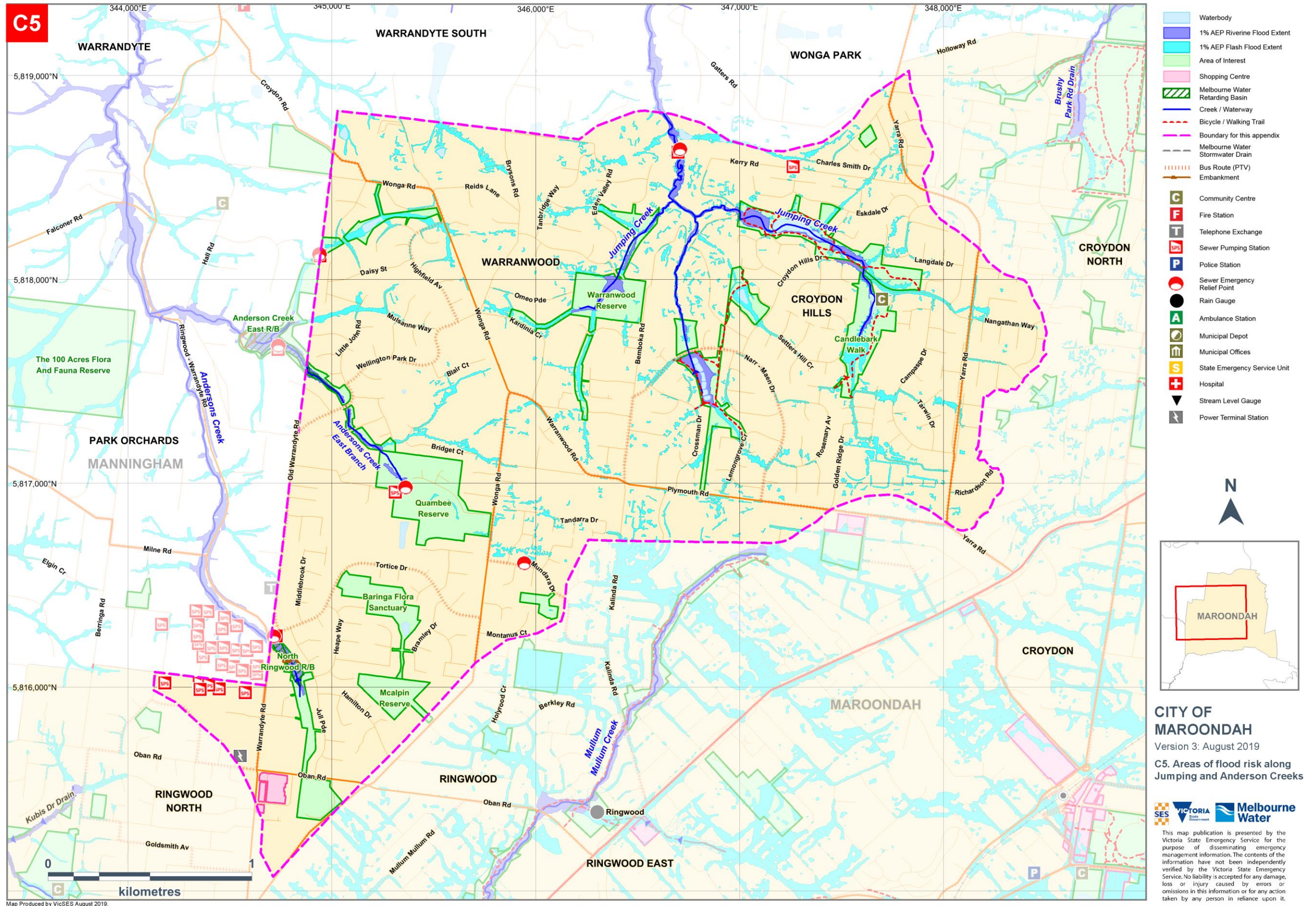


Figure C5 – Areas of flood risk around Croydon Hills, Warranwood & parts of Ringwood North in the City of Maroondah

## Properties at Flood Risk

Floor level surveys are not yet available for properties within the Jumping Creek and Andersons Creek catchments, so properties at risk of over-floor flooding is undetermined.

*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 at risk from Flooding Over-Floor in the Tarralla Creek catchment in Maroondah						
Residential			Commercial	Industrial	Rural	Public Use
Street No. at Risk in AEP Event			Address	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
Totals						

Table C5.3 – Properties at risk of flooding within the Jumping and Andersons Creeks catchments in the City of Maroondah

## Isolation

No major isolation risks exist for areas around Croydon Hills, Warranwood and parts of Ringwood North during a 1% AEP (100yr ARI) event. Some localised short-duration isolation may occur due to flash flooding.

## Essential Infrastructure

During an event, see the Public Transport Victoria's Website for details on delays or alterations to services. <http://ptv.vic.gov.au/live-travel-updates/>. A map of Public Transport routes within the City of Maroondah is available via the website at: [https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29\\_Maroondah\\_LAM.pdf](https://www.ptv.vic.gov.au/assets/default-site/more/maps/Local-area-maps/Metropolitan/351fea4fb3/29_Maroondah_LAM.pdf)

Apart from the roads outlined below, all other essential infrastructure and services areas around Croydon Hills, Warranwood and parts of Ringwood North 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 Croydon Hills, Warranwood and parts of Ringwood North. Check the VicRoads website for more details: <https://traffic.vicroads.vic.gov.au/>

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

- Wonga Road, Warranwood at Highfield Avenue

Table C5.4 – VicRoads Possible Road Closures during a flooding event

### Maroondah City Council Roads likely flooded in a 1% AEP (100yr ARI) event

CROYDON HILLS	WARRANWOOD
<ul style="list-style-type: none"> <li>• Campaspe Drive</li> </ul>	<ul style="list-style-type: none"> <li>• Highfield Avenue</li> </ul>
<ul style="list-style-type: none"> <li>• Country Terrace</li> </ul>	
<ul style="list-style-type: none"> <li>• Croydon Hills Drive</li> </ul>	
<ul style="list-style-type: none"> <li>• Lemongrove Crescent</li> </ul>	

Table C5.5 – Maroondah City Council Possible Road Closures during a flooding event

## Flood Mitigation

### Retarding Basins

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Height (Level)	ANCOLD Hazard Rating	Population at Risk (dam breach)	Melway Reference
Anderson Creek East	Anderson Creek East Branch	2.42 ha	74ML	95.3m AHD	Unavailable	12m (97m AHD)	Significant	2.3	35 J9
North Ringwood	Andersons Creek	1.01 ha	38.3ML	Stage1-130.5m AHD Stage2-127.8m AHD	Stage 1-130.7m AHD Stage 2-127.9m AHD	Stage 1-131.25m AHD Stage 2-Unavailable	Very Low	Road Itinerants only	49 K1

Table C5.6 – Melbourne Water Retarding Basins within the Jumping Creek and Andersons Creek catchments in or bordering the City of Maroondah

No formal Pumping Stations or Levees exist within the Jumping Creek and Andersons Creek catchments in Maroondah.

### Sewerage Infrastructure

Sewerage Infrastructure of note during a severe flood event located around Croydon Hills, Warranwood and parts of Ringwood North is contained within the following two tables.

#### Sewer Pumping Stations

Sewerage Pumping Station	On Drain / Waterway	Bank / Side of Waterway	Operator	Location	Melway Reference
Number of unsewered properties around Willaims Road, Ringwood North	Andersons Creek	South	Yarra Valley Water	Williams Road between Athelstane Drive and Warrandyte Road, Ringwood North	49 J2
Jumping Creek	Jumping Creek	West	Yarra Valley Water	Kerry Road, Warranwood	36 E7
Kerry Road Pipe Track	Local Drainage	-	Yarra Valley Water	Pipe Track at extension of Kerry Road, Croydon Hills	36 F7
Lorraine Court	Local Drainage	-	Yarra Valley Water	Easement behind Lorraine Court, Warranwood	35 K8

Quambee Reserve	Anderson Creek East Branch	-	Yarra Valley Water	Quambee Reserve, Ringwood North	36 A11
Warrandyte Road	Andersons Creek	North East	Yarra Valley Water	Warrandyte Road at Anderson Creek Retarding Basin, Ringwood North	49 J1

Table C5.7 – Sewer Pumping Stations within the Jumping Creek and Andersons Creek catchments in the City of Maroondah

### Sewer Emergency Relief Points

There are Sewer Emergency Relief Points within the Jumping Creek and Andersons Creek catchments 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
Anderson Creek	North East	Yarra Valley Water	Warrandyte Road at Anderson Creek Retarding Basin, Ringwood North	49 J1
Anderson Creek East Branch	-	Yarra Valley Water	Quambee Reserve, Ringwood North	36 A11
Jumping Creek	East	Yarra Valley Water	Kerry Road, Warranwood	36 E7

Table C5.8 – Sewer Emergency Relief Points in the Jumping Creek and Andersons Creek catchments in the City of Maroondah

### Command, Control & Coordination

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

### Flood Impacts & Operational Considerations (Intelligence Cards)

The tables on the following pages provide a breakdown of the possible consequences of flooding around Jumping Creek and Andersons Creek at various rain totals within the City of Maroondah. 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:

- Jumping Creek and Andersons Creek, Croydon Hills & Warranwood

# FLOOD INTELLIGENCE CARD – JUMPING CREEK & ANDERSONS CREEK, CROYDON HILLS & WARRANWOOD (UNGAUGED)



Version 3 – August 2019

*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	<b>Ringwood</b>
LOCATION	<b>Burnt Bridge Tennis Club, Maroondah Highway Ringwood</b>
MELWAY REF:	<b>50 C3</b>

GAUGE NUMBER	<b>586065</b>
GAUGE TYPE	<b>Rain</b>
TELEMETRIC/MANUAL	<b>Telemetric</b>

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 43mm 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)	<ul style="list-style-type: none"> <li>Nil impacts likely in City of Maroondah</li> </ul>	
15mm in 10 mins; 25mm in 30 mins; 31mm in 1 hour; 39mm in 2 hours; 44mm in 3 hours; or 57mm in 6 hours	5% AEP (20 year ARI)	<b>Water Over Road (over 300mm depth)</b> <b>Andersons Creek</b> <ul style="list-style-type: none"> <li>Wonga Road, Warranwood at Highfield Avenue</li> </ul> <b>Jumping Creek</b> <ul style="list-style-type: none"> <li>Campaspe Drive, Croydon Hills</li> <li>County Terrace, Croydon Hills</li> </ul>	

Design Rainfall Depths (mm) – <i>Indication of Possible Flooding</i>	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
<p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>			
<p>21mm in 10 mins; 34mm in 30 mins; 42mm in 1 hour; 51mm in 2 hours; 58mm in 3 hours; or 76mm in 6 hours</p> <p>Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.</p>	<p>1% AEP (100 year ARI)</p>	<p><b>Essential Infrastructure Likely Impacted</b></p> <ul style="list-style-type: none"> <li>• Bus Route 364 impacted if Highfield Avenue is flooded</li> </ul> <p><b>Water Over Road (over 300mm depth)</b></p> <p><b>Andersons Creek</b></p> <ul style="list-style-type: none"> <li>• Highfield Avenue, Warranwood</li> <li>• Wonga Road, Warranwood at Highfield Avenue</li> </ul> <p><b>Jumping Creek</b></p> <ul style="list-style-type: none"> <li>• Campaspe Drive, Croydon Hills</li> <li>• County Terrace, Croydon Hills</li> <li>• Croydon Hills Drive, Croydon Hills</li> <li>• Lemongrove Crescent, Croydon Hills</li> </ul>	

Table C5.9 – Breakdown of possible consequences at various rainfall intensities around Jumping Creek and Andersons Creek in Maroondah 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 by the IC in consultation with the MERO, MERC, DHHS, Health Commander and other key agencies and expert advice (CMA's and Flood Intelligence specialists).

Triggers for evacuation, eg. specific flood heights are predicted or are likely to occur will be considered when planning evacuation, though no triggers have been determined for gauges within the City of Maroondah at this stage.

## 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, DHHS and other key agencies and expert advice (CMA's and Flood Intelligence specialists).

## Phase 3 – Withdrawal

Withdrawal will be managed 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 IC or via the appointed VicPol evacuation manager.

Possible Evacuation Routes to be used will be determined on an event by event basis.

Landing zones for aircraft will be determined by the following:

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

### **Vulnerable People in Emergencies**

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

## Phase 4 – Shelter

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

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

Sector	Relief Centre/Assembly Area (include address)	Comments
To be determined dependant on location/ size of event	Karralyka Centre Mines Road Ringwood 3134 Melway 49 K6	As per ERC facility plan available through MERO
To be determined dependant on location/ size of event	The Rings 362 Canterbury Road Ringwood 3134 Melway 63 F1	As per ERC facility plan available through MERO

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

### Animal Shelter

Animal shelter compounds may be established for domestic pets and companion animals of evacuees. Animal shelters will be determined dependent on location and size of event. These facilities may be located at locations detailed in the MEMPlan.

### Caravans

There are no caravan parks within Maroondah. Where present, caravans may be evacuated. Caravan evacuation will be determined dependent on location and size of event.

## Phase 5 – Return

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

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

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

Considerations for deciding whether to evacuate include:

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



## Disruption to Services

Disruption to a range of services can occur in the event of a 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
<b>School Bus Routes</b>	General road closures across network leading to student pick ups being suspended	Inundation of road network and associated damage to an extent that it is unsafe for vehicles to use road	Alternate routes via clearly signed detours. Alternate routes to be determined by Council Traffic Engineers or works crews in conjunction with VicPol. Council works crews to install and monitor detour signage. Council Network Inspectors to monitor road conditions, closure signage and detour signage. Alternate student collection points to be established.
<b>Local Road Network</b>	General road closures across network	Inundation of road network and associated damage to an extent that it is unsafe for vehicles to use road	Alternate routes via clearly signed detours. Alternate routes to be determined by Council Traffic Engineers, Council works personnel and VicPol. Council works crews to install and monitor detour signage. Council Network Inspectors to monitor road conditions, closure signage and detour signage.

## Essential Infrastructure and Property Protection

Nil Essential Infrastructure and properties (e.g. roads, utilities, telecommunications etc.) that require protection have been identified. These will be populated if and when identified in the following table:

Facility	Impact	Trigger Point for action	Strategy/Temporary Measures

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

## Rescue

The following resources are available within the Maroondah Municipality to assist with rescue operations:

Aircraft available through state aircraft unit. Boats available through VICSES RDO. VICPOL resources available via RERC.

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

There are no identified communities at risk. The risk base is individual properties in low lying areas.

# 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 and through VicEmergency. Storm and Flood Warning Products include Severe Thunderstorm Warnings, Severe Weather Warnings, Flood Watches and Flood Warnings.

## Flood Bulletins

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

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

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

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

No local flood warning system arrangements are in place.

## Local Flood Warning System Arrangements

No local arrangements in place.

## Moderate Flood Warning Example

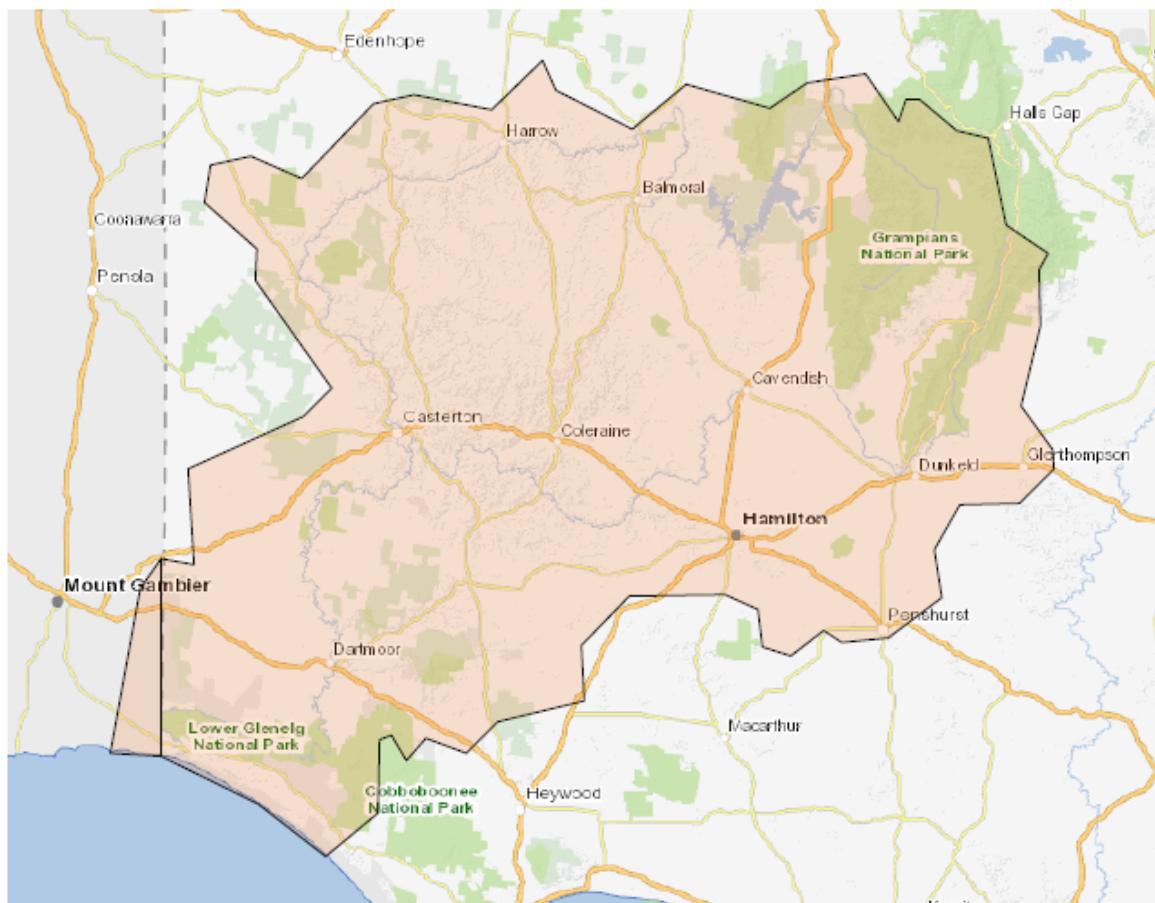
### Community Notification Sign-off



**WARNING - FLOOD**

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

#### 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) ([http://www.bom.gov.au/vic/flood/rain\\_river.shtml](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://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.
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- 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

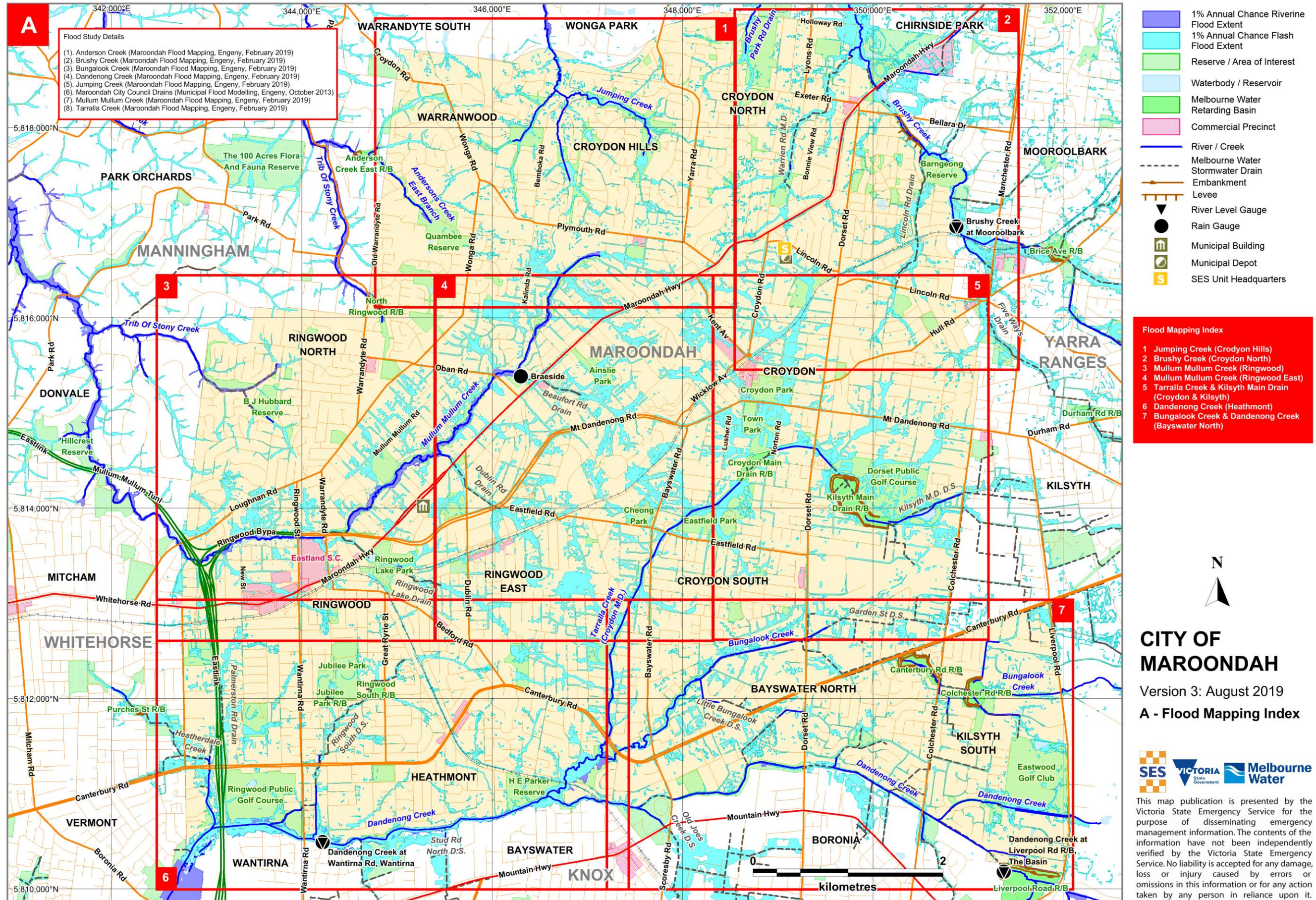
## Overview

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 Maroondah.
- A map showing the Municipal boundary together with the open waterways and underground stormwater drainage pipe network within the City of Maroondah and the 1% AEP (100-year ARI) flood extents (sourced from Melbourne Water GIS).
- A set of 7 maps showing flooding hot spots within the City of Maroondah together with the 1% AEP (100-year ARI) flood extents (sourced from the Melbourne Water GIS).

### Note that:

- Maps showing the Special Building Overlay and Land Subject to Inundation Overlay are included in the Maroondah 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 <http://planningschemes.dpcd.vic.gov.au/>.
- Maps showing 1 in 100-year ARI (1% AEP) flood extents and floodways (together with volume, height and water quality data) are shown at DELWP's mapshare website <http://mapshare.maps.vic.gov.au/MapShareVic/index.html?viewer=MapShareVic.PublicSite&locale=en-AU>



# CITY OF MAROONDAH

Version 3: August 2019

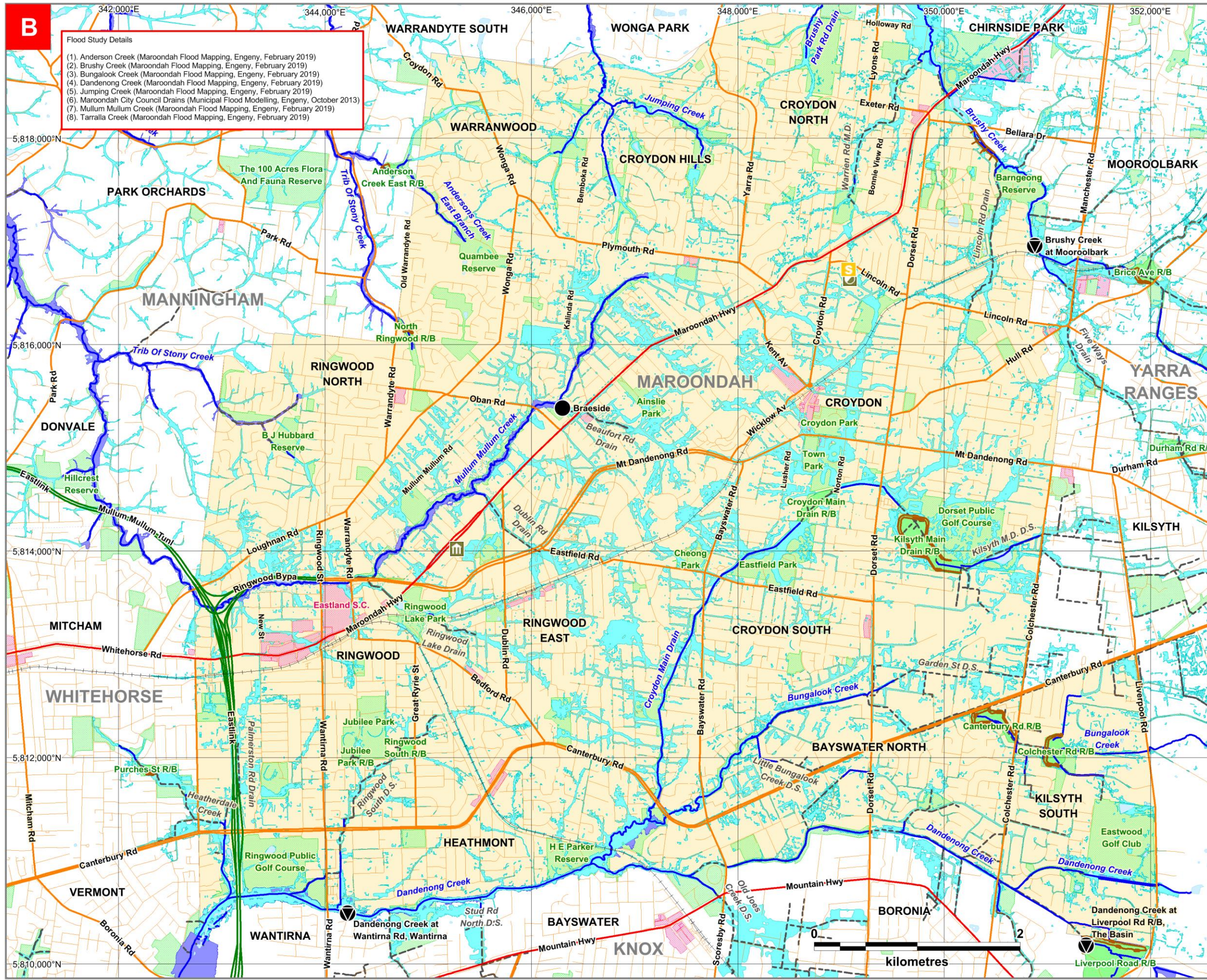
A - Flood Mapping Index



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**B**

- Flood Study Details
- (1) Anderson Creek (Maroondah Flood Mapping, Engeny, February 2019)
  - (2) Brushy Creek (Maroondah Flood Mapping, Engeny, February 2019)
  - (3) Bungalook Creek (Maroondah Flood Mapping, Engeny, February 2019)
  - (4) Dandenong Creek (Maroondah Flood Mapping, Engeny, February 2019)
  - (5) Jumping Creek (Maroondah Flood Mapping, Engeny, February 2019)
  - (6) Maroondah City Council Drains (Municipal Flood Modelling, Engeny, October 2013)
  - (7) Mullum Mullum Creek (Maroondah Flood Mapping, Engeny, February 2019)
  - (8) Tarralla Creek (Maroondah Flood Mapping, Engeny, February 2019)



- 1% Annual Chance Riverine Flood Extent
- 1% Annual Chance Flash Flood Extent
- Reserve / Area of Interest
- Waterbody / Reservoir
- Melbourne Water Retarding Basin
- Commercial Precinct
- River / Creek
- Melbourne Water Stormwater Drain
- Embankment
- Levee
- River Level Gauge
- Rain Gauge
- Municipal Building
- Municipal Depot
- SES Unit Headquarters



**CITY OF MAROONDAH**

Version 3: August 2019

**B - 1% Annual Chance (100yr ARI) Flood Extent**



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## Flood Extent Maps (sourced Melbourne Water GIS)



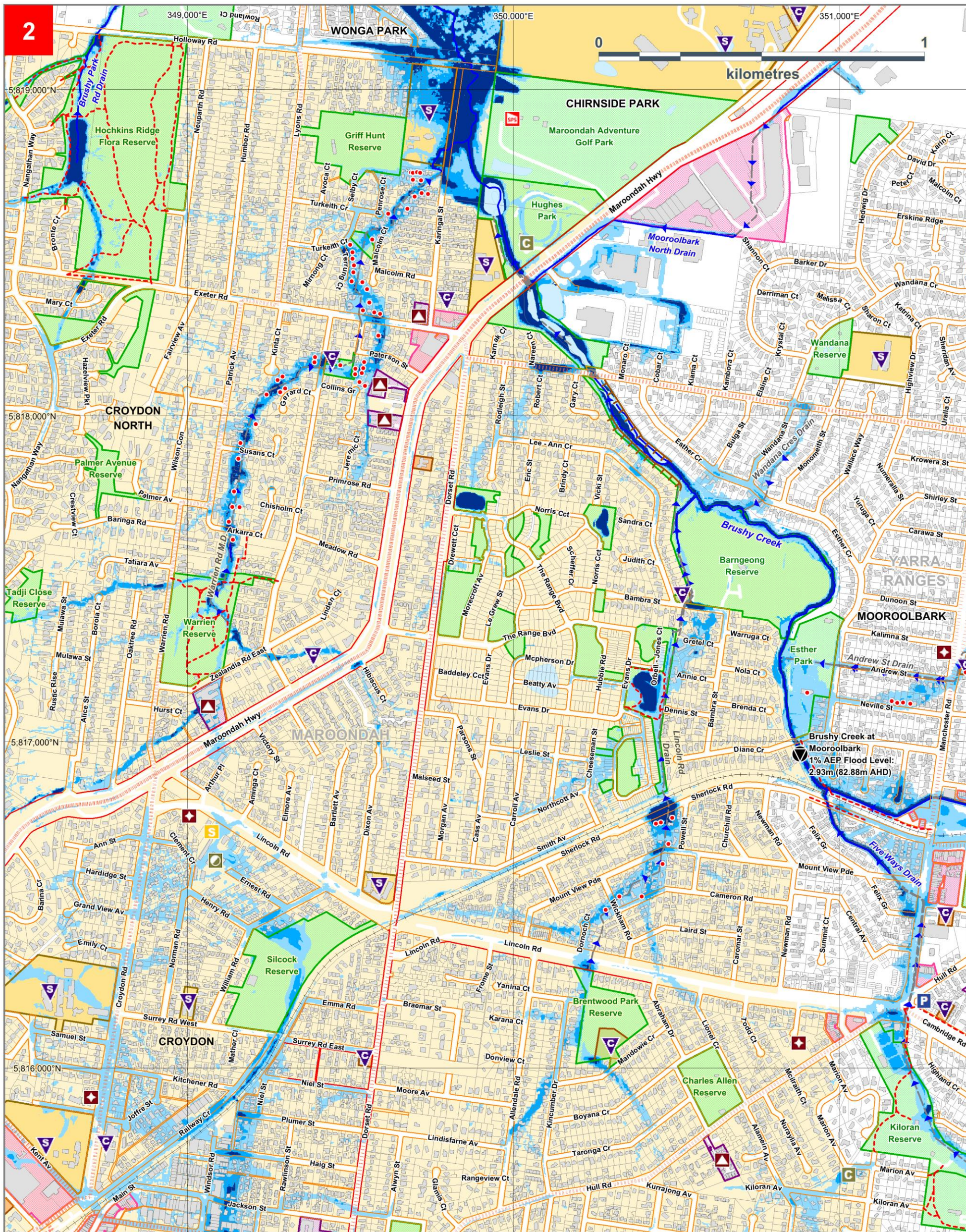
- Building
- Area of Interest
- Waterbody
- Shopping Precinct
- 1% AEP Flood Depth**
- Greater than 60cm
- Between 30cm and 60cm
- Up to 30cm
- Melbourne Water Retarding Basin
- Creek / Waterway
- Bicycle / Walking Trail
- Bus Routes (PTV)
- Melbourne Water Stormwater Drain
- Aged Care Facility
- Place Of Worship
- School / College
- Kindergarten / Child Care
- Sewer Pumping Station
- Sewer Emergency Relief Point



**CITY OF MAROONDAH**  
 1% AEP (100yr ARI) Flooding  
**1. Jumping Creek (Croydon Hills)**

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Jumping Creek flood modelling completed by Engy, February 2019. Local drainage flood modelling completed by Engy, October 2013. Map Produced by VicSES August 2019.



Brushy Creek flood modelling completed by Engeny, February 2019. Local Drainage flood modelling completed by Engeny, October 2013. Map Produced by VICSES August 2019.

## CITY OF MAROONDAH

1% AEP (100yr ARI) Flooding

### 2. Brushy Creek (Croydon North)

- |  |                         |  |                                  |  |   |
|--|-------------------------|--|----------------------------------|--|---|
|  | Building                |  | Creek / Waterway                 |  | Place Of Worship                        |
|  | Waterbody               |  | Melbourne Water Stormwater Drain |  | School / College                        |
|  | Greater than 60cm       |  | Bicycle / Walking Trail          |  | Kindergarten / Child Care               |
|  | Between 30cm and 60cm   |  | Bus Route (PTV)                  |  | 1% AEP Over-Floor Flooding Risk         |
|  | Up to 30cm              |  | Levee                            |  | Police Station                          |
|  | Reserve / Park          |  | Aged Care Facility               |  | Stream Level Gauge & 1% AEP Flood Level |
|  | Shopping Precinct       |  | Community Centre                 |  | Rain Gauge                              |
|  | State Emergency Service |  | Municipal Depot                  |  |   |
|  |                         |  | Sewer Pumping Station            |  |   |



**VICTORIA**  
Melbourne Water

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Mullum Mullum Creek flood modelling completed by Engeny, February 2019. Local drainage flood modelling completed by Engeny, October 2013. Map Produced by VICSES August 2019.

**CITY OF MAROONDAH**  
 1% AEP (100yr ARI) Flooding  
**3. Mullum Mullum Creek (Ringwood)**

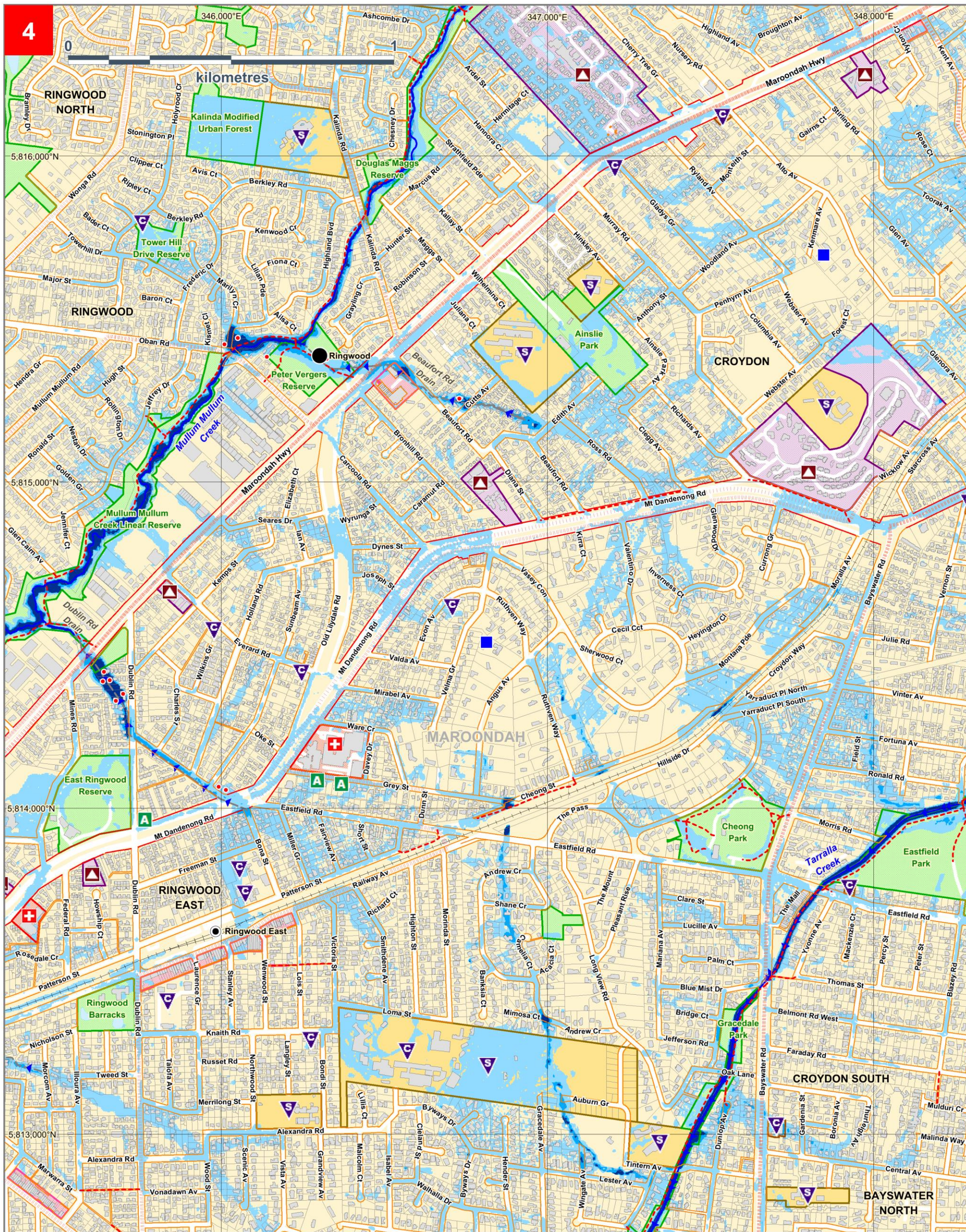
- |                                 |                                  |                                 |
|---------------------------------|----------------------------------|---------------------------------|
| Building                        | Creek / Waterway                 | Place Of Worship                |
| Waterbody                       | Melbourne Water Stormwater Drain | School / College                |
| Melbourne Water Retarding Basin | Bicycle / Walking Trail          | Kindergarten / Child Care       |
| <b>1% AEP Flood Depth</b>       | Bus Route (PTV)                  | 1% AEP Over-Floor Flooding Risk |
| Greater than 60cm               | Ambulance Station                | Fire Station                    |
| Between 30cm and 60cm           | Aged Care Facility               | Police Station                  |
| Up to 30cm                      | Community Centre                 | Sewer Emergency Relief Point    |
| Reserve / Park                  | Hospital                         | Power Terminal Station          |
| Shopping Precinct               | Municipal Offices                | Sewer Pumping Station           |
|                                 |                                  | Retail Water Storage            |



**VICTORIA**  
**Melbourne Water**

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Mullum Mullum Creek flood modelling completed by Engeny, February 2019. Local drainage flood modelling completed by Engeny, October 2013. Map Produced by VICSES August 2019.

## CITY OF MAROONDAH

1% AEP (100yr ARI) Flooding  
**4. Mullum Mullum Creek (Ringwood East)**

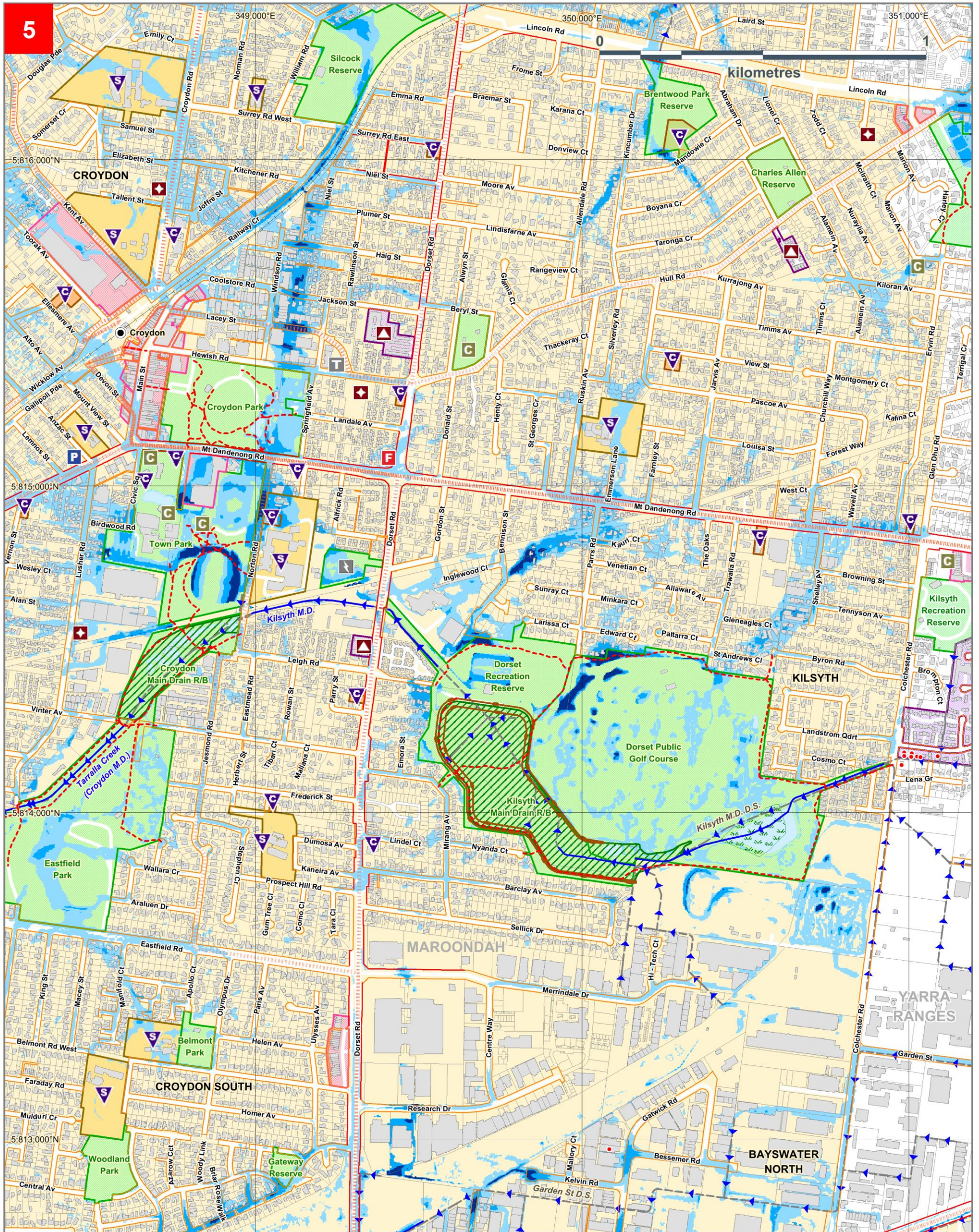
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Taralla Creek flood modelling completed by Engeny, February 2019. Local drainage flood modelling completed by Engeny, October 2013. Map Produced by VICSES August 2019.

### CITY OF MAROONDAH

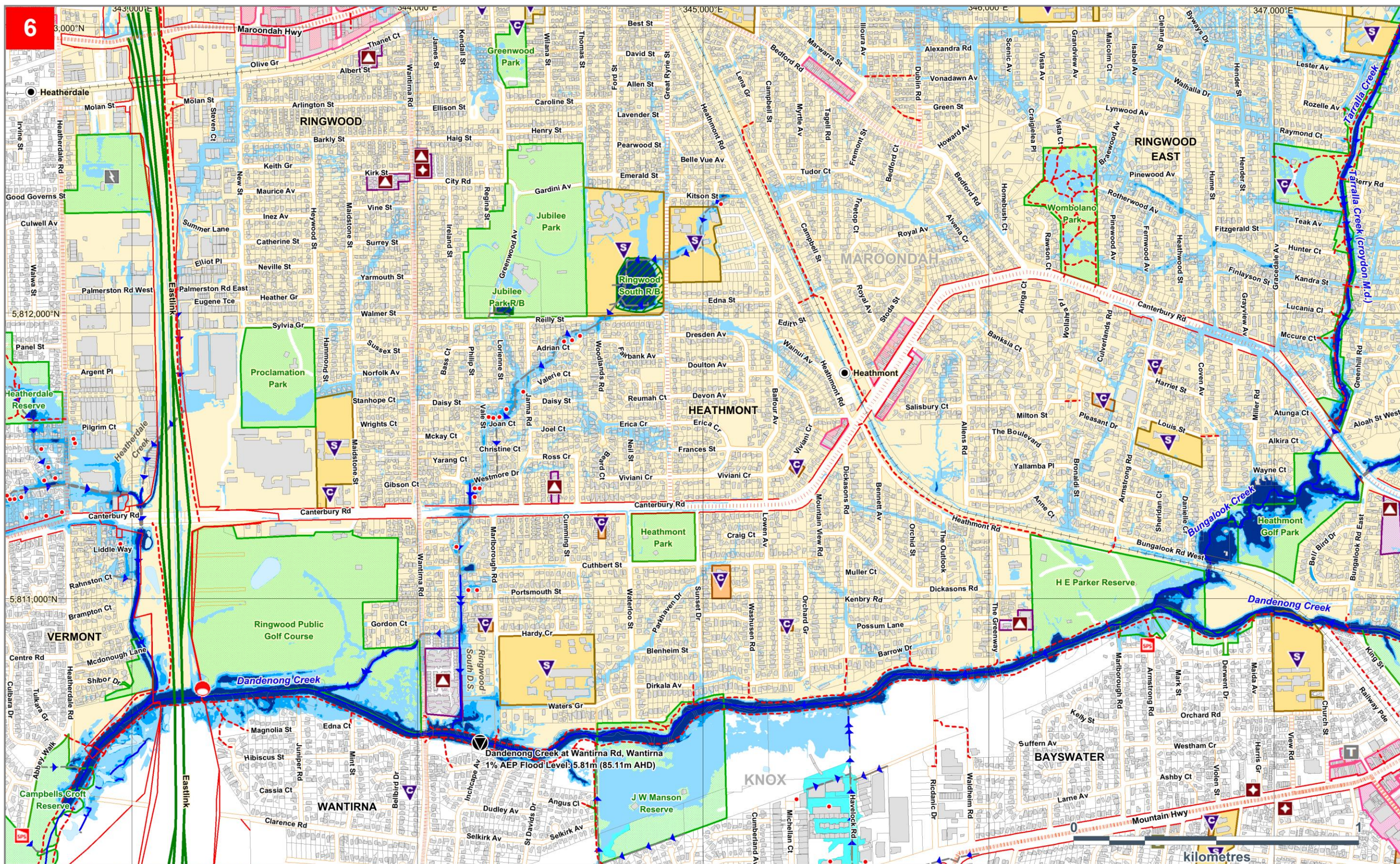
1% AEP (100yr ARI) Flooding  
**5. Taralla Creek & Kilsyth Main Drain (Croydon & Kilsyth)**

- |                                 |                                  |                                 |
|---------------------------------|----------------------------------|---------------------------------|
| Building                        | Creek / Waterway                 | Place Of Worship                |
| Waterbody                       | Melbourne Water Stormwater Drain | School / College                |
| Melbourne Water Retarding Basin | Bicycle / Walking Trail          | Kindergarten / Child Care       |
| Greater than 60cm               | Bus Route (PTV)                  | 1% AEP Over-Floor Flooding Risk |
| Between 30cm and 60cm           | Embankment                       | Police Station                  |
| Up to 30cm                      | Aged Care Facility               | Fire Station                    |
| Reserve / Park                  | Community Centre                 | Power Terminal Station          |
| Shopping Precinct               |                                  | Telephone Exchange              |



**SES VICTORIA** **Melbourne Water**

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Dandenong Creek flood modelling completed by Engery, February 2019. Local Drainage flood modelling completed by Engery, October 2013. Map Produced by VicSES August 2019.

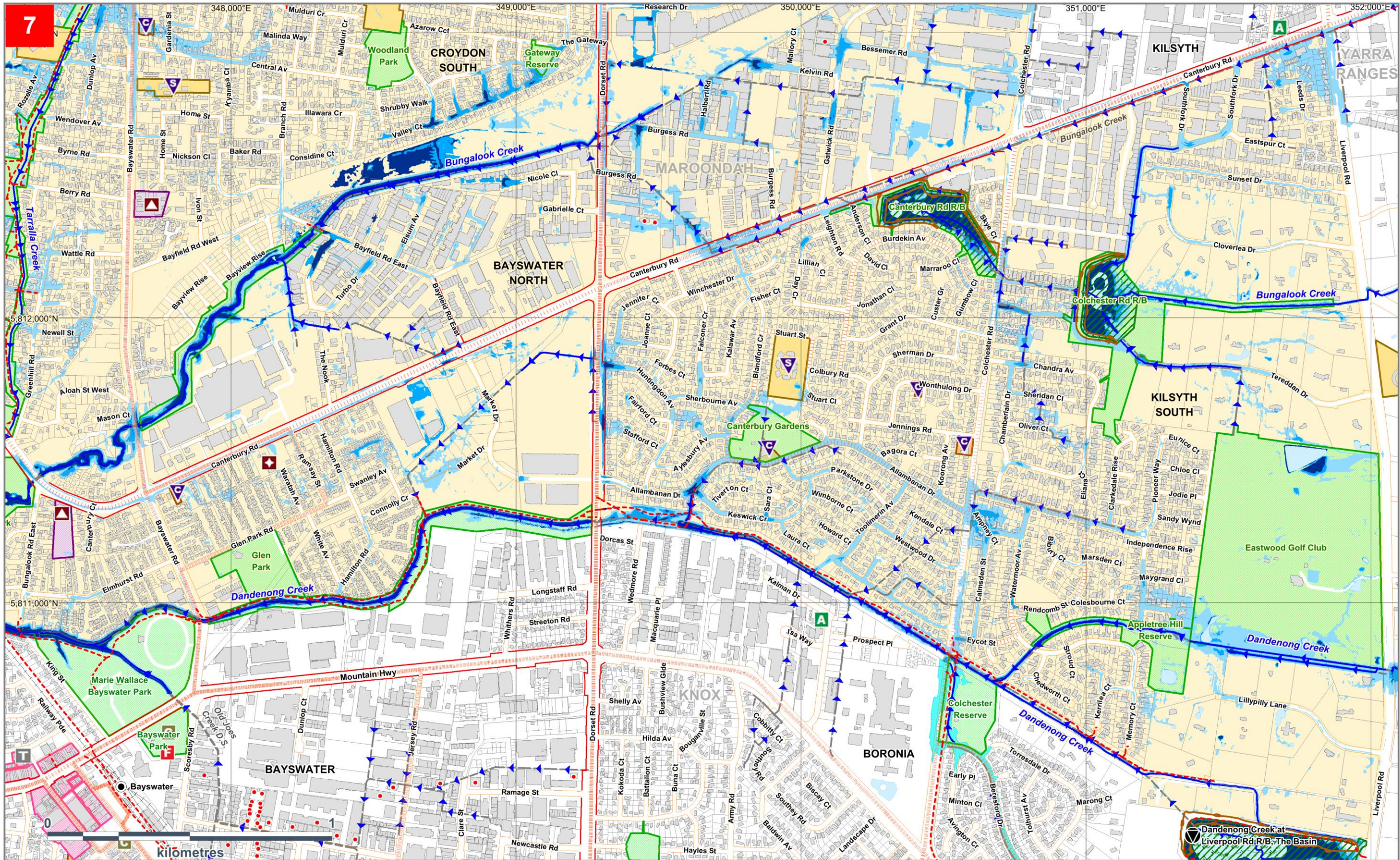
**CITY OF MAROONDAH**  
 1% AEP (100yr ARI) Flooding  
**6. Dandenong Creek (Heathmont)**

- |   |   |                           |                              |                                 |
|---|---|---------------------------|------------------------------|---------------------------------|
| Building                                      | 1% AEP Flood Depth<br>Greater than 60cm | Bicycle / Walking Trail   | Power Terminal Station       | Stream Level Gauge              |
| Area of Interest                              | Between 30cm and 60cm                   | Bus Route (PTV)           | Rain Gauge                   | Telephone Exchange              |
| Waterbody                                     | Up to 30cm                              | Aged Care Facility        | School / College             | 1% AEP Over-Floor Flooding Risk |
| Shopping Precinct                             | Melbourne Water Stormwater Drain        | Child Care / Kindergarten | Sewer Emergency Relief Point |                                 |
| Melbourne Water Retarding Basin               | Creek / Channel                         | Place Of Worship          | Sewer Pumping Station        |                                 |
| 1% AEP Flash Flood Extent (Depth Unavailable) |   |                           |                              |                                 |



**SES VICTORIA**  
**Melbourne Water**

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Bungalook Creek flood modelling completed by Engeny, February 2019. Local Drainage flood modelling completed by Engeny, October 2013. Map Produced by VicSES August 2019.

### CITY OF MAROONDAH

1% AEP (100yr ARI) Flooding  
**7. Bungalook Creek & Dandenong Creek (Bayswater North)**

- |                                 |   |                           |                    |                                 |
|---------------------------------|---|---------------------------|--------------------|---------------------------------|
| Building                        | 1% AEP Flood Depth<br>Greater than 60cm | Bicycle / Walking Trail   | Fire Station       | 1% AEP Over-Floor Flooding Risk |
| Area of Interest                | Between 30cm and 60cm                   | Bus Route (PTV)           | Place Of Worship   | Telephone Exchange              |
| Waterbody                       | Up to 30cm                              | Aged Care Facility        | Rain Gauge         |                                 |
| Shopping Precinct               | Melbourne Water Stormwater Drain        | Ambulance Station         | School / College   |                                 |
| Melbourne Water Retarding Basin | Creek / Channel                         | Community Centre          | Stream Level Gauge |                                 |
|                                 |   | Child Care / Kindergarten |                    |                                 |



**VICTORIA** State Government  
**Melbourne Water**

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## APPENDIX G – CATCHMENT SCHEMATICS

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

Within each Schematic, there are details useful to flood response such as those relating to gauges, towns, rivers, creeks, drains and reservoirs. Historical facts and figures may also be shown.

The schematics also detail the response boundaries for SES Units and local government, and provide a reference link to the corresponding Municipal Flood Emergency Plan.

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

Note that not all waterways or drains are included in the schematics, only those that are likely to contribute to flooding further on along the drainage system. Note also the flow direction; the schematics either flow from the top of the page to the bottom, or vice versa.





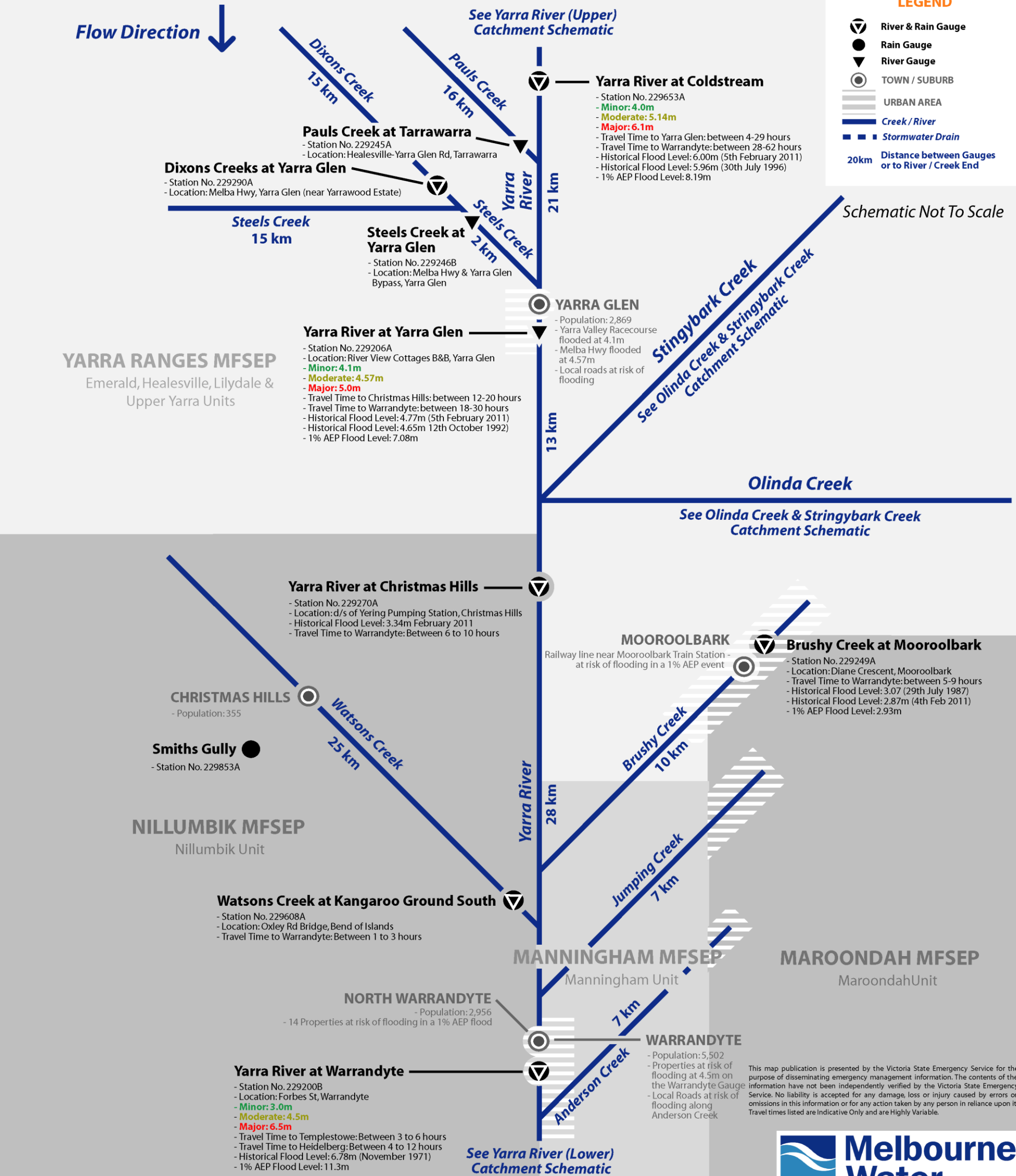
# Yarra River (Middle) Catchment Schematic

Version 4 - August 2019

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



Schematic Not To Scale

**YARRA RANGES MFSEP**  
Emerald, Healesville, Lilydale & Upper Yarra Units

**NILLUMBIK MFSEP**  
Nillumbik Unit

**MANNINGHAM MFSEP**  
Manningham Unit

**MAROONDAH MFSEP**  
Maroondah Unit

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



# Koonung, Ruffey & Mullum Mullum Creeks Catchment Schematic

Version 3 - August 2019

See Yarra River (Lower) Catchment Schematic

## Yarra River

Yarra River at Heidelberg

Yarra River at Templestowe

1.5 km

### BULLEEN

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

### 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

**BOROONDARA MFEP**  
Whitehorse Unit

### Doncaster

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

### TEMPLESTOWE

- 3 properties at risk of flooding over-floor in a 1% AEP event
- Local Roads at risk of flooding in a 1% AEP event

Templestowe East Drain  
4 km

3 km

### Mullum Mullum Creek at Doncaster East

- Station No. 229648A
- Location: Heidelberg-Warrandyte Rd, Doncaster East
- Travel Time to Templestowe: Between 2-5 hours
- Historical Flood Level: 3.75m February 2011
- Historical Flood Level: 3.66m September 1984
- Historical Flood Level: 3.51m December 2003

### Doncaster East

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

Hunt St Drain  
2 km

5 km

### BOX HILL NORTH

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

### BLACKBURN NORTH

- Eastern Freeway at risk of flooding in a 1% AEP event

**WHITEHORSE MFEP**  
Whitehorse Unit

**MANNINGHAM MFEP**  
Manningham Unit

17 km

Mullum Mullum Creek

Glenvale Rd Drain  
2 km

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

### RINGWOOD

- Maroondah Hwy at risk of flooding at three separate locations
- Station No. 586065
- Location: Burnt Bridge - Tennis Club, Ringwood

**MAROONDAAH MFEP**  
Maroondah Unit



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Schematic Not To Scale

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







# Dandenong Creek Catchment Schematic

Version 7 - August 2019

## YARRA RANGES MFEP

Emerald, Lilydale, Healesville & Upper Yarra Units

**Mount Dandenong**  
- Station No. 586090  
- Location: GTV9 Tower, Mount Dandenong

**Bungalook Creek at Fussell Rd Retarding Basin**  
- Station No. 228369A  
- Location: Fussell Road, Montrose (Melway 51K11)  
- Historical Flood Level: 7.23m (18th September 1984)  
- Historical Flood Level: 6.19m (30th July 1996)  
- Spillway Level: 8.15m  
- Embankment Level: 8.4m  
- 1% AEP Flood Level: 8.39m

## YARRA RANGES MFEP

Emerald, Lilydale, Healesville & Upper Yarra Units

**Dandenong Creek at Liverpool Rd Retarding Basin**  
- Station No. 228373A  
- Location: Liverpool Road, The Basin (Melway 65F4)  
- Historical Flood Level: 6.43m (22nd January 1994)  
- Spillway Level: 5.4m  
- Full Supply Level: 6.0m  
- Embankment Level: 6.6m

Flow Direction ↓

## MAROONDAH MFEP

Maroondah Unit

## Dandenong Creek at Wantirna

- Station No. 228357A  
- Location: Wantirna Road, Wantirna  
- Travel Time to Rowville: Between 1-14 hours  
- Historical Flood Level: 2.78m (5th February 2011)  
- Historical Flood Level: 2.73m (3rd February 2005)  
- Significant Level: 2.5m (Spillway at Police Rd Retarding Basin will start operating)  
- 1% AEP Flood Level: 4.9m

## WHITEHORSE MFEP

Whitehorse Unit

**KNOXFIELD**  
- Knox City S.C. Carpark flooding at 4.7m on the Blind Creek RB Gauge - Residential properties and Knox City Shopping Centre at risk of flooding at 6.3m - on the Blind Creek RB Gauge

**BAYSWATER**  
- 244 properties at risk of flooding over-floor in a 1% AEP event

**FERNTREE GULLY**  
- 68 properties at risk of flooding over-floor in a 1% AEP event

## MONASH MFEP

Monash Unit

## Blind Creek at Wantirna South

- Station No. 228351B  
- Location: High Street Rd, Wantirna South (Melway 72E1)  
- Travel Time to Rowville: Between 1-13 hours  
- Historical Flood Level: 3.65m (13th December 1993)  
- Historical Flood Level: 2.8m (3rd December 2003)

## Glen Waverley

Station No. 586197 - Location: Mt View Reservoir, - Waverley Rd, Glen Waverley

## WHEELERS HILL

- 51 properties at risk of flooding in a 1% AEP event  
- Ferntree Gully Rd flooded at 5.0m on the Police Rd Gauge  
- Wellington Rd flooded at 5.5m on the Police Rd Gauge

## Blind Creek at Blind Creek Retarding Basin

- Station No. 228366A  
- Location: Rear of Knox City Shopping Centre  
- Travel Time to Wantirna South: Between 0-3 hours  
- Historical Flood Level: 5.14m (3rd February 2005)  
- Spillway Level: 5.59m  
- Embankment Level: 6.39m  
- 1% AEP Flood Level: 6.4m

**UPPER FERNTREE GULLY**  
- Burwood Hwy near Mount Dandenong Tourist Rd at risk of flooding a 5% AEP event

## GREATER DANDENONG MFEP

Greater Dandenong Unit

## Dandenong Creek at Police Rd Retarding Basin

- Station No. 228368A  
- Location: Police Road, Rowville (Melway 81E6)  
- Minor: 4.6m; Moderate: 5.0m; Major: 5.5m  
- Travel Time to Dandenong: Between 2-9 hours  
- Travel Time to Patterson Lakes: Between 2-17 hours  
- Historical Flood Level: 5.69m (18th September 1984)  
- Historical Flood Level: 5.56m (3rd February 2005)  
- Historical Flood Level: 5.45m (5th February 2011)  
- Spillway Level: 4.28m  
- Levee Height (Crest) at Heatherton Rd: 5.25m  
- 1% AEP Flood Level: 5.5m

## DANDENONG

- 1 property at risk of flooding a 1% AEP event  
- Heatherton Rd at risk of flooding at 5.4m on the Police Rd RB Gauge

## Dandenong Creek at Keysborough

- Station No. 228356B  
- Location: Eastlink Crossing, Keysborough (Melway 94H5)  
- Historical Flood Level: 3.50m (5th February 2011)  
- Levee Height: 5.2m  
- 1% AEP Flood Level: 4.5m

## Corhanwarrabul Creek at Scoresby

- Station No. 228393A  
- Location: Stud Road, Scoresby (Melway 72J9)  
- Travel Time to Rowville: Between 2-12 hours  
- Historical Flood Level: 2.67m (3rd February 2005)  
- Historical Flood Level: 2.36m (5th February 2011)

## Monbulk Creek at Lysterfield

- Station No. 228229B  
- Location: Monbulk Creek Retarding Basin, Lysterfield (Melway 83J2)  
- Historical Flood Level: 8.56m (5th February 2011)  
- Spillway Level: 9.33m  
- Full Supply Level: 10.8m  
- Embankment Level: 11.3m

**LEGEND**

- Stream & Rain Gauge
- Rain Gauge
- Stream Gauge
- TOWN / SUBURB
- URBAN AREA
- Creek / River
- Stormwater Drain
- 20km Distance between Gauges or to River / Creek End

Schematic Not To Scale

## KINGSTON MFEP

Chelsea & Moorabbin Units

Port Phillip Bay



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## APPENDIX H - SEVERE WEATHER STORM EVENTS

### Overview

Storm events the City of Maroondah 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. Maroondah 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 and its proximity to the Dandenong Ranges.

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 Maroondah 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 1 below is a breakdown of requests by suburb and damage type during the period July 2009 and January 2016.

VICSES Request for Assistance (July 2009 – June 2019)					
Suburb	Building Damage	Flooding	Other*	Tree Down	Tree Down Traffic Hazard
Bayswater North	80	37	1	185	139
Croydon	276	164	2	593	364
Croydon Hills	18	11	1	51	29
Croydon North	84	17	1	170	78
Croydon South	48	8	0	100	35
Heathmont	146	19	0	255	99
Kilsyth	20	4	0	24	63
Kilsyth South	19	3	0	26	43
Park Orchards	1	0	0	2	3
Ringwood	195	25	1	316	143
Ringwood East	108	16	0	230	143
Ringwood North	103	14	1	247	75
Vermont	27	1	0	7	4
Warranwood	49	6	0	86	49
Wonga Park	3	0	0	1	7

Table H1 – Breakdown of severe weather RFAs received by VICSES Maroondah Unit by suburb

\* Loose Debris / Object, Rescue Structure Collapse, Rescue Persons Trapped, Sandbag Request

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

VICSES Request for Assistance (July 2009 – June 2019)

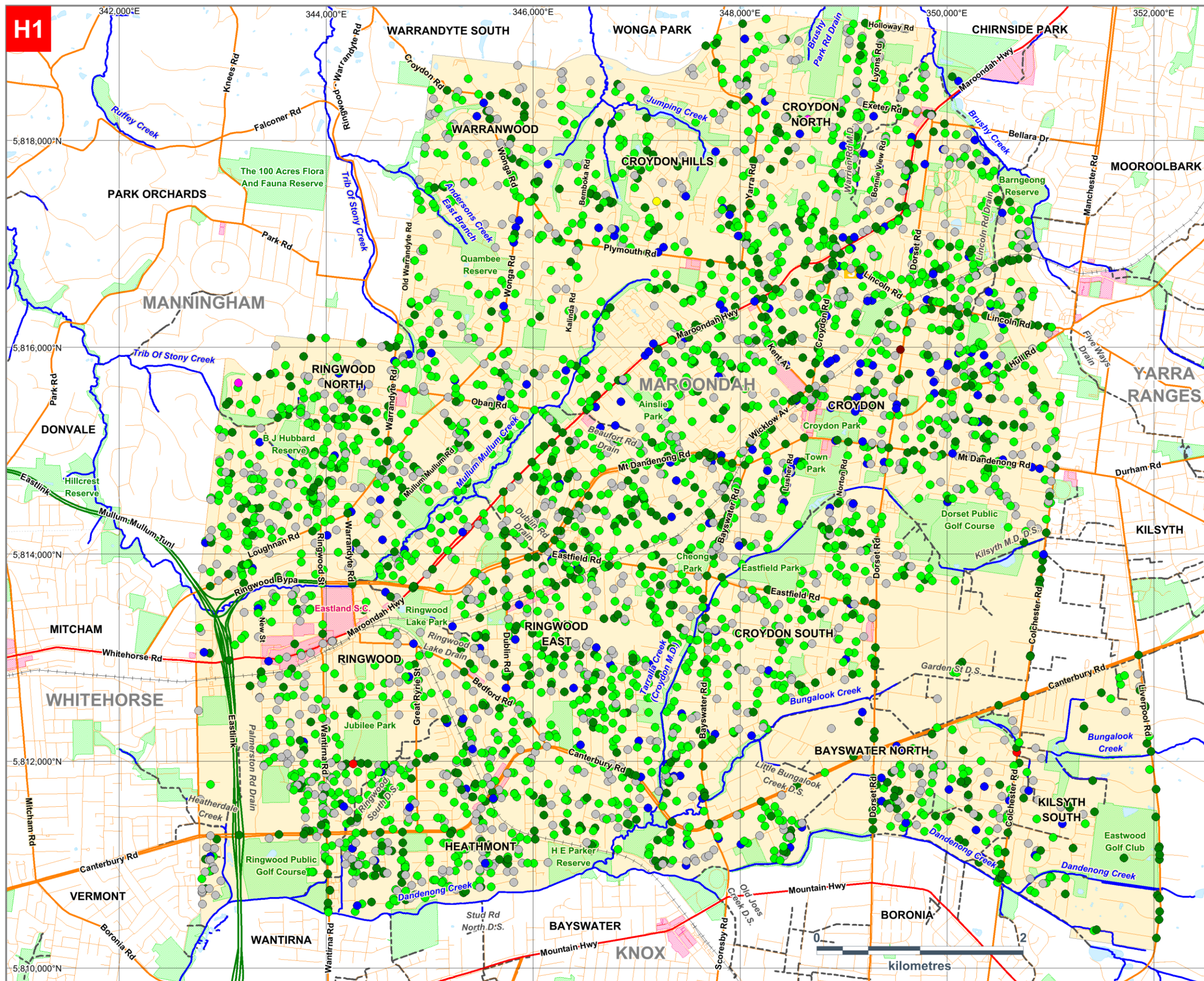
Date	Building Damage	Flooding	Other*	Tree Down	Tree Down Traffic Hazard
July 2009	1	0	0	2	2
August 2009	27	1	0	52	13
September 2009	4	0	0	6	4
October 2009	1	0	0	1	3
November 2009	14	4	0	20	6
December 2009	2	0	0	6	4
January 2010	5	0	0	21	8
February 2010	4	0	0	10	6
March 2010	21	1	0	15	3
April 2010	3	0	0	4	1
May 2010	2	0	0	4	1
June 2010	30	0	0	33	21
July 2010	1	0	0	7	10
August 2010	14	1	0	37	14
September 2010	13	0	0	42	11
October 2010	18	9	0	19	18
November 2010	12	3	0	17	5
December 2010	36	80	1	43	17
January 2011	17	1	1	40	23
February 2011	50	85	0	56	23
March 2011	4	4	0	16	13
April 2011	2	2	0	6	1
May 2011	3	0	0	13	3
June 2011	11	0	0	19	13
July 2011	5	0	0	5	3
August 2011	4	0	0	3	6
September 2011	9	0	0	15	8
October 2011	1	3	0	6	6
November 2011	21	34	0	21	14
December 2011	12	9	0	11	11
January 2012	11	0	0	43	12
February 2012	48	15	0	141	28
March 2012	5	2	0	26	26
April 2012	11	2	0	13	11
May 2012	6	3	0	5	6
June 2012	6	0	0	4	14
July 2012	3	1	0	3	4
August 2012	5	0	0	13	24
September 2012	19	0	0	69	33
October 2012	0	1	0	5	8
November 2012	2	0	0	5	2
December 2012	8	0	0	21	8
January 2013	4	0	0	11	19
February 2013	20	4	0	12	8
March 2013	9	0	0	27	13
April 2013	0	0	0	3	1
May 2013	1	0	0	5	8
June 2013	10	8	0	5	3
July 2013	5	0	0	12	17
August 2013	36	0	0	61	26
September 2013	14	0	0	45	18
October 2013	22	0	0	77	22
November 2013	1	0	0	7	5
December 2013	9	0	0	14	9
January 2014	11	0	0	49	20
February 2014	4	1	0	17	6
March 2014	2	0	0	4	5
April 2014	10	0	0	10	14
May 2014	1	0	0	6	6
June 2014	18	0	0	35	12

VICSES Request for Assistance (July 2009 – June 2019)					
Date	Building Damage	Flooding	Other*	Tree Down	Tree Down Traffic Hazard
July 2014	18	0	0	35	16
August 2014	11	0	0	7	3
September 2014	48	6	0	41	11
October 2014	6	0	0	17	7
November 2014	7	0	0	14	12
December 2014	9	0	0	28	10
January 2015	66	2	0	94	30
February 2015	6	0	0	13	18
March 2015	10	0	0	35	9
April 2015	5	0	0	2	1
May 2015	2	2	0	7	5
June 2015	1	0	0	4	3
July 2015	2	1	0	9	16
August 2015	4	0	0	2	5
September 2015	0	1	0	4	4
October 2015	3	0	0	13	10
November 2015	8	1	0	60	22
December 2015	7	0	0	18	30
January 2016	14	2	0	29	15
February 2016	4	0	0	11	11
March 2016	22	0	0	25	22
April 2016	3	0	0	3	2
May 2016	20	0	0	37	30
June 2016	12	1	0	11	6
July 2016	11	0	0	38	17
August 2016	5	1	0	4	8
September 2016	2	5	0	4	1
October 2016	30	72	0	42	1
November 2016	8	0	0	15	6
December 2016	24	17	0	18	15
January 2017	4	0	0	20	11
February 2017	3	0	0	19	11
March 2017	5	1	1	14	13
April 2017	5	0	0	5	7
May 2017	3	0	0	2	1
June 2017	2	0	0	1	2
July 2017	0	0	0	4	3
August 2017	1	0	0	4	3
September 2017	4	0	0	8	10
October 2017	1	0	0	9	3
November 2017	0	0	0	5	3
December 2017	35	10	0	29	26
January 2018	6	0	0	18	7
February 2018	7	0	0	40	22
March 2018	7	0	0	13	11
April 2018	7	0	0	8	11
May 2018	7	0	0	9	2
June 2018	11	0	0	2	4
July 2018	6	0	0	14	15
August 2018	5	0	0	9	4
September 2018	5	0	0	2	4
October 2018	4	0	0	0	3
November 2018	10	1	0	14	14
December 2018	7	1	0	8	5
January 2019	5	24	0	6	1
February 2019	2	13	0	9	1
March 2019	4	2	0	12	8
April 2019	2	0	0	5	3
May 2019	1	1	0	9	4
June 2019	2	1	0	2	5

Table H2 – Breakdown of severe weather RFAs received by VICSES Maroondah Unit by month

\* Loose Debris / Object, Rescue Structure Collapse, Rescue Persons Trapped, Sandbag Request

## VICSES Request for Assistance Mapping



- Reserve / Area of Interest
  - Waterbody / Reservoir
  - Commercial Precinct
  - River / Creek
  - Melbourne Water Stormwater Drain
  - SES Unit Headquarters
- Severe Weather RFAs (Storm or Flood)**
- Building Damage (1177)
  - Flooding (325)
  - Loose Debris / Objects (1)
  - Rescue Persons Trapped (3)
  - Rescue Structure Collapse (2)
  - Sandbag Request (1)
  - Tree Down (2294)
  - Tree Down Traffic Hazard (1278)

N

**CITY OF MAROONDAH**

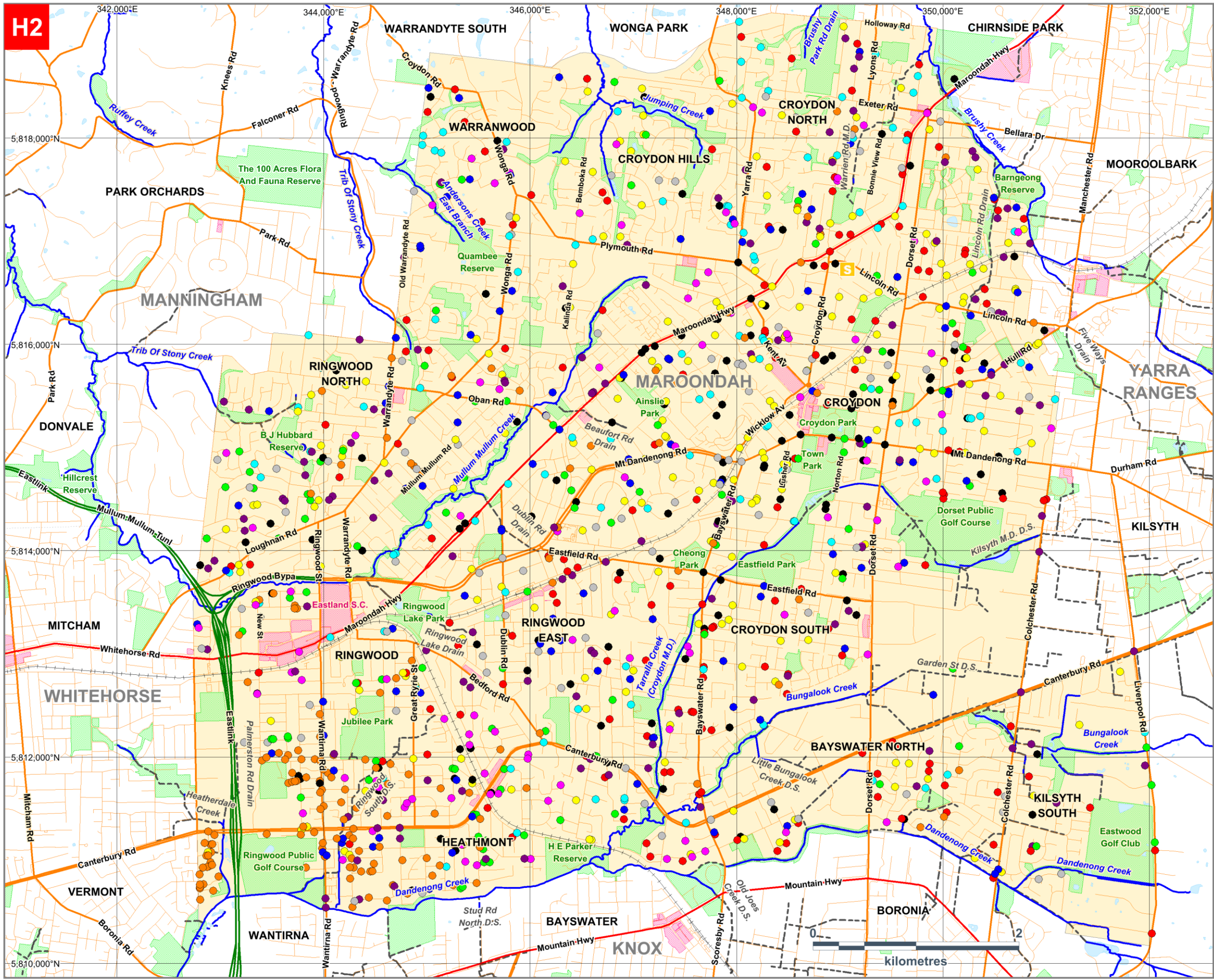
Version 3: August 2019

**H1 - Severe Weather Request for Assistance (RFA) Received by Type (Jul 2009 - Jun 2019)**



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- Reserve / Area of Interest
- Waterbody / Reservoir
- Commercial Precinct
- River / Creek
- Melbourne Water Stormwater Drain
- SES Unit Headquarters

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

December 2010	(177)
February 2011	(214)
February 2012	(232)
September 2012	(121)
August 2013	(123)
October 2013	(121)
September 2014	(106)
January 2015	(192)
October 2016	(145)
December 2017	(100)



## CITY OF MAROONDAH

Version 3: August 2019

H2 - Severe Weather Request for Assistance (RFA) Received by Month (Jul 2009 - Jun 2019)



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