City of Whitehorse

Storm and Flood Emergency Plan

A Sub-Plan of the Municipal Emergency Management Plan

For the City of Whitehorse
and
VICSES Whitehorse Unit

Final Version 4.0 September 2016

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25	Water Yarra Valley Water
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28	Others – refer to MEMP distribution list

Document Transmittal Form / Amendment Certificate

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

Suggestions for amendments to this Plan should be forwarded to:

Mr Steven Morison
Manager Compliance
City of Whitehorse
Locked Bag 2
Nunawading Delivery Centre Vic 3110 or

steven.morison@whitehorse.vic.gov.au

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

Amendment Number	Date of Amendment	Amendment Entered By	Summary of Amendment
1		S. Morison	Plan development
2	07/02/2012	L Daniel	Conversions to new Template V2.2 Oct2011
3	25/05/2015	Ross Butler	Update of Appendix A, B, C, F and addition of Appendix G
4	16/05/2016	Rob Gibney A Barnard	Update inclusion of Appendix H and I

This Plan will be maintained by Whitehorse City Council as a sub plan of the MEMP and is available at www.whitehorse.vic.gov.au or from the MERO

List of Abbreviations & Acronyms

The following abbreviations and acronyms are used in the Plan:

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

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Part 1. INTRODUCTION

Municipal Endorsement

This Municipal Storm and Flood Emergency Plan (MSFEP) has been prepared by a sub-committee of the Municipal Emergency Management Planning Committee (MEMPC) 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 City of Whitehorse Municipal Emergency Management Plan (MEMP), is consistent with the Emergency Management Manual Victoria (EMMV) and the Victoria Flood Management Strategy (DNRE, 1998a), and takes into account the outcomes of the Community Emergency Risk Assessment (CERA) process undertaken by the Municipal Emergency Management Planning Committee (MEMPC).

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

This MFEP is a result of the cooperative efforts of the City of Whitehorse Flood Planning Committee (MFPC) and its member agencies.

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

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

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The Municipality

An outline of the City of Whitehorse 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.

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 Whitehorse.

As such, the scope of the Plan is to:

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

Municipal Storm and Flood Planning Committee (MSFPC)

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

- VICSES (Unit Controller & Regional Officer – Emergency Management) **(Chair)**
- Whitehorse City Council (Municipal Emergency Resource Officer (MERO) or deputy
- VicPol (City of Whitehorse Municipal Emergency Response Co-ordinator) (MERC) or deputy,
- Department of Health and Human Services (DHHS) as required,
- Department of Environment, Land, Water and Planning (DELWP) as required,
- Water Authorities as required,
- Bureau of Meteorology as required,
- Local community representatives and
- Other agencies as required

Responsibility for Planning, Review & Maintenance of this Plan

This MSFEP must be maintained in order to remain effective.

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

The MSFPC 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;

- After the occurrence of a significant storm or flood event within the Municipality.

Endorsement of the Plan

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

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Part 2. PREVENTION / PREPAREDNESS ARRANGEMENTS

Community Awareness for all Types of Flooding

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

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

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

Structural Flood Mitigation Measures

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

Non-structural Flood Mitigation Measures

2.1.1 Exercising the Plan

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

2.1.2 Storm and Flood Warning

Arrangements for storm and flood warning are contained within the State Flood Emergency Plan (see http://www.ses.vic.gov.au/em-sector/vicses-emergency-plans), the EMMV (Part 3.11) and on the BOM website (see http://www.bom.gov.au).

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

2.1.3 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.

No Flood Wardens have been established for the City of Whitehorse.

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Part 3. RESPONSE ARRANGEMENTS

Introduction

3.1.1 Activation of Response

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

The IC/ VICSES Central Region RDO will activate agencies as required and documented in the State storm Emergency Plan and the State Flood Emergency Plan (see http://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 or flood within the City of Whitehorse. These agencies will be engaged through the EMT.

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

3.1.3 Municipal Emergency Coordination Centre (MECC)

The function, location, establishment and operation of the MECC are detailed in the Whitehorse City Council MEMP.

Liaison with the MECC will be through the VICSES Central Region RDO/ IC or established ICC. 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 State's arrangements provide for further resources to be made available, firstly from neighbouring Municipalities (on a regional basis) and then on a State-wide basis.

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

Strategic Control Priorities

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

1. Protection and preservation of life is paramount - this includes:

   a. Safety of emergency services personnel; and

   b. Safety of community members including vulnerable community members and visitors/tourist located within the incident area.

2. Issuing of community information and community warnings detailing incident information that is timely, relevant and tailored to assist community members make informed decisions about their safety;

3. Protection of critical infrastructure and community assets that supports community resilience;

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

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

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

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

Command, Control and Coordination

The Command, Control and Coordination arrangements in this Plan must be consistent with those detailed in the VICSES Central Region Storm and Flood Emergency Plans and State 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**.

3.1.4 Control

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

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

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

3.1.5 Incident Controller (IC)

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

3.1.6 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:

- Mulgrave
- Sunshine
- Ferntree Gully
- Woori Yallock

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3.1.7 Divisions and Sectors

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

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

Division	Sector
Whitehorse Unit)	To be allocated on a needs basis

Pre-determined Division Command locations are:

Whitehorse SES Unit
1 Ailsa Street
Box Hill South Vic 3130
Ph.: 03 9890 0069

Currently Whitehorse Unit Local Headquarters (LHQ) has been identified as the Divisional Command Point for events in the City of Whitehorse Municipality.

Pre-determined Sector Command locations are to be allocated on a as needs basis

3.1.8 Incident Management Team (IMT)

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

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

3.1.9 Emergency Management Team (EMT)

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

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

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

3.1.10 On Receipt of a Flood Watch / Severe Weather Warning

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

- Review storm and flood intelligence to assess likely storm and flood consequences
- Monitor weather and flood information – (see www.bom.gov.au)
- Assess Command and Control requirements.
- Review local resources and consider needs for further resources regarding personnel, property protection, flood rescue and air support

- Notify and brief appropriate officers. This includes RCC (if established), SCC (if established), Council or other emergency services through the EMT.
- Assess ICC readiness (including staffing of IMT and EMT) and open if required
- Ensure flood bulletins and community information are prepared and issued to the community
- Monitor watercourses and undertake reconnaissance of low-lying areas
- Develop media and community information management strategy
- Ensure flood mitigation works are being checked by owners
- Develop and issue incident action plan, if required
- Develop and issue situation report, if required

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

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

- Develop an appreciation of current flood levels and predicted levels. Are floodwaters, rising, peaking or falling?
- Review flood intelligence to assess likely flood consequences. Consider:
    - What areas may be at risk of inundation
    - What areas maybe at risk of isolation
    - What areas maybe at risk of indirect affects as a consequence of power, gas, water, telephone, sewerage, health, transport or emergency service infrastructure interruption
    - The characteristics of the populations at risk
- Determine what the at-risk community need to know and do as the flood or storm develops.
- Warn the at-risk community including ensuring that an appropriate warning and community information strategy is implemented including details of:
    - The current storm or flood situation
    - Storm and/or flood predictions
    - What the consequences of predicted levels may be
    - Public safety advice
    - Who to contact for further information
    - Who to contact for emergency assistance
- Liaise with relevant asset owners as appropriate (i.e. water and power utilities)
- Implement response strategies as required based upon flood/ storm consequence assessment.
- Continue to monitor the flood situation – www.bom.gov.au/vic/flood/
- Continue to conduct reconnaissance of low-lying areas

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Community Information and Warnings

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

Community information and warnings communication methods available include:

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

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

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

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

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

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

DHHS will coordinate information regarding public health and safety precautions.

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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.

All Whitehorse City Council media enquiry must be referred to Council's Communications team as detailed in the MEMP.

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 the storm or flooding. This information may then be used to provide the basis for further needs assessment and recovery planning by applicable recovery agencies.

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

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

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 Whitehorse MEMP.

Response to Flash Flooding

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

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

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

Due to the rapid development of flash flooding, it will often be difficult to establish evacuation (relief) centres ahead of actually triggering the evacuation. This is normal practice but this is insufficient justification for not adopting evacuation and these facilities should be established at the earliest possible time.

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

Evacuation

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

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

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

Refer to Part 3 of the EMMV for guidance on evacuations for flood emergencies.

Refer to **Appendix D** of this Plan for detailed evacuation arrangements for the City of Whitehorse.

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.

Aircraft Management

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

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

Resupply

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

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

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

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

Essential Community Infrastructure and Property Protection

Essential Infrastructure and Property (e.g. road, telecommunications, utilities 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.

Whitehorse City Council maintains a small stock of sandbags at Council's depot and back-up supplies are available through the VICSES Regional Headquarters. The Incident Controller will determine the priorities related the use of sandbags, which will be consistent with the strategic priorities and the VICSES Sandbag Policy.

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

Property may be protected by:

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

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

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 Whitehorse.

Road Closures

Whitehorse 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 VicRoads and Whitehorse Council staff of the need to erect warning signs and / or of closure of roads and bridges under its jurisdiction. VicRoads are responsible for designated main roads and highways and Councils are responsible for the designated local and regional road network.

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

Dam Failure

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

Major dams with potential to cause structural and community damage within the Municipality are contained in **Appendix A**. Further information can also be sourced through DELWP and/or Melbourne Water.

Waste Water related Public Health Issues and Critical Sewerage Assets

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

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

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

After Action Review

VICSES will coordinate the after action review arrangements of storm or 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.

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Part 4. EMERGENCY RELIEF AND RECOVERY ARRANGEMENTS

General

Arrangements for recovery from a storm and/or flood incident within the City of Whitehorse is detailed in the City of Whitehorse MEMP and the Relief/Recovery Sub-plan.

Emergency Relief

The IC determines the need for Emergency Relief Services in accordance with Part 4 of the EMMV. ICs are responsible for ensuring that relief arrangements have been considered and implemented where required under the State Emergency Relief and Recovery Plan (Part 4 of the EMMV). These should be carried out in line with the Nillumbik MEMP (ERC sub-plan).

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

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

Details of the relief arrangements are available in the MEMPlan.

Animal Welfare

Matters relating to the welfare of livestock and wildlife (including feeding and rescue) are to be referred to DEDJTR and DELWP. Domestic animal matters will be addressed via Whitehorse City Council's Municipal Emergency Management Pets in Emergencies Plan.

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.

Requests for emergency supply and/or delivery of fodder to stranded animals or for animal rescue should be referred through the MERO.

Transition from Response to Recovery

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

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APPENDIX A - FLOOD THREATS FOR CITY OF WHITEHORSE

C1 GENERAL

The City of Whitehorse is situated approximately 15 kilometres from the Melbourne CBD. Whitehorse's suburbs include Blackburn, Blackburn North, Blackburn South, Box Hill, Box Hill North, Box Hill South, Burwood, Burwood East, Forest Hill, Mitcham, Mont Albert, Mont Albert North, Nunawading, Surrey Hills, Vermont and Vermont South. The Council covers an area of just under 65 km^2 and is home to over 150,000 residents. Gardiners Creek, Dandenong Creek, Koonung Creek and their tributaries make up the majority of the waterways within the Council.

The Eastern Freeway, Whitehorse and Burwood Highways, and Canterbury and Highbury Roads are the major roads oriented East-West. Warrigal, Elgar, Station, Middleborough, Blackburn, Springvale and Mitcham Roads are the major traffic routes oriented North-South.

The municipality covers an area of rolling hills with well-defined valley floors, creek and stream lines. There are no major waterways with extremely large catchments where floods may pond for a period of days and weeks.

Flooding did not trouble many of the early settlers, but as urbanisation intensified, the percentage of impervious areas increased. This has resulted in more frequent and larger instances of overland flooding. Most of the City of Whitehorse is fully developed and is now undergoing a phase of redevelopment, with increases in population density and intensification of land use, particularly along the main transport routes. As a result, the potential for increased flood risk and potential danger has increased and needs to be managed in a proactive manner. The key flood risks are likely to be associated with relatively short and intense rainfall events of a few hours duration, but extended long-term rainfall over several days will also create risks and social disruption.

RIVERINE FLOODING

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

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

Water level rises through Whitehorse tend to be quick following a heavy rainfall event as the major watercourses in the Municipality are all at the stages of their upper catchments. As such, flooding along the Whitehorse stretches of the Gardiners; Koonung; & Mullum Mullum Creeks will generally occur with quick rises and falls, the exception being Dandenong Creek which due to the flat topography in the area can see slow water movement with more prolonged inundation around Vermont South.

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FLASH FLOODING & OVERLAND FLOWS

Short Duration, high intensity rainfall (usually associated with thunderstorms) can also cause localised flooding within the urbanised areas and some rural areas of the Municipality and 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 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, particularly in the more urbanised parts of the Municipality Blocked or capacity impaired stormwater drains can also lead to overland flows and associated flooding.

Because of the hilly nature of the Municipality, flash flooding and overland flows tend to be confined and fast moving. The high velocities that the natural topography creates by channelling the water pose a serious safety risk.

DESCRIPTION OF MAJOR WATERWAYS & DRAINS

Gardiners Creek rises in the centre of the City of Whitehorse through Blackburn, being fed by a number of drains and channels in Blackburn North, Blackburn South and Forest Hill. The creek then flows southwest, exiting the Municipality through Burwood into the City of Monash and Ashwood. See **Appendix G** for a schematic of Gardiners Creek.

Dandenong Creek rises in the foothills of the Dandenong Ranges in the Shire of the Yarra Ranges, flowing through the City of Knox before forming the south-eastern boundary of the City of Whitehorse at the Winton Wetland on the northern side of Boronia Rd. Dandenong Creek flows south at this point, passing under the Burwood Hwy at Vermont South and flowing into the City of Monash. See **Appendix G** for a schematic of Dandenong Creek

Koonung Creek rises in Nunawading and forms the northern boundary of the majority of the City of Whitehorse. The creek flows west, straddling the northern boundary of Box Hill North and leaving the Municipality at its north-western tip before joining up with the Yarra River in the City of Manningham. See **Appendix G** for a schematic of Koonung Creek.

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

Melbourne Water Drains & Waterways	Suburb/s	Melbourne Water Drains & Waterways	Suburb/s
Arnott Street Drain	Mont Albert North	Fulton Road Drain	Box Hill South & Blackburn South
Blackburn North Drain	Blackburn	Gardiners Creek	Burwood, Blackburn, Box Hill & Box Hill South
Blackburn South Drain	Blackburn, Blackburn South & Forest Hill	Heatherdale Creek Catchment	Mitcham & Vermont
Box Hill North Main Drain	Mont Albert & Mont Albert North	Koonung Creek	Blackburn North, Box Hill North, Mont Albert North & Nunawading
Box Hill South Main Drain	Box Hill & Box Hill South	Laburnum St Main Drain	Blackburn
Burwood Main Drain	Burwood	Lake Road Drain	Blackburn & Nunawading
Burwood South Drain System	Vermont South	McComas Grove Drain	Burwood
Bushy Creek Drain	Box Hill North & Mont Albert North	Mullum Mullum Creek	Mitcham
Collins Street Main Drain	Box Hill	Nunawading Outfall	Vermont South
Dandenong Creek	Vermont & Vermont South	Severn St Main Drain	Box Hill, Box Hill North & Mont Albert North
Dunlavin Road Drain	Nunawading	South Parade Main Drain	Blackburn
East Burwood Drain System	Vermont South	Stott Street Drain	Burwood
Eley Road East Drain	Blackburn South & Burwood East	Vermont East Drain System	Vermont South
Eley Road West Drain	Box Hill South	Vermont South Drain System	Vermont & Vermont South
Forest Hill Drain	Blackburn, Forest Hill, Nunawading & Vermont		

Table A1 – Melbourne Water Drains and Waterways within the City of Whitehorse

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FLOOD MITIGATION SYSTEMS

Flood mitigation has predominantly been developed in the form of 13 Retarding Basins, and one Levee. 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 Level	ANCOLD Hazard Rating	Houses In Flow Path (dam breach)	Melway Reference
Blackburn Lake, Blackburn	Lake Road Drain	58,000m^2	100 ML	97.3m AHD	97.9m AHD	98m AHD	High C	6	48 C12
Bushy Creek	Bushy Creek Drain	Unknown	16.1 ML	44.77m AHD	44.4m AHD	Unknown	High C	10	47 B3
Cornwall Street, Forest Hill	Blackburn South Drain	6,000m^2	19 ML	98.5m AHD	99.1m AHD	99.4m AHD	High A	8	62 B2
East Burwood, Vermont South	East Burwood Drain	Unknown	59.6 ML	86.9m AHD	87.2m AHD	87.5m AHD	High A	17	62 E8
Eley Road, Burwood East	Eley Road Drain	20,000m^2	62 ML	84.74m AHD	84.8m AHD	85.4m AHD	High A	8	61 H5
Fulton Road, Blackburn South	Fulton Road Drain	15,534m^2	24 ML	73.8m AHD	74.2m AHD	73.35m AHD	Low	21	61 G3
Glen Valley Road, Forest Hill	Forest Hill Drain	14,000m^2	47 ML	102.7m AHD	102.7m AHD	103.2m AHD	High A	6	62 D1
Kinkora Road, Blackburn Nth	Blackburn North Drain	5,000m^2	12 ML	86.0m AHD	86.6m AHD	86.9m AHD	High C	3	47 J8
Lernes Street, Forest Hill	Forest Hill Drain	31,000m^2	47 ML	111.0m AHD	112.5m AHD	112.8m AHD	High C	5	62 F2
Masons Road, Blackburn	Forest Hill Drain	19,000m^2	42 ML	94.4m AHD	94.4m AHD	94.8m AHD	High C	5	62 B1
Middleborough Road, Box Hill	Gardiners Creek	87,000m^2	210 ML	71.2m AHD	72.1m AHD	72.6m AHD	Low	Unknown	47 F12
Purches Street, Mitcham	Heatherdale Creek	Unknown	24.7 ML	97.3m AHD	97.6m AHD	97.9m AHD	High C	5	49 C12
Tram Road, Doncaster	Koonung Creek	Unknown	Unknown	Unknown	60.1m AHD	Unknown	High C	5	47 F3

Table A2 – Melbourne Water Retarding Basins

LEVEES

Levee	Reach	Side	Levee Height	Levee Length	Expected Level of Protection	ANCOLD Hazard Rating	Consequences of Failure	Melway Reference
Blackburn North Drain Flood Wall	O'Hara Street to Whitehorse Road, Blackburn North	East	760mm 86.85m AHD	135m	100yr ARI Flood Level with 450mm freeboard	Significant	Surrounding Houses (Total 8) would be flooded	47 J9

Table A3 – Levees within the City of Whitehorse

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SEWERAGE INFRASTRUCTURE

There are no sewerage pumping stations or Emergency Relief Structures expected to be within the vicinity of floodwaters during severe flood events within the City of Whitehorse. However a Sewer Emergency Relief Point is located along Dandenong Creek, upstream of the Municipality on the border of the Cities of Maroondah & Knox which will have an effect downstream if activated.

SEWER EMERGENCY RELIEF POINTS

On Drain / Waterway	Location	Melway Reference
Dandenong Creek	Ringwood Public Golf Course, Canterbury Road, Ringwood	63 E3

Table A4 – Sewer Emergency Relief Points within or close to the City of Whitehorse

FLOOD WARNING SYSTEM

Within the City of Whitehorse, Melbourne Water has six hydrographic monitoring sites along the Municipality's three major waterways. These are outlined in the table below. There are also monitors in adjoining Municipalities. These gauges can be monitored online through Melbourne Water at:

http://www.melbournewater.com.au/waterdata/rainfallandriverleveldata/Pages/rainfall-and-river-level.aspx

or through the Bureau of Meteorology at:

http://www.bom.gov.au/cgi-bin/wrap_fwo.pl?IDV60201.html

Hydrographic Monitoring Station	Station No.	Owner	Gauge Type	Melway Reference
Gardiners Creek at Kinkora Rd Retarding Basin, Blackburn North	229636A	Melbourne Water	Water Level & Rain	47 J8
Gardiners Creek at Lake Rd Retarding Basin, Blackburn	229635A	Melbourne Water	Water Level	48 B12
Gardiners Creek at Middleborough Rd Retarding Basin, Box Hill	229637A	Melbourne Water	Water Level	47 F12
Eley Road East Drain at Eley Rd Retarding Basin, Burwood East	229638A	Melbourne Water	Water Level & Rain	61 G5
Mitcham	586006	Melbourne Water	Rain	48 J10
Surrey Hills	586176	Melbourne Water	Rain	47 A12

Table A5 – Hydrographic Monitoring Stations within the City of Whitehorse

Other gauges located in adjoining Municipalities that may assist in flood warning for the Gardiners, Dandenong & Koonung Creeks are outlined below.

Hydrographic Monitoring Station	Station No.	Owner	Gauge Type	Melway Reference
Dandenong Creek at Wantirna Road, Wantirna	228357A	Melbourne Water	Water Level & Rain	63 H3
Gardiners Creek at Ashwood	229625A	Melbourne Water	Water Level & Rain	60 H11
Koonung Creek at Bulleen	229229A	Melbourne Water	Water Level	32 D10

Table A6 – Hydrographic Monitoring Stations within adjacent Municipalities to the City of Whitehorse

The Bureau does not issue formal flood warnings for the Gardiners, Koonung or Upper Dandenong Creeks due to their rapid response to rainfall. This is due either to the urban surrounds which quickly direct stormwater into drains and waterways or merely because of a small catchment size. This results in rapid stream rises during thunderstorms and heavy rainfall creating a short lead time for response.

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HISTORIC FLOODS

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

Event	Gardiners Creek Blackburn Nth Water Level	Gardiners Creek Blackburn Water Level	Gardiners Creek Box Hill Water Level	Dandenong Creek Wantirna Water Level	Koonung Creek Bulleen Water Level
Normal Water Level	0.10m	0.22m	0.00m	0.15m	1.30m
Minor	-	-	-	-	
Moderate	-	-	-	-	
Major	-	-	-	-	
18th September 1975	-	-	-	2.15m	-
April 1977			5.17m		
27th July 1977	**4.34m**	-	0.35m	1.31m	-
19th November 1978	1.92m	1.54m	0.76m	2.02m	-
24th December 1978	3.53m	0.65m	0.76m	1.61m	**5.30m**
6th October 1979	2.51m	1.24m	4.46m	2.09m	-
25th May 1981	1.31m	1.12m	4.23m	2.19m	-
15th October 1983	2.44m	1.48m	5.34m	1.83m	-
18th September 1984	3.88m	2.28m	5.78m	2.61m	-
29th July 1987	2.16m	1.11m	4.27m	1.12m	-
22nd November 1988	2.29m	1.23m	**5.88m**	1.55m	-
25th December 1988	1.42m	1.02m	3.10m	2.14m	-
21st March 1989	3.64m	1.35m	2.65m	2.18m	-
5th April 1989	3.90m	1.41m	3.32m	1.58m	-
11th June 1989	-	0.75m	2.05m	2.44m	-
18th July 1990	2.89m	1.41m	2.72m	2.10m	-
31st December 1991	0.23m	1.71m	4.14m	2.55m	-
27th December 1993	1.40m	1.77m	2.40m	2.19m	-
10th June 1999	-	1.29m	2.12m	2.02m	4.50m
26th December 1999	3.69m	1.69m	2.20m	1.99m	4.63m
3rd December 2003	4.01m	2.46m	3.04m	2.32m	4.51m
13th November 2004	1.70m	1.72m	2.05m	2.33m	2.93m
3rd February 2005	3.78m	**2.54m**	3.57m	2.72m	4.49m
22nd December 2007	3.49m	1.93m	2.14m	2.27m	4.20m
31st October 2010	2.16m	1.82m	2.33m	1.81m	3.76m
20th December 2010	1.33m	1.71m	1.92m	2.06m	2.82m
5th February 2011	3.49m	2.45m	2.27m	**2.77m**	4.08m
12th April 2011	4.02m	2.25m	2.38m	1.91m	4.53m
27th November 2011	2.82m	1.74m	3.15m	1.86m	4.14m
25th December 2011	2.35m	1.21m	2.23m	2.12m	4.04m
22nd June 2012	0.82m	1.39m	1.85m	1.45m	2.27m
1st June 2013	3.03m	2.28m	-	2.70m	4.23m

Table A7 – Historical Flood Events along the Gardiners, Koonung & Dandenong Creeks

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Dam Failure

No dams, either in or upstream of the City of Whitehorse are expected to affect the Municipality from flooding. See Dam Failure in Section 3 of this plan for more information.

Service Reservoirs located within the Municipality are listed below.

Melbourne Water Service Reservoir	Location	Owner	Material	Reservoir Capacity	Melway Reference
Mitcham Reservoir	Lucknow Street, Mitcham	Melbourne Water	Concrete	200 ML	48 J10
Surrey Hills Reservoir 1	Canterbury Road, Surrey Hills	Melbourne Water	Concrete	40.90 ML	46 K11
Surrey Hills Reservoir 2	Elgar Street, Surrey Hills	Melbourne Water	Concrete	68.20 ML	47 A12

Table A8 – Melbourne Water Service Reservoirs within the City of Whitehorse

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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.

B1 Typical Travel Times

Location From (gauge)	Location To (gauge)	Typical Travel Time	Comments
GARDINERS CREEK			
Blackburn North	Box Hill	Between (-4) to 4 hours	Negative travel time likely caused by Kinkora Road Retarding Basin or flows from the Blackburn South Drain
Blackburn	Box Hill	Between (-16) to 5 hours	Negative travel time likely caused by Blackburn Lake or flows from Blackburn North Drain

Table B1 – Typical Travel Times along sections of Gardiners Creek within the City of Whitehorse

B2 Historical Travel Times

Flood Event	Location From (gauge)	Location To (gauge)	Flood Peak Travel Time
GARDINERS CREEK			
19th November 1978	Blackburn North	Box Hill	Box Hill peaked 4 hours before Blackburn North
	Blackburn		Box Hill peaked 7 hours before Blackburn
24th December 1978	Blackburn North	Box Hill	Less than 1 hour
	Blackburn		2 hours
6th October 1979	Blackburn North	Box Hill	2 hours
	Blackburn		1 hour
25th May 1981	Blackburn North	Box Hill	3 hours
	Blackburn		1 hour
15th October 1983	Blackburn North	Box Hill	3 hours
	Blackburn		1 hour
18th September 1984	Blackburn North	Box Hill	2 hours
	Blackburn		Less than 1 hour
29th July 1987	Blackburn North	Box Hill	4 hours
	Blackburn		3 hours
22nd November 1988	Blackburn North	Box Hill	1 hour
	Blackburn		1 hour
25th December 1988	Blackburn North	Box Hill	4 hours
	Blackburn		1 hour
21st March 1989	Blackburn North	Box Hill	Box Hill peaked 1 hour before Blackburn North
	Blackburn		Box Hill peaked 4 hours before Blackburn
5th April 1989	Blackburn North	Box Hill	1 hour
	Blackburn		Less than 1 hour
18th July 1990	Blackburn North	Box Hill	1 hour
	Blackburn		Box Hill peaked 1 hour before Blackburn
26th December 1999	Blackburn North	Box Hill	1 hour
	Blackburn		Box Hill peaked 2 hours before Blackburn
3rd December 2003	Blackburn North	Box Hill	2 hours
	Blackburn		1 hour
3rd February 2005	Blackburn North	Box Hill	2 hours
	Blackburn		2 hours
22nd December 2007	Blackburn North	Box Hill	1 hour
	Blackburn		5 hours
31st October 2010	Blackburn North	Box Hill	1 hour
	Blackburn		Box Hill peaked 16 hours before Blackburn
5th February 2011	Blackburn North	Box Hill	Less than 1 hour
	Blackburn		Box Hill peaked 12 hours before Blackburn
12th April 2011	Blackburn North	Box Hill	2 hours
	Blackburn		Less than 1 hour
27th November 2011	Blackburn North	Box Hill	1 hour
	Blackburn		Box Hill peaked 14 hours before Blackburn
25th December 2011	Blackburn North	Box Hill	3 hours
	Blackburn		Box Hill peaked 1 hour before Blackburn

Table B2 – Historical Travel Times along sections of Gardiners Creek within the City of Whitehorse

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APPENDIX C1 – GARDINERS CREEK FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Gardiners Creek runs southwest through the centre of the City of Whitehorse. Suburbs adjacent to the creek include Blackburn; Blackburn South; Box Hill; Burwood; Burwood East; & Forest Hill. The creek exits the Municipality at its southern border entering the City of Monash.

A number of stormwater drains feed into Gardiners Creek, with the catchment response to short intense bursts of rainfall seeing quick rising water levels and flash flooding across the four water level gauges in the Municipality. A number of Retarding Basins including Blackburn Lake have been built along the various drains which minimise the impacts of flooding on the predominantly residential environment.

Areas of concern from flooding along Gardiners Creek and the stormwater drains that feed it are the Laburnum Street community which is at risk of over-floor flooding during a 10% AEP event as well as properties along the Box Hill South Main Drain in Box Hill South. Infrastructure at risk includes access to the Blackburn Railway Station through the underpass; the grounds of the Bellbird Private Hospital in Blackburn and major thoroughfares including Canterbury Road at a number of locations, Blackburn Road and Middleborough Road at two low points.

WARNING TIMES

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

Hydrographic/Telemetry Station	Station No.	Owner	Gauge Type	Melway Reference
Gardiners Creek at Kinkora Rd Retarding Basin, Blackburn North	229636A	Melbourne Water	Water Level & Rain	47 J8
Gardiners Creek at Lake Rd Retarding Basin, Blackburn	229635A	Melbourne Water	Water Level	48 B12
Gardiners Creek at Middleborough Rd Retarding Basin, Box Hill	229637A	Melbourne Water	Water Level	47 F12
Eley Road East Drain at Eley Rd Retarding Basin, Burwood East	229638A	Melbourne Water	Water Level & Rain	61 G5
Mitcham	586006	Melbourne Water	Rain	48 J10
Surrey Hills	586176	Melbourne Water	Rain	47 A12
Gardiners Creek at Ashwood	229625A	Melbourne Water	Water Level & Rain	60 H11

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/content/rivers_and_creeks/rainfall_and_river_level_data/rainfall_and_river_level_data.asp.

It is advised that residents monitor the Bureau of Meteorology's website http://www.bom.gov.au/ and the VicSES website http://www.ses.vic.gov.au/ for any thunderstorm, flood or severe weather warnings present for their area

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AREAS OF FLOOD RISK

CITY OF WHITEHORSE

1% AEP (100yr ARI) Flooding

Areas of flood risk along Gardiners Creek

SES Victoria Melbourne Water

Figure C1 – Areas of flood risk around Gardiners Creek in the City of Whitehorse

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PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding Over-Floor around the Gardiner's Creek catchment. As more intelligence becomes available, this list may grow.

Properties (Residences, Businesses & Public Use) at risk from Flooding Over-Floor

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
5% AEP	2% AEP	1% AEP				
1A	1A	1A	Alan Street	Blackburn South	Blackburn South Drain	Flash
1/9	1/9	1/9	Albion Road	Box Hill	Box Hill South Drain	Flash
2/9	2/9	2/9	Albion Road	Box Hill	Box Hill South Drain	Flash
3/9	3/9	3/9	Albion Road	Box Hill	Box Hill South Drain	Flash
4/9	4/9	4/9	Albion Road	Box Hill	Box Hill South Drain	Flash
5/9	5/9	5/9	Albion Road	Box Hill	Box Hill South Drain	Flash
6/9	6/9	6/9	Albion Road	Box Hill	Box Hill South Drain	Flash
7/9	7/9	7/9	Albion Road	Box Hill	Box Hill South Drain	Flash
8/9	8/9	8/9	Albion Road	Box Hill	Box Hill South Drain	Flash
9/9	9/9	9/9	Albion Road	Box Hill	Box Hill South Drain	Flash
10/9	10/9	10/9	Albion Road	Box Hill	Box Hill South Drain	Flash
11/9	11/9	11/9	Albion Road	Box Hill	Box Hill South Drain	Flash
12/9	12/9	12/9	Albion Road	Box Hill	Box Hill South Drain	Flash
13/9	13/9	13/9	Albion Road	Box Hill	Box Hill South Drain	Flash
-	11	11	Albion Road	Box Hill	Box Hill South Drain	Flash
-	-	2/20	Beaver Street	Box Hill South	Box Hill South Drain	Flash
-	-	3/20	Beaver Street	Box Hill South	Box Hill South Drain	Flash
-	32	32	Beaver Street	Box Hill South	Box Hill South Drain	Flash
6A	6A	6A	Beech Street	Nunawading	Forest Hill Drain	Flash
8	8	8	Beech Street	Nunawading	Forest Hill Drain	Flash
-	-	4	Bent Street	Blackburn	Blackburn North Drain	Flash
131	131	131	Blackburn Road	Blackburn	Blackburn South Drain	Flash
143	143	143	Blackburn Road	Blackburn	Blackburn South Drain	Flash
319	319	319	Blackburn Road	Burwood East	Eley Road East Drain	Flash
937	937	937	Canterbury Road	Box Hill	Box Hill South Drain	Flash
946	946	946	Canterbury Road	Box Hill South	Box Hill South Drain	Flash
-	15	15	Christa Avenue	Burwood East	Eley Road East Drain	Flash
18	18	18	Clydesdale Street	Box Hill	Box Hill South Drain	Flash
20	20	20	Clydesdale Street	Box Hill	Box Hill South Drain	Flash
-	-	22	Clydesdale Street	Box Hill	Box Hill South Drain	Flash
25	25	25	Clydesdale Street	Box Hill	Box Hill South Drain	Flash
27	27	27	Clydesdale Street	Box Hill	Box Hill South Drain	Flash
29	29	29	Clydesdale Street	Box Hill	Box Hill South Drain	Flash
-	31	31	Clydesdale Street	Box Hill	Box Hill South Drain	Flash
1	1	1	Collier Court	Burwood	McComas Grove Drain	Flash
9	9	9	Collier Court	Burwood	McComas Grove Drain	Flash
-	2A	2A	Collins Street	Box Hill	Box Hill South Drain	Flash
36	36	36	Collins Street	Box Hill	Box Hill South Drain	Flash
-	-	17	Cootamundra Crescent	Blackburn	Blackburn North Drain	Flash
-	41	41	Cumming Street	Burwood	McComas Grove Drain	Flash
42	42	42	Cumming Street	Burwood	McComas Grove Drain	Flash
44	44	44	Cumming Street	Burwood	McComas Grove Drain	Flash
-	-	14	Downing Street	Blackburn	Blackburn North Drain	Flash
-	-	16	Downing Street	Blackburn	Blackburn North Drain	Flash
-	18	18	Downing Street	Blackburn	Blackburn North Drain	Flash
-	20	20	Downing Street	Blackburn	Blackburn North Drain	Flash
-	-	2	Downing Street	Blackburn	Blackburn North Drain	Flash
-	84	84	Eley Road	Burwood East	Eley Road East Drain	Flash
86	86	86	Eley Road	Burwood East	Eley Road East Drain	Flash
88	88	88	Eley Road	Burwood East	Eley Road East Drain	Flash
90	90	90	Eley Road	Burwood East	Eley Road East Drain	Flash
-	21	21	Elm Street	Blackburn	Blackburn North Drain	Flash
37	37	37	Gillard Street	Burwood	McComas Grove Drain	Flash
38	38	38	Gillard Street	Burwood	McComas Grove Drain	Flash
39	39	39	Gillard Street	Burwood	McComas Grove Drain	Flash
41	41	41	Gillard Street	Burwood	McComas Grove Drain	Flash
-	42	42	Gillard Street	Burwood	McComas Grove Drain	Flash
-	-	36	Goodwin Street	Blackburn	Blackburn North Drain	Flash
-	1	1	Haig Street	Box Hill South	Box Hill South Drain	Flash
-	3	3	Halsey Street	Box Hill South	Box Hill South Drain	Flash
-	-	4	Halsey Street	Box Hill South	Box Hill South Drain	Flash
-	-	5	Halsey Street	Box Hill South	Box Hill South Drain	Flash
-	6	6	Halsey Street	Box Hill South	Box Hill South Drain	Flash

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Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
5% AEP	2% AEP	1% AEP				
-	8	8	Halsey Street	Box Hill South	Box Hill South Drain	Flash
-	28	28	Henwood Street	Blackburn South	Blackburn South Drain	Flash
-	-	1	Howard Street	Box Hill	Box Hill South Drain	Flash
-	13	13	Howard Street	Box Hill	Box Hill South Drain	Flash
-	15	15	Howard Street	Box Hill	Box Hill South Drain	Flash
17	17	17	Howard Street	Box Hill	Box Hill South Drain	Flash
22	22	22	Howard Street	Box Hill	Box Hill South Drain	Flash
24	24	24	Howard Street	Box Hill	Box Hill South Drain	Flash
27	27	27	Jellicoe Street	Box Hill South	Box Hill South Drain	Flash
25	25	25	Jenner Street	Blackburn South	Eley Road East Drain	Flash
-	-	10	Kitchener Street	Box Hill South	Box Hill South Drain	Flash
-	12	12	Kitchener Street	Box Hill South	Box Hill South Drain	Flash
-	-	4/15	Laburnum Street	Blackburn	South Parade Main Drain	Flash
-	5/15	5/15	Laburnum Street	Blackburn	South Parade Main Drain	Flash
-	6/15	6/15	Laburnum Street	Blackburn	South Parade Main Drain	Flash
-	7/15	7/15	Laburnum Street	Blackburn	South Parade Main Drain	Flash
-	8/15	8/15	Laburnum Street	Blackburn	South Parade Main Drain	Flash
-	-	9/15	Laburnum Street	Blackburn	South Parade Main Drain	Flash
4/21	4/21	4/21	Laburnum Street	Blackburn	South Parade Main Drain	Flash
5/21	5/21	5/21	Laburnum Street	Blackburn	South Parade Main Drain	Flash
-	-	10	Laburnum Street	Blackburn	Laburnum St Main Drain	Flash
-	-	16	Larch Street	Blackburn	Blackburn North Drain	Flash
-	-	17	Masons Road	Blackburn	Forest Hill Drain	Flash
-	-	19	Masons Road	Blackburn	Forest Hill Drain	Flash
-	1/21	1/21	Masons Road	Blackburn	Forest Hill Drain	Flash
-	-	2/21	Masons Road	Blackburn	Forest Hill Drain	Flash
-	-	30	McComas Grove	Burwood	McComas Grove Drain	Flash
-	1B	1B	Merton Street	Box Hill	Box Hill South Drain	Flash
-	8	8	Merton Street	Box Hill	Box Hill South Drain	Flash
-	8A	8A	Merton Street	Box Hill	Box Hill South Drain	Flash
6	6	6	Norris Court	Blackburn	Blackburn South Drain	Flash
8	8	8	Norris Court	Blackburn	Blackburn South Drain	Flash
10	10	10	Norris Court	Blackburn	Blackburn South Drain	Flash
13	13	13	Patricia Street	Box Hill	Box Hill South Drain	Flash
-	14	14	Patricia Street	Box Hill	Box Hill South Drain	Flash
-	1/3	1/3	Peace Street	Box Hill South	Box Hill South Drain	Flash
-	-	3/3	Peace Street	Box Hill South	Box Hill South Drain	Flash
42	42	42	Peacock Street	Burwood	McComas Grove Drain	Flash
44	44	44	Peacock Street	Burwood	McComas Grove Drain	Flash
-	1	1	Prince Street	Box Hill South	Box Hill South Drain	Flash
-	-	8	Prince Street	Box Hill South	Box Hill South Drain	Flash
-	9	9	Prince Street	Box Hill South	Box Hill South Drain	Flash
-	11	11	Prince Street	Box Hill South	Box Hill South Drain	Flash
-	-	10	Richmond Street	Blackburn South	Eley Road East Drain	Flash
28	28	28	Rosslyn Street	Blackburn South	Blackburn South Drain	Flash
-	-	21	Salisbury Avenue	Blackburn	Laburnum St Main Drain	Flash
-	-	15	Salisbury Avenue	Blackburn	Laburnum St Main Drain	Flash
-	-	19	Salisbury Avenue	Blackburn	Laburnum St Main Drain	Flash
-	-	17	Salisbury Avenue	Blackburn	Laburnum St Main Drain	Flash
-	-	1A	Salisbury Avenue	Blackburn	Laburnum St Main Drain	Flash
14-16	14-16	14-16	Sinnott Street	Burwood	McComas Grove Drain	Flash
-	-	56	South Parade	Blackburn	South Parade Main Drain	Flash
80	80	80	South Parade	Blackburn	South Parade Main Drain	Flash
118-120	118-120	118-120	South Parade	Blackburn	South Parade Main Drain	Flash
-	-	55	Stanley Grove	Blackburn	Blackburn North Drain	Flash
431	431	431	Station Street	Box Hill	Box Hill South Drain	Flash
-	-	432	Station Street	Box Hill	Box Hill South Drain	Flash
-	497	497	Station Street	Box Hill	Box Hill South Drain	Flash
-	1/499	1/499	Station Street	Box Hill	Box Hill South Drain	Flash
-	2/499	2/499	Station Street	Box Hill	Box Hill South Drain	Flash
-	3/499	3/499	Station Street	Box Hill	Box Hill South Drain	Flash
-	501	501	Station Street	Box Hill	Box Hill South Drain	Flash
-	-	510	Station Street	Box Hill	Box Hill South Drain	Flash
-	512	512	Station Street	Box Hill	Box Hill South Drain	Flash
8	8	8	Vista Court	Forest Hill	Forest Hill Drain	Flash
-	-	47	Whitehorse Road	Blackburn	Blackburn North Drain	Flash
-	-	5/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
6/22-24	6/22-24	6/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
7/22-24	7/22-24	7/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
8/22-24	8/22-24	8/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash

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Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
5% AEP	2% AEP	1% AEP				
13/22-24	13/22-24	13/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
14/22-24	14/22-24	14/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
15/22-24	15/22-24	15/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
-	16/22-24	16/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
-	17/22-24	17/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
19/22-24	19/22-24	19/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
-	-	20/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
21/22-24	21/22-24	21/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash
-	-	22/22-24	Whitehorse Road	Blackburn	Laburnum St Main Drain	Flash

Totals		
65	**105**	**142**

ISOLATION

No major isolation risks exist for areas around Gardiners Creek and the surrounding drainage network during a 1% AEP (100yr ARI) event. Some localised short-duration isolation may occur due to flash flooding.

ESSENTIAL INFRASTRUCTURE

- **Blackburn Railway Station** underpass at risk of flooding during a 10% AEP event or greater.
- **Bellbird Private Hospital** at 198 Canterbury Road, Blackburn has risk of flooding to carpark and grounds during a 5% AEP event or greater. Not expected to be over-floor.
- **Council Operations Centre** off Ailsa Street, Box Hill South likely flooded in parts during a 1% AEP event.

Apart from the roads outlined below, all other essential infrastructure and services areas around Gardiners Creek and the surrounding Drains are expected to remain unaffected by flooding during a 1% AEP (100yr ARI) event.

ROAD CLOSURES

The following roads are subject to closure during flooding around Gardiners Creek and the surrounding drainage network. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
• Blackburn Road, Blackburn at Furness Park
• Canterbury Road Eastbound Lane, Forest Hill near Mt Pleasant Road
• Canterbury Road, Blackburn South at Bellbird Private Hospital
• Canterbury Road, Box Hill South at Wavell Street
• Canterbury Road, Westbound Lane, Forest Hill near Thornhill Drive
• Middleborough Road, Box Hill North near Whitehorse Road Intersection

Whitehorse City Council Roads flooded in a 1% AEP (100yr ARI) event			
BLACKBURN	• South Parade	• Collins Street	• Sinnott Street
• Ashlar Crescent	• Stanley Grove	• Merton Street	**BURWOOD EAST**
• Bent Street	• The Ridge	• Wavell Street	• Arthur Street
• Central Road	• Thiele Court	**BOX HILL SOUTH**	• Christa Avenue
• Cootamundra Crescent	• Tyrrell Avenue	• Beaver Street	**FOREST HILL**
• Laburnum Street	• Williams Road	• Foch Street	• Faulkner Street
• Larch Street	**BLACKBURN SOUTH**	• Halsey Street	• Forest Road
• Main Street	• Eley Road	• Kitchener Street	• Sandra Street
• Maple Street	• Fulton Road	• Prince Street	**VERMONT**
• Masons Road	• Jenner Street	**BURWOOD**	• Betula Avenue
• Naughton Grove	• Wilkes Place	• Boardman Close	
• Pakenham Street	**BOX HILL**	• Gillard Street	
• Salisbury Avenue	• Clydesdale Street	• McComas Grove	

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FLOOD MITIGATION

RETARDING BASINS

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Houses In Flow Path (dam breach)	Melway Reference
Blackburn Lake, Blackburn	Lake Road Drain	58,000m^2	100 ML	97.3m AHD	97.9m AHD	98m AHD	High C	6	48 C12
Cornwall Street, Forest Hill	Blackburn South Drain	6,000m^2	19 ML	98.5m AHD	99.1m AHD	99.4m AHD	High A	8	62 B2
East Burwood, Vermont South	East Burwood Drain	Unknown	59.6 ML	86.9m AHD	87.2m AHD	87.5m AHD	High A	17	62 E8
Eley Road, Burwood East	Eley Road Drain	20,000m^2	62 ML	84.74m AHD	84.8m AHD	85.4m AHD	High A	8	61 H5
Fulton Road, Blackburn South	Fulton Road Drain	15,534m^2	24 ML	73.8m AHD	74.2m AHD	73.35m AHD	Low	21	61 G3
Glen Valley Road, Forest Hill	Forest Hill Drain	14,000m^2	47 ML	102.7m AHD	102.7m AHD	103.2m AHD	High A	6	62 D1
Kinkora Road, Blackburn Nth	Blackburn North Drain	5,000m^2	12 ML	86.0m AHD	86.6m AHD	86.9m AHD	High C	3	47 J8
Lernes Street, Forest Hill	Forest Hill Drain	31,000m^2	47 ML	111.0m AHD	112.5m AHD	112.8m AHD	High C	5	62 F2
Masons Road, Blackburn	Forest Hill Drain	19,000m^2	42 ML	94.4m AHD	94.4m AHD	94.8m AHD	High C	5	62 B1
Middleborough Road, Box Hill	Gardiners Creek	87,000m^2	210 ML	71.2m AHD	72.1m AHD	72.6m AHD	Low	Unknown	47 F12

LEVEES

Levee	Reach	Side	Levee Height	Levee Length	Expected Level of Protection	ANCOLD Hazard Rating	Consequences of Failure	Melway Reference
Blackburn North Drain Flood Wall	O'Hara Street to Whitehorse Road, Blackburn North	East	760mm 86.85m AHD	135m	100yr ARI Flood Level with 450mm freeboard	Significant	Surrounding Houses (Total 8) would be flooded	47 J9

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.

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FLOOD IMPACTS & REQUIRED ACTIONS

The table below is a breakdown of the number of properties flooded over-floor in a 1% AEP (100yr ARI) event. Refer to the following intelligence card/s for Blackburn North, Blackburn Lake, Box Hill, Gardiners Creek, Burwood East or the remaining Stormwater Drainage Network for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	132
Business	7
Industrial	2
Public Land	1
Rural	0
Total	**142**

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FLOOD INTELLIGENCE CARD – BLACKBURN NORTH GAUGE, GARDINERS CREEK

Version 4 – May 2015

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

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LOCATION	**Kinkora Road Retarding Basin, Kinkora Road, Blackburn**
MELWAY REFERENCE:	**47 J8**
STREAM:	**Blackburn North Drain**
GAUGE NUMBER:	**229636A**
GAUGE ZERO:	**82.29m AHD**
GAUGE TYPE	**Water Level & Rain**

MINOR:	**N/A**
MODERATE:	**N/A**
MAJOR	**N/A**
FLOOD WALL HEIGHT:	**4.88m**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**4.34m (27th July 1977)**

Retarding Basin Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
2.80m		**Properties at Flood Risk** • Properties on Laburnum Street and Salisbury Avenue, Blackburn	Early Warning System in place with residents aware of procedure
3.71m		• Spillway of Kinkora Road Retarding Basin starts operating	
3.81m	20% AEP (5yr ARI) Flood Level	**Properties at Flood Risk (Over-Floor)** **1 Property in Total** • 21 Elm Street, Blackburn **Community Infrastructure Flooded** • Cootamundra Walking Trail Flooded at various sections between Elm Street & Surrey Road **Water Over Road (Over 300mm Depth)** • Maple Street, Blackburn	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident.

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Retarding Basin Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
4.06m	10% AEP (10yr ARI) Flood Level	**Properties at Flood Risk (Over-Floor)** **2 Properties in Total** • 21 Elm Street, Blackburn • 5/21 Laburnum Street, Blackburn **Community Infrastructure Flooded** • The Larch Street Kindergarten, 16 Larch Street, Blackburn North Flooded • Cootamundra Walking Trail Flooded at various sections between Elm Street & Surrey Road **Water Over Road (Over 300mm Depth)** • Ashlar Crescent, Blackburn • Maple Street, Blackburn • Larch Street, Blackburn	Contact Kindergarten to ensure they are aware of flood potential 98781824
4.12m	5% AEP (20yr ARI) Flood Level	**Properties at Flood Risk (Over-Floor)** **3 Property in Total** • 21 Elm Street, Blackburn • 4/21 & 5/21 Laburnum Street, Blackburn **Community Infrastructure Impacted** • The Larch Street Kindergarten, 16 Larch Street, Blackburn North Flooded • Cootamundra Walking Trail Flooded at various sections between Elm Street & Williams Road **Water Over Road (Over 300mm Depth)** • Ashlar Crescent, Blackburn • Maple Street, Blackburn • Larch Street, Blackburn • Cootamundra Crescent, Blackburn • Bent Street, Blackburn • Stanley Grove, Blackburn	VicSES to respond as per request by request basis. Council to provide road closure signage if required.
4.28m	2% AEP (50yr ARI) Flood Level	**Properties at Flood Risk (Over-Floor)** **9 Properties in Total** • 18 & 20 Downing Street, Blackburn • 21 Elm Street, Blackburn • 5/15, 6/15, 7/15, 8/15, 4/21 & 5/21 Laburnum Street, Blackburn **Community Infrastructure Impacted** • The Larch Street Kindergarten, 16 Larch Street, Blackburn North Flooded • Cootamundra Walking Trail Flooded at various sections between Elm Street &	VicSES to respond as per request by request basis.

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Retarding Basin Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Williams Road **Water Over Road (Over 300mm Depth)** • Ashlar Crescent, Blackburn • Maple Street, Blackburn • Larch Street, Blackburn • Cootamundra Crescent, Blackburn • Williams Road, Blackburn at Cootamundra Walking Trail • Bent Street, Blackburn • Stanley Grove, Blackburn • Tyrrell Avenue, Blackburn	Council to provide road closure signage if required.
4.31m		• Full Supply Level of Kinkora Road Retarding Basin reached	
4.43m	1% AEP (100yr ARI) Flood Level	**Properties at Flood Risk (Over-Floor)** **20 Properties in Total** • 4 Bent Street, Blackburn • 17 Cootamundra Crescent, Blackburn • 2, 14, 16, 18 & 20 Downing Street, Blackburn • 21 Elm Street, Blackburn • 36 Goodwin Street, Blackburn • 16 Larch Street, Blackburn • 55 Stanley Grove, Blackburn • 47 Whitehorse Road, Blackburn • 4/15, 5/15, 6/15, 7/15, 8/15, 9/15, 4/21 & 5/21 Laburnum Street, Blackburn **Community Infrastructure Impacted** • The Larch Street Kindergarten, 16 Larch Street, Blackburn North Flooded • Cootamundra Walking Trail Flooded at various sections between Elm Street & Williams Road **Water Over Road (Over 300mm Depth)** • Ashlar Crescent, Blackburn • Maple Street, Blackburn • Larch Street, Blackburn • Cootamundra Crescent, Blackburn • Williams Road, Blackburn at Cootamundra Walking Trail • Bent Street, Blackburn • Stanley Grove, Blackburn	VicSES to respond as per request by request basis. Council to provide road closure signage if required.

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Retarding Basin Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Tyrrell Avenue, Blackburn	
4.61m		• Embankment Crest Level of Kinkora Road Retarding Basin reached	Road closure- Ensure VicPol and VicRoads are aware.
4.88m		• Height of Blackburn North Flood Wall reached	Warn residents of flood impact

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FLOOD INTELLIGENCE CARD – BLACKBURN LAKE GAUGE, GARDINERS CREEK

Version 4 – May 2015

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

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LOCATION	**Lake Road Retarding Basin, Lake road, Blackburn**
MELWAY REFERENCE:	**48 B12**
STREAM:	**Lake Road Drain**
GAUGE NUMBER:	**229635A**
GAUGE ZERO:	**95.26m AHD**
GAUGE TYPE	**Water Level**

MINOR:	**N/A**
MODERATE:	**N/A**
MAJOR	**N/A**
R/B WALL HEIGHT:	**2.75m**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**2.54m (3rd February 2005)**

Lake Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
1.93m	20% AEP (5yr ARI) Flood Level	• Nil Impacts expected upstream of Blackburn Lake	
2.04m		• Spillway Level Reached	
2.14m	10% AEP (10yr ARI) Flood Level	**Community Infrastructure Impacted** • Parts of the Coronella Retirement Village Hostel (AdventCare Whitehorse) Flooded **Water Over Road (Over 300mm Depth)** • Central Road, Blackburn at low point at Blackburn Lake	Whitehorse Unit- VicSES to contact retirement Village 92592000 VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement

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Lake Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
			to suit the level of incident.
2.33m	5% AEP (20yr ARI) Flood Level	**Community Infrastructure Impacted** • Parts of the Coronella Retirement Village Hostel (AdventCare Whitehorse) Flooded **Water Over Road (Over 300mm Depth)** • Central Road, Blackburn at low point at Blackburn Lake	VicSES to respond as per request by request basis. Council to provide road closure signage if required.
2.45m	5th February 2011 Flood Level Peak		
2.52m	2% AEP (50yr ARI) Flood Level	**Community Infrastructure Impacted** • Parts of the Coronella Retirement Village Hostel (AdventCare Whitehorse) Flooded **Water Over Road (Over 300mm Depth)** • Central Road, Blackburn at low point at Blackburn Lake	VicSES to respond as per request by request basis. Council to provide road closure signage if required.
2.64m	1% AEP (100yr ARI) Flood Level	• Full Supply Level of the Blackburn Lake Retarding Basin Reached **Community Infrastructure Impacted** • Parts of the Coronella Retirement Village Hostel (AdventCare Whitehorse) Flooded **Water Over Road (Over 300mm Depth)** • Central Road, Blackburn at low point at Blackburn Lake	Council to provide road closure signage if required.
2.74m		• Concrete Wall Height Reached. Water will start to spill onto Lake Road at Gauge Location.	

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FLOOD INTELLIGENCE CARD – BOX HILL GAUGE, GARDINERS CREEK

Version 4 – May 2015

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

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LOCATION	**Middleborough Road Retarding Basin, Middleborough Road, Box Hill**
MELWAY REFERENCE:	**47 F12**
STREAM:	**Gardiners Creek**
GAUGE NUMBER:	**229637A**
GAUGE ZERO:	**65.83m AHD**
GAUGE TYPE	**Water Level**

MINOR:	**N/A**
MODERATE:	**N/A**
MAJOR	**N/A**
EMBANKMENT HEIGHT:	**6.77m**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**5.88m (22nd November 1988)**

Retarding Basin Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
5.37m		• Spillway Level Reached	
6.27m		• Full Supply Level Reached	
6.77m		• Embankment Level Reached	

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FLOOD INTELLIGENCE CARD – ASHWOOD GAUGE, GARDINERS CREEK

Version 4 – May 2015

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

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LOCATION	**Ashwood Reserve, High Street Road, Ashwood (City of Monash)**
MELWAY REFERENCE:	**60 H11**
STREAM:	**Gardiners Creek**
GAUGE NUMBER:	**229625A**
GAUGE ZERO:	**35.379m AHD**
GAUGE TYPE	**Water Level & Rain**

MINOR:	**N/A**
MODERATE:	**N/A**
MAJOR	**N/A**
LEVEE HEIGHT:	**N/A**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**4.21m (November 1954)**

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
3.1m	1% AEP (100yr ARI) Flood Level	**Community Infrastructure Impacted** • Sports Grounds of Canaan International Student Centre, Hay Street, Box Hill South Flooded • Parts of Box Hill Golf Course, Riversdale Road, Box Hill South flooded along the banks of Gardiners Creek • Gardiners Creek Trail Flooded in sections between Station Street and Highbury Road **Water Over Road (Over 300mm Depth)** • Beaver Street, Box Hill South near Foch Street • Sinnott Street, Burwood	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident.
3.17m	5th February 2011 Flood Level Peak		

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FLOOD INTELLIGENCE CARD – BURWOOD EAST GAUGE, ELEY ROAD EAST DRAIN

Version 4 – May 2015

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

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LOCATION	**Eley Road Retarding Basin, Eley Road, Burwood East**
MELWAY REFERENCE:	**61 G5**
STREAM:	**Eley Road East Drain**
GAUGE NUMBER:	**229638A**
GAUGE ZERO:	**77.99m AHD**
GAUGE TYPE	**Water Level & Rain**

MINOR:	**N/A**
MODERATE:	**N/A**
MAJOR	**N/A**
EMBANKMENT HEIGHT:	**7.41m**
TELEMETRIC/MANUAL	**Telemetric**
HIGHEST RECORDED FLOOD:	**5.92m (18th September 1984)**

Retarding Basin Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
6.75m		• Spillway Starts Operating **Water Over Road (Over 300mm Depth)** • Westminster Close, Burwood	VicRoads and Council to provide road closure signage if required. VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident.
6.81m		• Full Supply Level Reached	

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Retarding Basin Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
7.01m	1% AEP (100yr ARI) Flood Level	**Properties at Flood Risk (Over-Floor)** **8 Properties in Total** • 319 Blackburn Road, Burwood East • 15 Christa Avenue, Burwood East • 84, 86, 88 & 90 Eley Road, Burwood East • 25 Jenner Street, Blackburn South • 10 Richmond Street, Blackburn South **Water Over Road (Over 300mm Depth)** • Arthur Street, Burwood East • Christa Avenue, Burwood East • Eley Road, Blackburn South at Royton Street • Jenner Street, Blackburn South at Richmond Street	VicSES to respond as per request by request basis. Council to provide road closure signage if required.
7.41m		• Embankment Crest Level Reached.	

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FLOOD INTELLIGENCE CARD – STORMWATER DRAINS IN BLACKBURN, BLACKBURN SOUTH, BOX HILL SOUTH, BURWOOD & FOREST HILL (UNGAUGED)

Version 4 – May 2015

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

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CLOSEST RAIN GAUGE	**Gardiners Creek at Blackburn North**
LOCATION	**Kinkora Road Retarding Basin, Blackburn North**
MELWAY REF:	**47 J8**

GAUGE NUMBER	**229636A**
GAUGE TYPE	**RAIN**
TELEMETRIC/MANUAL	**TELEMETRIC**

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	**Annual Exceedance Probability (% AEP)**	**Consequence / Impact**	**Operational Considerations**
11mm in 10 mins; 18mm in 30 mins; 24mm in 1 hour; 32mm in 2 hours; 48mm in 6 hours; or 62mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	20% AEP (5 year ARI)	**Properties at Flood Risk (Over-Floor)** **8 Properties in Total** **Forest Hill Drain** • 6A Beech Street, Nunawading **Blackburn South Drain** • 1A Alan Street, Blackburn South • 8 Norris Court, Blackburn **Box Hill South Main Drain** • 18 & 25 Clydesdale Street, Box Hill • 36 Collins Street, Box Hill • 24 Howard Street, Box Hill • 13 Patricia Street, Box Hill **Community Infrastructure Flooded** **Blackburn South Drain** • Gardiners Creek Trail flooded in parts between Blackburn Road and Middleborough Road, Blackburn	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Water Over Road (Over 300mm Depth) **Laburnum Street Main Drain** • Middleborough Road, Box Hill North near Whitehorse Road Intersection • Laburnum Street, Blackburn at Laburnum Railway Station Underpass **Blackburn South Drain** • Faulkner Street, Forest Hill at Holbury Park • Main Street, Blackburn at Furness Park **Box Hill South Main Drain** • Collins Street, Box Hill • Clydesdale Street, Box Hill • Foch Street, Box Hill South	Council to provide road closure signage if required.
13mm in 10 mins; 21mm in 30 mins; 28mm in 1 hour; 34mm in 2 hours; 54mm in 6 hours; or 69mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	10% AEP (10 year ARI)	**Properties at Flood Risk (Over-Floor)** **18 Properties in Total** **Laburnum Street Main Drain** • 7/22-24, 8/22-24, 13/22-25 & 15/22-24 Whitehorse Road, Blackburn **Forest Hill Drain** • 6A Beech Street, Nunawading **Blackburn South Drain** • 1A Alan Street, Blackburn South • 131 Blackburn Road, Blackburn • 8 Norris Court, Blackburn **Box Hill South Main Drain** • 937 Canterbury Road, Box Hill • 18, 20, 25, 27 & 29 Clydesdale Street, Box Hill • 36 Collins Street, Box Hill • 17 & 24 Howard Street, Box Hill • 13 Patricia Street, Box Hill **Community Infrastructure Impacted** **Blackburn South Drain** • Gardiners Creek Trail flooded in parts between Blackburn Road and Middleborough Road, Blackburn **Essential Infrastructure Impacted** **South Parade Main Drain** • Blackburn Railway Station's underpass flooded	Early Warning System in place for Laburnum Street Drain area with residents aware of procedure. Early warning system is managed by Melbourne Water – Flood team. Community and SES notified by SMS Whitehorse Unit of SES to monitor warnings and provide assistance to community- If required door knocking will be undertaken or affected properties VicSES to respond as per request by request basis.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Water Over Road (Over 300mm Depth) **Laburnum Street Main Drain** • Middleborough Road, Box Hill North near Whitehorse Road Intersection • Laburnum Street, Blackburn at Laburnum Railway Station Underpass • Salisbury Avenue, Blackburn **South Parade Main Drain** • South Parade, Blackburn **Blackburn South Drain** • Sandra Street, Forest Hill at Raleigh Street • Faulkner Street, Forest Hill at Holbury Park • Main Street, Blackburn at Furness Park **Box Hill South Main Drain** • Collins Street, Box Hill • Clydesdale Street, Box Hill • Wavell Street, Box Hill • Foch Street, Box Hill South	Council to provide road closure signage if required.
15mm in 10 mins; 25mm in 30 mins; 33mm in 1 hour; 43mm in 2 hours; 62mm in 6 hours; or 79mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	5% AEP (20 year ARI)	**Properties at Flood Risk (Over-Floor)** **47 Properties in Total** **Laburnum Street Main Drain** • 6/22-24, 7/22-24, 8/22-24, 13/22-25, 14/22-24, 15/22-24, 19/22-24 & 21/22-24 Whitehorse Road, Blackburn **South Parade Main Drain** • 80 & 118-120 South Parade, Blackburn **Forest Hill Drain** • 6A & 8 Beech Street, Nunawading • 8 Vista Court, Forest Hill **Blackburn South Drain** • 1A Alan Street, Blackburn South • 131 & 143 Blackburn Road, Blackburn • 6, 8 & 10 Norris Court, Blackburn • 28 Rosslyn Street, Blackburn South **Box Hill South Main Drain** • 1/9, 2/9, 3/9, 4/9, 5/9, 6/9, 7/9, 8/9, 9/9, 10/9, 11/9, 12/9, 13/9 & 11 Albion Road, Box Hill • 937 & 946 Canterbury Road, Box Hill	Early Warning System in place for Laburnum Street Drain area with residents aware of procedure

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 18, 20, 25, 27 & 29 Clydesdale Street, Box Hill • 36 Collins Street, Box Hill • 17, 22 & 24 Howard Street, Box Hill • 27 Jellicoe Street, Box Hill South • 13 Patricia Street, Box Hill • 431 Station Street, Box Hill **McComas Grove Drain** • 1 & 9 Collier Court, Burwood • 42 & 44 Cumming Street, Burwood • 37, 38, 39 & 41 Gillard Street, Burwood • 42 & 44 Peacock Street, Burwood • 14-16 Sinnott Street, Burwood **Community Infrastructure Impacted** **Blackburn South Drain** • Gardiners Creek Trail flooded in parts between Blackburn Road and Middleborough Road, Blackburn **Essential Infrastructure Impacted** **South Parade Main Drain** • Blackburn Railway Station's underpass flooded **Blackburn South Drain** • Bellbird Private Hospital, 198 Canterbury Road, Blackburn flooding to carpark and grounds. Not expected to be over-floor. **Water Over Road (Over 300mm Depth)** **Laburnum Street Main Drain** • Middleborough Road, Box Hill North near Whitehorse Road Intersection • Laburnum Street, Blackburn between The Terrace and Salisbury Avenue • Salisbury Avenue, Blackburn **South Parade Main Drain** • South Parade, Blackburn **Blackburn South Drain** • Sandra Street, Forest Hill at Raleigh Street • Faulkner Street, Forest Hill at Holbury Park • Canterbury Road, Blackburn South at Bellbird Private Hospital • Blackburn Road, Blackburn at Furness Park • Main Street, Blackburn at Furness Park	Blackburn Station 9610 8958, trains go express to next station, and then customers can come back to platform 3 and exit to the north side of station. Rail maintenance crews attend to pump out drain. Bellbird Hospital 9845 2333 Advise they can move patients upstairs in case of emergency, multiple exits for evacuation Council to provide road closure signage if required.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Pakenham Street, Blackburn at Blacks Walk Reserve **Box Hill South Main Drain** • Collins Street, Box Hill • Clydesdale Street, Box Hill • Wavell Street, Box Hill • Foch Street, Box Hill South	
19mm in 10 mins; 31mm in 30 mins; 40mm in 1 hour; 51mm in 2 hours; 74mm in 6 hours; or 93mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	2% AEP (50 year ARI)	**Properties at Flood Risk (Over-Floor)** **89 Properties in Total** **Laburnum Street Main Drain** • 6/22-24, 7/22-24, 8/22-24, 13/22-25, 14/22-24, 15/22-24, 16/22-24, 17/22-24, 19/22-24 & 21/22-24 Whitehorse Road, Blackburn **South Parade Main Drain** • 80 & 118-120 South Parade, Blackburn **Forest Hill Drain** • 6A & 8 Beech Street, Nunawading • 1/21 Masons Road, Blackburn • 8 Vista Court, Forest Hill **Blackburn South Drain** • 1A Alan Street, Blackburn South • 131 & 143 Blackburn Road, Blackburn • 28 Henwood Street, Blackburn South • 6, 8 & 10 Norris Court, Blackburn • 28 Rosslyn Street, Blackburn South **Box Hill South Main Drain** • 1/9, 2/9, 3/9, 4/9, 5/9, 6/9, 7/9, 8/9, 9/9, 10/9, 11/9, 12/9, 13/9 & 11 Albion Road, Box Hill • 32 Beaver Street, Box Hill South • 937 & 946 Canterbury Road, Box Hill • 18, 20, 25, 27, 29 & 31 Clydesdale Street, Box Hill • 2A & 36 Collins Street, Box Hill • 1 Haig Street, Box Hill South • 3, 6 & 8 Halsey Street, Box Hill South • 13, 15, 17, 22 & 24 Howard Street, Box Hill • 27 Jellicoe Street, Box Hill South	Early Warning System in place for Laburnum Street Drain area with residents aware of procedure VicSES to respond as per request by request basis.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• 12 Kitchener Street, Box Hill South • 1B, 8 & 8A Merton Street, Box Hill • 13 & 14 Patricia Street, Box Hill • 1/3 Peace Street, Box Hill South • 1, 9 & 11 Prince Street, Box Hill South • 431, 497, 1/499, 2/499, 3/499, 501 & 512 Station Street, Box Hill **McComas Grove Drain** • 1 & 9 Collier Court, Burwood • 41, 42 & 44 Cumming Street, Burwood • 37, 38, 39, 41 & 42 Gillard Street, Burwood • 42 & 44 Peacock Street, Burwood • 14-16 Sinnott Street, Burwood **Community Infrastructure Impacted** **Forest Hill Drain** • Grounds of Taralye Kindergarten on Blackburn Road, Blackburn Road flooded **Blackburn South Drain** • Grounds of Taralye Kindergarten on Blackburn Road, Blackburn Road flooded with possible access issues via Blackburn Road • Gardiners Creek Trail flooded in parts between Blackburn Road and Middleborough Road, Blackburn **Essential Infrastructure Impacted** **South Parade Main Drain** • Blackburn Railway Station's underpass flooded **Blackburn South Drain** • Bellbird Private Hospital, 198 Canterbury Road, Blackburn flooding to carpark and grounds. Not expected to be over-floor. **Water Over Road (Over 300mm Depth)** **Laburnum Street Main Drain** • Middleborough Road, Box Hill North near Whitehorse Road Intersection • Laburnum Street, Blackburn between The Terrace and Salisbury Avenue • Salisbury Avenue, Blackburn **South Parade Main Drain** • South Parade, Blackburn **Forest Hill Drain** • Betula Avenue, Vermont	Taralye Kindergarten -have alternate exit at rear of property 9877 1300 Council to provide road closure signage if required.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Canterbury Road Westbound Lane, Forest Hill near Thornhill Drive • Masons Road, Blackburn • The Ridge, Blackburn at Masons Road **Blackburn South Drain** • Sandra Street, Forest Hill at Raleigh Street • Faulkner Street, Forest Hill at Holbury Park • Canterbury Road, Blackburn South at Bellbird Private Hospital • Blackburn Road, Blackburn at Furness Park • Main Street, Blackburn at Furness Park • Pakenham Street, Blackburn at Blacks Walk Reserve **Box Hill South Main Drain** • Merton Street, Box Hill • Collins Street, Box Hill • Clydesdale Street, Box Hill • Wavell Street, Box Hill • Kitchener Street, Box Hill South • Halsey Street, Box Hill South • Foch Street, Box Hill South • Beaver Street, Box Hill South **Eley Road West Drain** • Boardman Close, Burwood **McComas Grove Drain** • Gillard Street, Burwood • McComas Grove, Burwood	
22mm in 10 mins; 36mm in 30 mins; 46mm in 1 hour; 58mm in 2 hours; 83mm in 6 hours; or 104mm in 12 hours Note: rainfall depths are a very rough method of estimating	1% AEP (100 year ARI)	**Properties at Flood Risk (Over-Floor)** **116 Properties in Total** **Laburnum Street Main Drain** • 10 Laburnum Street, Blackburn • 1A, 15, 17, 19 & 21 Salisbury Avenue, Blackburn • 5/22-24, 6/22-24, 7/22-24, 8/22-24, 13/22-25, 14/22-24, 15/22-24, 16/22-24, 17/22-24, 19/22-24, 20/22-24, 21/22-24 & 22/22-24 Whitehorse Road, Blackburn **South Parade Main Drain** • 56, 80 & 118-120 South Parade, Blackburn **Forest Hill Drain**	Early Warning System in place for Laburnum Street Drain area with residents aware of procedure VicSES to respond as per request by request basis.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.		• 6A & 8 Beech Street, Nunawading • 17, 19, 1/21 & 2/21 Masons Road, Blackburn • 8 Vista Court, Forest Hill **Blackburn South Drain** • 1A Alan Street, Blackburn South • 131 & 143 Blackburn Road, Blackburn • 28 Henwood Street, Blackburn South • 6, 8 & 10 Norris Court, Blackburn • 28 Rosslyn Street, Blackburn South **Box Hill South Drain** • 1/9, 2/9, 3/9, 4/9, 5/9, 6/9, 7/9, 8/9, 9/9, 10/9, 11/9, 12/9, 13/9 & 11 Albion Road, Box Hill • 2/20, 3/20 & 32 Beaver Street, Box Hill South • 937 & 946 Canterbury Road, Box Hill • 18, 20, 22, 25, 27, 29 & 31 Clydesdale Street, Box Hill • 2A & 36 Collins Street, Box Hill • 1 Haig Street, Box Hill South • 3, 4, 5, 6 & 8 Halsey Street, Box Hill South • 1, 13, 15, 17, 22 & 24 Howard Street, Box Hill • 27 Jellicoe Street, Box Hill South • 10 & 12 Kitchener Street, Box Hill South • 1B, 8 & 8A Merton Street, Box Hill • 13 & 14 Patricia Street, Box Hill • 1/3 & 3/3 Peace Street, Box Hill South • 1, 8, 9 & 11 Prince Street, Box Hill South • 431, 432, 497, 1/499, 2/499, 3/499, 501, 510 & 512 Station Street, Box Hill **McComas Grove Drain** • 1 & 9 Collier Court, Burwood • 41, 42 & 44 Cumming Street, Burwood • 37, 38, 39, 41 & 42 Gillard Street, Burwood • 30 McComas Grove, Burwood • 42 & 44 Peacock Street, Burwood • 14-16 Sinnott Street, Burwood	

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Community Infrastructure Impacted **Forest Hill Drain** • Grounds of Taralye Kindergarten on Blackburn Road, Blackburn Road flooded **Blackburn South Drain** • Grounds of Taralye Kindergarten on Blackburn Road, Blackburn Road flooded with possible access issues via Blackburn Road • Gardiners Creek Trail flooded in parts between Blackburn Road and Middleborough Road, Blackburn **Essential Infrastructure Impacted** **South Parade Main Drain** • Blackburn Railway Station's underpass flooded **Blackburn South Drain** • Bellbird Private Hospital, 198 Canterbury Road, Blackburn flooding to carpark and grounds. Not expected to be over-floor. **Fulton Road Drain** • Whitehorse VicSES Unit off Ailsa Street, Box Hill South may experience minor flooding to adjacent Ailsa Street near Middleborough Road but this is not expected to impede access to site. • Council Operations Centre off Ailsa Street, Box Hill South likely flooded in parts **Water Over Road (Over 300mm Depth)** **Laburnum Street Main Drain** • Middleborough Road, Box Hill North near Whitehorse Road Intersection • Thiele Court, Blackburn • Laburnum Street, Blackburn between The Terrace and Salisbury Avenue • Salisbury Avenue, Blackburn **South Parade Main Drain** • South Parade, Blackburn **Forest Hill Drain** • Betula Avenue, Vermont • Canterbury Road Eastbound Lane, Forest Hill near Mt Pleasant Road • Canterbury Road Westbound Lane, Forest Hill near Thornhill Drive • Forest Road, Forest Hill • Masons Road, Blackburn • The Ridge, Blackburn at Masons Road •	Blackburn Station 9610 8958, trains go express to next station, and then customers can come back to platform 3 and exit to the north side of station. Rail maintenance crews attend to pump out drain VicRoads and Council to provide road closure signage if required.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Blackburn South Drain • Sandra Street, Forest Hill at Raleigh Street • Faulkner Street, Forest Hill at Holbury Park • Canterbury Road, Blackburn South at Bellbird Private Hospital • Naughton Grove, Blackburn • Blackburn Road, Blackburn at Furness Park • Main Street, Blackburn at Furness Park • Pakenham Street, Blackburn at Blacks Walk Reserve **Box Hill South Main Drain** • Merton Street, Box Hill • Collins Street, Box Hill • Clydesdale Street, Box Hill • Wavell Street, Box Hill • Canterbury Road, Box Hill South at Wavell Street • Kitchener Street, Box Hill South • Halsey Street, Box Hill South • Prince Street, Box Hill South • Foch Street, Box Hill South • Beaver Street, Box Hill South **Fulton Road Drain** • Fulton Road, Blackburn South at Harrow Street • Wilkes Place, Blackburn South **Eley Road West Drain** • Boardman Close, Burwood **McComas Grove Drain** • Gillard Street, Burwood • McComas Grove, Burwood	

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APPENDIX C2 – KOONUNG CREEK & BOX HILL NORTH FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Koonung Creek and the Box Hill North Drainage Network are located to the north of the City of Whitehorse with Koonung Creek forming the Municipality's northern border before it joins the Yarra River. The catchment is small and therefore susceptible to flash flooding with the most notable risk being sections of the Eastern Freeway, where most recently in December 2003, 10 motorists required rescue by boat. The other prominent risks are pockets of residential properties (122 in total) along the Box Hill & Bushy Creek drainage network in Mont Albert North and Box Hill North at risk from over-floor flooding.

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.

Hydrographic/Telemetry Station	Station No.	Owner	Gauge Type	Melway Reference
Koonung Creek at Bulleen	229229A	Melbourne Water	Water Level	32 D10

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/content/rivers_and_creeks/rainfall_and_river_level_data/rainfall_and_river_level_data.asp. It is advised that residents monitor the Bureau of Meteorology's website http://www.bom.gov.au/ and the VicSES website http://www.ses.vic.gov.au/ for any thunderstorm, flood or severe weather warnings present for their area.

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AREAS OF FLOOD RISK

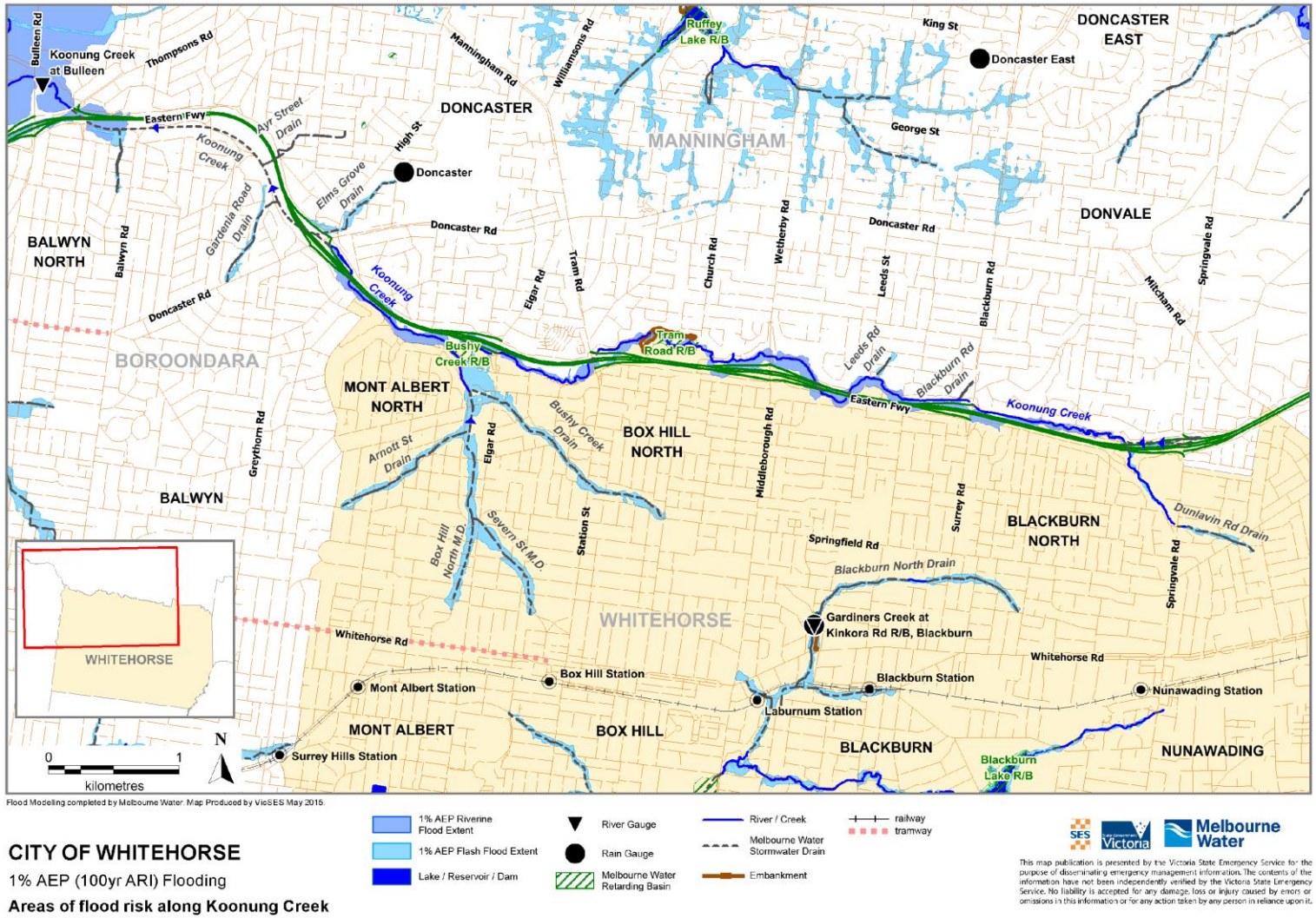

Figure C2 – Areas of flood risk around Koonung Creek and Box Hill North in the City of Whitehorse.

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PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding over-floor along the stormwater drains entering Koonung Creek in the City of Whitehorse. As more intelligence becomes available, this list may grow.

Properties (Residences, Businesses & Public Use) at risk from Flooding Over-Floor

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	4	4	Allison Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	4A	Allison Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	5	Allison Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	27	Arnott Street	Mont Albert North	Arnott Street Drain	Flash
-	-	28	Arnott Street	Mont Albert North	Arnott Street Drain	Flash
-	-	24	Barwon Street	Box Hill North	Severn Street Main Drain	Flash
-	-	472	Belmore Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	474	Belmore Road	Mont Albert North	Box Hill North Main Drain	Flash
		2/5	Beryl Street	Nunawading	Dunlavin Road Drain	Flash
-	-	1	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	2	2	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	-	3	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	4	4	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	-	6	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	-	8	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	-	10	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
25	25	25	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	-	27	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	-	29	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	-	31	Botanic Walk	Mont Albert North	Box Hill North Main Drain	Flash
-	-	1/1A	Cairo Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	2/1A	Cairo Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	1/3	Cairo Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	2/3	Cairo Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	3/3	Cairo Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	4/3	Cairo Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	5/3	Cairo Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	2/7	Cairo Road	Mont Albert North	Box Hill North Main Drain	Flash
2	2	2	Dunloe Avenue	Mont Albert North	Box Hill North Main Drain	Flash
-	1/3	1/3	Dunloe Avenue	Mont Albert North	Box Hill North Main Drain	Flash
-	-	2/3	Dunloe Avenue	Mont Albert North	Box Hill North Main Drain	Flash
-	-	3/3	Dunloe Avenue	Mont Albert North	Box Hill North Main Drain	Flash
-	-	6/3	Dunloe Avenue	Mont Albert North	Box Hill North Main Drain	Flash
-	-	7/3	Dunloe Avenue	Mont Albert North	Box Hill North Main Drain	Flash
-	531	531	Elgar Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	533	Elgar Road	Mont Albert North	Box Hill North Main Drain	Flash

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Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	-	535	Elgar Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	537	Elgar Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	541	Elgar Road	Mont Albert North	Box Hill North Main Drain	Flash
-	543	543	Elgar Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	8/601	Elgar Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	9/601	Elgar Road	Box Hill North	Box Hill North Main Drain	Flash
-	-	10/601	Elgar Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	11/601	Elgar Road	Mont Albert North	Box Hill North Main Drain	Flash
-	648	648	Elgar Road	Mont Albert North	Bushy Creek Drain	Flash
-	1	1	Goddard Court	Mont Albert North	Box Hill North Main Drain	Flash
-	1A	1A	Goddard Court	Mont Albert North	Box Hill North Main Drain	Flash
-	-	2	Goddard Court	Mont Albert North	Box Hill North Main Drain	Flash
-	-	6	Goddard Court	Mont Albert North	Box Hill North Main Drain	Flash
-	-	6	Janda Court	Box Hill North	Bushy Creek Drain	Flash
-	-	94	Kenmare Street	Mont Albert	Box Hill North Main Drain	Flash
-	-	96	Kenmare Street	Mont Albert	Box Hill North Main Drain	Flash
-	1/98	1/98	Kenmare Street	Mont Albert	Box Hill North Main Drain	Flash
-	2/98	2/98	Kenmare Street	Mont Albert	Box Hill North Main Drain	Flash
-	107	107	Kenmare Street	Mont Albert North	Box Hill North Main Drain	Flash
-	109	109	Kenmare Street	Mont Albert North	Box Hill North Main Drain	Flash
1/111	1/111	1/111	Kenmare Street	Mont Albert North	Box Hill North Main Drain	Flash
2/111	2/111	2/111	Kenmare Street	Mont Albert North	Box Hill North Main Drain	Flash
3/111	3/111	3/111	Kenmare Street	Mont Albert North	Box Hill North Main Drain	Flash
-	-	4/111	Kenmare Street	Mont Albert North	Box Hill North Main Drain	Flash
-	-	5/111	Kenmare Street	Mont Albert North	Box Hill North Main Drain	Flash
-	-	6/111	Kenmare Street	Mont Albert North	Box Hill North Main Drain	Flash
	5/13	5/13	Lindsay Avenue	Nunawading	Dunlavin Road Drain	Flash
	6/13	6/13	Lindsay Avenue	Nunawading	Dunlavin Road Drain	Flash
	7/13	7/13	Lindsay Avenue	Nunawading	Dunlavin Road Drain	Flash
	1/21	1/21	Lindsay Avenue	Nunawading	Dunlavin Road Drain	Flash
	2/21	2/21	Lindsay Avenue	Nunawading	Dunlavin Road Drain	Flash
-	-	61	Melrose Street	Mont Albert North	Box Hill North Main Drain	Flash
-	-	66	Melrose Street	Mont Albert North	Box Hill North Main Drain	Flash
-	1/68	1/68	Melrose Street	Mont Albert North	Box Hill North Main Drain	Flash
-	-	2/68	Melrose Street	Mont Albert North	Box Hill North Main Drain	Flash
-	-	3/68	Melrose Street	Mont Albert North	Box Hill North Main Drain	Flash
-	-	1/66	Melrose Street	Mont Albert North	Box Hill North Main Drain	Flash
-	-	2/66	Melrose Street	Mont Albert North	Box Hill North Main Drain	Flash
-	-	5	Mitchell Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	1/6	Mitchell Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	2/6	Mitchell Road	Mont Albert North	Box Hill North Main Drain	Flash
-	1/8	1/8	Mitchell Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	2/8	Mitchell Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	3/8	Mitchell Road	Mont Albert North	Box Hill North Main Drain	Flash
-	4/8	4/8	Mitchell Road	Mont Albert North	Box Hill North Main Drain	Flash

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Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	-	10-12	Mitchell Road	Mont Albert North	Box Hill North Main Drain	Flash
-	-	1/42	Mitchell Road	Mont Albert North	Arnott Street Drain	Flash
-	-	2/42	Mitchell Road	Mont Albert North	Arnott Street Drain	Flash
-	3/42	3/42	Mitchell Road	Mont Albert North	Arnott Street Drain	Flash
-	-	44	Mitchell Road	Mont Albert North	Arnott Street Drain	Flash
-	3	3	Morley Crescent	Box Hill North	Bushy Creek Drain	Flash
-	3A	3A	Morley Crescent	Box Hill North	Bushy Creek Drain	Flash
-	-	16	Moselle Street	Mont Albert North	Arnott Street Drain	Flash
-	-	50	Nelson Road	Box Hill North	Severn Street Main Drain	Flash
-	66	66	Nelson Road	Box Hill North	Severn Street Main Drain	Flash
-	68	68	Nelson Road	Box Hill North	Severn Street Main Drain	Flash
-	68	68	Rostrevor Parade	Mont Albert North	Arnott Street Drain	Flash
-	73	73	Rostrevor Parade	Mont Albert North	Arnott Street Drain	Flash
-	-	83	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	87	87	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	90	90	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	92	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	1/87	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	10/96	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	11/96	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	12/96	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	14/96	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	3/87	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	4/87	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	7/87	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	-	6/96	Severn Street	Box Hill North	Severn Street Main Drain	Flash
7/96	7/96	7/96	Severn Street	Box Hill North	Severn Street Main Drain	Flash
-	9/96	9/96	Severn Street	Box Hill North	Severn Street Main Drain	Flash
	2/377	2/377	Springfield Road	Nunawading	Dunlavin Road Drain	Flash
	3/377	3/377	Springfield Road	Nunawading	Dunlavin Road Drain	Flash
	4/377	4/377	Springfield Road	Nunawading	Dunlavin Road Drain	Flash
	5/377	5/377	Springfield Road	Nunawading	Dunlavin Road Drain	Flash
	6/377	6/377	Springfield Road	Nunawading	Dunlavin Road Drain	Flash
-	-	95	Thames Street	Box Hill	Severn Street Main Drain	Flash
-	1/106	1/106	Thames Street	Box Hill North	Severn Street Main Drain	Flash
-	2/106	2/106	Thames Street	Box Hill North	Severn Street Main Drain	Flash
-	-	106	Victoria Crescent	Mont Albert	Box Hill North Main Drain	Flash
-	-	13	Wattle Street	Box Hill North	Severn Street Main Drain	Flash
31A	31A	31A	Wimmera Street	Box Hill North	Bushy Creek Drain	Flash
-	37	37	Wimmera Street	Box Hill North	Bushy Creek Drain	Flash
-	54	54	Woodhouse Grove	Box Hill North	Bushy Creek Drain	Flash

Total No. of Properties		
7	**47**	**122**

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ISOLATION

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

ESSENTIAL INFRASTRUCTURE

Apart from the roads outlined below, all other essential infrastructure and services areas along Koonung Creek or the Box Hill Drainage System are expected to remain unaffected by flooding during a 1% AEP (100yr ARI) event.

ROAD CLOSURES

The following roads are subject to closure during flooding along Koonung Creek and the Bushy Creek Drain. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads flooded in a 1% AEP (100yr ARI) event
• Belmore Road, Mont Albert North at Koonung Secondary College
• Eastern Freeway, Box Hill North between Springvale Road and Doncaster Road
• Elgar Road, Box Hill North at Belmore Road
• Station Street, Box Hill North at Paisley Street

Whitehorse City Council Roads flooded in a 1% AEP (100yr ARI) event			
BLACKBURN NORTH	• Wimmera Street	• Arnott Street	• Melrose Street
• Joseph Street	• Woodhouse Grove	• Boondara Road	• Mitchell Road
BOX HILL NORTH	**MONT ALBERT**	• Box Hill Crescent	• Moselle Street
• Barwon Street	• Kenmare Street	• Cairo Road	• Rostrevor Parade
• Paisley Street	• Victoria Crescent	• Dunloe Avenue	**NUNAWADING**
• Station Street	**MONT ALBERT NORTH**	• Francesca Street	• Lindsay Avenue
• Thames Street	• Allison Road	• Goddard Court	• Springfield Road

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FLOOD MITIGATION

RETARDING BASINS

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Houses In Flow Path (dam breach)	Melway Reference
Bushy Creek	Bushy Creek Drain	Unknown	16.1 ML	44.77m AHD	44.4m AHD	Unknown	High C	10	47 B3
Tram Road, Doncaster	Koonung Creek	Unknown	Unknown	Unknown	60.1m AHD	Unknown	High C	5	47 F3

COMMAND, CONTROL & COORDINATION

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

FLOOD IMPACTS & REQUIRED ACTIONS

The table below is a breakdown of the number of properties flooded in a 1% AEP (100yr ARI) event. Refer to the following intelligence card/s for Bulleen and Box Hill North for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	120
Business	0
Industrial	0
Public Land	2
Rural	0
Total	**122**

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FLOOD INTELLIGENCE CARD – BULLEEN GAUGE, KOONUNG CREEK

Version 2 – May 2015

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

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LOCATION	**Swim Centre on Bulleen Road, Bulleen**
MELWAY REFERENCE:	**32 D10**
STREAM:	**Koonung Creek**
GAUGE NUMBER:	**229229A**
GAUGE ZERO:	**9.32m AHD**
GAUGE TYPE	**River Level**

MINOR:	**N/A**
MODERATE:	**N/A**
MAJOR	**N/A**
LEVEE HEIGHT:	**N/A**
TELEMETRIC/MANUAL	**TELEMETRIC**
HIGHEST RECORDED FLOOD:	**5.30m (24th December 1978)**

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
4.51m	3rd December 2003 Flood Level	**Event Summary** • 10 motorists required rescuing by boat on the Eastern Freeway at Bulleen Road when floodwaters reached chest high under the bridge • Marcellin College on Bulleen Road, Bulleen flooded • Trinity College Sports Grounds on Bulleen Road, Bulleen flooded	VicRoads to consider lane closures and warning signs on freeway
Unknown	1% AEP (100yr ARI) Flood Level	**Properties at Flood Risk** **2 Properties in Total** • 8 & 10 Kent Close, Blackburn North **Community Infrastructure Flooded** • Koonung Creek Linear Park Trail flooded at various sections between Springvale Road and Doncaster Road **Water Over Road** • Eastern Freeway, Box Hill North between Springvale Road and Doncaster Road • Joseph Street, Blackburn North	Council staff to monitor trail conditions VicRoads to monitor freeway and road conditions and close lanes if required

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FLOOD INTELLIGENCE CARD – BOX HILL NORTH & MONT ALBERT NORTH (UNGAUGED)

Version 2 – May 2015

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

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CLOSEST RAIN GAUGE	**Doncaster**
LOCATION	**Eastern Golf Club, Doncaster**
MELWAY REF:	**33 A12**

GAUGE NUMBER	**586010**
GAUGE TYPE	**RAIN**
TELEMETRIC/MANUAL	**TELEMETRIC**

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	**Annual Exceedance Probability (% AEP)**	**Consequence / Impact**	**Operational Considerations**
22mm in 10 mins; 36mm in 30 mins; 46mm in 1 hour; 58mm in 2 hours; 83mm in 6 hours; or 104mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.	1% AEP (100 year ARI)	**Properties at Flood Risk (Over-Floor)** **122 Properties in Total** **Severn Street Main Drain** • 24 Barwon Street, Box Hill North • 50, 66 & 68 Nelson Road, Box Hill North • 83, 87, 90, 92, 1/87, 10/96, 11/96, 12/96, 14/96, 3/87, 4/87, 7/87, 6/96, 7/96 & 9/96 Severn Street, Box Hill North • 95, 1/106 & 2/106 Thames Street, Box Hill North • 13 Wattle Street Box Hill North **Box Hill North Main Drain** • 4, 4A & 5 Allison Road, Mont Albert North • 472 & 474 Belmore Road, Mont Albert North • 1, 2, 3, 4, 6, 8, 10, 25, 27, 29 & 31 Botanic Walk Mont Albert North • 1/1A, 2/1A, 1/3, 2/3, 3/3, 4/3, 5/3 & 2/7 Cairo Road, Mont Albert North • 2, 1/3, 2/3, 3/3, 6/3 & 7/3 Dunloe Avenue, Mont Albert North • 531, 533, 535, 537, 541, 543, 8/601, 9/601, 10/601 & 11/601 Elgar Road, Mont	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Albert North • 1, 1A, 2 & 6 Goddard Court • 94, 96, 1/98, 2/98, 107, 109, 1/111, 2/111, 3/111, 4/111, 5/111 & 6/111 Kenmare Street, Mont Albert North • 61, 66, 1/68, 2/68, 3/68, 1/66 & 2/66 Melrose Street, Mont Albert North • 5, 1/6, 2/6, 1/8, 2/8, 3/8, 4/8 & 10-12 Mitchell Road, Mont Albert North • 106 Victoria Crescent, Mont Albert **Arnott Street Drain** • 27 & 28 Arnott Street Drain, Mont Albert North • 1/42, 2/42, 3/42 & 44 Mitchell Road, Mont Albert North • 16 Moselle Street, Mont Albert North • 68 & 73 Rostrevor Parade, Mont Albert North **Bushy Creek Drain** • 648 Elgar Road, Box Hill North • 6 Janda Court, Box Hill North • 31A & 37 Wimmera Street, Box Hill North • 54 Woodhouse Grove, Box Hill North **Dunlavin Road Drain** • 2/5 Beryl Street, Nunawading • 5/13, 6/13, 7/13, 1/21 & 2/21 Lindsay Avenue, Nunawading • 2/377, 3/377, 4/377, 5/377, 6/377 Springfield Road, Nunawading **Community Infrastructure Flooded** • Bushy Creek Trail, Box Hill North - the majority of the path between Dorking Road and Elgar Road • Athletics Track at Hagenauer Reserve on Barwon Street, Box Hill North • Mont Albert North Guide Hall on Rostrevor Parade at risk of over-floor flooding • Sports Grounds of Koonung Secondary College along Box Hill Crescent, Mont Albert North • Box Hill Miniature Steam Railway on Belmore Road, Mont Albert North • Elgar Park, Mont Albert North **Water Over Road (over 300mm Depth)** **Severn Street Main Drain** • Thames Street, Box Hill North • Barwon Street, Box Hill North **Box Hill North Main Drain**	VicSES to respond to requests on case by case basis Council to provide road closure signage if required.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Victoria Crescent, Mont Albert • Kenmare Street, Mont Albert • Melrose Street, Mont Albert North • Dunloe Avenue, Mont Albert North • Goddard Court, Mont Albert North • Box Hill Crescent, Mont Albert North • Allison Road, Mont Albert North • Mitchell Road, Mont Albert North • Belmore Road, Mont Albert North at Koonung Secondary College • Cairo Road, Mont Albert North **Arnott Street Drain** • Francesca Street, Mont Albert North • Rostrevor Parade, Mont Albert North • Moselle Street, Mont Albert North • Boondara Road, Mont Albert North • Arnott Street, Mont Albert North **Bushy Creek Drain** • Wimmera Street, Box Hill North • Station Street, Box Hill North at Paisley Street • Paisley Street, Box Hill North • Woodhouse Grove, Box Hill North • Elgar Road, Box Hill North at Belmore Road **Dunlavin Road Drain** • Springfield Road, Nunawading at Crest Grove • Lindsay Avenue, Nunawading	Council to consider pathway closures. Warning signs to be placed on Belmore road as required by VicRoads/ WCC

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APPENDIX C3 – DANDENONG CREEK FLOOD EMERGENCY PLAN

OVERVIEW OF FLOODING CONSEQUENCES

Dandenong Creek forms the southeast boundary of the City of Whitehorse flowing from the east along the borders of the Cities of Maroondah & Knox before exiting Whitehorse where the creek runs south along Monash and Knox's borders. A number of stormwater drainage networks discharge into Dandenong Creek in the suburbs of Vermont & Vermont South. Flash flooding may be experienced along these stormwater drains, while Dandenong Creek may flood with prolonged rainfall.

Areas of potential impact include flooding of Boronia Road from Dandenong Creek and Canterbury Road, Heatherdale Road and Burwood Highway from the stormwater drains adjacent to them.

WARNING TIMES

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

Hydrographic/Telemetry Station	Station No.	Owner	Gauge Type	Melway Reference
Dandenong Creek at Wantirna Road, Wantirna	228357A	Melbourne Water	Water Level & Rain	63 H3

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/content/rivers_and_creeks/rainfall_and_river_level_data/rainfall_and_river_level_data.asp

It is advised that residents monitor the Bureau of Meteorology's website http://www.bom.gov.au/ and the VicSES website http://www.ses.vic.gov.au/ for any thunderstorm, flood or severe weather warnings present for their area.

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AREAS OF FLOOD RISK

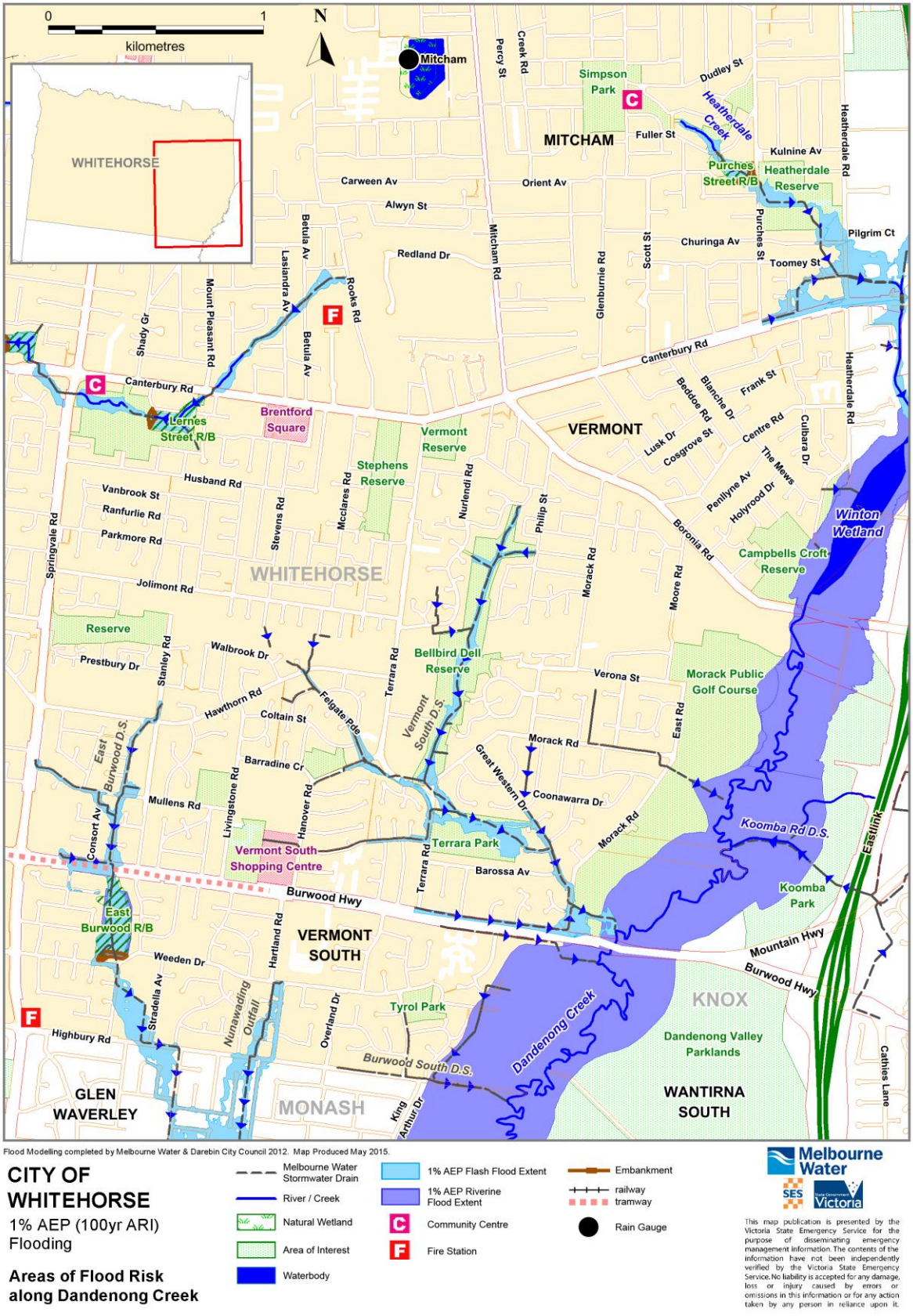

Figure C3 – Areas of flood risk along Dandenong Creek in the City of Whitehorse

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PROPERTIES AT FLOOD RISK

Properties listed in the table below are at risk from flooding over-floor during flash flood events along the Heatherdale Creek, Vermont South and East Burwood Drains. As more intelligence becomes available, this list may grow.

Properties (Residences, Businesses & Public Use) at risk from Flooding Over-Floor from Flash Flooding

Street No. at Risk in AEP Event			Street	Suburb	Along Melbourne Water Watercourse	Flood Risk Type
20% AEP	5% AEP	1% AEP				
-	1	1	Astley Court	Vermont South	Nunawading Outfall	Flash
-	-	3	Astley Court	Vermont South	Nunawading Outfall	Flash
4	4	4	Astley Court	Vermont South	Nunawading Outfall	Flash
-	417	417	Burwood Highway	Vermont South	East Burwood Drain	Flash
-	419	419	Burwood Highway	Vermont South	East Burwood Drain	Flash
-	421	421	Burwood Highway	Vermont South	East Burwood Drain	Flash
639	639	639	Canterbury Road	Vermont	Heatherdale Creek	Flash
641	641	641	Canterbury Road	Vermont	Heatherdale Creek	Flash
643	643	643	Canterbury Road	Vermont	Heatherdale Creek	Flash
-	-	647	Canterbury Road	Vermont	Heatherdale Creek	Flash
7	7	7	Dalroy Crescent	Vermont South	East Burwood Drain	Flash
-	15	15	Dalroy Crescent	Vermont South	East Burwood Drain	Flash
-	-	9	Eden Valley Close	Vermont South	Vermont South Drain	Flash
-	-	30	George Road	Vermont South	Vermont South Drain	Flash
-	811	811	Highbury Road	Vermont South	Nunawading Outfall	Flash
813	813	813	Highbury Road	Vermont South	Nunawading Outfall	Flash
-	-	765-773	Highbury Road	Vermont South	Nunawading Outfall	Flash
-	2	2	Highmont Drive	Vermont South	Nunawading Outfall	Flash
7	7	7	Kalara Place	Vermont South	Nunawading Outfall	Flash
9	9	9	Kalara Place	Vermont South	Nunawading Outfall	Flash
-	-	10	Kalara Place	Vermont South	Nunawading Outfall	Flash
-	-	2/1	Mullens Road	Vermont South	East Burwood Drain	Flash
-	-	2/1	Mullens Road	Vermont South	East Burwood Drain	Flash
37	37	37	Mullens Road	Vermont South	East Burwood Drain	Flash
39	39	39	Mullens Road	Vermont South	East Burwood Drain	Flash
41	41	41	Mullens Road	Vermont South	East Burwood Drain	Flash
-	60	60	Purches Street	Mitcham	Heatherdale Creek	Flash
31	31	31	Scarborough Road	Vermont South	East Burwood Drain	Flash
-	-	6	Yandell Close	Vermont South	Nunawading Outfall	Flash
8	8	8	Yandell Close	Vermont South	Nunawading Outfall	Flash
10	10	10	Yandell Close	Vermont South	Nunawading Outfall	Flash

Total No. of Properties		
15	**22**	**31**

ISOLATION

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

`

ESSENTIAL INFRASTRUCTURE

- A Sewer Emergency Relief Point is located on the upstream side the Eastlink bridge in Ringwood (City of Maroondah), which if activated following a storm event has the capacity to cause a hazard for emergency responders or any persons within floodwaters downstream.

Apart from the roads outlined below, all other essential infrastructure and services areas around Vermont & Vermont South 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 Dandenong Creek, Heatherdale Creek, Vermont South Drain & East Burwood Drain in Vermont & Vermont South. Check the VicRoads website for more details: alerts.vicroads.vic.gov.au

VicRoads Roads likely flooded in a 1% AEP (100yr ARI) event
• Boronia Road, Vermont at Dandenong Creek crossing
• Burwood Highway (East Bound Lane), Vermont South at Morack Road near Dandenong Creek
• Canterbury Road, Mitcham at Heatherdale Road
• Heatherdale Road, Mitcham between Canterbury Road and Churinga Avenue

Whitehorse City Council Roads likely flooded in a 1% AEP (100yr ARI) event			
MITCHAM	**VERMONT SOUTH**	• George Road	• Scarborough Road
• Coringa Close	• Burwood Highway Service Lanes between Springvale Road and Fortescue Grove	• Great Western Drive	• Sherwood Rise
• Fuller Street	• Dalroy Crescent	• Morack Road	• Stradella Avenue
• Lombard Road	• Eden Valley Close	• Mullens Road	• Terrara Road

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FLOOD MITIGATION

RETARDING BASINS

Melbourne Water Retarding Basin	On Drain/ Waterway	Area	Storage Capacity	Spillway Crest Level	Full Supply Level	Embankment Crest Level	ANCOLD Hazard Rating	Houses In Flow Path (dam breach)	Melway Reference
East Burwood, Vermont South	East Burwood Drain	Unknown	59.6 ML	86.9m AHD	87.2m AHD	87.5m AHD	High A	17	62 E8
Purches Street, Mitcham	Heatherdale Creek	Unknown	24.7 ML	97.3m AHD	97.6m AHD	97.9m AHD	High C	5	49 C12

SEWERAGE INFRASTRUCTURE

There are no sewerage pumping stations or Emergency Relief Structures expected to be within the vicinity of floodwaters during severe flood events within the City of Whitehorse. However a Sewer Emergency Relief Point is located along Dandenong Creek, upstream of the Municipality on the border of the Cities of Maroondah & Knox which will have an affect downstream if activated.

SEWER EMERGENCY RELIEF POINTS

On Drain / Waterway	Location	Melway Reference
Dandenong Creek	Ringwood Public Golf Course, Canterbury Road, Ringwood	63 E3

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.

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FLOOD IMPACTS & REQUIRED ACTIONS

The table below is a breakdown of the number of properties flooded in a 1% AEP (100yr ARI) event. Refer to the following intelligence card/s for Wantirna, Vermont & Vermont South for more details.

Land Use Flooded in a 1% AEP Event	Total
Residential	131
Business	1
Industrial	0
Public Land	4
Rural	0
Total	**136**

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FLOOD INTELLIGENCE CARD – WANTIRNA GAUGE, DANDENONG CREEK

Version 2 – May 2015

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

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LOCATION	**Wantirna Road, Wantirna**
MELWAY REFERENCE:	**63 H3**
STREAM:	**Dandenong Creek**
GAUGE NUMBER:	**228357A**
GAUGE ZERO:	**79.3m AHD**
GAUGE TYPE	**Water Level**

MINOR:	**N/A**
MODERATE:	**N/A**
MAJOR	**N/A**
LEVEE HEIGHT:	**N/A**
TELEMETRIC/MANUAL	**TELEMETRIC**
HIGHEST RECORDED FLOOD:	**2.61m (18th September 1984)**

Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
4.53m		**Water Over Road** • Boronia Road, Vermont at Dandenong Creek crossing	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident.
5.81m	1% AEP (100yr ARI) Flood Level	**Community Infrastructure Impacted** • Morack Public Golf Course on Morack Road, Vermont South partly flooded along eastern boundary	Whitehorse Council EHO to consider monitoring of water quality with EPA and water companies.

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Creek Height	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		Essential Infrastructure Impacted • A Sewer Emergency Relief Point is located on the upstream side the Eastlink bridge in Ringwood (City of Maroondah)	

FLOOD INTELLIGENCE CARD – VERMONT & VERMONT SOUTH (UNGAUGED)

Version 2 - May 2015

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

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CLOSEST RAIN GAUGE	**Mitcham**
LOCATION	**Mitcham Reservoir, Lucknow Street, Mitcham**
MELWAY REF:	**48 J10**

GAUGE NUMBER	**586006**
GAUGE TYPE	**RAIN**
TELEMETRIC/MANUAL	**TELEMETRIC**

Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
15mm in 10 mins; 25mm in 30 mins; 33mm in 1 hour; 43mm in 2 hours; 62mm in 6 hours; or 79mm in 12 hours Note: rainfall depths are a very rough	5% AEP (20 year ARI)	**Properties at Flood Risk (Over-Floor)** **15 Properties in Total** **Heatherdale Creek** • 639, 641 & 643 Canterbury Road, Vermont **East Burwood Drain & Nunawading Outfall** • 4 Astley Court, Vermont South • 7 Dalroy Crescent, Vermont South • 813 Highbury Road, Vermont South • 7 & 9 Kalara Place, Vermont South	VicSES State and Region to provide warnings to the community and other agencies. VicSES will provide warnings using OSOM and SMSER as required based on the predications provided by BoM regarding flood levels and the risk of Flash Flooding. The Central Duty officer in conjunction with the Regional Agency Commander will maintain operational awareness and form an appropriate response arrangement to suit the level of incident.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
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.		• 37, 39 & 41 Mullens Road, Vermont South • 31 Scarborough Road, Vermont South • 8 & 10 Yandell Close, Vermont South **Community Infrastructure Flooded** **East Burwood Drain** • Holy Saviour Catholic Primary School at risk of flooding on Highbury Road, Vermont South **Water Over Road (Over 300mm Depth)** **Heatherdale Creek** • Canterbury Road, Mitcham at Heatherdale Road • Heatherdale Road, Mitcham between Canterbury Road and Churinga Avenue • Coringa Close, Mitcham • Lombard Road, Mitcham **Vermont South Drain** • Great Western Drive, Vermont South between Morack Road and Mildara Street • Morack Road, Vermont South between Burwood Highway and Great Western Drive **East Burwood Drain** • Scarborough Road, Vermont South • Dalroy Crescent, Vermont South • Service Lanes on Burwood Highway between Springvale Road and Fortescue Grove • Sherwood Rise, Vermont South • Stradella Avenue, Vermont South at Highbury Road	Council to provide road closure signage if required.
19mm in 10 mins; 31mm in 30 mins; 40mm in 1 hour; 51mm in 2 hours; 74mm in 6 hours; or 93mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have	2% AEP (50 year ARI)	**Properties at Flood Risk (Over-Floor)** **22 Properties in Total** **Heatherdale Creek** • 639, 641 & 643 Canterbury Road, Vermont • 60 Purches Street, Mitcham **East Burwood Drain & Nunawading Outfall** • 1 & 4 Astley Court, Vermont South • 417, 419 & 421 Burwood Highway, Vermont South • 7 & 15 Dalroy Crescent, Vermont South • 811 & 813 Highbury Road, Vermont South • 2 Highmont Drive, Vermont South	VicSES to respond as per request by request basis.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
been used due to the ungagged nature of the catchment. This should be used as a guide only.		• 7 & 9 Kalara Place, Vermont South • 37, 39 & 41 Mullens Road, Vermont South • 31 Scarborough Road, Vermont South • 8 & 10 Yandell Close, Vermont South **Community Infrastructure Impacted** **East Burwood Drain** • Holy Saviour Catholic Primary School at risk of flooding on Highbury Road, Vermont South **Water Over Road (Over 300mm Depth)** **Heatherdale Creek** • Canterbury Road, Mitcham at Heatherdale Road • Heatherdale Road, Mitcham between Canterbury Road and Churinga Avenue • Coringa Close, Mitcham • Lombard Road, Mitcham • Fuller Street, Mitcham at Somers Trail crossing low point **Vermont South Drain** • Terrara Road, Vermont South between Barossa Avenue and Hanover Road • George Road, Vermont South at Terrara Road • Great Western Drive, Vermont South between Morack Road and Mildara Street • Eden Valley Close, Vermont South • Morack Road, Vermont South between Burwood Highway and Great Western Drive • Burwood Highway (East Bound Lane) at Morack Road **East Burwood Drain** • Scarborough Road, Vermont South • Mullens Road, Vermont South • Dalroy Crescent, Vermont South • Service Lanes on Burwood Highway between Springvale Road and Fortescue Grove • Sherwood Rise, Vermont South • Stradella Avenue, Vermont South at Highbury Road	Council to provide road closure signage if required.
22mm in 10 mins; 36mm in 30 mins; 46mm in 1 hour;	1% AEP (100 year ARI)	**Properties at Flood Risk (Over-Floor)** **31 Properties in Total** **Heatherdale Creek** • 639, 641, 643 & 647 Canterbury Road, Vermont	VicSES to respond as per request by request

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
58mm in 2 hours; 83mm in 6 hours; or 104mm in 12 hours Note: rainfall depths are a very rough method of estimating flood events and have been used due to the ungagged nature of the catchment. This should be used as a guide only.		• 60 Purches Street, Mitcham **Vermont South Drain** • 9 Eden Valley Close, Vermont South • 30 George Road, Vermont South **East Burwood Drain & Nunawading Outfall** • 1, 3 & 4 Astley Court, Vermont South • 417, 419 & 421 Burwood Highway, Vermont South • 7 & 15 Dalroy Crescent, Vermont South • 765-733, 811 & 813 Highbury Road, Vermont South • 2 Highmont Drive, Vermont South • 7, 9 & 10 Kalara Place, Vermont South • 2/1, 3/1, 37, 39 & 41 Mullens Road, Vermont South • 31 Scarborough Road, Vermont South • 6, 8 & 10 Yandell Close, Vermont South **Community Infrastructure Impacted** **East Burwood Drain** • Holy Saviour Catholic Primary School at risk of flooding over-floor on Highbury Road, Vermont South **Water Over Road (Over 300mm Depth)** **Heatherdale Creek** • Canterbury Road, Mitcham at Heatherdale Road • Heatherdale Road, Mitcham between Canterbury Road and Churinga Avenue • Coringa Close, Mitcham • Lombard Road, Mitcham • Fuller Street, Mitcham at Somers Trail crossing low point **Vermont South Drain** • Terrara Road, Vermont South between Barossa Avenue and Hanover Road • George Road, Vermont South at Terrara Road • Great Western Drive, Vermont South between Morack Road and Gelea Crescent • Eden Valley Close, Vermont South • Morack Road, Vermont South between Burwood Highway and Great Western Drive • Burwood Highway (East Bound Lane) at Morack Road **East Burwood Drain** • Scarborough Road, Vermont South	basis. School has flood and evacuation plans prepared and will enact as required Council to provide road closure signage if required.

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Design Rainfall Depths (mm) – *Indication of Possible Flooding*	Annual Exceedance Probability (% AEP)	Consequence / Impact	Operational Considerations
		• Mullens Road, Vermont South • Dalroy Crescent, Vermont South • Service Lanes on Burwood Highway between Springvale Road and Fortescue Grove • Sherwood Rise, Vermont South • Stradella Avenue, Vermont South at Highbury Road	VicRoads to monitor and respond with lane closures

APPENDIX D - FLOOD EVACUATION ARRANGEMENTS

The Victoria Police are responsible for evacuation. The decision to evacuate rests with the Control agency in conjunction with Police and available expert advice. Consideration must be given to the area, which is to be evacuated, the route to be followed, the means of transport and the location to which evacuees will be asked to attend.

Once the decision to evacuate has been made, the City of Whitehorse MERO and MRM should be contacted to assist in the implementation of the evacuation. The City of Whitehorse will provide advice regarding the most suitable Emergency Relief Centre and other resources that may be required (eg. public health, emergency relief considerations or requirements and special needs groups).

Assistance in an evacuation may be provided by the Victorian State Emergency Service. The Eastern Metropolitan Region (EMR) Councils, including Yarra Ranges Shire Council, Knox City Council, Manningham City Council, Maroondah City Council, Boroondara City Council, Monash City Council, Nillumbik Shire Council and Whitehorse City Council have established a formalised working relationship that outlines operational arrangements to respond to the Relief and Recovery aspects of an emergency and provides support resources to affected Councils in the region.

EMR Councils have developed a standard model of service delivery that takes into consideration staff recruitment, training, resource sharing, Emergency Relief Centre (ERC) plans, support agencies, and equipment. The development of the EMR model is intended to act as a best practice guide and is in no way a prescriptive process for participation in the EMR model but simply a recommended set of procedures and policies to activate ERC"s and transition them into Community Recovery Centres.

Warning Systems

The method of alerting people to the need for evacuation will depend on a number of factors. Consideration should be given to:

The type of emergency

The number of people affected

The ethnic origins of the affected people

The requirements of any special needs groups

For prolonged emergencies, information can be broadcast on Local Radio including ABC 774 AM.

Evacuation Plans

Special plans addressing the issue of evacuation for large organisations including schools are held at the Box Hill and Nunawading Police Stations.

Emergency Relief Centres

A Relief/Recovery/ Centre is a building in which a coordinated service response is provided to support emergency affected communities in the restoration of their emotional, social, economic and physical wellbeing.

In the event of an emergency Whitehorse Council will activate its designated Relief and Recovery Centre/s at the request of the Whitehorse MERC. The EMR Emergency Relief Centre Standard

Operating Guidelines will guide the process in the setup and operating of the Whitehorse Relief Centre/s.

The following emergency relief centres have been assessed found to be potentially suitable for use in times of emergency. Careful consideration must be given to the prevailing circumstances and number of people needing assistance when selecting a site or sites.

NAME	LOCATION	CAPACITY	MAP REF	CAR PARK	DISABLED ACCESS	TOILETS	KITCHEN	SHOWERS	PLAY GROUND	PHONE
Whitehorse Centre	**379 Whitehorse Rd Nunawading**	**500 (200 sleeping)**	**48 G8**	**Ample**	**Y**	**Y**	**Y**	**Y**	**Y**	**9262 6590**
Box Hill Town Hall	**1022 Whitehorse Rd Box Hill**	**1200 (200 sleeping)**	**47 E9**	**Limited**	**Y**	**Y**	**Y**	**Y**	**N**	**9262 6251**

Essential Infrastructure

Lucknow Street Water Storage Facility - Mitcham
Emergency Services Telecommunication Authority (ESTA) – Lakeside Drive Burwood East
Melbourne Water Reserve Surrey Hills
Metro Rail
Bellbird Private Hospital (Flood over floor Threat)

Phase 1 - Decision to Evacuate

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

- Properties are likely to become inundated;
- Properties are likely to become isolated and occupants are not suitable for isolated conditions;
- Public health is at threat as a consequence of flooding and evacuation is considered the most effective risk treatment. This is the role of the Health Commander of the incident to assess and manage. Refer to the State Health Emergency Response Plan (SHERP) for details);
- Essential services have been damaged and are not available to a community and evacuation is considered the most effective risk treatment.

The following should be considered when planning for evacuation:

- Anticipated flood consequences and their timing and reliability of predictions;
- Size and location of the community to be evacuated;
- Likely duration of evacuation;
- Forecast weather;
- Flood Models;

- Predicted timing of flood consequences;
- Time required to conduct the evacuation;
- Time available to conduct the evacuation;
- Evacuation priorities and evacuation planning arrangements;
- Access and egress routes available and their potential flood liability;
- Current and likely future status of essential infrastructure;
- Resources required to conduct the evacuation;
- Resources available to conduct the evacuation;
- Shelter including Emergency Relief Centres, Assembly Areas etc.;
- Vulnerable people and facilities;
- Transportation;
- Registration
- People of CALD background and transient populations;
- Safety of emergency service personnel;
- Different stages of an evacuation process.

The decision to evacuate is to be made in consultation with the MERO, MERC, DHHS, Health Commander and other key agencies and expert advice (CMA's and Flood Intelligence specialists).

Phase 2 – Warning

Warnings may include a warning to prepare to evacuate and a warning to evacuate immediately. Once the decision to evacuate has been made, the at-risk community will be warned to evacuate. Evacuation warnings can be disseminated via methods listed in part 3 of this plan.

Evacuation warning messages will be developed and issued by VICSES in consultation with the MERO, MERC, DHHS and other key agencies and expert advice (CMA's and Flood Intelligence specialists).

Phase 3 – Withdrawal

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

VICSES, MFB, 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 through the MERO/MERC
Landing zones for helicopters are located at:

- Case by Case basis (Potentially at East Burwood Reserve)

A listing of locations where vulnerable people gather is available through the Council.

Phase 4 – Shelter

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

Sector	**Relief Centre/Assembly Area** (include address)	**Comments**
East	Whitehorse Civic Centre 379 Whitehorse Rd Nunawading Mel Ref:48 G8 Ph:9262 6590	Capacity 500 sleeps 200 Ample Car Parking All facilities
West	Box Hill Town Hall 1022 Whitehorse Rd Box Hill Mel Ref: 47E9 Ph:9262 6251	Capacity 1200 sleeps 200 Limited Parking All Facilities

These locations are also listed in the Whitehorse City Council MEMP and Appendix F – Maps

VicPol in consultation with VICSES 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 Emergency Management Team (EMT).

Animal Shelter

The need for animal shelter compounds will be determined dependant on the location and size of the event. These facilities will be coordinated by the City of Whitehorse Animal Management Officer and may be located at the identified relief centre, or as listen in the Whitehorse MEMP.

Whitehorse City Council also has an agreement with RSPCA for displaced animals on a case by case basis.

Phase 5 – Return

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

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

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

Considerations for deciding whether to evacuate include:

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

Disruption to Services

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

Essential Infrastructure and Property Protection

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

Rescue

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

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

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

APPENDIX E - FLOOD WARNING SYSTEMS

Flood and Storm Warning

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

Flood Bulletins

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

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

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

Flood Bulletins should follow the following structure

- What is the current flood situation;
- What is the predicted flood situation;
- What are the likely flood consequences;
- What should the community do in response to flood warnings;
- Where to seek further information;
- Who to call if emergency assistance is required.

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

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

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

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

Local Flood Warning System Arrangements

A Melbourne Water flood forecasting and early warning system operates for some residents in Laburnum who were impacted by localised flooding in 2003. Table E1 on the following page lists properties in the Laburnum area likely affected during this period. The list does not represent residents who have signed up to the local flood warning arrangement. The warning system is managed by MW flood team.

Flood warning systems do not operate for other streams within the Municipality or for overland flows.

Location of House (Street Name & Number)		Depth of Flooding at Property for Selected Creek Heights on the Blackburn North Gauge					Depth of Over-Floor Flooding at Property for Selected Creek Heights on the Blackburn North Gauge				
		4.43m 1% (100yr)	4.28m 2% (50yr)	4.21m 5% (20yr)	4.06m 10% (10yr)	3.81m 20% (5yr)	4.43m 1% (100yr)	4.28m 2% (50yr)	4.21m 5% (20yr)	4.06m 10% (10yr)	3.81m 20% (5yr)
2	Downing Street	0.74m	0.52m	0.31m	0m	0m	0.14m	0m	0m	0m	0m
6	Downing Street	0.82m	0.54m	0.14m	0m	0m	0m	0m	0m	0m	0m
8	Downing Street	1.96m	1.64m	1.03m	0.5m	0.25m	0m	0m	0m	0m	0m
1/10	Downing Street	2.03m	1.69m	0.96m	0.4m	0m	0m	0m	0m	0m	0m
2/10	Downing Street	2.02m	1.68m	0.95m	0.33m	0m	0m	0m	0m	0m	0m
12	Downing Street	2.6m	2.26m	1.52m	0.79m	0m	0m	0m	0m	0m	0m
14	Downing Street	2.85m	2.51m	1.77m	1.04m	0m	0.15m	0m	0m	0m	0m
16	Downing Street	2.77m	2.43m	1.68m	0.95m	0m	0.26m	0m	0m	0m	0m
18	Downing Street	2.93m	2.59m	1.84m	1.04m	0.32m	0.36m	0.02m	0m	0m	0m
20	Downing Street	2.73m	2.39m	1.64m	0.81m	0.18m	0.36m	0.02m	0m	0m	0m
7	Frankcom Street	1.75m	1.41m	0.67m	0m	0m	0m	0m	0m	0m	0m
9	Frankcom Street	2.85m	2.51m	1.76m	1.02m	0m	0m	0m	0m	0m	0m
11	Frankcom Street	3.03m	2.69m	1.93m	1.13m	0.43m	0m	0m	0m	0m	0m
13	Frankcom Street	3.7m	3.36m	2.61m	1.75m	1.19m	0m	0m	0m	0m	0m
2	Laburnum Street	1.12m	1.06m	0.95m	0.84m	0m	0m	0m	0m	0m	0m
2A	Laburnum Street	0.66m	0.59m	0.46m	0.31m	0.09m	0m	0m	0m	0m	0m
4	Laburnum Street	0.48m	0.42m	0.31m	0.19m	0m	0m	0m	0m	0m	0m
6	Laburnum Street	0.61m	0.56m	0.48m	0.39m	0.21m	0m	0m	0m	0m	0m
1/7-13	Laburnum Street	0.31m	0.24m	0.16m	0.05m	0m	0m	0m	0m	0m	0m
2/7-13	Laburnum Street	0.32m	0.25m	0.16m	0.04m	0m	0m	0m	0m	0m	0m
3/7-13	Laburnum Street	0.39m	0.32m	0.23m	0.12m	0.07m	0m	0m	0m	0m	0m
4/7-13	Laburnum Street	0.27m	0.2m	0.1m	0m	0m	0m	0m	0m	0m	0m
5/7-13	Laburnum Street	0.42m	0.35m	0.25m	0.12m	0.08m	0m	0m	0m	0m	0m
6/7-13	Laburnum Street	0.41m	0.33m	0.23m	0.1m	0.06m	0m	0m	0m	0m	0m
2/8	Laburnum Street	0.72m	0.66m	0.58m	0.49m	0.33m	0m	0m	0m	0m	0m
10	Laburnum Street	0.7m	0.65m	0.57m	0.47m	0.33m	0.02m	0m	0m	0m	0m

Location of House (Street Name & Number)		Depth of Flooding at Property for Selected Creek Heights on the Blackburn North Gauge					Depth of Over-Floor Flooding at Property for Selected Creek Heights on the Blackburn North Gauge				
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12	Laburnum Street	0.93m	0.89m	0.82m	0.74m	0.66m	0m	0m	0m	0m	0m
14	Laburnum Street	0.26m	0.21m	0.14m	0.08m	0.01m	0m	0m	0m	0m	0m
1/15-17	Laburnum Street	0.37m	0.27m	0.14m	0m	0m	0m	0m	0m	0m	0m
2/15-17	Laburnum Street	0.42m	0.31m	0.16m	0m	0m	0m	0m	0m	0m	0m
3/15-17	Laburnum Street	0.41m	0.3m	0.13m	0m	0m	0m	0m	0m	0m	0m
4/15-17	Laburnum Street	0.5m	0.37m	0.18m	0m	0m	0m	0m	0m	0m	0m
5/15-17	Laburnum Street	0.38m	0.27m	0.09m	0m	0m	0m	0m	0m	0m	0m
6/15-17	Laburnum Street	0.5m	0.37m	0.18m	0m	0m	0m	0m	0m	0m	0m
8/15-17	Laburnum Street	0.32m	0.2m	0.03m	0m	0m	0m	0m	0m	0m	0m
16	Laburnum Street	0.62m	0.43m	0.34m	0.26m	0.19m	0m	0m	0m	0m	0m
18A	Laburnum Street	0.11m	0.05m	0m	0m	0m	0m	0m	0m	0m	0m
1/19	Laburnum Street	0.62m	0.43m	0.34m	0.26m	0.19m	0m	0m	0m	0m	0m
2/19	Laburnum Street	0.13m	0m	0m	0m	0m	0m	0m	0m	0m	0m
3/19	Laburnum Street	0.44m	0.32m	0.17m	0m	0m	0m	0m	0m	0m	0m
4/19	Laburnum Street	0.71m	0.6m	0.47m	0.2m	0m	0.06m	0m	0m	0m	0m
5/19	Laburnum Street	0.77m	0.66m	0.53m	0.25m	0m	0.19m	0.09m	0m	0m	0m
6/19	Laburnum Street	0.77m	0.66m	0.52m	0.25m	0m	0.24m	0.14m	0m	0m	0m
7/19	Laburnum Street	0.57m	0.46m	0.32m	0.06m	0m	0.22m	0.12m	0m	0m	0m
8/19	Laburnum Street	0.67m	0.56m	0.42m	0.17m	0m	0.18m	0.08m	0m	0m	0m
9/19	Laburnum Street	0.62m	0.51m	0.36m	0.12m	0m	0.06m	0m	0m	0m	0m
2/21	Laburnum Street	0.17m	0.05m	0m	0m	0m	0m	0m	0m	0m	0m
3/21	Laburnum Street	0.68m	0.57m	0.44m	0.16m	0m	0m	0m	0m	0m	0m
4/21	Laburnum Street	1.09m	0.99m	0.84m	0.58m	0.29m	0.35m	0.25m	0.1m	0m	0m
5/21	Laburnum Street	1.27m	1.16m	1m	0.75m	0.44m	0.72m	0.61m	0.46m	0.2m	0m
3/23	Laburnum Street	0.03m	0m	0m	0m	0m	0m	0m	0m	0m	0m
4/23	Laburnum Street	1.33m	1.22m	1.07m	0.82m	0.5m	0m	0m	0m	0m	0m
5/23	Laburnum Street	1.44m	1.33m	1.18m	0.93m	0.61m	0m	0m	0m	0m	0m

Location of House (Street Name & Number)		Depth of Flooding at Property for Selected Creek Heights on the Blackburn North Gauge					Depth of Over-Floor Flooding at Property for Selected Creek Heights on the Blackburn North Gauge				
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25	Laburnum Street	1.46m	1.35m	1.2m	0.95m	0.62m	0m	0m	0m	0m	0m
6/27	Laburnum Street	0.02m	0m	0m	0m	0m	0m	0m	0m	0m	0m
7/27	Laburnum Street	0.45m	0.34m	0.19m	0m	0m	0m	0m	0m	0m	0m
1	Minna Street	0.49m	0.44m	0.35m	0.26m	0m	0m	0m	0m	0m	0m
3	Minna Street	0.07m	0.02m	0m	0m	0m	0m	0m	0m	0m	0m
5	Minna Street	0.31m	0.26m	0.18m	0.09m	0m	0m	0m	0m	0m	0m
7	Minna Street	0.6m	0.54m	0.46m	0.36m	0.25m	0m	0m	0m	0m	0m
1/1	Pakenham Street	0.35m	0m	0m	0m	0m	0m	0m	0m	0m	0m
2/1	Pakenham Street	0.3m	0m	0m	0m	0m	0m	0m	0m	0m	0m
1A	Salisbury Avenue	0.24m	0.18m	0.12m	0.05m	0m	0.04m	0m	0m	0m	0m
2	Salisbury Avenue	0.87m	0.54m	0.37m	0.18m	0.04m	0m	0m	0m	0m	0m
1/4	Salisbury Avenue	1.04m	0.7m	0.51m	0.31m	0.17m	0m	0m	0m	0m	0m
7	Salisbury Avenue	0.23m	0.12m	0.07m	0.03m	0m	0m	0m	0m	0m	0m
6/11-13	Salisbury Avenue	0.27m	0.14m	0.06m	0m	0m	0m	0m	0m	0m	0m
7/11-13	Salisbury Avenue	0.36m	0.18m	0.09m	0m	0m	0m	0m	0m	0m	0m
15	Salisbury Avenue	0.43m	0.21m	0.1m	0m	0m	0.05m	0m	0m	0m	0m
17	Salisbury Avenue	0.51m	0.25m	0.12m	0m	0m	0.11m	0m	0m	0m	0m
19	Salisbury Avenue	0.63m	0.33m	0.18m	0m	0m	0.18m	0m	0m	0m	0m
21	Salisbury Avenue	0.75m	0.4m	0.22m	0m	0m	0.18m	0m	0m	0m	0m
14	South Parade	0.16m	0.06m	0m	0m	0m	0m	0m	0m	0m	0m
16	South Parade	0.34m	0.26m	0.11m	0m	0m	0m	0m	0m	0m	0m
18	South Parade	0.2m	0.12m	0m	0m	0m	0m	0m	0m	0m	0m
1	Thiele Court	0.87m	0.82m	0.76m	0.67m	0.58m	0m	0m	0m	0m	0m
3	Thiele Court	1.06m	1.02m	0.96m	0.9m	0.82m	0m	0m	0m	0m	0m
1/22-24	Whitehorse Road	0.16m	0.11m	0.03m	0m	0m	0m	0m	0m	0m	0m
2/22-24	Whitehorse Road	0.26m	0.21m	0.13m	0.04m	0m	0m	0m	0m	0m	0m
3/22-24	Whitehorse Road	0.34m	0.29m	0.21m	0.13m	0m	0m	0m	0m	0m	0m

Location of House (Street Name & Number)		Depth of Flooding at Property for Selected Creek Heights on the Blackburn North Gauge					Depth of Over-Floor Flooding at Property for Selected Creek Heights on the Blackburn North Gauge				
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4/22-24	Whitehorse Road	0.38m	0.32m	0.24m	0.15m	0m	0m	0m	0m	0m	0m
5/22-24	Whitehorse Road	0.51m	0.45m	0.35m	0.24m	0m	0.02m	0m	0m	0m	0m
6/22-24	Whitehorse Road	0.59m	0.52m	0.42m	0.29m	0.07m	0.29m	0.23m	0.11m	0m	0m
7/22-24	Whitehorse Road	0.62m	0.55m	0.43m	0.28m	0.07m	0.43m	0.37m	0.24m	0.08m	0m
8/22-24	Whitehorse Road	0.62m	0.55m	0.42m	0.26m	0.05m	0.6m	0.53m	0.4m	0.24m	0m
9/22-24	Whitehorse Road	0.42m	0.35m	0.2m	0.02m	0m	0m	0m	0m	0m	0m
10/22-24	Whitehorse Road	0.47m	0.39m	0.25m	0.07m	0m	0m	0m	0m	0m	0m
11/22-24	Whitehorse Road	0.44m	0.37m	0.22m	0.05m	0m	0m	0m	0m	0m	0m
12/22-24	Whitehorse Road	0.43m	0.36m	0.21m	0.04m	0m	0m	0m	0m	0m	0m
13/22-24	Whitehorse Road	0.67m	0.6m	0.47m	0.32m	0.11m	0.58m	0.51m	0.37m	0.21m	0m
14/22-24	Whitehorse Road	0.66m	0.6m	0.48m	0.35m	0.13m	0.31m	0.24m	0.11m	0m	0m
15/22-24	Whitehorse Road	0.61m	0.55m	0.44m	0.32m	0.1m	0.42m	0.36m	0.25m	0.13m	0m
16/22-24	Whitehorse Road	0.51m	0.45m	0.35m	0.24m	0m	0.15m	0.09m	0m	0m	0m
17/22-24	Whitehorse Road	0.46m	0.41m	0.33m	0.25m	0m	0.11m	0.06m	0m	0m	0m
18/22-24	Whitehorse Road	0.47m	0.42m	0.34m	0.25m	0.06m	0m	0m	0m	0m	0m
19/22-24	Whitehorse Road	0.56m	0.5m	0.43m	0.34m	0.16m	0.15m	0.1m	0.02m	0m	0m
20/22-24	Whitehorse Road	0.64m	0.59m	0.51m	0.42m	0.26m	0.03m	0m	0m	0m	0m
21/22-24	Whitehorse Road	0.65m	0.59m	0.51m	0.42m	0.27m	0.17m	0.11m	0.03m	0m	0m
22/22-24	Whitehorse Road	0.65m	0.6m	0.52m	0.42m	0.28m	0.04m	0m	0m	0m	0m
64	Whitehorse Road	0.56m	0.34m	0.1m	0m	0m	0m	0m	0m	0m	0m
66	Whitehorse Road	0.53m	0.28m	0.16m	0m	0m	0m	0m	0m	0m	0m

Table E1 – Properties in the Laburnum area at risk of flooding (May 2015)

APPENDIX F – MAPS

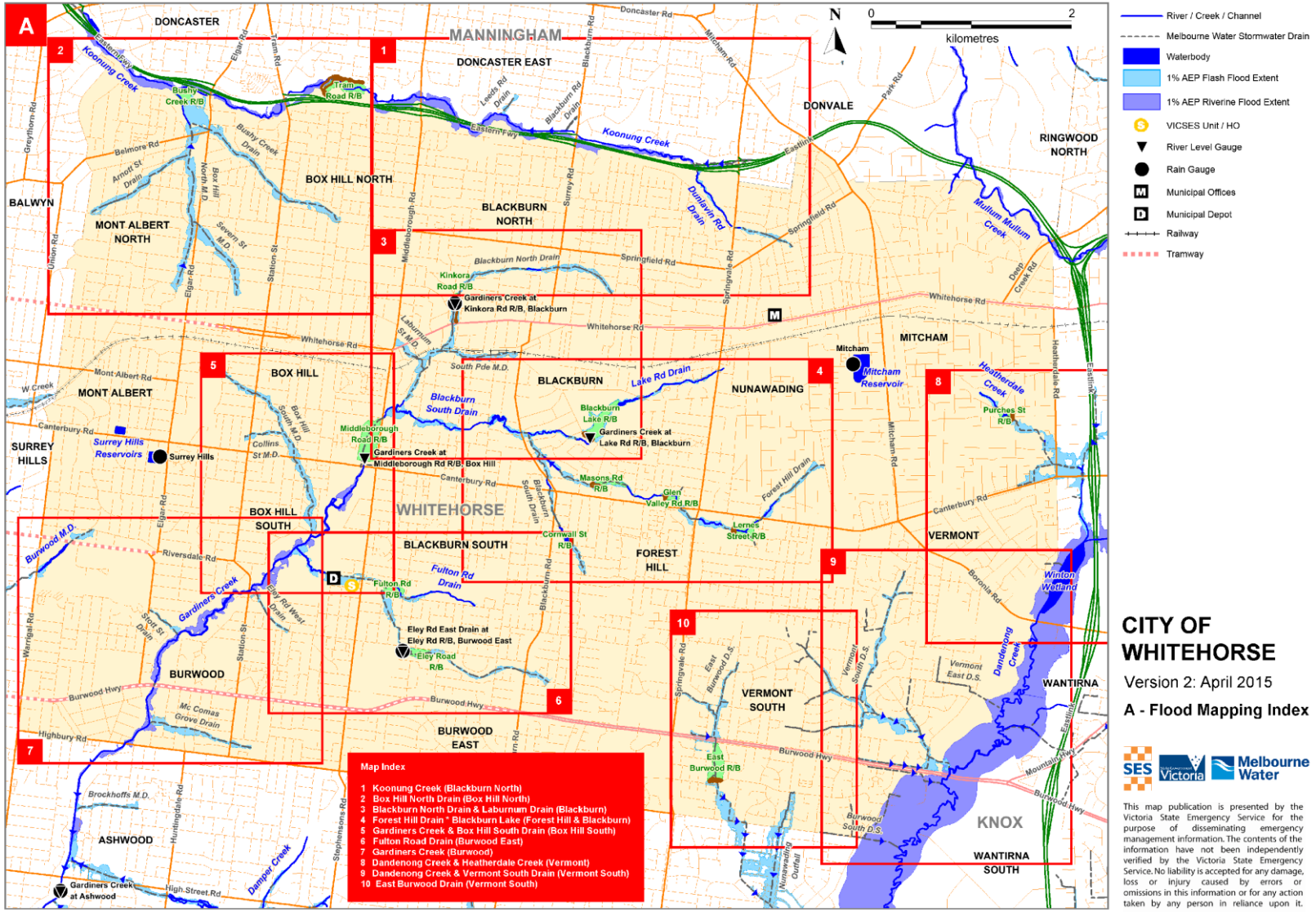
Overview

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 Whitehorse.
- A map showing the Municipal boundary together with the open waterways and underground stormwater drainage pipe network within the City of Whitehorse and the 1% AEP (100-year ARI) flood extents (sourced from Melbourne Water GIS).
- A set of 10 maps showing flooding hot spots within the City of Whitehorse together with the 1% AEP (100-year ARI) flood extents (sourced from the Melbourne Water GIS).

Note that:

- The mapping/data provided in this Appendix has been developed from Melbourne Water and other sources and taken from historical records and flood modelling. It may not include more recent data or local anecdotal information. It is planned that the mapping/data be updated as further studies or modelling is completed and other Information obtained.
- Maps showing the Special Building Overlay and Land Subject to Inundation Overlay are included in the Whitehorse Planning Scheme can be used as a guide to areas that may flood during an event. The maps can be found in hard copy form at the Council's main office or online at the Department of Planning and Community Development website http://planningschemes.dpcd.vic.gov.au/.
- Maps showing 1 in 100-year ARI (1% AEP) flood extents and floodway's (together with volume, height and water quality data) are shown at the Victorian Water Resources website http://nremap-sc.nre.vic.gov.au/MapShare.v2/imf.jsp?site=water.


A
DONCASTER
MANNINGHAM
DONCASTER EAST
DONVALE
RINGWOOD NORTH
BOX HILL NORTH
BLACKBURN NORTH
BALWYN
MONT ALBERT NORTH
MITCHAM
BOX HILL
BLACKBURN
NUNAWADING
MONT ALBERT
SURREY HILLS
WHITEHORSE
BOX HILL SOUTH
BLACKBURN SOUTH
FOREST HILL
VERMONT
BURWOOD
BURWOOD EAST
VERMONT SOUTH
WANTIRNA
KNOX
WANTIRNA SOUTH
ASHWOOD
Koonung Creek
Bushy Creek R/B
Tram Road R/B
Eastern Fwy
Blackburn Rd Drain
Leeds Rd Drain
Dunbavin Rd Drain
Mullum Mullum Creek
Blackburn North Drain
Kinkora Road R/B
Gardiners Creek at Kinkora Rd R/B, Blackburn
Laburnum St M.D.
Whitehorse Rd
Mitcham
Mitcham Reservoir
Heatherdale Creek
Purches St R/B
Lake Rd Drain
Blackburn South Drain
Blackburn Lake R/B
Gardiners Creek at Lake Rd R/B, Blackburn
Middleborough Road R/B
Gardiners Creek at Middleborough Rd R/B, Box Hill
Surrey Hills Reservoirs
Surrey Hills
Canterbury Rd
Masons Rd R/B
Glen Valley Rd R/B
Forest Hill Drain
Lornes Street R/B
Cornwall St R/B
Fulton Rd Drain
Fulton Rd R/B
Eley Rd East Drain at Eley Rd R/B, Burwood East
Eley Road R/B
Gardiners Creek
Eley Rd West Drain
Steet St Drain
Burwood M.D.
Riversdale Rd
Burwood Hwy
Mc Comas Grove Drain
Highbury Rd
Brockhoffs M.D.
Damper Creek
High Street Rd
Gardiners Creek at Ashwood
East Burwood R/B
Vermont East D.S.
Vermont South D.S.
Dandenong Creek
Winton Wetland
Burwood South D.S.
Nunawading Outfall
Map Index
1 Koonung Creek (Blackburn North)
2 Box Hill North Drain (Box Hill North)
3 Blackburn North Drain & Laburnum Drain (Blackburn)
4 Forest Hill Drain * Blackburn Lake (Forest Hill & Blackburn)
5 Gardiners Creek & Box Hill South Drain (Box Hill South)
6 Fulton Road Drain (Burwood East)
7 Gardiners Creek (Burwood)
8 Dandenong Creek & Heatherdale Creek (Vermont)
9 Dandenong Creek & Vermont South Drain (Vermont South)
10 East Burwood Drain (Vermont South)
N
0
2
kilometres
River / Creek / Channel
Melbourne Water Stormwater Drain
Waterbody
1% AEP Flash Flood Extent
1% AEP Riverine Flood Extent
VICSES Unit / HQ
River Level Gauge
Rain Gauge
Municipal Offices
Municipal Depot
Railway
Tramway
CITY OF WHITEHORSE
Version 2: April 2015
A - Flood Mapping Index
SES
Victoria
Melbourne Water
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B
N
0
2
kilometres
DONCASTER
MANNINGHAM
DONCASTER EAST
DONVALE
RINGWOOD NORTH
BOX HILL NORTH
BLACKBURN NORTH
BALWYN
MONT ALBERT NORTH
MONT ALBERT
BOX HILL
BLACKBURN
NUNAWADING
MITCHAM
SURREY HILLS
WHITEHORSE
BOX HILL SOUTH
BLACKBURN SOUTH
FOREST HILL
VERMONT
BURWOOD
BURWOOD EAST
VERMONT SOUTH
WANTIRNA
MONASH
KNOX
ASHWOOD
MOUNT WAVERLEY
GLEN WAVERLEY
WANTIRNA SOUTH
Koonung Creek
Gardiners Creek
Blackburn South Drain
Lake Rd Drain
Fulton Rd Drain
Mullum Mullum Creek
Dandenong Creek
Gardiners Creek at Kinkora Rd R/B, Blackburn
Gardiners Creek at Middleborough Rd R/B, Box Hill
Gardiners Creek at Lake Rd R/B, Blackburn
Eley Rd East Drain at Eley Rd R/B, Burwood East
Gardiners Creek at Ashwood
Mitcham Reservoir
Surrey Hills Reservoirs
Winton Wetland
River / Creek / Channel
Melbourne Water Stormwater Drain
Waterbody
1% AEP Flash Flood Extent
1% AEP Riverine Flood Extent
VICSES Unit / HQ
River Level Gauge
Rain Gauge
Municipal Offices
Municipal Depot
Railway
Tramway
CITY OF WHITEHORSE
Version 2: April 2015
B - 1% AEP (100yr ARI) Flood Extent
SES
Victoria
Melbourne Water
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1
N
0
500
metres
WHITEHORSE
DONCASTER
DONCASTER EAST
BLACKBURN NORTH
BOX HILL NORTH
BLACKBURN
MANNINGHAM
WHITEHORSE
NUNAWADING
Koonung Creek Linear Park
Koonung Creek Reserve
Eastern Freeway Linear Reserve
Boronia Grove Reserve
St Clems Reserve
Donvale Reserve
Slater Reserve
Koonung Park
R E Gray Reserve
Heights Aranga Reserve
Blackburn North Drain
Reserve
Leeds Rd Drain
Blackburn Rd Drain
Dunlavin Rd Drain
Eastlink
Eastern Fwy
Koonung Creek
Millward
Ascot House
Scout Hall
Hall
Beverley Hills Kindergarten
Beverley Hills Primary School
Doncaster East Daycare & Kinder
Tunstall Square Kindergarten
ACE Child Care Centre
Donvale Primary School
Heatherwood School
Ranoramic
Donvale Preschool
Katrina Preschool
Warekila Preschool
Old Orchard Primary School
St Phillip's Catholic Primary School
Springview Primary School
Blackburn North Baptist Preschool
Koonung Cottage
Blackburn Early Learning Centre
Casa Bambini
Blackburn High School
North Blackburn Shopping Centre
Larch Street Kindergarten
Little Raskals Kinder & Child Care
Nunawading Primary School
Flood Modelling completed by Melbourne Water. Map Produced by VicSES May 2015..
CITY OF WHITEHORSE
1% AEP (100yr ARI) Flooding
1. Koonung Creek (Blackburn North)
Building
Area of Interest
Melbourne Water Stormwater Drain
Creek / Channel
Shopping Centre
1% AEP Riverine Flood Extent
1% AEP Flash Flood Depth
0.6m >
0.3m-0.6m
0.05m-0.3m
Community Centre
School / College
Kindergarten / Child Care
Place of Worship
Nursing Home / Aged Care
1% AEP Over-Floor Flooding Risk
SES
Victoria
Melbourne Water
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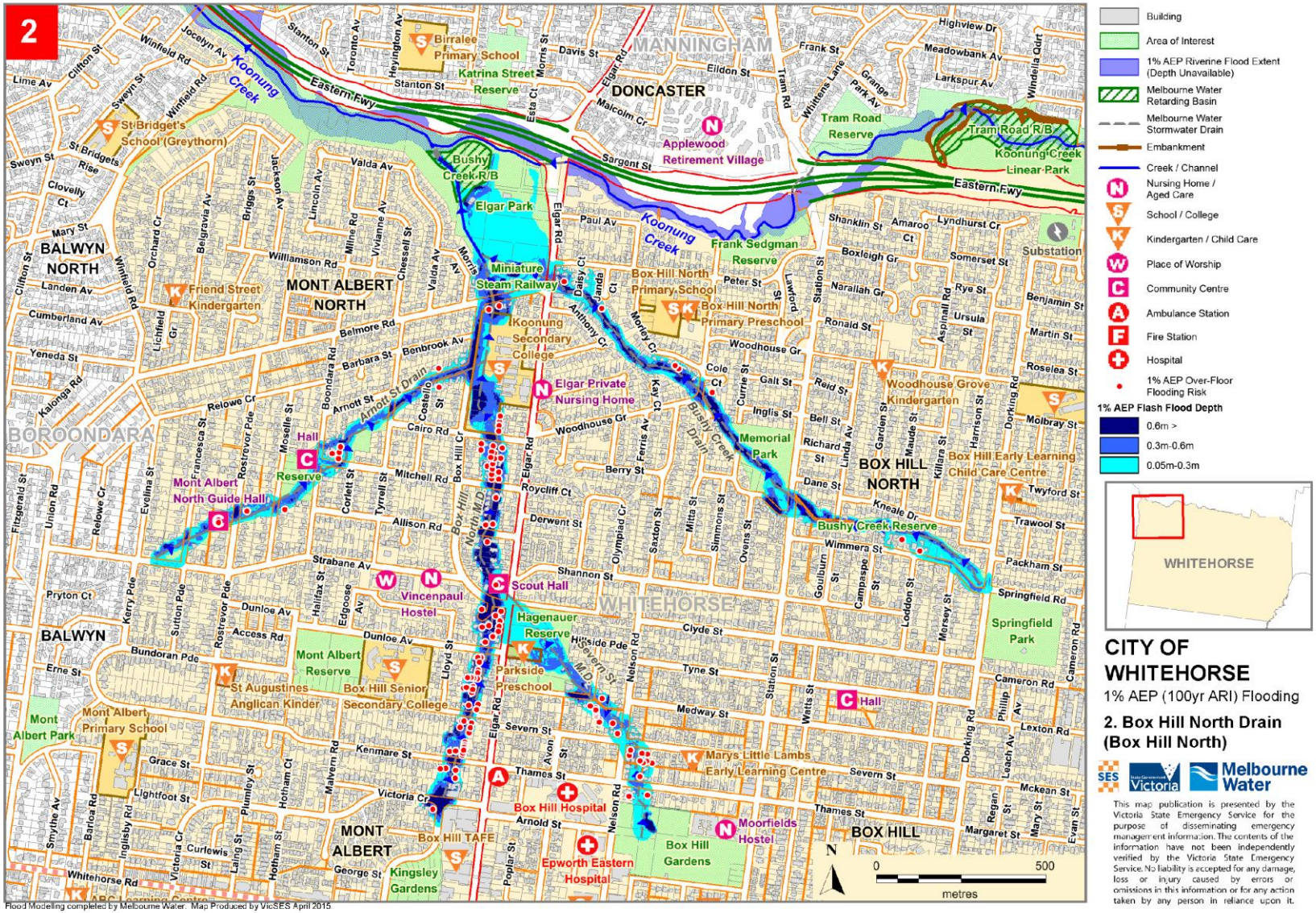
2
Koonung Creek
Eastern Fwy
Bushy Creek R/B
Elgar Park
Miniature Steam Railway
Box Hill North Primary School
Box Hill North Primary Preschool
Koonung Secondary College
Elgar Private Nursing Home
Frank Sedgman Reserve
Tram Road Reserve
Tram Road R/B
Koonung Creek Linear Park
Applewood Retirement Village
Birralee Primary School
Katrina Street Reserve
St Bridget's School (Greythorn)
Friend Street Kindergarten
Arnott St Drain
Hall Reserve
Mont Albert North Guide Hall
Memorial Park
Woodhouse Grove Kindergarten
Box Hill Early Learning Child Care Centre
Bushy Creek Reserve
Vincenpaul Hostel
Scout Hall
Hagenauer Reserve
Parkside Preschool
St Augustines Anglican Kinder
Box Hill Senior Secondary College
Mont Albert Reserve
Mont Albert Primary School
Mont Albert Park
Marys Little Lambs Early Learning Centre
Box Hill Hospital
Box Hill TAFE
Epworth Eastern Hospital
Moorfields Hostel
Box Hill Gardens
Kingsley Gardens
Springfield Park
Hall
Substation
DONCASTER
MANNINGHAM
BALWYN NORTH
MONT ALBERT NORTH
BOROONDARA
BOX HILL NORTH
WHITEHORSE
BALWYN
MONT ALBERT
BOX HILL
N
0
500
metres
Flood Modelling completed by Melbourne Water. Map Produced by VicSES April 2015
Building
Area of Interest
1% AEP Riverine Flood Extent (Depth Unavailable)
Melbourne Water Retarding Basin
Melbourne Water Stormwater Drain
Embankment
Creek / Channel
Nursing Home / Aged Care
School / College
Kindergarten / Child Care
Place of Worship
Community Centre
Ambulance Station
Fire Station
Hospital
1% AEP Over-Floor Flooding Risk
1% AEP Flash Flood Depth
0.6m >
0.3m-0.6m
0.05m-0.3m
WHITEHORSE
CITY OF WHITEHORSE
1% AEP (100yr ARI) Flooding
2. Box Hill North Drain (Box Hill North)
Melbourne Water
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4
BLACKBURN
NUNAWADING
WHITEHORSE
FOREST HILL
BLACKBURN SOUTH
VERMONT
Blackburn Lake
Blackburn Lake R/B
Gardiners Creek at Lake Rd R/B, Blackburn
1% AEP Flood Level: 2.7m (98m AHD)
Blackburn South Drain
Lake Rd Drain
Forest Hill Drain
Masons Road R/B
Glen Valley Road R/B
Cornwall Street R/B
Lernes Street R/B
Forest Hill Reserve
Blackburn Lake Sanctuary
Nunawading Christian College
Morton Park
Forest Hill Chase Shopping Centre
Brentford Square
Blackburn Aged Care Facility
Blackburn Road Preschool
St Thomas the Apostle
Lake Park Aged Care
Coronella Retirement Village Hostel
Our Kids Child Care Centre
Blackburn Lake Primary School
Forest Hills Retirement Village
Mt Pleasant Road Nunawading Primary School
Taralye Kindergarten
Covenant House Retirement Village
Bellbird Private Hospital
Mount Pleasant Kindergarten
Goodstart Early Learning
Holbury Childrens Centre
Forestwood Close
Scout Hall
Aurora School
Hall
Hall
Flood Modelling completed by Melbourne Water. Map Produced by VicSES May 2015.
CITY OF WHITEHORSE
1% AEP (100yr ARI) Flooding
4. Forest Hill Drain & Blackburn Lake (Forest Hill & Blackburn)
Building
Area of Interest
Melbourne Water Stormwater Drain
Creek / Channel
Embankment
Melbourne Water Retarding Basin
1% AEP Flash Flood Depth
0.6m >
0.3m-0.6m
0.05m-0.3m
Shopping Centre
School / College
Kindergarten / Child Care
Place of Worship
Nursing Home / Aged Care
1% AEP Over-Floor Flooding Risk
Community Centre
Fire Station
Water Level Gauge & 1% AEP Flood Level
N
0
500
metres
SES
Victoria
Melbourne Water
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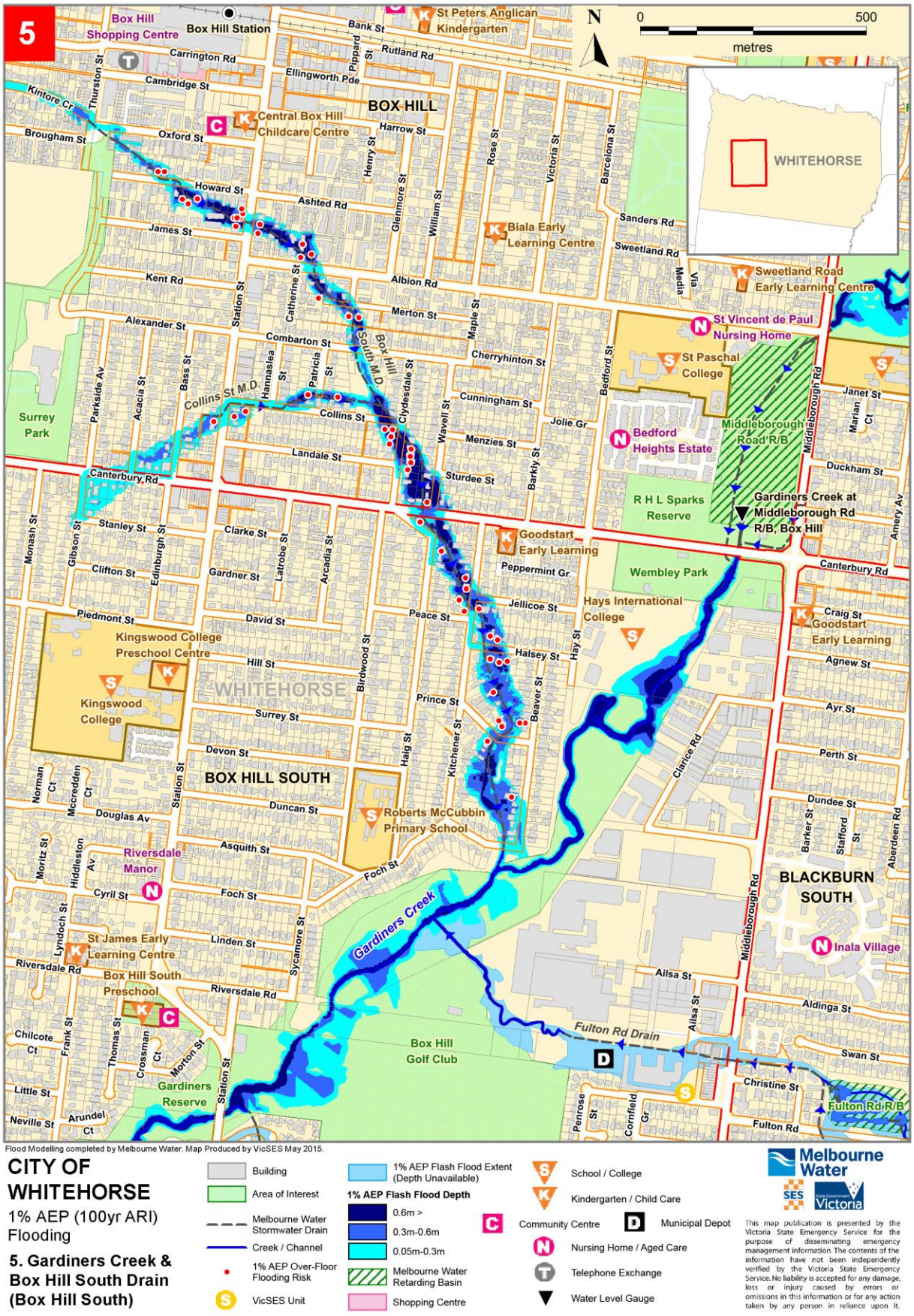
5
N
0
500
metres
WHITEHORSE
Box Hill Shopping Centre
Box Hill Station
St Peters Anglican Kindergarten
Carrington Rd
Bank St
Rutland Rd
Pippard St
Ellingworth Pde
Cambridge St
Kintore Cr
Thurston St
BOX HILL
Central Box Hill Childcare Centre
Brougham St
Oxford St
Harrow St
Howard St
Ashted Rd
James St
Biala Early Learning Centre
Sanders Rd
Sweetland Rd
Sweetland Road Early Learning Centre
Kent Rd
Albion Rd
Merton St
Alexander St
St Vincent de Paul Nursing Home
Combarton St
Cherryhinton St
St Paschal College
Surrey Park
Collins St M.D.
Box Hill South M.D.
Collins St
Cunningham St
Jolie Gr
Bedford Heights Estate
Middleborough Road R/B
Janet St
Landale St
Menzies St
Duckham St
Canterbury Rd
Sturdee St
R H L Sparks Reserve
Gardiners Creek at Middleborough Rd R/B, Box Hill
Stanley St
Clarke St
Goodstart Early Learning
Peppermint Gr
Wembley Park
Clifton St
Gardner St
Jellicoe St
Hays International College
Piedmont St
David St
Peace St
Craig St
Goodstart Early Learning
Kingswood College Preschool Centre
Halsey St
Agnew St
Kingswood College
WHITEHORSE
Prince St
Ayr St
Surrey St
Devon St
BOX HILL SOUTH
Perth St
Duncan St
Roberts McCubbin Primary School
Douglas Av
Dundee St
Riversdale Manor
Asquith St
Foch St
Cyril St
Gardiners Creek
BLACKBURN SOUTH
Linden St
Inala Village
St James Early Learning Centre
Riversdale Rd
Box Hill South Preschool
Ailsa St
Aldinga St
Fulton Rd Drain
Box Hill Golf Club
Swan St
Christine St
Gardiners Reserve
Fulton Rd R/B
Little St
Neville St
Arundel Ct
Fulton Rd
Flood Modelling completed by Melbourne Water. Map Produced by VicSES May 2015.
CITY OF WHITEHORSE
1% AEP (100yr ARI) Flooding
5. Gardiners Creek & Box Hill South Drain (Box Hill South)
Building
Area of Interest
Melbourne Water Stormwater Drain
Creek / Channel
1% AEP Over-Floor Flooding Risk
VicSES Unit
1% AEP Flash Flood Extent (Depth Unavailable)
1% AEP Flash Flood Depth
0.6m >
0.3m-0.6m
0.05m-0.3m
Melbourne Water Retarding Basin
Shopping Centre
School / College
Kindergarten / Child Care
Community Centre
Municipal Depot
Nursing Home / Aged Care
Telephone Exchange
Water Level Gauge
Melbourne Water
SES
Victoria
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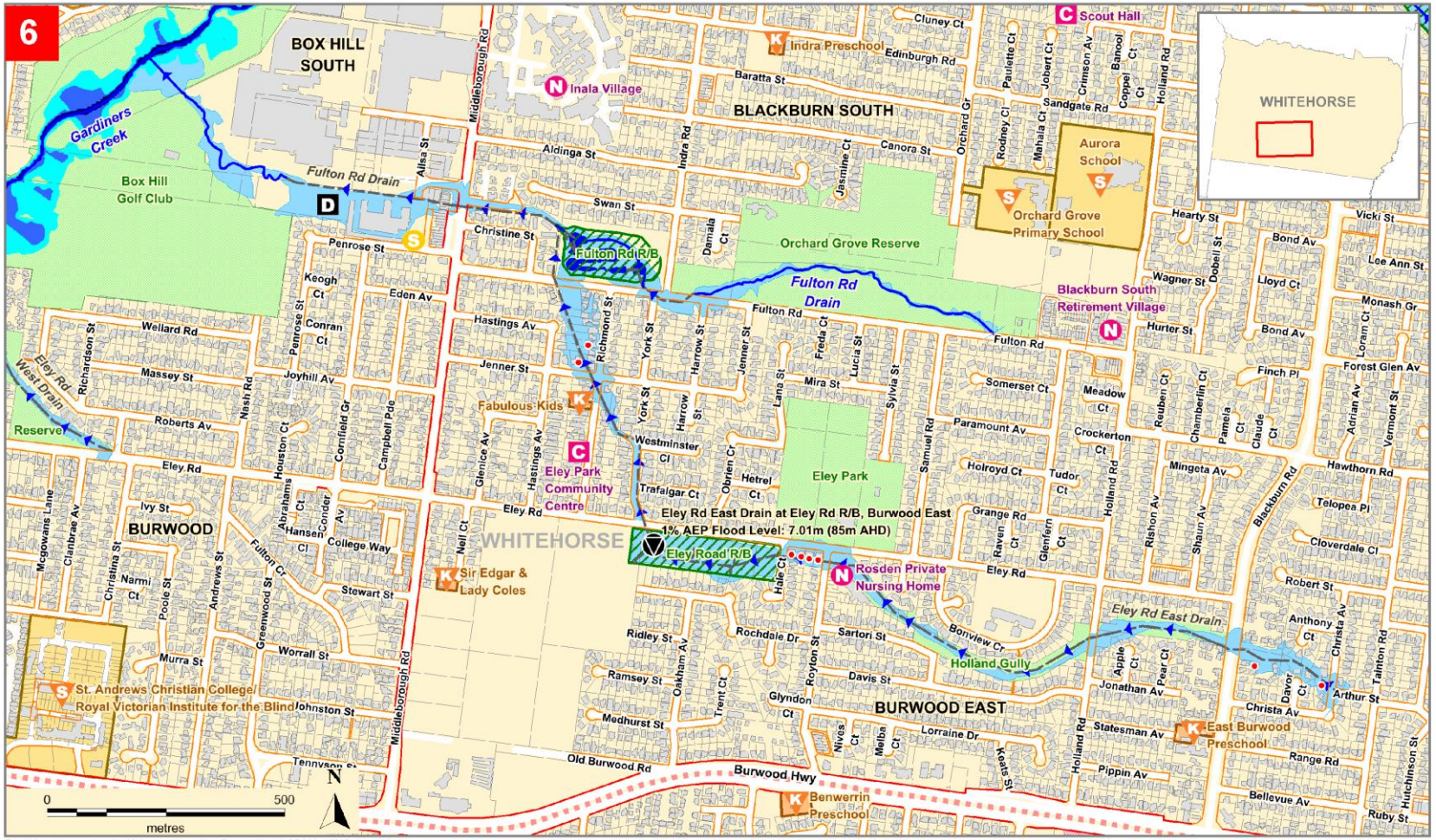


Flood Modelling completed by Melbourne Water. Map Produced by VicSES May 2015..

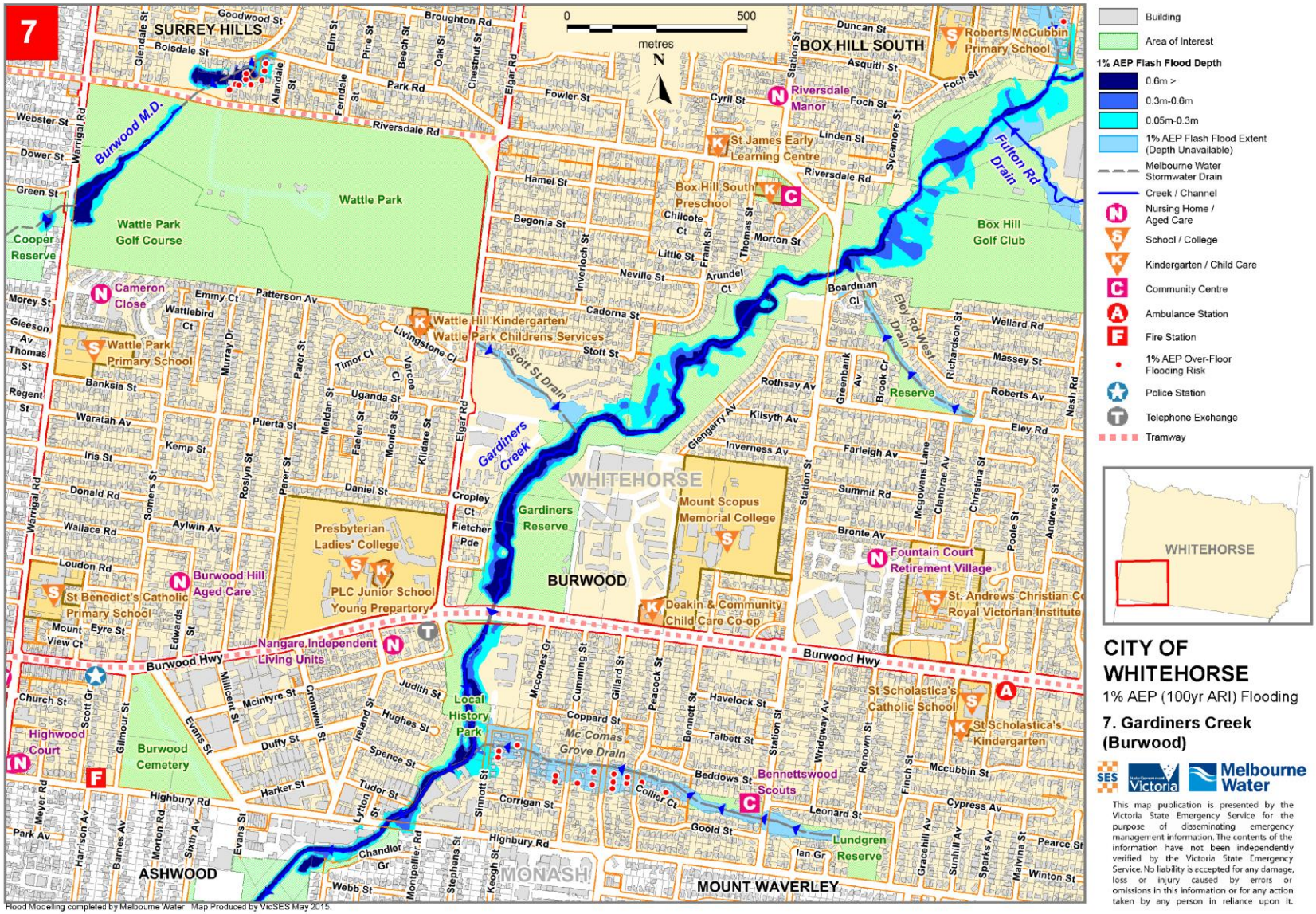
CITY OF WHITEHORSE

1% AEP (100yr ARI) Flooding

6. Fulton Road Drain (Burwood East)

Building
Area of Interest
Melbourne Water Stormwater Drain
Creek / Channel
VicSES
Melbourne Water Retarding Basin
1% AEP Flash Flood Depth
0.6m >
0.3m-0.6m
0.05m-0.3m
1% AEP Flash Flood Extent (Depth Unavailable)
School / College
Kindergarten / Child Care
Place of Worship
Nursing Home / Aged Care
1% AEP Over-Floor Flooding Risk
Community Centre
Fire Station
Water Level Gauge & 1% AEP Flood Level
Rain Gauge
Telephone Exchange
Municipal Depot
Tramway

SES
Victoria
Melbourne Water


7
0
500
metres
N
SURREY HILLS
BOX HILL SOUTH
WHITEHORSE
BURWOOD
ASHWOOD
MONASH
MOUNT WAVERLEY
Wattle Park
Wattle Park Golf Course
Box Hill Golf Club
Cooper Reserve
Gardiners Reserve
Lundgren Reserve
Burwood Cemetery
Local History Park
Burwood M.D.
Gardiners Creek
Stott St Drain
Fulton Rd Drain
Eley Rd West Drain
Mc Comas Grove Drain
Riversdale Rd
Burwood Hwy
Cameron Close
Wattle Park Primary School
Wattle Hill Kindergarten/ Wattle Park Childrens Services
Riversdale Manor
St James Early Learning Centre
Box Hill South Preschool
Roberts McCubbin Primary School
Presbyterian Ladies' College
PLC Junior School
Young Prepartory
Mount Scopus Memorial College
Deakin & Community Child Care Co-op
Fountain Court Retirement Village
St. Andrews Christian Co
Royal Victorian Institute
St Benedict's Catholic Primary School
Burwood Hill Aged Care
Nangare Independent Living Units
Highwood Court
St Scholastica's Catholic School
St Scholastica's Kindergarten
Bennettswood Scouts
Building
Area of Interest
1% AEP Flash Flood Depth
0.6m >
0.3m-0.6m
0.05m-0.3m
1% AEP Flash Flood Extent (Depth Unavailable)
Melbourne Water Stormwater Drain
Creek / Channel
Nursing Home / Aged Care
School / College
Kindergarten / Child Care
Community Centre
Ambulance Station
Fire Station
1% AEP Over-Floor Flooding Risk
Police Station
Telephone Exchange
Tramway
WHITEHORSE
CITY OF WHITEHORSE
1% AEP (100yr ARI) Flooding
7. Gardiners Creek (Burwood)
SES
Victoria
Melbourne Water
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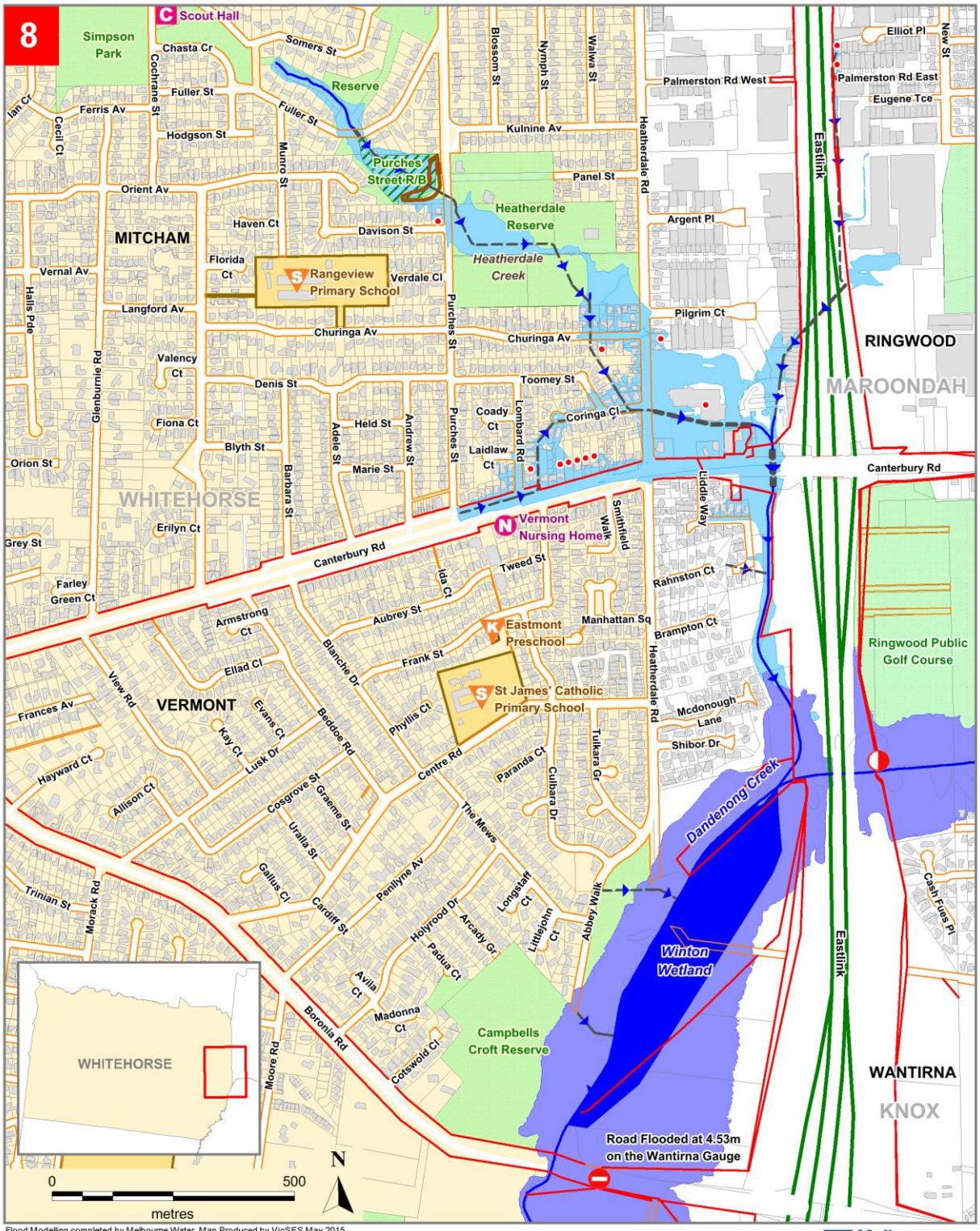
Flood Modelling completed by Melbourne Water. Map Produced by VicSES May 2015.


8
Simpson Park
Scout Hall
Reserve
Purches Street R/B
Heatherdale Reserve
Heatherdale Creek
Rangeview Primary School
MITCHAM
WHITEHORSE
VERMONT
RINGWOOD
MAROONDAH
WANTIRNA
KNOX
Vermont Nursing Home
Eastmont Preschool
St James' Catholic Primary School
Ringwood Public Golf Course
Dandenong Creek
Winton Wetland
Campbells Croft Reserve
Eastlink
Canterbury Rd
Palmerston Rd West
Palmerston Rd East
Kulnine Av
Panel St
Argent Pl
Pilgrim Ct
Elliot Pl
Eugene Tce
Chasta Cr
Somers St
Fuller St
Ferris Av
Hodgson St
Orient Av
Haven Ct
Davison St
Florida Ct
Verdale Cl
Vernal Av
Langford Av
Churinga Av
Valency Ct
Denis St
Toomey St
Coringa Cl
Coady Ct
Laidlaw Ct
Held St
Blyth St
Marie St
Orion St
Erilyn Ct
Grey St
Farley Green Ct
Tweed St
Rahnston Ct
Brampton Ct
Manhattan Sq
Aubrey St
Armstrong Ct
Frank St
Ellad Cl
Frances Av
Hayward Ct
Allison Ct
Shibor Dr
Mcdonough Lane
Paranda Ct
Centre Rd
Cosgrove St
Graeme St
Uralla St
The Mews
Penllyne Av
Holyrood Dr
Arcady Gr
Padua Ct
Avila Ct
Madonna Ct
Cotswold Cl
Boronia Rd
Moore Rd
Trinian St
Morack Rd
Cardiff St
Gellius Cl
Longstaff Ct
Littlejohn Ct
Abbey Walk
Tuikara Gr
Culbara Dr
Cash Fuss Pl
Liddle Way
Smithfield Walk
Road Flooded at 4.53m on the Wantirna Gauge
0
500
metres
N
Flood Modelling completed by Melbourne Water. Map Produced by VicSES May 2015.
CITY OF WHITEHORSE
1% AEP (100yr ARI) Flooding
8. Dandenong Creek & Heatherdale Creek (Vermont)
Building
Area of Interest
Melbourne Water Stormwater Drain
Creek / Channel
1% AEP Over-Floor Flooding Risk
Embankment
1% AEP Flash Flood Extent (Depth Unavailable)
1% AEP Riverine Flood Extent (Depth Unavailable)
Melbourne Water Retarding Basin
Lake / Waterbody
Sewer Emergency Relief Point
Road Closure with Height against Gauge
School / College
Kindergarten / Child Care
Nursing Home / Aged Care
Community Centre
Melbourne Water
SES
State Government Victoria
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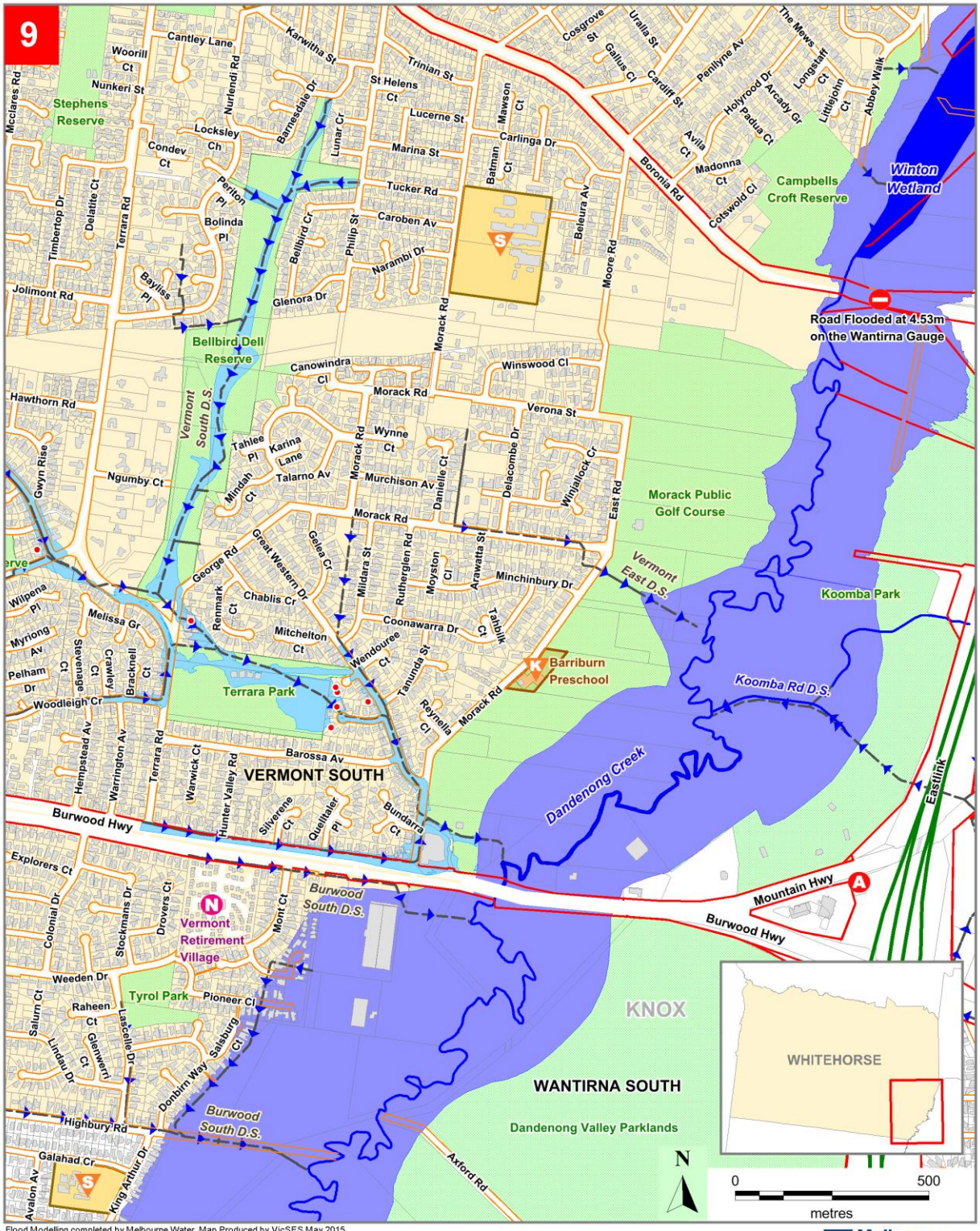


Flood Modelling completed by Melbourne Water. Map Produced by VicSES May 2015.

CITY OF WHITEHORSE

1% AEP (100yr ARI) Flooding

9. Dandenong Creek & Vermont South Drain (Vermont South)

- Building
- Area of Interest
- Melbourne Water Stormwater Drain
- Creek / Channel
- 1% AEP Flash Flood Extent (Depth Unavailable)
- 1% AEP Riverine Flood Extent (Depth Unavailable)
- Lake / Waterbody
- Road Closure with Height against Gauge
- Ambulance Station
- School / College
- Kindergarten / Child Care
- Nursing Home / Aged Care
- 1% AEP Over-Floor Flooding Risk

Melbourne Water

SES

Victoria

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

CITY OF WHITEHORSE

1% AEP (100yr ARI) Flooding

10. East Burwood Drain (Vermont South)

- Building
- Area of Interest
- Melbourne Water Stormwater Drain
- Creek / Channel
- Embankment
- 1% AEP Flash Flood Extent (Depth Unavailable)
- Melbourne Water Retarding Basin
- Shopping Centre
- Fire Station
- School / College
- Kindergarten / Child Care
- Nursing Home / Aged Care
- 1% AEP Over-Floor Flooding Risk

Melbourne Water

SES

Victoria

APPENDIX G – CATCHMENT SCHEMATICS

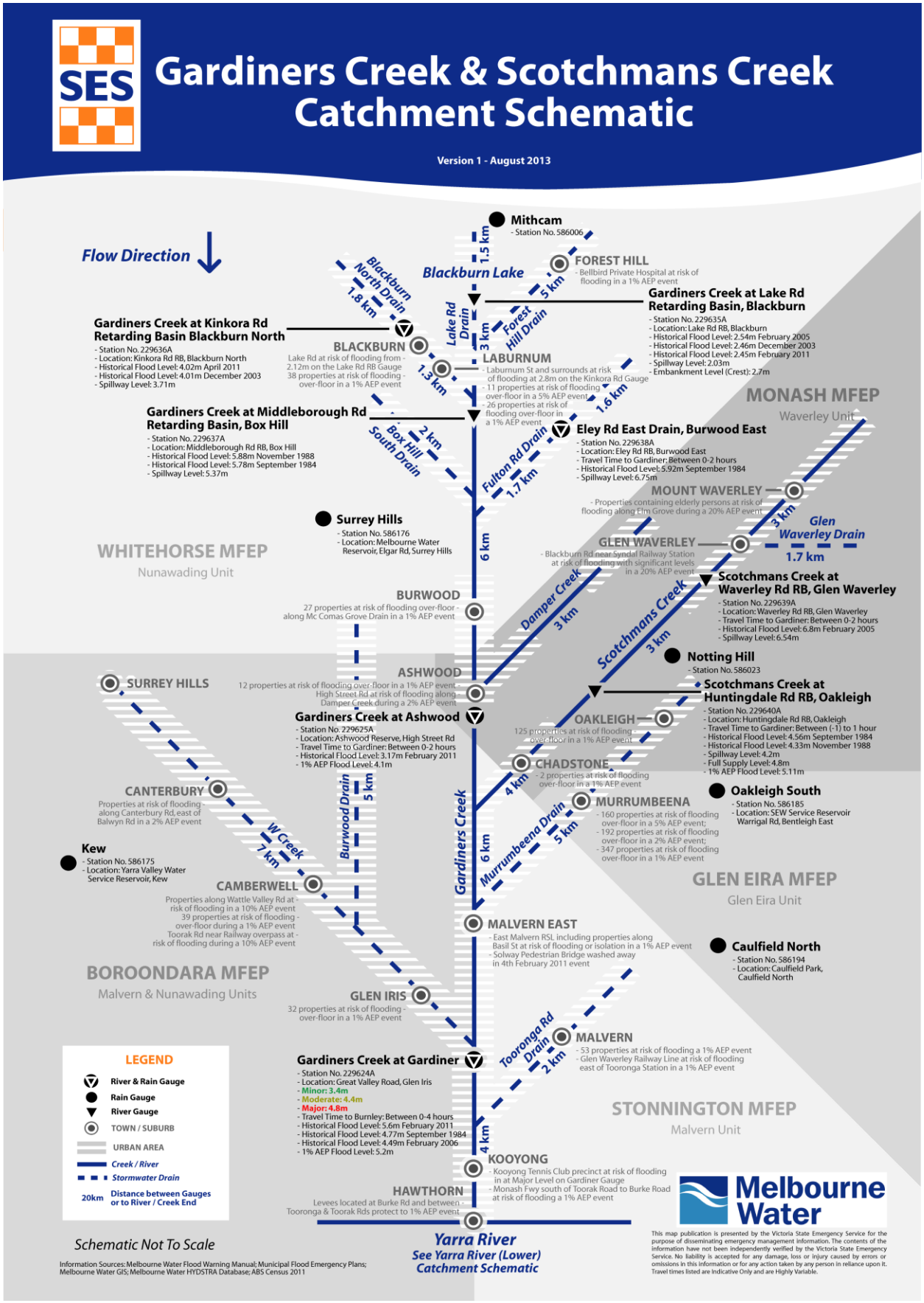
Schematics detailing the drainage catchments relevant for this municipality have been included in this Appendix. Each Schematic outlines the drainage system comprising of rivers, creeks or storm-water drains contained within one of the major catchments in the Port Phillip & Westernport Region.

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.


Gardiners Creek & Scotchmans Creek Catchment Schematic
Version 1 - August 2013
Flow Direction
Mithcam
- Station No. 586006
1.5 km
Blackburn Lake
FOREST HILL
- Bellbird Private Hospital at risk of flooding in a 1% AEP event
5 km
Blackburn North Drain
1.8 km
Lake Rd Drain
3 km
Forest Hill Drain
Gardiners Creek at Lake Rd Retarding Basin, Blackburn
- Station No. 229635A
- Location: Lake Rd RB, Blackburn
- Historical Flood Level: 2.54m February 2005
- Historical Flood Level: 2.46m December 2003
- Historical Flood Level: 2.45m February 2011
- Spillway Level: 2.03m
- Embankment Level (Crest): 2.7m
Gardiners Creek at Kinkora Rd Retarding Basin Blackburn North
- Station No. 229636A
- Location: Kinkora Rd RB, Blackburn North
- Historical Flood Level: 4.02m April 2011
- Historical Flood Level: 4.01m December 2003
- Spillway Level: 3.71m
BLACKBURN
Lake Rd at risk of flooding from - 2.12m on the Lake Rd RB Gauge
38 properties at risk of flooding - over-floor in a 1% AEP event
1.3 km
LABURNUM
- Laburnum St and surrounds at risk of flooding at 2.8m on the Kinkora Rd Gauge
- 11 properties at risk of flooding over-floor in a 5% AEP event
- 26 properties at risk of flooding over-floor in a 1% AEP event
1.6 km
MONASH MFEP
Waverley Unit
Gardiners Creek at Middleborough Rd Retarding Basin, Box Hill
- Station No. 229637A
- Location: Middleborough Rd RB, Box Hill
- Historical Flood Level: 5.88m November 1988
- Historical Flood Level: 5.78m September 1984
- Spillway Level: 5.37m
Box Hill South Drain
2 km
Fulton Rd Drain
1.7 km
Eley Rd East Drain, Burwood East
- Station No. 229638A
- Location: Eley Rd RB, Burwood East
- Travel Time to Gardiner: Between 0-2 hours
- Historical Flood Level: 5.92m September 1984
- Spillway Level: 6.75m
MOUNT WAVERLEY
- Properties containing elderly persons at risk of flooding along Elm Grove during a 20% AEP event
3 km
Glen Waverley Drain
1.7 km
Surrey Hills
- Station No. 586176
- Location: Melbourne Water Reservoir, Elgar Rd, Surrey Hills
WHITEHORSE MFEP
Nunawading Unit
6 km
GLEN WAVERLEY
- Blackburn Rd near Syndal Railway Station at risk of flooding with significant levels in a 20% AEP event
Damper Creek
3 km
Scotchmans Creek at Waverley Rd RB, Glen Waverley
- Station No. 229639A
- Location: Waverley Rd RB, Glen Waverley
- Travel Time to Gardiner: Between 0-2 hours
- Historical Flood Level: 6.8m February 2005
- Spillway Level: 6.54m
Scotchmans Creek
3 km
BURWOOD
27 properties at risk of flooding over-floor along Mc Comas Grove Drain in a 1% AEP event
Notting Hill
- Station No. 586023
SURREY HILLS
ASHWOOD
12 properties at risk of flooding over-floor in a 1% AEP event
High Street Rd at risk of flooding along Damper Creek during a 2% AEP event
Gardiners Creek at Ashwood
- Station No. 229625A
- Location: Ashwood Reserve, High Street Rd
- Travel Time to Gardiner: Between 0-2 hours
- Historical Flood Level: 3.17m February 2011
- 1% AEP Flood Level: 4.1m
Scotchmans Creek at Huntingdale Rd RB, Oakleigh
- Station No. 229640A
- Location: Huntingdale Rd RB, Oakleigh
- Travel Time to Gardiner: Between (-1) to 1 hour
- Historical Flood Level: 4.56m September 1984
- Historical Flood Level: 4.33m November 1988
- Spillway Level: 4.2m
- Full Supply Level: 4.8m
- 1% AEP Flood Level: 5.11m
OAKLEIGH
125 properties at risk of flooding over-floor in a 1% AEP event
CHADSTONE
- 2 properties at risk of flooding over-floor in a 1% AEP event
4 km
MURRUMBEENA
- 160 properties at risk of flooding over-floor in a 5% AEP event;
- 192 properties at risk of flooding over-floor in a 2% AEP event;
- 347 properties at risk of flooding over-floor in a 1% AEP event
Murrumbeena Drain
5 km
Oakleigh South
- Station No. 586185
- Location: SEW Service Reservoir Warrigal Rd, Bentleigh East
CANTERBURY
Properties at risk of flooding along Canterbury Rd, east of Balwyn Rd in a 2% AEP event
Burwood Drain
5 km
W Creek
7 km
Kew
- Station No. 586175
- Location: Yarra Valley Water Service Reservoir, Kew
Gardiners Creek
6 km
CAMBERWELL
Properties along Wattle Valley Rd at risk of flooding in a 10% AEP event
39 properties at risk of flooding - over-floor during a 1% AEP event
Toorak Rd near Railway overpass at - risk of flooding during a 10% AEP event
GLEN EIRA MFEP
Glen Eira Unit
MALVERN EAST
- East Malvern RSL including properties along Basil St at risk of flooding or isolation in a 1% AEP event
- Solway Pedestrian Bridge washed away in 4th February 2011 event
Caulfield North
- Station No. 586194
- Location: Caulfield Park, Caulfield North
BOROONDARA MFEP
Malvern & Nunawading Units
GLEN IRIS
32 properties at risk of flooding - over-floor in a 1% AEP event
Tooronga Rd Drain
2 km
MALVERN
- 53 properties at risk of flooding a 1% AEP event
- Glen Waverley Railway Line at risk of flooding east of Tooronga Station in a 1% AEP event
Gardiners Creek at Gardiner
- Station No. 229624A
- Location: Great Valley Road, Glen Iris
- Minor: 3.4m
- Moderate: 4.4m
- Major: 4.8m
- Travel Time to Burnley: Between 0-4 hours
- Historical Flood Level: 5.6m February 2011
- Historical Flood Level: 4.77m September 1984
- Historical Flood Level: 4.49m February 2006
- 1% AEP Flood Level: 5.2m
STONNINGTON MFEP
Malvern Unit
4 km
KOOYONG
- Kooyong Tennis Club precinct at risk of flooding in at Major Level on Gardiner Gauge
- Monash Fwy south of Toorak Road to Burke Road at risk of flooding a 1% AEP event
HAWTHORN
Levees located at Burke Rd and between - Tooronga & Toorak Rds protect to 1% AEP event
LEGEND
River & Rain Gauge
Rain Gauge
River Gauge
TOWN / SUBURB
URBAN AREA
Creek / River
Stormwater Drain
20km Distance between Gauges or to River / Creek End
Schematic Not To Scale
Yarra River
See Yarra River (Lower) Catchment Schematic
Melbourne Water
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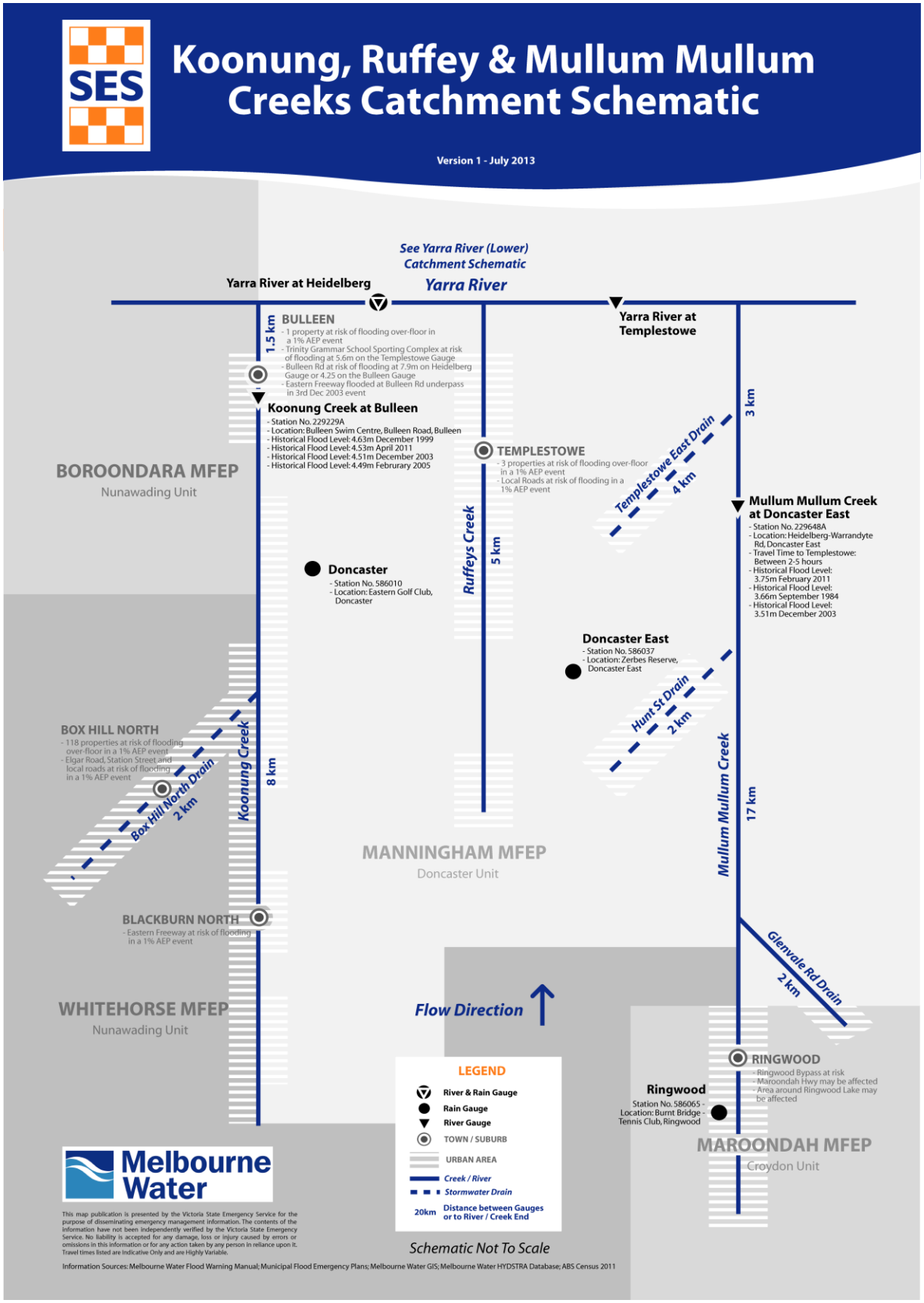
Information Sources: Melbourne Water Flood Warning Manual; Municipal Flood Emergency Plans; Melbourne Water GIS; Melbourne Water HYDSTRA Database; ABS Census 2011


SES
Koonung, Ruffey & Mullum Mullum Creeks Catchment Schematic
Version 1 - July 2013
See Yarra River (Lower) Catchment Schematic
Yarra River at Heidelberg
Yarra River
Yarra River at Templestowe
BULLEEN
- 1 property at risk of flooding over-floor in a 1% AEP event
- Trinity Grammar School Sporting Complex at risk of flooding at 5.6m on the Templestowe Gauge
- Bulleen Rd at risk of flooding at 7.9m on Heidelberg Gauge or 4.25 on the Bulleen Gauge
- Eastern Freeway flooded at Bulleen Rd underpass in 3rd Dec 2003 event
1.5 km
Koonung Creek at Bulleen
- Station No. 229229A
- Location: Bulleen Swim Centre, Bulleen Road, Bulleen
- Historical Flood Level: 4.63m December 1999
- Historical Flood Level: 4.53m April 2011
- Historical Flood Level: 4.51m December 2003
- Historical Flood Level: 4.49m Februrary 2005
TEMPLESTOWE
- 3 properties at risk of flooding over-floor in a 1% AEP event
- Local Roads at risk of flooding in a 1% AEP event
Templestowe East Drain
4 km
3 km
Mullum Mullum Creek at Doncaster East
- Station No. 229648A
- Location: Heidelberg-Warrandyte Rd, Doncaster East
- Travel Time to Templestowe: Between 2-5 hours
- Historical Flood Level: 3.75m February 2011
- Historical Flood Level: 3.66m September 1984
- Historical Flood Level: 3.51m December 2003
BOROONDARA MFEP
Nunawading Unit
Ruffeys Creek
5 km
Doncaster
- Station No. 586010
- Location: Eastern Golf Club, Doncaster
Doncaster East
- Station No. 586037
- Location: Zerbes Reserve, Doncaster East
Hunt St Drain
2 km
BOX HILL NORTH
- 118 properties at risk of flooding over-floor in a 1% AEP event
- Elgar Road, Station Street and local roads at risk of flooding in a 1% AEP event
Box Hill North Drain
2 km
Koonung Creek
8 km
Mullum Mullum Creek
17 km
MANNINGHAM MFEP
Doncaster Unit
BLACKBURN NORTH
- Eastern Freeway at risk of flooding in a 1% AEP event
Glenvale Rd Drain
2 km
WHITEHORSE MFEP
Nunawading Unit
Flow Direction
RINGWOOD
- Ringwood Bypass at risk
- Maroondah Hwy may be affected
- Area around Ringwood Lake may be affected
Ringwood
Station No. 586065 - Location: Burnt Bridge - Tennis Club, Ringwood
MAROONDAH MFEP
Croydon Unit
LEGEND
River & Rain Gauge
Rain Gauge
River Gauge
TOWN / SUBURB
URBAN AREA
Creek / River
Stormwater Drain
20km Distance between Gauges or to River / Creek End
Melbourne Water
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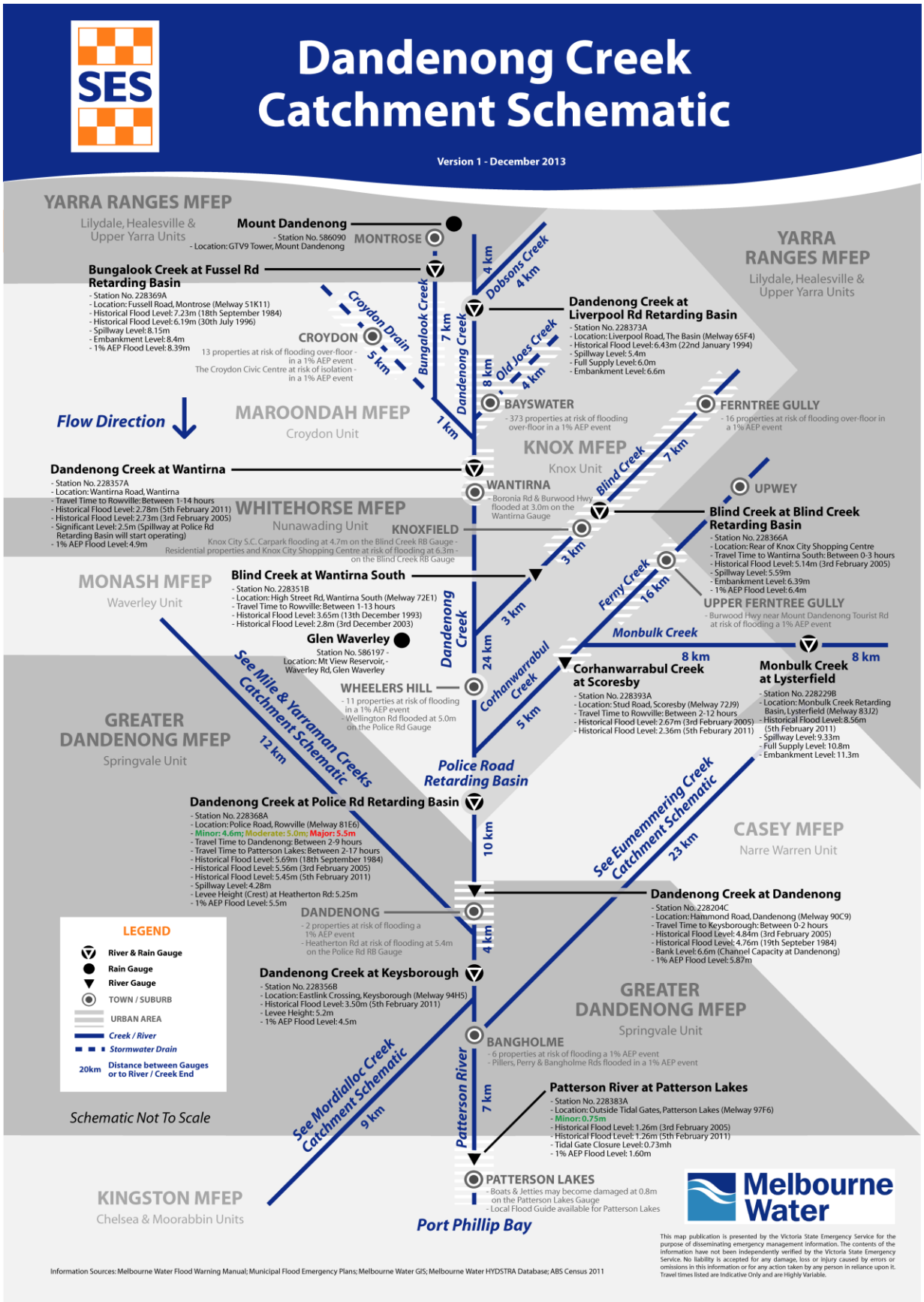
Schematic Not To Scale
Information Sources: Melbourne Water Flood Warning Manual; Municipal Flood Emergency Plans; Melbourne Water GIS; Melbourne Water HYDSTRA Database; ABS Census 2011


SES
Dandenong Creek Catchment Schematic
Version 1 - December 2013
YARRA RANGES MFEP
Lilydale, Healesville & Upper Yarra Units
Mount Dandenong
- Station No. 586090
- Location: GTV9 Tower, Mount Dandenong
MONTROSE
Bungalook Creek at Fussel 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
Croydon Drain
5 km
CROYDON
13 properties at risk of flooding over-floor - in a 1% AEP event
The Croydon Civic Centre at risk of isolation - in a 1% AEP event
Bungalook Creek
7 km
Dandenong Creek
4 km
Dobsons Creek
4 km
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
8 km
Old Joes Creek
4 km
BAYSWATER
- 373 properties at risk of flooding over-floor in a 1% AEP event
1 km
FERNTREE GULLY
- 16 properties at risk of flooding over-floor in a 1% AEP event
Flow Direction
MAROONDAH MFEP
Croydon Unit
KNOX MFEP
Knox 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
WANTIRNA
- Boronia Rd & Burwood Hwy flooded at 3.0m on the Wantirna Gauge
Blind Creek
7 km
UPWEY
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
WHITEHORSE MFEP
Nunawading 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
3 km
Ferny Creek
16 km
UPPER FERNTREE GULLY
- Burwood Hwy near Mount Dandenong Tourist Rd at risk of flooding a 1% AEP event
MONASH MFEP
Waverley 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)
Dandenong Creek
3 km
Monbulk Creek
8 km
8 km
Glen Waverley
Station No. 586197 - Location: Mt View Reservoir, - Waverley Rd, Glen Waverley
24 km
Corhanwarrabul Creek
5 km
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 Feburary 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
WHEELERS HILL
- 11 properties at risk of flooding in a 1% AEP event
- Wellington Rd flooded at 5.0m on the Police Rd Gauge
See Mile & Yarraman Creeks Catchment Schematic
12 km
GREATER DANDENONG MFEP
Springvale Unit
Police Road Retarding Basin
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
10 km
See Eumemmering Creek Catchment Schematic
23 km
CASEY MFEP
Narre Warren Unit
Dandenong Creek at Dandenong
- Station No. 228204C
- Location: Hammond Road, Dandenong (Melway 90C9)
- Travel Time to Keysborough: Between 0-2 hours
- Historical Flood Level: 4.84m (3rd February 2005)
- Historical Flood Level: 4.76m (19th Septeber 1984)
- Bank Level: 6.6m (Channel Capacity at Dandenong)
- 1% AEP Flood Level: 5.87m
DANDENONG
- 2 properties at risk of flooding a 1% AEP event
- Heatherton Rd at risk of flooding at 5.4m on the Police Rd RB Gauge
4 km
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
GREATER DANDENONG MFEP
Springvale Unit
BANGHOLME
- 6 properties at risk of flooding a 1% AEP event
- Pillers, Perry & Bangholme Rds flooded in a 1% AEP event
Patterson River
7 km
Patterson River at Patterson Lakes
- Station No. 228383A
- Location: Outside Tidal Gates, Patterson Lakes (Melway 97F6)
- Minor: 0.75m
- Historical Flood Level: 1.26m (3rd February 2005)
- Historical Flood Level: 1.26m (5th February 2011)
- Tidal Gate Closure Level: 0.73mh
- 1% AEP Flood Level: 1.60m
See Mordialloc Creek Catchment Schematic
9 km
PATTERSON LAKES
- Boats & Jetties may become damaged at 0.8m on the Patterson Lakes Gauge
- Local Flood Guide available for Patterson Lakes
KINGSTON MFEP
Chelsea & Moorabbin Units
Port Phillip Bay
LEGEND
River & Rain Gauge
Rain Gauge
River Gauge
TOWN / SUBURB
URBAN AREA
Creek / River
Stormwater Drain
20km Distance between Gauges or to River / Creek End
Schematic Not To Scale
Melbourne Water
Information Sources: Melbourne Water Flood Warning Manual; Municipal Flood Emergency Plans; Melbourne Water GIS; Melbourne Water HYDSTRA Database; ABS Census 2011
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APPENDIX H – SANDBAG ARRANGEMENTS

GENERAL

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

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

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

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

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

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

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

(Sandbagging demonstration- vicsesTV on YouTube).

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

OPERATIONAL

Sandbag Storage Locations

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

Organisation	Location	Number of Sandbags	Estimated Response Time	Contact
Whitehorse City Council Depot	Depot address	20	0-0.5 hrs business hours 1-2 hrs after hours and weekends	92626333
Whitehorse VICSES Unit	1 Ailsa St, Box Hill South	2000		Via Pager
Knox VICSES Unit	Unit LHQ	32000	1Hr	RDO
VICSES Central Region		As Required		RDO
Other				

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

Sand Suppliers

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

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

Organisation	Location	Delivery Capability	Restrictions	Contact
Whitehorse City Council Depot	Depot address	Up to 5m3 only		03 9262 6333
Surrey Hills Garden Supplies	682 Canterbury Road Surrey Hills	40m3		03 6912 1536
Col Smith Garden and Building Supplies	Cnr Blackburn and Andersons Creek Roads, Doncaster East 6 Beech Street, Nunawading	60m3	3 hrs minimum response time for delivery	Doncaster 8841 5100 Nunawading 8841 5120
Camerons Sand Supply	970 Dandenong Road Carnegie	20m3	Unavailable Sunday after 1800hrs	9571 5481
Bruce Sarre building and garden supplies	287 Canterbury Rd Forest Hill	50m3	Business Hrs	9878 2298

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

Sandbag Collection Points

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

Location	Address	Area	Operational Restrictions
Whitehorse City Council Depot	1 Ailsa Street Box Hill South	Adjacent to Bunning's and Masters	Limited parking and trailer turning space
Whitehorse recycling and waste centre	Burwood & Morack Rd Vermont South	Adjacent to Bunning's	

Table H3- Whitehorse City Council potential Sandbag Collection Points

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

- Bunnings
- Blackwoods
- Masters

Machinery Supply

Appliances documented below will be required when undertaking sandbagging operations

Organisation	Asset	Location	Estimated deployment time	Contact
Whitehorse City Council	Front End Loader Min lift height 2.5m Min Forward reach 60cm Max bucket width 2.5m	Council Depot	30min	9262 6333
Whitehorse City Council	Small tipper (3 tonnes)	Council Depot	30min	9262 6333
VICSES	Vehicle/ trailer for sandbag transport	Whitehorse SES	30min	Via CTDO
VICSES Central Region	Sandbag Fill Machine	Pakenham	1.5Hr	Via CTDO

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

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

- Backhoe
- Forklift
- Large Tipper

POST OPERATIONAL

Clean up and Disposal

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

APPENDIX I – SEVERE WEATHER (STORM) EVENTS

1. Overview

Whitehorse municipality is susceptible to severe weather events because of a combination of its hilly terrain; the high number of mature trees located within the municipality and its proximity to the Dandenong Ranges. This appendix details areas of risk from severe weather events by requests for assistance to the Victoria State Emergency Service (VICSES).

2. VICSES requests for assistance

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.

Table 1 – breakdown of severe weather requests for assistance received by VICSES Whitehorse Unit by suburb

Suburb	VicSES Request for Assistance (July 2009 – Jan 2016)				
	Building Damage	Flooding	Tree Down	Tree Down Traffic Hazard	Other*
Blackburn	186	33	387	159	30
Blackburn North	74	22	132	33	14
Blackburn South	74	15	153	77	11
Box Hill	38	16	74	43	30
Box Hill North	63	17	135	39	11
Box Hill South	41	18	87	22	21
Forest Hill	89	16	163	70	23
Mitcham	167	21	313	148	19
Mont Albert	28	10	50	31	9
Mont Albert North	37	5	67	14	2
Nunawading	109	15	177	89	13
Surry Hills	70	23	108	56	12
Vermont	202	12	278	104	16
Vermont South	60	20	114	77	10

Table 2 – breakdown of severe weather requests for assistance received by VICSES Whitehorse Unit by date

* assist fire service, assist police, message, rescue persons trapped, rescue structure collapse, SES incident other

3. VICSES requests for assistance mapping

Figure 1 – Breakdown of severe weather requests for assistance received by VICSES Whitehorse Unit by request type

		Building Damage	Flooding	Rescue Persons Trapped	Tree Down	Tree Down Traffic Hazard	Total
July	2009	6	1	0	17	2	26
August	2009	102	0	0	139	60	301
September	2009	11	3	0	25	12	51
October	2009	10	2	3	11	0	26
November	2009	119	12	3	267	102	503
December	2009	3	2	0	24	14	43
January	2010	10	3	2	30	15	60
February	2010	11	3	1	33	9	57
March	2010	88	15	1	43	7	154
April	2010	7	5	0	12	6	30
May	2010	4	3	0	2	9	18
June	2010	11	1	1	25	4	42
July	2010	3	0	0	7	4	14
August	2010	9	1	1	19	10	40
September	2010	5	1	1	32	10	49
October	2010	19	9	0	20	5	53
November	2010	12	8	1	19	3	43
December	2010	32	34	0	52	18	136
January	2011	18	16	0	23	11	68
February	2011	53	62	1	62	20	198
March	2011	5	1	1	3	5	15
April	2011	19	17	0	3	1	40
May	2011	5	1	1	4	5	16
June	2011	7	1	1	16	5	30
July	2011	1	1	7	1	1	11
August	2011	1	0	1	2	0	4
September	2011	4	3	0	12	3	22
October	2011	3	2	0	9	2	16
November	2011	22	7	1	50	11	91
December	2011	21	7	0	20	10	58
January	2012	11	1	1	42	16	71
February	2012	32	2	1	70	19	124
March	2012	8	1	0	16	6	31
April	2012	11	5	0	9	7	32
May	2012	16	1	1	12	2	32
June	2012	4	0	0	7	4	15
July	2012	4	1	1	1	4	11
August	2012	4	0	1	12	2	19
September	2012	38	0	0	98	31	167

October	2012	4	1	0	14	1	20
November	2012	4	1	1	12	4	22
December	2012	6	0	0	19	4	29
January	2013	6	0	0	7	2	15
February	2013	6	2	0	7	6	21
March	2013	21	3	1	29	11	65
April	2013	3	0	1	5	2	11
May	2013	10	2	0	4	3	19
June	2013	10	14	1	3	2	30
July	2013	5	2	0	19	5	31
August	2013	40	1	0	53	24	118
September	2013	13	1	0	37	15	66
October	2013	48	0	0	111	49	208
November	2013	6	0	2	5	4	17
December	2013	5	1	0	19	6	31
January	2014	12	0	1	60	16	89
February	2014	7	0	0	20	16	43
March	2014	3	1	1	3	7	15
April	2014	4	0	0	4	6	14
May	2014	3	1	0	4	2	10
June	2014	23	1	1	68	12	105
July	2014	12	0	0	25	5	42
August	2014	3	1	3	4	2	13
September	2014	27	3	0	28	8	66
October	2014	14	1	1	17	2	35
November	2014	6	1	3	5	4	19
December	2014	11	2	3	25	18	59
January	2015	154	4	2	290	109	559
February	2015	31	8	0	24	34	97
March	2015	24	0	2	98	19	143
April	2015	2	1	0	1	3	7
May	2015	3	0	0	5	1	9
June	2015	3	1	1	3	1	9
July	2015	3	1	1	8	1	14
August	2015	4	0	1	2	4	11
September	2015	0	0	1	2	1	4
October	2015	5	0	1	17	2	25
November	2015	16	1	1	46	20	84
December	2015	6	2	1	25	16	50
January	2016	5	3	2	23	6	39
Totals		1317	292	64	2400	908	4981

Figure 2 – breakdown of severe weather requests for assistance received by VicSES Whitehorse