



Australian Government
Bureau of Meteorology

Service Level Specification for Flood Forecasting and Warning Services for Victoria – Version 2.0



Service Level Specification for Flood Forecasting and Warning Services for Victoria

This document outlines the Service Level Specification for Flood Forecasting and Warning Services provided by the Commonwealth of Australia through the Bureau of Meteorology for the State of Victoria in consultation with the Victoria Flood Warning Consultative Committee

Service Level Specification for Flood Forecasting and Warning Services for Victoria

Published by the Bureau of Meteorology
GPO Box 1289
Melbourne VIC 3001
(03) 9669 4000
www.bom.gov.au

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Cover image: Major flooding on the Avoca River at Charlton in January 2011. Photo courtesy of the State of Victoria Department of Environment and Primary Industries.

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1 Introduction

- 1.1 The purpose of this Service Level Specification is to document and describe the flood forecasting and warning services provided by the Bureau of Meteorology (the Bureau) in Victoria.
- 1.2 The Bureau's flood forecasting and warning services are provided within the context of the Total Flood Warning System as defined in the Australian Emergency Manuals Series, Manual 21 Flood Warning (Australian Government, 2009 and illustrated in Figure 1).

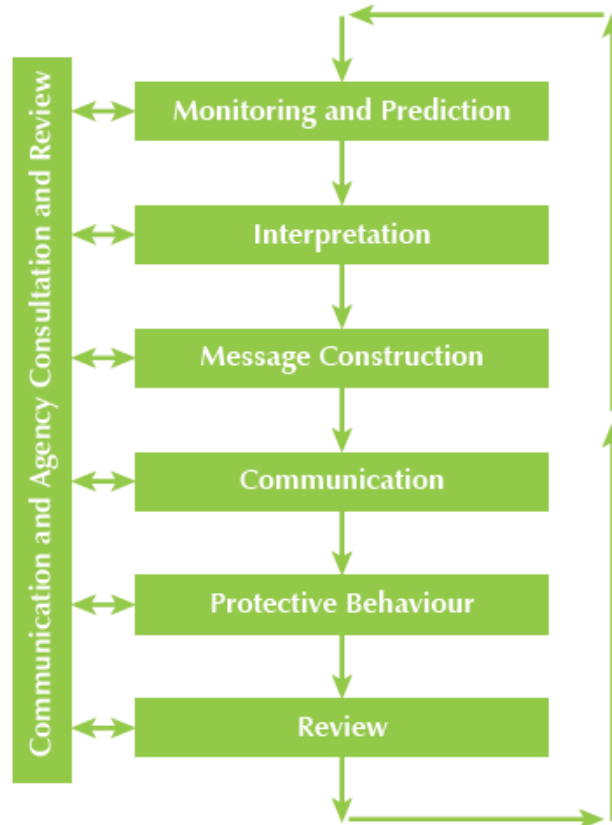


Figure 1: The components of the Total Flood Warning System (Australian Emergency Manual Series, Manual 21 Flood Warning, Australian Government 2009)

- 1.3 The Total Flood Warning System recognises that a fully effective flood warning service is multi-faceted in nature and its development and operation involves input from a number of agencies each with specialised roles to play. It is vital that the agencies involved work in close cooperation through all stages of developing and operating the system. The services described here are the Bureau's contribution to the Total Flood Warning System.
- 1.4 The Bureau's main role in the Total Flood Warning System is focussed on monitoring and prediction, and to a lesser extent interpretation, message construction and communication components (see Appendix A for descriptions). The Bureau also contributes to review activities and takes a role in the planning and coordination activities associated with ensuring that the activities of all agencies and appropriate linkages are well coordinated. The roles and responsibilities of all key stakeholders involved in the provision of a flood warning

service in Victoria are described in the National Arrangements for Flood Forecasting and Warning (Bureau of Meteorology, 2015).¹

- 1.5** This Service Level Specification is concerned with describing the Bureau's role in the Total Flood Warning System and its interaction with other stakeholders as described in the National Arrangements. This is to ensure that the service the Bureau is providing in support of each of the relevant components of the Total Flood Warning System is understood by the Bureau and other stakeholders.
- 1.6** A description of the activities that make up the Bureau's flood forecasting and warning services for Victoria is given in Section 3. This set of activities, associated products and target levels of service constitute the current standard services provided freely by the Bureau. The Bureau also provides supplementary services on a commercial or cost recovery basis but they are not covered in this document.

¹ The National Arrangements for Flood Forecasting and Warning (2015) is available on the Bureau's website: <http://www.bom.gov.au/water/floods/index.shtml>

2 Flood Warning Consultative Committee

- 2.1** The Victorian Flood Warning Consultative Committee provides the Bureau's key stakeholders with a consultation mechanism for its flood forecasting and warning services. As such, the committee is responsible for reviewing this Service Level Specification on an annual basis or as required.
- 2.2** The overall role of the Victorian Flood Warning Consultative Committee is to coordinate the development and operation of flood forecasting and warning services in Victoria, acting as an advisory body to the Bureau and participating State and local government agencies. Membership and terms of reference for this committee in Victoria are detailed in Schedule 1.
- 2.3** The Bureau chairs and provides secretariat support to the Victorian Flood Warning Consultative Committee, which meets six monthly depending on need and activity.

3 Bureau flood forecasting and warning services

3.1 The scope of services covered by this Service Level Specification is confined to those dealing with riverine flooding caused by rainfall where typical rain-to-flood times are six hours or more. Flash flooding (rain-to-flood times less than six hours) and flooding caused purely by elevated sea levels are not covered, nor are the weather forecasting and other services the Bureau provides that contribute to the flood forecasting and warning service, including Severe Weather and Severe Thunderstorm Warnings, Tropical Cyclone Warnings, provision of radar data and rainfall forecasts.

3.2 The nature of the services covered by this Service Level Specification include undertaking the routine catchment monitoring and river height prediction activities necessary for the Total Flood Warning System, as well as issuing and publishing specific warning and data products. These activities are listed below with further detail and associated performance measures provided in subsequent sections.

- Collect and publish rainfall and river level data
- Routine monitoring of flood potential
- Flood modelling and prediction
- Automated information and alerting
- Issue flood watches
- Issue flood warnings
- Communication of flood warnings and flood watches
- Data networks, communications and storage
- Operations
- Publishing of data and flood information
- Planning and liaison
- Support for emergency management training and training exercises

3.3 Collect and publish rainfall and river level data

3.3.1 The collection and publishing of rainfall and river level data is an important component of the overall service. Apart from use by the Bureau for data analysis and its hydrological modelling for flood predictions, the data is also used by the emergency service agencies, numerous operational agencies, businesses and the public to monitor rainfall and river conditions. To assist in describing the service, the locations where river height, dam, weir or lake level, and tidal observations are made are categorised into three types - namely forecast location (Schedule 2), information location (Schedule 3) and data location (Schedule 4).

- **Forecast location** is a location for which the Bureau provides a forecast of future water level either as the class of flood that is predicted (minor, moderate or major) or as a level and class – refer to Appendix A for definitions. At these locations observed data, flood classifications and additional qualifying information will also be available (Schedule 2).
- **Information location** is a location at which flood classifications are defined and observations of water level data are provided. At these locations forecasts of future water level are not produced. Other key thresholds may be defined and reported against (Schedule 3).

- **Data location** is a location for which just the observed water level data is provided. Flood classifications are not available for these locations and forecasts of future water level are not produced (Schedule 4).

3.3.2 An indicative level of priority has been assigned to each observing site and key communication infrastructure such as radio repeaters (Schedules 2-4 and 7-9) based on a three tiered scheme (Table 1). The priority level is based on the expected impact to the Bureau’s services. The impacts identified are the expected outcome of a service outage at that site during a flood emergency. Impact is described in terms of forecast performance and the Bureau’s ability to provide a flood warning service. Note that the scope of this priority scheme is limited to consideration of the requirements of forecasting and prediction only and should not be confused with any other priority assigned to that site by third party owners or other users.

Table 1 Site priority

Priority Level	Impact on performance	Impact on service delivery	Description
High	Very difficult to meet target	Direct and significant high level impact for the site and/or downstream locations	Degradation of service highly likely.
Medium	Difficult to meet target	Some impact for the site and/or downstream locations.	Possible degradation of service.
Low	Not likely to affect meeting targets	Little impact on the site and/or downstream location	No change in service. Lower possibility of degradation of service.

Note: Multiple outages within a given network will lead to a higher impact and greater service degradation. Table 1 indicates the effect of a single site failure within an otherwise functional network.

3.4 Routine monitoring of flood potential

3.4.1 The Bureau will maintain an awareness of catchment conditions and monitor the potential for riverine flooding. This monitoring activity will be supported by the Bureau’s weather services as required and is an activity undertaken to plan future flood operations.

3.5 Flood modelling and prediction

3.5.1 The Bureau will develop and maintain prediction systems for the forecast locations listed in Schedule 2a.

3.5.2 The Bureau prediction systems can include real-time hydrologic models, simple peak to peak correlations and other hydrologic techniques as appropriate.

3.5.3 The Bureau prediction systems will be maintained and updated following significant events or when new data becomes available.

3.5.4 The target level of performance for the prediction at each forecast location is given in Schedule 2a.

3.5.5 The responsibility for flood modelling and prediction services for the Melbourne Metropolitan catchments (Maribyrnong River, Yarra River, Dandenong Creek,

Westernport Catchments, Diamond Creek, Merri Creek, Kororoit Creek, Plenty River, and Werribee River) rests with Melbourne Water. Melbourne Water's flood forecasting and warning service details are listed in Schedule 2b.

- 3.5.6** The responsibility for flood modelling and prediction services for tail water gauges and for locations immediately downstream of major gated storages impacted by storage operations rests with storage operators as detailed in Schedule 2c.

3.6 Automated information and alerting

- 3.6.1** In Victoria, the Bureau currently does not provide a threshold-based river alerting service.

3.7 Issue flood watches

- 3.7.1** The Bureau will issue flood watches when the combination of forecast rainfall and catchment conditions indicates flooding is likely. The catchments and basins covered by flood watches include all those listed in Schedule 10. Note that flood watches may cover catchments that do not have established flood warning services.

- 3.7.2** The primary purpose of a flood watch is to provide early advice to communities and the relevant emergency service organisations of the potential flood threat from a developing weather situation. Typically, a flood watch is issued 1 to 4 days before an anticipated flood event depending on the confidence in rainfall forecasts.

- 3.7.3** Flood watches will be communicated by the Bureau using the dissemination methods detailed in Section 3.9.

3.8 Issue flood warnings

- 3.8.1** In general flood warnings are issued based on the following criteria:

- The river level of at least one forecast location (listed in Schedule 2a) is expected to reach and or exceed or has exceeded the minor flood level;
- The flood class levels or trigger heights defined at forecast locations are expected to be exceeded (refer to Schedule 2a);
- The flood class levels defined at information locations are exceeded (refer to Schedule 3).

The specific initiating criteria, if any, for each flood warning product are listed in Schedule 10.

In Victoria, the Bureau will also issue flood warnings:

- On receipt and notification of flood predictions and warning text from Melbourne Water, for forecast locations listed in Schedule 2b;
- On receipt of predictions from storage operators, for forecast locations listed in Schedule 2c.

The specific issuance criteria are defined for each warning in Schedule 10. This schedule also includes a list of warnings for which flood predictions are provided by Melbourne Water. In these catchments, the Bureau is responsible for the issue of

warnings within 30 minutes of predictions being received from Melbourne Water and the Bureau being notified.

- 3.8.2** Flood warnings may include either **qualitative** or **quantitative** predictions at forecast locations or a statement about future flooding in more **generalised** terms as outlined in Table 2. The type of prediction included is commensurate with user requirements, the availability of real time rainfall and river level data, and the capability of available flood prediction systems. A flood warning may contain **generalised, quantitative and qualitative** predictions and typically start with more **generalised** information and become more specific as data becomes available as the event develops and progresses.
- 3.8.3** **Quantitative** predictions include expected flood class (minor, moderate or major) with more specific information on the height and time of water levels at the forecast locations identified in Schedule 2a. A **quantitative** prediction can be a specific level or a range of levels, and has detailed timing down to blocks of a minimum of 3-6 hours. **Quantitative** predictions are based on all available information at the time of warning issue. The target lead time of the river height prediction for each forecast location where **quantitative** predictions are provided is given in Schedule 2a. For an example of a **quantitative** prediction refer to Table 2.
- 3.8.3.1** For the Bureau to be able to provide a **quantitative** prediction at a location, it is essential to have a suitable network of rainfall and river level sites upstream with data coming in real time, sufficient historical data to calibrate the flood forecasting model, a reliable rating table and documented flood impacts and flood classifications.
- 3.8.4** **Qualitative** predictions include expected flood class (minor, moderate or major) and timing of flooding at the forecast locations identified in Schedule 2a. The timing is indicated in blocks of six, 12 or 24 hours, using the terms such as early morning, afternoon or overnight. Such predictions are based on all available information at that time and may include advice on the peak classification that is expected or has occurred at that location. The target lead time for each forecast location where only **qualitative** predictions are provided are given in Schedule 2a. For an example of a **qualitative** prediction refer to Table 2.
- 3.8.4.1** For the Bureau to be able to provide a **qualitative** prediction at a location, it is essential to have at least some rainfall and river level sites upstream of the location with data coming in real time, at least some historical flood data to calibrate the flood forecasting model, a reasonable rating table and documented flood impacts and flood classifications.
- 3.8.5** The Bureau may also issue flood warnings with more **generalised** predictions and information when there are not enough data to make specific predictions or in the developing stages of a flood. These warnings contain generalised statements advising that flooding is expected and may include forecast trend (rising or falling) (for examples refer to Table 2).
- 3.8.6** The typical target accuracy of a **quantitative** water level prediction is that 70% are within 0.3 or 0.6 metres of observed water level. Specific accuracy targets by location are defined in Schedule 2a. Achievement of these targets is not possible in all floods or at all locations. In general, predictions of a flood peak are more accurate than “reach” or “exceed” predictions that are issued during the developing stages of a flood. This is due to uncertainty of future rainfall rates and/or upstream floodplain behaviour that are used when making those predictions.

3.8.7 A list of the flood warnings issued in Victoria, along with the basin/river to which they apply is included in Schedule 10. Details about forecast locations in each basin/river are included in Schedule 2a, 2b and 2c.

3.8.8 Flood warning summaries – a summary of flood watches and warnings that are current is provided to help media and other users readily access information.

Table 2. Prediction type description

Prediction type	Height prediction	Time of prediction	Example
Quantitative	Numerical prediction - Any Height - Peak Height Can refer to flood class	More specific, typically in blocks of 3 to 6 hours	The Ovens River at Wangaratta will exceed Minor Flood Level (11.9 metres) around 3pm Saturday evening. The Ovens River at Wangaratta is expected to peak near 12.9 metres (Major Flood Level 12.7 metres) around 6pm on Sunday.
Qualitative	Refers to flood class only (minor, moderate or major)	Range of times (6, 12 or 24 hour blocks)	Minor flooding is expected in the Snowy River at McKillops Bridge during Saturday afternoon The Snowy River at McKillops Bridge is expected to peak above the Major Flood Level (8.0 metres) during Sunday evening
Generalised	No height prediction - forecast trend (rising or falling)	Range of times (24 hour blocks)	Significant flooding is expected in the Genoa River catchments during Saturday with further rises possible due to forecast rainfall.

3.9 Communication of flood warnings and flood watches

3.9.1 Flood watches and warnings will be issued directly to a list of stakeholders with emergency management responsibilities. This list is maintained by the Bureau but is not detailed in this document. The direct dissemination methods supported include email, fax and the internet protocols such as File Transfer Protocol (FTP).

3.9.2 The format of messaging in flood related products will conform to a nationally consistent standard determined by the Bureau, in consultation with the Flood Warning Consultative Committee.

3.9.3 Flood watches and warnings are also communicated by the Bureau via:

3.9.3.1 Radio: Radio stations, particularly the ABC, broadcast flood warning information as part of their news bulletins, or whenever practicable. This form of broadcast may be covered in separate agreements between the Bureau and broadcasters.

3.9.3.2 Weather warning service: Flood warning information is recorded on a contracted telephone information service. Calls to this service incur a fee-for-service charge.

3.9.3.3 Internet: Flood watches and warnings are published on the Bureau's public web site and available by File Transfer Protocol (FTP) and Rich Site Summary (RSS) along with related rainfall and river level information (see 3.12).

3.9.4 Emergency management partners² and media can also access flood level and warning information directly from the Bureau Flood Warning Centre and Bureau National Operations Centre, subject to operational constraints. The Bureau does not publish to the public the contact details for the Flood Warning Centres and Bureau National Operations Centre.

3.10 Data networks, communications and storage

3.10.1 The services to be provided by the Bureau under this Service Level Specification depend on provision of data from networks of stations owned and operated by the Bureau and partner agencies. Permanent or temporary loss of real time data may necessitate a downgrading of the flood warning service from **quantitative** predictions to **qualitative** or then **generalised**.

3.10.2 The Bureau contribution to this network of stations includes:

- the operation and maintenance of equipment at the sites which are fully owned and maintained by the Bureau as listed in Schedule 7.
- assisting with maintenance of equipment for other agencies at the sites listed in Schedule 8.
- operating and maintaining Bureau-owned equipment at sites where this equipment is co-located at a site owned by another agency Schedule 9.

3.10.3 Where the site is owned or operated by other parties, installation, maintenance and repairs of Bureau equipment will depend on adequate access being provided to the Bureau and any of its contractors. The Bureau will confirm access arrangements with relevant land owners before entering the premises. The Bureau also requires that the site operators provide timely advice regarding any possible faults or other issues affecting the performance of the data network.

3.10.4 In Victoria the majority of flood warning networks are operated through the Regional Water Monitoring Partnerships, of which there are three – the Gippsland, Northern and South West. Participants in the Regional Water Monitoring Partnerships agree to share the decision-making and costs of maintaining water monitoring networks in Victoria to support flood warning as well as other business needs of the partners. Their relative roles, responsibilities and contributions, including funding arrangements, are detailed in the Water Monitoring Project Agreements. The Water Monitoring Project Agreements are legally binding.

3.10.5 The flood forecasting and warning service for Victoria also depends on the provision of data from partner agency data networks. The provision of these data for each of the agencies concerned is detailed in a Data Sharing Agreement between the Bureau and each partner (Schedule 6).

3.10.6 The Bureau will maintain the essential set of metadata describing the network of stations and related infrastructure regarding the Bureau's component of the data network, along with metadata required to inform the data ingest process for partner agency related networks and sites .

² Emergency management partners include those organisations that have an emergency management responsibility for the wider community (e.g. State Emergency Service)

- 3.10.7** The Data Sharing Agreements are intended to reflect operational arrangements and are not legally binding and allow multiple agreements between individual and/or multiple agencies.
- 3.10.8** The parties agree to the provision of data as set out in the Data Sharing Agreements during periods of routine site operation and increased frequency during flood periods.
- 3.10.9** Data transfer protocols and conditions regarding fitness for purpose as provided by each stakeholder will be adhered to as set out in the Data Sharing Agreements for data provision.
- 3.10.10** The sharing of data as set out in the Data Sharing Agreements can be amended by following the process described in the agreement.
- 3.10.11** The Bureau has developed special purpose software (Enviromon) for collecting, alarming, storing, on-forwarding and display of data from Event-Reporting Radio Telemetry Systems (ERRTS) (field equipment) based on Automated Local Evaluation in Real Time (ALERT) data protocol.
- 3.10.12** The Bureau provides a range of supplementary services associated with Enviromon, including: installation of Enviromon software; the commissioning of an Enviromon base station or maintenance and support; and onsite Enviromon training. However, software licensing and limited support for Enviromon base stations listed in Schedule 5 is currently a standard service (free of charge).

3.11 Operations

- 3.11.1** The Bureau will use reasonable endeavours to provide a 24 hours a day, seven days a week operational systems capability necessary to support flood warning operations. This will include on-line computer and data ingestion systems, along with appropriate communications infrastructure.
- 3.11.2** The Bureau operates a regional Flood Warning Centre in each capital city and a Bureau National Operations Centre in Melbourne on an as-required basis.
- 3.11.3** Through the regional Flood Warning Centre and Bureau National Operations Centre, the Bureau will provide operational coverage for up to 24 hours per day during flood events, subject to event requirements and operational constraints. The Bureau will advise its key emergency management clients of any impact in services if it is unable to provide sufficient staff coverage to meet the service levels set out in this Service Level Specification (see also 4.2).
- 3.11.4** Staff in the Bureau National Operations Centre will support regional operations either remotely or by providing additional capacity to a regional Flood Warning Centre where reasonably possible during significant and long duration events. When necessary, staff from regional offices in areas not impacted by current flooding will endeavour to assist.
- 3.11.5** The Bureau will maintain an internal catchment directive for each catchment where a warning service is provided. The catchment directive documents and describes the forecast process for the particular catchment and includes flood intelligence

information, flood history, contact details for partners with local knowledge and warning issue criteria.

3.11.6 The operation of the Flood Warning Centres will endeavour to be compliant with the fatigue management guidelines developed under the Bureau's Work Health and Safety Procedures. Particular attention to fatigue management will be provided during the management of extreme events. The requirement to comply with these guidelines applies to all personnel present at these centres.

3.11.7 The Bureau will assist in meeting the needs of the Australian Government's National Crisis Coordination Centre. The Bureau will use reasonable endeavours to support and participate in relevant critical event briefings as resources permit.

3.12 Publishing of data and flood information

3.12.1 The Bureau will maintain the systems to ingest all data being gathered through the flood warning data network.

3.12.2 The river height and rainfall data received by the Bureau will be published on its website as soon as practicable (the data are supplied at different frequencies and by various methods) upon receipt into Bureau operational systems. The data will be published in the form of tables, maps and plots and will also be included in warnings and alerting messages and used in modelling systems.

3.12.3 Data collected in Bureau systems will be available for use by the Bureau as it requires and for distribution to the public on suitable open source licence terms³.

3.12.4 The Bureau will continue to collect and update the background information on floods contained on its website. These may include survey information, flood history and flood event reports, catchment maps and brochures.

3.13 Planning and liaison

3.13.1 The Bureau undertakes a range of routine planning, maintenance and liaison activities that support the Total Flood Warning System. This includes contributing to related flood risk management activities within the State or Territory impacting on, or related to flood warning along with the ongoing coordination and liaison activities essential to the smooth operation of the Total Flood Warning System.

3.14 Support for emergency management training and exercises

3.14.1 The Bureau will, within operational constraints, endeavour to support and participate in relevant disaster management activities outside of flood operational periods, including training exercises and flood response planning.

³ Please refer to the Creative Commons License:
<http://www.bom.gov.au/water/regulations/dataLicensing/ccLicense.shtml>

4 Level of service and performance reporting

- 4.1** Achievable levels of service provided by the Bureau are dependent on many factors including adequate access to Bureau equipment where located on sites owned by other agencies, data availability in near real time from Bureau and partner agencies, modelling and prediction capability, geomorphology of the catchment and meteorological considerations such as rainfall patterns.
- 4.2** If during a flood event the achievable service level is expected to be reduced, for any reason below the target level as stated in this Service Level Specification, the Bureau will inform the key emergency management clients in Victoria of the reduced service level via email and phone.
- 4.3** The Bureau's performance during significant events will be reviewed and reported on using a standard performance structure developed in conjunction with key stakeholders and within the context of the Total Flood Warning System based on key performance indicators and the service levels defined in Schedule 2a.
- 4.4** An annual performance report will be tabled at a Flood Warning Consultative Committee meeting if significant flooding has occurred in the previous year. This report may be published on the Bureau website.
- 4.5** Event based performance reports with more detailed technical information may also be produced for significant and high profile events.

5 Limitations of service

5.1 Performance of services provided under this document are subject to:

- (a) The availability of funds and human resources of the Bureau and its partner agencies and changes to organisational policies that may affect the terms and conditions of the Service Level Specification.
- (b) Circumstances beyond the control of the Bureau including where the performance is the responsibility of another entity.
- (c) The existence of a reliable and ongoing supply of quality real time rainfall, water level and flow data.
- (d) The reliable and ongoing availability of the computing and communication infrastructure required for the performance of the services.
- (e) Adequate communication between the Bureau and all relevant partners under this Service Level Specification and related Data Sharing Agreements and any other agreement relevant to it including on any faults or issues.

5.2 In Victoria there are a number of documents that describes the States arrangements for flood warning and flood risk management. This Service Level Specification does not replace or reduce the value of these documents. The key documents are:

- (a) *State Flood Emergency Plan February 2012* (Victoria State Emergency Services)
 - *Attachment – Management of Flooding Downstream of Dams (6 February 2013)*
- (b) *Victoria Floodplain Management Strategy, July 1998*
- (c) *Regional Water Monitoring Project Agreements for the:*
 - *Northern Region*
 - *Gippsland Region*
 - *South West Region*

6 Service Level Specification consultation, review and updating

6.1 The initial and annual process for acceptance of this Service Level Specification will be:

6.1.1 The Flood Warning Consultative Committee members will be provided with the draft or amended Service Level Specification in advance of a special or scheduled committee meeting.

6.1.2 The members of the Flood Warning Consultative Committee will distribute the draft or amended Service Level Specification within their organisations and provide feedback from their organisation at the committee meeting.

6.1.3 After consultation and discussion at the Flood Warning Consultative Committee meeting, the Bureau will update the Service Level Specification.

6.1.4 The Chair of the Flood Warning Consultative Committee (Bureau's Regional Director) will accept and sign the document on behalf of the committee.

6.1.5 The Assistant Director Water Forecasting Services will sign the Service Level Specification on behalf of the Director of Meteorology.

6.1.6 The Bureau will then distribute the Service Level Specification to all members of the Flood Warning Consultative Committee and publish a copy on the Bureau website.

6.2 The schedules of this Service Level Specification will be reviewed annually and either updated following review, or when a significant change is made that impacts on the level of services described in this document. Updates to this document will be recorded in Schedule 11.

6.3 Any changes to the categorisation of a location into data, information or forecast location or to the level of services described in this document will be through a consultative process using agreed arrangements in Victoria and when required coordinated by the Flood Warning Consultative Committee.

7 Signature of parties

7.1 This Service Level Specification has been prepared by the Bureau of Meteorology in consultation with the Victorian Flood Warning Consultative Committee.



14/9/2015

Mr Ted Williams
Acting Chair of Victorian Flood Warning Consultative Committee, and
Regional Director - Victoria
Bureau of Meteorology

Date



14 September 2015

Mr Grant Wilson
Acting Assistant Director
Water Forecasting Services
Bureau of Meteorology

Date

Schedule 1: Flood Warning Consultative Committee

The Victorian Flood Warning Consultative Committee was formed in late 1989. The Committee's role is to coordinate the development and operations of the State's flood forecasting and warning services. It is an advisory body and reports to the Bureau of Meteorology and participating state and local government agencies as required. The membership includes

- Bureau of Meteorology (Chair/Secretariat)
- Department of Environment, Land, Water and Planning
- Victoria State Emergency Service
- Local Government – Municipal Association Victoria
- Catchment Management Authorities – West Gippsland CMA
- Rural Water Authorities – Goulburn Murray Water
- Melbourne Water
- Inspector General Emergency Management
- Institute of Public Works Engineering Australia
- Other State Government agencies (as required)

The nationally consistent Terms of Reference for Flood Warning Consultative Committees are:

1. Identify requirements and review requests for new and upgraded forecasting and warning services
2. Establish the priorities for the requirements that have been identified using risk based analyses of the Total Flood Warning System.
3. Review and provide feedback on the Service Level Specification for the Bureau's Flood Forecasting and Warning services on an annual basis
4. Coordinate the implementation of flood warning systems in accordance with appropriate standards.
5. Promote effective means of communication of flood warning information to the affected communities
6. Monitor and review the performance of flood forecasting and warning services.
7. Build awareness and promote the Total Flood Warning System concept.

Schedule 2a: Forecast locations and levels of service

Column definitions:

Bureau number: Refers to the unique number assigned to a particular station by the Bureau

Forecast location: Is the specific location that will be referred to in flood warnings (refer 3.3)

Station operated by: Refers to the owning and operating agency of the station. The Bureau may co-own stations. (refer Schedules 7 and 8)

Station type: Either manual (read by human) or automatic (consisting of either ERTS or telemetry gauges)

Flood classification: For definitions please refer to Appendix A.2.

Prediction type: The type of warning service that particular location can expect. (refer 3.8)

Target warning lead time: The minimum lead time that will be provided before the height or the flood class level given is exceeded (refer 3.8 & notes below)

Target peak accuracy: The error within which peak river level height is predicted (refer 3.8.7)

Priority: The impact a temporary or permanent loss of a site will have on service delivery and in meeting performance targets (refer 3.3.2)

Bureau number	AWRC Number	Forecast location	Station Operator	Station type	Flood classification (m)			Prediction type	Target warning lead time		70% of peak forecasts within	Priority
					Minor	Moderate	Major		Time	Trigger height (m)		
222 – Snowy River Basin												
570020	222019	Bombala Town	NSW Office of Water	Automatic	3.0	5.0	8.0	Qualitative	3 hrs	>3.0	n/a	High
084126	222209	McKillops Bridge	Gippsland RWMP	Automatic	2.5	6.0	8.0	Qualitative	6 hrs	>2.5	n/a	High
084109	222219	Basin Creek	Gippsland RWMP	Automatic	3.5	5.5	6.6	Qualitative	6 hrs	>3.5	n/a	High
584020	222206	Buchan (Buchan R)	Gippsland RWMP	Automatic	2.5	3.5	4.0	Qualitative	3 hrs	>2.5	n/a	High
584004	222200	Jarrahmond	Gippsland RWMP	Automatic	4.1	6.2	7.4	Quantitative	6 hrs	>4.1	+/- 0.3 m	High
584011	222201	Orbost (Snowy R)	Gippsland RWMP	Automatic	4.2	6.0	7.0	Quantitative	6 hrs	>4.0	+/- 0.5 m	High
224 – Mitchell River Basin												
085270	224203	Glenaladale	Gippsland RWMP	Automatic	3.0	4.5	5.5	Quantitative	6 hrs	>3.0	+/- 0.3 m	High

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Bureau number	AWRC Number	Forecast location	Station Operator	Station type	Flood classification (m)			Prediction type	Target warning lead time		70% of peak forecasts within	Priority
					Minor	Moderate	Major		Time	Trigger height (m)		
084146	224200	Bairnsdale (Pumphouse)	Gippsland RWMP	Manual	4.0	5.5	6.5	Quantitative	9 hrs	peak	+/- 0.3 m	High
225 – Thomson River Basin												
585025	225201	Stratford (Avon R)	Gippsland RWMP	Automatic	4.5	6.0	6.5	Quantitative	6 hrs	>4.5m	+/- 0.3 m	High
585004	225209	Licola (Macalister R)	Gippsland RWMP	Automatic	2.7	3.2	3.6	Qualitative	3 hrs	>2.7m	n/a	High
585236	225208	Cooper Ck	Southern Rural Water	Automatic	2.3	3.5	5.0	Qualitative	6 hrs	>2.3m	n/a	High
585027	225212	Wandocka	Gippsland RWMP	Automatic	6.2	6.5	6.7	Quantitative	6 hrs	>6.2m	+/- 0.3 m	High
085272	225237	Sale Wharf	Gippsland RWMP	Automatic	2.4	3.0	4.0	Quantitative	6 hrs	>2.4m	+/- 0.3 m	High
226 – Latrobe River Basin												
585031	226228	Rosedale (Main Stream)	Gippsland RWMP	Automatic	4.0	4.8	5.5	Quantitative	9 hrs	>4.0m	+/- 0.3 m	High
585013	226023	Traralgon Town	Gippsland RWMP	Automatic	3.5	4.0	4.8	Quantitative	3 hrs	>3.5m	+/- 0.3 m	High
223, 224, 225 & 226 – Gippsland Lakes Basin												
585058	226605	Hollands Landing	Gippsland RWMP	Automatic	0.7	n/a	0.9	Quantitative	6 hrs	>0.7m	+/- 0.2 m	High
585059	226606	Loch Sport Marina	Gippsland RWMP	Automatic	0.9	n/a	1.4	Quantitative	6 hrs	>0.9m	+/- 0.2 m	High
584018	226607	Paynesville	Gippsland RWMP	Automatic	0.7	n/a	1.3	Quantitative	6 hrs	>0.7m	+/- 0.2 m	High
584021	226608	Metung Marina	Gippsland RWMP	Automatic	0.8	n/a	1.9	Quantitative	6 hrs	>0.8m	+/- 0.2 m	High
584019	226609	Bullock Island (Lakes Entrance)	Gippsland RWMP	Automatic	0.9	n/a	1.3	Quantitative	6 hrs	>0.9m	+/- 0.2 m	High
232 – Moorabool River Basin												
587028	232202	Batesford Bridge	South West RWMP	Automatic	2.7	4.0	4.9	Quantitative	6 hrs	>2.7m	+/- 0.3 m	High
233 – Barwon River Basin												
589001	233213	Shelford (Hwy Bridge)	South West RWMP	Automatic	6.0	7.0	8.0	Quantitative	6 hrs	>6.0m	+/- 0.3m	High
587026	233217	Geelong	South West RWMP	Automatic	2.3	3.1	4.3	Quantitative	9 hrs	>2.3m	+/- 0.3m	High
238 – Glenelg River Basin												
590002	238212	Casterton	South West RWMP	Manual	3.8	5.2	6.0	Quantitative	9 hrs	peak	+/- 0.3m	High
401 – Upper Murray River Basin												
082106	401204	Tallandoon	Northern RWMP	Automatic	4.2	4.9	5.6	Qualitative	6 hrs	>4.2m	n/a	High
572004	401549	Bringenbrong	NSW Office of Water	Automatic	3.0	3.4	n/a	Quantitative	3 hrs	>3.0m	+/- 0.3m	High
072156	401201	Jingellic	Northern RWMP	Automatic	4.0	5.5	7.5	Quantitative	9 hrs	>4.0m	+/- 0.3m	High
402 – Kiewa River Basin												
582011	402222	Kiewa (Main Stream)	Northern RWMP	Automatic	3.3	3.7	4.0	Qualitative	6 hrs	>3.3m	n/a	High

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Bureau number	AWRC Number	Forecast location	Station Operator	Station type	Flood classification (m)			Prediction type	Target warning lead time		70% of peak forecasts within	Priority
					Minor	Moderate	Major		Time	Trigger height (m)		
582013	402205	Bandiana	Northern RWMP	Automatic	2.8	3.1	3.3	Qualitative	3 hrs	>2.8m	n/a	High
403 – Ovens River Basin												
583148	403205	Bright	Northern RWMP	Automatic	3.0	3.6	4.3	Qualitative	3 hrs	>3.0m	n/a	High
403 – Ovens River Basin (continued)												
082112	403250	Eurobin (Ovens R)	Northern RWMP	Automatic	4.5	5.5	6.0	Quantitative	3 hrs	>4.5m	+/- 0.3m	High
582014	403230	Rocky Point	Northern RWMP	Automatic	3.2	4.4	5.2	Quantitative	6 hrs	>3.2m	+/- 0.3m	High
582004	403223	Docker Rd Bridge	Northern RWMP	Automatic	3.7	3.95	4.1	Quantitative	6 hrs	>3.7m	+/- 0.3m	High
582002	403213	Greta South	Northern RWMP	Automatic	2.8	4.2	6.0	Qualitative	3 hrs	>2.8m	n/a	High
582033	403200	Wangaratta (Ovens R)	Northern RWMP	Automatic	11.9	12.4	12.7	Quantitative	9 hrs	>11.9m	+/- 0.3m	High
404 – Broken River Basin												
581006	404203	Benalla (Broken R)	Northern RWMP	Automatic	2.5	3.7	4.5	Quantitative	6 hrs	>2.5m	+/- 0.3m	High
581000	404216	Casey Weir	Northern RWMP	Automatic	2.1	2.6	3.0	Quantitative	6 hrs	>2.1m	+/- 0.3m	High
581015	404222	Orrvale	Northern RWMP	Automatic	6.8	7.2	7.9	Quantitative	9 hrs	>6.8m	+/- 0.3m	High
580018	404237	Nathalia (Broken Ck)	Northern RWMP	Automatic	1.3	2.5	2.9	Quantitative	12 hrs	peak	+/- 0.3m	High
405 – Goulburn River Basin												
088119	405209	Taggerty	Northern RWMP	Automatic	2.3	2.6	3.0	Qualitative	3 hrs	>2.3m	n/a	High
088126	405202	Seymour (Goulburn R)	Northern RWMP	Automatic	3.8	5.2	7.0	Quantitative	3 hrs	>3.8m	+/- 0.3m	High
581001	405200	Murchison	Northern RWMP	Automatic	9.0	10.2	10.7	Quantitative	6 hrs	>9.0m	+/- 0.3m	High
582017	405237	Euroa	Northern RWMP	Automatic	2.5	4.0	4.6	Quantitative	3 hrs	>2.5m	+/- 0.3m	High
581016	405269	Kialla West (Seven Cks)	Northern RWMP	Automatic	4.5	5.0	6.6	Quantitative	6 hrs	>4.5m	+/- 0.3m	High
081044	405204	Shepparton (Goulburn R)	Northern RWMP	Automatic	9.5	10.7	11.0	Quantitative	9 hrs	>9.5m	+/- 0.3m	High
580000	405232	McCoys Bridge	Northern RWMP	Automatic	9.0	10.0	10.2	Quantitative	9 hrs	>9.0m	+/- 0.3m	High
406 – Campaspe River Basin												
581002	406201	Barnadown	Northern RWMP	Automatic	3.8	4.4	5.0	Qualitative	6 hrs	>3.8m	n/a	High
580011	406202B	Rochester Town AHD	Bureau	Manual	113.0	114.0	114.5	Quantitative	9 hrs	peak	+/- 0.3m	High
407 – Loddon River Basin												
580002	407205	Appin South	Northern RWMP	Automatic	2.8	3.1	3.3	Quantitative	12 hrs	>2.8m	+/- 0.3m	High
580001	407242	Kerang (MV Hwy Bridge) AHD	Northern RWMP	Manual	77.0	77.5	77.8	Quantitative	12 hrs	peak	+/- 0.3m	High

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Bureau number	AWRC Number	Forecast location	Station Operator	Station type	Flood classification (m)			Prediction type	Target warning lead time		70% of peak forecasts within	Priority
					Minor	Moderate	Major		Time	Trigger height (m)		
408 – Avoca River Basin												
80106	408900	Charlton Town	Northern RWMP	Manual	3.5	5.0	7.0	Quantitative	9 hrs	peak	+/- 0.3m	High
577000	408203	Quambatook (Avoca R)	Northern RWMP	Automatic	2.0	2.2	2.4	Quantitative	12 hrs	peak	+/- 0.3m	High
415 – Wimmera River Basin												
579001	415201	Glenorchy Weir TG	Northern RWMP	Automatic	4.0	4.5	4.8	Quantitative	6 hrs	>4.0m	+/- 0.3m	High
579000	415200	Horsham (Walmer)	Northern RWMP	Automatic	2.8	3.1	3.6	tba	tba	>2.8m	+/- 0.3m	High
415 – Wimmera River Basin (continued)												
578004	415256	U/S Dimboola	Northern RWMP	Automatic	5.3	5.7	6.0	tba	tba	>5.3m	+/- 0.3m	High
409 / 414 – Murray Basin												
572000	409001	Albury *	NSW Office of Water	Automatic	4.3	4.9	5.5	Quantitative	12 hrs	>5.5m	+/- 0.3 m	High
582003	409002	Corowa *	NSW Office of Water	Automatic	4.6	5.9	8.6	Quantitative	24 hrs	>6.0m	+/- 0.3 m	High
074246	409025	Yarrawonga D/S *	NSW Office of Water	Automatic	6.4	6.7	7.8	Quantitative	24 hrs	>6.4m	+/- 0.3 m	High
574004	409202	Tocumwal *	Northern RWMP	Automatic	6.4	6.7	7.3	Quantitative	24 hrs	>6.4m	+/- 0.3m	High
574000	409200	Echuca Wharf /Moama AHD *	Northern RWMP	Automatic	93.5	93.9	94.4	Quantitative	24 hrs	>93.5m	+/- 0.3 m	High
574003	409207	Torrumbarry Weir *	Northern RWMP	Automatic	7.3	7.6	7.8	Quantitative	24 hrs	>7.3m	+/- 0.3 m	High
575000	409005	Barham *	NSW Office of Water	Automatic	5.5	5.8	6.1	Quantitative	24 hrs	>5.5m	+/- 0.3 m	High
076112	409204	Swan Hill *	Northern RWMP	Automatic	4.5	4.6	4.7	Quantitative	24 hrs	>4.5m	+/- 0.3 m	High
574010	409003	Deniliquin *	NSW Office of Water	Automatic	4.6	7.2	9.4	Quantitative	24 hrs	>4.6m	+/- 0.3m	High
575001	409014	Moulamein *	NSW Office of Water	Automatic	4.6	5.2	6.1	Quantitative	24 hrs	>4.6m	+/- 0.3m	High
574024	409023	Stevens Weir *	NSW Office of Water	Automatic	5.5	5.8	6.6	Quantitative	24 hrs	>5.5m	+/- 0.3m	High
049115	414203	Euston Weir *	Northern RWMP	Automatic	9.1	9.8	10.3	Quantitative	24 hrs	>9.1m	+/- 0.3 m	High
76124	414210	Mildura HG AHD *	Northern RWMP	Automatic	36.0	37.5	38.5	Quantitative	24 hrs	>36.0m	+/- 0.3 m	High
047100	425010	Wentworth Weir *	NSW Office of Water	Automatic	7.3	7.9	9.1	Quantitative	24 hrs	>7.3m	+/- 0.3m	High
076120	414200	Wakool Junction *	Northern RWMP	Automatic	8.8	10.5	11.5	Quantitative	24 hrs	>8.8m	+/- 0.3 m	High
076135	414201	Boundary Bend *	Northern RWMP	Automatic	8.0	8.5	9.0	Quantitative	24 hrs	>8.0m	+/- 0.3 m	High

Notes:

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- AHD - Australian Height Datum. See [Geoscience Australia](http://www.ga.gov.au) for further information.
- Gippsland RWMP: Gippsland Regional Water Monitoring Partnership
- South West RWMP: South West Regional Water Monitoring Partnership
- Northern RWMP: Northern Regional Water Monitoring Partnership

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- * – predictions provided by the NSW flood forecasting and warning team of the Bureau
- The target warning lead time specified in the table is the minimum lead time that will be provided. Wherever possible, and particularly where confidence is high with regards to the onset of flooding, more lead time will be given. The Bureau will also give due consideration to the time of day in issuing warnings.

Schedule 2b: Forecast locations where predictions are provided by Melbourne Water

Bureau number	AWRC Number	Forecast location	Station owner	Station type	Flood classification (m)			Priority
					Minor	Moderate	Major	
228 – Bunyip River Basin								
586071	228213	Iona	Melbourne Water	Automatic	2.1	5.0	6.0	High
586209	228380	Cora Lynn Ford	Melbourne Water	Automatic	3.1	5.0	6.0	High
586084	228368	Rowville	Melbourne Water	Automatic	4.6	5.0	5.5	High
228 – Yarra River Basin								
586067	229618	Eltham	Melbourne Water	Automatic	6.0	7.0	7.5	High
586151	229619	Hurstbridge	Melbourne Water	Automatic	5.5	6.4	7.0	High
586012	229645	Bell Street Coburg	Melbourne Water	Automatic	2.9	3.4	4.8	High
586080	229149	St Georges Rd Northcote	Melbourne Water	Automatic	3.2	3.8	5.0	High
586171	229614	Lower Plenty	Melbourne Water	Automatic	5.0	6.6	7.2	High
586064	229144	Healesville	Melbourne Water	Automatic	2.6	3.1	4.0	High
586175	229135	Banksia Street Heidelberg	Melbourne Water	Automatic	6.0	8.3	9.2	High
586039	229143	Chandler Highway Fairfield	Melbourne Water	Automatic	3.0	6.0	8.7	High
586053	229270	Christmas Hills	Melbourne Water	Automatic	3.0	6.0	7.0	High
586044	229653	Coldstream (Yarra Grange)	Melbourne Water	Automatic	4.0	5.1	6.1	High
586050	229142	Fitzsimons Lane Templestowe	Melbourne Water	Automatic	3.5	6.0	8.0	High
586177	229622	Johnston Street Abbotsford	Melbourne Water	Automatic	2.7	6.7	8.9	High
586801	229212	Millgrove	Melbourne Water	Automatic	2.0	2.5	3.0	High
086347	229200	Warrandyte	Melbourne Water	Automatic	3.0	4.5	6.5	High
586113	229206	Yarra Glen	Melbourne Water	Automatic	4.1	4.6	5.0	High
230 – Maribyrnong River Basin								
586178	230100	Darraweit Guim	Melbourne Water	Automatic	5.5	6.1	6.5	High
587006	230103	Rossllyne Res HG	Melbourne Water	Automatic	51.4	51.7	52.1	High
586122	230105	Keilor	Melbourne Water	Automatic	3.5	5.4	6.1	High
587015	230106	Maribyrnong	Melbourne Water	Automatic	1.7	2.3	2.9	High
231 – Werribee River Basin								
587001	231104	Deer Park	Melbourne Water	Automatic	3.6	4.0	4.5	High
587022	231211	U/S Goodman Ck (Lerderderg R)	Melbourne Water	Automatic	3.3	3.8	4.0	High
587017	231225	Ballan	Melbourne Water	Automatic	1.4	2.3	3.2	High
587023	231200	Bacchus Marsh	Melbourne Water	Automatic	4.4	5.2	5.6	High
587070	231237	Werribee (Cottrell St ford)	Melbourne Water	Automatic	2.7	3.1	6.0	High
087040	231205	Melton Res TG	Melbourne Water	Automatic	1.5	5.1	6.4	High
587525	231213	Sardine Ck (Obrien Crossing)	Melbourne Water	Automatic	2.1	3.0	3.5	High

Notes:

- All levels are in meters to local gauge datums unless indicated otherwise.

Schedule 2c: Forecast locations at tail water gauges or immediately downstream of storages where predictions are provided by storage operators

Bureau number	AWRC Number	Forecast location	Station Operator	Station type	Flood classification (m)			Priority
					Minor	Moderate	Major	
225 – Thomson River Basin								
585235	225204	Lake Glenmaggie D/S	Southern Rural Water	Automatic	2.3	4.0	5.2	High
585022	225231	U/S Cowwarr Weir	Southern Rural Water	Automatic	3.7	4.5	5.5	High
226 – Latrobe River Basin								
585245	226005	Thoms Bridge	Southern Rural Water	Automatic	4.0	5.0	6.5	High
401 – Upper Murray River Basin								
572037	n/a	Khancoban Pondage	Snowy Hydro	Automatic	113 m3/s	n/a	n/a	High
403 – Ovens River Basin								
583002	403228	Lake William Hovell D/S	Goulburn-Murray Water	Automatic	1.8	n/a	n/a	High
583007	403220	Lake Buffalo D/S	Goulburn-Murray Water	Automatic	3.2	5.0	6.3	High
405 – Goulburn River Basin								
588125	405203	Lake Eildon D/S	Goulburn-Murray Water	Automatic	3.0	4.0	5.0	High
406 – Campaspe River Basin								
581007	406207	Lake Eppalock D/S AHD	Goulburn-Murray Water	Automatic	158.4	160.4	162.4	High
407 – Loddon River Basin								
588000	407210	Cairn Curran Res TG	Goulburn-Murray Water	Automatic	2.0	3.5	4.0	High
581004	407203	Laanecoorie Res D/S	Goulburn-Murray Water	Automatic	1.5	3.0	5.5	High

Notes:

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- All levels indicate flooding in the local reaches of the stream.
- AHD - Australian Height Datum. See [Geoscience Australia](http://www.ga.gov.au/geoscience-australia) for further information.

Schedule 3: Information Locations with flood class levels defined

Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Flood classification (m)			Priority
					Minor	Moderate	Major	
221 – East Gippsland Basin								
084128	221209	Chandlers Ck (East Branch)	Gippsland RWMP	Automatic	2.0	2.3	2.8	High
084127	221201	Weeragua (West Branch)	Gippsland RWMP	Automatic	3.0	3.5	4.0	High
584007	221210	The Gorge (Genoa R)	Gippsland RWMP	Automatic	2.2	2.9	3.5	High
224 – Mitchell River Basin								
084118	224201	Waterford	Gippsland RWMP	Automatic	3.5	4.5	6.5	High
225 – Thomson River Basin								
085276	225224	The Channel	Gippsland RWMP	Automatic	5.0	6.9	7.5	High
226 – Latrobe River Basin								
585030	226204	Willow Grove	Gippsland RWMP	Automatic	4.1	5.5	n/a	High
585247	226209	Darnum	Gippsland RWMP	Automatic	3.5	4.3	4.6	High
085266	226226	Tanjil Junction	Gippsland RWMP	Automatic	2.0	2.5	3.5	High
585029	226216	Tanjil South	Gippsland RWMP	Automatic	2.5	3.0	3.5	High
585017	226407	Boolarra	Gippsland RWMP	Automatic	2.6	3.5	n/a	High
233 – Barwon River Basin								
089104	233215	Mt Mercer	South West RWMP	Automatic	2.0	3.0	4.0	High
590000	233224	Ricketts Marsh	South West RWMP	Automatic	3.0	6.0	6.7	High
087162	233200	Pollocksford	South West RWMP	Automatic	3.5	4.5	6.5	High
238 – Glenelg River Basin								
090142	238211	Dergholm	South West RWMP	Automatic	4.0	4.8	5.1	High
401 – Upper Murray River Basin								
583005	401203	Hinnomunjie	Northern RWMP	Automatic	3.6	3.8	4.0	High
582010	401211	Colemans	Northern RWMP	Automatic	3.4	4.2	6.4	High
582022	401220	McCallums	Northern RWMP	Automatic	1.6	2.0	2.3	High
582015	401012	Biggara	NSW Office of Water	Automatic	2.0	2.6	3.0	High
402 – Kiewa River Basin								
582012	402203	Mongans Bridge	Northern RWMP	Automatic	2.4	3.5	4.5	High
403 – Ovens River Basin								
583003	403233	Harris Lane	Northern RWMP	Automatic	2.8	3.5	4.2	High
082105	403227	Cheshunt	Northern RWMP	Automatic	1.8	2.3	2.6	High

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Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Flood classification (m)			Priority
					Minor	Moderate	Major	
404 – Broken River Basin								
580019	404238	Walshs Bridge	Northern RWMP	Automatic	2.0	3.0	3.4	High
405 – Goulburn River Basin								
583151	405219	Dohertys	Northern RWMP	Automatic	2.0	3.5	6.0	High
588127	405214	Tonga Bridge	Northern RWMP	Automatic	3.0	4.0	5.0	High
088125	405217	Devlins Bridge	Northern RWMP	Automatic	1.8	2.3	2.8	High
588020	405313	Yea (Yea R)	Northern RWMP	Manual	3.0	3.6	4.4	High
588129	405231	Flowerdale	Northern RWMP	Automatic	2.0	2.5	3.0	High
588007	405201	Trawool	Northern RWMP	Automatic	4.0	5.6	7.5	High
588128	405228	Tarcombe Rd	Northern RWMP	Automatic	2.0	2.8	3.6	High
588126	405212	Tallarook	Northern RWMP	Automatic	3.0	3.5	4.5	High
082151	405306	Strathbogie	Northern RWMP	Automatic	1.5	2.2	3.0	High
082150	405307	Galls Gap Rd	Northern RWMP	Automatic	2.2	3.0	4.0	High
082149	405308	Telfords Bridge	Northern RWMP	Automatic	1.2	1.8	2.4	High
406 – Campaspe River Basin								
588006	406213	Redesdale (Campaspe R)	Northern RWMP	Automatic	2.0	4.0	5.7	High
581008	406218	Campaspe Weir HG AHD	Northern RWMP	Automatic	121.2	121.4	121.6	High
580010	406202C	Rochester Syphon	Northern RWMP	Automatic	8.0	8.8	9.1	High
580014	406265	Echuca (Campaspe R) AHD	Northern RWMP	Manual	n/a	88.0	95.7	High
407 – Loddon River Basin								
588004	407215	Newstead	Northern RWMP	Automatic	3.0	4.5	5.6	High
581012	407211	Bet Bet	Northern RWMP	Automatic	4.0	5.0	6.0	High
580009	407224	Loddon Weir D/S	Northern RWMP	Automatic	3.3	6.0	7.0	High
408 – Avoca River Basin								
578000	408200	Yawong Weir (Coonooer)	Northern RWMP	Automatic	2.3	3.4	5.0	High
578001	408212	Charlton D/S	Northern RWMP	Automatic	3.5	5.0	7.0	High
415 – Wimmera River Basin								
579013	415261	Quantong Bridge	Northern RWMP	Automatic	4.5	5.4	5.9	High
579018	415241	Murtoa (Yarriambiak Ck)	Northern RWMP	Automatic	1.8	2.0	2.1	High

Notes:

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- Northern RWMP: Northern Regional Water Monitoring Partnership

Schedule 4: River data locations

Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Priority
221 – East Gippsland Basin					
584016	221224	Cann River (Cann R)	Gippsland RWMP	Manual	Low
569007	221001	Rockton	Gippsland RWMP	Automatic	Low
584026	221212	Princes Hwy (Bemm R)	Gippsland RWMP	Automatic	Low
222 – Snowy River Basin					
071019	222026	Dalgety Weir	NSW Office of Water	Automatic	Medium
570056	222017	The Hut	NSW Office of Water	Automatic	Low
570018	222004	Wellesley (Rowes)	NSW Office of Water	Automatic	Medium
070309	222008	Quidong	NSW Office of Water	Automatic	Medium
070008	222013	Burnt Hut Crossing	NSW Office of Water	Automatic	High
584003	222213	Suggan Buggan	Gippsland RWMP	Automatic	High
584027	222202	Sardine Ck (Brodribb R)	East Gippsland Water	Automatic	Low
223 – Tambo River Basin					
584006	223202	Swifts Ck (Tambo R)	Gippsland RWMP	Automatic	Low
584014	223205	D/S Ramrod Ck	Gippsland RWMP	Automatic	High
584022	223209	Battens Landing	Gippsland RWMP	Automatic	High
584023	223217	Pump House (Nicholson R)	Gippsland RWMP	Automatic	High
584008	223212	D/S Wilkinson Ck	Gippsland RWMP	Automatic	Low
224 – Mitchell River Basin					
585033	224206	Crooked River	Gippsland RWMP	Automatic	Medium
584005	224213	Lower Dargo Rd	Gippsland RWMP	Automatic	Medium
584013	224218	Wuk Wuk Bridge	Southern Rural Water	Automatic	Low
584012	224219	Bulmers Lane	Southern Rural Water	Automatic	Medium
084147	224217	Rosehill	Gippsland RWMP	Automatic	High
225 – Thomson River Basin					
585034	225218	Briagolong (Freestone Ck)	Gippsland RWMP	Automatic	Medium
585003	225219	Glencairn	Gippsland RWMP	Automatic	High
585032	225221	Stringybark Ck	Southern Rural Water	Automatic	Medium
585021	225230	The Gorge (Glenmaggie Ck)	Southern Rural Water	Automatic	High
585237	225225	Lake Glenmaggie HG	Southern Rural Water	Automatic	Low
585005	225213	Beardmore	Gippsland RWMP	Automatic	Medium
585020	225210	The Narrows	Gippsland RWMP	Automatic	Medium
585028	225236	Heyfield (Rainbow Ck)	Southern Rural Water	Automatic	Medium

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Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Priority
225 – Thomson River Basin (continued)					
585026	225200	Heyfield (Thomson R)	Southern Rural Water	Automatic	Medium
585038	225232	Bundalaguah	Gippsland RWMP	Automatic	High
226 – Latrobe River Basin					
585036	226205	Noojee (Latrobe R)	Gippsland RWMP	Automatic	Medium
585010	226402	Trafalgar East	Gippsland RWMP	Automatic	Medium
585079	226218	Thorpdale	Gippsland RWMP	Automatic	Medium
585192	226408	Yallourn (Morwell R)	Gippsland RWMP	Automatic	Low
585011	226021	Moe (Narracan Ck)	Gippsland RWMP	Automatic	Medium
585039	226227	Kilmany South	Gippsland RWMP	Automatic	High
585014	226415	Traralgon South	Gippsland RWMP	Automatic	High
085281	226410	Koornalla	Gippsland RWMP	Automatic	High
223, 224, 225 and 226 – Gippsland Lakes Basin					
584025	na	Lakes Entrance Breakwater	Gippsland Ports	Automatic	High
227 – South Gippsland Basin					
585047	227239	Stradbroke West	Gippsland RWMP	Automatic	Low
585046	227240	Seaspray	Gippsland RWMP	Automatic	Low
228 - Bunyip River					
586085	228366	Knox RB	Melbourne Water	Automatic	Low
586086	228373	The Basin RB	Melbourne Water	Automatic	Low
586088	228362	Springvale (Mile Ck)	Melbourne Water	Automatic	Low
586092	228204	Hammond Rd (Dandenong Ck)	Melbourne Water	Automatic	Low
586095	228369	Fussell Rd RB, Montrose	Melbourne Water	Automatic	Low
586096	228231	Hampton Park (Hallam Valley)	Melbourne Water	Automatic	Low
586098	228378	Frankston North	Melbourne Water	Automatic	Low
586099	228358	Braeside Drain	Melbourne Water	Automatic	Low
586100	228351	Wantirna South (Blind Ck)	Melbourne Water	Automatic	Low
586114	228203	Lyndhurst (Eumemmering Ck)	Melbourne Water	Automatic	Low
586179	228357	Heathmont	Melbourne Water	Automatic	Low
586190	228603	Clayton RB	Melbourne Water	Automatic	Low
586206	228210	Keysborough (Mile Ck)	Melbourne Water	Automatic	Low
586207	228381	Keysborough (Dandenong Ck)	Melbourne Water	Automatic	Low
586250	228372	Seaford (Kananook Ck)	Melbourne Water	Automatic	Low
586257	228235	Narre Warren North	Melbourne Water	Automatic	Low
585035	228219	Neerim South (Tarago R)	Melbourne Water	Automatic	Low
585043	228201	Drouin West (Tarago R)	Melbourne Water	Automatic	Low
585045	228255	Longwarry North	Melbourne Water	Automatic	Low

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Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Priority
228 - Bunyip River (continued)					
586081	228212	Tonimbuk (Bunyip R)	Melbourne Water	Automatic	Low
586082	228217	Pakenham (Toomuc Ck)	Melbourne Water	Automatic	Low
586093	228228	Cardinia	Melbourne Water	Automatic	Low
586094	228207	Tonimbuk (D/S Headworks)	Melbourne Water	Automatic	Low
586097	228365	Officer	Melbourne Water	Automatic	Low
586124	228209	Lang Lang	Melbourne Water	Automatic	Low
586130	228363	Pakenham (Princes Highway)	Melbourne Water	Automatic	Low
586198	228395	Kooweerup	Melbourne Water	Automatic	Low
586245	228364	Pakenham (Kennedy Ck)	Melbourne Water	Automatic	Low
229 - Yarra River					
586024	229130	Maroondah Res	Melbourne Water	Automatic	Low
586030	229603	Cooper St Somerton (Merri Ck)	Melbourne Water	Automatic	Low
586052	229624	Gardiners	Melbourne Water	Automatic	Low
586062	229608	Kangaroo Ground South	Melbourne Water	Automatic	Low
586078	229214	Yarra Junction	Melbourne Water	Automatic	Low
586148	229613	Epping	Melbourne Water	Automatic	Low
586149	229616	Mernda	Melbourne Water	Automatic	Low
586152	229272	Chapel Lane	Melbourne Water	Automatic	Low
586153	229621	Burnley	Melbourne Water	Automatic	Low
586157	229637	Middleborough Rd RB	Melbourne Water	Automatic	Low
586159	229638	Eley Rd RB	Melbourne Water	Automatic	Low
586160	229640	Huntingdale Rd RB	Melbourne Water	Automatic	Low
586162	229636	Kinkora Rd RB	Melbourne Water	Automatic	Low
586166	229670	St Kilda Marina	Melbourne Water	Automatic	Low
586167	229402	Fawkner Cemetry	Melbourne Water	Automatic	Low
586172	229612	Bundoora	Melbourne Water	Automatic	Low
586181	229660	Elsternwick Main Drain	Melbourne Water	Automatic	Low
586185	229648	Doncaster East	Melbourne Water	Automatic	Low
586191	229229	Bulleen	Melbourne Water	Automatic	Low
586192	229625	Ashwood	Melbourne Water	Automatic	Low
586194	229639	Waverley Rd RB	Melbourne Water	Automatic	Low
586195	229635	Lake Rd RB	Melbourne Water	Automatic	Low
586200	229665	Jacana RB	Melbourne Water	Automatic	Low
586202	229690	Mt Evelyn	Melbourne Water	Automatic	Low
586210	229404	Warburton East (Cement Ck)	Melbourne Water	Automatic	Low
586211	229627	Craigeburn	Melbourne Water	Automatic	Low
586212	229615	Greensborough	Melbourne Water	Automatic	Low

Service Level Specification for Flood Forecasting and Warning Services for Victoria

Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Priority
229 - Yarra River (continued)					
586213	229610	Edwardes Lake	Melbourne Water	Automatic	Low
586214	229403	Bell St Ivanhoe	Melbourne Water	Automatic	Low
586215	229215	Woori Yallock	Melbourne Water	Automatic	Low
586216	229687	Hawthorn	Melbourne Water	Automatic	Low
586220	229665	Mooroolbark	Melbourne Water	Automatic	Low
586221	229672	Lilydale Lake	Melbourne Water	Automatic	Low
230 - Maribyrnong River					
586224	230119	Doggetts Bridge Lancefield	Melbourne Water	Automatic	Low
587024	230102	Bulla	Melbourne Water	Automatic	Low
587052	230112	Spotswood	Melbourne Water	Automatic	Low
587055	230107	Konagaderra	Melbourne Water	Automatic	Low
587115	230211	Clarkefield	Melbourne Water	Automatic	Low
587116	230104	Sunbury	Melbourne Water	Automatic	Low
231 – Werribee River					
587042	231234	Parwan	South West RWMP	Automatic	Low
587526	231221	Melton Res HG	Southern Rural Water	Automatic	Low
587043	231231	Melton South	South West RWMP	Automatic	Low
587049	231110	Hoppers Crossing	Melbourne Water	Automatic	Low
587054	231107	Brooklyn	Melbourne Water	Automatic	Low
587130	231106	Diggers Rest	Melbourne Water	Automatic	Low
232 – Moorbaool River Basin					
087068	232210	Lal Lal	South West RWMP	Automatic	Low
087016	232204	Morrisons	South West RWMP	Automatic	Medium
587035	232802	Lara	Geelong City Council	Automatic	Low
233 – Barwon River Basin					
089084	233223	Warrambine	South West RWMP	Automatic	High
590006	233247	Kildean Lane	South West RWMP	Automatic	Medium
087109	233201	Winchelsea (Barwon R)	South West RWMP	Automatic	Medium
589003	233218	Inverleigh	South West RWMP	Automatic	Medium
587068	233719	Moolap (Salt Works)	Geelong City Council	Automatic	Low
236 – Hopkins River Basin					
589008	236213	Mena Park	South West RWMP	Automatic	Low
589007	236203	Skipton (Mt Emu Ck)	South West RWMP	Automatic	Low
589009	236219	Ararat (Hopkins R)	South West RWMP	Automatic	Low
589006	236202	Wickliffe (Hopkins R)	South West RWMP	Automatic	Low
590012	236210	Framlingham	South West RWMP	Automatic	Low
590003	236205	Woodford	South West RWMP	Automatic	Low

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Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Priority
237 – Portland River Basin					
590009	237200	Toolong	South West RWMP	Automatic	Low
590004	237205	Homerton Bridge	South West RWMP	Automatic	Low
238 – Glenelg River Basin					
079108	238224	Fulham Bridge	South West RWMP	Automatic	Low
590013	238223	Wando Vale	South West RWMP	Automatic	Medium
401 – Upper Murray River Basin					
583004	401216	Joker Ck	Northern RWMP	Automatic	Low
582016	401217	Gibbo Park	Northern RWMP	Automatic	Low
582008	401224	Lake Dartmouth HG	Northern RWMP	Automatic	Low
582018	401210	Granite Flat	Northern RWMP	Automatic	Medium
582026	401230	Towong	Northern RWMP	Automatic	High
572024	401017	Yarramundi	NSW Office of Water	Automatic	Low
572019	401007	Tumba2	NSW Office of Water	Automatic	Low
572023	401009	Maragle	NSW Office of Water	Automatic	Low
572022	401008	Tooma	NSW Office of Water	Automatic	Low
572005	401014	Pinegrove	NSW Office of Water	Automatic	High
572034	401016	The Square	NSW Office of Water	Automatic	Low
572035	401024	Bakers	NSW Office of Water	Automatic	Low
582009	401208	Berringama	Northern RWMP	Automatic	Low
582028	401229	Cudgewa North	Northern RWMP	Automatic	High
572006	401013	Jingellic Ck	NSW Office of Water	Automatic	Medium
402 – Kiewa River Basin					
582007	402220	Kiewa (Anabranche)	Northern RWMP	Automatic	Medium
582020	402204	Osbornes Flat	Northern RWMP	Automatic	Medium
403 – Ovens River Basin					
083001	403244	Harrietville (Ovens R)	Northern RWMP	Automatic	Medium
083058	403253	Upper Buckland	Northern RWMP	Automatic	Medium
082162	403214	Rosewhite	Northern RWMP	Automatic	Medium
083018	403222	Abbeyard	Northern RWMP	Automatic	Medium
582027	403210	Myrtleford	Northern RWMP	Automatic	Medium
583000	403217	Matong North (Rose R)	Northern RWMP	Automatic	Medium
583011	403218	Matong North (Dandongadale R)	Northern RWMP	Automatic	Medium
583009	403254	D/S Rose R Junction	Northern RWMP	Automatic	Medium
583150	403235	Lake Buffalo HG	Northern RWMP	Automatic	Medium
582005	403240	Edi	Northern RWMP	Automatic	High
082116	403226	Angleside	Northern RWMP	Automatic	High

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Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Priority
403 – Ovens River Basin (continued)					
082128	403224	Bobinawarra	Northern RWMP	Automatic	Medium
582021	403241	Peechelba East	Northern RWMP	Automatic	Low
082108	403251	Glenrowan	Northern RWMP	Automatic	Low
404 – Broken River Basin					
583006	404229	D/S Bridge Ck	Northern RWMP	Automatic	Low
582000	404243	Back Ck Junction	Northern RWMP	Automatic	Medium
582023	404226	Broken Weir	Northern RWMP	Automatic	High
082155	404230	Wrightley	Northern RWMP	Automatic	Medium
582030	404231	Loombah Res HG	Northern RWMP	Automatic	Low
582001	404207	Kelfeera	Northern RWMP	Automatic	High
581019	404224	Gowangardie Weir	Northern RWMP	Automatic	Medium
581023	404204	Tungamah (Boosey Ck)	Northern RWMP	Automatic	Low
580017	404214	Katamatite	Northern RWMP	Automatic	Low
405 – Goulburn River Basin					
583014	405218	Gerrang Bridge	Northern RWMP	Automatic	Medium
588009	405241	Rubicon	Northern RWMP	Automatic	Low
588002	405274	Yarck	Northern RWMP	Automatic	Low
088078	405310	Ghin Ghin	Northern RWMP	Automatic	Medium
088064	405238	Pyalong	Northern RWMP	Automatic	Low
588001	405240	Ash Bridge	Northern RWMP	Automatic	Medium
588021	405291	Whiteheads Ck	Northern RWMP	Automatic	Medium
588008	405248	Graytown	Northern RWMP	Automatic	Medium
581013	405259	Goulburn Weir HG	Northern RWMP	Automatic	Low
581009	405253	Goulburn Weir D/S	Northern RWMP	Automatic	High
581024	405704	East Goulburn Main Channel	Northern RWMP	Automatic	Low
581025	405701	Cattanach Canal	Northern RWMP	Automatic	Low
581026	405700	Stuart Murray Canal	Northern RWMP	Automatic	Low
581014	405247	Tamleugh	Northern RWMP	Automatic	Medium
082084	405294	U/S Violet Town	Northern RWMP	Automatic	Low
581010	405226	Moorilim	Northern RWMP	Automatic	Medium
581011	405246	Arcadia	Northern RWMP	Automatic	Medium
581022	405270	Kialla West (Arcadia Downs)	Northern RWMP	Automatic	Medium
082154	405234	D/S Polly McQuinn Weir	Northern RWMP	Automatic	Medium
406 – Campaspe River Basin					
581018	406262	Strathfieldsaye	Northern RWMP	Automatic	Medium
581017	406224	Runnymede	Northern RWMP	Automatic	Medium
588029	406235	Heathcote (Wild Duck Ck)	Northern RWMP	Automatic	Low

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Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Priority
407 – Campaspe River Basin (continued)					
581003	406219	Lake Eppalock HG	Northern RWMP	Automatic	Low
407 – Loddon River Basin					
588025	407220	Norwood	Northern RWMP	Automatic	Low
588010	407217	Vaughan	Northern RWMP	Automatic	Low
588011	407221	Yandoit	Northern RWMP	Automatic	Low
588018	407300	Muckleford North	Northern RWMP	Automatic	Low
588005	407230	Strathlea	Northern RWMP	Automatic	Medium
588013	407222	Clunes (Tullaroop Ck)	Northern RWMP	Automatic	Low
588024	407214	Clunes (Creswick Ck)	Northern RWMP	Automatic	Low
588014	407213	Carisbrook	Northern RWMP	Automatic	Low
588012	407248	Tullaroop Res (Outlet)	Northern RWMP	Automatic	Medium
588016	407244	Tullaroop Res HG	Northern RWMP	Automatic	Low
588027	407227	Smeaton	Northern RWMP	Automatic	Low
580008	407236	Mitiamo	Northern RWMP	Automatic	Low
588030	407239	Rodborough	Northern RWMP	Automatic	Medium
581005	407240	Laanecoorie Res HG	Northern RWMP	Automatic	Medium
580012	407229	Serpentine Weir	Northern RWMP	Automatic	Low
581029	407288	Lillicur (Bet Bet Ck)	Northern RWMP	Automatic	Low
408 – Avoca River Basin					
581028	408202	Amphitheatre	Northern RWMP	Automatic	Low
081127	408206	Archdale Junction	Northern RWMP	Automatic	Medium
415 – Wimmera River Basin					
579005	415207	Eversley (Wimmera R)	Northern RWMP	Automatic	Low
579006	415245	Crowlands	Northern RWMP	Automatic	Low
579010	415238	Navarre (Wattle Ck)	Northern RWMP	Automatic	Medium
579009	415206	Glynwylln	Northern RWMP	Automatic	High
579008	415237	Stawell (Concongella Ck)	Northern RWMP	Automatic	High
579007	415250	Fyans Ck	Northern RWMP	Automatic	Low
579002	415203	Lake Lonsdale TG	Northern RWMP	Automatic	Low
579014	415239	Drung Drung (Wimmera R)	Northern RWMP	Automatic	Medium
579011	415223	Wonwondah East	Northern RWMP	Automatic	Medium
579017	415251	Mckenzie Ck	Northern RWMP	Automatic	Medium
579012	415220	Wimmera Hwy (Avon R)	Northern RWMP	Automatic	Low
578003	415260	U/S Rich Avon Weir	Northern RWMP	Automatic	Low
578005	415246	Lochiel	Northern RWMP	Automatic	Low
578006	415257	U/S Donald	Northern RWMP	Automatic	Low

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Bureau number	AWRC Number	Station name	Station operated by	Gauge type	Priority
409 / 414 – Murray Basin					
574001	409215	Barmah	Northern RWMP	Automatic	Low
580015	409222	Pianta Rd	Northern RWMP	Automatic	Low
572001	409011	Hume Dam (Manual)	Murray Darling Basin Authority	Manual	High
576000	414207	Colignan	Northern RWMP	Automatic	High
572003	409017	Doctors Point	NSW Office of Water	Automatic	High
572002	409016	Heywoods	NSW Office of Water	Automatic	High
574034	409037	Howlong	NSW Office of Water	Automatic	High
575003	409035	Liewah	NSW Office of Water	Automatic	High
575002	409013	Stoney Crossing	NSW Office of Water	Automatic	High
547000	414202	Mildura D/S	Murray Darling Basin Authority	Manual	Low

Notes:

- Data from MANUAL stations are not available in (near) real time.
- Gippsland RWMP: Gippsland Regional Water Monitoring Partnership
- South West RWMP: South West Regional Water Monitoring Partnership
- Northern RWMP: Northern Regional Water Monitoring Partnership

Schedule 5: Enviromon base stations installed in Victoria

Owner	City/town	License number	Number of users	Date of registration	License version
Thiess Services	Wangaratta	61030001	3	24/05/2005	3.11.2
Thiess Services	Horsham	61030008	3	28/06/2007	3.11.2
Thiess Services	Maffra	61030021	3	05/01/2012	3.11.2
Latrobe City Council	Traralgon	61030003	3	08/11/2005	3.11.2
Latrobe City Council	Morwell	61030004	3	08/11/2005	3.11.2
Wimmera Catchment Management Authority	Horsham	61030007	3	03/05/2007	3.11.2
Strathbogie Shire Council	Euroa	61030017	3	26/04/2004	3.11.2
Wellington Shire	Sale	61030020	3	24/08/2009	3.11.2
City of Greater Geelong	Geelong	61030015	3	13/02/2004	3.11.2
Goulburn Murray Water	Lake Buffalo	61030002	3	28/06/2004	3.11.2
Southern Rural Water	Maffra	61030019	8	27/07/2009	3.11.2
Bureau of Meteorology	Melbourne	61030015	10	21/02/2008	3.11.2
Bureau of Meteorology	Melbourne	61030006	10	26/03/2007	3.11.2

Schedule 6: List of Data Sharing Agreements for data provision

A Data Sharing Agreement for data provision has been set up or is in development for the following agencies.

Agency	Status (complete or in progress)	Date of completion	Number of sites
Regional Water Monitoring Participants	Complete	Signatures not required	145
Goulburn Murray Water	Complete	Signed December 2014	145
Melbourne Water	In progress	TBA	155
Southern Rural Water	Complete	Signed July 2014	65
Gippsland Ports	Complete	Signed May 2013	2
Snowy Hydro	Complete	Signed July 2014	3
East Gippsland Water	Complete	Signed February 2015	9

Notes:

- The number of sites listed in the above Data Sharing Agreements include rainfall sites that are not listed in this Service Level Specification.

Schedule 7: List of sites owned and maintained by the Bureau

Bureau number	Station name	Gauge type	Data type	Priority
222 – Snowy River Basin				
84154	Mt Mcleod	Automatic	Repeater	High
223 – Tambo River Basin				
84144	Mt Nowa Nowa	Automatic	Rainfall/Repeater	High
84152	* Mt Delegate	Automatic	Rainfall/Repeater	High
224 – Mitchell River Basin				
84146	* Bairnsdale (Pumphouse)	Manual	Water level	High
84097	* Bulumwaal	Automatic	Rainfall	Low
225 – Thomson River Basin				
85288	* Mt Tamboritha	Automatic	Rainfall	Low
85289	* Murderers Hill	Automatic	Rainfall	Low
85021	* Mt Useful	Automatic	Rainfall/Repeater	High
85296	Mt Moornapa	Automatic	Rainfall/Repeater	High
85296	Mt Moornapa	Automatic	Base Station	High
85272	* Sale Wharf	Automatic	Water Level	High
85072	East Sale	Automatic	Base Station	High
403 – Ovens River Basin				
83077	* Bald Hill	Automatic	Rainfall	Low
82166	* Bloomfield Park (Everton)	Automatic	Rainfall	Low
82163	* Carboor Upper	Automatic	Rainfall	Low
83073	* Mt Buffalo Chalet	Automatic	Rainfall/Repeater	High
82164	* Schmidts Farm	Automatic	Repeater	High
83089	* Mt Porepukah	Automatic	Repeater	High
82167	* Greta West	Automatic	Rainfall	Low
82138	Wangaratta	Automatic	Base Station	High
404 – Broken River Basin				
82165	* Stump Hill (Barjarg)	Automatic	Rainfall	Low
81087	* Highlands (Bungeet)	Automatic	Rainfall/Repeater	High
582029	* Lurg	Automatic	Repeater	High
81124	Yarrowonga	Automatic	Base Station	High
405 – Goulburn River Basin				
88154	* Highwood	Automatic	Rainfall	Medium
406 – Campaspe River Basin				
580011	* Rochester Town	Manual	Water Level	High
415 – Wimmera River Basin				
79101	Ben Nevis	Automatic	Rainfall/Repeater	High
79103	Mt William	Automatic	Rainfall/Repeater	High
409 – Murray Riverina Basin				
574000	* Echuca Wharf / Moama	Automatic	Water Level	High

Notes:

- * Site included in the Regional Water Monitoring Partnerships for maintenance
- List does not include daily rainfall, automatic weather stations and other Bureau synoptic stations.

Schedule 8: List of sites where the Bureau assists other agencies with maintenance

Bureau number	Station name	Owner	Gauge type	Data type	Priority
NIL	NIL	NIL	NIL	NIL	NIL

Notes:

- The Bureau does not currently assist any other agencies with maintenance on river sites

Schedule 9: List of sites where the Bureau co-locates equipment and the site is owned by another agency

Bureau number	Station name	Owner	Gauge type	Data type	Priority
221 – East Gippsland Basin					
084128	* Chandlers Ck (East Branch)	Gippsland RWMP	Automatic	Rainfall/Water Level	High
569007	* Rockton	Gippsland RWMP	Automatic	Rainfall/Water Level	Low
222 – Snowy River Basin					
084126	* Mckillops Bridge	Gippsland RWMP	Automatic	Rainfall/Water Level	High
584020	* Buchan (Buchan R)	Gippsland RWMP	Automatic	Rainfall/Water Level	High
084109	* Basin Ck	Gippsland RWMP	Automatic	Rainfall/Water Level	High
224 – Mitchell River Basin					
584005	* Lower Dargo Rd	Gippsland RWMP	Automatic	Rainfall/Water Level	Medium
585033	* Crooked River	Gippsland RWMP	Automatic	Rainfall/Water Level	Medium
084118	* Waterford	Gippsland RWMP	Automatic	Rainfall/Water Level	High
085270	* Glenaladale	Gippsland RWMP	Automatic	Rainfall/Water Level	High
084147	* Rosehill	Gippsland RWMP	Automatic	Rainfall/Water Level	High
225 – Thomson River Basin					
085276	* The Channel	Gippsland RWMP	Automatic	Rainfall/Water Level	High
585034	* Briagolong (Freestone Ck)	Gippsland RWMP	Automatic	Rainfall/Water Level	Medium
585025	* Stratford (Avon R)	Gippsland RWMP	Automatic	Rainfall/Water Level	High
585022	* U/S Cowwarr Weir	Gippsland RWMP	Automatic	Rainfall/Water Level	High
585004	* Licola (Macalister R)	Gippsland RWMP	Automatic	Rainfall/Water Level	High
585003	* Glencairn	Gippsland RWMP	Automatic	Rainfall/Water Level	High
226 – Latrobe River Basin					
585029	* Tanjil South	Gippsland RWMP	Automatic	Rainfall/Water Level	High
585036	* Noojee	Gippsland RWMP	Automatic	Rainfall/Water Level	Medium
585247	* Darnum	Gippsland RWMP	Automatic	Rainfall/Water Level	High
585017	* Boolarra	Gippsland RWMP	Automatic	Rainfall/Water Level	High
585079	* Thorpdale	Gippsland RWMP	Automatic	Rainfall/Water Level	Medium
233 – Barwon River Basin					
087162	* Pollocksford	South West RWMP	Automatic	Water Level	High
090187	* Boonah	South West RWMP	Automatic	Rainfall	Medium
589001	* Shelford Highway Bridge	South West RWMP	Automatic	Rainfall/Water Level	High
590000	* Ricketts Marsh	South West RWMP	Automatic	Rainfall/Water Level	High
089104	* Mt Mercer	South West RWMP	Automatic	Rainfall/Water Level	High

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Bureau number	Station name	Owner	Gauge type	Data type	Priority
401 – Upper Murray River Basin					
582009	* Berringama	Northern RWMP	Automatic	Rainfall/Water Level	Medium
402 – Kiewa River Basin					
582012	* Mongan's Bridge	Northern RWMP	Automatic	Rainfall/Water Level	High
582020	* Osbornes Flat	Northern RWMP	Automatic	Rainfall/Water Level	High
403 – Ovens River Basin					
082105	* Cheshunt	Northern RWMP	Automatic	Rainfall/Water Level	High
082112	* Eurobin (Ovens R)	Northern RWMP	Automatic	Rainfall/Water Level	High
082128	* Bobinawarra	Northern RWMP	Automatic	Rainfall/Water Level	High
082162	* Rosewhite	Northern RWMP	Automatic	Rainfall/Water Level	Medium
582002	* Greta South	Northern RWMP	Automatic	Rainfall/Water Level	High
582004	* Docker Rd Bridge	Northern RWMP	Automatic	Water Level	High
583003	* Harris Lane	Northern RWMP	Automatic	Rainfall/Water Level	High
582014	* Rocky Point	Northern RWMP	Automatic	Rainfall/Water Level	High
583007	* Lake Buffalo D/S	Northern RWMP	Automatic	Rainfall/Water Level	High
583012	Mt Buggary	Northern RWMP	Automatic	Rainfall	Medium
583148	* Bright (Ovens R)	Northern RWMP	Automatic	Rainfall/Water Level	High
405 – Goulburn River Basin					
588129	* Flowerdale	Northern RWMP	Automatic	Rainfall/Water Level	High
88119	* Taggerty	Northern RWMP	Automatic	Rainfall/Water Level	High
088125	* Devlin's Bridge	Northern RWMP	Automatic	Rainfall/Water Level	High
588002	* Yarck	Northern RWMP	Automatic	Rainfall/Water Level	Medium
407 – Loddon River Basin					
588018	* Muckleford North	Northern RWMP	Automatic	Rainfall/Water Level	Medium
415 – Wimmera River Basin					
579005	* Eversley	Northern RWMP	Automatic	Rainfall/Water Level	High
579010	* Navarre (Wattle Ck)	Northern RWMP	Automatic	Rainfall/Water Level	High
579008	* Stawell	Northern RWMP	Automatic	Rainfall/Water Level	High
579019	Wimmera	Wimmera Catchment Management Authority	Automatic	Base Station	High

Notes:

- * Site included in the Regional Water Monitoring Partnerships for maintenance
- Does not include daily rainfall, automatic weather stations and other Bureau synoptic stations.
- Gippsland RWMP: Gippsland Regional Water Monitoring Partnership
- South West RWMP: South West Regional Water Monitoring Partnership
- Northern RWMP: Northern Regional Water Monitoring Partnership

Schedule 10: List of flood warning related products issued by the Bureau in Victoria (warnings, watches, bulletins, river alerts)

Flood warnings

Product ID	Product name	Initiating criteria	Updated	Finalising
IDV36110	Flood Warning for the Cann and Genoa	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36120	Flood Warning for the Snowy Flood Warning for the Buchan	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36140	Flood Warning for the Mitchell River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36205	Flood Warning for the Gippsland Lakes	expected > minor flood level	Minor: Minimum once a day. Re-issue if significant changes occur. Major: Minimum twice a day. Re-issue if significant changes occur. Less frequent once situation has stabilised.	< minor flood level
IDV36210	Flood Warning for the Avon River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36220	Flood Warning for the Macalister River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDV36230	Flood Warning for the Thomson River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36240	Flood Warning for the Latrobe River Flood Warning for the Tanjil River Flood Warning for the Moe River Flood Warning for the Morwell River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36245	Flood Warning for the Traralgon Creek	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36300	Flood Warning for the Maribyrnong River and Jacksons Creek	Within 30 minutes of receiving Melbourne Water email warning and notification	Melbourne Water updates	Melbourne Water finalises warning
IDV36310	Flood Warning for the Yarra River Flood Warning for the Watts River	Within 30 minutes of receiving Melbourne Water email warning and notification	Melbourne Water updates	Melbourne Water finalises warning
IDV36320	Flood Warning for the Dandenong Creek	Within 30 minutes of receiving Melbourne Water email warning and notification	Melbourne Water updates	Melbourne Water finalises warning
IDV36330	Flood Warning for the Bunyip River and Westernport Catchments	Within 30 minutes of receiving Melbourne Water email warning and notification	Melbourne Water updates	Melbourne Water finalises warning
IDV36340	Flood Warning for the Diamond Creek	Within 30 minutes of receiving Melbourne Water email warning and notification	Melbourne Water updates	Melbourne Water finalises warning

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDV36350	Flood Warning for the Merri Creek	Within 30 min from receiving Melbourne Water email warning and notification	Melbourne Water updates	Melbourne Water finalises warning
IDV36360	Flood Warning for the Kororoit Creek	Within 30 minutes of receiving Melbourne Water email warning and notification	Melbourne Water updates	Melbourne Water finalises warning
IDV36370	Flood Warning for the Plenty River	Within 30 min from receiving Melbourne Water email warning and notification	Melbourne Water updates	Melbourne Water finalises warning
IDV36390	Flood Warning for the Werribee River	Within 30 minutes of receiving Melbourne Water email warning and notification	Melbourne Water updates	Melbourne Water finalises warning
IDV36400	Flood Warning for the Barwon River Flood Warning for the Leigh River Flood Warning for the Moorabool River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36520	Flood Warning for the Glenelg River	> minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36610	Flood Warning for the Mitta Mitta River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36620	Flood Warning for the Kiewa River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur. Less frequent once situation has stabilised.	< minor flood level

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDV36630	Flood Warning for the Ovens River Flood Warning for the King River Flood Warning for the Buffalo River Flood Warning for the Fifteen Mile Creek	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36640	Flood Warning for the Broken River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36641	Flood Warning for the Seven Creeks Flood Warning for the Castle Creek	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDV36642	Flood Warning for the Broken Creek	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur. Less frequent once situation has stabilised.	< minor flood level
IDV36710	Flood Warning for the Goulburn River Flood Warning for the Yea River Flood Warning for the Sunday Creek Flood Warning for the Hughes Creek	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur. Less frequent once situation has stabilised.	< minor flood level
IDV36750	Flood Warning for the Campaspe River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur. Less frequent once situation has stabilised.	< minor flood level
IDV36810	Flood Warning for the Loddon River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur. Less frequent once situation has stabilised.	< minor flood level

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDV36820	Flood Warning for the Avoca River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur. Less frequent once situation has stabilised.	< minor flood level
IDV36830	Flood Warning for the Wimmera River	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur. Less frequent once situation has stabilised.	< minor flood level
IDV36910	Flood Warning for the Murray River U/S of Lake Hume	expected > minor flood level	Minor: Minimum once a day. Re-issue when significant changes occur. Moderate and major: Minimum twice a day. Re-issue if significant changes occur.	< minor flood level
IDN36629	Flood Warning for the Murray River D/S of Lake Hume	expected > minor flood level	Expected > minor – once a day. Re-issue if significant changes occur. Expected > major flood at Albury – 3 hourly.	< minor flood level
IDV36050	Victoria Flood Warning Summary	First flood watch and/or flood warning issued	After flood watch and flood warnings updates	Expires 24 hours after last flood summary issue

Notes:

- Flood warnings will be issued in accordance with the target warning lead times specified in the schedules. The target warning lead time is the minimum lead time that will be provided. Wherever possible, and particularly where confidence is high with regards to the onset of flooding, more lead time will be given. The Bureau will also give due consideration to the time of day in issuing warnings.

Flood watches

Product ID	Product name	Initiating criteria	Updated	Finalising
IDV35100	Flood Watch for East Gippsland (Mitchell, Tambo, Snowy, Cann and Genoa Rivers, and Gippsland Lakes)	Expected > minor flooding	Every 24 hours.	Rain easing
IDV35200	Flood Watch for West and South Gippsland (Lalor, Thomson, Macalister, Avon and South Gippsland Rivers, and Gippsland Lakes)	Expected > minor flooding	Every 24 hours.	Rain easing
IDV35300	Flood Watch for Greater Melbourne Catchments (Werribee, Maribyrnong, Yarra, Dandenong and Westernport Catchments)	Expected > minor flooding	Every 24 hours.	Rain easing
IDV35400	Flood Watch for the Barwon, Moorabool and Leigh Basins	Expected > minor flooding	Every 24 hours.	Rain easing
IDV35500	Flood Watch for the Glenelg and Hopkins Basins	Expected > minor flooding	Every 24 hours.	Rain easing
IDV35600	Flood Watch for North East Victoria (Upper Murray, Mitta Mitta, Kiewa, Owens and King Catchments)	Expected > minor flooding	Every 24 hours.	Rain easing
IDV35700	Flood Watch for the Goulburn and Broken Basins	Expected > minor flooding	Every 24 hours.	Rain easing
IDV35800	Flood Watch for the Campaspe, Loddon, Avoca and Wimmera Basins	Expected > minor flooding	Every 24 hours.	Rain easing

River alerts

Product ID	Product name	Initiating criteria	Updated	Finalising
NIL	NIL	NIL	NIL	NIL

Notes:

- No river alerts are currently issued in Victoria.

Rainfall alerts

Product ID	Product name	Initiating criteria	Updated	Finalising
NIL	NIL	NIL	NIL	NIL

Notes:

- No rainfall alerts are currently issued in Victoria.

River and rainfall bulletins

Product ID	Product name	Initiating criteria	Updated	Finalising
IDV60078	Latest River Heights for the Mitchell, Tambo, Snowy, Cann, Genoa, Gippsland Lakes	None	Hourly	Never
IDV60079	Latest River Heights for the Latrobe, Thomson, Macalister, Avon, South Gippsland, Gippsland Lakes	None	Hourly	Never
IDV60201	Latest River Heights for the Werribee, Maribyrnong, Yarra, Dandenong, Bunyip	None	Hourly	Never
IDV60147	Latest River Heights for the Barwon, Moorabool, Leigh, Glenelg	None	Hourly	Never
IDV60148	Latest River Heights for the Wimmera, Murray-Mallee	None	Hourly	Never
IDV60149	Latest River Heights for the Campaspe, Loddon, Avoca, Murray-Riverina	None	Hourly	Never
IDV60150	Latest River Heights for the Goulburn, Broken, Murray - Riverina	None	Hourly	Never
IDV60151	Latest River Heights for the Upper Murray, Mitta Mitta, Kiewa, Ovens, King	None	Hourly	Never
IDV60154	Latest River Heights for the Victorian Rivers	None	Hourly	Never
IDV60163	One hourly rainfall bulletin for Mitchell, Tambo, Snowy, Cann, Genoa	None	Hourly	Never
IDV60162	One hourly rainfall bulletin for Latrobe, Thomson, Macalister, Avon, South Gippsland	None	Hourly	Never
IDV60161	One hourly rainfall bulletin for Werribee, Maribyrnong, Yarra, Dandenong, Bunyip	None	Hourly	Never
IDV60160	One hourly rainfall bulletin for Barwon, Moorabool, Leigh, Hovells Creek, Corangamite, Otway Coast	None	Hourly	Never
IDV60159	One hourly rainfall bulletin for Glenelg, Wannon, Portland Coast, Hopkins	None	Hourly	Never
IDV60155	One hourly rainfall bulletin for Wimmera, Murray - Mallee	None	Hourly	Never
IDV60156	One hourly rainfall bulletin for Campaspe, Loddon, Avoca	None	Hourly	Never
IDV60157	One hourly rainfall bulletin for Goulburn, Broken	None	Hourly	Never
IDV60158	One hourly rainfall bulletin for Upper Murray, Mitta Mitta, Kiewa, Ovens and King	None	Hourly	Never
IDV60172	Three hourly rainfall bulletin for Mitchell, Tambo, Snowy, Cann, Genoa	None	Every three hours	Never
IDV60171	Three hourly rainfall bulletin for Latrobe, Thomson, Macalister, Avon, South Gippsland	None	Every three hours	Never
IDV60170	Three hourly rainfall bulletin for Werribee, Maribyrnong, Yarra, Dandenong, Bunyip	None	Every three hours	Never
IDV60169	Three hourly rainfall bulletin for Barwon, Moorabool, Leigh, Hovells Creek, Corangamite, Otway Coast	None	Every three hours	Never

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDV60168	Three hourly rainfall bulletin for Glenelg, Wannon, Portland Coast, Hopkins	None	Every three hours	Never
IDV60164	Three hourly rainfall bulletin for Wimmera, Murray - Mallee	None	Every three hours	Never
IDV60165	Three hourly rainfall bulletin for Campaspe, Loddon, Avoca	None	Every three hours	Never
IDV60166	Three hourly rainfall bulletin for Goulburn, Broken	None	Every three hours	Never
IDV60167	Three hourly rainfall bulletin for Upper Murray, Mitta Mitta, Kiewa, Ovens and King	None	Every three hours	Never
IDV60181	Daily rainfall bulletin for Mitchell, Tambo, Snowy, Cann, Genoa	None	Hourly	Never
IDV60180	Daily rainfall bulletin for Latrobe, Thomson, Macalister, Avon, South Gippsland	None	Hourly	Never
IDV60179	Daily rainfall bulletin for Werribee, Maribyrnong, Yarra, Dandenong, Bunyip	None	Hourly	Never
IDV60178	Daily rainfall bulletin for Barwon, Moorabool, Leigh, Hovells Creek, Corangamite, Otway Coast	None	Hourly	Never
IDV60177	Daily rainfall bulletin for Glenelg, Wannon, Portland Coast, Hopkins	None	Hourly	Never
IDV60173	Daily rainfall bulletin for Wimmera, Murray - Mallee	None	Hourly	Never
IDV60174	Daily rainfall bulletin for Campaspe, Loddon, Avoca	None	Hourly	Never
IDV60175	Daily rainfall bulletin for Goulburn, Broken	None	Hourly	Never
IDV60176	Daily rainfall bulletin for Upper Murray, Mitta Mitta, Kiewa, Ovens and King	None	Hourly	Never
IDV60003	Daily Rainfall bulletin for Victoria	None	Daily	Never
IDV60004	Weekly Rainfall bulletin for Victoria	None	Weekly	Never

Schedule 11: List of changes to this Service Level Specification

Version	Date	Name	Update
1.0	05/08/2014	Nicole Pana	Version 1.0 signed
2.0	March 2015	Nicole Pana Elma Kazazic	Clauses 1.3 and 1.4 rewording for clarification.
			Additional sentence to clause 1.6 highlighting supplementary services
			Clause 2.1 deleted to remove repetition.
			Clauses 3.1 and 3.2 reworded for clarification.
			Clauses 3.3.1, 3.3.2 and 3.3.3 in the V1 consolidated into new clause 3.3.1 in the V2.
			Clause 3.3.4 in the V1 replaced with new clause 3.3.2 in the V2. Definition of priority level for stations in clause 3.3.2 and Table 1 which are also new additions. Addition of priorities to stations in schedules 2-4 and 7-9.
			Clause 3.7.2 reworded for clarification.
			Clause 3.8 – revised including: Clause 3.8.1 reworded to clarify criteria for issuing warnings. Clause 3.8.2 and 3.8.3 in the V1 consolidated into new clause 3.8.2 in the V2 for clarification. Quantitative and Qualitative clauses better described (3.8.3 and 3.8.4)
			Clause 3.10.12 reworded to clarify standard and supplementary services associated with Enviromon.
			Clause 3.11.3 and 3.11.4 in the V1 consolidated into clause 3.11.3 in the V2.
			Clause 3.12.4 added
			Schedules 2-4 and 7-9 edits to some station numbers and names, and addition of few sites.
			Snowy River at Basin Creek added as prediction location to Schedule 2a and removed from Schedule 3 information location.
			Schedule 2b – added AWRC numbers
Schedule 6 updated.			

Appendix A: Glossary of terms

A.1 General

Bureau Flood Warning Centre: an operational area set aside in each capital city to fulfil the Bureau's role in the Total Flood Warning System specifically flood forecasting and warning.

Bureau National Operations Centre: The principal role of the National Operations Centre is to augment regional flood forecasting teams during major floods and to provide operational system support. The National Operations Centre is also responsible for leading new initiatives to enhance the quality of operations and services.

Catchment Directive: A catchment directive provides guidance specific to a catchment to help develop forecasting and warning products.

Flood warning: A written product to provide advice on impending flooding so people can take action to minimise its negative impact. This will involve some people taking action on their own behalf and others doing so as part of agency responsibilities.

Flood watch: A written product that alerts when the combination of forecast rainfall and catchment conditions indicates the flooding is likely.

National Crisis Coordination Centre: The Australian Government Crisis Coordination Centre has been designed to connect relevant Australian Government, State and Territory agencies to centralise Australian Government actions during complex national crises, to develop a single, timely and consistent picture or understanding of a crisis, its implications and the national capacity to respond.

National Flood Warning Arrangements: The National Arrangements outline the general roles and responsibilities of each level of Government in providing and supporting an effective flood warning service and includes separate chapters describing the specific arrangements and agency roles that apply in each jurisdiction.

Protective behaviour: generating appropriate and timely actions and behaviours from the agencies involved and from the threatened community.

Severe Thunderstorm: A thunderstorm is characterised by sudden electrical discharges, each manifested by a flash of light (lightning) and a sharp rumbling sound. Thunderstorms are associated with convective clouds (cumulonimbus) and are usually accompanied by precipitation. Thunderstorms are often short-lived and impact on only a small area. Severe thunderstorms may last for an hour or more and can have a more widespread impact.

A severe thunderstorm will also have one or more of the following phenomena:

- Tornado
- Wind gust of 90 km/h (49 knots) or more
- Hailstones with diameter of 2 cm or larger
- Very heavy rain sufficient to cause flash flooding

Weather warnings: Weather warnings are messages sent out by the Bureau to warn the community of potentially hazardous or dangerous weather conditions. Such warnings include but are not limited to: road weather alerts, severe thunderstorm warnings, severe weather warnings for heavy rain, strong or gale force winds, marine wind warnings, warnings for sheep graziers and frost warnings. More information on weather terms is given in the [Bureau's glossary](#).

A.2 The components of the Total Flood Warning System

Based on the Manual 21 Australian Emergency Manual Series, Australian Government 2009 (see the Manual for more details).

Communication: disseminating warning information in a timely fashion to people and organisations likely to be affected by the flood (see Chapter 6).

Interpretation: identifying in advance the impacts of the predicted flood levels on communities at risk (see Chapter 4).

Message construction: devising the content of the message which will warn people of impending flooding (see Chapter 5).

Monitoring and prediction: detecting environmental conditions that lead to flooding, and predicting river levels during the flood (see Chapter 3),

Review: examining the various aspects of the system with a view to improving its performance (see Chapter 7).

A.3 Flood classifications

The classification of minor, moderate and major flood levels at key river height stations is based upon the effect of flooding for some distance upstream and downstream of that station. These levels are determined using the following descriptive categories of flooding, historical data or relevant local information.

The process for establishing flood class levels involves determining local flood effects, review and endorsement by relevant stakeholders and passing recommendations to the Bureau for inclusion in forecast and warning procedures. The process for establishment of flood class levels specific to each State and Territory is documented in the National Arrangements.

- Minor flooding - Causes inconvenience. Low-lying areas next to watercourses are inundated. Minor roads may be closed and low-level bridges submerged. In urban areas inundation may affect some backyards and buildings below the floor level as well as bicycle and pedestrian paths. In rural areas removal of stock and equipment may be required.
- Moderate flooding - In addition to the above, the area of inundation is more substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of flood affected areas may be required. In rural areas removal of stock is required.
- Major flooding – In addition to the above, extensive rural areas and/or urban areas are inundated. Many buildings may be affected above the floor level. Properties and towns are likely to be isolated and major rail and traffic routes closed. Evacuation of flood affected areas may be required. Utility services may be impacted.

Appendix B: References

1. Emergency Management Australia 2009, *Flood Warning Manual*, Series 21.
2. Bureau of Meteorology 2013, *National Flood Warning Arrangements*
3. Bureau of Meteorology 2013, *National Flood Directive* (unpublished - internal use)
4. Bureau of Meteorology 2013, *Catchment Flood Directives* (unpublished - internal use)
5. Data Sharing Agreements