



**Australian Government**  
**Bureau of Meteorology**

# Service Level Specification for Flood Forecasting and Warning Services for Western Australia – Version 2.0



## Service Level Specification for Flood Forecasting and Warning Services for Western Australia

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 Western Australia in consultation with the Western Australian Flood Warning Consultative Committee

Service Level Specification for Flood Forecasting and Warning Services for Western Australia

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Cover image: Flooding in Kununurra, Western Australia.  
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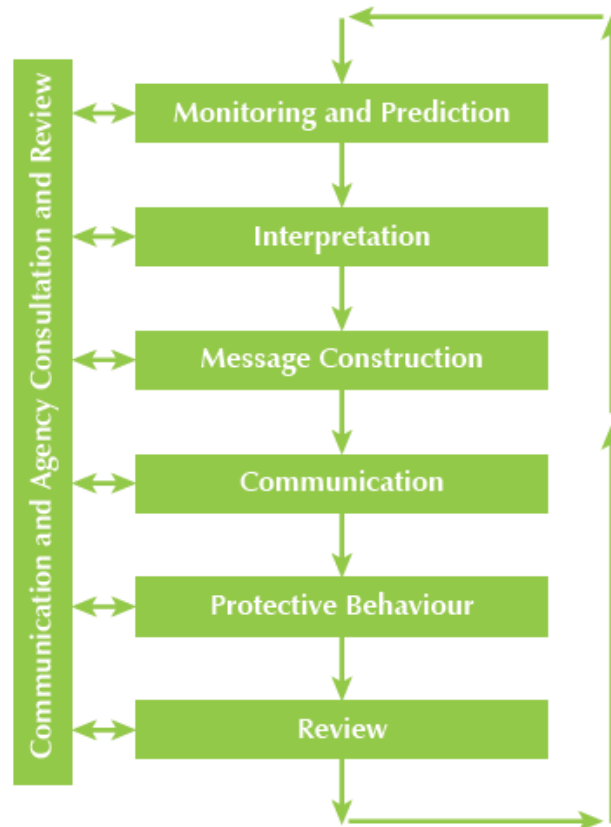
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## 1 Introduction

- 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 Western Australia.
- 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 Western Australia are described in the National Arrangements for Flood Forecasting and Warning (Bureau of Meteorology, 2015)<sup>1</sup> as well as Appendix D of the Government of Western Australia – State Emergency Management Plan for Flood (WESTPLAN- FLOOD).

- 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 Western Australia 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.

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<sup>1</sup> 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 Western Australian Flood Warning Consultative Committee provides the Bureau's key stakeholder's 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. The role of the committee is also covered in Section 1.6.1.1 of WESTPLAN-FLOOD.
- 2.2** The overall role of the Western Australian Flood Warning Consultative Committee is to coordinate the development and operation of flood forecasting and warning services in Western Australia, acting as an advisory body to the Bureau and participating State and local government agencies. Membership and terms of reference for this committee in Western Australia are detailed in Schedule 1.
- 2.3** The Bureau chairs and provides the secretariat support to the Western Australian 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**

<b>Priority Level</b>	<b>Impact on performance</b>	<b>Impact on service delivery</b>	<b>Description</b>
<b>High</b>	Very difficult to meet target	Direct and significant high level impact for the site and/or downstream locations	Degradation of service highly likely.
<b>Medium</b>	Difficult to meet target	Some impact for the site and/or downstream locations.	Possible degradation of service.
<b>Low</b>	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 higher impact levels 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 2.

**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 forecasting location is given in Schedule 2.

### 3.6 Automated information and alerting

**3.6.1** Automated information and alerting is not applicable in Western Australia.

### 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 2) 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 2);
  - 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 is listed in Schedule 10

- 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 2. 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 2. 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 2. 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 2. 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 the observed water level. Specific accuracy targets by location are defined in Schedule 2. 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 Western Australia, 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 2.

**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
<b>Quantitative</b>	Numerical prediction - Any Height - Peak Height Can refer to flood class	More specific, typically in blocks of 3 to 6 hours	The Gascoyne River at Nine Mile Bridge is likely to exceed 6.5 metres with moderate flooding by 3pm Saturday before peaking late Saturday night.  The Gascoyne River at Nine Mile Bridge is expected to peak near 7.7 metres (major flooding) about 6pm Sunday.
<b>Qualitative</b>	Refers to flood class (minor, moderate or major)	Range of times (6, 12 or 24 hour blocks)	Minor to moderate flooding is expected to continue in the Murray River at Pinjarra during Saturday afternoon and the river level is expected to peak early Sunday morning.
<b>Generalised</b>	No height prediction - forecast trend (rising or falling)	Range of times (24 hour blocks)	Widespread local flooding is expected to continue during Saturday in the Ludlow and Capel River catchments with further rises likely as the second peak moves through the area.

### 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. The list is maintained by the Bureau but is not detailed in this document. The direct dissemination methods supported include email, fax and 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 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 partners<sup>2</sup> 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

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<sup>2</sup> Emergency management partners include those organisations that have an emergency management responsibility for the wider community (e.g. State Emergency Services)

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** The flood forecasting and warning service for Western Australia 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).
- 3.10.5** 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.
- 3.10.6** 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.
- 3.10.7** 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.
- 3.10.8** Data transfer protocols and conditions regarding fitness for purpose as provided by each stakeholder will be adhered to as set out in the Data Service Agreements for data provision.
- 3.10.9** The sharing of data as set out in the Data Sharing Agreements can be amended by following the process described in the agreement.
- 3.10.10** 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.
- 3.10.11** 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 special purpose flood warning data network.
- 3.12.2** The river height and rainfall data received by the Bureau will be published as soon as practicable (the data are supplied at different frequencies and by various methods) upon receipt into Bureau operational systems. This data will be published in the form of data 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 terms<sup>3</sup>.
- 3.12.4** The Bureau will continue to collect and update the flood background information on floods contained on its website. These 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

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

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.



## **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 Western Australia 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 2.
- 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 Western Australia there is one key document that describes the State's arrangements for flood warning and flood risk management. This Service Level Specification does not replace or reduce the value of this document. The document is:

- (a) WESTPLAN Flood State Emergency Management Plan, September 2010 (Western Australia FESA)

## **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 Western Australia 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 Western Australia Flood Warning Consultative Committee.



3.3.16

Mike Bergin  
Chair of Western Australia Flood Warning Consultative Committee, and  
Regional Director – Western Australia  
Bureau of Meteorology

Date



04 March 2016

Dr Dasarath (Jaya) Jayasuriya  
Assistant Director  
Water Forecasting Services  
Bureau of Meteorology

Date

## Schedule 1: Flood Warning Consultative Committee

The Western Australia Flood Warning Consultative Committee was formed in 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 twice each year. The membership includes:

- Bureau of Meteorology (Chair/Secretariat)
- representative(s) of Department of Fire and Emergency Services (Hazard Management Agency for flood);
- representative(s) of Department of Water;
- representative(s) of Water Corporation;
- representative(s) of Main Roads Western Australia;
- representative(s) of Department of Agriculture and Food;
- representative(s) of Department of Housing – Planning and Programs Aboriginal Housing
- representative(s) of Landgate (Satellite Remote Sensing Service)
- representative(s) of Department of Planning
- representative(s) of Western Australian Local Government Association; and
- other agencies as seconded by the Chair

Representative(s) from other government agencies may include (e.g. Department of Planning and Infrastructure – Marine Information, Department of Environment and Conservation, etc.), academic institutions, industry or specific communities may be invited to work with the Committee to work on particular issues, problems and solutions.

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 2: 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 3.3.1)

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

Gauge type: Either manual (read by human) or automatic (ERTS, IP (Next G and satellite and dial-up telemetry))

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)

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 site will have on service delivery and in meeting performance targets (refer 3.3.2)

Bureau number	Forecast location	Station owner	Gauge type	Flood classification (m)			Prediction type	Target warning lead time		70% of peak forecasts within	Priority
				Minor	Moderate	Major		Time (hours)	Trigger height (m)		
<b>802 – Fitzroy River (WA)</b>											
503014	Fitzroy Crossing	Department of Water	Automatic	9.5	11.0	12.5	Quantitative	15	Minor	n/a	High
503007	Noonkanbah	Department of Water	Automatic	9.5	12.0	13.0	Quantitative	15	Minor	n/a	High
503013	Willare Crossing	Department of Water	Automatic	8.0	8.8	9.2	Quantitative	48	Minor	n/a	High
<b>710 – De Grey River</b>											
504000	Coolenar Pool (Great Northern Highway)	Department of Water	Automatic	5.5	6.0	8.0	Qualitative	48	Minor	n/a	High
<b>706 – Ashburton River</b>											
505000	Nanutarra	Department of Water	Automatic	6.0	7.5	8.0	Qualitative	24	Minor	n/a	High

## Service Level Specification for Flood Forecasting and Warning Services for Western Australia

Bureau number	Forecast location	Station owner	Gauge type	Flood classification (m)			Prediction type	Target warning lead time		70% of peak forecasts within	Priority
				Minor	Moderate	Major		Time (hours)	Trigger height (m)		
<b>704 – Gascoyne River</b>											
506012	Jimba	Department of Water	Automatic	4.0	7.0	8.0	Qualitative	12	Minor	n/a	High
506011	Fishy Pool	Department of Water	Automatic	4.5	9.0	11.0	Quantitative	12	Minor	n/a	High
506000	Nine Mile Bridge	Department of Water	Automatic	5.5	6.5	7.6	Quantitative	24	Minor	n/a	High
<b>701 – Greenough River</b>											
508036	Eradu	Department of Water	Automatic	3.5	4.2	5.0	Qualitative	24	Minor	n/a	High
508020	Karlanew	Department of Water	Automatic	2.5	3.5	4.5	Qualitative	24	Minor	n/a	High
508042	Dongara	Department of Water	Automatic	5.0	7.0	8.0	Qualitative	12	Minor	n/a	High
<b>616 – Swan Coast</b>											
509438	Walyunga	Department of Water	Automatic	3.5	7.0	7.5	Qualitative	24	Minor	n/a	High
509440	Barrack Street Jetty	Department of Transport	Automatic	1.6	2.0	2.5	Qualitative	24	Minor	n/a	High
<b>615 – Avon River</b>											
510507	Beverley	Department of Water	Automatic	1.5	2.0	2.5	Qualitative	12	Minor	n/a	High
510059	York	Department of Water	Automatic	2.5	3.0	4.0	Qualitative	12	Minor	n/a	High
510061	Northam	Department of Water	Automatic	1.5	1.8	2.0	Qualitative	12	Minor	n/a	High
510060	Toodyay	Department of Water	Automatic	2.5	3.5	4.0	Qualitative	12	Minor	n/a	High
<b>714 – Murray River</b>											
509542	Pinjarra	Department of Water	Automatic	6.5	7.0	8.0	Qualitative	12	Minor	n/a	High
509543	Ravenswood	Department of Water	Automatic	2.0	2.5	3.0	Qualitative	18	Minor	n/a	High
<b>611 – Preston River</b>											
509525	Donnybrook	Department of Water	Automatic	3.5	4.5	5.0	Qualitative	6	Minor	n/a	High
509524	Boyanup Bridge	Department of Water	Automatic	3.0	3.5	4.0	Qualitative	12	Minor	n/a	High
<b>609 – Blackwood River</b>											
509517	Bridgetown	Department of Water	Automatic	3.5	4.2	6.0	Qualitative	12	Minor	n/a	High
509518	Nannup	Department of Water	Automatic	5.5	7.0	8.0	Qualitative	12	Minor	n/a	High

**Notes:**

- All levels are in metres to local gauge datums unless indicated otherwise.
- AHD - Australian Height Datum. See [Geoscience Australia](#) for further information.
- Certainty – Low (+/- 1 - 2 metres); Moderate (+/- 1.0 metres); High (+/- 0.5 metres)



**Schedule 3: Information locations with flood class levels defined**

Bureau number	Station name	Station owner	Gauge type	Flood classification (m)			Priority
				Minor	Moderate	Major	
<b>809 – Ord River</b>							
502015	Ord River at Bedford Downs	Department of Water	Automatic	6.5	7.5	8.0	Medium
502014	Fletcher Ck Trib at Frog Hollow	Department of Water	Automatic	2.0	2.8	3.5	Medium
502028	Ord River at Old Ord Homestead	Department of Water	Automatic	6.5	10.0	15.0	Medium
514825	Negri River at Mistake Ck Homestead	Department of Water	Automatic	6.8	10.0	15.0	Medium
502010	Wilson River at Odonnell Range	Department of Water	Automatic	5.0	6.5	8.2	Medium
502031	Dunham River at Dunham Gorge	Department of Water	Automatic	8.0	10.0	12.0	Medium
502029	Dunham River at Flying Fox Hole	Department of Water	Automatic	6.5	10.0	12.0	Medium
502000	Ord River at Tarrara Bar	Department of Water	Automatic	6.0	10.0	12.0	Medium
501000	King River at Cockburn North	Department of Water	Automatic	2.0	2.5	3.0	Medium
501029	Moochalabra Ck at Moochalabra Dam	Department of Water	Automatic	2.0	2.5	3.0	Medium
<b>802 – Fitzroy River</b>							
502024	Hann River at Phillips Range	Department of Water	Automatic	6.5	9.0	12.0	Medium
502027	Fitzroy River at Dimond Gorge	Department of Water	Automatic	6.5	9.0	12.0	High
502006	Margaret River at Me No Savvy	Department of Water	Automatic	7.0	9.0	12.0	Medium
502059	Margaret River at Margaret Gorge	Department of Water	Automatic	6.5	8.0	9.5	Medium
502001	Leopold River at Mount Winifred	Department of Water	Automatic	7.5	9.0	10.0	Medium
502005	Margaret River at Mount Krauss	Department of Water	Automatic	6.5	8.0	11.0	High
503000	Christmas Creek at Homestead	Department of Water	Automatic	4.0	6.0	7.5	Medium
503017	Fitzroy River at Fitzroy Barrage	Department of Water	Automatic	7.0	9.0	10.0	Medium
503012	Fitzroy River at Looma	Department of Water	Automatic	7.5	9.0	10.0	Medium
<b>710 – De Grey River</b>							
504039	Oakover River at Ripon Hills Rd	Department of Water	Automatic	1.5	5.0	8.0	Medium
504016	Nullagine River at Nullagine	Department of Water	Automatic	0.8	3.0	4.0	Medium
504036	Nullagine River at Tumbinna Pool	Department of Water	Automatic	1.5	3.5	4.0	Medium
504037	Coongan River at Marble Bar	Department of Water	Automatic	0.8	2.5	3.5	Medium
504041	Coongan River at Marble Bar Rd	Department of Water	Automatic	1.8	2.8	3.8	Medium
504035	Shaw River at North Pole Mine	Department of Water	Automatic	1.0	3.0	5.0	Medium
504040	Shaw River at Marble Bar Rd	Department of Water	Automatic	0.5	2.0	3.0	Medium
<b>709 – Port Hedland Coast</b>							
504017	Yule River at Jelliabidina	Department of Water	Automatic	1.5	5.0	6.0	Medium
504044	Sherlock River at Sherlock Rd Br	Department of Water	Automatic	4.0	5.0	7.0	Medium
505042	Maitland River at Miaree Pool	Department of Water	Automatic	2.0	5.0	7.0	Low

## Service Level Specification for Flood Forecasting and Warning Services for Western Australia

Bureau number	Station name	Station owner	Gauge type	Flood classification (m)			Priority
				Minor	Moderate	Major	
<b>708 – Fortescue River</b>							
507011	Fortescue River at Newman	Department of Water	Automatic	4.0	6.0	7.5	Medium
505010	Fortescue River at Gregory Gorge	Department of Water	Automatic	4.5	6.0	7.0	Medium
505039	Fortescue River at Bilanoo	Department of Water	Automatic	4.0	7.0	8.0	Medium
<b>707 – Onslow Coast</b>							
505055	Cane River at Toolungu	Department of Water	Automatic	3.0	5.0	6.0	Medium
<b>706 – Ashburton River</b>							
507002	Ashburton River at Capricorn Range	Department of Water	Automatic	4.5	8.0	10.0	High
<b>705 – Lyndon-Minilya River</b>							
506004	Minilya River at Minilya Bridge	Department of Water	Automatic	3.0	4.0	4.5	Medium
<b>704 – Gascoyne River</b>							
507000	Gascoyne River at Yinnetharra Xing	Department of Water	Automatic	3.0	4.5	5.5	Medium
506016	Gascoyne River at Pells Island	Department of Water	Automatic	2.5	3.8	4.5	Medium
506013	Lyons River at Lyons River Xing	Department of Water	Automatic	1.5	5.0	6.0	High
<b>702 – Murchison River</b>							
508021	Murchison River at Emu Springs	Department of Water	Automatic	5.0	6.0	7.0	Medium
<b>701 – Greenough River</b>							
508017	Greenough River at Pindarring Rocks	Department of Water	Automatic	2.0	2.5	3.0	Medium
508037	Greenough River at Mitthutharra	Department of Water	Automatic	2.5	6.5	7.5	High
508038	Irwin River at Yatharagga	Department of Water	Automatic	4.0	6.0	7.0	Medium
508039	Lockier River at Mingenew	Department of Water	Automatic	2.5	4.0	4.5	Medium
508303	Irwin River at Strawberry Bridge	Department of Water	Automatic	4.0	6.0	7.0	High
508032	Irwin River at Mountain Bridge	Department of Water	Automatic	4.5	6.5	7.0	High
<b>617 – Moore-Hill River</b>							
509168	Hill River at Hill River Springs	Department of Water	Automatic	1.5	2.0	2.5	Medium
509418	Hill River at Ardross	Department of Water	Automatic	2.5	2.8	3.5	Medium
508035	Moore River Nth at Nardy Road	Department of Water	Automatic	1.0	1.2	1.6	Medium
508031	Dungaroo Ck at Round Hill Br	Department of Water	Automatic	0.8	1.2	2.2	Medium
508030	Moore River Nth at Long Pool Br	Department of Water	Automatic	1.2	2.0	3.0	Medium
508000	Moore River Nth at Moora Caravan Park	Department of Water	Automatic	3.0	3.5	4.0	High
509381	Moore River at Quinns Ford	Department of Water	Automatic	3.5	4.5	5.0	Medium
509421	Moore River at Waterville Road	Department of Water	Automatic	2.0	2.7	3.0	Medium
509427	Gingin Brook at Gingin	Department of Water	Automatic	1.0	1.5	2.0	Medium
509419	Gingin Brook at Bookine Bookine	Department of Water	Automatic	1.4	1.8	2.0	Medium
<b>615 – Avon River</b>							
510514	Avon River at Boyagarra Rd	Department of Water	Automatic	2.2	2.5	3.0	Medium

## Service Level Specification for Flood Forecasting and Warning Services for Western Australia

Bureau number	Station name	Station owner	Gauge type	Flood classification (m)			Priority
				Minor	Moderate	Major	
<b>615 – Avon River (continued)</b>							
510058	Salt River at Qualandary Crossing	Department of Water	Automatic	2.2	2.5	3.0	High
510512	Avon River at Yenyening Confluence	Department of Water	Automatic	1.5	2.5	3.0	Medium
510524	Avon River at Bells Farm	Department of Water	Automatic	1.5	2.5	3.0	Medium
510508	Dale River at Waterhatch Br	Department of Water	Automatic	2.0	2.5	3.0	High
510000	Mortlock River North at Frenches	Department of Water	Automatic	1.9	2.2	2.5	High
510035	Mortlock River at ODriscolls Farm	Department of Water	Automatic	1.8	2.2	2.5	High
<b>616 – Swan Coast</b>							
509376	Wooroloo Brook at Karls Ranch	Department of Water	Automatic	2.2	2.6	3.2	High
509447	Brockman River at Tanamerah	Department of Water	Automatic	2.5	3.5	4.5	Medium
510523	Brockman River at Yalliwirra	Department of Water	Automatic	3.5	7.0	7.5	High
509457	Ellen Brook at Railway Parade	Department of Water	Automatic	1.8	2.0	2.5	Medium
509380	Swan River at Great Northern Hwy	Department of Water	Automatic	5.5	8.0	8.5	Medium
510017	Helena River at Ngangaguringuring	Department of Water	Automatic	2.0	2.5	3.0	Medium
509458	Helena River at Poison Lease	Department of Water	Automatic	2.0	2.5	3.0	Medium
509459	Helena Brook at Trew Road	Department of Water	Automatic	1.0	1.2	1.4	Medium
509456	Jane Brook at National Park	Department of Water	Automatic	1.0	1.5	2.0	Medium
509471	Darkin River at Pine Plantation	Department of Water	Automatic	1.0	1.5	2.0	Medium
509378	Swan River at Meadow Street Br	Department of Water	Automatic	2.0	3.5	4.0	High
509379	Canning River at Seaforth	Department of Water	Automatic	3.0	4.0	5.0	High
509063	Southern River at Anaconda Drive	Department of Water	Automatic	3.0	3.5	4.0	Medium
<b>614 – Murray River</b>							
509295	Serpentine Drain at Dog Hill	Department of Water	Automatic	2.0	2.5	3.0	Medium
509428	Peel Main Drain at Karnup Road	Department of Water	Automatic	1.4	1.8	2.2	Medium
510506	Hotham River at Pumphreys Br	Department of Water	Automatic	2.5	3.0	3.5	Medium
510521	Crossman River at Rivendale	Department of Water	Automatic	2.0	3.0	4.0	Medium
510522	14 Mile Brook at Congelin	Department of Water	Automatic	1.5	2.5	3.5	Medium
509545	Hotham River at Marradong Road Br	Department of Water	Automatic	3.5	4.5	5.0	High
509544	Williams River at Saddleback Rd Br	Department of Water	Automatic	3.0	5.5	6.5	High
509541	Murray River at Baden Powell Spout	Department of Water	Automatic	4.5	6.0	7.0	High
509129	Marrinup Brook at Brookdale Siding	Department of Water	Automatic	1.6	1.8	2.2	Medium
<b>613 – Harvey River</b>							
509119	Harvey River at Dingo Road	Department of Water	Automatic	3.0	3.6	4.0	Medium
<b>612 – Collie River</b>							
509539	Collie River East at James Crossing	Department of Water	Automatic	2.0	2.5	3.0	Medium
509534	Collie River at Buckingham Mill	Department of Water	Automatic	3.5	4.0	4.5	Medium
509529	Collie River East at Coolangatta	Department of Water	Automatic	3.5	5.0	6.0	Medium

Service Level Specification for Flood Forecasting and Warning Services for Western Australia

Bureau number	Station name	Station owner	Gauge type	Flood classification (m)			Priority
				Minor	Moderate	Major	
<b>612 – Collie River (continued)</b>							
509533	Collie River at Collie	Department of Water	Automatic	3.5	4.0	4.8	Medium
509532	Collie River South at Collie	Department of Water	Automatic	1.8	2.2	2.4	Medium
509530	Collie River at Mungalup Tower	Department of Water	Automatic	2.8	4.5	5.5	Medium
509536	Collie River at Rose Road	Department of Water	Automatic	3.0	4.5	5.0	Medium
<b>611 – Preston River</b>							
509528	Thomson River at Woodperry	Department of Water	Automatic	1.5	2.0	3.0	High
509526	Preston River at Lowden Road Br	Department of Water	Automatic	3.8	4.5	5.0	High
509565	Preston River at Moonlight Bridge	Department of Water	Automatic	2.0	2.6	3.5	Medium
509551	Ferguson River at South Western Hwy	Department of Water	Automatic	2.3	3.2	4.0	Medium
<b>610 – Busselton Coast</b>							
109509	Walsall Bk at Chapman Hill Rd CB2	Department of Water	Automatic	3.0	3.6	3.7	High
109508	Vasse River at Doyle Rd CB1	Bureau	Automatic	2.8	3.3	3.6	High
009984	Sabina Main Drain at Vasse Hwy CB3	Bureau	Automatic	2.8	3.3	3.6	High
509523	Vasse Diversion at Wonnerup East Rd	Department of Water	Automatic	1.5	1.8	2.4	Medium
509521	Vasse Diversion at D/S Hill Rd	Department of Water	Automatic	2.5	3.5	4.2	High
<b>609 – Blackwood River</b>							
510503	Cobline River at Bibikin Road Br	Department of Water	Automatic	1.5	2.5	3.0	Medium
510500	North Arthur River at Lake Toolibin	Department of Water	Automatic	1.0	1.4	2.0	Medium
510502	Beaufort River at Manywaters	Department of Water	Automatic	2.0	2.5	2.8	Medium
509461	Blackwood River at Winnejup	Department of Water	Automatic	3.5	4.2	6.0	High
509519	Blackwood River at Boyup Flax Mill	Department of Water	Automatic	3.2	5.0	6.5	High

**Notes:**

- All levels are in metres.
- All flow rates in cumecs (m<sup>3</sup>/sec) unless indicated otherwise
- n/a indicates flood class levels are not yet determined
- All levels indicate flooding in the local reaches of the stream
- AHD – Australian Height Datum. [Geoscience Australia](#) for further information.

**Schedule 4: River data locations**

Bureau number	Station name	Owner	Gauge type	Priority
<b>802 – Fitzroy River</b>				
503011	ELLEDALE	Department of Water	Automatic	Medium
<b>803 – Lennard River</b>				
503008	MOUNT JOSEPH	Department of Water	Automatic	Medium
<b>804 – Isdell River</b>				
503009	DALES YARD	Department of Water	Automatic	Medium
<b>709 – Port Hedland Coast</b>				
504032	PINCUNAH	Department of Water	Automatic	Medium
<b>708 – Fortescue River</b>				
505040	TARINA	Department of Water	Automatic	Medium
<b>701 – Greenough River</b>				
508040	YERINA	Department of Water	Automatic	Medium
508026	UTAKARRA	Department of Water	Automatic	Medium
508017	PINDARRING ROCKS	Department of Water	Automatic	Medium
508037	MITTHUTHARRA	Department of Water	Automatic	Medium
508038	YATHARAGGA	Department of Water	Automatic	Medium
508039	MINGENEW	Department of Water	Automatic	Medium
508303	STRAWBERRY BRIDGE	Department of Water	Automatic	Medium
508032	MOUNTAIN BRIDGE	Department of Water	Automatic	Medium
<b>617 – Moore-Hill River</b>				
509168	HILL RIVER SPRINGS	Department of Water	Automatic	Medium
508418	ARDROSS	Department of Water	Automatic	Medium
508035	NARDY ROAD	Department of Water	Automatic	Medium
508031	ROUND HILL BRIDGE	Department of Water	Automatic	Medium
508030	LONG POOL BRIDGE	Department of Water	Automatic	Medium
509381	QUINNS FORD	Department of Water	Automatic	Medium
509421	WATERVILLE ROAD	Department of Water	Automatic	Medium
509427	GINGIN	Department of Water	Automatic	Medium
509419	BOOKINE BOOKINE	Department of Water	Automatic	Medium
<b>615 – Avon River</b>				
510031	MOORANOPPIN ROCK	Department of Water	Automatic	Medium
510030	GAIRDNERS CROSSING	Department of Water	Automatic	Medium
510252	KWOLYN HILL	Department of Water	Automatic	Medium
<b>616 – Swan Coast</b>				
509457	RAILWAY PARADE	Department of Water	Automatic	Medium
509476	SLADE STREET	Department of Water	Automatic	Medium
509477	LIEGE STREET OUTFLOW	Department of Water	Automatic	Medium
509484	KENT STREET WEIR	Department of Water	Automatic	Medium
<b>614 – Murray River</b>				
509221	ONEIL ROAD	Department of Water	Automatic	Medium
509586	KIELMAN	Department of Water	Automatic	Medium
509442	LOWLANDS	Department of Water	Automatic	Medium
<b>613 – Harvey River</b>				
509368	URQUAHARTS	Department of Water	Automatic	Medium
509540	CLIFTON PARK	Department of Water	Automatic	Medium
509589	OLD BUNBURY ROAD	Department of Water	Automatic	Medium
<b>614 – Collie River</b>				
509309	PALMER	Department of Water	Automatic	Medium
509594	WORSLEY	Department of Water	Automatic	Medium
509370	SANDLEWOOD	Department of Water	Automatic	Medium
509535	JUEGENUP	Department of Water	Automatic	Medium
509531	CROSS FARM	Department of Water	Automatic	Medium

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Bureau number	Station name	Owner	Gauge type	Priority
<b>611 – Preston River</b>				
509450	DOWDELLS ROAD BRIDGE	Department of Water	Automatic	Medium
<b>610 – Busselton Coast</b>				
509462	YATES BRIDGE	Department of Water	Automatic	Medium
509591	CAPEL RAILWAY BRIDGE	Department of Water	Automatic	Medium
509522	LENNOX VINEYARD	Department of Water	Automatic	Medium
509190	WOODLANDS	Department of Water	Automatic	Medium
509065	WILLMOTS FARM	Department of Water	Automatic	Medium
509355	WHICHER RANGE	Department of Water	Automatic	Medium
<b>609 – Blackwood River</b>				
510501	MOUNT BROWN	Department of Water	Automatic	Medium
509516	MOODIARUP	Department of Water	Automatic	Medium
509473	DARRAUP	Department of Water	Automatic	Medium
509468	GINGILUP	Department of Water	Automatic	Medium
509475	ROSA CAMPSITE	Department of Water	Automatic	Medium
509470	FOREST GROVE	Department of Water	Automatic	Medium
509549	HUT POOL	Department of Water	Automatic	Medium
509199	BRENNANS FORD	Department of Water	Automatic	Medium
<b>608 – Donnelly River</b>				
509467	STRICKLAND	Department of Water	Automatic	Medium
<b>607 – Warren River</b>				
509482	QUINTARRUP	Department of Water	Automatic	Medium
509465	WHEATLEY FARM	Department of Water	Automatic	Medium
509572	RAINBOW TRAIL	Department of Water	Automatic	Medium
509464	CASCADES	Department of Water	Automatic	Medium
509463	BARKER RD CROSSING	Department of Water	Automatic	Medium
509566	TONE RIVER AT BULLIUP	Department of Water	Automatic	Low
<b>606 – Shannon River</b>				
509196	BALDANIA CREEK CONFLUENCE	Department of Water	Automatic	Medium
509412	WATTLE BLOCK	Department of Water	Automatic	Medium
509266	ORDINANCE ROAD CROSSING	Department of Water	Automatic	Medium
509300	TEDS POOL	Department of Water	Automatic	Medium
509578	DOG POOL	Department of Water	Automatic	Medium
<b>605 – Frankland River</b>				
509548	MOUNT FRANKLAND	Department of Water	Automatic	Medium
<b>604 – Kent River</b>				
509278	STYX JUNCTION	Department of Water	Automatic	Medium
509385	ROCK GLEN	Department of Water	Automatic	Medium
<b>603 – Denmark River</b>				
509022	WOONANUP	Department of Water	Automatic	Medium
509466	KOMPUP	Department of Water	Automatic	Medium
509017	MOUNT LINDESAY	Department of Water	Automatic	Medium
509587	OCEAN BEACH ROAD	Department of Water	Automatic	Medium
509514	DENMARK COLLEGE	Department of Water	Automatic	Medium
509451	TORBAY TOWNSHIP	Department of Water	Automatic	Medium
509590	EDEN ROAD	Department of Water	Automatic	Medium
509439	SLEEMAN ROAD BRIDGE	Department of Water	Automatic	Medium
509559	WILSON INLET AT OLD RAINLWAY BRIDGE	Department of Water	Automatic	Medium
<b>602 – Albany Coast</b>				
509011	BLACK CAT FLATS	Department of Water	Automatic	Medium
509320	STEVENS FARM	Department of Water	Automatic	Medium
509585	BILLA BOYA RESERVE	Department of Water	Automatic	Medium

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Bureau number	Station name	Owner	Gauge type	Priority
<b>602 – Albany Coast (continued)</b>				
509448	LOWER KING ROAD	Department of Water	Automatic	Medium
510026	BULL CROSSING	Department of Water	Automatic	Medium
<b>601 – Esperance Coast</b>				
509561	PITCHIE RITCHIE	Department of Water	Automatic	Medium
512018	CASCADES	Department of Water	Automatic	Medium
509004	NEDS CORNER	Department of Water	Automatic	Medium
509195	FAIRFIELD	Department of Water	Automatic	Medium
509546	MYRUP ROAD	Department of Water	Automatic	Medium
509513	FISHERIES ROAD	Department of Water	Automatic	Medium

**Notes:**

- Data from manual stations are not available in (near) real time.



**Schedule 5: Enviromon base stations installed in Western Australia**

<b>Owner</b>	<b>City/town</b>	<b>License number</b>	<b>Number of users</b>	<b>Date of registration</b>	<b>License version</b>
Bureau	Perth	61090005	10	8/05/2007	3

## 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
Department of Water	In progress	TBA	189
Department of Agriculture and Food	In Progress	TBA	99
Department of Conservation and Environment	In progress	TBA	13
BHP-Billion	In progress	TBA	6
Rio Tinto	In progress	TBA	4

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

Bureau number	Station name	Gauge type	Data type	Priority
<b>809 – Ord River</b>				
1006	WYNDHAM AERO *	Automatic	Rainfall	Medium
2012	HALLS CREEK AIRPORT *	Automatic	Rainfall	Medium
2056	KUNUNURRA AERO *	Automatic	Rainfall	Medium
2064	ARGYLE AERODROME *	Automatic	Rainfall	Medium
2072	BEDFORD DOWNS AIRSTRIP *	Automatic	Rainfall	Medium
<b>806 – King Edward River</b>				
1019	KALUMBURU	Automatic	Rainfall	Medium
<b>802 – Fitzroy River</b>				
2009	GIBB RIVER	Automatic	Rainfall	Medium
2019	MARGARET RIVER AIRFIELD *	Automatic	Rainfall	Medium
2020	MOOLA BULLA	Automatic	Rainfall	Medium
2021	MOUNT AMHURST	Automatic	Rainfall	Medium
2022	MOUNT WINIFRED	Automatic	Rainfall	Medium
2030	YULMBU	Automatic	Rainfall	Medium
2036	OLD MORNINGTON HOMESTEAD	Automatic	Rainfall	Medium
2043	MOUNT KRAUSS	Automatic	Rainfall	Medium
2053	LANSDOWNE	Automatic	Rainfall	Medium
2077	SIDDINS CREEK	Automatic	Rainfall	Medium
3011	LEOPOLD DOWNS	Automatic	Rainfall	High
3032	DERBY AERO *	Automatic	Rainfall	Low
3043	CHRISTMAS CREEK	Automatic	Rainfall	Medium
3051	MOUNT BARNETT	Automatic	Rainfall	Medium
3068	DAMPIER DOWNS AIRFIELD *	Automatic	Rainfall	High
3080	CURTIN AERO *	Automatic	Rainfall	Low
3088	LARRAWA AIRFIELD *	Automatic	Rainfall	Medium
3093	FITZROY CROSSING AERO *	Automatic	Rainfall	Medium
3098	MOUNT HOUSE AIRSTRIP *	Automatic	Rainfall	Medium
<b>808 – Pentecost River</b>				
2068	MARION DOWNS	Automatic	Rainfall	Medium
<b>801 – Cape Leveque Coast</b>				
3003	BROOME AIRPORT *	Automatic	Rainfall	Medium
3096	WEST ROEBUCK	Automatic	Rainfall	Medium
<b>803 – Lennard River</b>				
3094	WINDJANA GORGE	Automatic	Rainfall	Medium
<b>125 – Sandy Desert</b>				
4019	MANDORA	Automatic	Rainfall	Medium
13030	TELFER AERO *	Automatic	Rainfall	Medium
<b>709 – Port Hedland Coast</b>				
4032	PORT HEDLAND AIRPORT *	Automatic	Rainfall	Medium
4083	KARRATHA AERO *	Automatic	Rainfall	Medium
4090	ROEBOURNE AERO *	Automatic	Rainfall	Medium
<b>710 – De Grey River</b>				
4106	MARBLE BAR *	Automatic	Rainfall	Medium
<b>705 – Lyndon-Minilya Rivers</b>				
5007	LEARMONTH AIRPORT *	Automatic	Rainfall	Medium
6072	EMU CREEK STATION	Automatic	Rainfall	Medium
6108	CAPE CUVIER WHARF	Automatic	Rainfall	Medium
<b>707 – Onslow Coast</b>				
5008	MARDIE	Automatic	Rainfall	Medium
<b>706 – Ashburton River</b>				
5017	ONLOW AIRPORT *	Automatic	Rainfall	Medium
7185	PARABURDOO AERO *	Automatic	Rainfall	Medium
<b>704 – Gascoyne River</b>				
6011	CARNARVON AIRPORT *	Automatic	Rainfall	Medium
6104	MINNIE CREEK AIRSTRIP *	Automatic	Rainfall	Medium
6111	WINDERIE AIRSTRIP *	Automatic	Rainfall	Medium

## Service Level Specification for Flood Forecasting and Warning Services for Western Australia

Bureau number	Station name	Gauge type	Data type	Priority
<b>704 – Gascoyne River (continued)</b>				
6112	LYONS RIVER AIRSTRIP *	Automatic	Rainfall	Medium
7207	LANDOR AIRSTRIP *	Automatic	Rainfall	Medium
7208	MOUNT AUGUSTUS AIRSTRIP *	Automatic	Rainfall	Medium
7209	COBRA AIRSTRIP *	Automatic	Rainfall	Medium
7210	BURRINGURRAH AIRSTRIP *	Automatic	Rainfall	Medium
7211	DALGETY DOWNS AIRSTRIP *	Automatic	Rainfall	Medium
<b>703 – Wooramel River</b>				
6105	SHARK BAY AIRPORT *	Automatic	Rainfall	Low
<b>702 – Murchison River</b>				
7045	MEEKATHARRA AIRPORT *	Automatic	Rainfall	Medium
<b>708 – Fortescue River</b>				
7176	NEWMAN AERO *	Automatic	Rainfall	Medium
<b>618 – Yarra Yarra Lakes</b>				
7600	MOUNT MAGNET AERO *	Automatic	Rainfall	Medium
8296	MORAWA AIRPORT *	Automatic	Rainfall	Medium
<b>701 – Greenough River</b>				
8051	GERALDTON AIRPORT *	Automatic	Rainfall	High
8237	TENINDEWA	Automatic	Rainfall	High
8298	TIBRADDEN	Automatic	Rainfall	High
8299	ARRADALE	Automatic	Rainfall	High
8300	TABLETOP	Automatic	Rainfall	High
8304	MOASCAR	Automatic	Rainfall	High
8307	COOLANGATTA ALERT	Automatic	Rainfall	Medium
8308	TARDUN HILL	Automatic	Rainfall	Medium
8309	BELLENDINE	Automatic	Rainfall	Medium
8310	SOUTH HOLMWOOD	Automatic	Rainfall	High
<b>615 – Avon River</b>				
8297	DALWALLINU	Automatic	Rainfall	Medium
8302	WONGAN HILLS NORTH	Automatic	Rainfall	Medium
10000	AMERY ACRES	Automatic	Rainfall	Medium
10031	YORKRAKINE TM	Automatic	Rainfall	Medium
10064	BOLGART BIN	Automatic	Rainfall	Medium
10089	LONG FOREST	Automatic	Rainfall	High
10111	NORTHAM	Automatic	Rainfall	Medium
10129	MOUNT NODDY	Automatic	Rainfall	High
10132	MOUNT HARDEY	Automatic	Rainfall	High
10230	WAEEL	Automatic	Rainfall	Medium
10245	BERRING	Automatic	Rainfall	Medium
10286	CUNDERDIN AIRFIELD *	Automatic	Rainfall	Medium
10307	QUADNEY	Automatic	Rainfall	Medium
10308	TOODYAY EAST	Automatic	Rainfall	Medium
10311	YORK	Automatic	Rainfall	Medium
10511	WICKEPIN SOUTH	Automatic	Rainfall	Medium
10515	BEVERLEY	Automatic	Rainfall	Medium
10524	BROOKTON	Automatic	Rainfall	Medium
10527	BULYEE	Automatic	Rainfall	Medium
10536	CORRIGIN	Automatic	Rainfall	Medium
10556	COONDEE	Automatic	Rainfall	Medium
10614	NARROGIN	Automatic	Rainfall	Medium
10626	PINGELLY	Automatic	Rainfall	Medium
10628	QUAIRADING	Automatic	Rainfall	Medium
10908	YANGEDINE	Automatic	Rainfall	High
10692	NEWDEGATE RESEARCH STATION	Automatic	Rainfall	Medium
10911	LAKE GRACE	Automatic	Rainfall	Medium
10912	YEALERING EAST	Automatic	Rainfall	Medium
10920	MOUNT WESTDALE	Automatic	Rainfall	High
10923	WILLIAMS NORTH	Automatic	Rainfall	High
12320	SOUTHERN CROSS AIRFIELD *	Automatic	Rainfall	Medium

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Bureau number	Station name	Gauge type	Data type	Priority
<b>617 – Moore-Hill River</b>				
8301	BARBERTON EAST	Automatic	Rainfall	High
9037	BADGINGARRA RESEARCH STN	Automatic	Rainfall	Medium
9279	CANTERBURY	Automatic	Rainfall	High
9178	GINGIN AERO *	Automatic	Rainfall	Medium
<b>616 – Swan Coast</b>				
9021	PERTH AIRPORT *	Automatic	Rainfall	Medium
9053	PEARCE RAAF	Automatic	Rainfall	High
9066	GIDGEGANNUP	Automatic	Rainfall	Medium
9147	MOOLIABEENEE	Automatic	Rainfall	Medium
9172	JANDAKOT AERO	Automatic	Rainfall	Medium
9204	GOOSEBERRY HILL	Automatic	Rainfall	Medium
9214	OCEAN REEF	Automatic	Rainfall	Medium
9215	SWANBOURNE	Automatic	Rainfall	Medium
9224	FREMANTLE PORT	Automatic	Rainfall	Medium
9225	PERTH METRO	Automatic	Rainfall	Medium
9240	BICKLEY	Automatic	Rainfall	High
9263	WHITEMAN PARK	Automatic	Rainfall	Medium
9268	JULIMAR FOREST	Automatic	Rainfall	High
9271	BUNGENDORE	Automatic	Rainfall	Medium
9274	MINSTON PARK	Automatic	Rainfall	High
9275	MUCHEAU	Automatic	Rainfall	Medium
9277	LAKE CHITTERING	Automatic	Rainfall	Medium
10310	WERRIBEE	Automatic	Rainfall	Medium
<b>614 – Murray River (WA)</b>				
9023	JARRAHDAL	Automatic	Rainfall	Medium
9039	SERPENTINE	Automatic	Rainfall	Medium
9260	MOUNT SOLUS	Automatic	Rainfall	High
9538	DWELLINGUP	Automatic	Rainfall	Medium
9769	CULFORD	Automatic	Rainfall	Medium
9977	MANDURAH	Automatic	Rainfall	Medium
10917	WANDERING	Automatic	Rainfall	Medium
10919	WILGARRA	Automatic	Rainfall	High
109516	BODDINGTON NORTH	Automatic	Rainfall	Medium
<b>609 – Blackwood River</b>				
9518	CAPE LEEUWIN	Automatic	Rainfall	Medium
9617	BRIDGETOWN	Automatic	Rainfall	High
10916	KATANNING	Automatic	Rainfall	High
<b>610 – Busselton Coast</b>				
9519	CAPE NATURALISTE	Automatic	Rainfall	Medium
9569	BUSSELTON	Automatic	Rainfall	Medium
9746	WITCHCLIFFE	Automatic	Rainfall	Medium
9603	BUSSELTON AERO *	Automatic	Rainfall	Medium
9771	YOONGARILLUP	Automatic	Rainfall	Medium
9776	ASTON DOWNS	Automatic	Rainfall	Medium
9877	LUDLOW	Automatic	Rainfall	Medium
9971	ACTON PARK	Automatic	Rainfall	Medium
9978	JINDONG	Automatic	Rainfall	Medium
9987	PAYNEDEALE AL	Automatic	Rainfall	Medium
9988	HAPPY VALLEY	Automatic	Rainfall	Medium
9992	CAPEL NORTH	Automatic	Rainfall	Medium
9997	RAVENSCLIFFE AL	Automatic	Rainfall	Medium
109508	DOYLE ROAD CB1	Automatic	River	High
109509	CHAPMAN HILL ROAD CB2	Automatic	River	High
009984	VASSE HWY CB3	Automatic	River	High
<b>611 – Preston River</b>				
9527	DARDANUP EAST AL	Automatic	Rainfall	Medium
9965	BUNBURY	Automatic	Rainfall	Medium
9989	THOMSON BROOK	Automatic	Rainfall	Medium
9990	BOYANUP NORTH	Automatic	Rainfall	Medium

## Service Level Specification for Flood Forecasting and Warning Services for Western Australia

Bureau number	Station name	Gauge type	Data type	Priority
<b>611 – Preston River (continued)</b>				
9991	DONNYBROOK EAST	Automatic	Rainfall	Medium
109507	FERGUSON VALLEY AL	Automatic	Rainfall	Medium
<b>601 – Esperance Coast</b>				
9542	ESPERANCE AERO *	Automatic	Rainfall	Medium
9789	ESPERANCE	Automatic	Rainfall	Medium
9961	HOPETOUN NORTH	Automatic	Rainfall	Medium
12044	MUNGLINUP WEST	Automatic	Rainfall	Medium
<b>607 – Warren River</b>				
9573	MANJIMUP	Automatic	Rainfall	Medium
<b>602 – Albany Coast</b>				
9741	ALBANY AIRPORT *	Automatic	Rainfall	Medium
10905	JACUP	Automatic	Rainfall	Medium
<b>604 – Kent River</b>				
9964	ROCKY GULLY	Automatic	Rainfall	Medium
<b>606 – Shannon River</b>				
9968	SHANNON	Automatic	Rainfall	Medium
9998	NORTH WALPOLE	Automatic	Rainfall	Medium
<b>612 – Collie River</b>				
9982	HENTY BROOK	Automatic	Rainfall	High
9994	COLLIE EAST	Automatic	Rainfall	High
<b>122 – Nullarbor</b>				
11003	EUCLA	Automatic	Rainfall	Medium
11052	FORREST	Automatic	Rainfall	Medium
<b>124 – Salt Lake</b>				
12009	NORSEMAN AERO *	Automatic	Rainfall	Medium
12038	KALGOORLIE-BOULDER AIRPORT *	Automatic	Rainfall	Medium
12071	SALMON GUMS RES.STN.	Automatic	Rainfall	Medium
12241	LEONORA AERO *	Automatic	Rainfall	Medium
12305	LAVERTON AERO *	Automatic	Rainfall	Medium
12314	LEINSTER AERO *	Automatic	Rainfall	Medium
<b>123 – Warburton River</b>				
13011	WARBURTON AIRFIELD *	Automatic	Rainfall	Medium
<b>613 – Harvey River</b>				
109501	MOUNT WILLIAM	Automatic	Rainfall	High

**Notes:**

- Does not include daily rainfall and other Bureau synoptic stations.
- \* Refers to an Automatic Weather Station which is owned and operated by the Bureau of Meteorology but its primary purpose is not for flood warning.

**Schedule 7a: List of rainfall sites owned and maintained by external agencies**

Bureau number	Station name	Gauge type	Data type	Priority
<b>601 – Esperance Coast</b>				
509579	CONDINGUP WEST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509011	BLACK CAT FLAT	Automatic	Department of Water	Medium
510026	BULL CROSSING	Automatic	Department of Water	Medium
509574	COOMALBIDGUP (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509556	ESPERANCE (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
511002	MT BURAMINYA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
512016	MT HOWICK (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
512021	CASCADE (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510517	RAVENSTHORPE (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
512015	SALMON GUMS (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
512014	SCADDAN (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509004	NEDS CORNER	Automatic	Department of Water	Medium
509195	FAIRFIELD	Automatic	Department of Water	Medium
509560	RAISED BED	Automatic	Department of Water	Medium
512018	CASCADES	Automatic	Department of Water	Medium
512017	MT BURDETT (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>602 – Albany Coast</b>				
509571	MANY PEAKS (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509570	WELLSTEAD (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509581	GAIRDNER (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510511	JERRAMUNGUP (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509582	STIRLINGS SOUTH (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510532	MAGENTA DAM (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510540	STIRLINGS NORTH (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>603 – Denmark Coast</b>				
509022	WOONANUP	Automatic	Department of Water	Medium
509439	SLEEMAN ROAD BRIDGE	Automatic	Department of Water	Medium
509453	BEIGPIEGUP	Automatic	Department of Water	Medium
509466	KOMPUP	Automatic	Department of Water	Medium
509474	SUNNY GLEN	Automatic	Department of Water	Medium
509555	MOUNT BARKER (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>605 – Frankland River</b>				
510539	TUNNEY (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium

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Bureau number	Station name	Gauge type	Data type	Priority
<b>605 – Frankland River (continued)</b>				
509573	FRANKLAND (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>606 – Shannon River</b>				
509196	BALDANIA CK CONFLU	Automatic	Department of Water	Medium
509300	TEDS POOL	Automatic	Department of Water	Medium
509319	OSULLIVAN	Automatic	Department of Water	Medium
509394	LAKE MUIR	Automatic	Department of Water	Medium
509412	WATTLE BLOCK	Automatic	Department of Water	Medium
509413	MATTABAND	Automatic	Department of Water	Medium
509512	WALPOLE CALM	Automatic	Department of Parks and Wildlife	Medium
<b>607 – Warren River</b>				
509554	MANJIMUP (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509506	MANJIMUP CALM	Automatic	Department of Parks and Wildlife	Medium
509210	CORBALLUP ROAD	Automatic	Department of Water	Medium
509212	QUABICUP HILL	Automatic	Department of Water	Medium
509383	METTABINUP	Automatic	Department of Water	Medium
509566	BULLILUP	Automatic	Department of Water	Medium
509509	PEMBERTON CALM	Automatic	Department of Parks and Wildlife	Medium
<b>608 – Donnelly River</b>				
509564	PEMBERTON (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>609 – Blackwood River</b>				
509580	QUAELUP (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
510536	DARKAN (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
510535	DUMBLEYUNG AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510510	KATANNING (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
509583	SCOTT RIVER (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
509508	NANNUP CALM	Automatic	Department of Parks and Wildlife	High
509184	LAWSON ROAD	Automatic	Department of Water	Medium
509199	BRENNANS FORD	Automatic	Department of Water	Medium
509516	MOODIARUP TM	Automatic	Department of Water	Medium
510500	LAKE TOOLIBIN INFLOW	Automatic	Department of Water	Medium
510502	MANYWATERS	Automatic	Department of Water	Medium
510503	BIBIKIN ROAD BRIDGE	Automatic	Department of Water	Medium
510504	WISHBONE	Automatic	Department of Water	Medium
510505	COOKS FARM	Automatic	Department of Water	Medium
510534	WAGIN AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510516	WICKEPIN (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium



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Bureau number	Station name	Gauge type	Data type	Priority
<b>610 – Busselton Coast</b>				
509553	VASSE (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509505	KIRUP CALM	Automatic	Department of Parks and Wildlife	Medium
509062	GEORGE ROAD	Automatic	Department of Water	Medium
509584	WILYABRUP (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509065	WILLMOTS FARM	Automatic	Department of Water	Medium
509191	HARMAN SOUTH RD	Automatic	Department of Water	Medium
509355	WHICHER RANGE	Automatic	Department of Water	Medium
509520	CHAPMAN HILL TM	Automatic	Department of Water	Medium
509507	MARGARET RIVER CALM	Automatic	Department of Parks and Wildlife	Low
<b>611 – Preston River</b>				
509073	MANDALAY	Automatic	Department of Water	Medium
509310	HARRIS ROAD	Automatic	Department of Water	Medium
509528	WOODPERRY HOMESTEAD	Automatic	Department of Water	Medium
509563	DONNYBROOK (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>612 – Collie River</b>				
509503	COLLIE CALM	Automatic	Department of Parks and Wildlife	High
509082	SANDY ROAD	Automatic	Department of Water	Medium
509220	WIGHTS CATCH	Automatic	Department of Water	Medium
509321	MAXON FARM	Automatic	Department of Water	Medium
509370	SANDALWOOD	Automatic	Department of Water	Medium
509539	JAMES CROSSING	Automatic	Department of Water	Medium
509577	DARDANUP (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509594	WORSLEY	Automatic	Department of Water	Medium
<b>613 – Harvey River</b>				
509360	ORION	Automatic	Rio Tinto	Medium
509576	HARVEY (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
509562	MYALUP (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
509504	HARVEY CALM	Automatic	Department of Parks and Wildlife	High
509575	WAROONA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509119	DINGO ROAD	Automatic	Department of Water	Medium
509307	SAMSON BROOK DAM	Automatic	Department of Water	Medium
509366	BRISTOL ROAD	Automatic	Department of Water	Medium
509368	URQUHARTS	Automatic	Department of Water	Medium
<b>614 – Murray River</b>				
509510	SADDLEBACK CALM	Automatic	Department of Parks and Wildlife	Medium
509500	BODDINGTON CALM	Automatic	Department of Parks and Wildlife	Medium
510530	POPANYINNING (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium

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Bureau number	Station name	Gauge type	Data type	Priority
<b>614 – Murray River (continued)</b>				
509396	MEDINA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509129	BROOKDALE SIDING	Automatic	Department of Water	Medium
509221	O'NEIL ROAD	Automatic	Department of Water	Medium
509295	DOG HILL	Automatic	Department of Water	Medium
509329	YARRAGIL FORMATION	Automatic	Department of Water	Medium
509460	BOURNBROOK AVENUE	Automatic	Department of Water	Medium
509472	OLD MANDURAH ROAD	Automatic	Department of Water	Medium
509544	SADDLEBACK ROAD BRIDGE	Automatic	Department of Water	Medium
509545	MARRADONG ROAD BRIDGE	Automatic	Department of Water	Medium
510506	PUMPHREYS BRIDGE TM	Automatic	Department of Water	Medium
510531	NARROGIN AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>615 – Avon River</b>				
510067	BEACON AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510520	EAST BEVERLEY (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510526	BROOKTON (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510527	CORRIGIN AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510074	EJANDING (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
510528	HYDEN (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510070	KELLERBERRIN AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
510533	KONDININ AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510073	KOORDA AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510519	HOLT ROCK (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510518	LAKE KING (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510064	MECKERING NORTH (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
512022	BURRACOPPIN SOUTH (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510062	MERREDIN (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
512010	BONNIE ROCK (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510068	MUKINBUDIN AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510525	NAREMBEEN AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510529	DRAGON ROCKS (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510509	NEWDEGATE (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510065	MURESK (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510063	NORTHAM (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510537	NYABING EAST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510538	ONGERUP NORTH (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510072	SHACKLETON (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
512013	YILGARN SOUTH (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium

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Bureau number	Station name	Gauge type	Data type	Priority
<b>615 – Avon River (continued)</b>				
510069	TRAYNING WEST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
512020	WESTONIA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510515	WICKEPIN EAST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508041	WONGAN HILLS (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
510000	FRENCHES	Automatic	Department of Water	Medium
510018	JELCOBINE	Automatic	Department of Water	Medium
510031	MOORANOPPIN ROCK	Automatic	Department of Water	Medium
510035	ODRISCOLLS FARM	Automatic	Department of Water	Medium
510046	OTOOLE	Automatic	Department of Water	Medium
510252	KWOLYN HILL	Automatic	Department of Water	Medium
510508	WATERHATCH BRIDGE	Automatic	Department of Water	Medium
<b>616 – Swan Coastal</b>				
509446	FLOREAT PARK (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509391	SOUTH PERTH (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509281	WANNEROO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509141	CHITTERING ROAD	Automatic	Department of Water	Medium
509269	SELDOM SEEN CREEK GARDENS	Automatic	Department of Water	Medium
509270	CERIANI FARM	Automatic	Department of Water	Medium
509271	MOUNT CURTIS	Automatic	Department of Water	Medium
509359	WELSHPOOL DEPOT	Automatic	Department of Water	Medium
509376	KARLS RANCH	Automatic	Department of Water	Medium
509388	YALLIAWIRRA NORTH	Automatic	Department of Water	Medium
509611	CARLOTTA FARM	Automatic	Department of Water	Medium
510017	NGANGAGURINGURING	Automatic	Department of Water	Medium
509288	WANNEROO CALM	Automatic	Department of Parks and Wildlife	Medium
<b>617 – Moore-Hill Rivers</b>				
509479	NEW NORCIA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508063	WARRADARGE EAST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509445	BADGINGARRA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
508055	ENEABBA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
509430	GIN GIN WEST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
509478	JURIEN BAY (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
509431	LANCELIN EAST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508057	BINDI BINDI (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508044	MOORA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
508062	COOROW WEST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508054	LATHAM (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium

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Bureau number	Station name	Gauge type	Data type	Priority
<b>617 – Moore-Hill Rivers (continued)</b>				
508035	NARDY ROAD	Automatic	Department of Water	High
508065	LONG POOL	Automatic	Department of Water	High
509168	HILL RIVER SPRINGS	Automatic	Department of Water	High
509381	QUINNS FORD	Automatic	Department of Water	High
509419	BOOKINE BOOKINE	Automatic	Department of Water	High
508056	WATHEROO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
<b>618 – Yarra Yarra</b>				
510066	KALANNIE (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508045	MORAWA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508060	CANNA EAST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
508053	PERENJORI AERO (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508058	THREE SPRINGS (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>701 – Greenough River</b>				
508061	ALLANOOKA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
508049	ERADU (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
508052	ERANGY SPRINGS (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
508059	GUTHA WEST (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
508048	MINGENEW (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
508046	MULLEWA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	High
508050	CHAPMAN VALLEY (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508051	YUNA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508011	WICKA	Automatic	Department of Water	High
508017	PINDARRING ROCKS	Automatic	Department of Water	High
508020	KARLANEW PEAK	Automatic	Department of Water	High
508032	MOUNTAIN BRIDGE	Automatic	Department of Water	High
508034	NOLBA	Automatic	Department of Water	High
508037	MITTHUTHARRA	Automatic	Department of Water	High
508040	YERINA	Automatic	Department of Water	High
508064	KAPARI	Automatic	Department of Water	High
508066	CASLEYS	Automatic	Department of Water	High
<b>702 – Murchison River</b>				
508047	BINNU (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
508021	EMU SPRINGS	Automatic	Department of Water	High
<b>704 – Gascoyne River</b>				
506011	FISHY POOL	Automatic	Department of Water	High
506012	JIMBA	Automatic	Department of Water	High
506013	LYONS RIVER CROSSING	Automatic	Department of Water	High

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Bureau number	Station name	Gauge type	Data type	Priority
<b>704 – Gascoyne River (continued)</b>				
506016	PELLS ISLAND	Automatic	Department of Water	High
507000	YINNETHARRA CROSSING	Automatic	Department of Water	High
506014	CARNARVON (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>706 – Ashburton River</b>				
505019	AREA C	Automatic	BHP Billiton Limited	Medium
507002	CAPRICORN RANGE	Automatic	Department of Water	High
507020	WEST ANGELAS	Automatic	Rio Tinto	Medium
507018	CHANNAR	Automatic	Rio Tinto	High
507019	PARABURDOO	Automatic	Rio Tinto	High
505043	BROCKMAN 2	Automatic	Rio Tinto	Medium
505044	BROCKMAN 4	Automatic	Rio Tinto	Medium
505046	MARANDOO	Automatic	Rio Tinto	Medium
505047	TOM PRICE	Automatic	Rio Tinto	Medium
<b>708 – Fortescue River</b>				
507015	OPHTHALMIA	Automatic	BHP Billiton Limited	Medium
507014	WHALEBACK	Automatic	BHP Billiton Limited	Medium
507013	WHEELARRA	Automatic	BHP Billiton Limited	Medium
504043	YANDI	Automatic	BHP Billiton Limited	Medium
505045	HOPE DOWNS 1	Automatic	Rio Tinto	Medium
505004	MUNJINA	Automatic	Department of Water	High
505009	UPPER PORTLAND	Automatic	Department of Water	High
505010	GREGORY GORGE	Automatic	Department of Water	High
505011	FLAT ROCKS	Automatic	Department of Water	High
505039	BILANOO POOL	Automatic	Department of Water	High
505040	TARINA	Automatic	Department of Water	High
505041	WATERLOO BORE	Automatic	Department of Water	High
507012	WONMUNNA	Automatic	Department of Water	High
505048	YANDICOOGINA	Automatic	Rio Tinto	Medium
<b>710 – De Grey River</b>				
504042	YARRIE	Automatic	BHP Billiton Limited	Medium
504009	UPPER NORTH POLE	Automatic	Department of Water	High
504016	NULLAGINE TM	Automatic	Department of Water	High
504035	NORTH POLE MINE	Automatic	Department of Water	High
504036	TUMBINNA POOL	Automatic	Department of Water	High
504037	MARBLE BAR	Automatic	Department of Water	High
504039	RIPON HILLS ROAD	Automatic	Department of Water	High
504040	MARBLE BAR RD CROSSING	Automatic	Department of Water	High

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Bureau number	Station name	Gauge type	Data type	Priority
<b>809 – Ord River</b>				
501008	MOOCHALABRA NO 1	Automatic	Department of Water	High
501029	MOOCHALABRA DAM	Automatic	Department of Water	High
502014	FROG HOLLOW	Automatic	Department of Water	High
502015	BEDFORD DOWNS TM	Automatic	Department of Water	High
502019	LIAMMA BORE	Automatic	Department of Water	High
502020	ELGEE CLIFFS	Automatic	Department of Water	High
502028	ORD RIVER HOMESTEAD	Automatic	Department of Water	High
502030	DURACK RANGE	Automatic	Department of Water	High
502031	DUNHAM GORGE	Automatic	Department of Water	High
502039	LAKE KUNUNURRA	Automatic	Department of Water	High
502046	MOUNT ROB	Automatic	Department of Water	High
502062	ABNEY HILL	Automatic	Department of Water	High
514825	MISTAKE CREEK HOMESTEAD	Automatic	Department of Water	High
502007	KUNUNURRA (DAFWA)	Automatic	Department of Agriculture and Food Western Australia	Medium
<b>802 – Fitzroy River</b>				
502001	MT WINIFRED	Automatic	Department of Water	High
502002	MUD SPRINGS	Automatic	Department of Water	High
502005	MOUNT KRAUSS	Automatic	Department of Water	High
502006	ME NO SAVVY	Automatic	Department of Water	High
502024	PHILLIPS RANGE	Automatic	Department of Water	High
502027	DIMOND GORGE	Automatic	Department of Water	High
502059	MARGARET GORGE	Automatic	Department of Water	High
503000	CHRISTMAS CK	Automatic	Department of Water	High
503007	NOONKANBAH	Automatic	Department of Water	High
503011	ELLENDALE	Automatic	Department of Water	High
503012	LOOMA	Automatic	Department of Water	High
<b>804 – Isdell River</b>				
503009	DALES YARD	Automatic	Department of Water	High
<b>810 – Keep River</b>				
502033	MICROWAVE TOWER	Automatic	Department of Water	High
502038	EIGHT MILE MILL	Automatic	Department of Water	High
<b>604 – Kent River</b>				
509278	STYX JUNCTION	Automatic	Department of Water	High
509385	ROCKY GLEN	Automatic	Department of Water	High
<b>803 – Lenard River</b>				
503008	MOUNT JOSEPH	Automatic	Department of Water	High

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Bureau number	Station name	Gauge type	Data type	Priority
<b>705 – Lyndon-Minilya Rivers</b>				
506004	MINILYA BRIDGE	Automatic	Department of Water	High
<b>709 – Port Hedland Coastal Rivers</b>				
504001	COONANARRINA POOL	Automatic	Department of Water	High
504030	SOANSVILLE	Automatic	Department of Water	High
504031	ABYDOS NORTH	Automatic	Department of Water	High
504032	PINCUNAH	Automatic	Department of Water	High
504033	CARRABA	Automatic	Department of Water	High
504038	BOODARIE	Automatic	Department of Water	High
504046	LYRE CREEK WELL	Automatic	Department of Water	High
504047	BLACK HILLS	Automatic	Department of Water	High
505057	59 MILE PEG	Automatic	Department of Water	High
<b>702 – Wooramel River</b>				
506002	MEEDO POOL	Automatic	Department of Water	High
506015	STEADMANS	Automatic	Department of Water	High

### 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 in Western Australia



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

Bureau number	Station name	Owner	Gauge type	Data type	Priority
<b>610 – Busselton Coast</b>					
509521	D/S HILL ROAD	Department of Water	Automatic	River	High
<b>616 – Swan Coast</b>					
509440	BARRACK STREET JETTY	Department of Transport (Marine Information)	Automatic	River	High
509438	WALYUNGA POOL	Department of Water	Automatic	River	High
<b>615 – Avon River</b>					
510060	STIRLING TCE TOODYAY	Department of Water	Automatic	River	High
510061	NORTHAM WEIR	Department of Water	Automatic	River	High

**Notes:**

- Does not include daily rainfall, automatic weather stations and other Bureau synoptic stations.

**Schedule 10a: List of flood warning related products issued by the Bureau in Western Australia (warnings, watches, bulletins)****Flood warnings**

<b>Product ID</b>	<b>Product name</b>	<b>Initiating criteria</b>	<b>Updated</b>	<b>Finalising</b>
IDW39700	Eucla District	To be issued in potential or actual developing weather situations which could lead to flooding.	Minimum once a day, usually twice daily, more frequently depending on severity of event or if significant changes in the situation indicate the need to do so.	When no further significant rainfall expected and threat of further stream rises has passed.
IDW39710	Interior District	To be issued in potential or actual developing weather situations which could lead to flooding.	Minimum once a day, usually twice daily, more frequently depending on severity of event or if significant changes in the situation indicate the need to do so.	When no further significant rainfall expected and threat of further stream rises has passed
IDW39715	Goldfields District	To be issued in potential or actual developing weather systems which could lead to flood situations .	Minimum once a day, usually twice daily, more frequently depending on severity of event or if significant changes in the situation indicate the need to do so.	When no further significant rainfall expected and threat of further stream rises has passed
IDW39720	Southern Coastal District	To be issued in potential or actual developing weather situations which could lead to flooding.	Minimum once a day, usually twice daily, more frequently depending on severity of event or if significant changes in the situation indicate the need to do so.	When no further significant rainfall expected and threat of further stream rises has passed..
IDW39730	Blackwood River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once a day, usually twice daily, more frequently depending on severity of event or if significant changes in the situation indicate the need to do so.	When all river levels are falling, approaching minor flood level and no further heavy rainfall is expected
IDW39740	South West District	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once a day, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and no further heavy rainfall is expected.
IDW39760	Preston River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once a day, usually twice a day. More frequently if required due to Three (3) or six (6) hourly intervals, depending on the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and no further rainfall is expected.
IDW39765	Collie River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once a day, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and no further rainfall is expected.

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDW39770	Lower West District	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and threat of renewed rises has passed.
IDW39775	Murray River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39780	Canning River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39785	Swan River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39790	Avon River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once a daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39798	Moore River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once a day, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39800	Irwin River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once a day, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39802	Greenough River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once a day, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39805	Chapman River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once a day, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDW39808	Wooramel River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39810	Murchison River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39820	Gascoyne River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39830	Pilbara Coastal Rivers	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39835	Ashburton River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39840	Fortescue River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39845	De Grey River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	Minimum once daily, usually twice a day. More frequently if required due to the severity of the event and/or a fast rate of rise.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39870	East Kimberley District	To be issued in potential or actual developing weather systems which could lead to flood situations.	For small or minor floods products should be renewed at least daily.	When the threat of flooding has passed.
IDW39875	North Kimberley District	To be issued in potential or actual developing weather systems which could lead to flood situations.	For small or minor floods products should be renewed at least daily.	When the threat of flooding has passed.
IDW39880	West Kimberley District	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	For small or minor floods products should be renewed at least daily.	When the threat of flooding has passed.

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDW39885	Fitzroy River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	For small or minor floods products should be renewed at least daily.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39890	Ord River Catchment	To be issued in potential or actual developing flood situations when minor flood levels are expected to be exceeded.	For small or minor floods products should be renewed at least daily.	When all river levels are falling, approaching minor flood level and the threat of renewed rises has passed.
IDW39600	Western Australia Flood Summary	Is issued once the first flood warning or watch product is issued.	When new warning and watch products are added and/or removed.	Once all warning and watch products are removed.

**Flood watches**

Product ID	Product name	Initiating criteria	Updated	Finalising
IDW39610	Kimberley	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.
IDW39620	Pilbara	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.
IDW39625	Gascoyne District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDW39630	Central West District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.
IDW39640	Lower West District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.
IDW39650	Central Wheatbelt District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.
IDW39660	South West District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.
IDW39670	Great Southern District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDW39680	Goldfields District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.
IDW39683	Interior District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.
IDW39687	Eucla District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.
IDW39690	Southern Coastal District	When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region.	A flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so.	The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.

### River height bulletins

Product ID	Product name	Initiating criteria	Updated	Finalising
IDW60400	Latest River Heights for the Pentecost, Ord, Fitzroy, Lenard and Isdel Rivers	None	Hourly	Never
IDW60401	Latest River Heights for the De Grey, Pilbara coastal, Fortescue and Ashburton Rivers	None	Hourly	Never
IDW60402	Latest River Heights for the Lyndon-Minilya, Gascoyne, Wooramel and Murchison Rivers	None	Hourly	Never
IDW60403	Latest River Heights for the Hutt, Chapman, Greenough, Irwin and Hill-Moore Rivers	None	Hourly	Never
IDW60404	Latest River Heights for the Avon, Dale, Mortlock, Brockman, Swan and Canning Rivers	None	Hourly	Never

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Product ID	Product name	Initiating criteria	Updated	Finalising
IDW60405	Latest River Heights for the Serpentine, Murray, Harvey, Collie, Preston, Capel and Ludlow Rivers	None	Hourly	Never
IDW60406	Latest River Heights for the Vasse, Margaret, Blackwood, Donnelly, Warren, Shannon, Frankland, Kent and Denmark Rivers	None	Hourly	Never
IDW60407	Latest River Heights for the Albany and Esperance Coast Rivers	None	Hourly	Never

### Rainfall bulletins – 1 Hourly

Product ID	Product name	Initiating criteria	Updated	Finalising
IDW60200	Kimberley	None	Hourly	Never
IDW60202	Pilbara	None	Hourly	Never
IDW60203	Gascoyne – Murchison	None	Hourly	Never
IDW60204	Mid West	None	Hourly	Never
IDW60207	Avon – Swan	None	Hourly	Never
IDW60205	Mandurah – Ludlow	None	Hourly	Never
IDW60206	Bussleton – Albany	None	Hourly	Never
IDW60201	Albany to Esperance	None	Hourly	Never
IDW60208	Goldfields	None	Hourly	Never
IDW60227	Wheatbelt	None	Hourly	Never

### Rainfall bulletins – 3 Hourly

Product ID	Product name	Initiating criteria	Updated	Finalising
IDW60209	Kimberley	None	Every three hours	Never
IDW60211	Pilbara	None	Every three hours	Never
IDW60212	Gascoyne – Murchison	None	Every three hours	Never
IDW60213	Mid West	None	Every three hours	Never
IDW60216	Avon – Swan	None	Every three hours	Never
IDW60214	Mandurah – Ludlow	None	Every three hours	Never
IDW60215	Bussleton – Albany	None	Every three hours	Never
IDW60210	Albany to Esperance	None	Every three hours	Never
IDW60217	Goldfields	None	Every three hours	Never
IDW60228	Wheatbelt	None	Every three hours	Never



**Rainfall bulletins – 24 Hourly**

<b>Product ID</b>	<b>Product name</b>	<b>Initiating criteria</b>	<b>Updated</b>	<b>Finalising</b>
IDW60218	Kimberley	None	Hourly	Never
IDW60220	Pilbara	None	Hourly	Never
IDW60221	Gascoyne – Murchison	None	Hourly	Never
IDW60222	Mid West	None	Hourly	Never
IDW60225	Avon – Swan	None	Hourly	Never
IDW60223	Mandurah – Ludlow	None	Hourly	Never
IDW60224	Bussleton – Albany	None	Hourly	Never
IDW60219	Albany to Esperance	None	Hourly	Never
IDW60226	Goldfields	None	Hourly	Never
IDW60229	Wheatbelt	None	Hourly	Never

## Schedule 10b: Flood warning products – Linkages to general Bureau products

### Flood Watch issue times

When, as a result of a routine assessment, it is anticipated that flood producing rainfall may occur within 24 to 72 hours for a particular forecast district or region, a flood watch advice will be issued daily or more frequently if the changing weather situation indicates the need to do so. The flood watch advice is to remain in effect until either the potential flood threat passes and activity reverts to routine catchment monitoring, or the flood situation has developed to a point where flood warnings are warranted.

The emphasis must be on advising those authorities responsible for action at a state and local level of the likelihood of flooding. Rainfall and river level reports should be obtained from a sufficient number of indicator stations, where possible, to monitor developments and enable assessment of catchment rainfall.

Flood Watch will be mentioned in the District Forecast Products. GFE?

### Flood Warning issue times

For streams in the **South West Coast Drainage Division**, the flood warnings will be issued:

- immediately the need becomes apparent; then
- Minimum once a day, usually twice daily, more frequently depending on severity of event or if significant changes in the situation indicate the need to do so. three (3) or six (6) hourly intervals, depending on the severity of the event and/or a fast rate of rise. Towards the forecast peak level the warnings may be required to be issued hourly.

For other regions of the State, flood warnings are normally issued:

- immediately the need becomes apparent (eg. when a cyclone affects the area or extremely high rainfall is forecast or reported); then
- Minimum once a day, usually twice daily or up to six (6) hourly intervals, depending on the severity of the event and/or a fast rate of rise. For extreme events when rises moving towards the forecast peak level the warnings may be required to be issued more frequently.

When river systems in the Kimberley and Pilbara regions are in flood for a large part of the wet season, once the initial extent and severity of the flooding in the region are known to the different agencies involved in the services and the public, updates may be covered in the flood summary rather than issuing flood warning advices.

Intermediate issues will be made for any river system in the State if it is considered that, in light of new information, the previous issue was significantly in error.

In order to assist flood forecasting, the Flood Warning Centre may consult with Flood Warning Operational Group (FWOG) members or activate the FWOG as it deems appropriate.

Product ID	Product name	Forecast district			Towns covered by area of product
IDW39600	Flood Summary				
<b>Flood watch advices</b>					
IDW39610	Kimberley	Kimberley			Broome & Kununurra
IDW39620	Pilbara	Pilbara	North Interior		Port Hedland, Karratha, Exmouth & Newman
IDW39625	Gascoyne District	Gascoyne			Carnarvon, Newman & Meekatharra
IDW39630	Central West District	Central West			Geraldton
IDW39640	Lower West District	Lower West			Perth & Mandurah

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Product ID	Product name	Forecast district			Towns covered by area of product
<b>Flood watch advices (continued)</b>					
IDW39650	Central Wheatbelt District	Central Wheat Belt			
IDW39660	South West District	South West			Bunbury & Busselton
IDW39670	Great Southern District	Great Southern			
IDW39680	Goldfields District	Goldfields			Kalgoorlie
IDW39683	North Interior District	North Interior			
IDW39687	Eucla District	Eucla			
IDW39690	South Coastal District	South Coast			
IDW39695	SouthEast Coastal District	Southeast Coastal			Esperance
<b>Flood warnings</b>					
IDW39700	Eucla District	Eucla			
IDW39710	Interior District	North Interior	Southern Interior		
IDW39715	Goldfields District	Goldfields			Kalgoorlie
IDW39720	South Coastal District	South Coastal			Albany
IDW39725	SouthEast Coastal District	Southeast Coastal			Esperance
IDW39730	Blackwood River Catchment	Southwest	Great Southern		
IDW39740	South West District	Southwest			Bunbury & Busselton
IDW39760	Preston River Catchment	Southwest			Bunbury
IDW39765	Collie River Catchment	Lower West	Great Southern	Southwest	Bunbury
IDW39770	Lower West District	Lower West			Perth & Mandurah
IDW39775	Murray River Catchment	Lower West	Great Southern		Mandurah
IDW39780	Canning River Catchment	Lower West			Perth
IDW39785	Swan River Catchment	Lower West			Perth
IDW39790	Avon River Catchment	Central Wheat Belt	Great Southern	Lower West	Perth
IDW39798	Moore River Catchment	Central West	Lower West		
IDW39800	Irwin River Catchment	Central West			
IDW39802	Greenough River Catchment	Central West			Geraldton
IDW39805	Chapman River Catchment	Central West			Geraldton
IDW39808	Wooramel River Catchment	Gascoyne			
IDW39810	Murchison River Catchment	Central West	Gascoyne		
IDW39820	Gascoyne River Catchment	Gascoyne			Carnarvon
IDW39822	Lyndon-Minilya Rivers	Pilbara	Gascoyne		Exmouth
IDW39825	Onlow Coastal Rivers	Pilbara			
IDW39830	Pilbara Coastal Rivers	Pilbara			Port Hedland & Karratha
IDW39835	Ashburton River Catchment	Pilbara	Gascoyne		
IDW39840	Fortescue River Catchment	Pilbara			Karratha & Port Hedland
IDW39845	De Grey River Catchment	Pilbara	North Interior		Port Hedland
IDW39870	East Kimberley District	Kimberley			Kununurra
IDW39750	North Kimberley District	Kimberley			
IDW39880	West Kimberley District	Kimberley			Broome

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Product ID	Product name	Forecast district			Towns covered by area of product
<b>Flood warnings (continued)</b>					
IDW39885	Fitzroy River Catchment	Kimberley			
IDW39890	Ord River Catchment	Kimberley			Kununurra

### Schedule 11: List of changes to this Service Level Specification

Version	Date	Name	Update
1.0	25 <sup>th</sup> October 2013	Nicole Pana	Version 1.0 signed
2.0	April 2015	Nicole Pana	Additional sentence to clause 1.6 highlighting supplementary services
			Addition of priorities to stations in schedules 2-4 and 7-9. This is defined in clause 3.3.2 and Table 1 which are also new additions.
2.0	March 2016	Steve Dugan	Quantitative and Qualitative clauses better described (3.8.3 and 3.8.4)
			Editorial and table data changes in response to FWCC comments.

## 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)