



PROVISION OF AND REQUIREMENTS FOR FLOOD WARNING

Supplementary Document to the State Flood Plan

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1. Introduction

1.1. PURPOSE

The purpose of this document is to inform the community of New South Wales (NSW) of:

- How the development of flood warning systems and the issuing of associated warning products occurs within NSW;
- Roles and responsibilities for operation and maintenance of warning systems and dissemination of associated warning products;
- The types of flood warning products issued; and
- Locations flood warnings and local flood advices are issued.

This document is supplementary to the [NSW State Flood Plan](#).

1.2. BACKGROUND

Flood warning products provide vital information to the communities and individuals of NSW on the flood threat and how to respond appropriately to this threat. Warning systems are developed to inform communities of possible riverine or flash flooding, as well as flooding downstream of dams.

Flood or Flooding means the covering of normally dry land by water that has escaped or been released from the normal confines of:

1. Any lake, or any river, creek or other natural watercourse, whether or not altered or modified; or
2. Any reservoir, canal or dam.

The development of flood warning products and their associated systems is guided by the Total Flood Warning System concept.

1.2.1 Total Flood Warning System

The Total Flood Warning System concept recognises that a fully effective gauge network and associated flood warning service is multi-faceted in nature. Its development and operation involves input from a number of stakeholders with specialised roles to play. The key components of a Total Flood Warning System include:

- Monitoring and prediction;
- Interpretation;
- Message construction;
- Communication;
- Predictive behaviour; and
- Review.

These components must all be present, and integrated, for the system to be effective.

Further information on the Total Flood Warning System can be found in the [National Arrangements for Flood Forecasting and Warning](#).

1.2.2 Flood Warning Consultative Committee

To ensure integrated development of warnings within NSW, the NSW and ACT Flood Warning Consultative Committee (FWCC) advises and reports to the Bureau of Meteorology (the Bureau). Its purpose is to coordinate the development and operation of flood forecasting and warning services across NSW. Membership comprises of:

- The Bureau;
- NSW State Emergency Service (NSW SES);
- NSW Office of Environment and Heritage (OEH);
- ACT SES;
- Water NSW;
- NSW Local Government (Council);
- Sydney Water; and
- Floodplain Management Australia.

1.2.3 Forecasting and Warning Services

The [Intergovernmental Agreement on the provision of Bureau of Meteorology Hazard Services to the States and Territories](#) (Intergovernmental Agreement) outlines the agreed responsibilities for forecasting and warning services for Riverine and Flash Flooding. While noting that, in practice, the responsibility for flood preparation and monitoring, developing forecasts and warnings and the dissemination of warnings is shared between all levels of government, specific detail is provided for Riverine and Flash Flooding services.

It states that the Bureau has historical and statutory responsibility for the issuing of warnings of weather conditions likely to give rise to floods. Specifically the Bureau has the responsibility for the provision of forecasting and warning services for Riverine Flooding across the State.

It further states that in areas where the Bureau does not provide Flash Flood warnings (for small catchments), that the responsibility for Flash Flood warnings and systems lies with the States and Territories in partnership with local government (where appropriate) within their jurisdictions.

In NSW, Councils have taken the lead developing local flash flood warning systems within their local government areas. This is typically done through the [Floodplain Management Program](#), which is administered by NSW OEH who provide technical advice and grant funding assistance to Councils.

The Bureau provide technical assistance to Councils establishing local flash flood warning systems through its Flash Flood Advisory Resource ([FLARE](#)). The Bureau maintains FLARE,

which is an online resource created to assist agencies to design, implement and manage fit-for-purpose flash flood warning systems.

NSW SES is the legislated Combat Agency for floods and is responsible for the control of flood operations. The [SES Act 1989](#) states that NSW SES also has the function of establishing flood warning systems. NSW SES work with the Bureau and Councils to develop warning systems and to ensure warning products and messaging are consistent across the state.

Dam Failure Warning Systems and accompanying arrangements have been established for communities below some dams identified as the as the highest risk by the Dam Safety Committee.

2. Key Stakeholders and their Role

2.1. THE BUREAU OF METEOROLOGY (THE BUREAU)

The Bureau has historical and statutory responsibility for the issuing of warnings of weather conditions likely to give rise to floods. The Bureau provide forecasting and warning services for Riverine Flooding across the State.

The Bureau provide generalised, qualitative or quantitative flood predictions for agreed flood forecast locations. Information on flood conditions, heights and classifications are provided as per the [Service Level Specification for Flood Forecasting and Warning Services for New South Wales and the Australian Capital Territory](#).

The Bureau use gauges to provide predictions and warning. The Bureau rely on accurate gauge information and metadata to ensure these services are provided correctly. The Bureau own and maintain gauges as well as utilise externally owned and maintained gauges to provide the above service.

In addition to warning services for riverine flooding, the Bureau provide technical assistance to Councils establishing local flash flood warning systems through its Flash Flood Advisory Resource ([FLARE](#)). The Bureau maintains FLARE, which is an online resource created to assist agencies to design, implement and manage fit-for-purpose flash flood warning systems.

2.2. NSW STATE EMERGENCY SERVICE (NSW SES)

As the legislated Combat Agency for floods, NSW SES is responsible for the control of flood operations. The [SES Act 1989](#) states that NSW SES also has the function of establishing flood warning systems. NSW SES work with the Bureau and Councils to develop warning systems and to ensure warning products and messaging are consistent across the state.

The requirements of the Act are met by NSW SES issuing flood warning products and by identifying the need for flood warning classifications and associated warning services.

NSW SES utilise gauge information to prepare flood intelligence, to prepare and issue warning products and to respond to flooding. NSW SES are responsible for maintaining the NSW SES Flood Intelligence System which documents gauge and associated warning information as well as consequences at varying gauge water levels and recommended response actions.

NSW SES work with the Bureau and Councils to develop warning systems and to ensure warning products and messaging are consistent across the state.

2.3. NSW OFFICE OF ENVIRONMENT AND HERITAGE (OEH)

OEH administer the NSW Floodplain Management Program by providing financial support and technical advice to Council's to investigate the potential for new gauges/networks, to install gauges/networks and to develop new flood warning services through the program.

OEH is also a Gauge Owner, maintaining a gauge network within the coastal zone of catchments east of the Great Dividing Range. Manly Hydraulics Laboratory (MHL), on behalf of OEH, operate, upgrade and maintain this network as well as provide public access to this data.

2.4. NSW LOCAL GOVERNMENT (COUNCIL)

The Intergovernmental Agreement states that in areas where the Bureau does not provide Flash Flood warnings (for small catchments), that the responsibility for Flash Flood warnings and systems lies with the States and Territories in partnership with local government (where appropriate) within their jurisdictions.

Council is responsible for implementing the NSW Floodplain Management Process. A Floodplain Risk Management Committee is established as part of this process to assist Council in the development and implementation of Floodplain Risk Management Plans. A Plan may recommend the installation of gauges, establishment of a gauge network, or establishment of a warning system. These recommendations may be for riverine or flash flood catchments. For Riverine Flooding, Councils work with the Bureau and NSW SES to establish this addition to the state wide service. For Flash Flooding, Council's lead the development of these systems which they would own and maintain.

In addition to this, Councils may identify the need for a new or revision to existing flood classification level through the Floodplain Management Process.

2.5. WATERNSW

WaterNSW own a gauge network west of the Great Dividing Range. Water NSW is responsible for the upgrade and maintenance of the existing primary network of flood gauges, and provision of a permanent archive of, and access to, the state's dataset.

2.6. DAM OWNERS AND OPERATORS

Dam Failure Warning Systems and accompanying arrangements have been established for communities below dams identified as the as the highest risk by the Dam Safety Committee. Arrangements for these are specified in an individual dams, Dam Safety Emergency Plan (DSEP).

Dam Owners and Operators are responsible for the ongoing management of dams, as well as maintaining and operating associated Dam Failure Warning Systems.

It is the responsibility of Dam Owners and Operators to:

- state the arrangements governing the operation of these systems;
- develop warnings and notification processes in consultation with NSW SES;
- notify downstream emergency managers and warn communities; as well as
- document these processes and arrangements in the Dams DSEP.

The Dam Failure Hotline is to be used to inform NSW SES to ensure dam failure warnings are disseminated with priority and urgency.

2.7. OTHER STAKEHOLDERS

There may be additional gauge owners to those stated above. Gauge owners may be Federal or State Government agencies or Local Government (for example Manly Hydraulics Laboratory or Sydney Water). Gauge Owners are responsible for the installation and maintenance of water level and rain gauges, as well as for providing real-time (or near real-time) access to gauge data to the Bureau. It is the responsibility of Gauge Owners to ensure ongoing provision of service to forecast locations and key warning gauges.

3. Components of the Flood Warning System

3.1. FLOOD GAUGE NETWORKS

Gauges are essential for monitoring stream flow, water levels and rainfall. Data collected from gauges provides real-time data to the Gauge Owner and the Bureau. This data, when provided to the Bureau, can be used to provide flood warnings as a component of the Total Flood Warning System (as defined in the [Australian Emergency Manuals Series, Manual 21 Flood Warning](#)).

In addition to this, near live data can also be provided to NSW SES, the community and other stakeholders. This is utilised to inform preparation and response to flooding.

Gauges may be stand alone or connected to a gauge network. A gauge network may be locally owned (owned and maintained by Councils) and/or connected to the broader, state wide, network.

A locally owned gauge network may be established when the need for a local flash flood warning system is identified. The need for a gauge or a gauge network may be identified through the [Floodplain Management Process](#). This need would be stated as a recommendation in a Council adopted Floodplain Risk Management Plan. Alternatively, if not identified through this process, the need for a new gauge may be identified if a gap is present in an existing network, or when gauge data is required to calibrate flood intelligence for a community at risk.

The owners of gauges with flood warnings and local flood advices attached to them, are stated in Table 1.

Gauge data, such as the current water level, from the respective owners can be found online from the below links:

- [Bureau of Meteorology](#)
- [Manly Hydraulics Laboratory](#)
- [WaterNSW](#)

3.2. FLOOD WARNING CLASSIFICATIONS

To determine the impact of potential riverine flooding and associated consequences, flood warning classifications are determined for forecast locations and key warning gauges.

Flood warning classifications describe three severity levels of riverine flooding, minor, moderate and major.

1. 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.
2. 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.
3. 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.

Classifications are determined by NSW SES. They can be informed from findings of a Floodplain Risk Management Study, or from the gathering of flood intelligence and assessing the associated consequences.

3.3. WARNING PRODUCTS

Flood warning products communicate potential risks and associated consequences of flooding. Warning products can also communicate required actions to individuals to respond to the flood threat. The Bureau, NSW SES and Councils issue flood warning products. The varying products are detailed below.

The Bureau issue the following Warning Products:

- **Severe Thunderstorm Warnings** range in character from short-lived events causing patchy localised damage to more organised systems producing widespread damage across broader areas. The most intense and long-lived supercell thunderstorms

generate long swathes of destruction over several hours. Weather phenomena accompanying these storms include any combination of large hail, damaging or destructive winds, tornadoes and intense rainfall leading to local flash flooding.

- **Regional Severe Thunderstorm Warnings** are issued when severe thunderstorms are already occurring or are expected to develop within or move into the specified area over the next few hours. The warnings describe the area under threat and the particular hazards likely to be associated with the thunderstorms. These warnings are distributed widely to the media and emergency services, and are available to the public via the internet and various telephone and fax based services. An image is available with the warning on the internet to show in a map format the area at risk. This service is provided for all parts of NSW. Typical lead-times between issue and impact are up to the order of several hours with specific areas under threat being broadly defined.

- **Detailed Severe Thunderstorm Warnings - Sydney/Newcastle/Wollongong** – are issued when severe thunderstorms are already occurring, or are expected to develop within or move into the heavily populated regions around Sydney, Newcastle and Wollongong. High quality, full-time weather radar coverage in this area allows these warnings to describe the current location of individual thunderstorms, and the places likely to be affected within the next 30 to 60 minutes. Again, an image is available with the warning showing in map format the location of the severe thunderstorms and their forecast tracks. The more detailed warnings are available for Sydney, Newcastle, Wollongong and surrounds. Typical lead-times between issue and impact range up to 30-60 minutes with areas under threat being more precise and tightly defined than Regional warnings.

- **Severe Weather Warnings** are issued when severe weather is expected to affect land-based communities and Lord Howe Island within the next 24-36 hours; and
 - it is not directly the result of severe thunderstorms; and
 - it is not covered by tropical cyclone or fire weather warnings

- **Flood Watches** are an early advice of increased flood risk over a catchment by the Bureau up to four days in advance of large-scale weather systems that have the potential to cause flooding. The Flood Watch covers all catchments in NSW including catchments without flood forecasting systems and data networks, and also covers inland and desert areas, and areas without well-defined rivers and streams where local flooding is the dominant flood risk. Flood Watches are distributed to the media by the Bureau and are published on the Bureau website.

- **Flood Warnings** provide advance notice that a flood may occur in the near future at a certain location or in a certain river basin or catchment. The list of locations where the Bureau provides Flood Warnings is provided in Table 1. For locations where the Bureau provides quantitative predictions, warnings normally include predicted flood heights at the forecast location. Flood Warnings are renewed at regular intervals until the relevant river level gauge drops to below the minor flood level. Flood Warnings are distributed to the media by the Bureau and are published on the Bureau website.

The NSW SES issue the following flood warning products:

- **Livestock and Equipment Warnings.** These are issued when there is evidence of significant rises in stream levels to below minor flood heights. The NSW SES may seek advice from the Bureau on likely rises.
- **Local Flood Advices.** These are issued on the basis of localised valley watch information for locations for which the Bureau does not issue Flood Warnings. They normally predict which class of flooding (minor, moderate or major) will occur, and must not contradict any Flood Warnings provided by the Bureau for other gauges on the same river. Local Flood Advices are to be clearly identified as being issued by the NSW SES.
- **Flood Bulletins.** These are issued to radio stations by NSW SES to inform people about what is expected to happen during flooding. NSW SES Flood Bulletins contain information on likely flood consequences and what actions are required to protect persons and property.

Bulletins include, verbatim, the first paragraph of the predictions section of the latest warning products issued by the Bureau. Flood Bulletins also include, as appropriate:

- What the predicted height means in terms of areas likely to be flooded and the depth and nature of the expected flooding;
- Local Flood Advices;
- Advice on what actions people should take to protect themselves and their property (and indicating appropriate time frames for these actions);
- Areas of danger to be avoided;
- The data section of the latest flood warning issued by the Bureau. Note that:
 - If later river and rainfall gauge readings are available, they may be inserted with the time of reading;
 - Data can be condensed to include key sites only;
 - Additional gauges of local importance may be inserted; and
 - Locally-accepted names may be used for gauges, but only if the NSW SES State Headquarters and the Bureau are aware of the local name.

- Roads currently closed, roads which may become closed, and roads which will not be closed;
 - NSW SES emergency assistance number (132 500) in the event of assistance being required; and
 - Contact details for obtaining road information.
- **NSW SES Evacuation Warning.** Evacuation Warnings are a message advising the community to prepare for likely evacuation. The warning advises people what to do and what to prepare to take with them.
 - **NSW SES Evacuation Order.** Evacuation Orders communicate the need for a community (or parts of a community) to evacuate by a specified time in response to an imminent threat. An Evacuation Order also advises where people should go and may advise by which evacuation route to take.

Warnings are also provided in relation to:

- Severe thunderstorms or severe weather for heavy or very heavy rainfall that may lead to flash flooding (provided by the Bureau as Severe Weather Warnings);
- Flooding from storm induced large waves and coastal inundation (provided by the Bureau as Severe Weather Warnings);
- Releases from gated dams. Advice on the impacts of such releases is provided by the owners of these dams to NSW SES. A distinction should be made with regards to the releases and dam safety alerts. The distribution of information about routine operational releases is the responsibility of dam owners. When releases occur during flood events and minor flood levels are likely to be exceeded at downstream locations, Bureau flood warnings will be issued;
- Local overland and creek flooding. Although the Bureau does not provide a specific service for these events, they may at times be captured by the “heavy rainfall” statement in severe weather and severe thunderstorm warnings provided by the Bureau if rainfall information indicates the possibility of such flooding.

There is currently no standard flash flood warning message template or content for Council’s to utilise. NSW SES can provide guidance when Councils are developing their message system and content.

3.4. SMALL CATCHMENT / FLASH FLOOD WARNING SERVICES

Riverine Flooding means any flooding where the rain-to-flood delay time is relatively high and typically more than six hours, but excludes flooding caused by:

- Elevated sea levels;

- Storm Surge;
- Flash Floods;
- Failure of any man-made infrastructure, for example failure of dams or levees; or
- Urban overland flow.

Flash Flooding, or Small Catchment Flooding, means any flooding of short duration with a relatively high peak discharge in which the time interval between the observable causative event and the flood is less than six hours.

Riverine flood warnings are not provided by the Bureau for small catchments where there is generally less than six hours between heavy rainfall and flooding.

The Bureau Flood Watch product broadly covers small catchments across NSW, referring to possible impacts in these areas as local flooding however the Bureau does not provide gauge specific flash flood warnings in these areas; Under legacy arrangements, warnings for the small catchments listed below are provided by the Bureau.

Warnings for catchments marked with * will be transitioned to an automated system with NSW SES taking back the lead for warning the community.

Areas with local small catchment warning systems include:

- *Blackmans Swamp Creek, Orange;
- *Brunswick River Valley;
- *Camden Haven, Kendall;
- *Coffs Creek, Coffs Harbour;
- *Cooma Creek and Cooma Back Creek, Cooma;
- *Cootamundra and Stockinbingal (Cootamundra Shire);
- Dora Creek, Lake Macquarie;
- *Dumaresq Creek, Armidale;
- *Kingdon Ponds, Scone;
- *Lower Cooks River.
- *Molong Creek, Molong;
- *Myall River, Bulahdelah;
- Newcastle City, Newcastle;
- *Wooli River, Wooli;
- *Woronora River, Sutherland.

As stated previously, the Intergovernmental Agreement states that in areas where the Bureau does not provide Flash Flood Warnings, that the responsibility for Flash Flood warnings and systems lies with the States and Territories in partnership with local government (where appropriate) within their jurisdictions.

In NSW, Councils have taken the lead developing flash flood warning systems within their local government areas. A Floodplain Risk Management Plan may identify the need for a local flash flood warning system. Councils can then work with OEH, NSW SES and the Bureau to develop these systems.

3.5. DAM FAILURE WARNING SYSTEMS

Dam Failure is the uncontrolled release of a water storage. The failure may consist of the collapse of the dam or some part of it, or excessive seepage or discharges. The most likely causes of dam failure are:

- **Flood Induced Dam Failure:** dam failure caused by flood, either due to overtopping erosion or by subsequent structural failure.
- **Sunny Day Dam Failure:** dam failure as a result of factors other than flood i.e. other than flood flow into the reservoir. Causes of "Sunny Day" dam failure can include internal erosion, landslide, piping, earthquake, structural weaknesses or sabotage.

Dam Failure Warning Systems have been installed by some Dam Owners to provide advance notice of conditions under which failure could occur. As emergency planning for potential dam failure proceeds, further Dam Failure Warning Systems, gauges, sensors and telemetry may be established. The focus for establishing Dam Failure Warnings Systems should be on highest risk dams whose risks are intolerable according to NSW Dam Safety Committee Societal Risk Requirements.

Arrangements governing the operation of these systems, the notification of downstream emergency managers and the warning of communities at risk is developed by the Dam Owner in consultation with NSW SES.

Dam Safety Emergency Plans (DSEP) outline the required actions of owners and their personnel at dams in response to a range of possible emergency situations. The NSW Dam Safety Committee requires a quality controlled DSEP, with associated dam break warning procedures, to be prepared for prescribed dams where persons may be at risk downstream if the dam were to fail.

3.6. WARNING DISSEMINATION

NSW SES pre-write Flood Bulletins for forecast locations, key warning gauges, flash flood environments, areas downstream of highest risk dams and for areas susceptible to coastal inundation.

Where possible, NSW SES deliver flood warning information directly, in addition to utilising media outlets. A combination of the following warning methods may be utilised:

- Mobile and fixed public address systems;
- Two-way radio;
- Emergency Alert;

- Telephone and fax;
- Doorknocking;
- Mobile and fixed sirens;
- Variable message signs;
- Community notices in identified hubs;
- Distribution through established community liaison networks, partnerships and relationships; and
- Internet including social media (authorised channels) and the NSW SES website.

Emergency Alert is a national telephony based alerting system available for use by emergency service agencies to send SMS and voice messages to landlines and/or mobile telephones in times of emergency.

Where appropriate and possible, and usually in conjunction with other warning messages, Emergency Alert is used to send SMS and/or voice alerts to land lines and mobile phones within a specified geographic area. The short warning times which apply to flash flooding will preclude the use of EA in those situations, however in general it should be used in conjunction with Evacuation Warnings and Evacuation Orders.

The Standard Emergency Warning Signal (SEWS) is a distinctive audio signal that has been adopted to alert the community to the broadcast of an urgent safety message relating to a major emergency. It is intended to be played on public media such as radio, television, public address systems, and mobile sirens to attract listeners attention to the fact that they should take notice of the emergency message. Its use is limited to very severe flooding conditions (for example leading to residential inundation and involving evacuation, especially when time is limited and urgent action is necessary).

The use of SEWS is detailed in the SEWS National Guidelines. Requests to the media to broadcast SEWS contain details of the text of the message, information stating when the broadcasts are to commence, their frequency and the geographic location for broadcast.

3.7. REVIEW AND IMPROVING FLOOD WARNING SERVICES

During a flood warning products may be reviewed and require re-issue. For example, following the issuing of a Bureau warning product, NSW SES State Headquarters maintains regular contact with the Bureau until the flood potential has passed. NSW SES will advise the Bureau when local information may indicate a need for the Bureau to review information within their warning products.

Owners and managers of gauge networks connected to a forecast location or a key warning gauge are also responsible for notifying the Bureau and NSW SES when systems and gauges are not operating as specified.

In the flood planning phases before and after floods, NSW SES maintain a continuous review of the State's flood warning requirement. This is maintained specifically by re-examining warnings and their associated systems after floods and during the process of revising Local

Flood Sub Plans, intelligence, the flood warning classifications and warning time requirements listed.

This review may lead to changes to flood warning classifications. Changes will be made only after:

- Consultation with the affected community (including via its local council), the Bureau and the FWCC; and
- Official notification of the changes by council through local media.

The FWCC also oversee review and improvements to existing warning systems and arrangements, as well as inform their development in the future.

4. Provision of and Requirements for Flood Warning

Table 1 details locations warnings are issued in NSW and the associated provision requirements for each location. For Bureau issued warnings, the table replicates information within the Bureau's *Service Level Specification for Flood Forecasting and Warning Services for New South Wales and the Australian Capital Territory*. The current version of this document is available from the Bureau's website www.bom.gov.au

Additional locations are also detailed in the table. These locations are for locations where NSW SES issue Local Flood Advices, which is done independently of Bureau flood warnings.

The headings within the table are detailed below:

- **Bureau Number:** Refers to the unique number assigned to a particular station by the Bureau. N/A refers to locations for which NSW SES provide a Local Flood Advice, however no gauge is present, and no warning is provided by the Bureau.
- **AWRC Number:** Refers to the unique number assigned to a particular station by the Australian Water Resources Council. Each gauge within Australia is assigned a unique AWRC number. N/A refers to locations for which NSW SES provide a Local Flood Advice, however no gauge is present and no warning is provided by the Bureau.
- **Forecast location:** Is the specific location that will be referred to in flood warnings.
- **Station Owner.** Is the owning and operating agency of the station.
- **Gauge type:** Either manual (read by human) or automatic.
- **Flood Classification:** Flood warning classifications are locally defined flood levels used in flood warning products to give an indication of the severity of the impact of expected flooding. These impacts are defined as minor, moderate and major. Definitions for minor, moderate and major can be found in the Glossary. n/a refers to locations where flood classifications have not yet be defined by NSW SES.
- **Flood Warnings Provided by the Bureau:** Flood warnings may include quantitative predictions at forecast locations or a statement about future flooding in more generalised terms. 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. 'No' refers to locations for which NSW SES provide a Local Flood Advice, no warning is provided by the Bureau. This field may also state when warnings are issued not from NSW BOM (i.e. QLD BOM)

- **Target warning lead time:** The minimum lead time that will be provided before the height or the flood class level given is exceeded. n/a refers to locations for which NSW SES provide a Local Flood Advice, no warning is provided by the Bureau.
- **Time (hours):** The minimum time prior to flooding a warning product will be released.
- **Trigger height (m):** The minimum height forecast which triggers the issuing of a warning product.
- **70% of peak forecasts within:** The percentage listed shows the Target Peak Accuracy. Target Peak Accuracy is the error within which peak river level height is predicted.
- **Local flood advices provided by SES:** Yes indicates a Local Flood Advice is provided by NSW SES. Local Flood Advices are provided in locations the Bureau does not issue flood warnings. The location for which the Local Flood Advice is issued in known as a Key Warning Gauge.

Below is the Table Key:

^ = Small catchments described in 5.6.

* = key location for downstream predictions, critical for the provision of a quantitative flood forecasting service to downstream sites marked with +.

+ = key locations for prediction which are based on a telemetered gauge proxy

u/s = upstream levels acting as a trigger for forecasts at given location.

All levels are in metres to local gauge datum unless indicated otherwise.

Table 1: Provision and requirements for flood warning in NSW

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
201 – Tweed River Valley												
58186	201420	North Murwillumbah*	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	3.0	4.0	4.8	Quantitative	6 hrs 12 hrs	>3.5 m >6.6m	+/- 0.3 m	
558014	201432	Tumbulgum	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	n/a	n/a	n/a	No				Yes
558010	201426	Chinderah (Barneys Point)	Tweed Shire Council	Automatic	1.3	1.7	2.0	Quantitative	6 hrs	>1.3m	+/- 0.3 m	
202 – Brunswick River Valley												
558020	202400	Billinudgel * ^	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.5	3.0	3.5	Quantitative	3 hrs	>2.5 m	+/- 0.3 m	Yes
558006	202402	Mullumbimby ^	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.5	3.5	4.5	Quantitative	3 hrs	>2.5 m	+/- 0.3 m	
203 – Richmond and Wilsons River Valley												
58176	203904	Lismore AHD *	Local Council	Automatic	4.2	7.2	9.7	Quantitative	12 hrs	>10 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
558001	203005	Wiangaree *	Water NSW	Automatic	11.0	15.5	n/a	Quantitative	6 hrs	>11 m	+/- 0.3 m	
558002	203900	Kyogle *	Water NSW	Automatic	12.0	14.4	16.0	Quantitative	6 hrs	13.0 m	+/- 0.3 m	
558013	203907	Casino *	Local Council	Manual	9.2	12.2	15.0	Quantitative	6 hrs	>9.2 m	+/- 0.3 m	
58175	203403	Coraki *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	3.4	5.0	5.7	Quantitative	24 hrs	3.8	+/- 0.3 m	
58184	203450	Bungawalbin *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	3.0	4.5	5.0	Quantitative	24 hrs	4.5	+/- 0.3 m	
n/a	203029	Leeville			n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
n/a	n/a	Tintenbar			n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
n/a	n/a	Ellengowan			n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
n/a	203039	Teven			n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
n/a	203415	Broadwater			n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
n/a	203468	Wardell	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
558097	203425	Ballina Breakwall	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
558015	203030	Rappville	Water NSW		n/a	n/a	n/a	No	n/a	n/a	n/a	Yes

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
n/a	n/a	Cabbage Tree Island			n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
58061	203412	Woodburn	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	3.2	3.7	4.2	Quantitative	12 hrs	>3.2 m	+/- 0.3 m	
204 – Clarence River Valley												
58178	204400	Grafton *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.1	3.6	5.4	Quantitative	6 hrs	>3.6 m	+/- 0.3 m	
									24 hrs	>8.2 m		
558030	204909	Coutts Crossing	Local Council	Manual	5.0	9.0	12.0	Quantitative	6 hrs	>9.0m	+/-0.3 m	
58188	204480	Ulmarra *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.1	3.4	4.9	Quantitative	6 hrs	>3.4 m	+/- 0.3 m	
									12hrs	3.3m		
558022	204410	Maclean	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.6	2.2	2.5	Quantitative	6 hrs	>2.2 m	+/- 0.3 m	
									24 hrs	>3.3 m		
59123	204907	Glenreagh *	Bureau	Manual	4.0	7.0	10.0	Quantitative	6 hrs	>5.8 m	+/- 0.3 m	
205 – Bellinger River Valley												
59121	205002	Thora *	Water NSW	Automatic	3.0	4.3	5.8	Quantitative	3 hrs	>3.0 m	+/- 0.3 m	
59126	205442	Bellingen Bridge *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	3.7	6.7	8.2	Quantitative	6 hrs	>4.9 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
559024	205403	Repton	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.0	n/a	3.0	Quantitative	6 hrs	>2.0 m	+/- 0.3 m	
559011	205407	Urunga	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.5	2.0	2.4	Quantitative	6 hrs	>1.5 m	+/- 0.3 m	
559012	205439	Coffs Creek Highway Bridge ^	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	3.0	n/a	4.7	Quantitative	1 hr	>3.0 m	+/- 0.3 m	
558060	205463	Wooli Caravan Park ^	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.9	2.2	2.5	Quantitative	6 hrs	>1.9m	+/- 0.3 m	
205 – Nambucca River Valley												
559001	205006	Bowraville *	Bureau	Manual	5.5	5.8	10.1	Quantitative	3 hrs	>5.5 m	+/- 0.3 m	
559006	205416	Macksville	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.7	2.1	2.6	Quantitative	6 hrs	>2.0 m	+/- 0.3 m	Yes
									12 hrs	>3.0 m		
206 – Macleay River Valley												
556017	206032	Armidale – Stephens Bridge ^	Water NSW	Automatic	2.9	n/a	n/a	Quantitative	1 hr	>2.9 m	+/- 0.3 m	
557001	206024	Georges Creek *	Water NSW	Automatic	6.0	8.0	10.0	Quantitative	6 hrs	>8.0 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
59122	206019	Bellbrook *	Local Council	Automatic	6.5	10.5	13.5	Quantitative	6 hrs	>6.5 m	+/- 0.3 m	
59127	206402	Kempsey AHD	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	4.5	5.7	6.6	Quantitative	12 hrs	4.5 m	+/- 0.3 m	
									24 hrs	>5.7m		
559040	206406	Smithtown	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	3.4	4.0	4.2	Quantitative	12 hrs	>4.0m	+/- 0.3 m	
207 – Hastings and Camden Haven River Valleys												
60116	207004	Kindee Bridge *	Water NSW	Automatic	3.0	5.5	7.6	Quantitative	6 hrs	>8.7 m	+/- 0.3 m	
60124	207401	Wauchope Railway Bridge *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.5	4.3	5.5	Quantitative	6 hrs	>2.5 m	+/- 0.3 m	
									12 hrs	>5.5 m		
60133	207418	Settlement Point	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.2	1.5	1.75	Quantitative	12 hrs	>1.2 m	+/- 0.3 m	
560017	207428	Logans Crossing * ^	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	7.0	7.6	7.9	Quantitative	3 hrs	>7.0 m	+/- 0.3 m	
560018	207425	Laurieton	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.1	1.5	1.7	Quantitative	3 hrs	>1.1 m	+/- 0.3 m	
									6 hrs	>1.5 m		
208 – Manning River Valley												

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
560062	208020	Gloucester	Water NSW	Automatic	4.3	4.9	5.2	Quantitative	3 hrs	>4.0 m	+/- 0.3 m	
60120	208400	Wingham AHD *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	4.9	8.9	11.9	Quantitative	12 hrs	>5.0 m	+/- 0.3 m	
									24 hrs	>12 m		
60119	208410	Taree AHD *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.8	2.4	3.7	Quantitative	12 hrs	>2.1 m	+/- 0.3 m	
									24 hrs	>4 m		
560008	208404	Croki *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.5	n/a	n/a	Quantitative	12 hrs	>1.5m	+/- 0.3 m	
560027	208425	Harrington	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.9	2.2	2.8	Quantitative	12 hrs	>1.9 m	+/- 0.3 m	
209 – Karuah River Valley												
560057	209906	Tuncurry	Local Council	Automatic	0.9	1.5	1.9	Quantitative	3 hrs	>0.9 m	+/- 0.3 m	
560040	209460	Bulahdelah ^	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	3.0	n/a	4.5	Quantitative	3 hrs	>3.0 m	+/- 0.3 m	
210 – Hunter River Valley												
61360	210904	Scone ^	Local Council	Automatic	3.2	3.5	3.7	Quantitative	3 hrs	>3.2 m	+/- 0.3 m	Yes
561005	210002	Muswellbrook *	Water NSW	Automatic	7.2	8.0	10.0	Quantitative	4 hrs	>7.2 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
									12 hrs	>10.0 m		
561015	210055	Denman *	Water NSW	Automatic	6.5	7.9	9.0	Quantitative	8 hrs	9.0 m	+/- 0.3 m	
561024	210056	Aberdeen	Water NSW	Automatic	7.2	9.8	10.0	Quantitative	6 hrs	7.2 m	+/- 0.3 m	Yes
561032	210406	Paterson	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	6.1	7.6	9.1	Info location				Yes
561022	210448	Hexham Bridge	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.9	2.9	3.8	Info location				Yes
61347	210028	Bulga * (Wollombi Brook)	Water NSW	Automatic	3.0	3.7	4.6	Quantitative	12 hrs	3.0 m	+/- 0.3 m	
561010	210001	Singleton *	Water NSW	Automatic	10.0	11.5	13.0	Quantitative	6 hrs 24 hrs	>10 m >14.2 m	+/- 0.3 m	
61268	210458	Maitland AHD (Belmore Brridge) *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	5.9	8.9	10.5	Quantitative	12 hrs 24 hrs	>5.9 m >7.1 m	+/- 0.3 m	
61349	210402	Gostwyck Br. * (Paterson)	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	9.1	10.7	12.2	Quantitative	12 hrs	>9.1 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
61267	210903	Dungog * (Williams)	Water NSW	Automatic	4.9	7.6	8.5	Quantitative	3 hrs	>4.9m	+/- 0.3 m	
61339	210010	Mill Dam Falls * (Williams)	Water NSW	Automatic	6.1	7.6	9.1	Quantitative	12 hrs	6.1 m	+/- 0.3 m	
561037	210452	Raymond Terrace	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.5	3.1	3.5	Quantitative	6 hrs	>2.5 m	+/- 0.3 m	
									18 hrs	>3.5 m		
211 – Lake Macquarie, Tuggerah Lake and Wyong River												
561025	211002	Wyong *	Local Council	Automatic	2.7	3.8	4.0	Quantitative	6 hrs	>2.7m	+/- 0.3 m	
561080	211418	Long Jetty	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	0.9	1.8	2.2	Quantitative	6 hrs	>0.9 m	+/- 0.3 m	
n/a	n/a	Dora Creek			n/a	n/a	n/a	No				Yes
561070	211461	Lake Macquarie - Belmont	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	0.7	0.9	1.1	Quantitative	6 hrs	>0.7 m	+/- 0.3 m	
212 – Hawkesbury Nepean River Valley												
68216	212904	Menangle *	Bureau	Automatic	5.2	9.2	12.2	Quantitative	6 hrs	>5.2 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
n/a	n/a	Goulburn Lansdowne Bridge			n/a	n/a	n/a	No				Yes
n/a	n/a	Goulburn Marsden Weir			n/a	n/a	n/a	No				Yes
563074	212011	Lithgow (Farmers Creek)			n/a	n/a	n/a	No				Yes
568154	212216	Camden Weir *	Water NSW	Automatic	6.8	8.3	13.8	Quantitative	12 hrs	>6.8 m	+/- 0.3 m	
68214	212900	Camden Bridge ⁺	Bureau	Manual	6.8	8.3	13.8					
67093	212202	Wallacia Weir *	Water NSW	Automatic	5.0	8.7	11.0	Quantitative	12 hrs	> 5.0 m	+/- 0.3 m	
567047	212201	Penrith *	Water NSW	Automatic	3.9	7.9	10.4	Quantitative	6 hrs	>8.9 m	+/- 0.3 m	
									8 hrs	>11.3m		
063282	212902	North Richmond Bridge ⁺	Bureau	Manual	4.3	8.4	11.0	Quantitative	6hrs	>16m	+/- 0.3 m	
									15hrs	>18m		
567098	212200	North Richmond WPS *	Water NSW	Automatic	4.3	8.4	11.0	No	6hrs	>16m	+/- 0.3 m	
									15hrs	>18m		
567044	212426	Windsor PWD*	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	5.8	7.0	12.2	Quantitative	6hrs if peak>16	9.6m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
									15hrs if peak>16	13.7m		
									12-18 hrs	Peak		
67095	212903	Windsor ⁺	Bureau	Manual	5.8	7.0	12.2				+/- 0.3 m	
63280	212406	Sackville *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	4.6	7.3	9.7	Quantitative	18 hrs	>4.6	+/- 0.3 m	
67094	212407	Colo Junction *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	4.6	6.1	7.6	Quantitative	18 hrs	>4.6	+/- 0.3 m	
63288	212908	Putty Road	Bureau	Manual	2.7	5.7	10.7	Quantitative	12 hrs	>5.7	+/- 0.3 m	
561004	212408	Webbs Creek (Wisemans Ferry)	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	n/a	3.5	4.2	Quantitative	12hrs	>3.5 m	+/- 0.3 m	
213 – Georges River and Sydney Coast												
566054	213400	Liverpool *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.0	3.0	4.5	Quantitative	6 hrs	>2.0 m	+/- 0.3 m	
									12 hrs	>4.0 m		
66168	213405	Milperra *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.0	3.3	4.2	Quantitative	6 hrs	>2.0 m	+/- 0.3 m	
									12 hrs	>4.0 m		

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
566011	213410D	Picnic Point Downstream	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.0	n/a	n/a	Quantitative	6 hrs	>2.0m	+/- 0.3 m	
566045	213482	Woronora Bridge ^	Local Council – Manly Hydraulic Laboratory	Automatic	1.5	3.4	3.9	Quantitative	3 hrs	>1.5 m	+/- 0.3 m	
n/a	n/a	Parramatta River	No specific forecast location exists – forecast based on exceedance of a rainfall threshold as per trigger height column.					Generalised	3 hrs	>1%	n/a	
566012	213415	Cooks River – Tempe Bridge ^	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.3	n/a	n/a	Quantitative	3 hrs	>1.3 m	+/- 0.3 m	
n/a	213408D	Ocean Street	Council - Manly Hydraulics Laboratory		n/a	n/a	n/a	Local flood warning system				Yes
215 – Shoalhaven River Valley												
68213	215411	Nowra – AHD *	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.3	3.3	4.3	Quantitative	6 hrs	>2.3m	+/- 0.3 m	
									9 hrs	>3.3 m		
									12 hrs	>4.3 m		
68221	215420	Terara	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.2	3.0	3.9	Quantitative	6 hrs	>3.0m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
216 – Clyde River Valley – St Georges Basin												
568200	216415	Island Point Road	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	1.2	1.5	1.8	Quantitative	3 hrs	>1.2m	+/- 0.3 m	
568198	216412	Sussex Inlet	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	0.9	1.2	1.8	Quantitative	3 hrs	>0.9m	+/- 0.3 m	
217 – Moruya River Valley												
69136	217002	Wamban *	Bureau	Manual	4.4	6.2	8.0	Quantitative	3 hrs	>4.4 m	+/- 0.3 m	
69130	217410	Moruya Bridge	NSW Office of Environment and Heritage – Manly Hydraulics Laboratory	Automatic	2.0	2.6	3.2	Quantitative	6 hrs	>2.6 m	+/- 0.3 m	
219 – Bega River Valley												
069120	219900	Bega	Water NSW	Automatic	4.6	7.0	8.0	Quantitative	3 hrs	>4.6m	+/- 0.3 m	
222 – Snowy River Valley												
570020	220019	Bombala	Water NSW	Automatic	3.0	5.0	8.0	Quantitative	3hrs	>3.0m	+/- 0.3 m	
401 – Upper Murray												
582015	401012	Biggara	Water NSW	Automatic	2.0	2.6	3.0	Snowy Mountains	n/a	n/a	n/a	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
								Authority (Khancoban) advises of outflows likely to cause flooding. Warnings issued in conjunction with BoM Victoria office				
572004	401001	Bringenbrong	Water NSW	Automatic	3.0	3.4		Snowy Mountains Authority (Khancoban) advises of outflows likely to cause flooding. Warnings issued in conjunction with BoM Victoria office	n/a	n/a	n/a	
422 – Culgoa River Valley												
48212	422016	Brenda *	Water NSW	Automatic	4.9	5.5	5.9	Quantitative	3days	>5.9m	+/- 0.3 m	
48230	422017	Weilmoringle *	Water NSW	Automatic	5.2	n/a	5.8	Quantitative	2 days	>5.6m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
									3 days	>6.2m		
48052	422006	Kenebree *	Water NSW	Automatic	4.7	5.7	6.3	Quantitative	3 days	>6.1m	+/- 0.3 m	
									3 days	>6.5m		
48215	422014	Goodooga (Bokhara)*	Water NSW	Automatic	2.7	3.4	4.2	Quantitative	2 days	>3.7m	+/- 0.3 m	
548011	422013	Goodooga (Birrie) *	Water NSW	Automatic	3.2	4.0	5.0	Quantitative	2 days	>4.0m	+/- 0.3 m	
548012	422005	Goodwins * (Bokhara)	Water NSW	Automatic	2.0	2.6	3.5	Quantitative	2 days	>2.0 m	+/- 0.3 m	Yes
048168	NA	New Angledool	Bureau	Manual	1.8	2.0	2.3	Quantitative	2 days	>2.8m	+/- 0.3 m	
423 – Warrego River Valley												
548003	423004	Barrington 2 *	Water NSW	Automatic	2.8	3.8	5.0	Quantitative	24 hrs	>2.8m	+/- 0.3 m	
48039	423903	Enngonia *	Bureau	Manual	2.0	2.5	3.0	Quantitative	24 hrs	>2.0m	+/- 0.3 m	
									2 days	>3.1 m		
548002	423002	Ford's Bridge Bywash	Water NSW	Automatic	1.7	2.3	3.2	Quantitative	24 hrs	>2.3m	+/- 0.3 m	
424 – Paroo River Valley												
548008	424002	Willara Crossing *	Water NSW	Automatic	0.7	n/a	n/a	Quantitative	1 day	>0.7m	+/- 0.3 m	Yes

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
	424901	Hungerford			1.0	1.5	2.0	Queensland BoM				
48181	424001	Wanaaring	Bureau	Manual	2.4	3.3	4.0	Quantitative	3 days	>4.0 m	+/- 0.3 m	
416 – Macintyre River Valley												
56227	416009	Inverell (Ross Hill) *	Local Council	Manual	3.0	4.3	5.2	Quantitative	3 hrs	>3.0 m	+/- 0.3 m	
54145	416006	Ashford *	Water NSW	Automatic	2.2	4.0	6.0	Quantitative	3 hrs	>2.2 m	+/- 0.3 m	
554014	416058	Yetman Bridge *	Water NSW	Automatic	5.0	7.6	9.1	Quantitative	6 hrs	>5.0 m	+/- 0.3 m	
541030	416201	Goondiwindi Weir	WaterNSW		3.5	6.1	8.5	Queensland BoM				
n/a	n/a	Boomi	Border Rivers Commission		n/a	n/a	n/a	No				Yes
53101	416002	Boggabilla *	Water NSW	Automatic	5.0	11.5	12	Quantitative	6 hrs	>5.0 m	+/- 0.3 m	
425 – Barwon Darling River												
052068	416001	Mungindi *	Water NSW	Automatic	6.1	6.7	7.2	Quantitative	24 hrs	>6.1m	+/- 0.3 m	
548000	422004	Mogil Mogil *	Water NSW	Automatic	7.5	n/a	8.3	Quantitative	24 hrs	>7.5m	+/- 0.3 m	
48226	422003	Collarenebri *	Water NSW	Automatic	5.8	7.9	8.5	Quantitative	24 hrs	>5.8m	+/- 0.3 m	
552014	422001	Walgett *	Water NSW	Automatic	10.5	12.0	12.5	Quantitative	24 hrs	>10.5m	+/- 0.3 m	
48214	422002	Brewarrina *	Water NSW	Automatic	6.4	7.0	9.5	Quantitative	3 days	>10m	+/- 0.3 m	
548004	425003	Bourke *	Water NSW	Automatic	9.5	11.4	12.7	Quantitative	3 days	>13.2 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
548005	425004	Louth *	Water NSW	Automatic	8.6	10.0	12.0	Quantitative	3 days	>13.6 m	+/- 0.3 m	
48213	425900	Tilpa *	Water NSW	Automatic	9.0	10.5	11.5	Quantitative	3 days	>12.2 m	+/- 0.3 m	
546010	425002	Wilcannia *	Water NSW	Automatic	9.0	9.7	10.4	Quantitative	3 days	>10 m	+/- 0.3 m	
47101	425001	Menindee *	Water NSW	Automatic	8.5	9.1	9.7	Quantitative	2 days	>8.8 m	+/- 0.3 m	
47103	425005	Pooncarie *	Water NSW	Automatic	6.8	7.6	8.7	Quantitative	2 days	>6.8m	+/- 0.3 m	
547015	425007	Burtundy *	Water NSW	Automatic	6.1	n/a	7.7	Quantitative	2 days	>6.1m	+/- 0.3 m	
418 – Gwydir River Valley												
556007	418008	Bundarra *	Water NSW	Automatic	8.0	9.1	10.7	Quantitative	3 hrs	>8 m	+/- 0.3 m	
54141	418013	Gravesend *	Water NSW	Automatic	6.1	9.4	12.0	Quantitative	12 hrs	>6.1 m	+/- 0.3 m	
553000	418001	Pallamallawa *	Water NSW	Automatic	6.0	9.5	10.4	Quantitative	12 hrs	>6 m	+/- 0.3 m	
553002	418004	Yarraman Bridge	Water NSW	Automatic	4.0	6.5	7.0	Quantitative	12 hrs	5.5 m	+/- 0.3 m	
									24 hrs	>7 m		
554009	418025	Bingara	Water NSW	Automatic	5.5	7.6	9.1	Info Location				
553001	418002	Moree	Water NSW	Automatic	5.5	7.6	8.8	Quantitative	12 hrs	>5.5 m	+/- 0.3 m	
									24 hrs	>7.0 m		
419 – Namoi and Peel River Valley												

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
55277	419022	Manilla *	Water NSW	Automatic	6.1	9.7	10.7	Quantitative	7 hrs	>6.1 m	+/- 0.3 m	
55307	419009	Tamworth *	Water NSW	Automatic	3.0	4.2	6.0	Quantitative	6 hrs	>3 m	+/- 0.3 m	
555024	419909	Carroll Village	Local village	Manual	8.2	8.8	9.3	Quantitative	6 hrs	>8.2 m	+/- 0.3 m	
555000	419001	Gunnedah *	Water NSW	Automatic	7.3	7.6	7.9	Quantitative	24 hrs	>7.3 m	+/- 0.3 m	
555004	419012	Boggabri	Water NSW	Automatic	7.0	n/a	n/a	Quantitative	12 hrs	>7.0m	+/- 0.3 m	
54152	419003	Narrabri Creek *	Water NSW	Automatic	4.9	6.4	6.7	Quantitative	6 hrs	>4.9m	+/- 0.3 m	
53105	419900	Wee Waa *	Water NSW	Automatic	5.3	6.4	6.7	Quantitative	12 hrs	>5.3m	+/- 0.3 m	
552000	419021	Bugilbone *	Water NSW	Automatic	4.9	5.5	n/a	Quantitative	12 hrs	>4.9m	+/- 0.3 m	
055310	419027	Breeza	Water NSW	Automatic	n/a	3.9	4.8	Info location				Yes
552011	419026	Goangra *	Water NSW	Automatic	5.5	6.7	7.8	Quantitative	12 hrs	>5.5 m	+/- 0.3 m	
420 – Castlereagh River Valley												
564000	420004	Mendooran *	Water NSW	Automatic	3.3	5.0	9.0	Quantitative	6 hrs	>3.3m	+/- 0.3 m	
51144	420001	Gilgandra *	Local Council	Manual	5.0	6.4	7.9	Quantitative	6 hrs	>5.0m	+/- 0.3 m	
564005	420022	Coonabarabran	Water NSW	Automatic				No				Yes
51143	420005	Coonamble	Local Council	Manual	n/a	4.9	5.2	Quantitative	6 hrs	>4.9m	+/- 0.3 m	
421 – Macquarie River Valley												

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
63287	421908	Bathurst	Local Council	Automatic	3.0	4.5	5.7	Quantitative	12 hrs	>6m	+/- 0.3 m	
565002	421003	Wellington-Macquarie *	Water NSW	Automatic	4.0	9.1	12.2	Quantitative	3 hrs	>4.0m	+/- 0.3 m	
562006	421008	Wellington-Bell *	Local Council	Manual	3.4	5.9	8.4	Quantitative	3 hrs	>3.4m	+/- 0.3 m	
563026	421911	Molong – Wellington Bridge ^	Local Council	Manual	n/a	3.3	3.9	Quantitative	1 hr	>3.3m	+/- 0.3 m	
n/a	n/a	Orange	No specific forecast location exists – forecast based on exceedence of a rainfall threshold as per trigger height column.					Generalised	1 hr	>70mm in 6hrs	n/a	
565001	421001	Dubbo *	Water NSW	Automatic	5.5	7.9	11.0	Quantitative	6hrs	>5.5m	+/- 0.3 m	
551000	421006	Narromine *	Local Council	Manual	5.5	9.1	13.7	Quantitative	6hrs	>5.5m	+/- 0.3 m	
n/a	n/a	Geurie			n/a	n/a	n/a	No				Yes
51145	421014	Warren	Water NSW	Manual	7.5	8.5	9.0	Quantitative	12hrs	>7.5m	+/- 0.3 m	
421 – Bogan River Valley												
550001	421076	Peak Hill *	Water NSW	Automatic	2.5	4.6	6.0	Quantitative	3 hrs	>2.5m	+/- 0.3 m	
551002	421083	Dandaloo *	Water NSW	Automatic	4.1	5.2	6.0	Quantitative	12 hrs	>4.1m	+/- 0.3 m	
51155	421905	Mudall *	Bureau	Manual	2.7	3.0	3.6	Quantitative	24 hrs	>2.7m	+/- 0.3 m	
51156	421138	Nyngan *	Water NSW	Automatic	n/a	3.5	4.2	Quantitative	24 hrs	>3.5m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
48225	421902	Mulgawarrina *	Bureau	Manual	4.2	5.0	5.5	Quantitative	24 hrs	>4.2m	+/- 0.3 m	
548010	421023	Gongolgon *	Water NSW	Automatic	0.8	1.0	1.3	Quantitative	24 hrs	>0.8m	+/- 0.3 m	
412 – Lachlan River Valley												
63278	412002	Cowra *	Water NSW	Automatic	8.5	10.7	13.4	Quantitative	6 hrs	>8.5 m	+/- 0.3 m	
065087	412009	Canowindra *	Water NSW	Automatic	4.0	4.5	5.5	Quantitative	3 hrs	>4.0m	+/- 0.3 m	
565007	412057	Nanami *	Water NSW	Automatic	7.4	9.7	10.7	Quantitative	6 hrs	>7.4m	+/- 0.3 m	
									12 hrs	>10.7m		
65086	412904	Eugowra-town	Bureau	Manual	8.0	n/a	9.0	Quantitative	6 hrs	>8.0m	+/- 0.3 m	
65088	412901	Forbes Iron Bridge*	Local Council	Automatic	8.8	9.5	10.55	Quantitative	12 hrs	>8.8 m	+/- 0.3 m	
									24 hrs	>10.4 m		
565003	412004	Cottons Weir *	Water NSW	Automatic	3.5	5.3	6.6	Quantitative	24 hrs	>3.5m	+/- 0.3 m	
565000	412036	Jemalong Weir *	Water NSW	Automatic	7.2	7.5	7.7	Quantitative	48 hrs	>7.2 m	+/- 0.3 m	
550000	412006	Condobolin *	Water NSW	Automatic	5.2	5.9	6.7	Quantitative	48 hrs	>5.2 m	+/- 0.3 m	
49125	412903	Euabalong *	Bureau	Manual	6.4	n/a	6.8	Quantitative	3 days	>5.8 m	+/- 0.3 m	
		Ungarie			n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
575013	412039	Hillston Weir *	Water NSW	Automatic	2.4	2.8	3.0	Quantitative	3 days	>2.4 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
n/a	n/a	Stockinbingal^	No specific forecast location exists – forecast based on exceedance of a rainfall threshold as per trigger height column					Generalised	1hr	>50mm in 6hrs	n/a	Yes
n/a	n/a	Ardlethan			n/a	n/a	n/a	No				Yes
n/a	410146	Barellan			n/a	n/a	n/a	No				Yes
n/a	n/a	Beckom			n/a	n/a	n/a	No				Yes
575006	412011	Lake Cargelligo	Water NSW		1.5	1.9	2.0	Info location	n/a	n/a	n/a	Yes
75171	412005	Booligal Weir	Water NSW	Automatic	2.4	n/a	n/a	Quantitative	3 days	>2.4 m	+/- 0.3 m	
410 – Queanbeyan Molonglo River Valley												
570033	410901	Queanbeyan	Local Council	Manual	4.2	7.4	8.2	Quantitative	6 hrs	>4.2m	+/- 0.3 m	
570012	410705	Burbong (Molonglo)	ACT Government	Automatic	1.6	2.2	2.8	Info Location				
570943	410729	Oaks Estate	ACT Government	Automatic	4.6	5.8	6.4	Quantitative	6 hrs	>4.5m	+/- 0.3 m	
410 – Murrumbidgee River Valley												
n/a	n/a	Cootamundra	No specific forecast location exists – forecast based on exceedance of a rainfall threshold as per trigger height column.					Generalised	1 hr	>50mm in 6hrs	n/a	
570031	410902	Cooma SMEC	Local Council	Automatic	n/a	n/a	1.8	Quantitative	1 hr	>1.8 m	+/- 0.3 m	
570035	410081	Cooma – Koolaroo	Local Council	Automatic	n/a	n/a	3.8	Quantitative	1 hr	>3.8m	+/- 0.3 m	
572014	410006	Tumut *	Water NSW	Automatic	2.0	2.6	3.7	Quantitative	3 hrs	>2.0 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
73132	410004	Gundagai *	Water NSW	Automatic	6.1	7.6	8.5	Quantitative	12 hrs	>6.1 m	+/- 0.3 m	
573000	410001	Wagga Wagga *	Water NSW	Automatic	7.3	9.0	9.6	Quantitative	12 hrs	7.3 m	+/- 0.3 m	
									24 hrs	9.0 m		
									30 hrs	>9.6 m		
574020	410005	Narranderra *	Water NSW	Automatic	6.7	7.3	8.2	Quantitative	5 days	6.7 m	+/- 0.3 m	
575011	410021	Darlington Point *	Water NSW	Automatic	5.5	7.0	7.3	Quantitative	7 days	5.5 m	+/- 0.3 m	
75170	410078	Carrathool *	Water NSW	Automatic	7.0	7.5	8.5	Quantitative	10 days	7.0 m	+/- 0.3 m	
575010	410002	Hay-town *	Local Council	Manual	6.5	7.5	8.0	Quantitative	10 days	6.5 m	+/- 0.3 m	
574039	410169	Yanco	Water NSW		n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
n/a	n/a	Ganmain			n/a	n/a	n/a	No				Yes
n/a	n/a	The Rock (Burke Creek)			n/a	n/a	n/a	No				Yes
570009	410026	Yass	Water NSW	Automatic	n/a	n/a	n/a	No	n/a	n/a	n/a	Yes
549001	410130	Balranald- Weir Downstream*	Water NSW	Automatic	6.7	6.9	7.1	Quantitative	10 days	>6.5 m	+/- 0.3 m	
409 – Murray River Valley												
572000	409001	Albury *	Water NSW	Automatic	4.3	4.9	5.5	Quantitative	12 hrs	>5.5 m	+/- 0.3 m	
582003	409002	Corowa *	Water NSW	Automatic	4.6	5.9	8.6	Quantitative	24 hrs	>6.0 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
74246	409025	Yarrowonga D/S *	Water NSW	Automatic	6.4	6.7	7.8	Quantitative	24 hrs	>6.4 m	+/- 0.3 m	
574004	409202	Tocumwal *	Murray-Darling Basin Authority	Automatic	6.4	6.7	7.3	Quantitative	24 hrs	>6.4 m	+/- 0.3 m	
574000	409200	Moama / Echuca *	Murray-Darling Basin Authority	Automatic	93.5	93.9	94.4	Quantitative	24 hrs	>93.5 m	+/- 0.3 m	
574003	409207	Torumbarry Weir *	Murray-Darling Basin Authority	Automatic	7.3	7.6	7.8	Quantitative	24 hrs	>7.3 m	+/- 0.3 m	
575000	409005	Barham *	Water NSW	Automatic	5.5	5.8	6.1	Quantitative	24 hrs	>5.5 m	+/- 0.3 m	
76112	409204	Swan Hill *	Murray-Darling Basin Authority	Automatic	4.5	4.6	4.7	Quantitative	24 hrs	>4.5 m	+/- 0.3 m	
574010	409003	Deniliquin *	Water NSW	Automatic	4.6	7.2	9.4	Quantitative	24 hrs	>4.6 m	+/- 0.3 m	
575001	409014	Moulamein *	Water NSW	Automatic	4.6	5.2	6.1	Quantitative	24 hrs	>4.6 m	+/- 0.3 m	
574024	409023	Stevens Weir *	Water NSW	Automatic	5.5	5.8	6.6	Quantitative	24 hrs	>5.5 m	+/- 0.3 m	
49115	414203	Euston Weir *	Murray-Darling Basin Authority	Automatic	9.1	9.8	10.3	Quantitative	24 hrs	>9.1m	+/- 0.3 m	
76124	414210	Mildura AHD *	Murray-Darling Basin Authority	Manual	36.0	37.5	38.5	Quantitative	24 hrs	>36.0 m	+/- 0.3 m	
47100	425010	Wentworth Weir *	Water NSW	Automatic	7.3	7.9	9.1	Quantitative	24 hrs	>7.3 m	+/- 0.3 m	
76120	414200	Wakool Junction *	Murray-Darling Basin Authority	Automatic	8.8	10.5	11.5	Quantitative	24 hrs	>8.8 m	+/- 0.3 m	
76135	414201	Boundary Bend *	Murray-Darling Basin Authority	Automatic	8.0	8.5	9.0	Quantitative	24 hrs	>8.0 m	+/- 0.3 m	

Bureau number	AWRC number	Gauge Name	Station owner	Gauge type	Flood classification (m)			Flood Warnings provided by the Bureau	Target warning lead time		70% of peak forecasts within	Local Flood Advice provided by NSW SES
					Minor	Moderate	Major		Time	Trigger height		
72156	401201	Jingellic	Victoria		4.0	5.5	7.0	Warnings issued in conjunction with BoM Victoria office				

5. Document Control

It is the responsibility of NSW SES to maintain the currency of this plan by:

- Ensuring all supporting emergency services and functional areas, organisations and officers mentioned in it are aware of their roles and responsibilities;
- Conducting exercises to test arrangements;
- Reviewing the contents of the plan:
 - After flood operations
 - When changes to the use of land
 - When there are changes which alter agreed plan arrangements
 - Following the review of the Bureau's [Service Level Specification for Flood Forecasting and Warning Services for New South Wales and the Australian Capital Territory](#)