

# Flood classifications in Queensland

A best practice guide for local governments



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*Image: (cover) Gauge, located at Bedourie, (below) Flooding, Fitzroy River, Rockhampton, 2011, (right) manual gauge, Fitzroy River.*  Interpreter



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#### Consultation

Developed in consultation with the Bureau of Meteorology.

#### Copies

Copies of this publication are available on our website at www.qra.qld.gov.au/flood-classifications

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# About this guide

## Flood classifications in Queensland – A best practice guide for local governments

The aim of this guide is to assist Queensland's local governments to understand:

- flood classifications
- river heights and flood forecasts
- different types of gauges
- flood warnings based on a river height
- how to determine and set flood classifications
- considerations when reviewing flood classifications
- roles and responsibilities of key stakeholders.

The guide has been developed in consultation with the Bureau of Meteorology (the Bureau). It clearly outlines the four steps for local governments to be able to review flood classifications:

- 1. map community assets
- 2. relate impacts to a gauge or forecast location
- 3. identify impacts and link to a gauge height
- 4. consider community education and awareness (flood mapping).

## Audience for this guide

The intended audience for this guide is primarily local government authorities, however additional audiences may include:

- local disaster management groups
- district disaster management groups
- emergency and disaster management stakeholders and professionals
- state and federal government agencies
- experts across the range of natural disasters, hazards and risk management
- non-government organisations who have a role in prevention, preparedness, response and recovery.

## **Resilient Queensland**

This guide is an initiative of Resilient Queensland 2018-2021, and aligns with all four objectives of the Queensland Strategy for Disaster Resilience:

- 1. We understand the potential disaster risks we face
- 2. We work together to better manage disaster risk
- 3. We seek new opportunities to reduce disaster risk
- 4. We continually improve how we prepare for, respond to and recover from disasters.



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Image: Flood Warning Infrastructure Network meeting, Rockhampton.



# **Understanding floods**

Floods are a natural part of the Queensland landscape. Floods vary greatly in size, extent, duration and frequency. No flood is the same, and as such floods can have different impacts.

Sudden, heavy and intense rainfall can cause floods to quickly rise in the minutes or hours that follow. These are known as flash floods and are typically associated with relatively small catchment areas.

Floods can occur slowly in large catchment areas, where rainfall can build up over hours, days or weeks. The runoff from this rainfall may create significant floods that inundate large areas of land for days, weeks or months. Floods impact on both individuals and communities, and have social, economic, and environmental consequences. The consequences of floods, both negative and positive, vary greatly depending on the location and extent of flooding, and the vulnerability and value of the natural and constructed environments they affect.

Through data collection and analysis, city administrators, hydrologists, engineers and planners identify and delineate those areas likely to be exposed to flood waters and where possible mitigate the likely impacts of future floods.

Therefore a flood prediction and or warning is of little value unless the community understands what it means with regards to the likely impact and what they need to do in response to their individual situation.



#### Useful resource

The Bureau of Meteorology has published an article titled *Explainer: what is a flood?* (2019) to help us understand floods, what causes floods, and how to know if there's one on the way.

The article also contains educational videos that cover understanding floods, topographic drainage divisions and river regions.

http://media.bom.gov.au/social/blog/2156/exp lainer-what-is-a-flood/

Image: (top) Flooding, Fitzroy River, 2011.



# Flood warnings in Queensland: Roles and responsibilities

In Queensland, the effectiveness of the flood warning system depends on the cooperative involvement of the Bureau of Meteorology (the Bureau), Queensland Government agencies and local governments working with flood-threatened communities.

The roles and responsibilities of all key stakeholders involved in the provision of a flood warning service in Queensland are described in the National Arrangements for Flood Forecasting and Warning (Bureau of Meteorology, 2015) available at http://www.bom.gov.au/water/floods/document/Natio nal\_Arrangements\_V4.pdf.

Coordination of the development and operation of flood warning services in Queensland is via the Queensland Flood Warning Consultative Committee (FWCC), a joint Commonwealth, state and local government committee chaired by the Bureau.

#### Local government responsibilities

The National Arrangements for Flood Forecasting and Warning state that in Queensland the establishment of flood classification levels rests with local government, in consultation with the Bureau.

These levels are determined by local government, based on the Bureau's standard descriptions of flood effects, historical data and relevant local information. After councils determine the level and impacts, these are used by the Bureau when flood warnings are issued for the location.

Flood classifications can be revised at any time and should be reviewed if there have been any changes to infrastructure or flood behaviour that impacts a community. The Service Level Specification (SLS) for Flood Forecasting and Warning Services for Queensland Version 3.1 (2018) is provided to Queensland by the Bureau, in consultation with the Queensland Flood Warning Consultative Committee.

The SLS describes the flood forecasting and warning services provided by the Bureau for Queensland and is available at

http://www.bom.gov.au/qld/flood/brochures/QLD\_S LS\_current.pdf.

#### **Queensland flood forecast locations**

The SLS provides Queensland's full list of forecast locations in the <u>SLS (Schedule 2 on p18)</u> which includes station owners, gauge type, and flood classification.



*Image: (inset) The Service Level Specification and Warning Services for Queensland – Version 3.1. Image: (top) Flinders Highway bridge damage, Monsoon Trough, 2019.* 



## Flood classifications

The Bureau of Meteorology (the Bureau) uses a three tiered classification scheme that defines flooding as minor, moderate or major at key river height stations, known as the river gauge locations. Each classification is defined by the water level that causes certain impacts upstream and downstream of the station. These levels have been determined and described based on standard descriptions of flood effects (see below), historical data and relevant local information.

**MINOR FLOODING** - Causes inconvenience. Lowlying 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 Minor flood effects, the area of inundation is more substantial. Main traffic routes may be affected. Some buildings may experience water 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 Moderate flood effects, 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.

#### **Useful resource**

**Video:** The Bureau of Meteorology video titled *Understanding Flood Classifications* explains the Minor, Moderate and Major flood classifications, and the difference between flood watches and warnings. It is available on YouTube at:

https://www.youtube.com/watch?v=gKDPgp5D s9s



#### **Useful resource**

**Manual 21:** Flood Warning (2009) from the Australian Disaster Resilience Knowledge Hub at www.knowledge.aidr.org.au (Note: This manual was under review at the time of publication).



Image: (top) Flooding, Condamine River.



# **River heights and flood forecasts**

## Understanding river heights

We can significantly improve the disaster resilience of Queensland communities by increasing our understanding of flood risk, river height levels and impacts, and flood warning systems.

Rainfall and river height level data is published on the Bureau's website at

http://www.bom.gov.au/qld/flood. This information is used by emergency services and other operational agencies, commercial businesses and the public to monitor rainfall and river conditions.

The Bureau uses the data it collects for enhanced hydrological modelling used for flood predictions.

River heights can be referenced to key locations or relevant landmarks (e.g. nearby crossings/bridges or causeways), and referenced to the levels at which flooding can affect residential and other buildings, and cropping/grazing land.

Community engagement is an important step during any review of flood classifications. When the impacts and consequences of rising river water are understood by the community, flood warnings are at their most effective.

## **Flood forecasts**

Flood forecasts are critical to emergency responses to avoid loss of life and limit property damage.

Flood forecasters at the Bureau rely heavily on realtime data from radars, rainfall and river water heights. The Bureau uses hydrological computer models to determine:

- how much rainfall will run off different parts of the catchment
- how water from different tributaries converges in the river network
- how long it will take for runoff to reach major waterways
- time water will take to travel to known points in the river system.

## Flood warning infrastructure

There are various types of flood warning infrastructure that capture data and information for the Bureau.

Rain gauges monitor the amount of rain falling on a catchment.

River gauges measure water levels along our river systems.

Satellites, radars, rainfall and river level gauges are generally the tools that the Bureau uses for their warning predictions.

Manual rain and river gauges are read by volunteers who visit the gauge and report to the Bureau on the amount of rain that has fallen or the height of the river on an hourly or daily basis.

Automatic rain and river gauges use a range of sensors that relay data to the Bureau on a real time basis either using 3G/4G or VHF.

Image: (top) Automatic gauge at Emerald, Eastern Side, Central Highlands Regional Council.



# Gauge types and functions

## **Images: Types of gauges**

- A. Automatic rain gauge
- B. Automatic rain and river gauge with a manual river gauge used as a backup
- C. Department of Natural Resources, Mines and Energy (DNRME) gauge hut used for water quality, water management, capturing rainfall and river flood height
- D. Automatic water level gauge usually found in creek systems
- E. Rain and river height gauge with a camera
- F. Manual river height gauge
- G. Manual river height gauge
- H. Manually read rain gauge



Image: (top) DNRME Gauge, Burke River.



# **Describing the Flood Warning Service**

The Bureau will provide detailed flood warnings for key locations and general flood warnings to other locations, which typically include a statement about:

- reference to the relevant flood classification which provides potential impact information
- current and expected levels of flooding at a key location
- weather forecast
- latest available observations of river height and rainfall in the area.

To assist in describing a Flood Warning Service, the gauge locations where river height observations are made are categorised into three types:

- forecast location
- information location
- data location.

#### **Forecast location**

#### A forecast location as outlined in <u>Schedule 2 of the</u>

Service Level Specification is a location for which the Bureau provides a forecast of a future water level either as the class of flood that is predicted (minor, moderate or major) or as a level and class e.g. 4.6 metres – MAJOR flood level.

#### Information location

An information location is a location at which observations of water level data are provided, and where flood classifications (minor, moderate or major) are defined.

Forecasts of projected future water levels are not provided.

Information locations also assist the Bureau with warnings to forecast locations.

#### **Data location**

A data location is a location for which only the observed water level data is provided.

Flood classifications (minor, moderate or major) are not available for these locations and forecasts of future water are not produced.

Data locations provide the Bureau with data to make predictions at information locations and forecast locations.



# Setting flood classifications

Local governments in Queensland, through their Local Disaster Management Group (LDMG), are responsible for the initial determination, review and update of flood classifications in their area. This is done in consultation with the Bureau and other relevant state agencies (e.g. Sunwater) so they accurately reflect the impacts at key river height stations.

Based on that information the Bureau will ensure that flood watches and warning advices are relevant and effective.

Additionally, flood classifications require regular review to ensure they continue to reflect the expected or known flood impacts. Local development or changes to infrastructure (e.g. bridges/levees) are common reasons that flood classifications may require review.

Flood classifications for all stations in Queensland are part of the Flood Warning Network and are listed by the Bureau in the <u>SLS</u>. The SLS is generally updated on an annual basis. In Queensland the establishment of flood classification levels rests with local government, in consultation with the Bureau.

Flood classifications allow the expected or observed impact and severity of flooding to be clearly communicated and understood by the:

- a. community
- b. State Disaster Coordination Centre (SDCC)
- c. Australian Government Crisis Coordination Centre (AGCCC) in some situations.

There is a risk that incorrect flood classifications can breed complacency in the community – "it's just another major flood."

*Image: (top) Flooding, Idalia, Townsville, 2019. Image (below): Example from the SLS.* 

Basin	Station No	Station Name	First Report	Bridge Height	Minor Fld Ht.	Crops Grazg	Moderate Fld Ht.	Towns Fld Ht.	Major Fld Ht.
BURDEKIN	032063 532017	BLUE RANGE BLUE RANGE TM	7.0	3.20 E 3.20 E	B 8.0 B 8.0	20.0 20.0	12.0 12.0		15.0 15.0
	034085 533075	SELLHEIM SELLHEIM ALERT	2.0	13.50 E 13.50 E	5.5 B 12.0 B 12.0	14.0 14.0	11.5 14.0 14.0	18.0 18.0	17.0 15.0 15.0
	533011 535296 035236	SELLHEIM TM RIVINGTON ALERT RIVINGTON	2.0	13.50 E 2.20 ) 2.20 E	B 12.0 K 3.5 B 3.5	14.0	14.0 6.0 6.0	18.0 7.5 7.5	15.0 7.0 7.0
	035229	ALPHA	2.0	11.20 8	B 7.0	7.0	7.5	8.0	8.0



# Considerations when reviewing flood classifications

The following checklist is provided as a guide for the review of flood classifications.

- □ Check current flood classifications and when they were last reviewed / updated.
- Determine, if possible, how the existing flood classifications were established (i.e. based on past floods, survey details, or detailed flood mapping).
- Collect all of the available sources of flood impacts. This may include the identification of flood marks or debris lines, which can be surveyed for extra context. This data collection process is likely to include a crosssection of stakeholders from local, state and federal agencies as well as asset infrastructure owners, the general public and business owners in the community.
- Check to see what critical infrastructure and other important community infrastructure has been surveyed (or needs to be) and could be affected or impacted e.g. bridge decks and approaches, community facilities, habitable floor areas for at risk locations, etc.
- Check if the flood classifications are in line with the expected or known flood impacts across the community, as per flood classification definitions (minor, moderate, and major).
- Check if the flood classifications and impacts are reflected in the current local disaster management plans, arrangements, sub plans and any other associated plans.

- Investigate whether there have been any flood studies or modelling undertaken in the area since the last review of flood classification that might provide more information and context.
- Check if the river height station has been relocated, rebuilt or modified in any way since the flood classifications were last reviewed. Has the gauge zero (point above which the water level is measured) been adjusted? Is there a confusion as to which river height station is the point of reference?
- Determine if there has been any development or physical changes in the area (e.g. levee construction, bridge works) since the flood classifications were last reviewed / updated.
- If there is no impact or community consequence at a location, there may not be a need for a flood classification. Sometimes the original reason it was put in place is no longer relevant e.g. a bridge that previously flooded has been raised or recent mitigation works have alleviated the risk and community impacts.
- Once flood classifications are updated, community education is required to ensure the changes are well understood. Ensure the updates are added to the disaster management, sub plans and operating procedures for both the Local Disaster Management Group (LDMG) and District Disaster Management Group (DDMG).

Image: Flood Warning Infrastructure Network workshop, Cloncurry, September 2019.



# Initial sources of flood information

Flood classifications are impact-based. All available information, including flood mapping and local knowledge, needs to be assessed in determining the flood classification.

## **Flood mapping**

Outputs from flood studies provide an initial assessment into the probable flood extent and potential impacts as well as a flood height at a known gauge location.

Flood classifications are linked to on-the-ground impacts. Outputs of a flood study are primarily used for land use planning purposes to identify those areas that are most at risk of flooding. They also provide a visual representation of possible flood inundation.



Local knowledge is invaluable and is considered by the Bureau as the most critical of information sources.

Local knowledge is likely to be held by council staff, disaster management agencies (including SES), generational landowners and residents, the Bureau, state water agencies, catchment management authorities and other interested parties.



*Image: (above) Example of a flood map showing the flood extent of a modelled event.* 

Image: (top) Currawong Station on the Maranoa River, near Mitchell.



*Graphic: (above) The relationship between flood classification and community impacts .* 



# Step-by-step guide to review flood classifications

# Four steps to review flood classifications

The four steps to review flood classifications are outlined in the following sections of this guide:

Step 1. <u>Map comm</u>unity assets

## Step 2.

Relate impacts to a known river gauge or forecast location

## Step 3.

Identify the community impacts and link them to a gauge height

## Step 4.

Community education and awareness (flood mapping)



Image: (top) Courtesy of Queensland Museum Network, photo by Gary Cranitch, (inset) Warwick flood classification board.



# Step 1. Map community assets

#### Map your important community assets

Flood classifications are in place to understand how things the community values may be impacted during a flood event.

#### **Key considerations**

- What are the important assets to the community?
- What are the important assets for council that if impacted will affect service delivery?

The first step in the process is to map the area of interest and surrounding area, including community assets such as:

- building and infrastructure
- human and social aspects (parks, areas of cultural importance, etc.)
- roads, bridges and other transport infrastructure
- environmental assets
- economic assets
- other points of interest.

#### Assistance

For local governments with access to a GIS system, seek assistance from your spatial team for this task.

For local governments without a GIS capability, utilise the Queensland Globe (seek training from the Department of Natural Resources, Mines and Energy if you have not used it before). The Queensland Globe is published at: https://qldglobe.information.qld.gov.au/

#### **Data sources**

Primary sources include:

- council asset databases (the council asset databases are always the primary point of truth)
- any existing flood studies
- local knowledge
- historical records.

Secondary sources include:

- Queensland Globe (QGlobe)
- Queensland Emergency Management Risk Framework (QEMRF) data catalogue.

#### Checklist - Before you move to Step 2

- There is survey data of critical locations that can be related to a river gauge.
- Map (printed or in digital form) clearly identifies the important community assets impacted.
- Guidance from the community and relevant interests defines the important community assets.
- Critical infrastructure that will affect service delivery, if impacted, has been identified.

Image: (top) Flooding in central Ipswich, 2011.



## Step 2. Relate impacts to a gauge or forecast location

# Relate impacts back to a known gauge or forecast location

The first step to link impacts back to a known gauge or forecast location is understanding where the gauges are located.

The Bureau provides river height brochures and flood warning network maps to assist council in building this knowledge.

Each river brochure outlines flood risk, current flood classifications, and most importantly a table that summarises the flood history of the named river catchment.

Select or confirm the gauge that will be used.

For initial detail on this gauge, key flood heights are recorded at each forecast location within a catchment. It is likely that the Bureau may hold additional information for all of the other stations in the catchment area so it is worthwhile involving the Bureau at this stage.

### **Useful resources**

Flood Warning in Queensland http://www.bom.gov.au/qld/flood/brochure s/qld/fld\_qld.shtml

Queensland River Maps http://www.bom.gov.au/qld/flood/brochure s/river\_maps.shtml

Flood Event	Yatton	Tartrus	Emerald	Taroom	Theodore	Moura	Baralaba	Yaamba	Rockhampton
Jan 1918	-	17		6.71			10	17.32	10.11
Feb 1954	8	17.48	14.12	8.15	13.64		15.52	16.59	9.40
Jan/Feb 1978	17.99	16.60	12.97	<b>4</b> .08	11.27	10.46	11.85	14.75	8.15
May 1983	15.39	14.90	12.00	7.46	13.24	12.09	13.60	14.97	8.25
Jan 1991	17.64	18.10		6.24	7.98	6.60	9.45	16.65	9.30
Jan 2008	17.07	16.20	15.36	6.07		8.00	17	14.25	7.50
Feb/Mar 2010	15.68	11.81	9.40	7.26	13.45	12.23	12.50	10.73	5.30
Dec 10/ Jan 11	16.54	16.34	16.05	10.43	14.70	12.66	15.25	16.55	9.20
Feb/Mar 2012	17.38	15.90		6.35	9.78	8.52	-	13.50	7.10
Jan/Feb 2013	2	15.86		5.32	9.03	9.30	17	15.70	8.61
Mar/Apr 2017	19.68	18.29	<u> </u>			12	2	16.10	8.9

All heights are in metres on flood gauges.

Image: An example of flood history tables for the Fitzroy River.



# Step 3. Identify impacts and link to a gauge height

# Templates to identify impacts and link these to a gauge height

Sample templates on the following pages demonstrate how councils can identify impacts and link them to a gauge height for minor, moderate and major flood classifications.

The sample templates are available for download at: www.qra.qld.gov.au/flood-classifications.



*Image: (top) Manual gauge at Charleville which is the forecast location, (right) Burdekin Cislowski Road, Plantation Creek.* 

Flood classification (Forecast location)	Impact	Yes / no (where)	Expected height of impact	Height at gauge
MINOR Causes inconvenience. Low-lying areas next to watercourses are inundated. Minor roads	Inconvenience	Yes No	1.2M	3.5m
		example: Bottom of Le Park next to river and playground	emke	
	Low lying areas	Yes No	1.25m	3.5m
may be closed and low- level bridges submerged.		example: Yorks Flats a with Kerry Rd	along	
In urban areas inundation may affect some	Minor roads	Yes No	1.2M	3.6m
backyards and buildings below the floor level as	closed	example: End of Black and Jeremy St	rs Rd	
well as bicycle and pedestrian paths. In rural areas, removal of stock	Low level bridges	Yes No		
and equipment may be required.	Inundation in urban areas	Yes No	1.3m	3.7m
		example: Stafford Low and parts of Anzac Ave	vlands enue	
	Backyards inundated	Yes No	1.3m	3.7m
		<i>example: Backyards a Jeremy St in Stafford Lowlands, approx. 14 backyards</i>	long	
	Buildings below floor level	Yes No		
	Bicycle and pedestrian paths impacted	Yes No		
	Stock are	Yes No	1.3m	3.7m
	to higher ground	<i>example: Properties a Yorks Flats next to rive moving cattle</i>	long er are	
	Farm	Yes No	1.25m	3.5m
	being moved	<i>example: Pumps and irrigation equipment b moved along upper SI adjacent to Spring Cre</i>	being haw Rd bek	

Flood classification (forecast location)	Impact	Yes / no (where)	Expected height of impact	Height at gauge
<b>MODERATE</b> In addition to the minor effects, the area of inundation is more	Inundation in some areas is more substantial	Yes No example: End of Chambers Rd is now closed. Chambers Flat and surrounding areas are inundated	2.6m	5.2m
substantial. Main traffic routes may be affected. Some buildings may be affected above the floor level. Evacuation of	Main traffic routes may be affected	Yes No example: Main axis route into township (Flinders Hwy) is closed to the north	2.7M	5.3m
flood affected areas may be required. In rural areas, removal of stock is required.	Some buildings are likely to be affected above floor level	Yes No example: Buildings in Ramsey Industrial estate are being impacted above floor level. Just for Cars and Detroit Diesel businesses are being inundated	2.8m	5.4m
	Evacuation of flood affected areas may be required	Yes No		
	Stock needs to be moved to higher ground	Yes No example: All stock along properties within Chambers Flat, Ferry Downs, Johnstone Pike and Tree Tops are being inundated. Stock are currently being moved to higher ground	2.6m	5.2m
	Farming equipment (pumps and irrigation lines) need to be moved	Yes No example: All properties along eastern side of Charmeston River down to Peaks Crossing will need to move farming equipment	2.6m	5.2m

Flood classification (Forecast location)	Impact	Yes / no (where)	Expected height of impact	Height at gauge
MAJOR In addition to the moderate effects, 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.	Extensive rural areas are inundated and isolated	Yes No example: Chambers Rd is now closed. All properties along Road are now inundated	4.3m	6.7m
	Urban areas are inundated and in some areas islands with isolation are identified	Yes No example: All streets around Kitchener Rd are inundated and isolated	4.4m	6.8m
	Many buildings are impacted and affected above floor level	Yes No example: approx. 107 homes within Boundary Suburb are effected	4.4m	6.8m
	Properties and townships are likely to be isolated	YesNoExample: Tree Tops and Ferry Downs are now isolated. Township of Ferry Downs is affected heavily	4.5m	6.9m
	Major rail and traffic routes are closed	Yes No example: Main line at Tree Tops and Ferry Downs is closed. Main traffic route north is closed in multiple locations	4.5m	6.9m
	Evacuation of flood affected areas may be required	YesNoexample: All properties along eastern side of Charmeston River down to Peaks Crossing will need to move farming equipment	4.5m	6.9m
	Utility services may be impacted	Yes No All services in Tree Tops, Ferry Downs, Scatia Plains and Kamarooka are impacted	4.5m	6.9m



## Communicating the hazard

## **Example: River flood impacts**

This is an example of river flood information shared with a community on the impact and consequences of rising water during a flood.

Height	Impacts	
7.0m – 7.6m	<ul> <li>South River Road flooded</li> <li>East Carnarvon flooded</li> <li>Water flowing out of Nickol Bay Flats</li> <li>Town levees designed to withstand 1961 flood or 7.61 metres at Nine Mile Bridge with 1.22 metres (4 feet) freeboard</li> </ul>	2
6.7m	All breakouts flowing	Α A
6.5m	<ul> <li>Water severs North West Coastal Highway at Geraldton turnoff and the road must be closed</li> <li>Water flows across South River Road</li> <li>Old Nine-Mile Bridge is overtopped</li> <li>Carnarvon is isolated by road</li> <li>East Carnarvon and South River Road are liable to flooding</li> </ul>	OR
6m	<ul> <li>Overflow into McGlad Road area</li> <li>As the River level rises the flow is reversed as water flows out of Nicol Bay Flats</li> </ul>	Z
5.0m – 5.5m	North River Road severed approximately 1.1 km west of Plantation Crossing	IODEI
4.5m	Gully overflows through assessments 110 and 113	RAT
3.5m – 4.0m	Lewers Island cut off	m
3m	Lewers Creek commences flowing	3
2.3m	> Bibbawarra Crossing is overtopped	INC
1.8m	Lewers Creek starts backing up	)R

**River flood effects** 



## Step 4. Community education and awareness (flood mapping)

Community education and awareness about flood maps and / or mapping products are vital for the communication of flood behaviour and the hazard.

Maps are a useful tool, however, community education should be based around the community impacts, possible consequences, and actions in response at various gauge levels. Refer to the graphic "Communicating the hazard" on the previous page.

Community engagement communication materials should recognise that your community will have different needs in interpreting flood information so the style of communication will need to cater to different needs.

#### **Useful resources**

Community Engagement Framework (Handbook 6) produced by Emergency Management Australia https://knowledge.aidr.org.au/resources/ha ndbook-6-community-engagementframework/

Building Resilience to Natural Disasters – Collaboration Guide available at https://www.qra.qld.gov.au/resilientqueensland/collaboration-guide Education and information flood maps should relate to levels on stream gauges via the following two processes:

 Mapping of flood model results at increments that directly correlate to levels on the gauge (rather than peak values). Depending on local flood behaviour, this might be at half metre increments or coarser / finer increments as warranted.

Additional levels relating to planning and critical infrastructure for example (such as development levels or levee immunity levels) are also valuable for emergency management purposes and should be described in public information.

- 2. Inclusion of a location-specific flood totem icon or sign that displays:
  - the flood classifications of minor / moderate / major flood levels (if available)
  - peak levels of historic flood (noting the date of the flood)
  - relevant design flood levels (particularly the Defined Flood Event)
  - levels of local landmarks (such as the town bridges or the local post office steps).

Where a flood height relates to a particular level on the gauge, this value should also be clearly highlighted on the totem.

*Image: (top) Example of a flood map showing flood extent at 5.4m on the gauge at Killarney (flood evacuation map, yellow zone).* 



#### Building community awareness and education

It is important to commence active and targeted community engagement and education in the review process and after changes to the flood warning service have been formalised by the Bureau.

Community meetings, media releases, social media posts with supporting brochures and handouts that identify the hazard, likely impact and consequences of rising water and actions are methods that may be utilised to deliver this message in preparation for future events.

It is important that any community engagement has a clear aim, objectives and succinct key messages. Outlined below is a generic starting point councils might use.

#### Aim

 Review flood classifications within the council area against the decision-making framework and national guidelines for flood warnings as outlined in this document.

Objectives

- Identify those in the community who receive flood warnings and public information
- Identify the impacts that must be communicated during flood events
- Identify the range of community understanding of flood classifications, what it means to them and what do they do with the information
- Identify to what extent relevant impacts can be inferred from predictions at the particular forecast location
- What actions do you expect the community to take at various gauge heights as forecasted by the Bureau?

#### **Key messages**

Flood classifications need to be meaningful and relevant to the community before and during a flood event as they are built into to the warnings issued by the Bureau.

Therefore accurate flood classifications are required to ensure that relevant warnings are issued and to ensure that the community properly understands the likely impacts and consequences to rising water and what to do in response.

A change to flood classifications does not change flood readings. In other words, a 6m flood is still a 6m flood and will have the same impact and effects.

If flood classifications are understated, we expose our community to risk. Any review will determine whether this should be called a minor, moderate or major flood level.

## Supporting material and resources

Resources, supporting material and examples are available from

- Local Government Authorities,
- the Queensland Reconstruction Authority and,
- The Bureau of Meteorology.

A resource sheet is provided on the following page.

Image: Mary River resilience workshop.



### **Educational videos**

The Queensland Reconstruction Authority (QRA) has produced a series of short educational videos to help Queenslanders understand flood risk at: https://www.qra.qld.gov.au/understand-yourflood-risk The video topics include:

- Understand your flood risk
- Flood warnings
- Flash flooding
- Riverine flooding
- How Queensland's river catchments work.



## **Understanding flood classifications**

To assist with community awareness, councils can also link to the Bureau's educational video on flood classifications.



The video is available at: https://www.youtube.com/watch?v=gKDPgp5 Ds9s&feature=youtu.be

## Fact sheet examples

Many councils provide examples of interactive flood mapping on their websites to assist local residents to determine their flood risk.



Image: Southern Downs Regional Council has a number of good examples of flood emergency action guides that explain flood classifications and how to use maps. These are available on Council's website at

https://www.sdrc.qld.gov.au/council/disastermanagement/flood-fact-sheets-and-information



# Ongoing review of the flood classifications

Once the flood classifications have been assessed for a local government area it is important to keep them relevant.

Development of any nature can occur in a floodplain. This may either positively or negatively impact flood effects and likely consequences on a town, locality or infrastructure.

Development of particular note includes bridge and other river crossing upgrades and flood mitigation works like a levee or creek diversion. Therefore, an annual assessment of flood impact is encouraged across all councils to ensure flood classifications remain consistent with expected impacts at the particular location.

A simple example of how this can be recorded is set out below.

If a change is required follow the process outlined in this document starting with Step 1.

Forecast Location (Name of location)						
Flood Classification	Revised Height at Gauge	Date	Next assessment			
MINOR	3.5m	22 Aug 2019	22 Aug 2021			
MODERATE	5.2m	22 Aug 2019	22 Aug 2021			
MAJOR	6.9m	22 Aug 2019	22 Aug 2021			

Images: Condamine flood classification board. (Right) Automatic rain and river gauge with camera, Diamantina.

Condomine

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www.qra.qld.gov.au/resilient-queensland