



New South Wales

# **Floodplain Management Plan for the Macquarie Valley Floodplain Order 2021**

under the

Water Management Act 2000

I, Melinda Pavey, the Minister for Water, Property and Housing, in pursuance of sections 45 (5) and 50 of the *Water Management Act 2000*, make this Order.

Dated this 20th day of September 2021.

**MELINDA PAVEY MP**

**Minister for Water, Property and Housing**

## **Explanatory note**

This Order repeals the *Macquarie River, Narromine to Oxley Station, Floodplain Management Plan 2008* and makes the *Floodplain Management Plan for the Macquarie Valley Floodplain 2021*.

This Order is made under sections 45 (5) and 50 of the *Water Management Act 2000*. The concurrence of the Minister for Energy and Environment was obtained prior to the making of the *Floodplain Management Plan for the Macquarie Valley Floodplain 2021*.

**Floodplain Management Plan for the Macquarie Valley Floodplain Order 2021**

under the

**Water Management Act 2000**

**1 Name of Order**

This Order is the *Floodplain Management Plan for the Macquarie Valley Floodplain Order 2021*.

**2 Commencement**

This Order commences on the day it is published on the NSW legislation website.

**3 Repeal**

The *Macquarie River, Narromine to Oxley Station, Floodplain Management Plan 2008* adopted under section 166A of the *Water Act 1912* (Gazette No 155 of 05.12.2008) is repealed on the commencement of this Order.

**4 Making of Minister's Plan**

The *Floodplain Management Plan for the Macquarie Valley Floodplain 2021* set out at Schedule 1 is made on the commencement of this Order.

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## Schedule 1

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# Floodplain Management Plan for the Macquarie Valley Floodplain 2021

## Notes.

- 1 In accordance with section 48 of the *Water Management Act 2000*, the Minister must take all reasonable steps to give effect to the provisions of this Plan when exercising functions under the Act.
- 2 In accordance with section 49 of the *Water Management Act 2000*, public authorities must also have regard to the provisions of this Plan to the extent they apply to the public authority.
- 3 The Minister may amend this Plan at any time under section 45 of the *Water Management Act 2000*, including if satisfied it is in the public interest to do so, or in such circumstances, in relation to such matters and to such extent as Part 10 provides.

## Part 1 Introduction

### 1 Name of Plan

This Plan is the *Floodplain Management Plan for the Macquarie Valley Floodplain 2021* (*this Plan*).

### 2 Nature and status of Plan

- (1) This Plan is made under section 50 of the *Water Management Act 2000* (*the Act*).
- (2) This Plan is a plan for floodplain management and generally deals with the matters set out in sections 29 and 30 of the Act, as well as other sections of the Act.

#### Notes.

- 1 Where a provision of this Plan is made under another section of the Act, the section is referred to in the notes to this Plan.
- 2 Rural Floodplain Management Plans: Technical Manual for plans developed under the *Water Management Act 2000* (*the Technical Manual*) details the methodologies used to develop this Plan.

### 3 Commencement

This Plan commences on the day on which it is published on the NSW legislation website.

#### Notes.

- 1 This Plan replaces the *Macquarie River, Narromine to Oxley Station, Floodplain Management Plan 2008*, which was repealed under section 45 of the Act.
- 2 In accordance with section 43 of the Act, this Plan has effect for 10 years from the 1 July next after the date the plan commenced.

### 4 Application of Plan

- (1) This Plan applies to the Macquarie Valley Floodplain (*the Floodplain*).

**Note.** The Macquarie Valley Floodplain is declared to be a floodplain under the *Water Management (General) Regulation 2018*. The Dictionary to the Act provides that a **floodplain** means land declared by the regulations to be a floodplain.

- (2) The boundaries of the Floodplain are shown on the *Floodplain Management Plan Map (FMP033\_Version 1)*, *Floodplain Management Plan for the Macquarie Valley Floodplain 2021* (*the Plan Map*), held by the Department and published on the NSW legislation

website.

**Note.** An overview of the Plan Map is shown in Appendix 1. The Plan Map is available on the NSW legislation website.

- (3) The boundaries of the management zones within the Floodplain are shown on the *Management Zones Map (FMP034\_Version 1), Floodplain Management Plan for the Macquarie Valley Floodplain 2021 (the Management Zones Map)*, held by the Department and published on the NSW legislation website.

**Notes.**

- 1 **Management zones** is defined in the Dictionary.
- 2 An overview of the Management Zones Map is shown in Appendix 2. The Management Zones Map is available on the NSW legislation website.

- (4) The boundaries of the floodway network within the Floodplain are shown on the *Floodway Network Map (FMP035\_Version 1), Floodplain Management Plan for the Macquarie Valley Floodplain 2021 (the Floodway Network Map)*, held by the Department and published on the NSW legislation website.

**Note.** An overview of the Floodway Network Map is shown in Appendix 3. The Floodway Network Map is available on the NSW legislation website.

- (5) The boundaries of the ecological assets within the Floodplain are shown on the *Ecological Assets Map (FMP036\_Version 1), Floodplain Management Plan for the Macquarie Valley Floodplain 2021 (the Ecological Assets Map)*, held by the Department and published on the NSW legislation website.

**Notes.**

- 1 **Ecological assets** is defined in the Dictionary.
- 2 An overview of the Ecological Assets Map is shown in Appendix 4. The Ecological Assets Map is available on the NSW legislation website.

- (6) The boundaries of the area enclosed by existing flood works are shown on the *Existing Flood Works Map (FMP037\_Version 1), Floodplain Management Plan for the Macquarie Valley Floodplain 2021 (the Existing Flood Works Map)*, held by the Department and published on the NSW legislation website.

**Notes.**

- 1 The Existing Flood Works Map depicts the overall footprint of major flood works constructed on the Floodplain and the major areas enclosed by those flood works. It does not depict individual flood works, and it does not include all flood works in the area.
- 2 An overview of the Existing Flood Works Map is shown in Appendix 5. The Existing Flood Works Map is available on the NSW legislation website.

- (7) The 1990 peak discharge calculation locations are shown on the *Peak Flood Flow Distribution (1990) Map (FMP038\_Version 1), Floodplain Management Plan for the Macquarie Valley Floodplain 2021 (the Peak Flood Flow Distribution (1990) Map)*, held by the Department and published on the NSW legislation website.

**Notes.**

- 1 **Peak discharge calculation location** is defined in the Dictionary.

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- 2 An overview of the Peak Flood Flow Distribution (1990) Map is shown in Appendix 6. The Peak Flood Flow Distribution (1990) Map is available on the NSW legislation website.

## 5 Management zones

For the purposes of this Plan and clause 45 (b) of the *Water Management (General) Regulation 2018 (the Regulation)*, the following management zones are established in the Macquarie Valley Floodplain and shown on the Management Zones Map:

- (a) Macquarie Management Zone A,

**Notes.**

- 1 Macquarie Management Zone A includes areas of the Floodplain where a significant discharge of floodwater occurs during floods, with relatively high flood flow velocity and depth.
- 2 Macquarie Management Zone A is Management Zone A for the purposes of clause 45 (b) of the Regulation.

- (b) Macquarie Management Zone BH,

**Note.** Management Zone BH includes high-level floodway areas upstream of Warren where a significant discharge of floodwater occurs during large floods.

- (c) Macquarie Management Zone B,

**Note.** Macquarie Management Zone B includes areas of the Floodplain that are important for the conveyance of floodwater during large flood events and for the temporary pondage of floodwaters during the passage of a flood. Some areas may include existing approved flood works of limited height. Its outer boundary is defined by the modelled inundation extent of the large design floods described in Part 4.

- (d) Macquarie Management Zone C,

**Note.** Macquarie Management Zone C contains elevated areas or areas protected by existing flood works of unlimited height.

- (e) Macquarie Management Zone C for urban areas (*Macquarie Management Zone CU*),

**Notes.**

- 1 Macquarie Management Zone CU contains urban areas where there is either a flood study, a floodplain risk management study, floodplain risk management plan, or areas that are protected by flood mitigation works, such as town levees.
- 2 **Flood study, Floodplain Risk Management Study and Floodplain Risk Management Plan** are defined in the Dictionary.

- (f) Macquarie Management Zone D.

**Notes.**

- 1 Macquarie Management Zone D is a special protection zone for areas of ecological or cultural significance, or both. Areas of ecological or cultural significance, or both, in the Macquarie Management Zone D are listed in Schedule 2.
- 2 Macquarie Management Zone D is Management Zone D for the purposes of clause 45 (b) of the Regulation.

**Note.** The methodology for delineating management zones is described in the Technical Manual. Information on how the management zones were delineated for this Plan is provided in *Rural Floodplain Management Plans developed under the Water Management Act 2000: Background document to the floodplain management plan for the Macquarie Valley Floodplain 2021 (the Background Document)*.

## **6 Interpretation**

- (1) Unless otherwise defined in this Plan, words and expressions that are defined in the Act or in the regulations made under the Act have the same meaning in this Plan.
- (2) Words and expressions that are defined in the Dictionary at the end of this Plan have the meaning set out in the Dictionary.
- (3) The Dictionary and Schedules to this Plan form part of this Plan.
- (4) The following maps form part of this Plan:
  - (a) Plan Map,
  - (b) Management Zones Map,
  - (c) Floodway Network Map,
  - (d) Ecological Assets Map,
  - (e) Existing Flood Works Map,
  - (f) Peak Flood Flow Distribution (1990) Map.
- (5) A number in brackets following the name of a gauge is the gauge number.
- (6) Notes in the text of this Plan do not form part of this Plan.
- (7) Appendices to this Plan do not form part of this Plan.



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## Part 2 Vision, objectives, strategies and performance indicators

**Note.** This Part is made in accordance with section 35 (1) of the Act.

### 7 Vision statement

The vision of this Plan is to contribute to a sustainable, healthy and working floodplain by managing the development of new flood works and amendments to existing flood works to protect the passage of floodwater through the Floodplain, whilst recognising the need to minimise the risk to life and property.

### 8 Acknowledgement

Respect is paid to the traditional owners of this country, who are acknowledged as the first natural resource managers within the Floodplain.

### 9 Objectives

The objectives of this Plan are as follows:

- (a) facilitate the orderly passage of floodwaters through the Floodplain,
- (b) to establish a framework for the granting or amending of flood work approvals for flood works located in the Floodplain,
- (c) to contribute to the minimisation of the risk to life and property from the effects of flooding in the Floodplain,
- (d) to maintain flood connectivity to wetlands, other floodplain ecosystems, and areas of groundwater recharge in the Floodplain,
- (e) to contribute to the protection of flood-dependent ecological assets and flood-dependent ecological values in the Floodplain,
- (f) to contribute to the protection of flood-dependent assets, including flood-dependent Aboriginal cultural values and heritage sites in the Floodplain.

### 10 Strategies

The strategies for reaching the objectives of this Plan are as follows:

- (a) to delineate a floodway network that accurately represents the passage of floodwater in the Floodplain,

**Note.** The Floodway Network Map and Part 4 delineate the floodway network for the Floodplain. This information is used to inform the delineation of the management zones and contributes to achieving all of the objectives in clause 9 of this Plan.

- (b) to establish management zones with rules and assessment criteria for the granting or amending of flood work approvals in the Floodplain,

**Note.** Clause 5 establishes management zones in the Floodplain and the provisions in Part 8 establish rules and assessment criteria for flood work approvals specific to each

management zone. The rules and assessment criteria for flood work approvals assist in the coordination of flood work development in the Floodplain. The methodology for delineating the management zones is based on hydraulic, ecological, cultural and existing planning arrangements criteria, and is described in the Technical Manual and Background Document. The Management Zones Map and the provisions in Part 8 contribute to achieving all of the objectives in clause 9 of this Plan.

- (c) to identify areas of the Floodplain where flooding may impact life and property,
- Note.** Part 4 and the Floodway Network Map identify areas of the Floodplain that are subject to major flood discharge or inundation during times of flooding. The provisions in Part 7 deal with the risk to life and property from the effects of flooding. The floodway network is used to inform the delineation of the management zones in clause 5, and Part 8 establishes rules and assessment criteria for flood work approvals specific to each management zone. The provisions in Part 8 facilitate the approval of flood protection works in the Floodplain and limit the hydraulic impacts on flood behaviour. These provisions contribute to achieving the objective in clause 9 (c) of this Plan.
- (d) to identify and prioritise flood-dependent ecological assets and values in the Floodplain,
- Note.** Division 2 of Part 5, Schedule 1 and Schedule 2 identify flood-dependent ecological assets and values in the Floodplain. This information is used to inform the delineation of the management zones, and contributes to achieving the objectives in clause 9 (d) and (e) of this Plan.
- (e) to establish rules and assessment criteria for flood work approvals that ensure adequate flood connectivity is maintained in the Floodplain,
- Note.** The provisions in Part 8 establish assessment criteria for flood work approvals specific to each management zone and contribute to achieving the objectives in clause 9 (d) and (e) of this Plan.
- (f) to identify and prioritise flood-dependent cultural assets and values, including Aboriginal cultural values and heritage sites in the Floodplain,
- Note.** Division 3 of Part 5 identifies flood-dependent cultural assets and values in the Floodplain. This information is used to inform the delineation of the management zones, and contributes to achieving the objective in clause 9 (f) of this Plan.
- (g) to establish assessment criteria for flood work approvals that protect heritage sites in the Floodplain, during the construction or modification of flood works.
- Note.** The provisions in Part 8 establish assessment criteria that protect heritage sites during flood work construction or modification, and contribute to achieving the objective in clause 9 (f) of this Plan.

## 11 Performance indicators

- (1) The performance indicators used to measure the success in achieving the objectives of this Plan are as follows:
- (a) the extent to which the Floodway Network Map and the management zone boundaries accurately represent the passage of floodwater in the Floodplain,
- Note.** Information about the hydraulic behaviour of monitored floods will be used for this performance indicator.
- (b) the extent to which flood works, approved in accordance with Part 8 of this Plan, and constructed or modified after the commencement of this Plan, have altered the following:

- (i) the hydraulic behaviour of floodwater in the Floodplain,
  - (ii) flood connectivity to flood-dependent ecological assets and values in the Floodplain,
  - (iii) flood connectivity to flood-dependent cultural assets and values, including Aboriginal cultural values and heritage sites in the Floodplain,
  - (iv) the condition of heritage sites in the Floodplain,
- (c) the extent to which this Plan has accurately identified flood-dependent ecological assets and values in the Floodplain,
  - (d) the extent to which this Plan has accurately identified flood-dependent cultural assets and values, including Aboriginal cultural values and heritage sites, in the Floodplain.

**Note.** One or more performance indicators may be measured to evaluate each of the objectives listed in clause 9 and strategies listed in clause 10.

- (2) In evaluating the effectiveness of the strategies in meeting the objectives of this Plan, the following will be relevant:

- (a) the extent to which the strategies and provisions in this Plan have been effectively implemented and complied with,
- (b) the extent to which external influences on the Floodplain have affected progress toward achieving the objectives.

**Note.** External influences may include long and short-term climate trends and land use change. There may be other external influences other than those factors.

## Part 3 Flooding regimes

**Note.** This Part is made in accordance with sections 5 (6) and 29 (a) and (b) of the Act.

### 12 General

This Part identifies the existing and natural flooding regimes in the Floodplain.

**Note.** *Flooding regime* is defined in the Dictionary.

### 13 Natural flooding regime

- (1) The natural flooding regime in the Floodplain was characterised by flood events that occurred prior to the construction of weirs, dams, roads and railways, river regulation, land use changes and flood work development within the Floodplain.
- (2) A summary of the natural flooding regime is provided in Table 1.

**Table 1 — Natural flooding regime**

	<b>Natural flooding regime</b>
<b>Nature</b>	<p>In the Floodplain downstream of Narromine, flooding was mostly generated by runoff from the upper catchments of the Macquarie River. Flows from the smaller tributaries of Ewenmar Creek and Marthaguy Creek, which drained the eastern side of the valley to the north of Narromine, also contributed to flooding in the Floodplain.</p> <p>During major flood events, floodwaters passing down the Macquarie River spread out onto the Floodplain downstream of Narromine following natural flow paths and low-lying land. Outflows from the Macquarie River extended to the west through a series of effluent creeks that drained slowly to the Bogan River and the Barwon River. Flood flows along the Macquarie Floodplain were dispersed downstream as the channel capacity of the river decreased inundating large areas of the Floodplain.</p> <p>Downstream of Marebone, north of Warren, the Macquarie River broke down into a series of interconnected channels forming the extensive floodout areas of the Macquarie Marshes. The Macquarie River exited the Macquarie Marshes as a single channel before joining the Castlereagh River and draining into the Barwon River.</p>
<b>Frequency</b>	<p>Several flood events were recorded in the Floodplain prior to the construction of Burrendong Dam in 1967. The 1955 flood at the Macquarie River at Narromine gauge (421006) was a 0.7% annual exceedance probability (<b>AEP</b>) or 1 in 140 annual recurrence interval (<b>ARI</b>). Other major flood events occurred in 1926 and 1950 (both 7% AEP or 1 in 15 ARI) and in 1931 (10% AEP or 1 in 10 ARI).</p>
<b>Duration</b>	<p>Floods in the Floodplain receded slowly due to the small carrying capacities of the major channels and the slow rates of rise and fall of floods. Major flood events were typically of long duration (over six months) due to the effect of slow-moving floodwaters on the flat slopes of the Floodplain.</p>
<b>Extent</b>	<p>The Macquarie Valley Flood Plain Atlas (Sinclair Knight and Partners, 1984) shows the extent of flooding observed in the 1955 flood and is indicative of the extent of flooding under the natural flooding regime.</p>

**Note.** *Annual exceedance probability* (AEP) and *annual recurrence interval* (ARI) are defined in the Dictionary.

## 14 Existing flooding regime

- (1) The existing flooding regime in the Macquarie Valley Floodplain is generally characterised by changes that have occurred since the construction of the following:
  - (a) Burrendong Dam in 1967 on the Macquarie River,
  - (b) Windamere Dam in 1984 on the Cudgegong River.
- (2) Changes to the flooding regime in the Floodplain have generally coincided with river regulation (mainly the construction of weirs and regulators that allow water to be managed for irrigation delivery), land use and flood work development.
- (3) A summary of the existing flooding regime is provided in Table 2.

**Table 2 — Existing flooding regime**

	<b>Existing flooding regime</b>
<b>Nature</b>	<p>In the Floodplain downstream of Narromine, flooding is mostly generated by runoff from the upper catchments of the Macquarie River. Flows from the smaller tributaries of Ewenmar Creek and Marthaguy Creek, which drain the eastern side of the valley to the north of Narromine, also contribute to flooding in the Floodplain.</p> <p>During major flood events, floodwaters passing down the Macquarie River spread out onto the Floodplain downstream of Narromine following natural flow paths and low-lying land. Outflows from the Macquarie River extend to the west through a series of effluent creeks that drain slowly to the Bogan River and the Barwon River. Flood flows along the Macquarie Floodplain are dispersed downstream as the channel capacity of the river decreases inundating large areas of the Floodplain.</p> <p>Downstream of Marebone, north of Warren, the Macquarie River breaks down into a series of interconnected channels forming the extensive floodout areas of the Macquarie Marshes. The Macquarie River exits the Macquarie Marshes as a single channel before joining the Castlereagh River and draining into the Barwon River.</p> <p>Changes to the nature of flooding following river regulation, land use changes and flood work development include the following:</p> <ol style="list-style-type: none"> <li>(a) alteration of the direction and depth of flood flows in some areas,</li> <li>(b) alteration of river, creeks and overland flow path flood volume carrying capacity in some areas,</li> <li>(c) increase in the velocity of flood flow rates, with flows getting to the lower reaches of the Floodplain faster.</li> </ol>
<b>Frequency</b>	<p>Since the construction of Burrendong Dam, and Windamere Dam, there has been a decrease in the frequency of major and moderate flood events.</p> <p>A number of flood events have been recorded in the Floodplain following the construction of Burrendong Dam in 1967 and Windamere Dam in 1984. Major flood events occurred in 1990 and 2000 at the Macquarie River at the Narromine gauge (421006) at 2.9% and 8% AEP respectively, with a smaller flood event occurring in 2012 (33% AEP)</p>
<b>Duration</b>	<p>The duration of some flood events has changed due to floodplain development and land use changes, which have altered the nature of flooding in the Floodplain.</p>

	Floods in the Floodplain recede slowly due to the small capacities of the major channels and the slow rates of rise and fall of floods. Slow moving floodwaters on flat slopes often lead to long duration flooding. Flood damage from major flooding is caused by long periods of inundation, which accompanies the slow rates of rise and fall of floods.
<b>Extent</b>	The Floodway Network Map is a general spatial representation of the existing flooding regime, which shows the modelled inundation extent of the small and large design floods.

## Part 4 Floodway network

**Note.** This Part is made in accordance with sections 29 (a) and 30 (c) of the Act.

### 15 General

- (1) This Part identifies a floodway network for the Floodplain.

**Notes.**

- 1 The floodway network is the hydraulic basis for determining the management zones and rules in this Plan.
- 2 The methodology for delineating the floodway network is described in the Technical Manual.
- 3 Detail specific to delineating the floodway network for this Plan is provided in the Background Document.

- (2) The floodway network is shown on the Floodway Network Map.

**Notes.**

- 1 An overview of the Floodway Network Map is shown in Appendix 3. The Floodway Network Map is available on the NSW legislation website.
- 2 The Floodway Network Map represents areas on the Floodplain that have adequate hydraulic capacity and continuity to effectively convey floodwaters. The areas are comprised of the following:
  - (a) a coordinated and integrated network of floodways where a significant discharge of floodwater occurs during floods,
  - (b) high level floodways, which are areas upstream of Warren where a significant discharge of floodwater occurs during the 1990 large design flood,
  - (c) the inundation extent of small and large design floods,
  - (d) areas that preserve flood connectivity,
  - (e) areas that provide sufficient pondage for floodwater.
- 3 Macquarie Management Zone C and Macquarie Management Zone CU represent the areas within the Floodplain that are not part of the floodway network.

- (3) The following design floods were used to model the floodway network:

- (a) design flood of August 1990 (3% AEP or 1 in 35 ARI at the Macquarie River at Narromine gauge (421006)) (*the 1990 large design flood*),
- (b) design flood of November 2000 (8% AEP or 1 in 12 ARI at the Macquarie River Narromine gauge (421006)) (*the 2000 large design flood*),
- (c) design flood of December 2012 (33% AEP or 1 in 3 ARI at the Macquarie River at Narromine gauge (421006)) (*the small design flood*).

**Note.** To ensure a similar probability of occurrence is maintained across the Floodplain, what is referred to as the design flood of August 1990 is a synthetic flood comprised of the peak discharge for the 1990 flood in the Macquarie River and the peak discharge of the December 2010 flood in Ewenmar Creek, Marthaguy Creek and Merri Merri Creek (hereafter '*eastern tributaries*'). A flood frequency analysis found that the December 2010 flood (2-5% AEP or 1 in 20-50 ARI in the eastern tributaries) has a similar probability of occurrence as the 1990 flood for the Macquarie flows.

- (4) The floodway network was defined using information that includes the following:

- (a) hydraulic model outputs including the following:

- (i) depth-velocity product maps for the large design floods,
  - (ii) discharge and velocity values along flow paths,
  - (iii) inundation extent for the small and large design floods,
- (b) flood aerial photography and satellite imagery,
  - (c) spatial watercourse layers and topographical information,
  - (d) previous rural floodplain management plans and guidelines,
  - (e) local knowledge obtained from floodplain communities and managers.

**Notes.**

- 1 ***Depth-velocity product, design flood, large design floods*** and ***floodways*** are defined in the Dictionary.
- 2 Areas that reached the depth-velocity product threshold of greater than or equal to  $0.1\text{m}^2/\text{s}$  for the 1990 large design flood north of Oxley Highway and the 2000 large design flood south of Oxley Highway were categorised as floodways.
- 3 Areas that reached the depth-velocity product threshold of greater than or equal to  $0.1\text{m}^2/\text{s}$  for the 1990 large design flood south of Oxley Highway were categorised as high-level floodways.



## Part 5 Benefits of flooding

**Note.** This Part is made in accordance with sections 5 (2) and 29 (b) of the Act.

### Division 1 General

#### 16 General

This Part:

- (a) identifies the ecological benefits of flooding and identifies ecological assets and values that are flood-dependent assets within the Floodplain (Division 2), and
- (b) identifies benefits of the flooding of Aboriginal cultural values to Aboriginal people and their culture within the Floodplain and identifies cultural assets (including heritage sites) that are flood-dependent assets within the Floodplain (Division 3).

**Note.** *Aboriginal cultural values*, *cultural assets* and *flood-dependent assets* are defined in the Dictionary.

### Division 2 Ecological assets and values dependent on flooding

#### 17 Ecological benefits of flooding

The ecological benefits of flooding in the Floodplain are as follows:

- (a) maintaining or improving the structure and condition of habitat for waterbirds, fish and other amphibious fauna,
- (b) recharging groundwater reserves and drought refuges,
- (c) contributing to nutrient, sediment and carbon cycling,
- (d) improving opportunities for floodplain and aquatic fauna to migrate, reproduce and feed,
- (e) supporting recruitment of floodplain vegetation, including flowering, seeding and germination,
- (f) suppressing the growth and intrusion of invasive vegetation weed species,
- (g) improving wetland ecosystem resilience.

**Notes.**

- 1 Waterbirds, fish and amphibious fauna in the Floodplain are listed in Schedule 1.
- 2 *Wetlands* and *areas of groundwater recharge* are defined in the Dictionary.

#### 18 Ecological assets and values

- (1) The types of ecological assets in the Floodplain that are flood-dependent assets are those ecological assets identified in Schedule 1 and shown on the Ecological Assets Map (*flood-*

*dependent ecological assets*).

- (2) The ecological values in the Floodplain that are flood-dependent assets are described in Schedule 1 (*flood-dependent ecological values*).

**Notes.**

- 1 **Ecological values** is defined in the Dictionary.
- 2 Further information on how ecological values were used as surrogates for biodiversity to prioritise ecological assets is provided in the Background Document.
- 3 The flood-dependent ecological values were used to inform the identification of the flood-dependent ecological assets and management zones for the purposes of this Plan.

## **Division 3 Cultural assets and values dependent on flooding**

### **19 Cultural assets and values**

The cultural assets and values in the Floodplain that are flood-dependent assets are the Aboriginal cultural values and heritage sites identified in clauses 20 and 21.

**Note.** *Heritage site* is defined in the Dictionary.

### **20 Aboriginal cultural values**

- (1) Aboriginal cultural values in the Floodplain that are flood-dependent assets are listed in any of the sources under subclause (2) and include the following (*flood-dependent Aboriginal cultural values*):
- (a) places that are, or could be, used for cultural activities and that benefit from flooding (such as fish traps made of stone or sticks),
  - (b) flood-dependent ecological assets that:
    - (i) are recognised for their spiritual or cultural significance (or both), or
    - (ii) have been culturally modified, including:
      - (A) scarred trees, and
      - (B) tree carvings, or
    - (iii) contain resources that are or were utilised in cultural activities, or
    - (iv) are associated with places that are used for contemporary cultural activities.
- (2) Flood-dependent Aboriginal cultural values are those listed in any of the following sources:
- (a) Aboriginal Heritage Information Management System,
  - (b) Murray-Darling Basin Authority Aboriginal Submissions Database,
  - (c) NSW State Heritage Register,
  - (d) Commonwealth Heritage List,

(e) any other source that, in the Minister's opinion, is relevant.

**Note.** Details on the identification and assessment of flood-dependent Aboriginal cultural values identified in this clause are described in the Background Document.

(3) The benefits of the flooding of Aboriginal cultural values within the Floodplain to Aboriginal people and their cultures include the following:

(a) continuation of Aboriginal cultural practices connected with flooding, including:

- (i) harvesting traditional flood-dependent resources, and
- (ii) cultural activities connected with and dependent upon floods,

(b) preservation and longevity of Aboriginal cultural values,

(c) maintaining potential for cultural renewal,

(d) maintaining spiritual connection with the Floodplain landscape.

## 21 Heritage sites

Heritage sites that are flood-dependent assets within the Floodplain rely on flooding to maintain their heritage value and are sites, objects or places listed in any of the following (*flood-dependent heritage sites*):

(a) NSW State Heritage Register,

(b) NSW State Heritage Inventory,

(c) Aboriginal Heritage Information Management System,

(d) Murray-Darling Basin Authority Aboriginal Submissions Database,

(e) Historic Heritage Information Management System,

(f) Commonwealth Heritage List,

(g) any other source that, in the Minister's opinion, is relevant.

### Notes.

1 Heritage sites may be sensitive to changes in flood behaviour or disturbance from the construction of flood works. Where a heritage site is located within the area of a flood work application, the flood work application will be assessed against criteria to ensure the heritage site is not adversely impacted.

2 An example of a flood-dependent heritage site (other than an Aboriginal cultural value) may be a River Red Gum tree that is located on the Floodplain and is associated with a historic homestead. To be considered a flood-dependent heritage site, the tree would need to be listed in at least one of the sources referred to in clause 21 and would need to be dependent on flooding to maintain its heritage value.

## Part 6 Existing flood works

**Note.** This Part is made in accordance with sections 5 (2) (e)–(g) and (6), 29 (c) and 30 (b)–(d) of the Act.

### 22 General

This Part deals with the identification of existing flood works within the Floodplain, their benefits in terms of the protection they give to life and property, and their cultural, socio-economic and ecological impacts, including cumulative impacts.

### 23 Types of existing flood works

The following types of flood works are present in the Floodplain:

- (a) infrastructure protection works,
- (b) levees,
- (c) access roads,
- (d) storages,
- (e) supply channels,
- (f) stock refuge works,
- (g) Aboriginal cultural value, ecological and heritage site enhancement works,
- (h) other earthworks and embankments.

**Note.** *Infrastructure protection work* is defined in the Dictionary.

### 24 Approved flood works

At the commencement of this Plan, it is estimated that 51 approved flood works are present in the Floodplain including (but not limited to) the following:

- (a) above ground channels, and
- (b) levees and embankments, and
- (c) storages.

**Note.** A single flood work approval may be comprised of numerous individual flood works. Some flood works can be used for other purposes, for example, levees and embankments can also be used as roads or infrastructure protection works.

### 25 Area enclosed by existing flood works

At the commencement of this Plan, the area within the boundaries of the existing flood works in the Floodplain, as shown on the Existing Flood Works Map, is estimated to be 32,600 hectares (*ha*).

**Notes.**

- 1 An overview of the Existing Flood Works Map is shown in Appendix 5. The Existing Flood Works Map is available on the NSW legislation website.

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- 2 The Existing Flood Works Map depicts the overall footprint of major flood works constructed in the Floodplain and the major areas enclosed by those flood works. The map does not depict individual flood works, and it does not include all flood works in the area.

## 26 Ecological impacts of existing flood works

- (1) The positive impacts in relation to flood behaviour and flood connectivity of existing flood works on flood-dependent ecological assets include any of the following:
- (a) increased localised flooding frequency and duration (due to the diversion and retention of floodwaters) when flooding regimes have generally been reduced by river regulation,
  - (b) increased localised groundwater recharge (due to the diversion and retention of floodwaters) in areas where groundwater recharge is generally restricted by altered flooding regimes.
- Note.** *Flood connectivity* and *flood-dependent ecological assets* are defined in the Dictionary.
- (2) The negative impacts in relation to flood behaviour and flood connectivity of existing flood works on flood-dependent ecological assets include any of the following:
- (a) altered flood connectivity, resulting in any of the following:
    - (i) disconnection of the flood-dependent ecological assets from flooding by obstructing flow paths,
    - (ii) diversion of flood flows away from the flood-dependent ecological assets,
    - (iii) increased flooding duration of the flood-dependent ecological assets that exceeds the requirements of floodplain species,
    - (iv) decline in available forage, nesting and refuge habitat for fauna reliant on the flood-dependent ecological assets,
  - (b) restricted native fish passage, resulting in any of the following:
    - (i) reduction of fish migration within the Floodplain,
    - (ii) stranding of fish by existing flood works on the Floodplain when floodwater recedes,
    - (iii) reduced access to habitat and food resources during floods,
    - (iv) decline in the abundance and distribution of native fish,
- Note.** *Fish passage* is defined in the Dictionary.
- (c) reduction in groundwater recharge during floods (due to a reduction in the extent and duration of flooding),

- (d) net reduction of floodwater available to flood-dependent ecological assets (due to river regulation and existing flood works).

## **27 Aboriginal cultural and heritage impacts of flood works**

- (1) The positive impact in relation to flood behaviour and flood connectivity of existing flood works on flood-dependent Aboriginal cultural values and flood-dependent heritage sites is an increased localised flooding frequency and duration (due to the diversion and retention of floodwaters) where flooding regimes have been reduced by river regulation.
- (2) The negative impacts in relation to flood behaviour, flood risk and flood connectivity of existing flood works on flood-dependent Aboriginal cultural values and flood-dependent heritage sites include any of the following:
  - (a) altered flood connectivity to the flood-dependent Aboriginal cultural values and flood-dependent heritage sites, resulting in any of the following:
    - (i) disconnection of the flood-dependent Aboriginal cultural values and the flood-dependent heritage sites from flooding by obstructing flow paths,
    - (ii) diversion of flood flows away from the flood-dependent Aboriginal cultural values and flood-dependent heritage sites,
    - (iii) increased flooding duration of the flood-dependent Aboriginal cultural values and the flood-dependent heritage sites that exceeds the requirements of those areas and sites,
  - (b) increased flood velocity resulting in scour and erosion damage to Aboriginal cultural values and heritage sites, such as burial sites.

## **28 Socio-economic impacts of existing flood works**

- (1) The positive socio-economic impacts in relation to flood behaviour and flood risk of existing flood works include any of the following:
  - (a) flood protection of crops and property,
  - (b) flood protection for on-farm access,
  - (c) infrastructure for managing irrigation or stock and domestic water requirements.
- (2) The negative socio-economic impact in relation to flood behaviour, flood risk and flood connectivity of existing flood works is the redistribution of flood flows and altered flood behaviour resulting in any of the following:
  - (a) diversion of flood flows onto adjacent properties,
  - (b) increased flood velocity possibly resulting in scour and erosion damage,
  - (c) increased flood levels on adjacent and downstream properties,

- (d) disruptions to daily life such as restricted property access during floods,
- (e) loss of crops and infrastructure during floods.

## 29 Cumulative impacts of flood works

- (1) This Plan recognises the positive impacts of existing flood works if construction of the flood works is undertaken in a coordinated manner and the cumulative negative impacts of flood works if construction of the flood works is undertaken in an uncoordinated manner.
- (2) This Plan manages the potential cumulative negative impacts of existing and proposed flood works through provisions that:
  - (a) identify existing flood works in the Floodplain to be used in the hydraulic modelling, and
  - (b) use hydraulic modelling to understand the cumulative impacts of existing flood works across the Floodplain, and
  - (c) establish management zones within the Floodplain, and
  - (d) establish rules for the granting and amending of flood work approvals that consider the cumulative impacts of additional flood works across the Floodplain.

**Note.** The mechanisms used by this Plan to address cumulative impacts are interrelated. For example, hydraulic modelling may show that, by taking account of identified existing flood works, the construction of new flood works in major discharge areas would have a significant cumulative impact on the distribution of flood flow and flood levels. These areas are represented by the Macquarie Management Zones A and D where only minor flood works are permitted.

## Part 7 Risks from flooding

**Note.** This Part is made in accordance with sections 5 (6) and 29 (d) of the Act.

### 30 General

This Part deals with the risk to life and property from the effects of flooding.

### 31 Risk to life and property

Risks to life and property from the effects of flooding include any of the following:

- (a) tangible flood damage, resulting in a financial loss, including any of the following:
  - (i) damage or loss of goods, possessions, livestock and crops,
  - (ii) property damage, including contents damage, such as carpets and furniture, structural damage, such as walls, floors and windows, and external damage, such as high value infrastructure and motor vehicles,
  - (iii) loss of wages and additional financial costs incurred during clean-up operations,  
**Note:** *High value infrastructure* is defined in the Dictionary.
- (b) intangible flood damage, including any of the following:
  - (i) increased levels of emotional stress,
  - (ii) mental and physical illness,
  - (iii) disruption to daily life, such as restricted property access.

### 32 Consideration of risk to life and property

This Plan deals with the risk to life and property from the effects of flooding through:

- (a) the establishment of a floodway network in Part 4 that identifies areas of the Floodplain where the risk to life and property is greatest, and
- (b) the establishment of management zones in clause 5 with rules for the granting and amending of flood work approvals in each zone (including assessment criteria and cumulative impact assessment) in Part 8, and
- (c) the consideration of existing flood works in the Floodplain and their incorporation in the delineation of the floodway network, and the design of the management zones.

**Note.** Part 6 recognises the benefits of existing flood works in terms of the protection they give to life and property, and their cultural, socio-economic and ecological impacts, including cumulative impacts.

### 33 The floodway network

The floodway network addresses the risk to life and property through:



- (a) the identification of areas within the floodway network that may impact on life and property, including:
  - (i) major flood discharge areas, and
  - (ii) areas of the Floodplain that are subject to inundation during times of flooding, and
- (b) flood risk awareness through the provision of:
  - (i) maps of floodways, and
  - (ii) maps showing the extent of modelled historic flood flows.

### **34 Management zones and rules for granting or amending flood work approvals**

- (1) The design of the management zones and rules for granting or amending flood work approvals address the risk to life and property from flooding as follows:
  - (a) by identifying hydraulic thresholds within management zones where the local and cumulative impact of flood work development is to be limited to prevent flood flow redistribution, increased flood velocities and flood levels,
  - (b) by developing rules to limit the granting of flood work approvals for flood works that are minor in nature, including flood protection works to protect infrastructure and livestock, in the Macquarie Management Zones A and D due to the occurrence of major flood discharge,
  - (c) by developing rules to allow landholders to apply for some flood protection works in the Macquarie Management Zone B, without requiring advertising, to protect infrastructure, crops and livestock from floods,
  - (d) by specifying the type of flood works that can be constructed.
- (2) The implementation of the management zones and rules for granting or amending flood work approvals (including assessment criteria and cumulative impact assessment) will minimise flood risk as follows:
  - (a) by coordinating and controlling the type of flood work development,
  - (b) by preventing the construction of flood works that pose a significant risk to property,
  - (c) by increasing flood risk awareness and informing land use planning through mapping of management zones that highlight areas in the Macquarie Management Zones A and D that are subject to frequent inundation.

## **Part 8 Rules for granting or amending flood work approvals**

**Note.** Rules for flood work approvals in this Part are made in accordance with sections 5, 29, 30 and 95 (3) of the Act.

### **Division 1 General**

#### **35 General**

The provisions in this Part apply to the granting or amending of flood work approvals for flood works, or proposed flood works, located in the Floodplain.

### **Division 2 Granting or amending flood work approvals in the Macquarie Management Zone A**

#### **36 Flood works approvals in the Macquarie Management Zone A**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

(1) This clause applies to a flood work or proposed flood work, or part of a flood work or proposed flood work, that is in the Macquarie Management Zone A.

#### **(2) Requirements for all or parts of flood works in the zone**

The granting or amending of a flood work approval for a flood work to which this clause applies is only permitted if, in the Minister's opinion, all of the following apply:

- (a) the flood work is any of the following types of flood works:
  - (i) an access road,
  - (ii) a supply channel,
  - (iii) a stock refuge,
  - (iv) an infrastructure protection work,
  - (v) an ecological enhancement work,
  - (vi) an Aboriginal cultural value enhancement work,
  - (vii) a heritage site enhancement work,
- (b) the granting or the amending of the approval complies with the specific requirements for the work under the relevant subclause (3) to (9),
- (c) the flood work satisfies the assessment criteria for the Macquarie Management Zone A under clause 39,
- (d) a cumulative impact assessment for the Macquarie Management Zone A of the flood work under clause 39 has been completed.

**Note.** *Stock refuge* is defined in the Dictionary.

(3) **Specific requirements for access roads**

The granting or amending of a flood work approval for an access road is only permitted if, in the Minister's opinion, the following applies:

- (a) the height of the access road at any point of the road is no more than:
  - (i) 30 cm above the natural surface level if it is not a primary access road, or  
**Note.** *Natural surface level* and *primary access road* are defined in the Dictionary.
  - (ii) 50 cm above the natural surface level if it is a primary access road, and
- (b) any borrow associated with the construction and maintenance of the access road is located on the downstream side of the access road and is no deeper than 30 cm below the natural surface level, and  
**Note.** *Borrow* is defined in the Dictionary.
- (c) the access road is constructed:
  - (i) with causeways that:
    - (A) are no higher than the natural surface level, and
    - (B) are located at low points of the floodway, and
    - (C) occur at least once every 200 metres, and
    - (D) total at least 10% of the total length of the access road that is in the Macquarie Management Zone A, or  
**Note.** This applies to access roads that span a single property or multiple properties.
  - (ii) in a way that adequately allows for the passage of floodwater and adequately prevents the diversion of floodwater from natural flow paths.  
**Note.** The Minister may require that a structure be put in place at a low point of the access road to meet the requirements of this subclause.

(4) **Specific requirements for supply channels**

The granting or amending of a flood work approval for a supply channel is only permitted if, in the Minister's opinion, all of the following apply:

- (a) the height of the supply channel is below the natural surface level,
- (b) the supply channel is constructed to ensure:
  - (i) the adequate passage of floodwater and prevention of diversion of floodwater from natural flow paths, and  
**Note.** The Minister may require that a structure be put in place at a low point of the supply channel to meet the requirements of this subparagraph.

- (ii) the spoil associated with the construction and maintenance of the supply channel:
  - (A) forms a windrow parallel to the direction of flow so that it does not block more than 5% of the width of the Macquarie Management Zone A, as measured at the location of the supply channel and perpendicular to the flood flow direction, or
  - (B) is levelled to a height of 10 cm or less above the natural surface level at any point of the spoil.

**Note.** *Spoil* and *windrow* are defined in the Dictionary.

(5) **Specific requirements for stock refuges**

The granting or amending of a flood work approval for a stock refuge is only permitted if, in the Minister's opinion, all of the following apply:

- (a) the area of the stock refuge is 10ha or less and no other stock refuge is in that area,
- (b) the total area of stock refuges on the landholding on which the stock refuge is located is no more than 5% of the total area of the landholding,
- (c) the stock refuge blocks 5% or less of the width of the Macquarie Management Zone A, as measured at the location of the stock refuge and perpendicular to the flood flow direction.

**Note.** For example, if the Macquarie Management Zone A is 200 m in width, the stock refuge must not extend more than 10m into the Macquarie Management Zone A.

(6) **Specific requirements for infrastructure protection works**

The granting or amending of a flood work approval for an infrastructure protection work is only permitted if, in the Minister's opinion, the following apply:

- (a) the infrastructure protection work is on a landholding:
  - (i) where 20ha or less of the landholding is located in the Macquarie Management Zone A and 10% or less of the area of the landholding located within the Macquarie Management Zone A is enclosed by the work, or
  - (ii) where more than 20ha of the landholding is located in the Macquarie Management Zone A and no more than 2ha or 1% (whichever is greater) of the area of the landholding located in the Macquarie Management Zone A is enclosed by the work, and

**Note.** For example, if a property has 25ha located in Macquarie Management Zone A, the area enclosed by infrastructure protection works located in Macquarie Management Zone A must not exceed 2ha in area. Alternatively, if a property has

300ha located in Macquarie Management Zone A, the area enclosed by infrastructure protection works located in Macquarie Management Zone A must not exceed 3ha in area.

- (b) the infrastructure protection work blocks 5% or less of the width of the Macquarie Management Zone A, as measured at the location of the infrastructure protection work and perpendicular to the flood flow direction.

**(7) Specific requirements for ecological enhancement works**

The granting or amending of a flood work approval for an ecological enhancement work is only permitted if, in the Minister's opinion, the work is for the purpose of providing a positive outcome for a flood-dependent ecological asset or any other ecological asset specified in local, state or Commonwealth environmental plans, policy or legislation, including any of the following:

- (a) *Basin Plan 2012 (Cth)*,
- (b) *Biodiversity Conservation Act 2016*,
- (c) *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*,
- (d) the long-term water plan for the Macquarie-Castlereagh surface water resource plan area under the *Basin Plan 2012 (Cth)*,
- (e) *National Parks and Wildlife Act 1974*,
- (f) *Fisheries Management Act 1994*,
- (g) NSW Wetlands Policy 2010,
- (h) *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (2013 update)*,
- (i) any other source that, in the Minister's opinion, is relevant.

**(8) Specific requirements for Aboriginal cultural value enhancement works**

The granting or amending of a flood work approval for an Aboriginal cultural value enhancement work is only permitted if, in the Minister's opinion, the work is for the purpose of providing a positive outcome for a flood-dependent Aboriginal cultural value or any other Aboriginal cultural value listed in any of the following:

- (a) Aboriginal Heritage Information Management System,
- (b) Murray-Darling Basin Authority Aboriginal Submissions Database,
- (c) NSW State Heritage Register,
- (d) Commonwealth Heritage List,
- (e) any other source that, in the Minister's opinion, is relevant.

(9) **Specific requirements for heritage site enhancement works**

The granting or amending of a flood work approval for a heritage site enhancement work is only permitted if, in the Minister's opinion, the work is for the purpose of providing a positive outcome for a heritage site that is a flood-dependent heritage site or any other heritage site that is listed in any of the following:

- (a) Aboriginal Heritage Information Management System,
- (b) Murray-Darling Basin Authority Aboriginal Submissions Database,
- (c) NSW State Heritage Register,
- (d) NSW State Heritage Inventory,
- (e) Historic Heritage Information Management System,
- (f) Commonwealth Heritage List,
- (g) any other source, that in the Minister's opinion, is relevant.

**37 Flood work approvals for existing flood works in the Macquarie Management Zone**

**A**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work, or part of a flood work, in the Macquarie Management Zone A that was constructed any time before the commencement of this Plan and for which an approval is not permitted under clause 36.
- (2) The granting of a flood work approval for a flood work to which this clause applies is only permitted if, in the Minister's opinion:
  - (a) the flood work is any of the following types of flood works:
    - (i) an access road,
    - (ii) a stock refuge,
    - (iii) an infrastructure protection work,
    - (iv) a supply channel, and
  - (b) as at the date of application, the flood work is not the subject of a previously refused application, for any of the following:
    - (i) an approval for a controlled work under the repealed Part 8 of the *Water Act 1912*,
    - (ii) a flood work approval under the Act, and

- (c) the flood work satisfies the assessment criteria for the Macquarie Management Zone A under clause 39, and
  - (d) a cumulative impact assessment for the Macquarie Management Zone A of the flood work under clause 39 has been completed.
- (3) The amending of a flood work approval for a flood work to which this clause applies is only permitted if, in the Minister's opinion:
- (a) any proposed modification to the flood work will reduce the impact of the flood work on flow patterns (including distribution of flows, drainage, depth or velocity) in the Macquarie Management Zone A, and
  - (b) the flood work satisfies the assessment criteria for the Macquarie Management Zone A under clause 39, and
  - (c) the cumulative impact assessment for the Macquarie Management Zone A of the flood work under clause 39 has been completed.

### **38 Flood work approvals for undetermined applications in the Macquarie Management Zone A**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work, or part of a flood work, in the Macquarie Management Zone A that is the subject of an undetermined application for a flood work approval under the Act at the commencement of this Plan and for which an approval is not permitted under clause 36 or 37.
- (2) The granting or amending of a flood work approval for a flood work to which this clause applies is only permitted if the Minister is satisfied that:
  - (a) the undetermined application was lodged before 30 June 2020, and
  - (b) on the date that the undetermined application was lodged, the flood work had not been the subject of a previously refused application, for any of the following:
    - (i) an approval for a controlled work under the repealed Part 8 of the *Water Act 1912*,
    - (ii) a flood work approval under the Act, and
  - (c) the flood work:
    - (i) if located south of the Oxley Highway (as shown on the Plan Map), satisfies the assessment criteria for the Macquarie Management Zone BH where references to Macquarie Management Zone BH are taken to be references to Macquarie Management Zone A, or

- (ii) if located north of the Oxley Highway (as shown on the Plan Map), satisfies the assessment criteria for the Macquarie Management Zone B where references to Macquarie Management Zone B are taken to be references to the Macquarie Management Zone A, and
- (d) the undetermined application has been advertised.

### 39 Assessment criteria for flood works in the Macquarie Management Zone A

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) A flood work must, in the Minister's opinion:
  - (a) maintain adequate flood connectivity to the following under a range of flood scenarios including, at a minimum, scenarios for the large design floods and small design flood:
    - (i) flood-dependent ecological assets,
    - (ii) facilitation of fish passage, and

**Notes.**

- 1 **Large design floods** and **small design flood** are defined in the Dictionary.
- 2 Ecological assets that have been identified as flood-dependent assets for the purposes of this Plan are identified in Schedule 1 and shown on the Ecological Assets Map.

- (b) maintain adequate flood connectivity to the following under a range of flood scenarios including, at a minimum, scenarios for the large design floods and small design flood:
  - (i) flood-dependent Aboriginal cultural values,
  - (ii) flood-dependent heritage sites, and

**Notes.**

- 1 Aboriginal cultural values that are flood-dependent assets for the purposes of this Plan are the Aboriginal cultural values identified in clause 20.
- 2 Heritage sites that have been identified as flood-dependent assets for the purposes of this Plan are sites, objects or places listed in at least one of the sources referred to in clause 21.

- (c) not be constructed or modified if the construction or modification is likely to disturb the ground surface of a heritage site or cause more than minimal erosion to a heritage site, and

**Note.** Heritage sites may be sensitive to changes in flood behaviour or disturbance from the construction of flood works.
- (d) maintain adequate drainage on landholdings (including adjacent landholdings) that may be affected by the proposed flood work.

- (2) In the granting or amending of a flood work approval for a flood work, the Minister must



consider the cumulative impact that the flood work on the landholding on which the flood work is located, and other existing works on the landholding, may have on all of the following:

- (a) adjacent landholdings,
  - (b) any other landholdings that may be affected by the flood work,
  - (c) the Floodplain environment.
- (3) In this Plan:

*assessment criteria for the Macquarie Management Zone A* means the requirements for a flood work under subclause (1).

*cumulative impact assessment for the Macquarie Management Zone A* means the requirements in granting or amending a flood work approval under subclause (2).

### **Division 3 Granting or amending flood work approvals in the Macquarie Management Zone BH**

#### **40 Advertising for flood work approvals in the Macquarie Management Zone BH**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work or proposed flood work, or part of a flood work or proposed flood work, that is in the Macquarie Management Zone BH.
- (2) For the purposes of clause 26 (1) (c) of the Regulation, an application for a new or amended flood work approval for a flood work to which this clause applies must be advertised.

#### **41 Assessment criteria in the Macquarie Management Zone BH**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work or proposed flood work, or part of a flood work or proposed flood work, that is in the Macquarie Management Zone BH.
- (2) The granting or amending of a flood work approval for a flood work to which this clause applies is only permitted if, in the Minister's opinion, the flood work satisfies the assessment criteria for the Macquarie Management Zone BH.
- (3) The flood work must, in the Minister's opinion:
  - (a) maintain adequate flood connectivity to the following under a range of flood scenarios including, at a minimum, scenarios for the large design floods and small design flood:
    - (i) flood-dependent ecological assets,

- (ii) facilitation of fish passage, and

**Note.** Ecological assets that have been identified as flood-dependent assets for the purposes of this Plan are identified in Schedule 1 and shown on the Ecological Assets Map.

- (b) maintain adequate flood connectivity to the following under a range of flood scenarios including, at a minimum, scenarios for the large design floods and small design flood:

- (i) flood-dependent Aboriginal cultural values,
- (ii) flood-dependent heritage sites, and

**Notes.**

- 1 Aboriginal cultural values that are flood-dependent assets for the purposes of this Plan are the Aboriginal cultural values identified in clause 20.
- 2 Heritage sites that have been identified as flood-dependent assets for the purposes of this Plan are sites, objects or places listed in at least one of the sources referred to in clause 21.

- (c) not be constructed or modified if the construction or modification is likely to disturb the ground surface of a heritage site or cause more than minimal erosion to a heritage site, and

**Note.** Heritage sites may be sensitive to changes in flood behaviour or disturbance from the construction of flood works.

- (d) maintain adequate drainage on landholdings (including adjacent landholdings) that may be affected by the proposed flood work.

- (4) The construction or modification of the flood work on a landholding on which the flood work is located must not, in the Minister's opinion, be likely to:

- (a) redistribute the peak flood flow by greater than 2% on adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to the peak flood flow under existing development conditions for a range of flood scenarios including, at a minimum, a scenario for the 1990 large design flood or small design flood, or

**Note.** *1990 large design flood* is defined in the Dictionary.

- (b) increase flood levels by greater than 10 cm on adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flood levels under pre-development conditions and existing development conditions for a range of flood scenarios, including at a minimum, a scenario for the 1990 large design flood, or
- (c) increase flow velocity by more than 25% on the landholding, adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flow velocity under pre-development conditions and existing

development conditions for a range of flood scenarios, including at a minimum, a scenario for the 1990 large design flood, unless:

- (i) increases greater than 25% are in isolated areas on the landholding and the landholder mitigates the impact of the flood wave so that the average impact across the landholding does not exceed 25%, and

**Note. Flood wave** is defined in the Dictionary.

- (ii) increases in flow velocity do not exceed 25% at the boundary of the landholding, or

- (d) increase flood levels resulting in impacts on high value infrastructure when compared to flood levels under pre-development conditions and existing development conditions for a range of flood scenarios, including at a minimum, a scenario for the 1990 large design flood, or

- (e) increase flow velocity by an amount that, in the Minister's opinion, is likely to have more than a minimal impact on soil erodibility on the landholding, adjacent landholdings and other landholdings that may be affected by the proposed flood work, taking into account the ground cover on those landholdings.

**Note. Pre-development conditions** and **existing development conditions** are defined in the Dictionary.

- (5) The construction or modification of the flood work on a landholding on which the flood work is located must not, in the Minister's opinion, be likely to:

- (a) redistribute the peak flood flow by greater than 2% at any of the peak discharge calculation locations shown on the Peak Flood Flow Distribution (1990) Map, when compared to redistribution under existing development conditions, or

- (b) redistribute peak flood flow by greater than 2% at any location and under any other flood scenario considered relevant by the Minister.

- (6) In this Plan:

**assessment criteria for the Macquarie Management Zone BH** means the requirements under subclauses (3), (4) and (5) for a flood work to which the clause applies.

**Note.** In conducting the assessments described under subclauses (3)(a), (3)(b), (4) and (5), the Minister may consider any flood scenario that is appropriate to the flood work that is proposed and its location on the Floodplain, including the large design floods under existing and/or pre-development conditions, the 1% AEP flood under existing and/or pre-development conditions, or any other relevant flood scenario.

## Division 4 Granting or amending flood work approvals in the Macquarie

## Management Zone B

### 42 Advertising for flood work approvals in Macquarie Management Zone B

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work or proposed flood work, or part of a flood work or proposed flood work, that is in the Macquarie Management Zone B.
- (2) For the purposes of clause 26 (1) (c) of the Regulation, an application for a new or amended flood work approval for a flood work to which this clause applies must be advertised if, in the Minister's opinion, any of the following applies:
  - (a) the flood work is greater than 40 cm above the natural surface level at any location,
  - (b) the flood work is a stock refuge:
    - (i) with an area that is greater than 10ha and no other stock refuge is within that area, or
    - (ii) on a landholding of which the total area of stock refuges is greater than 5% of the total area of the landholding,
  - (c) the flood work is an infrastructure protection work with an area that is greater than 1% of the total area of the landholding on which it is located.

### 43 Assessment criteria in the Macquarie Management Zone B

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work or proposed flood work, or part of a flood work or proposed flood work, that is in the Macquarie Management Zone B.
- (2) Subject to subclause (3), the granting or amending of a flood work approval for a flood work to which this clause applies is only permitted if, in the Minister's opinion, the flood work satisfies the assessment criteria for the Macquarie Management Zone B.
- (3) Unless the Minister otherwise determines, subclauses (5) and (6) do not apply to the granting or amendment of a flood work approval for a flood work to which this clause applies if the application for the flood work approval is not required to be advertised in accordance with clause 42.

**Note.** In determining whether to grant or amend a flood work approval in the Macquarie Management Zone B that does not require advertising in accordance with clause 42, the Minister may conduct the assessments described in subclauses (5) and (6).

- (4) The flood work must, in the Minister's opinion:

(a) maintain adequate flood connectivity to the following under a range of flood scenarios including, at a minimum, scenarios for the large design floods and small design flood:

(i) flood-dependent ecological assets,

(ii) facilitation of fish passage, and

**Note.** Ecological assets that have been identified as flood-dependent assets for the purposes of this Plan are identified in Schedule 1 and shown on the Ecological Assets Map.

(b) maintain adequate flood connectivity to the following under a range of flood scenarios including, at a minimum, scenarios for the large design floods and small design flood:

(i) flood-dependent Aboriginal cultural values,

(ii) flood-dependent heritage sites, and

**Notes.**

1 Aboriginal cultural values that are flood-dependent assets for the purposes of this Plan are the Aboriginal cultural values identified in clause 20.

2 Heritage sites that have been identified as flood-dependent assets for the purposes of this Plan are sites, objects or places listed in at least one of the sources referred to in clause 21.

(c) not be constructed or modified if the construction or modification is likely to disturb the ground surface of a heritage site or cause more than minimal erosion to a heritage site, and

**Note.** Heritage sites may be sensitive to changes in flood behaviour or disturbance from the construction of flood works.

(d) maintain adequate drainage on landholdings (including adjacent landholdings) that may be affected by the proposed flood work.

(5) The construction or modification of the flood work on a landholding on which the flood work is located must not, in the Minister's opinion, be likely to:

(a) redistribute the peak flood flow by greater than 5% on adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to the peak flood flow under existing development conditions for a range of flood scenarios including, at a minimum, a scenario for the 1990 large design flood, or

(b) increase flood levels by greater than 10 cm on adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flood levels under pre-development conditions and existing development conditions for a range of flood scenarios, including at a minimum, a scenario for the 1990 large design flood, or

- (c) increase flow velocity by more than 50% on the landholding, adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flow velocity under pre-development conditions and existing development conditions for a range of flood scenarios, including at a minimum, a scenario for the 1990 large design flood, unless:
    - (i) increases greater than 50% are in isolated areas on the landholding and the landholder mitigates the impact of the flood wave so that the average impact across the landholding does not exceed 50%, and  
**Note. Flood wave** is defined in the Dictionary.
    - (ii) increases in flow velocity do not exceed 50% at the boundary of the landholding, or
  - (d) increase flood levels resulting in impacts on high value infrastructure when compared to flood levels under pre-development conditions and existing development conditions for a range of flood scenarios, including at a minimum, a scenario for the 1990 large design flood, or
  - (e) increase flow velocity by an amount that, in the Minister's opinion, is likely to have more than a minimal impact on soil erodibility on the landholding, adjacent landholdings and other landholdings that may be affected by the proposed flood work, taking into account the ground cover on those landholdings.  
**Note. Pre-development conditions** and **existing development conditions** are defined in the Dictionary.
- (6) The construction or modification of the flood work on a landholding on which the flood work is located must not, in the Minister's opinion, be likely to:
- (a) redistribute the peak flood flow by greater than 5% at any of the peak discharge calculation locations shown on the Peak Flood Flow Distribution (1990) Map, when compared to redistribution under existing development conditions, or
  - (b) redistribute peak flood flow by greater than 5% at any location and under any other flood scenario considered relevant by the Minister.

- (7) In this Plan:

**assessment criteria for the Macquarie Management Zone B** means, subject to subclause (3), the requirements under subclauses (4), (5) and (6) for a flood work to which the clause applies.

**Note.** In conducting the assessments described under subclauses (4)(a), (4)(b), (5) and (6), the Minister may consider any flood scenario that is appropriate to the flood work that is proposed and its location on the Floodplain, including the large design floods under existing and/or pre-development conditions, the 1% AEP flood under existing and/or pre-development conditions, or any other relevant flood scenario.

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## Division 5 Granting or amending flood work approvals in the Macquarie Management Zone C

### 44 Assessment criteria in the Macquarie Management Zone C

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work or proposed flood work, or part of a flood work or proposed flood work, that is in the Macquarie Management Zone C.
- (2) The granting or amending of a flood work approval for a flood work to which this clause applies is only permitted if, in the Minister's opinion, the flood work satisfies the assessment criteria for the Macquarie Management Zone C.
- (3) Flood works to which this clause applies must, in the Minister's opinion:
  - (a) maintain adequate flood connectivity to the following under a range of flood scenarios, including at a minimum, scenarios for the large design floods and small design flood:
    - (i) flood-dependent ecological assets,
    - (ii) facilitation of fish passage, and

**Note.** Ecological assets that have been identified as flood-dependent assets for the purposes of this Plan are identified in Schedule 1 and shown on the Ecological Assets Map.

- (b) maintain adequate flood connectivity to the following under a range of flood scenarios, including at a minimum, scenarios for the large design floods and small design floods:
  - (i) flood-dependent Aboriginal cultural values,
  - (ii) flood-dependent heritage sites, and

**Notes.**

- 1 Aboriginal cultural values that are flood-dependent assets for the purposes of this Plan are the Aboriginal cultural values identified in clause 20.
- 2 Heritage sites that have been identified as flood-dependent assets for the purposes of this Plan are sites, objects or places listed in at least one of the sources referred to in clause 21.

- (c) not be constructed or modified if the construction or modification is likely to disturb the ground surface of a heritage site or cause more than minimal erosion to a heritage site, and

**Note.** Heritage sites may be sensitive to changes in flood behaviour or disturbance from the construction of flood works.

- (d) maintain adequate drainage on landholdings (including adjacent landholdings) that may be affected by the proposed flood work.

- (4) Unless the Minister otherwise determines, in granting or amending the flood work approval of a flood work to which this clause applies, the Minister must consider whether the construction or modification of the flood work on a landholding on which it is located would be likely to:
- (a) redistribute the peak flood flow by greater than 5% on adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to the peak flood flow under existing development conditions for one or more flood scenarios, or
  - (b) increase flood levels by greater than 10 cm on adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flood levels under pre-development conditions and existing development conditions for one or more flood scenarios, or
  - (c) increase flow velocity by greater than 50% on the landholding, adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flow velocity under pre-development conditions and existing development conditions for one or more flood scenarios, unless:
    - (i) increases greater than 50% are in isolated areas on the landholding and the landholder mitigates the impact of the flood wave so that the average impact across the landholding does not exceed 50%, and
    - (ii) increases in flow velocity do not exceed 50% at the boundary of the landholding, or
  - (d) increase flood levels resulting in impacts on high value infrastructure when compared to flood levels under pre-development conditions and existing development conditions for one or more flood scenarios, or
  - (e) increase flow velocity by an amount that, in the Minister's opinion, is likely to have more than a minimal impact on soil erodibility on the landholding, adjacent landholdings and other landholdings that may be affected by the proposed flood work, taking into account the ground cover on those landholdings.
- (5) Unless the Minister otherwise determines, in granting or amending the flood work approval for a flood work to which this clause applies, the Minister must consider whether the construction or modification of the flood work would be likely to:
- (a) redistribute the peak flood flow by greater than 5% under existing development conditions at any of the peak discharge calculation locations shown in the Peak Flood Flow Distribution (1990) Map, or



- (b) redistribute peak flood flow by greater than 5% at any location and under any other flood scenario considered relevant by the Minister.

**Notes.**

- 1 In determining whether to grant or amend a flood work approval in the Macquarie Management Zone C, the Minister may determine not to conduct the assessments described under subclauses (4) and (5).
- 2 In conducting the assessments described under subclauses (3) (a), (3) (b), (4) and (5), the Minister may consider any flood scenario that is appropriate to the flood work that is proposed and its location on the Floodplain, including the large design floods under existing and/or pre-development conditions, the 1% AEP flood under existing and/or pre-development conditions, or any other relevant flood scenario.

- (6) In this Plan:

*assessment criteria for the Macquarie Management Zone C* means the requirements under subclauses (3), (4), and (5) for a flood work to which this clause applies.

## **Division 6 Granting or amending flood work approvals in the Macquarie Management Zone CU**

### **45 Assessment criteria in the Macquarie Management Zone CU**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work or proposed flood work, or part of a flood work or proposed flood work, that is in the Macquarie Management Zone CU.
- (2) The granting or amending of a flood work approval for a flood work to which this clause applies is only permitted if, in the Minister's opinion, the flood work satisfies the assessment criteria for the Macquarie Management Zone C in clause 44, where references to the Macquarie Management Zone C are taken to be references to the Macquarie Management Zone CU.

## **Division 7 Granting or amending flood work approvals in the Macquarie Management Zone D**

### **46 Flood work approvals in the Macquarie Management Zone D**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work or proposed flood work, or part of a flood work or proposed flood work, that is in the Macquarie Management Zone D.
- (2) **Requirements for all or parts of flood works in the zone**

The granting or amending of a flood work approval to which this clause applies is only permitted if, in the Minister's opinion, all of the following apply:

- (a) the flood work is any of the following types of flood works:

- (i) an access road,
  - (ii) a stock refuge,
  - (iii) an infrastructure protection work,
  - (iv) an ecological enhancement work,
  - (v) an Aboriginal cultural value enhancement work,
  - (vi) a heritage site enhancement work,
- (b) the granting or the amending of the approval complies with the specific requirements for the work under the relevant subclauses (3) to (8),
  - (c) the flood work satisfies the assessment criteria for the Macquarie Management Zone D specified under clause 49,
  - (d) a cumulative impact assessment for the Macquarie Management Zone D of the flood work under clause 49 has been completed.

(3) **Specific requirements for access roads**

The granting or amending of a flood work approval for an access road is only permitted if, in the Minister's opinion, the following applies:

- (a) the height of the access road at any point of the road is no more than 30 cm above the natural surface level, and  
**Note.** *Natural surface level* is defined in the Dictionary.
- (b) any borrow associated with the construction and maintenance of the access road is located on the downstream side of the access road and is no deeper than 30 cm below the natural surface level, and  
**Note.** *Borrow* is defined in the Dictionary.
- (c) the access road is constructed:
  - (i) with causeways that:
    - (A) are no higher than the natural surface level, and
    - (B) are located at low points of the floodway, and
    - (C) occur at least once every 200 metres, and
    - (D) total at least 10% of the total length of the access road that is in the Macquarie Management Zone D, or  
**Note.** This applies to access roads that span a single property or multiple properties.
  - (ii) in a way that adequately allows for the passage of floodwater and adequately prevents the diversion of floodwater from natural flow paths.

**Note.** The Minister may require that a structure be put in place at a low point of the access road to meet the requirements of this subclause.

(4) **Specific requirements for stock refuges**

The granting or amending of a flood work approval for a stock refuge is only permitted if, in the Minister's opinion, all of the following apply:

- (a) the area of the stock refuge is 10ha or less and no other stock refuge is in that area,
- (b) the total area of stock refuges on the landholding on which the stock refuge is located is no more than 5% of the total area of the landholding,
- (c) the stock refuge blocks 5% or less of the width of the Macquarie Management Zone D, as measured at the location of the stock refuge and perpendicular to the flood flow direction.

**Note.** For example if the Macquarie Management Zone D is 200 m in width, the stock refuge must not extend more than 10m into the Macquarie Management Zone D.

(5) **Specific requirements for infrastructure protection works**

The granting or amending of a flood work approval for an infrastructure protection work is only permitted if, in the Minister's opinion, the following apply:

- (a) the infrastructure protection work is on a landholding:
  - (i) where 20ha or less of the landholding is located in the Macquarie Management Zone D and 10% or less of the area of the landholding located within the Macquarie Management Zone D is enclosed by the work, or
  - (ii) where more than 20ha of the landholding is located in the Macquarie Management Zone D and no more than 2ha or 1% (whichever is greater) of the area of the landholding located in Macquarie Management Zone D is enclosed by the work,

**Note.** For example, if a property has 25ha located in Macquarie Management Zone D, the area enclosed by infrastructure protection works located in Macquarie Management Zone D must not exceed 2ha in area. Alternatively, if a property has 300ha located in Macquarie Management Zone D, the area enclosed by infrastructure protection works located in Macquarie Management Zone D must not exceed 3ha in area.

- (b) the infrastructure protection work blocks 5% or less of the width of the Macquarie Management Zone D, as measured at the location of the infrastructure protection work and perpendicular to the flood flow direction.

(6) **Specific requirements for ecological enhancement works**

The granting or amending of a flood work approval for an ecological enhancement work

is only permitted if, in the Minister's opinion, the work is for the purpose of providing a positive outcome for a flood-dependent ecological asset or any other ecological asset specified in local, state or Commonwealth environmental plans, policy or legislation, including any of the following:

- (a) *Basin Plan 2012 (Cth)*,
- (b) *Biodiversity Conservation Act 2016*,
- (c) *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*,
- (d) the long-term water plan for the Macquarie-Castlereagh surface water resource plan area under the *Basin Plan 2012 (Cth)*,
- (e) *National Parks and Wildlife Act 1974*,
- (f) *Fisheries Management Act 1994*,
- (g) NSW Wetlands Policy 2010,
- (h) Fisheries NSW *Policy and Guidelines for Fish Habitat Conservation and Management* (2013 update)
- (i) any other source that, in the Minister's opinion, is relevant.

(7) **Specific requirements for Aboriginal cultural value enhancement works**

The granting or amending of a flood work approval for an Aboriginal cultural value enhancement work is only permitted if, in the Minister's opinion, the work is for the purpose of providing a positive outcome for a flood-dependent Aboriginal cultural value or any other Aboriginal cultural value listed in the any of the following:

- (a) Aboriginal Heritage Information Management System,
- (b) Murray-Darling Basin Authority Aboriginal Submissions Database,
- (c) NSW State Heritage Register,
- (d) Commonwealth Heritage List,
- (e) any other source that, in the Minister's opinion, is relevant.

(8) **Specific requirements for heritage site enhancement works**

The granting or amending of a flood work approval for a heritage site enhancement work is only permitted if, in the Minister's opinion, the work is for the purpose of providing a positive outcome for a heritage site that is a flood-dependent heritage site or any other heritage site that is listed in any of the following:

- (a) the Aboriginal Heritage Information Management System,
- (b) Murray-Darling Basin Authority Aboriginal Submissions Database,

- (c) NSW State Heritage Register,
- (d) NSW State Heritage Inventory,
- (e) Historic Heritage Information Management System,
- (f) Commonwealth Heritage List,
- (g) any other source, that in the Minister's opinion, is relevant.

**47 Flood work approvals for existing flood works in the Macquarie Management Zone D**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work, or part of a flood work, in the Macquarie Management Zone D that was constructed any time before the commencement of this Plan and for which an approval is not permitted under clause 46.
- (2) The granting of a flood work approval for a flood work to which this clause applies is only permitted if, in the Minister's opinion:
  - (a) the flood work is any of the following types of flood works:
    - (i) an infrastructure protection work,
    - (ii) a stock refuge,
    - (iii) an access road,
    - (iv) a supply channel, and
  - (b) as at the date of application, the flood work is not the subject of a previously refused application, for any of the following:
    - (i) an approval for a controlled work under the repealed Part 8 of the *Water Act 1912*,
    - (ii) a flood work approval under the Act, and
  - (c) the flood work satisfies the assessment criteria for the Macquarie Management Zone D under clause 49, and
  - (d) the cumulative impact assessment for the Macquarie Management Zone D of the flood work under clause 49 has been completed.
- (3) The amending of a flood work approval for a flood work to which this clause applies is only permitted if, in the Minister's opinion:

- (a) any proposed modification to the flood work will reduce the impact of the flood work on flow patterns (including distribution of flows, drainage, depth or velocity) in the Macquarie Management Zone D, and
- (b) the flood work satisfies the assessment criteria for the Macquarie Management Zone D under clause 49, and
- (c) a cumulative impact assessment for the Macquarie Management Zone D of the flood work under clause 49 has been completed.

#### **48 Flood work approvals for undetermined applications in the Macquarie Management Zone D**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) This clause applies to a flood work, or part of a flood work, in the Macquarie Management Zone D that is the subject of an undetermined application for a flood work approval under the Act at the commencement of this Plan and for which an approval is not permitted under clause 46 or 47.
- (2) The granting or amending of a flood work approval for a flood work to which this clause applies is only permitted if the Minister is satisfied that:
  - (a) the undetermined application was lodged prior to 30 June 2020, and
  - (b) on the date that the undetermined application was lodged, the flood work had not been the subject of a previously refused application, for any of the following:
    - (i) an approval for a controlled work under the repealed Part 8 of the *Water Act 1912*,
    - (ii) a flood work approval under the Act, and
  - (c) the flood work:
    - (i) if located south of the Oxley Highway, as shown on the Plan Map, satisfies the assessment criteria for the Macquarie Management Zone BH where references to Macquarie Management Zone BH are taken to be references to Macquarie Management Zone D, or
    - (ii) if located north of the Oxley Highway, as shown on the Plan Map, satisfies the assessment criteria for the Macquarie Management Zone B where references to Macquarie Management Zone B are taken to be references to Macquarie Management Zone D, and
  - (d) the undetermined application has been advertised.

#### **49 Assessment criteria in the Macquarie Management Zone D**

**Note.** The Minister may require applicants for flood work approvals to submit technical studies or supporting information to demonstrate that a flood work or proposed flood work meets the criteria outlined in this clause.

- (1) A flood work must, in the Minister's opinion:
- (a) maintain adequate flood connectivity to the following under a range of flood scenarios, including at a minimum, scenarios for the large design floods and small design flood:

- (i) flood-dependent ecological assets,
- (ii) facilitation of fish passage, and

**Note.** Ecological assets that have been identified as flood-dependent assets for the purposes of this Plan are identified in Schedule 1 and shown on the Ecological Assets Map.

- (b) maintain adequate flood connectivity to the following under a range of flood scenarios, including at a minimum, scenarios for the large design floods and small design flood:
- (i) flood-dependent Aboriginal cultural values,
- (ii) flood-dependent heritage sites, and

**Notes.**

- 1 Aboriginal cultural values that are flood-dependent assets for the purposes of this Plan are the Aboriginal cultural values identified in clause 20.
- 2 Heritage sites that have been identified as flood-dependent assets for the purposes of this Plan are sites, objects or places listed in at least one of the sources referred to in clause 21.

- (c) not be constructed or modified if the construction or modification is likely to disturb the ground surface of a heritage site or cause more than minimal erosion to a heritage site, and

**Note.** Heritage sites may be sensitive to changes in flood behaviour or disturbance from the construction of flood works.

- (d) maintain adequate drainage on landholdings (including adjacent landholdings) that may be affected by the proposed flood work.

- (2) In the granting or amending of a flood work approval for a flood work to which this clause applies, the Minister must consider the cumulative impact that the flood work on the landholding on which the flood work is located, and other existing works on the landholding, may have on all of the following:

- (a) adjacent landholdings,
- (b) other landholdings that may be affected by the proposed flood work,
- (c) the Floodplain environment.

- (3) In this Plan:

*assessment criteria for the Macquarie Management Zone D* means the requirements for a flood work under subclause (1).

*cumulative impact assessment for the Macquarie Management Zone D* means the requirements in granting or amending a flood work approval under subclause (2).



## **Part 9 Mandatory conditions**

**Note.** This Part is made in accordance with section 17 (c) of the Act.

### **50 General**

- (1) For the purposes of this Part, a requirement to notify the Minister in writing will only be satisfied by writing to the email address for enquiries on the Department's website.
- (2) Flood work approvals for flood works in the Floodplain must have mandatory conditions to give effect to:
  - (a) the clauses set out in this Part, and,
  - (b) any other condition required to implement the provisions of this Plan.
- (3) Upon becoming aware of a breach of any condition of the approval, the approval holder must:
  - (a) notify the Minister as soon as practicable, and
  - (b) if the notification under paragraph (a) was not in writing, confirm this notification in writing within seven days of becoming aware of the breach.

### **51 Flood work decommissioning condition**

- (1) A flood work that is no longer intended to be used must be decommissioned in accordance with this clause.
- (2) The approval holder must notify the Minister in writing of any intention to decommission the flood work at least 60 days before commencing decommissioning. The notice must include a work plan for decommissioning the flood work.
- (3) The approval holder must comply with any notice from the Minister received within 60 days of the notice referred to in subclause (2) stating that the flood work:
  - (a) must not be decommissioned, or
  - (b) must be decommissioned in accordance with the requirements specified in the notice.
- (4) In decommissioning the flood work, the approval holder must comply with the work plan referred to in subclause (2) or requirements referred to in subclause (3) (b).
- (5) Within 60 days of the flood work being decommissioned, the approval holder must notify the Minister in writing that the flood work has been decommissioned and details of the decommissioning.

## Part 10 Amendment of this Plan

### 52 General

- (1) For the purposes of section 45 (1) (b) of the Act, this Part provides for when this Plan may be amended and that any such amendments are taken to be authorised by this Plan.
- (2) An amendment authorised by this Plan is taken to include any consequential amendments required to be made to this Plan to give effect to that particular amendment.

**Note.** For example, if Part 1 is amended to add a new management zone, this may require amendments to other parts of this Plan to include rules for that management zone.

### 53 Part 1

Part 1 may be amended to do any of the following:

- (a) apply this Plan to new or additional areas or to modify or remove existing areas,
- (b) amend the Plan Map,
- (c) amend the Floodway Network Map,
- (d) amend the Peak Flood Flow Distribution (1990) Map,
- (e) add, remove or modify a management zone using any of the following information, or other supporting information as determined by the Minister:
  - (i) an aerial photograph or equivalent satellite image showing flood inundation at the property scale of either the small design flood or the large design floods,
  - (ii) oblique photographs showing flood inundation of either the small design flood or the large design floods that contain verifiable landmarks,
  - (iii) oblique photographs of flood survey marks that can be verified for either the small design flood or the large design floods.

**Note.** A hydraulic study which provides velocity and depth information for the large design floods may be used to support this information.

### 54 Part 3

Part 3 may be amended to do any of the following:

- (a) amend the description of the natural flooding regime,
- (b) amend the description of the existing flooding regime.

### 55 Part 4

Part 4 may be amended to add, remove or modify the design floods used to establish the floodway network.

## 56 Part 5

Part 5 may be amended to do any of the following:

- (a) amend the ecological benefits of flooding specified in clause 17,
- (b) add, remove or modify Aboriginal cultural values in clause 20,
- (c) add, remove or modify heritage sites in clause 21.

## 57 Part 6

Part 6 may be amended to do any of the following:

- (a) add, remove or modify the types of existing flood works in clause 23,
- (b) add, remove or modify the number of existing flood works in clause 24,
- (c) modify the area enclosed by existing flood works in clause 25.

## 58 Part 8

Part 8 may be amended to do any of the following:

- (a) add, remove or modify rules for granting or amending flood work approvals,
- (b) add rules to give effect to an action plan made under Part 8 including rules for:
  - (i) the granting or amending of flood work approvals, and
  - (ii) the modification or removal of existing flood works,

**Note. *Action plan*** is defined in the Dictionary.
- (c) add rules for the removal or modification of existing flood works.

## 59 Part 9

Part 9 may be amended to do any of the following:

- (a) add, remove or modify requirements for the decommissioning of flood works,
- (b) add, remove or modify requirements if the approval holder intends to permanently cease using a flood work,
- (c) add, remove or modify conditions to implement an action plan made as part of this Plan.

## 60 Dictionary

The Dictionary may be amended to add, modify or remove a definition.

## 61 Schedules

- (1) Schedule 1 may be amended to add or remove any ecological assets or ecological values that benefit from flooding.

- (2) Schedule 2 may be amended to add or remove areas of ecological or cultural significance, or both, in the Macquarie Management Zone D.
- (3) Schedule 3 may be amended to add or remove an address.

## Dictionary

**Note.** Unless otherwise defined in this Plan, words and expressions that are defined in the Act or in the regulations have the same meanings in this Plan.

**1990 large design flood** refers to the design flood of August 1990 (3% AEP or 1 in 35 ARI at the Macquarie River at Narromine gauge (421006).

**2000 large design flood** refers to the design flood of November 2000 (8% AEP or 1 in 12 ARI at the Macquarie River at Narromine gauge (421006).

**Aboriginal cultural values** are sites, objects, landscapes, resources and beliefs that are important to Aboriginal people as part of their continuing culture.

**action plan** refers to a plan that may be developed to assess flood works for remedial action.

**annual exceedance probability (AEP)** is the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage (%) or a likelihood of 1 flood in  $x$  years.

**Note.** For example, a flood with an AEP of 5% means there is a 5% chance that a flood of same size or larger will occur in any one year.

**annual recurrence interval (ARI)** is the long-term average number of years between the occurrence of a flood as big or larger than the selected flood event.

**Note.** For example, floods with a discharge as great or greater than the 20 year-ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.

**areas of groundwater recharge** are areas where water from a flood event leaks through the soil profile into the underlying aquifers.

**borrow** is an area of land where material is excavated, or removed, to construct a flood work at another location which results in a depression or hole in the ground.

**cultural assets** are objects, places or values that are important for people to maintain their connections, beliefs, customs, behaviours and social interactions.

**depth-velocity product** is a hydraulic model output that can be used to indicate areas of a floodplain where a significant discharge of water occurs during floods; that is, areas where flow velocity or water depth (or both) are relatively high.

**design flood** is a flood of known magnitude or annual exceedance probability that can be modelled; a design flood is selected to design floodway networks which are used to define management zones for the planning and assessment of the management of flood works on floodplains.

**Note.** The selection of a design flood is based on an understanding of flood behaviour and associated flood risk. Multiple design floods may be selected to account for the social, economic and ecological consequences associated with floods of different magnitudes.

**ecological assets** are wetlands or other floodplain ecosystems, including watercourses that depend on flooding to maintain their ecological character and areas where groundwater reserves are recharged by floodwaters, which are spatially explicit and set in the floodplain landscape.

**ecological values** are surrogates for biodiversity that are used to inform and prioritise the flood-dependent ecological assets and include fauna species and fauna habitat, vegetation communities and areas of conservation significance.

**existing development conditions** refers to the level of development at the commencement of this Plan.

**fish passage** refers to connectivity that facilitates the movement of native fish species between upstream and downstream habitats (longitudinal connectivity) and adjacent riparian and floodplain areas (lateral connectivity); areas that are important for fish passage include rivers, creeks and flood flow paths.

**flood connectivity** refers to the unimpeded passage of floodwater through the floodplain and is important for in-stream aquatic processes and biota and the conservation of natural riverine systems.

**flood flow direction** means the direction in which a flood flows for the relevant area as depicted on the Peak Flood Flow Distribution (1990) Map.

**flood study (FS)** is a comprehensive technical investigation of flood behaviour and defines the nature of flood risk.

**flood wave** means a rise in flows associated with flooding, culminating in a peak and followed by a recession to lower flows.

**flood-dependent Aboriginal cultural values** has the meaning given in clause 20 (1).

**flood-dependent assets** are ecological assets, Aboriginal cultural values, or heritage sites that have important ecological or cultural features which rely on inundation by floodwaters to sustain essential processes.

**flood-dependent ecological assets** has the meaning given in clause 18 (1).

**flood-dependent ecological values** has the meaning given in clause 18 (2).

**flood-dependent heritage sites** has the meaning given in clause 21 (1).

**flooding regime** refers to the frequency, duration, nature and extent of flooding.

**Floodplain Risk Management Plan (FRMP)** identifies and determines options in consideration of social, ecological and economic factors relating to flood risk and the management of flood prone land.

**Floodplain Risk Management Study (FRMS)** provides preferred options relating to flood risk and provides the information necessary for adequate forward planning of flood prone land.

**floodways** are areas where a significant discharge of floodwater occurs during small and large design floods.

**heritage site** means a cultural heritage object or place that is listed on a Commonwealth, state or local government heritage register.

**high value infrastructure** includes but is not limited to houses/dwellings, infrastructure protection works, town levees, stockyards, sheds and pump sites; it does not include farm levee banks, irrigation development and fences.

**infrastructure protection work** refers to a flood work that is for the purpose of protecting houses, stock yards and other major infrastructure, such as machinery sheds in times of flooding.

**large design floods** refers to the 1990 large design flood and the 2000 large design flood.

**management zones** are areas in the Floodplain that have specific rules to define the purpose, nature and construction of flood works that can occur in those areas.

**natural surface level** is the average undisturbed surface level in the immediate vicinity of a flood work.

**peak discharge calculation location** is a section of the Floodplain where flow is calculated for the purpose of assessing the change in flow behaviour due to proposed flood works.

**pre-development conditions** refers to the natural flooding regimes.

**primary access road** is a road providing access from a public road to a permanently occupied fixed dwelling via a direct route.

**small design flood** refers to the design flood of December 2012 (33% AEP or 1 in 3 ARI at the Macquarie River at Narromine gauge (421006).

**spoil** refers to waste material (such as dirt or soil) that is produced during the construction or modification of a flood work.

**stock refuge** refers to a flood work that is for the purpose of protecting stock in times of flooding.

**wetlands** refers to areas of land that are wet by surface water or groundwater, or both, for long enough periods that the plants and animals in them have adapted to, and depend on, moist conditions for at least part of their lifecycle; they include areas that are inundated cyclically, intermittently or permanently with fresh, brackish or saline water, which is generally still or slow moving except in distributary channels.

**Note.** Examples of wetlands include lakes, lagoons, rivers, floodplains, swamps, billabongs and marshes.

**windrow** refers to a row or line of cut vegetation or other material.

## Schedule 1 Ecological assets and ecological values

(clause 18 (1) and (2))

### 1 Flood-dependent ecological assets:

- (1) Wetlands:
  - (a) semi-permanent (non-woody):
    - (i) swamp wallaby grass (*Amphibromus nervosus*),
    - (ii) pacific azolla (*Azolla filiculoides*),
    - (iii) azolla (*Azolla pinnata*),
    - (iv) marsh club-rush (*Bolboschoenus fluviatilis*),
    - (v) clubrush (*Bolboschoenus medianus*),
    - (vi) swamp daisy (*Brachyscome basaltica* var. *gracilis*),
    - (vii) tall sedge (*Carex appressa*),
    - (viii) common sneezeweed (*Centipeda cunninghamii*),
    - (ix) spreading sneezeweed (*Centipeda minima* subsp. *minima*),
    - (x) small water ribbons (*Cycnogeton dubium*),
    - (xi) water ribbons (*Cycnogeton procerum*),
    - (xii) downs nutgrass (*Cyperus bifax*),
    - (xiii) trim flat-sedge (*Cyperus concinnus*),
    - (xiv) variable flat-sedge (*Cyperus difformis*),
    - (xv) tall flat-sedge (*Cyperus exaltatus*),
    - (xvi) sticky sedge (*Cyperus fulvus*),
    - (xvii) flecked flat-sedge (*Cyperus gunnii* subsp. *gunnii*),
    - (xviii) dwarf flat-sedge (*Cyperus pygmaeus*),
    - (xix) flat-sedge (*Cyperus rigidellus*),
    - (xx) flat sedge (*Cyperus victoriensis*),
    - (xxi) starfruit (*Damasonium minus*),
    - (xxii) brown beetle grass (*Diplachne fusca*),
    - (xxiii) brown beetle grass (*Diplachne muelleri*),

- (xxiv) marsh millet (*Echinochloa inundata*),
- (xxv) waterwort (*Elatine gratioloides*),
- (xxvi) common spike-rush (*Eleocharis acuta*),
- (xxvii) pale spike sedge (*Eleocharis pallens*),
- (xxviii) flat spike sedge (*Eleocharis plana*),
- (xxix) small spike-rush (*Eleocharis pusilla*),
- (xxx) tall spike rush (*Eleocharis sphacelata*),
- (xxxi) hoary willow-herb (*Epilobium hirtigerum*),
- (xxxii) cane grass (*Eragrostis australasica*),
- (xxxiii) river club-rush (*Isolepis victoriensis*),
- (xxxiv) tussock rush (*Juncus aridicola*),
- (xxxv) jointed rush (*Juncus articulatus*),
- (xxxvi) toad rush (*Juncus bufonius*),
- (xxxvii) tussock rush (*Juncus flavidus*),
- (xxxviii) hoary rush (*Juncus radula*),
- (xxxix) hoary rush (*Juncus subglaucus*),
- (xl) finger rush (*Juncus subsecundus*),
- (xli) common rush (*Juncus usitatus*),
- (xlii) blown grass (*Lachnagrostis filiformis*),
- (xliii) duckweed (*Lemna disperma*),
- (xliv) umbrella canegrass (*Leptochloa digitata*),
- (xlv) Australian mudwort (*Limosella australis*),
- (xlvi) large mudwort (*Limosella curdieana*),
- (xlvii) water primrose (*Ludwigia peploides* subsp. *montevidensis*),
- (xlviii) hyssop loosestrife (*Lythrum hyssopifolia*),
- (xlix) nardoo (*Marsilea costulifera*),
- (l) common nardoo (*Marsilea drummondii*),
- (li) river mint (*Mentha australis*),



- (lii) slender monkey-flower (*Mimulus gracilis*),
- (liiii) water milfoil (*Myriophyllum crispatum*),
- (liv) common water milfoil (*Myriophyllum papillosum*),
- (lv) milfoil (*Myriophyllum simulans*),
- (lvi) milfoil (*Myriophyllum variifolium*),
- (lvii) red water-milfoil (*Myriophyllum verrucosum*),
- (lviii) waternymph (*Najas tenuifolia*),
- (lix) wavy marshwort (*Nymphoides crenata*),
- (lx) swamp lily (*Ottelia ovalifolia* subsp. *ovalifolia*),
- (lxi) water couch (*Paspalum distichum*),
- (lxii) slender knotweed (*Persicaria decipiens*),
- (lxiii) common reed (*Phragmites australis*),
- (lxiv) sweet swamp-grass (*Poa fordeana*),
- (lxv) curly pondweed (*Potamogeton crispus*),
- (lxvi) pondweed (*Potamogeton sulcatus*),
- (lxvii) floating pondweed (*Potamogeton tricarinatus*),
- (lxviii) poison pratia (*Pratia concolor*),
- (lxix) mud grass (*Pseudoraphis spinescens*),
- (lxx) river buttercup (*Ranunculus inundatus*),
- (lxxi) swamp buttercup (*Ranunculus undosus*),
- (lxxii) perennial marsh cress (*Rorippa laciniata*),
- (lxxiii) swamp dock (*Rumex brownii*),
- (lxxiv) shiny dock (*Rumex tenax*),
- (lxxv) river club-rush (*Schoenoplectus validus*),
- (lxxvi) rat's tail couch (*Sporobolus mitchellii*),
- (lxxvii) swamp starwort (*Stellaria angustifolia*),
- (lxxviii) narrow-leaved cumbungi (*Typha domingensis*),
- (lxxix) broad-leaved cumbungi (*Typha orientalis*), and

(lxxx) eelweed (*Vallisneria australis*),

(b) floodplain (flood-dependent shrubland):

(i) lignum (*Duma florulenta*), and

(ii) river cooba (*Acacia stenophylla*).

**Note.** There may be additional wetland species other than those listed subject to local hydrological conditions. Differences in flooding frequency, timing, duration, water quality and drainage may determine wetland vegetation composition and structure at any location in the Macquarie Valley Floodplain. The *Background Document* provides further information on relevant plant community types.

(2) other floodplain ecosystems:

(a) flood-dependent forest/woodland (wetlands):

(i) river red gum (*Eucalyptus camaldulensis*),

(b) flood-dependent woodland:

(i) coolibah (*Eucalyptus coolabah*), and

(ii) black box (*Eucalyptus largiflorens*).

**Note.** Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions is listed as an endangered ecological community under Schedule 2 (Threatened ecological communities) to the *Biodiversity Conservation Act 2016*. Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions is listed as an endangered ecological community under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

(3) areas of groundwater recharge:

(a) alluvial soils, and

(b) rivers.

**Note.** The nature of groundwater recharge is complex and recharge may occur in areas other than those listed.

## 2 Flood-dependent ecological values:

- (1) Areas of state, national and international conservation significance that are dependent on flooding:
  - (a) Ramsar Convention:
    - (i) Macquarie Marshes Ramsar site, specifically:
      - (A) 'Macquarie Marshes Nature Reserve – Northern section',
      - (B) 'Macquarie Marshes Nature Reserve – Southern section',
      - (C) 'U-block', and
      - (D) 'Wilgara'.
  - (b) Wetlands of national importance as per the Directory of Important Wetlands in Australia:
    - (i) Macquarie Marshes – NSW009
  - (c) State Conservation Areas:
    - (i) Ginghet Nature Reserve, and
    - (ii) Macquarie Marshes Nature Reserve
- (2) Habitat for flood-dependent fauna:
  - (a) mapped flood-dependent vegetation communities,
  - (b) drought refuges,
  - (c) observed waterbird breeding habitat sites, and
  - (d) wetlands as listed in Schedule 1, Clause 1(1) of this Plan.

**Note.** Mapped flood-dependent vegetation communities providing habitat for flood-dependent fauna are listed in Schedule 1 and further information is provided in the Background Document.
- (3) Water-dependent fauna species, including threatened species:
  - (a) fish species:
    - (i) olive perchlet (*Ambassis agassizii*),
    - (ii) silver perch (*Bidyanus bidyanus*),
    - (iii) un-specked hardyhead (*Craterocephalus stercusmuscarum fulvus*),
    - (iv) mountain galaxias (*Galaxias olidus*),
    - (v) unidentified carp-gudgeon (*Hypseleotris* spp.),
    - (vi) spangled perch (*Leiopotherapon unicolor*),

- (vii) trout cod (*Maccullochella macquariensis*),
- (viii) Murray cod (*Maccullochella peelii*),
- (ix) golden perch (*Macquaria ambigua*),
- (x) Murray-Darling rainbowfish (*Melanotaenia fluviatilis*),
- (xi) bony herring (*Nematalosa erebi*),
- (xii) flathead gudgeon (*Philypnodon grandiceps*),
- (xiii) Australian smelt (*Retropinna semoni*), and
- (xiv) eel-tailed catfish (*Tandanus tandanus*),

**Note.** The eel-tailed catfish and olive perchlet are listed as an endangered population under Part 2 of Schedule 4 to the *Fisheries Management Act 1994*. The silver perch is listed as a vulnerable species under Part 1 of Schedule 5 to *Fisheries Management Act 1994* and critically endangered under the *Environment Protection and Biodiversity Act 1999* (Cth). The indicative (or known and expected) distributions for NSW freshwater threatened fish species has been modelled by the NSW Department of Primary Industries, including eel-tailed catfish, olive perchlet, trout cod and silver perch. The indicative distribution means there is a high probability that the species will occur in a stream segment, given the species has been recorded there or the environmental conditions are the same as a stream segment where the species is already known to occur.

- (b) frog species:
  - (i) eastern sign-bearing froglet (*Crinia parinsignifera*),
  - (ii) common eastern froglet (*Crinia signifera*),
  - (iii) sloane's froglet (*Crinia sloanei*),
  - (iv) striped burrowing frog (*Cyclorana alboguttata*),
  - (v) water-holding frog (*Cyclorana platycephala*),
  - (vi) rough frog (*Cyclorana verrucosa*),
  - (vii) fletcher's frog (*Limnodynastes fletcheri*),
  - (viii) salmon-striped frog (*Limnodynastes salmini*),
  - (ix) spotted marsh frog (*Limnodynastes tasmaniensis*),
  - (x) green tree frog (*Litoria caerulea*),
  - (xi) broad-palmed frog (*Litoria latopalmata*),
  - (xii) peron's tree frog (*Litoria peronii*),
  - (xiii) desert tree frog (*Litoria rubella*),
  - (xiv) sudell's frog (*Neobatrachus sudellae*),
  - (xv) crucifix frog (*Notaden bennettii*),
  - (xvi) small-headed toadlet (*Uperoleia capitulata*), and

- (xvii) wrinkled toadlet (*Uperoleia rugosa*),
- (c) amphibious mammal species:
  - (i) rakali (*Hydromys chrysogaster*),
- (d) turtle species:
  - (i) broad shelled turtle (*Chelodina expansa*),
  - (ii) eastern long-necked turtle (*Chelodina longicollis*), and
  - (iii) Murray turtle (*Emydura macquarii*),
- (e) reptile species:
  - (i) eastern water skink (*Eulamprus quoyii*),
  - (ii) eastern water dragon (*Intellagama lesueurii*), and
  - (iii) red-bellied black snake (*Pseudechis porphyriacus*),
- (f) aquatic snail species:
  - (i) river snail (*Notopala sublineata*),
  - (ii) billabong banded snail (*Notopala kingi suprafasciata*),
  - (iii) sculptured snail (*Plotiopsis balonnensis*), and
  - (iv) pouch snail (*Glyptophysa gibbosa*),

**Note.** The river snail is listed as critically endangered under Schedule 4A to the *Fisheries Management Act 1994* which identifies critically endangered species and ecological communities. The indicative (or known and expected) distribution for river snail has been modelled by the NSW Department of Primary Industries. The indicative distribution means there is a high probability that the species will occur in a stream segment, given the species has been recorded there or the environmental conditions are the same as a stream segment where the species is already known to occur.
- (g) waterbird species:
  - (i) magpie goose (*Anseranas semipalmata*),
  - (ii) Australasian bittern (*Botaurus poiciloptilus*),
  - (iii) curlew sandpiper (*Calidris ferruginea*),
  - (iv) black-necked stork (*Ephippiorhynchus asiaticus*),
  - (v) brolga (*Grus rubicunda*),
  - (vi) black-tailed godwit (*Limosa limosa*),
  - (vii) cotton pygmy-goose (*Nettapus coromandelianus*),
  - (viii) blue-billed duck (*Oxyura australis*),
  - (ix) Australian painted snipe (*Rostratula australis*), and

- (x) freckled duck (*Stictonetta naevosa*),

**Note.** The magpie goose, brolga, blue-billed duck and freckled duck are listed as vulnerable under Schedule 1 of the *Biodiversity Conservation Act 2016*. The black-necked stork and Australian painted snipe are listed as endangered under Schedule 1 of the *Biodiversity Conservation Act 2016*. The Australian painted snipe is also listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). All species on the list of migratory species are matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). This Plan aims to protect the flood connectivity to the habitats of these species.

- (h) colonial nesting waterbird species:

- (i) Australasian darter (*Anhinga novaehollandiae*),
- (ii) cattle egret (*Ardea ibis*),
- (iii) intermediate egret (*Ardea intermedia*),
- (iv) eastern great egret (*Ardea modesta*),
- (v) white-necked heron (*Ardea pacifica*),
- (vi) little egret (*Egretta garzetta*),
- (vii) pied heron (*Egretta picata*),
- (viii) white-faced heron (*Egretta novaehollandiae*),
- (ix) Australian pelican (*Pelecanus conspicillatus*),
- (x) great cormorant (*Phalacrocorax carbo*),
- (xi) little black cormorant (*Phalacrocorax sulcirostris*),
- (xii) pied cormorant (*Phalacrocorax varius*),
- (xiii) yellow-billed spoonbill (*Platalea flavipes*),
- (xiv) royal spoonbill (*Platalea regia*),
- (xv) glossy ibis (*Plegadis falcinellus*),
- (xvi) straw-necked ibis (*Threskiornis spinicollis*),
- (xvii) Australian white ibis (*Threskiornis molucca*), and
- (xviii) little pied cormorant (*Microcarbo melanoleucos*).

**Note.** Commonwealth and State environmental watering priority areas are comprised of ecological assets and values. The following strategies and policies were considered:

- *Basin environmental watering outlook for 2016–17*, Murray Darling Basin Authority, 2016
- *Basin environmental watering outlook for 2017–18*, Murray Darling Basin Authority, 2017
- *Commonwealth Environmental Water Portfolio Management Plan: Macquarie River Valley 2017–18*, Commonwealth of Australia, 2017
- *Commonwealth Environmental Water Portfolio Management Plan: Macquarie River Valley 2016–17*, Commonwealth of Australia, 2016
- *Assessment of environmental water requirements for the proposed Basin Plan: Macquarie*

*Marshes, 2012, Murray–Darling Basin Authority*

- *Macquarie–Castlereagh Water Resource Plan Area, Statement of annual environmental watering priorities 2016–17, 2016* State of NSW and Office of Environment and Heritage
- *Macquarie Marshes Adaptive Environmental Management Plan, 2010, Department of Environment, Climate Change and Water*

**Schedule 2 Areas of ecological or cultural significance, or both in the Macquarie Management Zone D** (clauses 5, 10 and 11)

ID number	Area of ecological significance	Easting	Northing	Zone
1	Ban Ban Lagoon	587500	6479758	55
2	Buddah Lake			
3	Cowal Swamp	527734	6544515	55
4	Coxs Lagoon	591929	6473959	55
5	Eastern Macquarie Marshes wetlands and streams	570855	6577560	55
6	Eulooon Cowal	610294	6469631	55
7	Goan Waterhole			
8	Greenhide Swamp	595665	6479982	55
9	Horseshoe Waterhole	549656	6546297	55
10	Magawah Lagoon	570209	6499886	55
11	Marra Creek Billabong 1	532201	6571999	55
12	Marra Creek Billabong 2	532582	6574099	55
13	Marra Creek Billabong 3	530939	6575017	55
14	Marra Creek Billabong 4	524804	6579885	55
15	Marra Creek Billabong 5	522282	6582354	55
16	Marra Creek Billabong 6	522423	6587617	55
17	Marra Creek Billabong 7	520203	6609064	55
18	Marra Creek Billabong 8	519771	6611281	55
19	Northern Macquarie Marshes wetlands and streams	553286	6615020	55
20	Paddy's Cowal	609104	6475010	55
21	Raby billabong (lagoon) anabranch	566621	6503812	55
22	Southern Macquarie Marshes wetlands and streams	552334	6575130	55
23	The Big Lagoon	519021	6616837	55
24	The Overflow	530013	6526853	55
25	Trailgang Cowal	612825	6448298	55
26	Unnamed lagoon	592308	6501234	55
27	Unnamed Swamp (Buena Vista)			
28	Unnamed lagoon (Ferndale Stud Park)	602981	6483198	55
29	Wamboin Lagoon	521000	6603637	55
30	Wonbobbie Lake	593399	6500306	55

**Note.** Coordinates were calculated using GDA 1994 MGA Zone 55. Coordinates are not provided for some cultural assets due to data sensitivity. Coordinates are generally taken from the centre of the asset and do not reflect the extent of the asset.



### **Schedule 3    Offices**

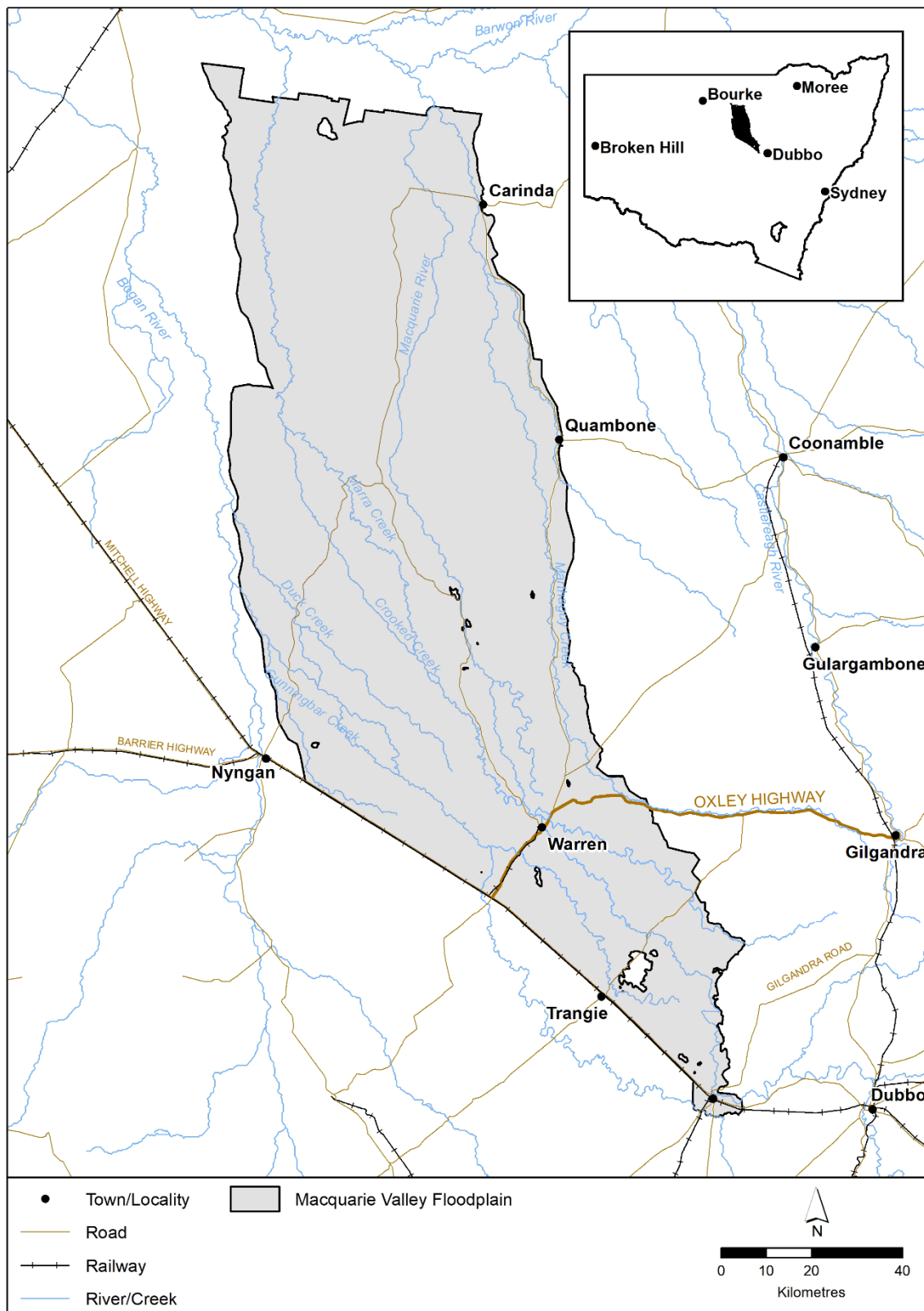
Any notifications that may be required to be made to the Minister, as specified in this Plan can be made to either of the offices listed below.

NSW Department of Planning, Industry and Environment  
209 Cobra Street  
DUBBO NSW 2830

NSW Department of Planning, Industry and Environment  
Tamworth Agricultural Institute  
4 Marsden Park Road  
CALALA NSW 2340

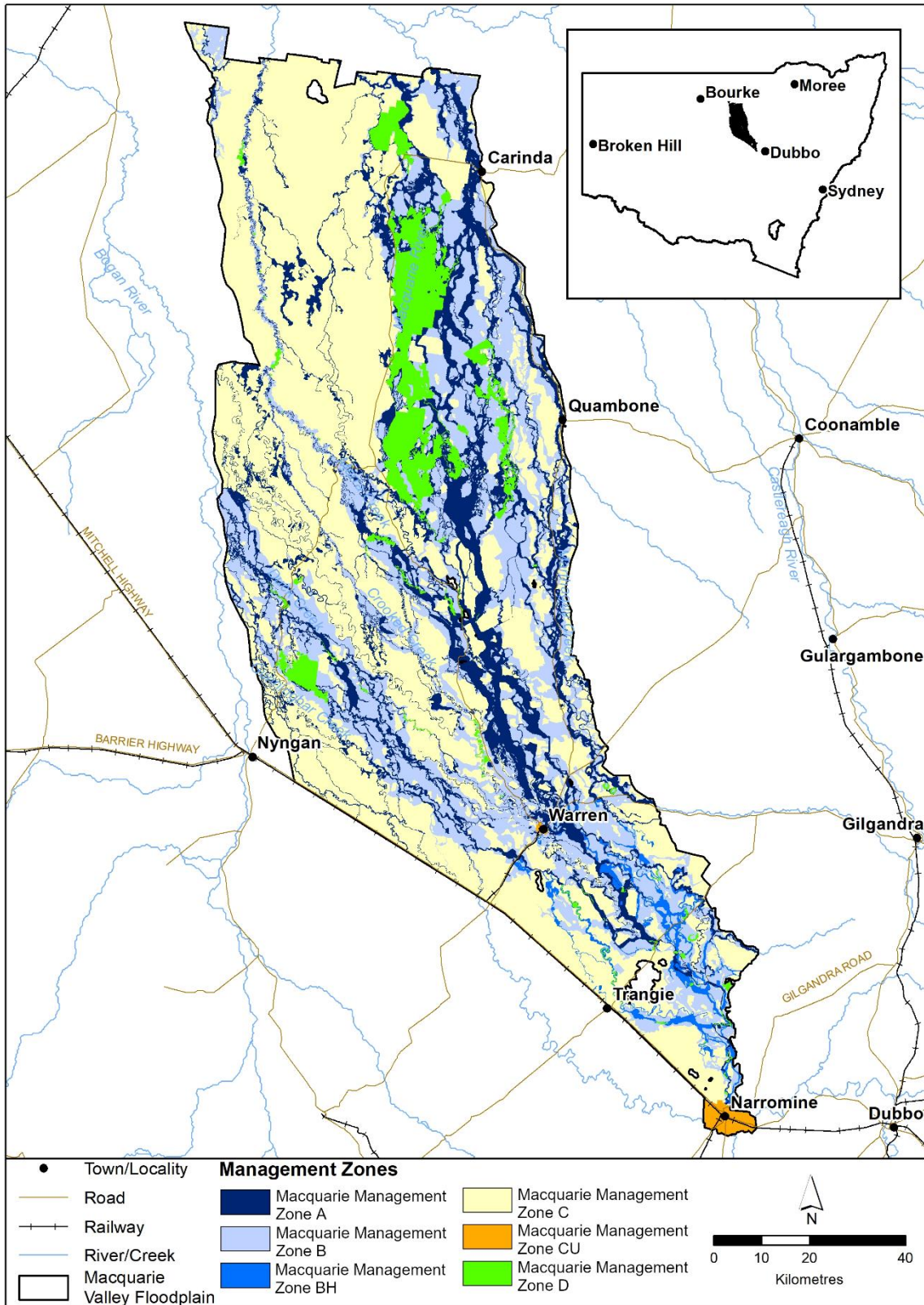
## Appendix 1 Overview of the Plan Map

Overview of the Floodplain Management Plan Map (FMP033\_Version 1),  
Floodplain Management Plan for the Macquarie Valley Floodplain 2021



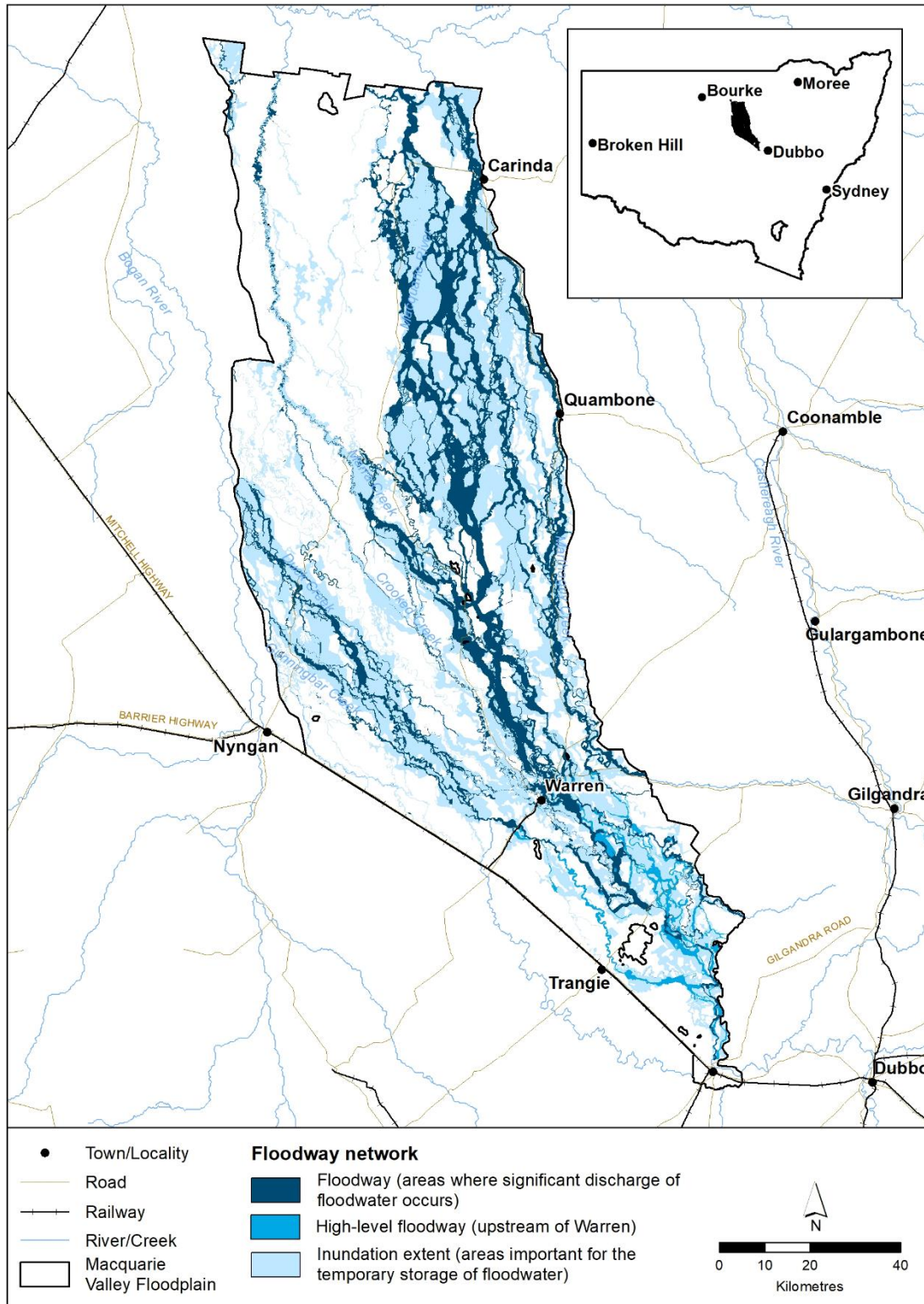
## Appendix 2 Overview of the Management Zones Map

Overview of the Management Zones Map (FMP034\_Version 1),  
Floodplain Management Plan for the Macquarie Valley Floodplain 2021



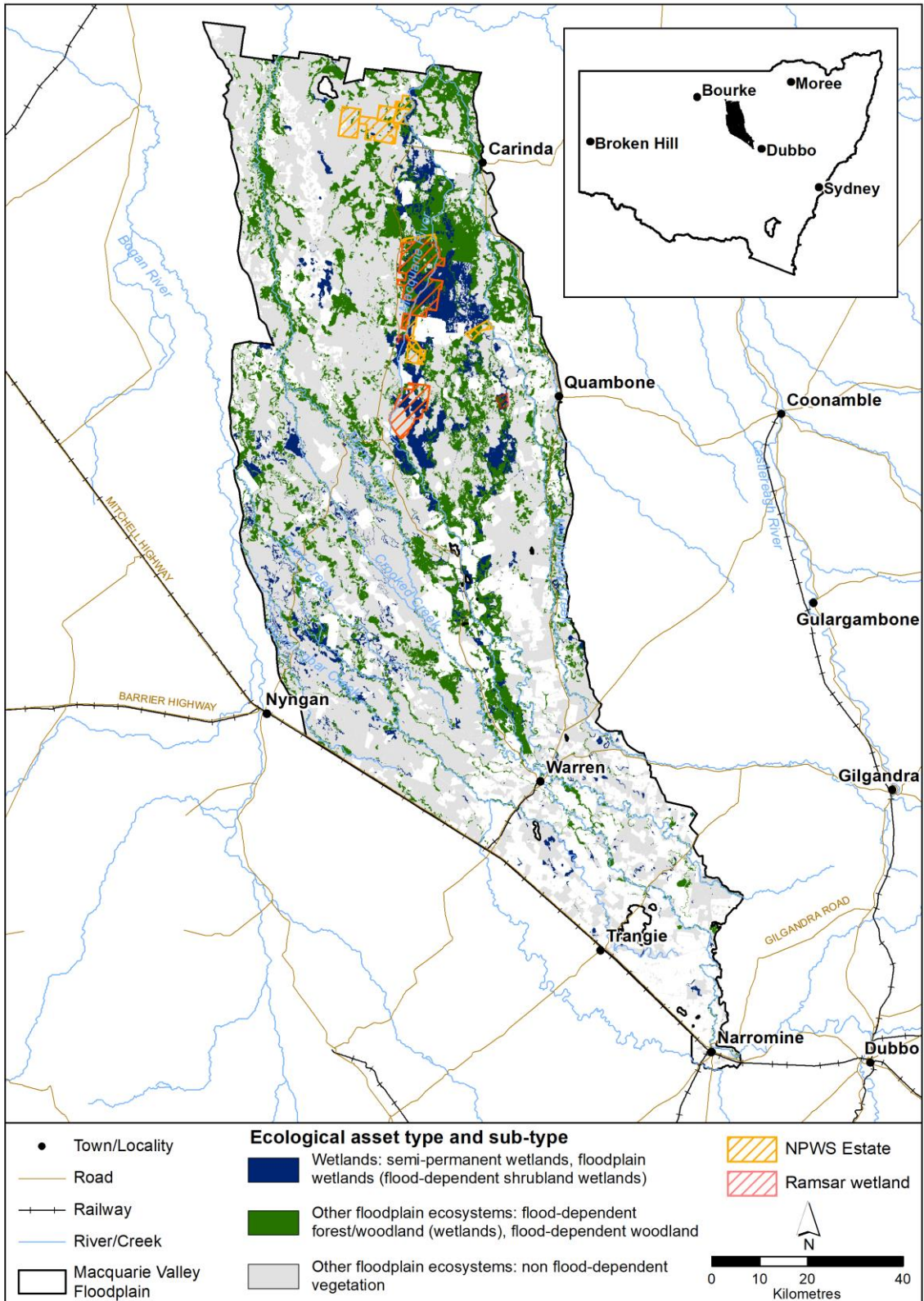
### Appendix 3 Overview of the Floodway Network Map

#### Overview of the Floodway Network Map (FMP035\_Version 1), Floodplain Management Plan for the Macquarie Valley Floodplain 2021



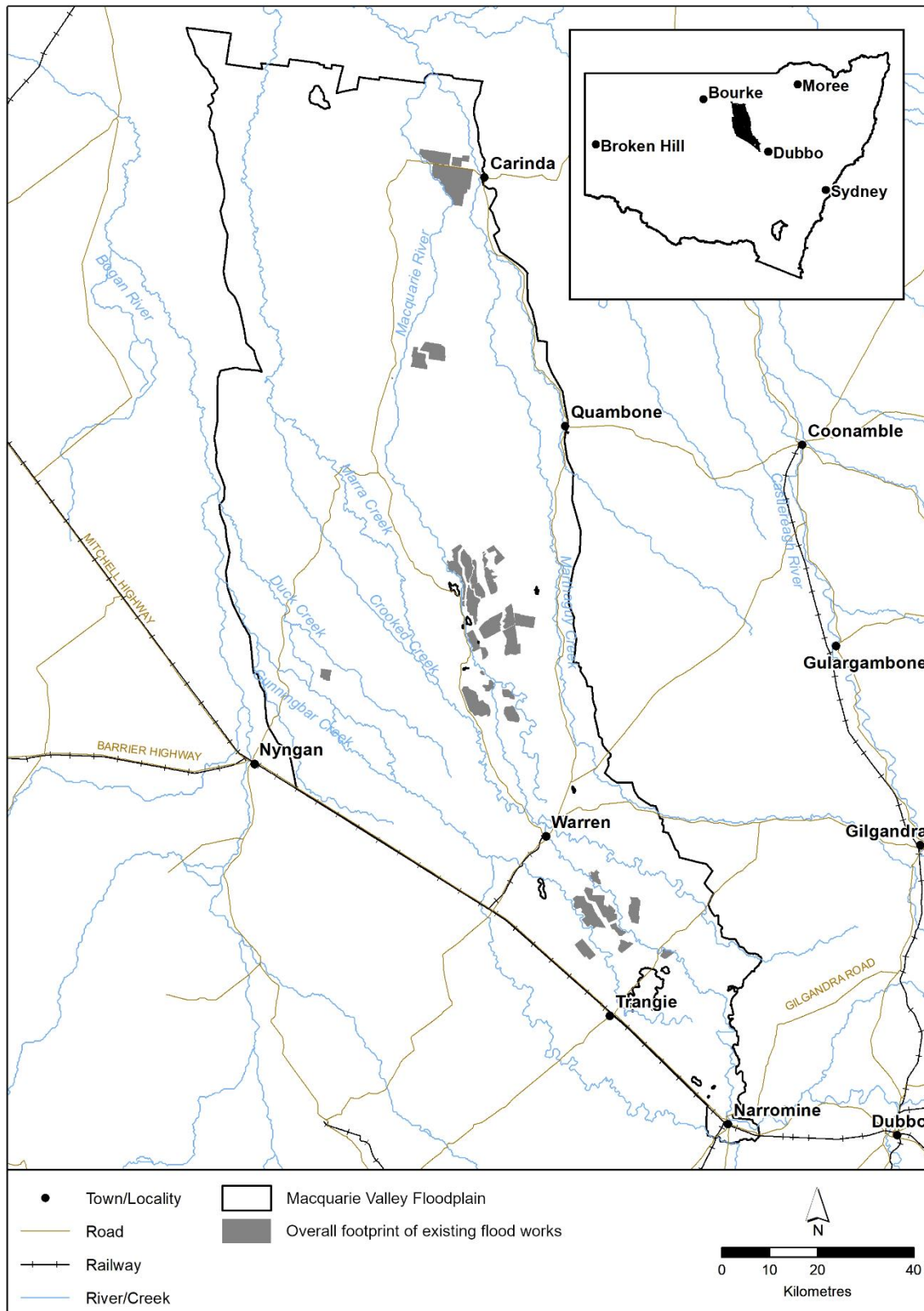
## Appendix 4 Overview of the Ecological Assets Map

### Overview of the Ecological Assets Map (FMP036\_Version 1), Floodplain Management Plan for the Macquarie Valley Floodplain 2021



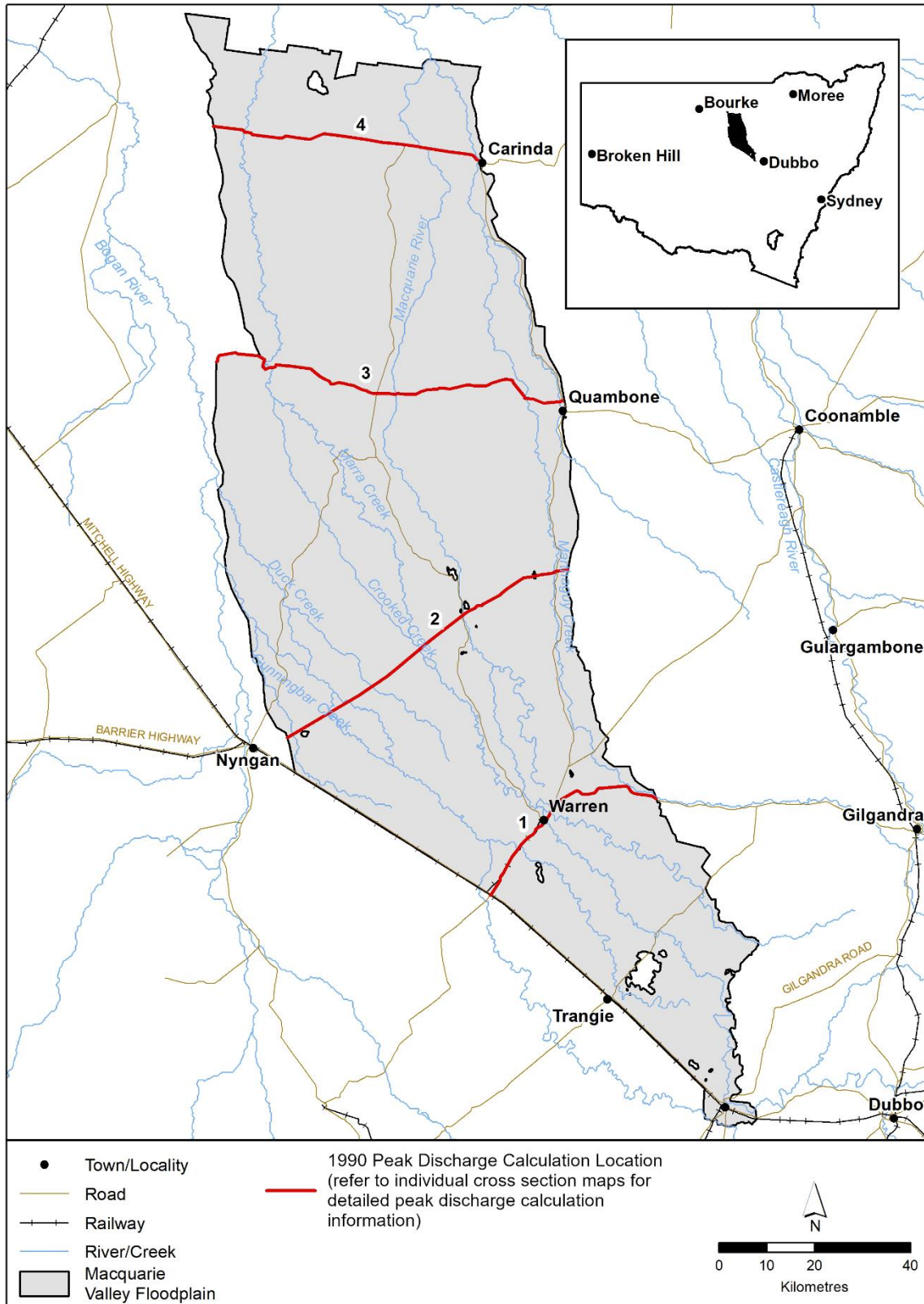
## Appendix 5 Overview of the Existing Flood Works Map

### Overview of the Existing Works Map (FMP037\_Version 1), Floodplain Management Plan for the Macquarie Valley Floodplain 2021



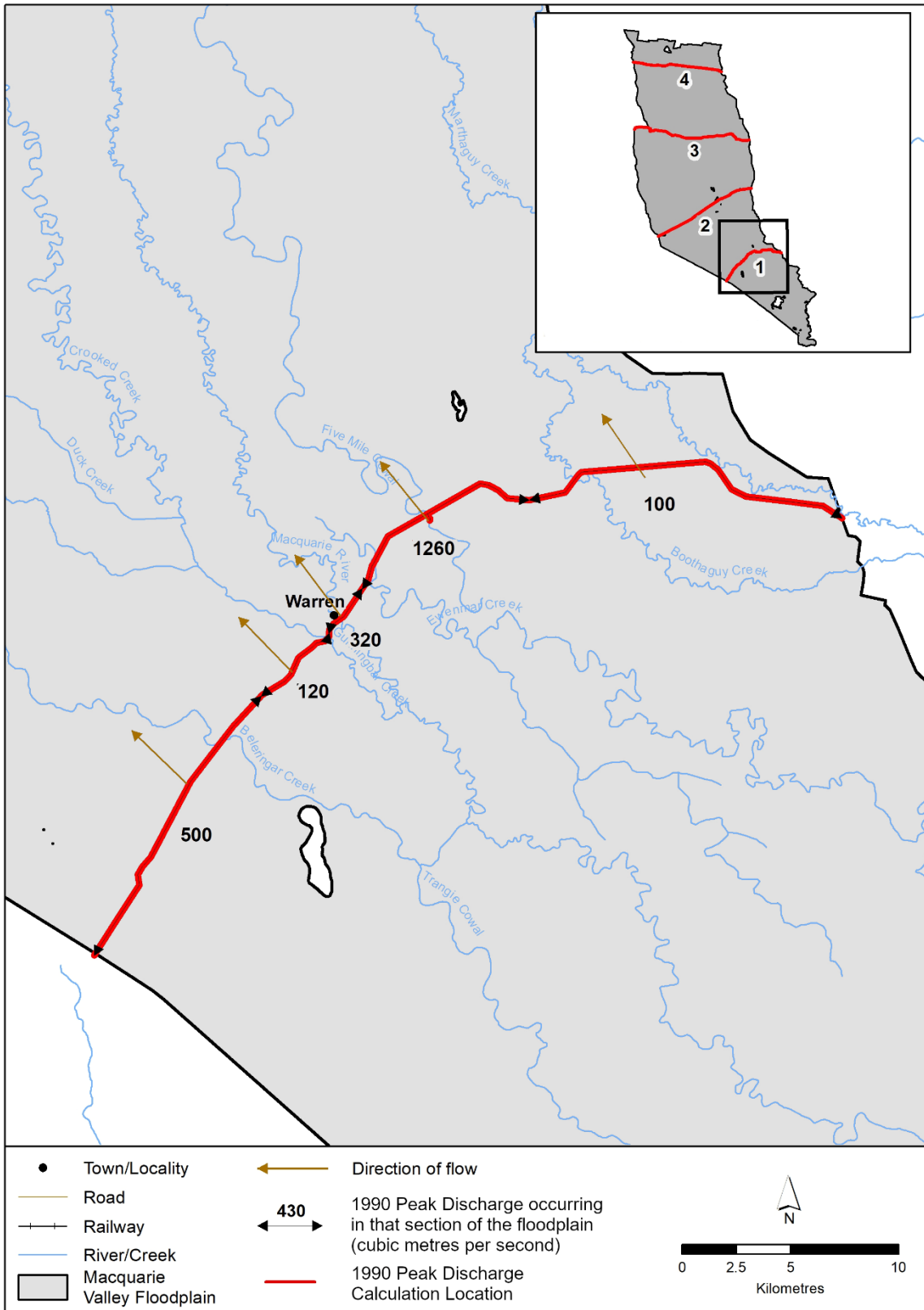
## Appendix 6 Overview of the Peak Flood Flow Distribution (1990) Map

### Overview of the Peak Flood Flow Distribution (1990) Map (FMP038\_Version 1), Floodplain Management Plan for the Macquarie Valley Floodplain 2021



Section 1 of the Peak Flood Flow Distribution (1990) Map (FMP038\_Version 1),

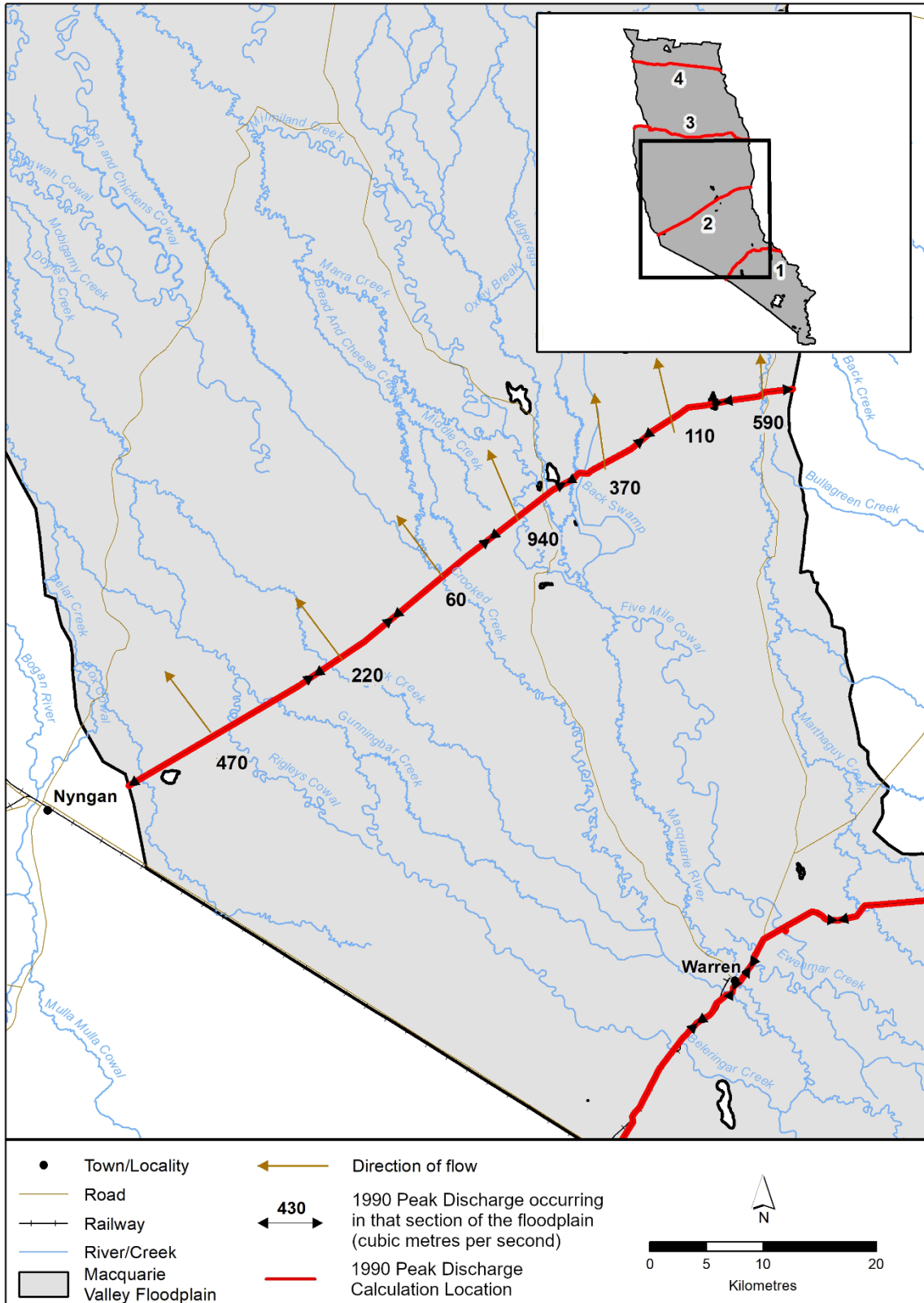
**Floodplain Management Plan for the Macquarie Valley Floodplain 2021**



**(Map 1 of 4)**

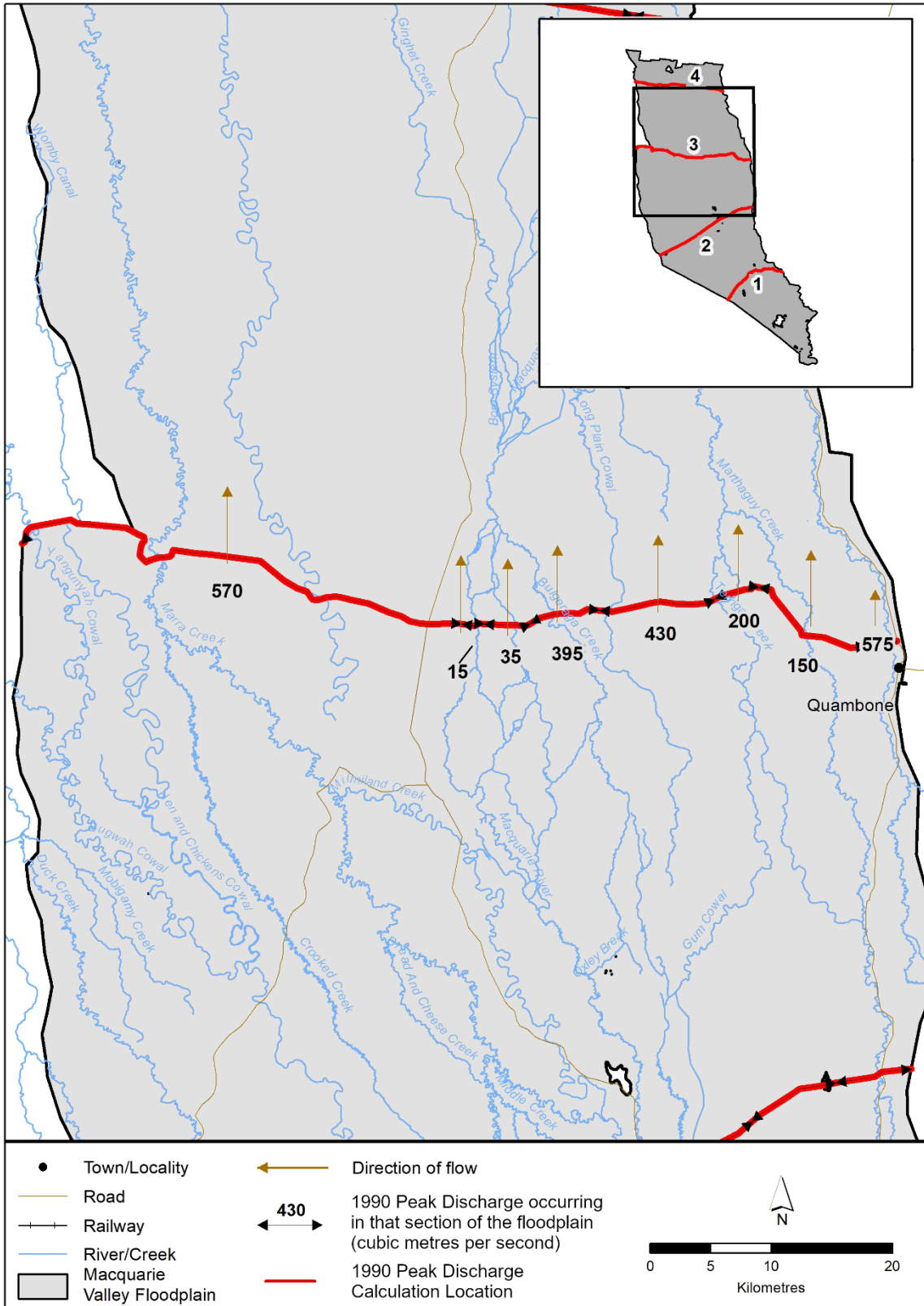
**Section 2 of the Peak Flood Flow Distribution (1990) Map (FMP038\_Version 1),  
Floodplain Management Plan for the Macquarie Valley Floodplain 2021**





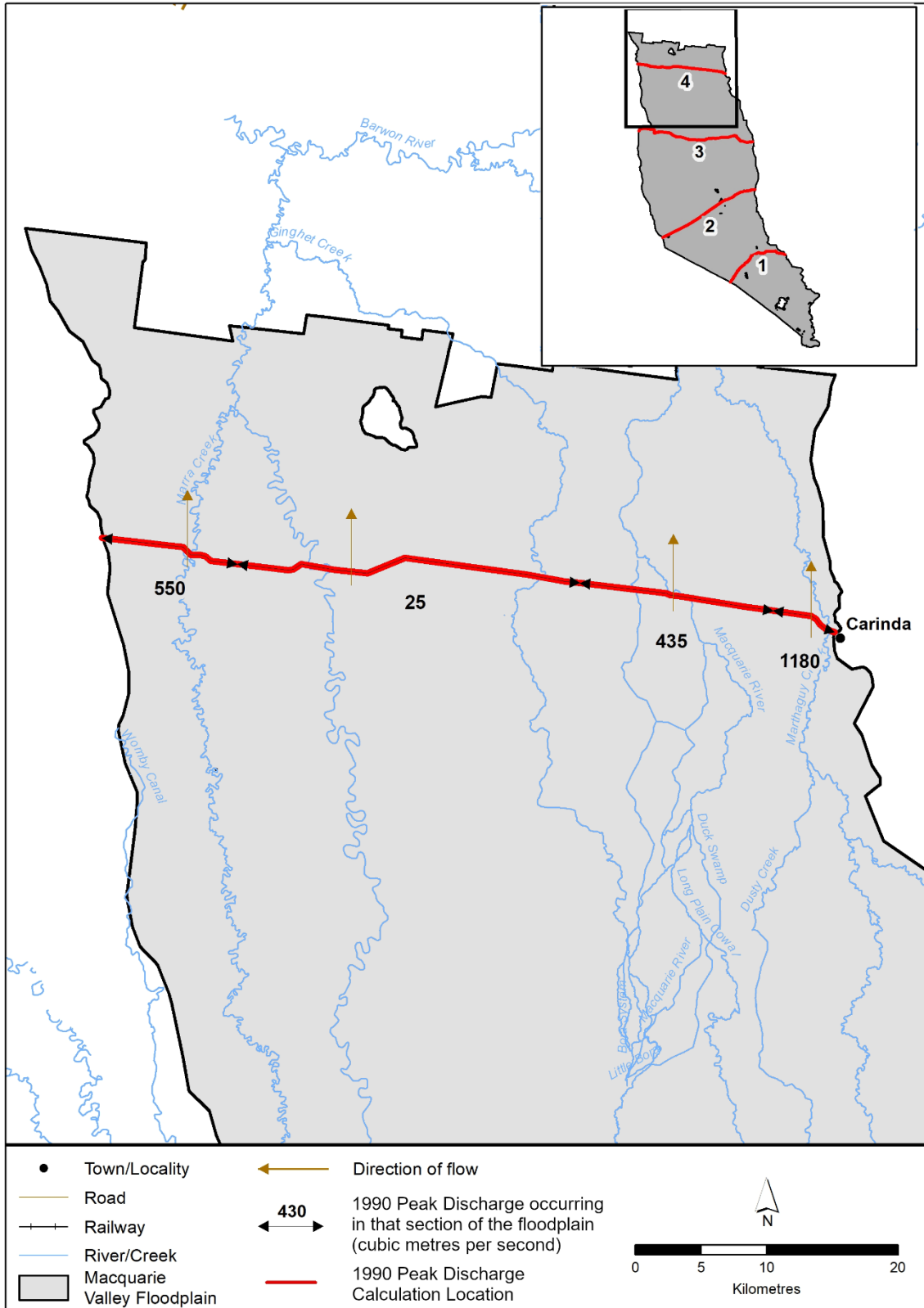
(Map 2 of 4)

**Section 3 of the Peak Flood Flow Distribution (1990) Map (FMP038\_Version 1),  
Floodplain Management Plan for the Macquarie Valley Floodplain 2021**



(Map 3 of 4)

**Section 4 of the Peak Flood Flow Distribution (1990) Map (FMP038\_Version 1),  
Floodplain Management Plan for the Macquarie Valley Floodplain 2021**



(Map 4 of 4)