



New South Wales

## **Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019**

under the

**Water Management Act 2000**

I, Melinda Jane Pavey, the Minister for Water, Property and Housing in pursuance of section 50 of the *Water Management Act 2000*, do, by this Order, make the following Minister's Plan for the Upper Namoi Valley Floodplain.

Dated this 6th day of June 2019.

**MELINDA JANE PAVEY MP**

**Minister for Water, Property and Housing**

### **Explanatory note**

This Order is made under section 50 of the *Water Management Act 2000*.

The object of this Order is to make the *Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019*. The concurrence of the Minister for the Environment was obtained prior to the making of this Order.

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# Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019

## Part 1 Introduction

**Note.** Part 10 of this Plan allows for amendments to be made to this Part.

### 1 Name of Plan

This Plan is the *Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019*.

### 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 the day on which it is published on the NSW legislation website.

#### **Notes.**

- 1 This Plan replaces the *Blackville Floodplain Management Plan 2003*, *Carroona – Breeza Floodplain Management Plan 2006*, *Carroll to Boggabri Floodplain Management Plan 2006*, *Lower Cocks Creek Floodplain Management Plan 2013*, *Upper Cocks Creek Floodplain Management Plan 2005*, *Upper Yarraman Creek Floodplain Management Plan 2006* and the *Warrah Creek Floodplain Management Plan 2012*, which were repealed under section 45 of the Act.
- 2 This Plan will have effect for 10 years in accordance with section 43(1) of the Act.

### 4 Interpretation

- (1) Words and expressions that are defined in the Dictionary to this Plan have the meanings

set out in the Dictionary.

- (2) 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 meanings in this Plan.
- (3) The Dictionary and Schedules to this Plan form part of this Plan.
- (4) The maps listed in Schedule 3 of the Plan form part of this Plan.
- (5) Notes included in this Plan do not form part of this Plan.
- (6) Appendices to this Plan do not form part of this Plan.

## 5 Application of Plan

This Plan applies to the area within the Upper Namoi Valley Floodplain shown on the map called *Floodplain Management Plan Map (FMP008\_Version 1)*, *Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019 (the Plan Map)* held by the Department.

### Notes.

- 1 The Upper Namoi 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 An overview of the Plan Map is shown in Appendix 1. Copies of the Plan Map may be inspected at the office listed in Appendix 2 and are available on the NSW legislation website.

## 6 Management zones

- (1) This Plan establishes the following management zones in the Upper Namoi Valley Floodplain:
  - (a) Upper Namoi Management Zone A for defined floodways (*Upper Namoi Management Zone AD*). Upper Namoi Management Zone AD is Management Zone A for the purposes of clause 45 of the *Water Management (General) Regulation 2018 (the Regulation)*,

**Note.** Upper Namoi Management Zone AD includes defined floodways with major drainage lines and other areas where a significant discharge of floodwater occurs during all flood events. These areas are generally characterised by relatively high flood flow velocity and depth. Some of these areas may include existing approved flood works of limited height.
  - (b) Upper Namoi Management Zone A for ill-defined floodways (*Upper Namoi Management Zone AID*). Upper Namoi Management Zone AID is Management

Zone A for the purposes of clause 45 of the Regulation,

**Note.** Upper Namoi Management Zone AID includes ill-defined floodways that are major discharge areas without clear channels or banks.

- (c) Upper Namoi Management Zone B for the Upper Liverpool Plains (*Upper Namoi Management Zone BU*),

**Note.** Upper Namoi Management Zone BU includes areas of the Upper Liverpool Plains Floodplain (which is the area of the floodplain south of the Binnaway to Werris Creek railway) 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 a slope of less than or equal to 0.5%.

- (d) Upper Namoi Management Zone B for the Lower Liverpool Plains (*Upper Namoi Management Zone BL*),

**Note.** Upper Namoi Management Zone BL includes areas of the Lower Liverpool Plains Floodplain (which is the area of the floodplain north of the Binnaway to Werris Creek railway) 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. Its outer boundary is defined by a slope of less than or equal to 0.5%. Some areas may include existing approved flood works of limited height.

- (e) Upper Namoi Management Zone C (*Upper Namoi Management Zone C*),

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

- (f) Upper Namoi Management Zone C for urban areas (*Upper Namoi Management Zone CU*),

**Note.** Upper Namoi Management Zone CU contains urban areas where there is either a flood study, flood risk management study, flood risk management plan, or that are protected by flood mitigation works such as town levees.

- (g) Upper Namoi Management Zone D (*Upper Namoi Management Zone D*). Upper Namoi Management Zone D is Management Zone D for the purposes of clause 45 of the Regulation,

**Note.** Upper Namoi Management Zone D is a special protection zone for areas of ecological and/or cultural significance. Areas of ecological and/or cultural significance in Upper Namoi Management Zone D are listed in Schedule 2.

- (2) The management zones in subclause (1) are shown on the *Management Zones Map (FMP009\_Version 1)*, *Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019 (the Management Zones Map)* held by the Department.

**Notes.**

- 1 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: Background document to the floodplain management plan for the Upper Namoi Valley Floodplain 2019 (the **Background Document**)*.
- 2 An overview of the Management Zones Map is shown in Appendix 3. Copies of the Management Zones Map may be inspected at the offices listed in Appendix 2 and are available on the NSW legislation website.

## **7 Understanding the rules in this Plan**

This Plan contains various rules. Where appropriate, the rules specified in this Plan are given effect by the mandatory conditions for flood work approvals in Part 9 of this Plan.

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

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

### **8 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, while recognising the need to minimise the risk to life and property.

### **9 Acknowledgement**

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

### **10 Objectives**

The objectives of this Plan are as follows:

- (a) to facilitate the orderly passage of floodwaters through the Upper Namoi Valley Floodplain,
- (b) to minimise the risk to life and property from the effects of flooding,
- (c) to maintain flood connectivity to wetlands, other floodplain ecosystems, and areas of groundwater recharge,
- (d) to contribute to the protection of the ecological assets and values of the Upper Namoi Valley Floodplain,
- (e) to contribute to the protection of cultural, heritage and spiritual features of the Upper Namoi Valley Floodplain that are significant to Aboriginal people and other stakeholders.

### **11 Strategies**

The strategies of this Plan are as follows:

- (a) to establish management zones for coordinating flood work development,

- (b) to identify the existing and natural flooding regimes in the area,
- (c) to delineate a floodway network that has adequate hydraulic capacity and continuity to effectively convey floodwaters,
- (d) to identify ecological assets and the ecological benefits of flooding,
- (e) to identify cultural assets and the cultural benefits of flooding,
- (f) to identify existing flood works,
- (g) to establish rules for the granting or amending of flood work approvals.

## **12 Performance indicators**

The following indicators are to be used to measure the success of the strategies to reach the objectives of this Plan:

- (a) the extent to which flood works are impacting on the flood connectivity of any ecological or cultural assets and groundwater recharge,
- (b) the change to flood connectivity to any ecological or cultural assets caused by flood works constructed after commencement of the Plan,
- (c) the extent to which flood works are modifying the hydraulic behaviour of floodwaters,
- (d) the change to the hydraulic behaviour of floodwater caused by flood works constructed after commencement of this Plan,
- (e) the extent to which the hydraulic behaviour of monitored floods is consistent with the floodway network.

## Part 3 Flooding regimes

### Notes.

- 1 Part 10 of this Plan allows for amendments to be made to this Part.
- 2 This Part is made in accordance with sections 5 (6) and 29 (a) of the Act.

### 13 General

This Part deals with the identification of the existing and natural flooding regimes in the area covered by the Plan Map, in terms of the nature, frequency, duration and extent of flooding.

### 14 Natural flooding regime

- (1) The natural flooding regime in the Upper Namoi Valley 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 Upper Namoi Valley.

**Note.** *Flooding regime* and *natural flooding regime* are defined in the Dictionary.

- (2) A summary of the nature, extent, frequency and duration of the natural flooding regime is provided in Table 1.

**Table 1 — Natural flooding regime**

	<b>Natural Flooding Regime</b>
<b>Nature</b>	<p><i>Overview</i></p> <p>Downstream from the slopes, river terraces widened and floodwaters inundated areas of rich alluvial flats. The surrounding land was typically higher than that at the river banks, so floodwaters were mostly confined to the area adjacent to the river channel.</p> <p>Further towards the plains, the waterways of the main river channels decreased and this, combined with the slow velocities associated with extremely flat river bed slopes, significantly reduced the carrying capacity of the river channels. Furthermore, the banks tended to be higher than the surrounding land so the high overbank flows caused by the reduced channel capacity were able to spread over a wider area.</p> <p><i>Boggabri to Narrabri</i></p> <p>The floodplain was relatively narrow, especially in the area known as 'Gins Leap'. There were several smaller anabranches or breakouts along the route;</p>

however, the main area of flooding was where Maules Creek joins the Namoi River.

*Liverpool Ranges to Werris Creek Railway*

The area was characterised by flat to gently rolling low hills with natural elevations of around 350 m Australian Height Datum. Flooding was characterised by shallow, broad, low-energy flows which dissipated much of the discharge into the alluvial fan. The native grasses had a buffering effect on the floods. Flows from the steeper slopes of the Liverpool Plains would have reached the lower slopes in a less concentrated form.

Lake Goran, a large shallow lake in the Liverpool Plains, fluctuated in size due to rainfall, runoff and evaporation and was only full for short periods. There was a very intricate pattern of flow paths on the broad floodplain in the south of the Liverpool Plains. Generally, the main streams in the catchment came from the Liverpool Range at the southern catchment border, and flowed in a northerly direction. Beyond the foothills of the Liverpool Ranges, these streams did not follow a defined route.

The southernmost areas contained depressions, which were consistent with a braided drainage system of small channels through a low lying swampy area with very little lateral grade. The braided channel system consisted of several channels that shared flood flows.

*Mid-eastern parts of the floodplain (Mooki floodplain)*

Large areas of flat fertile country existed along the Mooki River, particularly downstream of Quirindi. The wide eastern floodplain with a low surface gradient caused floodwaters to be typically slow-moving and widespread. Exceptions were the natural constrictions at Breeza, the Melville Range and Nicholson Ridge where flood velocities increased slightly. Scouring would have been minimal due to the low surface gradient of the area.

The main streams in the western and middle parts (Yarramanbah, Pump Station, McDonalds, Millers, Big Jacks and Little Jacks Creeks) had little definition at the point where they dispersed onto the broad floodplain. The creeks gradually dispersed into a dendritic pattern of minor depressions.

Six kilometres downstream of the confluence of the Namoi and Peel Rivers, floods inundated both sides of the river extensively, with a major breakout further downstream at Tommy Swamp. Some of the floodwaters moved onto the Mooki River floodplain and combined with Mooki River floodwaters to rejoin the Namoi River upstream of Gunnedah.

Downstream of Gunnedah, flooding extended across the floodplain as a number of flood runners came into effect. The principal flood runner was Dead Man's Gully, which affected the western floodplain and ran from Gunnedah to Boggabri. Immediately upstream of Boggabri, the flow pattern was quite complex, with a major system of prior streams passing flood waters either side of Flood Hill.

*Mid-western parts of the floodplain (Coxs Creek)*

Floodwaters entered the Upper Coxs Creek floodplain from the upstream boundary of the Coxs Creek system, predominantly affecting the southern floodplain at first, and gradually flowing to the lower reaches towards Premer, Tambar Springs and Mullaley, where flow from Garrawilla Creek entered the system. Flows in the Garrawilla Creek system could spread onto the north western floodplain of Coxs Creek.

<b>Frequency</b>	Since official records began, there was only one major flood recorded before Keepit Dam was built in 1960. This flood occurred in 1955 and had 800,000 ML/day recorded at Gunnedah.
<b>Duration</b>	Flooding was generally of short duration and localised, lasting for a few days instead of weeks (compared to the Lower Namoi Valley). Early European reports describe large waterlogged areas with ill-defined drainage lines on the southern segment of the Liverpool Plains. This was due in part to the sharp change in gradient from range to plain that forced a sharp and discrete sorting of sediment, and also due to the sheer mass of sediment that levelled out the underlying topography and helped form the lower gradient plains.
<b>Extent</b>	Flood extent was more widespread in many parts of the Liverpool Plains, due to shallow and ill-defined channels.

## 15 Existing flooding regime

- (1) The existing flooding regime in the Upper Namoi Valley Floodplain is generally characterised by changes since the construction of Keepit Dam in 1960 on the Namoi River, the construction of Chaffey Dam in 1976 on the Peel River, and the construction of Split Rock Dam in 1984 on the Manilla River. These changes have 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. These changes have affected the nature, frequency, extent and duration of flooding in the Upper Namoi Valley Floodplain.
- (2) Changes to the nature of flooding include the following:
  - (a) alteration of the direction and depth of flood flows in some areas,
  - (b) alteration of river, creek and overland flow path flood volume carrying capacity in some areas,
  - (c) increase in the velocity of flood flow rates, with flows getting to the lower reaches of the floodplain faster since the construction of development for irrigation purposes,
  - (d) erosion of drains, and concentration of flows in scour paths.
- (3) Some parts of the valley have experienced a decrease in flooding due to the construction of Keepit Dam, while other parts have been subject to a potential increase in the frequency of flooding due to channelisation and land use (for example Bundella Creek).

- (4) Changes to duration of flooding include a reduction or increase in flooding duration in some flood events due to the changes to the nature of flooding.
- (5) Historical information on the existing flooding regime, including the nature, frequency and extent, was used to delineate the floodway network in the following ways:
  - (a) in relation to nature—the size of the floodways, connections between floodways and their spatial representation, and whether the floodway was considered defined or ill-defined,
  - (b) in relation to frequency—a flood frequency analysis based on natural and existing flooding regimes was undertaken to select small and large design floods to support the delineation of the floodway network,
  - (c) in relation to extent—areas with land slope of less than 0.5% captured the inundation extent of the small and large design floods for the existing flooding regime. This information, together with hydraulic modelling where applicable, was used to define the extent of the floodway network.

**Note.** *Design flood* and *floodways* are defined in the Dictionary.

- (6) The existing flooding regime as captured in the floodway network, including its nature, frequency and extent, was used as the basis for delineating management zones for the floodplain.

## Part 4 Floodway network

### Notes.

- 1 Part 10 of this Plan allows for amendments to be made to this Part.
- 2 This Part is made in accordance with sections 29 and 30 of the Act.

### 16 General

- (1) This Part deals with the identification of a floodway network for this Plan.

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

- (2) The floodway network is shown on the map called *Floodway Network Map (FMP010\_Version 1)*, *Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019 (the Floodway Network Map)* held by the Department.

### Notes.

- 1 An overview of the Floodway Network Map is shown in Appendix 4. Copies of the Floodway Network Map may be inspected at the office listed in Appendix 2 and are available on the NSW legislation website.
  - 2 The Floodway Network Map represents those areas on the floodplain that have adequate hydraulic capacity and continuity to effectively convey flood waters. It is comprised of:
    - a coordinated and integrated network of floodways where a significant discharge of floodwater occurs during floods, and
    - the inundation extent of small and large design floods, and
    - areas of significant discharge of the large design flood, and
    - areas that preserve floodplain connectivity, and
    - areas that provide sufficient pondage for floodwater.
  - 3 Upper Namoi Management Zone C and Upper Namoi Management Zone CU represent those areas within the designated floodplain that are not part of the floodway network.
- (3) The following three hydraulic categories are mapped in the floodway network:
    - (a) defined floodways, which are areas with defined channels or riverbanks where a significant discharge of floodwater occurs during design floods,

- (b) ill-defined floodways, which are areas that are overland flow paths with no defined channels or riverbanks where a significant discharge of floodwater occurs during design floods,
- (c) inundation extent, which includes areas of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood.

**Note.** *Discharge* and *connectivity* are defined in the Dictionary.

- (4) The following four large design floods, which approximate a 1 in 20 or a 5% annual exceedance probability (AEP) flood event (*the large design flood*), were used to support the development of the floodway network:
  - (a) design flood of 1971 (at the Boggabri gauging station),
  - (b) design flood of 1984 (at the Boggabri and Breeza gauging stations, a 1 in 50 or 2% AEP at the Quirindi gauging station),
  - (c) design flood of 1998 (at the Carroona and Tambar Springs gauging stations),
  - (d) a probabilistic 1 in 20 or 5% AEP flood.

**Note.** *Annual exceedance probability* is defined in the Dictionary.

- (5) The large design floods listed in subclause (4) are shown on the map called *Large Design Floods Map (FMP011\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019 (the Large Design Flood Map)* held by the Department.

**Note.** The Large Design Flood Map is part of this Plan. An overview of the Large Design Flood Map is shown in Appendix 5. Copies of the Large Design Flood Map may be inspected at the office listed in Appendix 2 and are available on the NSW legislation website.

- (6) The following two small design floods, that approximate a 1 in 5 or a 20% AEP flood event (*the small design flood*), were used to support the development of the floodway network:
  - (a) design flood of 1992,
  - (b) probabilistic 1 in 5 or a 20% AEP flood.

- (7) The small design floods listed in subclause (6) are shown on the map called *Small Design Floods Map (FMP012\_Version 1), Floodplain Management Plan for the Upper Namoi*

*Valley Floodplain 2019 (the Small Design Flood Map)* held by the Department.

**Note.** An overview of the Small Design Flood Map is shown in Appendix 6. Copies of the Small Design Flood Map may be inspected at the office listed in Appendix 2 and are available on the NSW legislation website.

- (8) The floodway network was determined using the following:
- (a) flood aerial photography and satellite imagery,
  - (b) spatial watercourse layers and topographical mapping,
  - (c) previous rural floodplain management plans and guidelines,
  - (d) local knowledge obtained from floodplain communities and floodplain managers,
  - (e) hydraulic modelling,
  - (f) adopted hydraulic criteria for defining riparian buffer zones.

## **Part 5 Benefits of flooding**

### **Notes.**

- 1 Part 10 of this Plan allows for amendments to be made to this Part.
- 2 This Part is made in accordance with sections 5 (2) and (6) and 29 (b) of the Act.

### **Division 1 General**

#### **17 General**

This Part deals with the identification of any ecological or cultural assets that benefit from flooding.

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

#### **18 Ecological benefits of flooding**

The ecological benefits of flooding in the Upper Namoi Valley Floodplain identified for the purposes of this Plan are the following:

- (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 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.

**Note.** Waterbirds, fish and amphibious fauna existing in the area to which this Plan relates are listed in Schedule 1.

## 19 Ecological assets

- (1) The types of ecological assets identified for the purposes of this Plan are the following:
  - (a) wetlands:
    - (i) semi-permanent (non-woody), and
    - (ii) floodplain (flood-dependent shrubland),
  - (b) other floodplain ecosystems:
    - (i) flood-dependent forest/woodland (wetlands), and
    - (ii) flood-dependent woodland,
  - (c) likely areas of groundwater recharge:
    - (i) alluvial soils, and
    - (ii) rivers.

### Notes.

- 1 The nature of groundwater recharge is complex and recharge may occur in areas other than those listed in paragraph (c).
- 2 **Areas of groundwater recharge** and **wetland** are defined in the Dictionary.

- (2) The types of ecological assets in subclause (1) are described in detail in Schedule 1.
- (3) Areas of ecological assets are shown on the map called *Ecological Assets Map (FMP013\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019 (the Ecological Assets Map)* held by the Department.

**Note.** An overview of the Ecological Assets Map is shown in Appendix 7. Copies of the Ecological Assets Map may be inspected at the office listed in Appendix 2 and are available on the NSW legislation website.

## 20 Ecological values

- (1) The ecological values identified for the purposes of this Plan are the following:
  - (a) areas of state, national and international conservation significance that are dependent on flooding,

- (b) habitat for flood-dependent fauna,
  - (c) floodplain vegetation and fauna species, including threatened species.
- (2) The ecological values in subclause (1) are listed in detail in Schedule 1.

**Notes.**

- 1** *Ecological assets* and *ecological values* are defined in the Dictionary.
- 2** Further information on how ecological values were used as surrogates for biodiversity to prioritise the ecological assets is provided in the document titled Rural Floodplain Management Plans: Background to the Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019 - Appendices.

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

### **21 Aboriginal values**

- (1) The Aboriginal values identified for the purposes of this Plan are the flood-dependent assets described in subclause (2). The functions, services and features identified as benefiting Aboriginal people and their cultures described in subclause (3) are listed in one of the following:
- (a) Aboriginal Heritage Information Management System,
  - (b) Aboriginal Water Initiative System,
  - (c) Murray Darling Basin Authority Aboriginal Submissions Database,
  - (d) NSW State Heritage Register,
  - (e) Commonwealth Heritage List,
  - (f) any other source that has been deemed relevant by the Minister.
- (2) Aboriginal values identified as flood-dependent assets for the purposes of this clause are:
- (a) places or sites that are, or could be, used for cultural activities and that benefit from flooding, such as fish traps made of stone or sticks, and
  - (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) are or contain resources that are or were utilised in cultural activities, or
  - (iv) are associated with places that are used for contemporary cultural activities.
- (3) Aboriginal values involving the following functions, services and features identified as benefiting Aboriginal people and their cultures for the purposes of this clause are the following:
- (a) Aboriginal cultural processes that are dependent on flooding, including:
    - (i) harvesting traditional flood-dependent resources, and
    - (ii) cultural activities connected with and dependent upon flood events,
  - (b) continuation of Aboriginal cultural practices connected with flooding,
  - (c) preservation and longevity of Aboriginal values,
  - (d) maintaining potential for cultural renewal,
  - (e) maintaining spiritual connection with the floodplain landscape.

**Notes.**

- 1** *Aboriginal values, flood-dependent assets* and *cultural assets* are defined in the Dictionary.
- 2** Details of the identification and cultural assessment of the Aboriginal values identified in subclause (2) are described in the Background Document.
- 3** For an Aboriginal site to be identified in this clause for the purposes of this Plan, it has to be listed in a source described in subclause (1). Aboriginal sites identified as part of this planning process were added to the relevant source.

## **22 Heritage sites**

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 following:

- (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) Aboriginal Water Initiative System,
- (g) Commonwealth Heritage List,
- (h) any other source that has been deemed relevant by the Minister,

where the heritage value of the listing is associated with flooding.

**Notes.**

- 1 **Heritage sites** is defined in the Dictionary.
- 2 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 it will be assessed against criteria to ensure these sites are not adversely impacted.

## **Part 6 Existing flood works**

### **Notes.**

- 1 Part 10 of this Plan allows for amendments to be made to this Part.
- 2 This Part is made in accordance with sections 5 (2) (e)–(g), 5 (6), 29 (c) and 30 (b)–(d) of the Act.

### **23 General**

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

### **24 Types of flood works**

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

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

### **25 Approved flood works**

At the commencement of this Plan, 156 flood works were approved in the Upper Namoi Valley Floodplain. The types of approved flood works include the following:

- (a) above ground channels,

- (b) levees and embankments,
- (c) storages,
- (d) drains.

**Note.** A single approval may be comprised of numerous individual 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.

## 26 Area enclosed by existing flood works

- (1) At the commencement of this Plan, the area shown on the Plan Map that is enclosed by existing flood works is estimated to be 49,640 hectares.
- (2) The area enclosed by existing flood works is shown on the map called *Existing Flood Works Map (FMP014\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019 (the Existing Flood Works Map)* held by the Department.

### Notes.

- 1 An overview of the Existing Flood Works Map is shown in Appendix 8. Copies of the Existing Flood Works Map may be inspected at the office listed in Appendix 2 and are available on the NSW legislation website.
- 2 The Existing Flood Works Map depicts the overall footprint of major works constructed in the area shown on the Plan Map and the major areas enclosed by those works. The map does not depict individual works, and it does not include all works in the area.

## 27 Ecological impacts of flood works

- (1) The positive impacts of existing flood works on ecological assets identified in clause 19 in relation to flood behaviour and flood connectivity can include any of the following:
  - (a) increased localised flooding frequency and duration (due to the diversion and retention of floodwaters) for ecological assets 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.
- (2) The negative impacts of existing flood works on ecological assets identified in clause 19 in relation to flood behaviour and flood connectivity can include any of the following:

- (a) altered flood connectivity, which may result in any of the following:
    - (i) disconnection of ecological assets from flooding by blocking or partially obstructing flow paths,
    - (ii) diversion of flood flows away from ecological assets,
    - (iii) increased flooding duration of ecological assets that exceeds the requirements of floodplain species,
    - (iv) decline in available forage, nesting and refuge habitat for fauna reliant on ecological assets,
  - (b) restricted native fish passage, which may result in any of the following:
    - (i) reduction of fish migration within the floodplain,
    - (ii) fish becoming stranded by existing flood works on the floodplain when floodwaters recede,
    - (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 as extent and duration of flooding is reduced,
  - (d) net reduction of floodwater available to ecological assets as a result of river regulation and existing flood works.

## 28 Cultural impacts of flood works

- (1) The positive impact of existing flood works on cultural assets identified in clauses 21 and 22 in relation to flood behaviour and flood connectivity can include increased localised flooding frequency and duration (due to the diversion and retention of floodwaters) for flood-dependent cultural places with flooding regimes reduced by river regulation.
- (2) The negative impacts of existing flood works on cultural assets identified in clauses 21 and 22 in relation to flood behaviour, flood risk and flood connectivity can include any of the

following:

- (a) altered flood connectivity to cultural assets, which may result in any of the following:
  - (i) disconnection of flood-dependent cultural assets from flooding by blocking or partially obstructing flow paths, and
  - (ii) diversion of flood flows away from flood-dependent cultural assets, and
  - (iii) increased flooding duration of flood-dependent cultural assets that exceeds the requirements of those assets,
- (b) increase in flood velocity, which may result in scour and erosion damage to cultural places, such as burial sites.

## **29 Socio-economic impacts of flood works**

- (1) The positive impacts of existing flood works on socio-economic factors in relation to flood behaviour and flood risk can 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.
- (2) The negative impacts of existing flood works on socio-economic factors in relation to flood behaviour, flood risk and flood connectivity are redistribution of flood flows and altered flood behaviour which may result in any of the following:
  - (a) re-direction of flood flows onto adjacent properties,
  - (b) increase in flood velocity leading to increased erosion and scour,
  - (c) increase in flood levels on adjacent and downstream properties,
  - (d) disruptions to daily life, for instance limited or no property access during floods,
  - (e) loss of crops and infrastructure.

### 30 Cumulative impacts of flood works

- (1) This Plan recognises the positive socio-economic, cultural and ecological impacts of existing flood works where they are constructed in a coordinated manner, but also recognises that cumulative negative impacts of flood works can occur where their construction is uncoordinated.
- (2) This Plan addresses the potential negative cumulative impacts of existing and proposed flood works by way of the following:
  - (a) identifying existing flood works in the Upper Namoi Valley Floodplain for use in the hydraulic modelling of different floodplain scenarios,
  - (b) using hydraulic modelling to compare undeveloped floodplain scenarios to existing developed floodplain conditions, in order to understand the cumulative impacts of existing flood works across the floodplain,
  - (c) developing management zones and rules for granting and amending flood work approvals in consideration of the cumulative impacts additional flood works may have across the floodplain.

**Note.** The mechanisms used by the Plan to address cumulative impacts are interrelated. For instance, hydraulic modelling shows that, taking account of identified existing works, the construction of new flood works in major discharge areas would have a significant cumulative impact on the distribution of flow and flood levels. These areas are represented by Management Zones AD, AID and D where only minimal flood work development is permitted.

## Part 7 Risks from flooding

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

### 31 General

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

### 32 Risk to life and property

Risk to life and property from the effects of flooding includes, but is not limited to, any of the following:

- (a) the risk of tangible flood damage, which is financial in nature, including any of the following:
  - (i) the damage or loss caused by floodwaters wetting goods, possessions and crops,
  - (ii) property damage, which includes contents damage (e.g. carpets and furniture), structural damage (e.g. wall, floors and windows) and external damage (e.g. high value infrastructure and parked motor vehicles),
  - (iii) the loss of livestock,
  - (iv) the loss of wages and extra outlays incurred during clean-up operations,

**Note:** *High value infrastructure* is defined in the Dictionary.

- (b) the risk of intangible flood damage, including any of the following:
  - (i) increased levels of emotional stress,
  - (ii) mental and physical illness caused by the flood episode,
  - (iii) disruption to daily life, such as restricted or no access to property.

### 33 Consideration of risk to life and property

The risk to life and property from the effects of flooding is addressed in this Plan in Parts 4, 6, and 8.

### 34 The floodway network

The floodway network addresses the risk to life and property by way of the following:

- (a) identification of areas within the floodway network that may impact on life and property, such as:
  - (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:
  - (i) mapping of floodways, and
  - (ii) mapping the extent of historic flood flows.

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

- (1) The risk to life and property from the effects of flooding is addressed in the design of the management zones and the rules for granting or amending flood work approvals as follows:
  - (a) by identifying hydraulic thresholds within management zones where the local and cumulative impact of flood work development should 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 zones where major flood discharge occurs (Upper Namoi Management Zones AD, AID and D),
  - (c) by developing rules to allow landholders to apply for certain flood protection works in Upper Namoi Management Zones BU and BL (where temporary storage of large floods occurs) without requiring advertising, to protect infrastructure, crops and livestock from flood events,
  - (d) by specifying the nature of flood works that can be constructed.

**Note.** *Management zones* is defined in the Dictionary.

- (2) The implementation of the management zones and rules for granting or amending flood work approvals will minimise flood risk as follows:
- (a) by coordinating and controlling the type and nature 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 subject to frequent inundation (Upper Namoi Management Zones AD, AID and D).

### **36 Existing works**

The risk to life and property from the effects of flooding was considered through the identification of existing flood works as follows:

- (a) by consideration of existing flood works in the delineation of the floodway network and the design of the management zones,
- (b) by identification of areas within the floodplain where cumulative impacts from existing works may be high.

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

### **Notes.**

- 1 Part 10 of this Plan allows for amendments to be made to this Part.
- 2 This Part is made in accordance with sections 5, 29, 30 and 95 of the Act.

### **Division 1 General**

#### **37 General**

- (1) This Part deals with the rules that apply to granting or amending flood work approvals for flood works in the Upper Namoi Valley Floodplain.
- (2) Where a flood work approval is sought for a flood work that is located or is proposed to be located in more than one management zone, the rules in each of the management zones in which the work is located apply only to that portion of the work located within the management zone.

### **Division 2 Rules for granting or amending flood work approvals in Upper Namoi Management Zone AD**

#### **38 Flood works authorised in Upper Namoi Management Zone AD**

- (1) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone AD unless, in the Minister's opinion, the flood work approval is for one of the following:
  - (a) an infrastructure protection work,
  - (b) a stock refuge,
  - (c) an access road,
  - (d) a drain,
  - (e) a supply channel,
  - (f) an ecological enhancement work,

- (g) an Aboriginal value enhancement work, or
  - (h) a heritage site enhancement work.
- (2) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of an infrastructure protection work on a landholding of less than or equal to 20 ha in area in Upper Namoi Management Zone AD unless, in the Minister's opinion, the area enclosed by the infrastructure protection work accounts for no more than 10% of the total area of the landholding.

**Notes.**

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

**2** For example, if a landholding is 10 ha in area, the infrastructure protection work must enclose no more than 1 ha.

- (3) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of an infrastructure protection work on a landholding of greater than 20 ha in area in Upper Namoi Management Zone AD unless, in the Minister's opinion, the area enclosed by the infrastructure protection work accounts for no more than the greater of the following:

(a) 2 ha,

(b) 1% of the total landholding.

**Note.** For example, if a property is 25 ha in area, the area enclosed by the infrastructure protection work must be no more than 2 ha in area. A property that is 300 ha in area may have an infrastructure protection work that encloses an area no more than 3 ha in area.

- (4) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of an infrastructure protection work in Upper Namoi Management Zone AD if, in the Minister's opinion, it would block more than 5% of the width of Upper Namoi Management Zone AD at the location of the work.
- (5) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of a stock refuge on a landholding of less than or equal to 20 ha in area in Upper Namoi Management Zone AD unless, in the Minister's opinion, the area enclosed by the stock refuge accounts for no more than 10% of the total area of the landholding.

**Notes.**

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

2 For example, if a landholding is 10 ha in area, the stock refuge must enclose no more than 1 ha.

(6) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of a stock refuge on a landholding of greater than 20 ha in area in Upper Namoi Management Zone AD unless, in the Minister's opinion, the area enclosed by the stock refuge accounts for no more than the greater of the following:

(a) 2 ha, or

(b) 1% of the total landholding.

**Note.** For example, if a property is 25 ha in area, the area enclosed by the stock refuge must be no more than 2 ha in area. A property that is 300 ha in area may have a stock refuge that encloses an area no more than 3 ha in area.

(7) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of a stock refuge in Upper Namoi Management Zone AD if, in the Minister's opinion, it would block more than 5% of the width of Upper Namoi Management Zone AD at the location of the work.

(8) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of an access road in Upper Namoi Management Zone AD unless, in the Minister's opinion, the access road is or is proposed to be:

(a) no more than 15 cm in height above the natural surface level,

**Note.** *Natural surface level* is defined in the Dictionary.

and is constructed:

(b) with causeways at no higher than the natural surface level and occurring at least once every 200 m of road length, and

(c) with causeways that comprise at least 10% of the total length of the access road that is in Upper Namoi Management Zone AD, and

**Note.** This applies to access roads within a single property that span multiple properties.

- (d) so that the borrow associated with the construction and maintenance of the access road is located on the downstream side of the road and is of no greater depth than 15 cm below the natural surface level.

**Note.** *Borrow* is defined in the Dictionary.

- (9) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of a drain in Upper Namoi Management Zone AD unless, in the Minister's opinion, the drain is or is proposed to be constructed:

- (a) no more than 30 cm below the natural surface level except where the drain is in transition into another drain, natural depression or watercourse, and
- (b) to convey flow of no more than a 1 Exceedances per Year (1EY) event, and
- (c) at an orientation of approximately 90 degrees to the direction of flow, and
- (d) with a longitudinal slope of less than 1 in 500 and a non-scouring velocity, and
- (e) so that the distance over which the drain is in transition is kept to a minimum, and
- (f) in a way that does not increase the capacity of the drain (where the drain is proposed to be modified) or impact flood behaviour.

**Notes.**

- 1 For example, spoil must not be placed in a way that would increase the capacity of the drain.
- 2 Where possible, the drain should be constructed or modified so that it transitions into an existing drain or natural depression rather than into a watercourse. Transition length must be kept to a minimum to prevent erosion. A drop structure may be required to pass water to a lower elevation in a controlled manner and prevent erosion. Drop structures can take many forms depending on the transition depth, length or topography. A common example of a drop structure is a grade control, sill or weir.
- 3 *Drain* and *Exceedances per Year (EY)* are defined in the Dictionary.

- (10) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of a supply channel in Upper Namoi Management Zone AD unless, in the Minister's opinion, the supply channel is proposed to be constructed or modified:

- (a) to be below the natural surface level, and

- (b) in such a way as to allow for the adequate passage of floodwater and to adequately prevent the 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 paragraph.

- (c) so that spoil from its construction or modification, and maintenance:
  - (i) forms a windrow parallel to the direction of flow such that it does not block more than 5% of the width of Upper Namoi Management Zone AD at the location where the work is being constructed, or
  - (ii) is levelled to a maximum of 10 cm above the natural surface level.

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

- (11) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of an ecological enhancement work in Upper Namoi Management Zone AD unless, in the Minister's opinion, the ecological enhancement work is or is proposed to provide a positive outcome for an ecological asset that is mapped, recognised in or protected by this Plan, or local, state or Commonwealth environmental policy or legislation.

**Note.** *Ecological enhancement work* is defined in the Dictionary.

- (12) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of an Aboriginal value enhancement work in Upper Namoi Management Zone AD unless, in the Minister's opinion, the Aboriginal value enhancement work is or is proposed to provide a positive outcome for an Aboriginal value asset that is listed in any of the following:

- (a) Aboriginal Heritage Information Management System,
- (b) Aboriginal Water Initiative System,
- (c) Murray Darling Basin Authority Aboriginal Submissions Database,
- (d) NSW State Heritage Register,
- (e) Commonwealth Heritage List,
- (f) any other source deemed relevant by the Minister.

**Note. *Aboriginal value enhancement work*** is defined in the Dictionary.

- (13) Subject to subclause (1) and clause 40, a flood work approval must not be granted or amended to authorise the construction or modification of a heritage site enhancement work in Upper Namoi Management Zone AD unless, in the Minister's opinion, the heritage site enhancement work is or is proposed to provide a positive outcome for a heritage site asset that is listed in any of the following:
- (a) Aboriginal Heritage Information Management System,
  - (b) Aboriginal Water Initiative System,
  - (c) Murray Darling Basin Authority Aboriginal Submissions Database,
  - (d) NSW State Heritage Register,
  - (e) NSW State Heritage Inventory,
  - (f) Historic Heritage Information Management System,
  - (g) Commonwealth Heritage List,
  - (h) any other source deemed relevant by the Minister.

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

### **39 Existing flood works in Upper Namoi Management Zone AD**

- (1) A flood work approval in Upper Namoi Management Zone AD may be granted for a flood work that does not comply with the requirements of clause 38, provided the flood work meets all of the following criteria:
- (a) the flood work was constructed as at the date of commencement of this Plan,
  - (b) the flood work is, in the Minister's opinion, for:
    - (i) an infrastructure protection work, or
    - (ii) a stock refuge, or
    - (iii) an access road, or
    - (iv) a drain, or

- (v) a supply channel,
- (c) as at the date of application, the flood work is not the subject of:
- (i) an undetermined controlled work application under Part 8 of the *Water Act 1912*, or
  - (ii) a previously refused Part 8 application of the *Water Act 1912*, or
  - (iii) an undetermined flood work application under the Act, or
  - (iv) a previously refused flood work application under the Act.
- (2) An amendment of a flood work approval in Upper Namoi Management Zone AD may be granted for a flood work that does not comply with the requirements of clause 38, provided the flood work meets all of the following criteria:
- (a) the flood work was constructed as at the date of commencement of this Plan,
  - (b) the proposed modification to the flood work will, in the Minister's opinion, reduce the impact of the work on flow patterns (distribution of flows, drainage, depth or velocity) in Upper Namoi Management Zone AD.
- (3) An application under this clause must be assessed against the assessment criteria outlined in clause 40 of this Plan.

#### **40 Assessment criteria for flood works in Upper Namoi Management Zone AD**

**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) Flood work applications in Upper Namoi Management Zone AD must be assessed against the assessment criteria outlined in this clause.
- (2) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone AD unless, in the Minister's opinion, the flood work can be constructed to maintain adequate flood connectivity to:
  - (a) ecological assets, and

- (b) facilitate fish passage,

under a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods..

**Note.** Relevant design floods are based on the location of the proposed work and are shown in Appendix 5 and Appendix 6.

- (3) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone AD unless, in the Minister's opinion, the flood work can be constructed to maintain adequate flood connectivity to:

- (a) Aboriginal values, and

- (b) heritage sites,

under a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods:

- (4) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone AD if, in the Minister's opinion, the construction of the flood work is likely to disturb the ground surface of a heritage site or cause more than minimal erosion to a heritage site.

**Note.** 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 22.

- (5) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone AD unless, in the Minister's opinion, the flood work can be constructed to maintain drainage on adjacent landholdings and other landholdings that may be affected by the proposed flood work within 12 hours of existing drainage time when compared to drainage times under pre-development and existing development conditions for a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods.

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

- (6) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone AD unless the Minister has considered the cumulative impact that the proposed flood work and other existing

works on the landholding may have on adjacent landholdings, and on other landholdings that may be affected by the proposed flood work and the floodplain environment.

### **Division 3 Rules for granting or amending flood work approvals in Upper Namoi Management Zone AID**

#### **41 Flood works authorised in Upper Namoi Management Zone AID**

**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) Despite any other provision of this Plan, a flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone AID unless, in the Minister's opinion, the construction or modification of the flood work will maintain a flood flow corridor which meets the following requirements (a *required flood flow corridor*):
  - (a) the flood flow corridor must have a minimum width of:
    - (i) 20 m (a *narrow flood flow corridor*), or
    - (ii) 100 m (a *wide flood flow corridor*),
  - (b) the flood flow corridor must link:
    - (i) to other required flood flow corridors on the property under application or on adjacent landholdings, or
    - (ii) to Upper Namoi Management Zone AD on the property under application or on adjacent landholdings if linking to other required flood flow corridors is not possible.

**Note.** *Flood flow corridor* is defined in the Dictionary.

- (2) Clause 38 and 39 of this Plan apply to applications for proposed or amended flood works in Upper Namoi Management Zone AID which are located wholly or partly within a required flood flow corridor, as if references in those clauses to Upper Namoi Management Zone AD were references to Upper Namoi Management Zone AID.

- (3) Clause 44 of this Plan applies to applications for proposed or amended flood works in Upper Namoi Management Zone AID which are located outside of a required flood flow corridor and south of the Binnaway to Werris Creek railway, as if references in those clauses to Upper Namoi Management Zone BU were references to Upper Namoi Management Zone AID.
- (4) Clause 46 of this Plan applies to applications for proposed or amended flood works in Upper Namoi Management Zone AID which are located outside of a required flood flow corridor and north of the Binnaway to Werris Creek railway, as if references in those clauses to Upper Namoi Management Zone BL were references to Upper Namoi Management Zone AID.

#### **42 Certain other flood works in Upper Namoi Management Zone AID**

**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) Despite any other provision of this Plan, an application for a new or amended flood work approval in Upper Namoi Management Zone AID that meets the requirements of this clause must be advertised.
- (2) A flood work approval in Upper Namoi Management Zone AID may be granted or amended to authorise the construction or modification of a flood work that does not comply with the rules in clause 38 or clause 39 of this Plan, if the flood work:
  - (a) will be located wholly or partly within a wide required flood flow corridor, and
  - (b) is not one of the following:
    - (i) an infrastructure protection work,
    - (ii) a stock refuge,
    - (iii) an access road,
    - (iv) a drain,
    - (v) a supply channel,
    - (vi) an ecological enhancement work,
    - (vii) an Aboriginal value enhancement work, or

(viii) a heritage site enhancement work, and

(c) has or will have a height of no greater than 30 cm above the natural surface level.

#### **43 Assessment criteria for flood works in Upper Namoi Management Zone AID**

**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) Applications for proposed or amended flood works which will be located wholly or partly within a required flood flow corridor in Upper Namoi Management Zone AID and which meet clause 38 or clause 39 of this Plan, must be assessed against the assessment criteria for Upper Namoi Management Zone AD in clause 40, as if references in those clauses to Upper Namoi Management Zone AD were references to Upper Namoi Management Zone AID.
- (2) Applications for proposed or amended flood works in Upper Namoi Management Zone AID which will be located wholly or partly within a wide required flood flow corridor, that do not meet clause 38 or clause 39 of this Plan, but do meet clause 42 of this Plan, and are south of the Binnaway to Werris Creek railway must be assessed against the assessment criteria for Upper Namoi Management Zone BU in clause 45, as if references to Upper Namoi Management Zone BU were references to Upper Namoi Management Zone AID.
- (3) Applications for proposed or amended flood works in Upper Namoi Management Zone AID which will be located wholly or partly within a wide required flood flow corridor, that do not meet clause 38 or clause 39 of this Plan, but do meet clause 42 of this Plan, and are north of the Binnaway to Werris Creek railway must be assessed against the assessment criteria for Upper Namoi Management Zone BL in clause 47, as if references to Upper Namoi Management Zone BL were references to Upper Namoi Management Zone AID.
- (4) Applications for proposed or amended flood works in Upper Namoi Management Zone AID which will be located outside of a required flood flow corridor, and south of the Binnaway to Werris Creek railway must be assessed against the assessment criteria for Upper Namoi Management Zone BU in clause 45, as if references to Upper Namoi Management Zone BU were references to Upper Namoi Management Zone AID.
- (5) Applications for proposed or amended flood works in Upper Namoi Management Zone AID which will be located outside of a required flood flow corridor, and north of the Binnaway to Werris Creek railway must be assessed against the assessment criteria for

Upper Namoi Management Zone BL in clause 47, as if references to Upper Namoi Management Zone BL were references to Upper Namoi Management Zone AID.

## **Division 4 Rules for granting or amending flood work approvals in Upper Namoi Management Zone BU**

### **44 Advertising for flood work approvals in Upper Namoi Management Zone BU**

**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.

An application for a new or amended flood work approval in Upper Namoi Management Zone BU must be advertised unless, in the Minister's opinion, the flood work is proposed to be used as a drain and is proposed to be constructed or modified to meet all of the following criteria:

- (a) at no more than 30 cm below the natural surface level except where the drain is in transition into another drain, natural depression or watercourse,
- (b) to convey flow of no more than a 1 Exceedances per Year (1EY) event,
- (c) at an orientation of approximately 90 degrees to the direction of flow,
- (d) with a longitudinal slope of less than 1 in 500 and a non-scouring velocity,
- (e) so that the distance over which the drain is in transition is kept to a minimum,
- (f) in a way that does not increase the capacity of the drain (where the drain is proposed to be modified) or impact flood behaviour.

### **45 Assessment criteria for flood works in Upper Namoi Management Zone BU**

**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) All flood work applications in Upper Namoi Management Zone BU must be assessed against the assessment criteria outlined in this clause. However, flood work applications in Upper Namoi Management Zone BU that do not require advertising in accordance with clause 44 do not require assessment against subclauses (6) or (7) unless required by the Minister.

**Note.** In determining whether to grant or amend a flood work approval to authorise the construction of a flood work in Upper Namoi Management Zone BU that does not require advertising in accordance with clause 43, the Minister may conduct the assessments described in subclauses (6) and (7).

(2) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone BU unless, in the Minister's opinion, the construction or modification of the flood work will maintain adequate flood connectivity to:

(a) ecological assets, and

(b) facilitate fish passage,

under a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods:

(3) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone BU unless, in the Minister's opinion, the construction or modification of the flood work will maintain adequate flood connectivity to:

(a) Aboriginal values, and

(b) heritage sites,

under a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods.

(4) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone BU if, in the Minister's opinion, the construction or modification of the flood work is likely to disturb the ground surface of a heritage site or cause more than minimal erosion to a heritage site.

**Note.** 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 22.

(5) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone BU unless, in the Minister's opinion, the construction or modification of the flood work will maintain drainage on adjacent landholdings and other landholdings that may be affected by the proposed flood work within 12 hours of existing drainage time when compared to drainage

times under pre-development and existing development conditions for a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods.

- (6) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone BU if, in the Minister's opinion, the construction or modification of the flood work is likely to:
- (a) redistribute the peak flood flow by more 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 pre-development and existing development conditions for a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods, or
  - (b) increase flood levels by more than 20 cm on adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flood levels under pre-development and existing development conditions for a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods, or
  - (c) increase flow velocity by more than 50% on the landholding under application, adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flow velocity under pre-development conditions for a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods, unless:
    - (i) increases by more than 50% are in isolated areas where the landholder mitigates the impact of the flood wave so that the average impact across the landholding under application is no greater than 50%, and
    - (ii) flow velocity is not increased by more than 50% at the boundary of the landholding under application, or
  - (d) increase flood levels such that they impact high value infrastructure when compared to flood levels under pre-development and existing development conditions for a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods, or

- (e) increase flow velocity by an amount that is likely to have more than a minimal impact on soil erodibility on the landholding under application, adjacent landholdings and other landholdings that may be affected by the proposed flood work, taking into account the ground cover on those landholdings.
- (7) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone BU if, in the Minister's opinion, construction or modification of the flood work is likely to:
- (a) redistribute the peak flood flow by more than 5% at any of the peak discharge calculation locations as determined by the Minister, when compared to redistribution under existing development conditions for a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods, and
  - (b) redistribute the peak flood flow under existing development conditions by more than 5% at any location and under any other flood scenario considered relevant by the Minister.

**Notes.**

- 1 In conducting the assessments described under subclauses (2), (3), (6) and (7), 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 flood under existing and/or pre-development conditions, the 1% AEP flood under existing and/or pre-development conditions, or any other relevant flood scenario.
- 2 Relevant design floods are based on the location of the proposed work and are shown in Appendix 5 and Appendix 6.
- 3 **Peak discharge calculation location** is defined in the Dictionary.

## **Division 5 Rules for granting or amending flood work approvals in Upper Namoi Management Zone BL**

### **46 Advertising for flood work approvals in Upper Namoi Management Zone BL**

**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.

An application for a new or amended flood work approval in Upper Namoi Management Zone BL must be advertised unless, in the Minister's opinion, the proposed flood work will be:

- (a) constructed to a height of no more than 50 cm above the natural surface level, or
- (b) used as a stock refuge or as an infrastructure protection work, and the area to be used or protected:
  - (i) is no more than 1% of the total area of the landholding, and
  - (ii) is no more than 2 ha in size in any single location in Upper Namoi Management Zone BL.

#### **47 Assessment criteria for flood works in Upper Namoi Management Zone BL**

**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.

Flood work applications in Upper Namoi Management Zone BL must be assessed against the assessment criteria outlined in clause 45(2) to (7) of this Plan, as if references to Upper Namoi Management Zone BU were references to Upper Namoi Management Zone BL.

### **Division 6 Rules for granting or amending flood work approvals in Upper Namoi Management Zone C**

#### **48 Assessment criteria for flood works in Upper Namoi 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) Flood work applications in Upper Namoi Management Zone C must be assessed against the assessment criteria outlined in this clause.
- (2) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone C unless, in the Minister's opinion, the construction or modification of the flood work will maintain adequate flood connectivity to:
  - (a) ecological assets, and
  - (b) facilitate fish passage,

under a range of flood scenarios, including at a minimum, scenarios for the relevant small and large design floods.

- (3) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone C unless, in the Minister's opinion, the construction or modification of the flood work will maintain adequate flood connectivity to:

- (a) Aboriginal values, and
- (b) heritage sites,

under a range of flood scenarios, including at a minimum, scenarios for the relevant small and large design floods:

- (4) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone C if, in the Minister's opinion, the construction or modification of the flood work is likely to disturb the ground surface of a heritage site or cause more than minimal erosion to a heritage site.

**Note.** 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 22.

- (5) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone C unless, in the Minister's opinion, the flood work can be constructed or modified to maintain drainage on adjacent landholdings and other landholdings within 12 hours of existing drainage time when compared to drainage times under pre-development and existing development conditions for a range of flood scenarios including, at a minimum, the relevant large design flood.

- (6) In determining whether to grant or amend a flood work approval to authorise the construction or modification of a flood work in Upper Namoi Management Zone C, the Minister may have regard to whether construction or modification of the flood work would be likely to:

- (a) redistribute the peak flood flow by more 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 pre-development and existing development conditions for one or more flood scenarios, or

- (b) increase flood levels by more than 20cm on adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flood levels under pre-development and existing development conditions under one or more flood scenarios, or
  - (c) increase flow velocity by more than 50% on the landholding under application, adjacent landholdings and other landholdings that may be affected by the proposed flood work when compared to flow velocity under pre-development conditions under one or more flood scenarios, unless:
    - (i) increases by more than 50% are in isolated areas where the landholder mitigates the impact on the flood wave so that the average impact across the landholding under application is no greater than 50%, and
    - (ii) flow velocity is not increased by more than 50% at the boundary of the landholding under application, or
  - (d) 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 under application, adjacent landholdings and other landholdings that may be affected by the proposed flood work, taking into account the ground cover on those landholdings, or
  - (e) increase flood levels such that they impact high value infrastructure when compared to flood levels under pre-development and existing development conditions under one or more flood scenarios.
- (7) In determining whether to grant or amend a flood work approval to authorise the construction or modification of a flood work in Upper Namoi Management Zone C, the Minister may have regard to whether construction or modification of the flood work is likely to redistribute the peak flood flow by more than 5% at any of the peak discharge calculation locations as determined by the Minister, when compared to redistribution under existing development conditions under one or more flood scenarios considered relevant by the Minister.

**Notes.**

- 1 In conducting the assessments described under subclauses (2), (3), (6) and (7), 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 flood under existing and/or pre-development conditions, the 1% AEP flood under existing and/or pre-development conditions, or any other relevant flood scenario.

- 2 Relevant design floods are based on the location of the proposed work and are shown in Appendix 5 and Appendix 6.

## **Division 7 Rules for granting or amending flood work approvals in Upper Namoi Management Zone CU**

### **49 Assessment criteria for flood works in Upper Namoi 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.

Flood work applications in Upper Namoi Management Zone CU must be assessed against the assessment criteria outlined in clause 48 of this Plan as if references to Upper Namoi Management Zone C were references to Upper Namoi Management Zone CU.

## **Division 8 Rules for granting or amending flood work approvals in Upper Namoi Management Zone D**

### **50 Flood works authorised in Upper Namoi 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 approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone D unless, in the Minister's opinion, the flood work approval is for any of the following:
  - (a) an ecological enhancement work,
  - (b) an Aboriginal value enhancement work,
  - (c) a heritage site enhancement work.
- (2) Subject to subclause (1) and clause 52, a flood work approval must not be granted or amended to authorise the construction or modification of an ecological enhancement work in Upper Namoi Management Zone D unless, in the Minister's opinion, the ecological enhancement work is or is proposed to provide a positive outcome for an ecological asset that is mapped, recognised in or protected by this Plan, or local, state or Commonwealth environmental policy or legislation.

- (3) Subject to subclause (1) and clause 52, a flood work approval must not be granted or amended to authorise the construction or modification of an Aboriginal value enhancement work in Upper Namoi Management Zone D unless, in the Minister's opinion, the Aboriginal value enhancement work is or is proposed to provide a positive outcome for an Aboriginal value asset that is listed in any of the following:
- (a) Aboriginal Heritage Information Management System,
  - (b) Aboriginal Water Initiative System,
  - (c) Murray Darling Basin Authority Aboriginal Submissions Database,
  - (d) NSW State Heritage Register,
  - (e) Commonwealth Heritage List,
  - (f) any other source deemed relevant by the Minister.
- (4) Subject to subclause (1) and clause 52, a flood work approval must not be granted or amended to authorise the construction or modification of a heritage site enhancement work in Upper Namoi Management Zone D unless, in the Minister's opinion, the heritage site enhancement work is or is proposed to provide a positive outcome for a heritage site asset that is listed in any of the following:
- (a) Aboriginal Heritage Information Management System,
  - (b) Aboriginal Water Initiative System,
  - (c) Murray Darling Basin Authority Aboriginal Submissions Database,
  - (d) NSW State Heritage Register,
  - (e) NSW State Heritage Inventory,
  - (f) Historic Heritage Information Management System,
  - (g) Commonwealth Heritage List,
  - (h) any other source deemed relevant by the Minister.

## 51 Existing flood works in Upper Namoi 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 approval in Upper Namoi Management Zone D may be granted for a flood work that does not comply with the requirements of clause 50, provided the flood work meets the following criteria:
  - (a) the flood work was constructed as at the date of commencement of this Plan,
  - (b) the flood work is, in the Minister's opinion, for:
    - (i) an infrastructure protection work, or
    - (ii) a stock refuge, or
    - (iii) an access road, or
    - (iv) a drain, or
    - (v) a supply channel,
  - (c) as at the date of application, the flood work is not the subject of:
    - (i) an undetermined controlled work application under Part 8 of the *Water Act 1912*, or
    - (ii) a previously refused Part 8 application of the *Water Act 1912*, or
    - (iii) an undetermined flood work application under the Act, or
    - (iv) a previously refused flood work application under the Act.
- (2) An amendment of a flood work approval in Upper Namoi Management Zone D may be granted for a flood work that does not comply with the requirements of clause 50, provided the flood work meets the following criteria:
  - (a) the flood work was constructed as at the date of commencement of this Plan,

- (b) the proposed modification to the flood work will, in the Minister's opinion, reduce the impact of the work on flow patterns (distribution of flows, drainage, depth or velocity) in Upper Namoi Management Zone D.

## 52 Assessment criteria for flood works in Upper Namoi 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) Flood work applications in Upper Namoi Management Zone D must be assessed against the assessment criteria outlined in this clause.
- (2) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone D unless, in the Minister's opinion, the flood work can be constructed to maintain adequate flood connectivity to:
  - (a) ecological assets, and
  - (b) facilitate fish passage,

under a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods.

**Note.** Relevant design floods are based on the location of the proposed work and are shown in Appendix 5 and Appendix 6.

- (3) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone D unless, in the Minister's opinion, the flood work can be constructed to maintain adequate flood connectivity to:
  - (a) Aboriginal values, and
  - (b) heritage sites,

under a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods:

- (4) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone D if, in the Minister's

opinion, the construction of the flood work is likely to disturb the ground surface of a heritage site or cause more than minimal erosion to a heritage site.

**Note.** 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 22.

- (5) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone D unless, in the Minister's opinion, the flood work can be constructed to maintain drainage on adjacent landholdings and other landholdings that may be affected by the proposed flood work within 12 hours of existing drainage time when compared to drainage times under pre-development and existing development conditions for a range of flood scenarios including, at a minimum, scenarios for the relevant small and large design floods.
- (6) A flood work approval must not be granted or amended to authorise the construction or modification of a flood work in Upper Namoi Management Zone D unless the Minister has considered the cumulative impact that the proposed flood work and other existing works on the landholding may have on adjacent landholdings, and on other landholdings that may be affected by the proposed flood work and the floodplain environment.

## Part 9 Mandatory conditions

### Notes.

- 1 Part 10 of this Plan allows for amendments to be made to this Part.
- 2 This Part is made in accordance with section 17 (c) of the Act.

### 53 General

- (1) In this Part, a requirement to notify the Minister in writing will be satisfied by a written notice sent to the address listed in Schedule 4 of this Plan or to the email address for water enquiries on the Department's website.

**Note.** At the commencement of this Plan, the email address for water enquiries on the Department's website is [water.enquiries@dpi.nsw.gov.au](mailto:water.enquiries@dpi.nsw.gov.au).

- (2) Flood work approvals for flood works within the area shown on the Plan Map must have mandatory conditions to give effect to the following:
  - (a) the rules for granting or amending flood work approvals in Part 8 of this Plan,
  - (b) the approval holder must notify the Minister, in writing, immediately upon becoming aware of a breach of any condition of the approval,
  - (c) the approval holder must, within 60 days after completing the construction or modification of the flood work (as relevant), notify the Minister in writing of the details of the completion of the construction or modification (as relevant) of the flood work in a form approved by the Minister,
  - (d) if the approval holder intends to permanently cease using a flood work, the approval holder must:
    - (i) notify the Minister, in writing, that the approval holder intends to decommission the work and provide the Minister with a work plan for decommissioning the work at least 90 days before commencing action to decommission the work,
    - (ii) not commence decommissioning the work unless the approval holder receives written notice from the Minister authorising the decommissioning of the work,

- (iii) act in accordance with any notice from the Minister stating that the Minister does not authorise the work to be decommissioned, or requires the work to be decommissioned according to specific requirements,
- (iv) within 60 days after completing the flood work decommissioning, notify the Minister, in writing, that the flood work has been decommissioned and provide details of the decommissioning.

## Part 10 Amendment of this Plan

### 54 General

- (1) Amendments specified in this Plan, including this Part, are amendments 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 the amendment.

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

### 55 Part 1

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

- (a) modify the area to which this Plan applies,
- (b) modify the Plan Map,
- (c) 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 flood,
  - (ii) oblique photographs showing flood inundation of either the small design flood or the large design flood that contain verifiable land marks,
  - (iii) oblique photographs of flood survey marks that can be verified for either the small design flood or the large design flood.

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

### 56 Part 3

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

- (a) modify the description of the natural flooding regime,

- (b) modify the description of the existing flooding regime.

#### **57 Part 4**

Part 4 may be amended to do any of the following:

- (a) add, remove or modify the design floods used to establish the floodway network,
- (b) modify the Floodway Network Map.

#### **58 Part 5**

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

- (a) modify the ecological benefits of flooding specified in clause 18,
- (b) add, remove or modify ecological assets in clause 19,
- (c) add, remove or modify Aboriginal values in clause 21,
- (d) add, remove or modify heritage sites in clause 22.

#### **59 Part 6**

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

- (a) add, remove or modify the types of flood works in clause 24,
- (b) add, remove or modify the number or types of flood works in clause 25,
- (c) modify the area enclosed by existing flood works in clause 26.

#### **60 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 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.

## **61 Part 9**

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

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

## **62 Dictionary**

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

## **63 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 and/or cultural significance in the Upper Namoi Management Zone D.
- (3) Schedule 4 may be amended to add or remove an address.

## Dictionary

### Notes.

- 1 Unless otherwise defined in this Plan, words and expressions that are defined in the Act or in the regulations have the same meaning in this Plan.
- 2 The Act and the *Interpretation Act 1987* contain definitions and other provisions that affect the interpretation and application of this Plan.

**Aboriginal value enhancement work** is a flood work that is constructed only to benefit Aboriginal value assets that are listed in the Aboriginal Heritage Information Management System, Aboriginal Water Initiative System, Murray Darling Basin Authority Aboriginal Submissions Database, NSW State Heritage Register, Commonwealth Heritage List or any other source deemed relevant by the Minister.

**Aboriginal 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 event of a given or larger size occurring in any one year, usually expressed as a percentage (%) or a likelihood of 1 flood event in  $x$  years. For example, a flood event with an AEP of 5% means there is a 5% chance that a flood event of same size or larger will occur in any one year.

**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. The removal of material from this area results in a depression or hole in the ground.

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

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

**design flood** is a flood of known magnitude or AEP 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. The selection 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.

**discharge (or flow)** is the rate of flow measured in volume per unit of time (e.g. megalitres per day = ML/day).

**drain** is a below-ground structure used to intercept surface water and remove water from land after a flood has passed or during a local rainfall event.

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

**ecological enhancement work** is a flood work that is constructed only to benefit ecological assets that are recognised in or protected by a local, state or Commonwealth environmental policy and/or legislation.

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

**Exceedances per Year (EY)** is the expected number of times in a year that the event will occur or be exceeded.

**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-dependent assets** refers to assets that have been identified in this Plan as having important ecological and/or cultural features which rely on inundation by floodwaters to sustain essential processes.

**flood flow corridor** is a hydraulic corridor that conveys flood flow through a management zone.

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

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

**heritage site enhancement work** is a flood work that is constructed only to benefit heritage site assets that are listed in the Aboriginal Heritage Information Management System, Aboriginal Water Initiative System, Murray Darling Basin Authority Aboriginal Submissions Database, NSW State Heritage Register, NSW State Heritage Inventory, Historic Heritage Information Management System, Commonwealth Heritage List or any other source deemed relevant by the Minister.

**heritage sites** are cultural heritage objects and places as listed on Commonwealth, State and/or local government heritage registers or any other source deemed relevant by the Minister.

**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 or fences.

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

**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 flooding regime** refers to how flood waters moved over the floodplain before development (i.e. flood works and major storage dams), land use changes and climate change.

**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.

***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 protection of stock in times of flooding.

***wetland*** 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. 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

### 1 Ecological assets identified for the purposes of this Plan:

- (1) wetlands:
  - (a) semi-permanent (non-woody):
    - (i) marsh club-rush (*Bolboschoenus fluviatilis*),
    - (ii) tall sedge (*Carex appressa*),
    - (iii) spreading sneezeweed (*Centipeda minima* subsp. *minima*),
    - (iv) sedge (*Cyperus betchei* subsp. *betchei*),
    - (v) downs nutgrass (*Cyperus bifax*),
    - (vi) trim flat-sedge (*Cyperus concinnus*),
    - (vii) tall flat-sedge (*Cyperus exaltatus*),
    - (viii) flecked flat-sedge (*Cyperus gunnii* subsp. *gunnii*),
    - (ix) spiny flat-sedge (*Cyperus gymnocaulos*),
    - (x) stiff flat-sedge (*Cyperus vaginatus*),
    - (xi) flat sedge (*Cyperus victoriensis*),
    - (xii) common spike-rush (*Eleocharis acuta*),
    - (xiii) pale spike-sedge (*Eleocharis pallens*),
    - (xiv) flat spike-sedge (*Eleocharis plana*),
    - (xv) small spike-rush (*Eleocharis pusilla*),
    - (xvi) starfruit (*Damasonium minus*),
    - (xvii) common fringe-sedge (*Fimbristylis dichotoma*),

- (xviii) tussock rush (*Juncus aridicola*),
- (xix) rush (*Juncus continuus*),
- (xx) tussock rush (*Juncus flavidus*),
- (xxi) pale rush (*Juncus psammophilus*),
- (xxii) rush (*Juncus ochrocoleus*),
- (xxiii) finger rush (*Juncus subsecundus*),
- (xxiv) common rush (*Juncus usitatus*),
- (xxv) blown grass (*Lachnagrostis filiformis*),
- (xxvi) umbrella canegrass (*Leptochloa digitata*),
- (xxvii) spiny-headed mat-rush (*Lomandra longifolia*),
- (xxviii) water primrose (*Ludwigia peploides* subsp. *montevidensis*),
- (xxix) nardoo (*Marsilea costulifera*),
- (xxx) common nardoo (*Marsilea drummondii*),
- (xxxi) slender monkey-flower (*Mimulus gracilis*),
- (xxxii) milfoil (*Myriophyllum* spp.),
- (xxxiii) milfoil (*Myriophyllum variifolium*),
- (xxxiv) water couch (*Paspalum distichum*),
- (xxxv) swamp foxtail (*Pennisetum alopecuroides*),
- (xxxvi) slender knotweed (*Persicaria decipiens*),
- (xxxvii) curly pondweed (*Potamogeton crispus*),
- (xxxviii) poison pratia (*Pratia concolor*),

- (xxxix) river buttercup (*Ranunculus inundatus*),
- (xl) swamp buttercup (*Ranunculus undosus*),
- (xli) swamp dock (*Rumex brownii*),
- (xlii) shiny dock (*Rumex crystallinus*),
- (xliii) swamp starwort (*Stellaria angustifolia*),
- (xliv) rat's tail couch (*Sporobolus mitchellii*),
- (xlv) narrow-leaved cumbungi (*Typha domingensis*),
- (xlvi) broadleaf cumbungi (*Typha orientalis*),

(b) floodplain (flood-dependent shrubland):

- (i) lignum (*Duma florulenta*),
- (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 Upper Namoi Valley Floodplain. The Background Document provides further information on relevant plant community types.

(2) other floodplain ecosystems:

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

- (i) rough-barked apple (*Angophora floribunda*),
- (ii) river red gum (*Eucalyptus camaldulensis*),
- (iii) black tea-tree (*Melaleuca bracteata*), and
- (iv) river oak (*Casuarina cunninghamiana* subsp. *cunninghamiana*),

(b) flood-dependent woodland:

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

(3) areas of groundwater recharge:

(a) alluvial soils,

(b) rivers.

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

## 2 Ecological values identified for the purposes of this Plan:

(1) areas of state, national and international conservation significance that are dependent on flooding:

(a) Goran Lake.

**Note.** Goran Lake is listed in the Australian Wetlands Database.

(2) habitat for flood-dependent fauna:

(a) mapped flood-dependent vegetation communities,

(b) drought refuges,

(c) observed waterbird breeding habitat sites,

(d) wetlands as listed in Schedule 1, Clause 1 (1) of this Plan.

**Note.** The Background Document provides further information on mapped flood-dependent vegetation communities providing habitat for flood-dependent fauna.

(3) fauna species, including threatened species:

(a) fish species:

(i) un-specked hardyhead (*Craterocephalus stercusmuscarum fulvus*),

(ii) Darling River hardyhead (*Craterocephalus amniculus*),

(iii) Australian smelt (*Retropinna semoni*),

(iv) bony herring (*Nematalosa erebi*),

(v) carp gudgeons (*Hypseleotris* spp.),

(vi) golden perch (*Macquaria ambigua*),

(vii) Murray cod (*Maccullochella peelii*),

(viii) Murray-Darling rainbowfish (*Melanotaenia fluviatilis*),

(ix) spangled perch (*Leiopotherapon unicolor*),

- (x) silver perch (*Bidyanus bidyanus*),
- (xi) eel-tailed catfish (*Tandanus tandanus*),
- (xii) purple spotted gudgeon (*Mogurnda adspersa*),
- (xiii) olive perchlet (*Ambassis agassizii*),
- (xiv) flathead galaxias (*Galaxias rostratus*),

**Note.** The indicative (or known and expected) distributions for NSW freshwater threatened fish species have been modelled, species include purple spotted gudgeon, eel-tailed catfish, flathead galaxias, olive perchlet and silver perch. The indicative distribution means that there is a high probability that the species will occur in a stream segment, because the species has been recorded there or the environmental conditions are the same as those of 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) striped burrowing frog (*Cyclorana alboguttata*),
- (iv) water-holding frog (*Cyclorana platycephala*),
- (v) south-eastern banjo frog (*Limnodynastes dumerilii dumerilii*),
- (vi) fletcher's frog (*Limnodynastes fletcheri*),
- (vii) salmon-striped frog (*Limnodynastes salmini*),
- (viii) spotted marsh frog (*Limnodynastes tasmaniensis*),
- (ix) green tree frog (*Litoria caerulea*),
- (x) broad-palmed frog (*Litoria latopalmata*),
- (xi) peron's tree frog (*Litoria peronii*),
- (xii) desert tree frog (*Litoria rubella*),

- (xiii) sudell's frog (*Neobatrachus sudellae*),
- (xiv) crucifix frog (*Notaden bennettii*),
- (xv) ornate burrowing frog (*Platyplectrum ornatum*),
- (xvi) bribon's toadlet (*Pseudophryne bibronii*),
- (xvii) smooth toadlet (*Uperoleia laevigata*),
- (xviii) wrinkled toadlet (*Uperoleia rugosa*),
- (c) amphibious mammal species:
  - (i) platypus (*Ornithorhynchus anatinus*),
  - (ii) water rat (*Hydromys chrysogaster*),
- (d) turtle species:
  - (i) eastern long-necked turtle (*Chelodina longicollis*),
  - (ii) broad-shelled turtle (*Chelodina expansa*),
  - (iii) Macquarie turtle (*Emydura macquarii*),
- (e) reptile species:
  - (i) red-bellied black snake (*Pseudechis porphyriacus*),
- (f) aquatic snail species:
  - (i) river snail (*Notopala sublineata sublineata*),
  - (ii) sculptured snail (*Plotiopsis balonnensis*),
  - (iii) pouch snail (*Glyptophysa gibbosa*),
  - (iv) pouch snail (*Isidorella newcombi*),
- (g) waterbird species:

- (i) black-necked stork (*Ephippiorhynchus asiaticus*),
- (ii) brolga (*Grus rubicunda*),
- (iii) blue-billed duck (*Oxyura australis*),
- (iv) Australian painted snipe (*Rostratula australis*),
- (v) freckled duck (*Stictonetta naevosa*),

**Note.** The waterbird species listed here are listed as endangered or vulnerable under Schedule 1 of the *Biodiversity Conservation Act 2016*. 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) intermediate egret (*Ardea intermedia*),
  - (iii) eastern great egret (*Ardea modesta*),
  - (iv) white-necked heron (*Ardea pacifica*),
  - (v) little egret (*Egretta garzetta*),
  - (vi) white-faced heron (*Egretta novaehollandiae*),
  - (vii) little pied cormorant (*Microcarbo melanoleucos*),
  - (viii) nankeen night-heron (*Nycticorax caledonicus*),
  - (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) Australian white ibis (*Threskiornis molucca*),
- (xvii) straw-necked ibis (*Threskiornis spinicollis*).

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

- Commonwealth Environmental Water Portfolio Management Plan: Namoi River Valley 2017-18, Commonwealth of Australia, 2017
- Commonwealth Environmental Water Portfolio Management Plan: Namoi River Valley 2016–17, Commonwealth of Australia, 2016
- Integrated planning for the use, carryover and trade of Commonwealth environmental water: Namoi River Valley 2015–16. Commonwealth of Australia, 2015.
- Commonwealth environmental water use options 2014–15: Namoi River Valley, Commonwealth of Australia, 2014
- Barma Water Resources, Thurtell, L and Wettin, P, Environmental Water Delivery: Namoi River. Prepared for Commonwealth Environmental Water Office, 2012.

**Schedule 2 Areas of ecological and/or cultural significance in Upper Namoi Management Zone D**

<b>ID number</b>	<b>Area of ecological and/or cultural significance</b>	<b>Easting</b>	<b>Northing</b>	<b>Zone</b>
1	Barbers Lagoon			
2	Bundella Lagoon			
3	Gulligal Lagoon			
4	Lake Goran			
5	Un-named lagoon near Tarriaro			
6	Broadwater Lagoon	224593	6594310	56
7	Curlewis Swamp	241206	6552750	56
8	Goran Swamp	225871	6542170	56
9	Gunnible Lagoon	235374	6575560	56
10	Landry Lagoon	234376	6574630	56
11	Nicholsons Lagoon	268697	6521440	56

**Note.** Coordinates were calculated using GDA 1994 MGA Zone 56. 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    Maps**

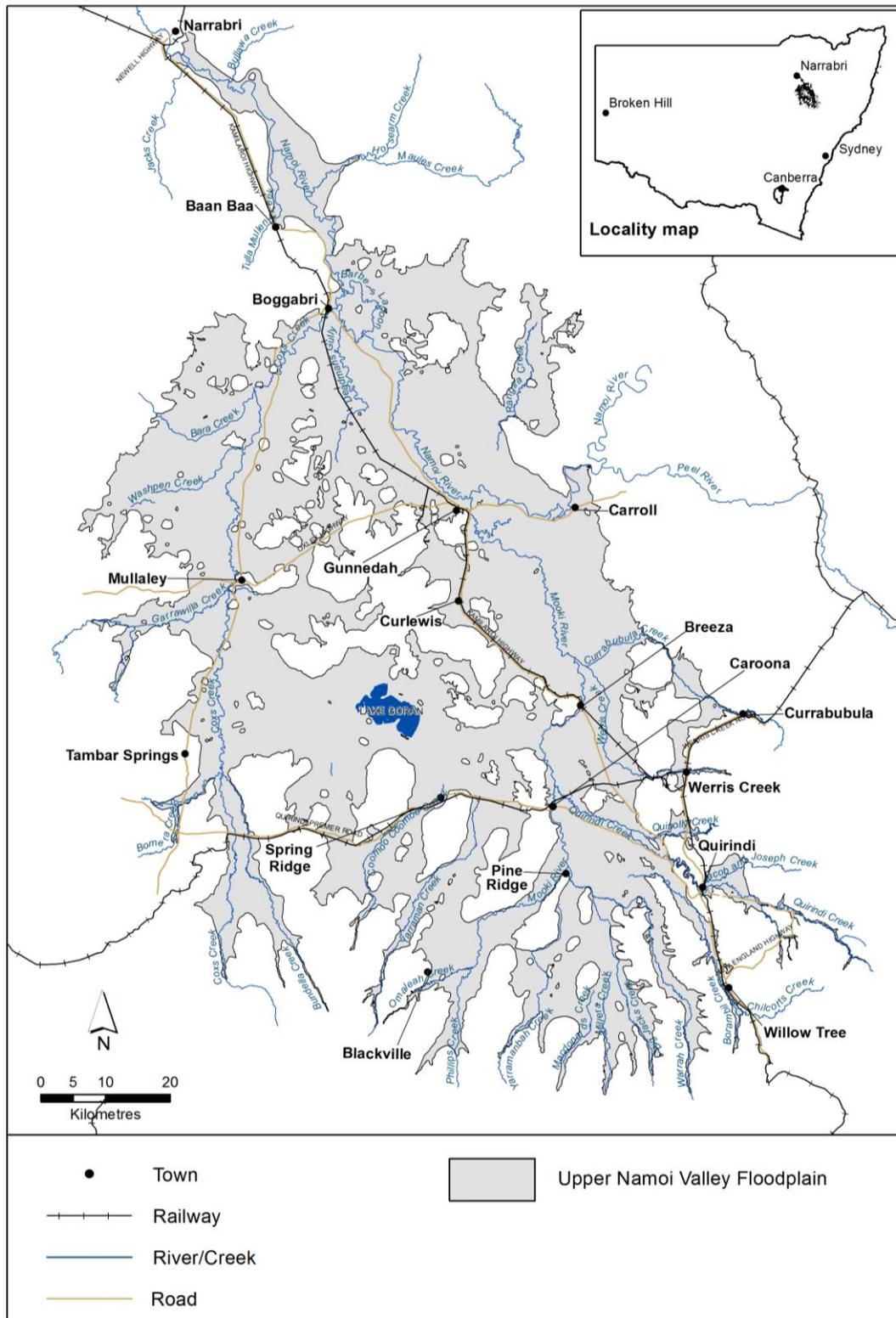
- (a) *Floodplain Management Plan Map (FMP008\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019*
- (b) *Management Zones Map (FMP009\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019*
- (c) *Floodway Network Map (FMP010\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019*
- (d) *Large Design Floods Map (FMP011\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019*
- (e) *Small Design Floods Map (FMP012\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019*
- (f) *Ecological Assets Map (FMP013\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019*
- (g) *Existing Flood Works Map (FMP014\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019*

## **Schedule 4    Address**

Department of Industry - Water  
Tamworth Agricultural Institute  
4 Marsden Park Road  
CALALA NSW 2340

## Appendix 1 Overview of the Plan Map

### Floodplain Management Plan Map (FMP008\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019



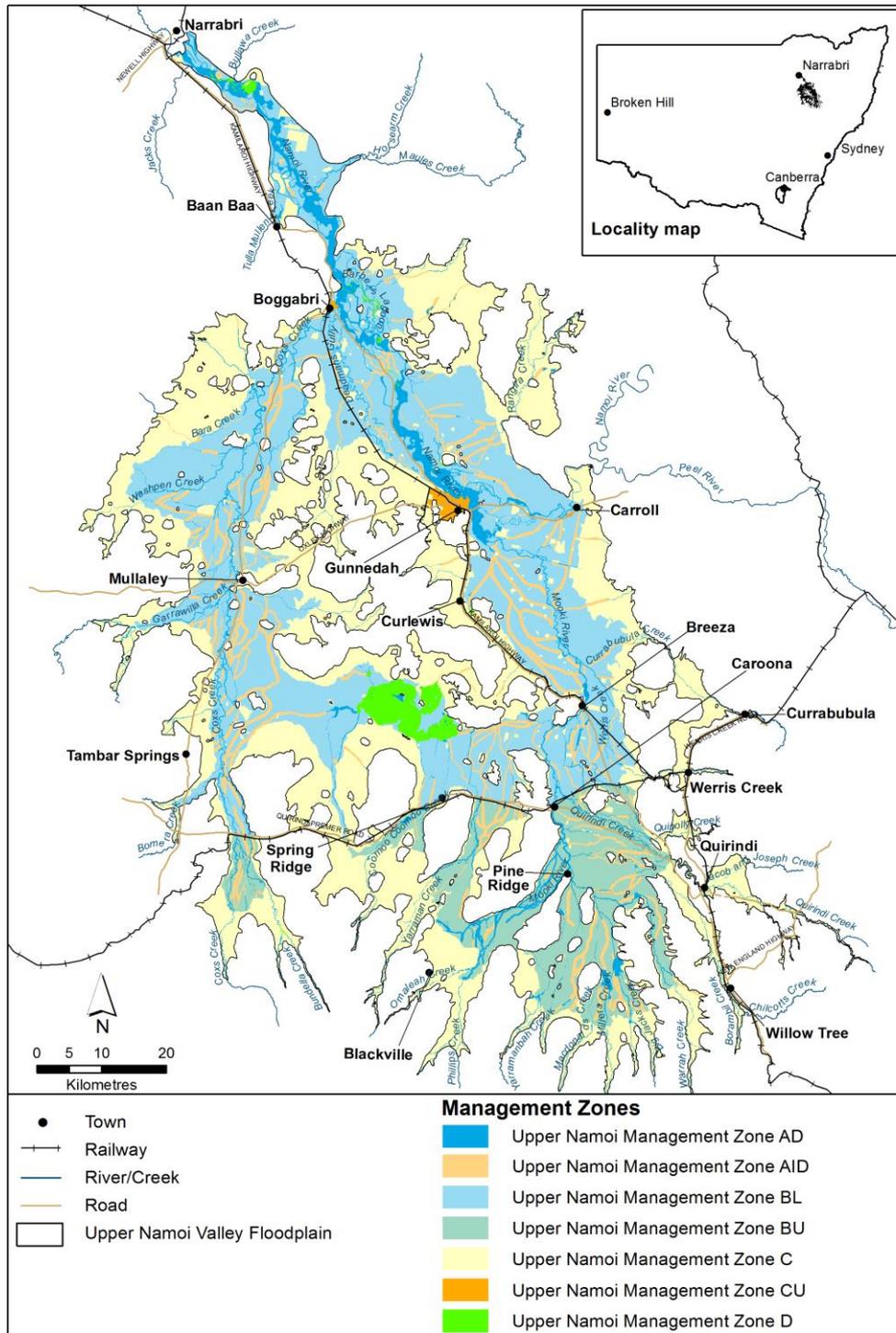
## **Appendix 2    Inspection of maps and notifications**

Copies of the Plan Map, Management Zones Map, Floodway Network Map, Large Design Flood Map, Small Design Flood Map, Ecological Assets Map and the Existing Flood Works Map may be inspected at the office listed below. Any notifications that may be required to be made to the Minister, as specified in this Plan can be made to the office listed below.

Department of Industry - Water  
Tamworth Agricultural Institute  
4 Marsden Park Road  
CALALA NSW 2340

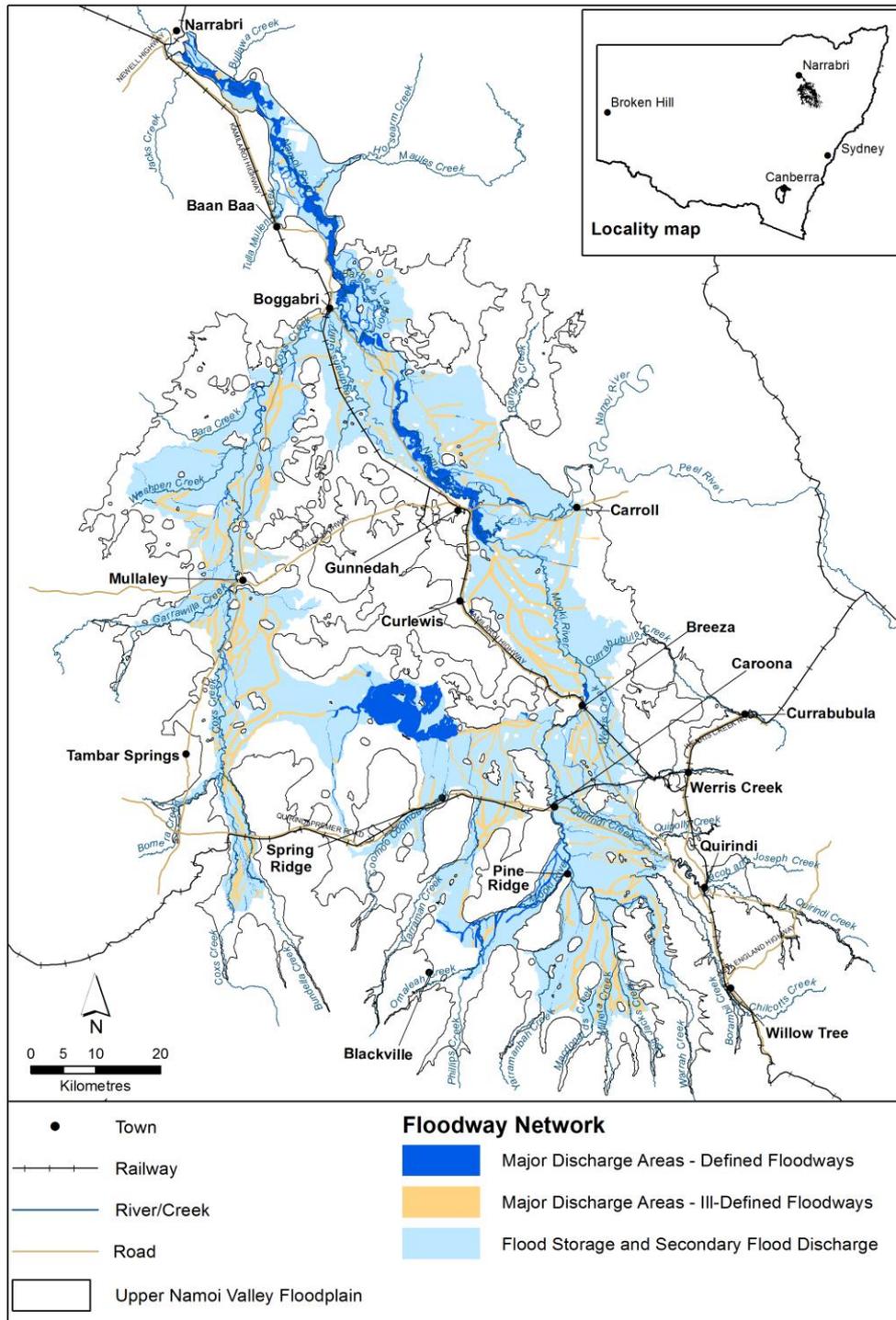
## Appendix 3 Overview of the Management Zones Map

### Management Zones Map (FMP009\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019



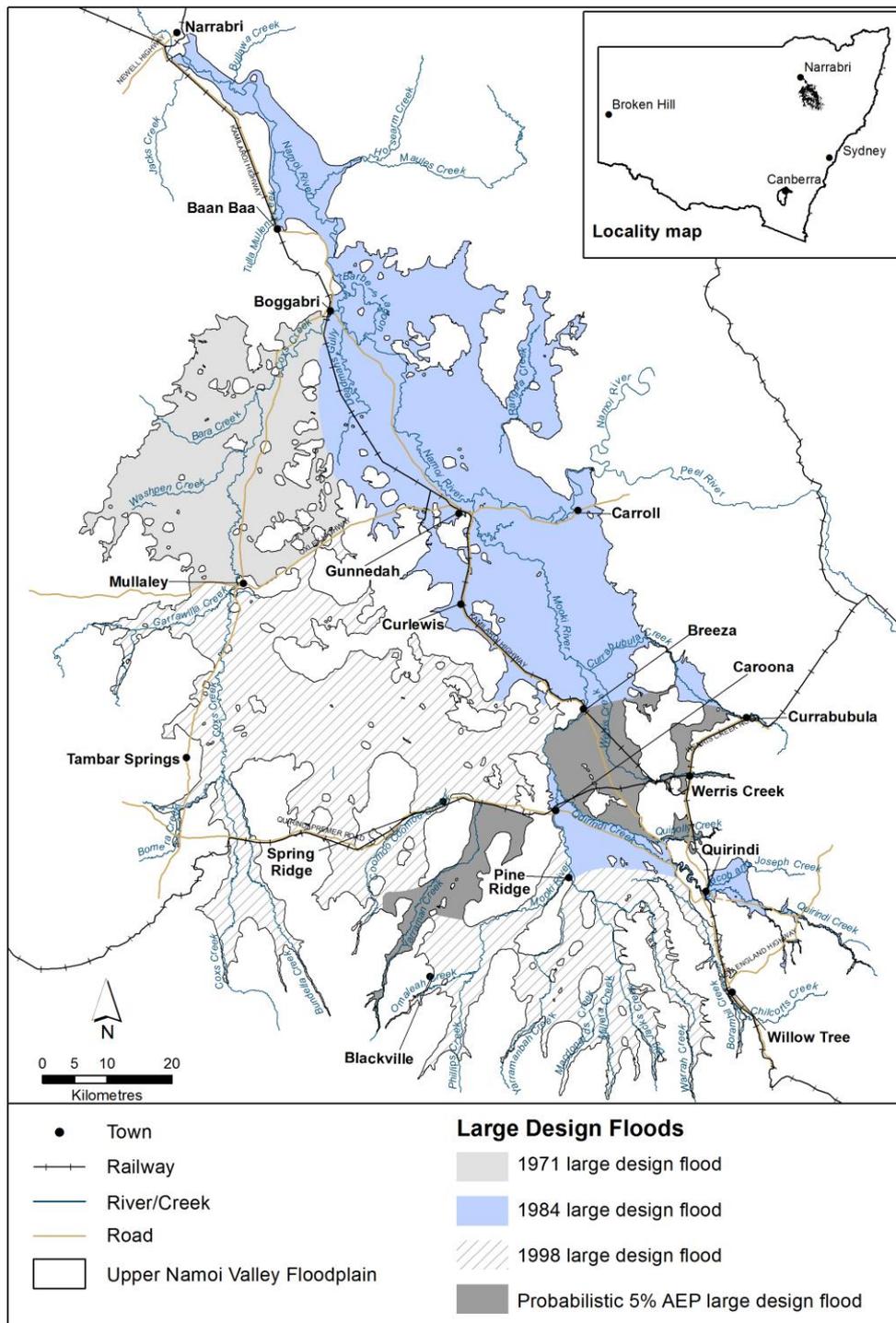
## Appendix 4 Overview of the Floodway Network Map

### Floodway Network Map (FMP010\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019



## Appendix 5 Overview of the Large Design Flood Map

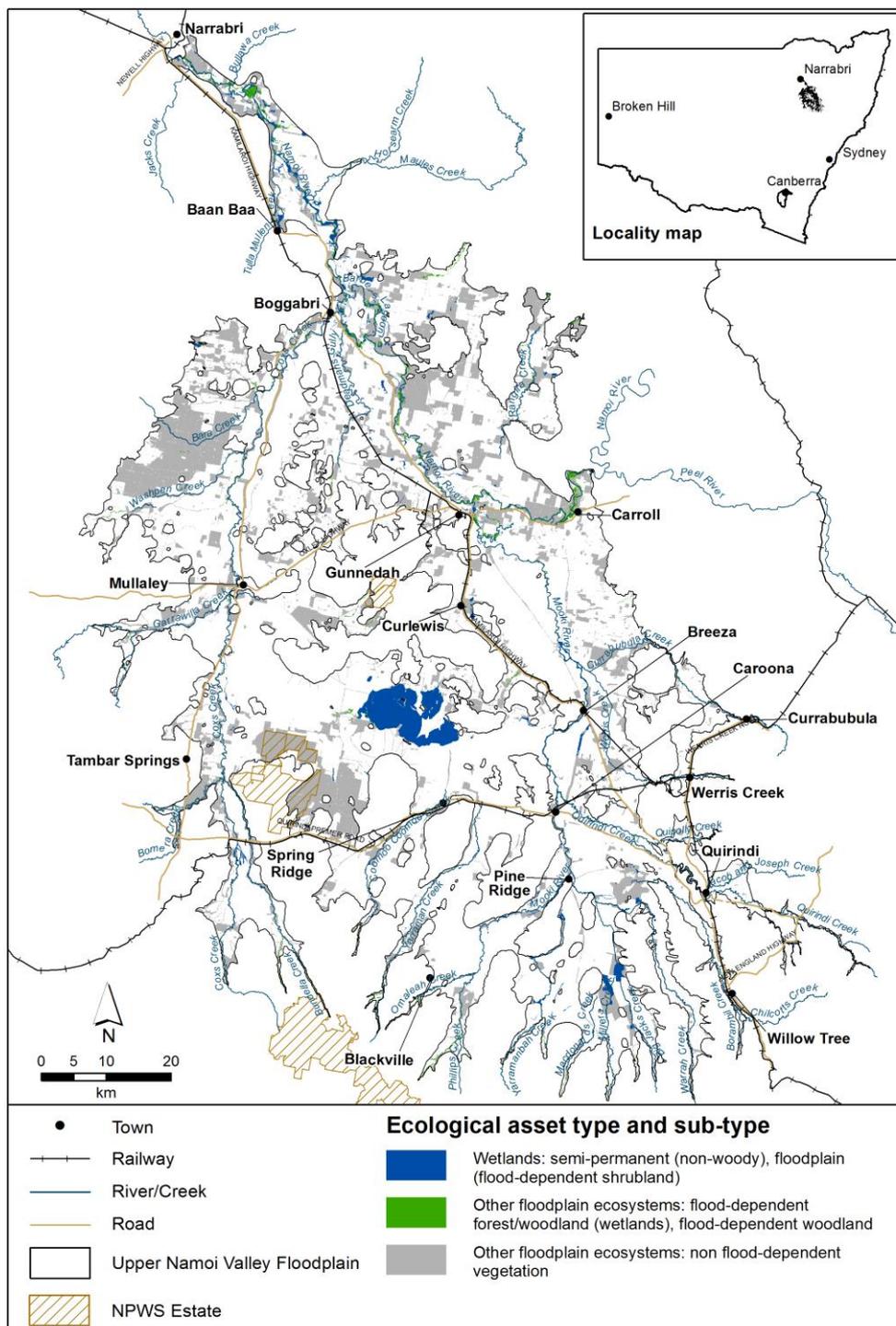
### Large Design Flood Map (FMP011\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019





## Appendix 7 Overview of the Ecological Assets Map

### Ecological Assets Map (FMP013\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019



## Appendix 8 Overview of the Existing Flood Works Map

### Existing Flood Works Map (FMP014\_Version 1), Floodplain Management Plan for the Upper Namoi Valley Floodplain 2019

