



Natural Resources Commission

Final report

Audit of the implementation of the Floodplain Management Plans for the Lachlan, Murray and Murrumbidgee

August 2020



Acknowledgement of Country

The Natural Resources Commission acknowledges and pays respect to traditional owners and Aboriginal peoples. The Commission recognises and acknowledges that traditional owners have a deep cultural, social, environmental, spiritual and economic connection to their lands and waters. We value and respect their knowledge in natural resource management and the contributions of many generations, including Elders, to this understanding and connection.

In relation to the FMP areas subject to this audit, the Commission pays its respects to the Baraba Baraba, Wiradjuri, Gurendji, Mudi-Mudi, Nari-Nari, Ngiyampaa, Wadi Wadi, Wamba Wamba, Yida-Yida and Yorta Yorta Traditional Owners past, present and future, as well as other Aboriginal peoples for whom these waterways are significant. The Commission hopes that the audit process will help to shape collaborative floodplain planning that is beneficial to Aboriginal peoples and their country.

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Document No. D20/2832

ISBN: 978 1 925204 57 5

Cover page photo provided by the Department of Planning, Industry and Environment – Environment, Energy and Science

Acronyms and abbreviations

Act	<i>Water Management Act 2000</i> (NSW)
AHIMS	Aboriginal Heritage Information Management System
ASAE	Australian Standard on Assurance Engagements
Commission	the Natural Resources Commission
CIRaM	Compliance Investigation Reporting and Management system
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DECC	(former) Department of Environment, Climate Change
DECCW	(former) Department of Environment, Climate Change and Water
DNR	(former) Department of Natural Resources
DoI-Water	(former) NSW Department of Industry - Water
DPIE-EES	Department of Planning, Industry and Environment, Environment, Energy and Science
DPIE-Water	Department of Planning, Industry and Environment - Water
DPI-Water	(former) Department of Primary Industries - Water
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
FMP	Floodplain management plan
The FMPs	The FMPs reviewed in this report (see Section 2.2 for list)
NOW	NSW Office of Water
NRAR	Natural Resources Access Regulator
OEH	(former) Office of Environment and Heritage
Regulations	<i>Water Management (General) Regulation 2018</i> (NSW)
SES	State Emergency Services

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1 Executive summary

The Natural Resources Commission (the Commission) has audited the ten floodplain management plans (FMPs) in the Lachlan, Murray and Murrumbidgee regions¹ ('the FMPs') to ascertain whether the provisions of the FMPs are being given effect to, as required under Section 44 of the *Water Management Act 2000* (the Act).²

1.1 Audit conclusion

The Commission considers that the provisions of the FMPs have not been given full effect in accordance with the Act.

The audit conclusion is based on the procedures performed and the evidence obtained. The Commission is of the view that the information presented fairly reflects the implementation of FMPs.

1.2 Audit findings and recommendations

Table 1 summarises the audit findings and recommendations against the six audit criteria, which apply consistently across the FMPs.

In addition to its findings and recommendations, the Commission identified several factors that have contributed to the audit conclusion. The Commission has suggested actions to address these factors and support its audit recommendations (**Table 2**). The suggested actions should be considered by the audited agencies as part of future improvements to FMP implementation.

The Commission acknowledges that the age, structure and language of the FMPs has combined with a complex history of changes in NSW Government agency roles, governance and legislation to create challenges for their implementation.

However, implementation of FMPs is likely to reduce potential adverse impacts in the FMP regions. For example:

- changes to flood flow patterns, increasing risks to life and property from floods
- adverse impacts to the health of riverine and floodplain ecosystems that depend on flood inundation

¹ The FMPs reviewed in this report include: the Lachlan River (Gooloogong to Jemalong Gap) FMP 2011; Lachlan River (Jemalong Gap to Condobolin) FMP 2012; Lachlan River (Hillston, Lake Brewster to Whealbah) FMP 2005 (the **Lachlan FMPs**); the Edward and Wakool Rivers Stage 1 (Deniliquin to Moama-Moulamein Railway) FMP 2011; Wakool River Stage 2 (Moama-Moulamein Railway to Gee Gee Bridge) FMP 2011; Edward and Niemur Rivers Stage 3 (Moama-Moulamein Railway to Liewah and Mallan) FMP 2011; Edward and Wakool Rivers Stage 4 (Noorang Rd to Wakool Murray Junction) FMP 2000; Tuppal and Bullatale Creeks (Murray River Uptake to Deniliquin) FMP 2004 (the **Murray FMPs**); the Murrumbidgee River (Hay to Maude) FMP 2014; Billabong Creek FMP 2006 (the **Murrumbidgee FMPs**).

² Note that in this report, 'the Act' is used to refer only to the *Water Management Act 2000* and 'the Regulations' refers only to the *Water Management (General) Regulations 2018*. References to the *Water Act 1912* and other legislation are written in full, except for the *Environmental Planning and Assessment Act 1979*, which is referred to as the EP&A Act.

- an increased likelihood of unauthorised or non-compliant flood works, and uncoordinated floodplain development
- potential inequity on the floodplains and a lack of sustainability
- an inability to determine if FMP implementation meets FMP objectives and the objects and principles of the Act
- a limited evidence base to undertake mandatory five-year reviews.

Improving the implementation of FMPs will provide confidence that:

- rules and criteria regarding existing and proposed flood works are being applied consistently and fairly
- floodplain structures are being managed to acceptable levels of risk to life, property and public or private assets
- flood flows are likely to be maintained to environmental and cultural assets that require periodic flooding.

Table 1: Audit findings and recommendations

Findings	Recommendations
Criterion 1: The relevant NSW Government agencies have implemented plan provisions related to floodplain works approvals (approvals) and the relevant zones and /or floodway network, including assessment, granting or refusal, conditioning and enforcement	
<p>F 1.1 Approvals assessment, granting or refusal and application of conditions were carried out in line with requirements. However, some improvements could be made regarding how the hydraulic, environment and cultural impact assessments are carried out.</p>	<p>No recommendation. See Table 2 for suggested actions.</p>
<p>F 1.2 A reactive compliance and enforcement regime was in place during the audit period and is ongoing.</p>	<p>No recommendation. See Table 2 for suggested actions.</p>
Criterion 2: The relevant NSW Government agencies have implemented plan provisions in relation to modifications of existing works (for example required modifications or alternative as relevant)	
<p>F 2.1 No evidence was provided to demonstrate that provisions related to required modifications to existing works have been implemented during the audit period.</p>	<p>R 2.1 The Department of Planning, Industry and Environment - Water (DPIE-Water), as the overseeing agency for FMPs, to develop and coordinate implementation of a strategy to address the required modifications identified in the FMPs.</p> <p>This strategy should re-consider the risks (including consideration of costs and benefits) of existing structures in the FMP areas in the context of current natural and developed landscapes. Once the list of structures requiring modification is confirmed, the strategy should address:</p> <ul style="list-style-type: none"> ▪ responsibilities of NSW Government agencies and other parties for implementation ▪ upfront and ongoing funding arrangements ▪ how to assess and record the status of required modifications ▪ how to prioritise and sequence implementation ▪ how to address extensions of flood work approvals that require modification ▪ an approach to landholder and land manager engagement for required modifications.
Criterion 3: The relevant NSW Government agencies have implemented plan provisions in relation to performance indicators	
<p>F 3.1 Provisions related to performance indicators were not implemented within the audit period.</p>	<p>R 3.1 DPIE-Water to lead the assessment and monitoring of performance indicators and use these data to support decision making for FMP implementation and review.</p>
Criterion 4: The relevant NSW Government agencies have implemented plan provisions in relation to flood monitoring	
<p>F 4.1 Provisions relating to flood monitoring were not implemented within the audit period.</p>	<p>R 4.1 DPIE-Water to:</p> <ul style="list-style-type: none"> ▪ review FMP flood monitoring requirements in line with the principles, objects and key provisions of the Act ▪ ensure there are appropriate arrangements in place to implement these requirements in advance of flood events (across multiple agencies if appropriate), including funding arrangement, and defined and agreed responsibilities for data collection and sharing. <p>This will support FMP performance indicator assessment and FMP review.</p>
Criterion 5: The relevant NSW Government agencies have implemented plan provisions in relation to environmental monitoring	
<p>F 5.1 Provisions relating to environmental monitoring were not implemented within the audit period.</p>	<p>R 5.1 DPIE-Water to:</p> <ul style="list-style-type: none"> ▪ review FMP environmental monitoring requirements in line with the principles, objects and key provisions of the Act ▪ ensure there are appropriate arrangements in place to implement these requirements in advance of flood events (across multiple agencies if appropriate), including funding arrangements, and defined and agreed responsibilities for data collection and sharing. <p>This will support FMP performance indicator assessment and review.</p>
Criterion 6: The relevant NSW Government agencies have implemented plan provisions in relation to plan review	
<p>F 6.1 Provisions relating to FMP review were not implemented in accordance with the five-year timeframe prescribed by the Act.</p>	<p>R 6.1 DPIE-Water to review the FMPs as soon as practicable.</p>

Table 2: Contributing factors to findings and suggested actions

Contributing factors to findings	Suggested actions to support recommendations
<p>a. There is limited expertise available to support ongoing FMP implementation. (F 1.1, F 1.2, F 2.1, F 3.1, F 4.1, F 5.1, F 6.1)</p>	<p>SA 1 DPIE-Water, the Natural Resource Access Regulator (NRAR) and WaterNSW to make available under ongoing arrangements the relevant technical expertise required to implement their ongoing functions and roles in assessment, granting and conditioning of approvals, enforcement, monitoring and review of FMPs.</p>
<p>b. Procedures to guide the assessment process:</p> <ul style="list-style-type: none"> ▪ are old and in draft form ▪ do not provide detailed guidance material to support a consistent approach and appropriate level of hydraulic, environmental and cultural impact assessment for flood works approval applications [Contributing Factor (b)]. (F 1.1) 	<p>SA 2 DPIE-Water (overseeing agency), WaterNSW and NRAR (approval assessment agencies) to ensure procedures and guidance material to support the approvals assessment process are in line with the objects and principles of the Act and are consistently implemented.</p>
<p>c. There is limited sharing of spatial data between NSW Government agencies to support assessments of approvals and impacts from flood works. (F 1.1, F 1.2)</p>	<p>SA 3 DPIE-Water to make spatial data readily available to NRAR and WaterNSW to support the approvals assessment process, assessment of cumulative impacts of flood works and facilitate flood studies.</p>
<p>d. Systems for managing approvals and enforcement are not:</p> <ul style="list-style-type: none"> ▪ capturing spatial data ▪ informing overall compliance at the FMP scale ▪ enabling public transparency of flood works approvals. (F 1.1, F 1.2) 	<p>SA 4.1 WaterNSW (with input from NRAR) to update the Water Licensing System to enable capture relevant spatial information relating to approvals and to enable searching of this data by FMP area.</p> <p>SA 4.2 NRAR enable the search of flood work compliance allegations by FMP area.</p> <p>SA 4.3 WaterNSW to update the NSW Water Register to include flood work approvals.</p>
<p>e. No evidence of landholder engagement undertaken by NSW Government agencies to raise the awareness of flood work approval obligations to reduce risks of non-compliance. (F 1.2)</p>	<p>SA 5 DPIE-Water, NRAR and WaterNSW to define agency responsibilities for landholder and community education in relation to flood work approval obligations and take coordinated action to raise awareness.</p>

2 The Commission's role and audit approach

2.1 The Commission's role in auditing management plans

The Commission is an independent body with broad investigating and reporting functions that aim to establish a sound evidence base to inform natural resource management in the social, economic and environmental interests of NSW.

The Commission has a role under Section 44 of the Act to audit water management plans within the first five years of each plan to ascertain whether their provisions are being given effect to. This role began on 1 December 2018 under changes to the Act.

Water management plans include:

- **water sharing plans** – statutory documents that establish the rules for sharing water between the environment and other water users
- **FMPs** – frameworks to coordinate flood work development to minimise future changes to flooding behaviour, and to increase awareness of risk to life and property from flooding.

More detail on the purpose of FMPs is provided in **Section 4.1**.

2.2 Audit objective

The objective of this audit was to determine, in accordance with Section 44 of the Act, whether the provisions of the following 10 FMPs are being given effect to:

Lachlan FMPs

- Lachlan River (Gooloogong to Jemalong Gap) FMP 2011
- Lachlan River (Jemalong Gap to Condobolin) FMP 2012
- Lachlan River (Hillston, Lake Brewster to Whealbah) FMP 2005

Murray FMPs

- Edward and Wakool Rivers Stage 1 (Deniliquin to Moama-Moulamein Railway) FMP 2011
- Wakool River Stage 2 (Moama-Moulamein Railway to Gee Gee Bridge) FMP 2011
- Edward and Niemur Rivers Stage 3 (Moama-Moulamein Railway to Liewah and Mallan) FMP 2011
- Edward and Wakool Rivers Stage 4 (Noorang Rd to Wakool Murray Junction) FMP 2000³
- Tuppall and Bullatale Creeks (Murray River Uptake to Deniliquin) FMP 2004

Murrumbidgee FMPs

- Murrumbidgee River (Hay to Maude) FMP 2014
- Billabong Creek FMP 2006.

³ Note that this FMP is labelled a 'floodplain management strategy' but has been adopted as an FMP under the Act.

2.3 Audit standards

This audit was executed as a limited assurance engagement in accordance with the following standards:

- *Standards on Assurance Engagements (ASAE) 3000 Assurance Engagements other than Audits or Reviews of Historical Financial Information*
- *ASAE 3100 Compliance Engagements*
- *Auditing Standard ASQC 1 Quality Control for Firms that Perform Audits and Reviews of Financial Reports and Other Financial Information, and Other Assurance Engagements.*

In accordance with these standards, the Commission has:

- complied with applicable ethical requirements
- planned and performed procedures to obtain independent assurance about whether the relevant NSW Government agencies have implemented the plans, in all material respects, as evaluated against the audit criteria.

2.4 Audit criteria

Audit criteria were developed based on common parts of the FMPs that the Commission considered warranted examination to ascertain whether provisions are being given effect to.

The audit criteria were:

- **Criterion 1:** The relevant NSW Government agencies have implemented plan provisions relating to flood work approvals and the relevant zones and/or floodway network, including assessment, granting or refusal, conditioning and enforcement.
- **Criterion 2:** The relevant NSW Government agencies have implemented plan provisions in relation to required actions.
- **Criterion 3:** The relevant NSW Government agencies have implemented plan provisions in relation to performance indicators.
- **Criterion 4:** The relevant NSW Government agencies have implemented plan provisions in relation to flood monitoring (as relevant to each plan).
- **Criterion 5:** The relevant NSW Government agencies have implemented plan provisions in relation to environmental monitoring (as relevant to each plan).
- **Criterion 6:** The relevant NSW Government agencies have implemented plan provisions in relation to plan review (as relevant to each plan).

These criteria were selected for audit as they are:

- governed by requirements under the Act (for example, flood works approval assessments and plan review), or
- not explicitly governed by requirements under the Act but important for determining if FMP implementation supports, or is in accordance with, the Act requirements (for example, monitoring and performance indicator assessment information can be used to inform legislated FMP reviews).

The audit focussed on current implementation practices to determine recommendations but also considered:

- evidence from the full audit period, which is defined as being from the FMPs commencement under the Act (September 2015) to the date of receipt of agency comments on the draft report (August 2020)
- some evidence from the period when the FMPs were developed (2005 to 2012), such as for agency and statutory arrangements
- some requirements relating to actions pre-2015 that impact on current performance, such as required modifications to existing structures.

2.5 Audit procedures

Audit procedures included:

- document review, including overarching frameworks, procedures, guidelines, manuals, policies and reports
- interviews with process owners, implementors and users including:
 - auditee NSW Government agencies – DPIE-Water, NRAR and WaterNSW
 - other agencies with a historical or current role in aspects of floodplains, but without responsibility for FMP implementation – Department of Planning, Industry and Environment – Environment, Energy and Science (DPIE-EES) and the State Emergency Service (SES)
- walk throughs of material activities, including key systems and processes with system implementors, owners and users
- sampling of data.

These procedures were carried out on a test basis to provide sufficient appropriate evidence to provide a limited assurance conclusion.

2.6 Limitations

This audit was a limited assurance engagement. The procedures performed in a limited assurance engagement vary in nature and timing and are of lesser extent than for a reasonable assurance engagement. As such, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained through a reasonable assurance engagement.

Further, the audit cannot be relied on to comprehensively identify all weaknesses, improvements or areas of non-compliance. Inherent limitations mean that there is an unavoidable risk that some material matters may not be detected, despite the audit being properly planned and executed in accordance with the standards outlined in **Section 2.3**.

2.7 Exclusions

The audit has not provided an assessment against all provisions or parts in the FMPs. It has not examined or provided an opinion regarding:

- compliance or non-compliance of individuals
- whether the FMPs are being implemented efficiently
- whether stated objectives are being achieved
- whether the FMPs are appropriate
- other legislation that may interact with FMP implementation
- compliance with any legislation unrelated to the Act
- any activity before September 2015, except where there is explicit mention of an activity (specifically, required modifications were considered to determine if there are outstanding requirements).

3 FMP areas

This chapter provides an overview of the FMP areas for each group of FMPs subject to this audit.

3.1 Lachlan FMPs

The designated floodplains in the Lachlan FMPs cover the areas upstream and surrounding the towns of Forbes, Condobolin and Hillston in the Central West region of NSW.⁴ These urban areas are excluded from the designated statutory areas to which the (rural) Lachlan FMPs apply. The areas subject to the Lachlan FMPs are provided in **Appendix A**.

The broader Lachlan catchment, of which the Lachlan FMPs are a proportion, has significant water-dependent and flood-dependent ecological values, including:⁵

- 471,011 hectares of wetlands in the lower floodplain
- native fish species including the Australian smelt (*Retropinna semoni*), freshwater catfish (*Tandanus tandanus*), silver perch (*Bidyanus bidyanus*), golden perch (*Macquaria ambigua*), big-headed gudgeon (*Philypnodon grandiceps*) and western carp gudgeon (*Hypseleotris klunzingeri*)
- habitat for threatened species, such as Sloane's froglet (*Crinia sloanei*), Australian painted snipe (*Rostratula australis*), osprey (*Pandion cristatus*), blue-billed duck (*Oxyura australis*) and the fishing bat (*Myotis macropus*)
- areas of river red gum forest and woodland, black box woodland and lignum
- nine wetlands with values for water bird and migratory bird habitat, listed in the *Directory of Important Wetlands in Australia*.⁶ These include the Booligal Wetlands, Murrumbidgee Swamp/Lake Merrimajeel, Cuba Dam, Merrowie Creek, Great Cumbung Swamp, Lachlan Swamp, Lake Brewster, Lower Mirrool Creek Floodplain, and Lake Cowal/Wilbertroy wetlands.⁷

The Lachlan FMP areas broadly overlap with lands of the Nari Nari, Ngiyampaa, Wiradjuri and Yita Yita Traditional Owners.⁸ The Lachlan FMP areas contain areas of spiritual, cultural and economic importance to the people of these nations, including significant flood-dependent species, wetlands and water courses.⁹ The Lachlan FMPs acknowledge important cultural values but do not provide specific information on flood-dependent cultural values.

Agriculture has been the predominant industry in the catchment since the early 1900s. Currently, land is primarily used for livestock grazing and dryland cropping. Irrigated crops

⁴ Australian Bureau of Statistics (2016) *Census*. Available at:

<https://www.abs.gov.au/websitedbs/D3310114.nsf/Home/census>.

⁵ Commonwealth Environmental Water Office (2012) *Lachlan Catchment*. Available at:

<http://www.environment.gov.au/ewater/northern/lachlan/index.html>.

⁶ Department of Agriculture, Water and the Environment (n.d.) *Directory of Important Wetlands in Australia*.

Available at: <https://www.environment.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands>.

⁷ Commonwealth Environmental Water Office (2012) *Lachlan Catchment*. Available at:

<http://www.environment.gov.au/ewater/northern/lachlan/index.html>.

⁸ Horton, D.R. (1996) Aboriginal Studies Press, The Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS), and Auslig/Sinclair, Knight, Merz (2020) *AIATSIS map of Indigenous Australia*. Available at: <https://aiatsis.gov.au/explore/articles/aiatsis-map-indigenous-australia>.

⁹ Lachlan River (Gooloogong to Jemalong Gap) FMP 2011.

cover 1.4 percent of the catchment area but are significant within the Lachlan FMPs areas and are economically important to the region. Irrigated crops include pasture, cereals and oilseeds grown on the alluvial soils of the riverine plain.¹⁰ In 2018-19, the contribution of the Lachlan valley between Cowra and Lake Cargelligo to gross domestic product was \$3 billion, with primary industries just under \$1 billion.¹¹

3.2 Murray FMPs

The designated floodplains in the Murray FMPs cover the areas upstream and surrounding the towns of Deniliquin, Tocumwal and Barham in the Riverina region of NSW.¹² These urban areas are excluded from the designated statutory areas to which the (rural) Murray FMPs apply. The areas subject to the Murray FMPs are provided in **Appendix A**.

The Murray catchment, of which the Murray FMPs are a proportion, contains diverse and rich natural assets:¹³

- The broader region supports a significant estate of river red gum forest, wetlands and floodplains, including the Barmah-Millewa, Gunbower, Koondrook-Perricoota and Weraï forests. These forests provide important habitat for threatened terrestrial animal species and plant species.^{14,15}
- The Murray FMP areas are in the vicinity of the Central Murray Forests Ramsar wetland site, listed in 2003.¹⁶ These wetlands support nationally and internationally significant populations of wetland birds and fish, some of which are listed as threatened globally¹⁷ and in NSW. Key species include the southern myotis (*Myotis macropus*) and Sloane's froglet, which are listed as threatened in NSW. They also support at least eight globally threatened fauna listed by the World Conservation Union (IUCN). The site, together with

¹⁰ DPI-Water (2016) *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources: Background document for amended plan 2016*. Available at: https://www.industry.nsw.gov.au/__data/assets/pdf_file/0009/166851/lachlan_unreg_alluvial_background.pdf.

¹¹ SGS Economics and Planning (2019) *GDP report: Economic Performance of Australia's Cities and Regions*. Available at: <https://www.sgsep.com.au/publications/insights/gdp-report-economic-performance-of-australias-cities-and-regions> (note that Hillston figures are grouped with Griffith and the Murrumbidgee and not disaggregated).

¹² Australian Bureau of Statistics (2016) *Census*. Available at: <https://www.abs.gov.au/websitedbs/D3310114.nsf/Home/census>.

¹³ Department of Agriculture, Water and the Environment (n.d.) *Mid-Murray overview*. Available at: <https://www.environment.gov.au/water/cewo/catchment/mid-murray>.

¹⁴ Natural Resources Commission (2009) *Final assessment report: Riverina Bioregion Regional Forest Assessment. River red gums and woodland forest*. Available at: <http://www.nrc.nsw.gov.au/publications>.

¹⁵ Including the Australasian bittern (*Botaurus poiciloptilus*), superb parrot (*Polytelis swainsonii*), Mueller daisy (*Brachyscome muelleroides*), swamp wallaby grass (*Amphibromus*), silver perch, Murray cod (*Maccullochella peelii*) and trout cod (*Maccullochella macquariensis*).

¹⁶ Harrington, B. and Hale, J. (2011) *Ecological Character Description for the NSW Central Murray Forests Ramsar site*. Report prepared for the Department of Sustainability, Environment, Water, Population and Communities. Available at: <http://www.environment.gov.au/water/wetlands/publications/ecd-nsw-central-murray-forests>.

¹⁷ Including the Australasian bittern, superb parrot, silver perch and flat-headed galaxias (*Galaxias rostrata*), which are listed as 'vulnerable' IUCN Red List; and the regent honeyeater (*Xanthomyza phrygia*), swift parrot (*Lathamus discolor*), Murray hardyhead (*Craterocephalus fluviatilis*) and trout cod, which are listed as 'endangered' on the Red List.

the adjacent Ramsar sites in Victoria (Barmah Forest and Gunbower Forest), regularly supports large numbers of waterbirds.¹⁸

The Murray FMP overlaps with lands of the Perrepa Perrepa, Wamba Wamba, Wadi Wadi, and Yorta Yorta Traditional Owners, with many areas of spiritual, cultural and economic importance to these nations.^{19,20} The Murray FMPs acknowledge important cultural values but do not provide specific information on flood-dependent cultural values.²¹

Intensified farming practices (dryland farming and irrigation) and the development of low-lying areas of the floodplain (including levees, supply channels and other works) has occurred since European settlement in the 1840s. Levee construction increased after floods in 1956 and the early 1970s. Currently, over three-quarters of the Murray catchment is managed by private landowners for primary production.²² In 2019, Murray River Council (the local government area covering most of the FMP areas) had an estimated gross regional product of \$705 million, supporting 4,466 jobs.²³ The region's river red gum forest industry, which is directly dependent on floodwaters, is estimated to be worth \$16 million annually and supports 270 local jobs.²⁴

3.3 Murrumbidgee FMPs

The designated floodplains in the Murrumbidgee FMPs cover the areas upstream and surrounding the towns of Hay for Murrumbidgee River (Hay to Maude) FMP and Jerilderie for Billabong Creek FMP.²⁵ These urban areas are excluded from the designated statutory areas to which the (rural) Murray FMPs apply. The areas subject to the Murrumbidgee FMPs are provided in **Appendix A**.

The Murrumbidgee catchment is home to several important wetlands, including the Fivebough and Tuckerbill swamps and the Lower Murrumbidgee River Floodplain (Lowbidgee), which is immediately downstream of the Murrumbidgee River (Hay to Maude) FMP area. The Lowbidgee covers 200,000 hectares and includes some of the largest lignum wetlands in NSW,

¹⁸ Harrington, B. and Hale, J. (2011) *Ecological Character Description for the NSW Central Murray Forests Ramsar site*. Report prepared for the Department of Sustainability, Environment, Water, Population and Communities. Available at: <http://www.environment.gov.au/water/wetlands/publications/e cd-nsw-central-murray-forests>.

¹⁹ Edward and Wakool Rivers Stage 1 (Deniliquin to Moama-Moulamein Railway) FMP 2011, pp. 3-4.

²⁰ Horton, D.R. (1996) Aboriginal Studies Press, The Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS), and Auslig/Sinclair, Knight, Merz. (2020) *AIATSIS map of Indigenous Australia*. Available at: <https://aiatsis.gov.au/explore/articles/aiatsis-map-indigenous-australia>.

²¹ Yarkuwa Indigenous Knowledge Centre (n.d.) *Werai Indigenous Protected Area*. Available at: <http://www.yarkuwa.org.au/werai-ipa.html>.

²² DPI-Water (2012) *Water Sharing Plan for the Murray Unregulated and Alluvia Water Sources: Background document for amended plan 2012*. Available at: http://www.water.nsw.gov.au/__data/assets/pdf_file/0011/549065/wsp_murray_unregulated_alluvial_ba ckground.pdf.

²³ Remplan (2019) *Economy profile – Murray River Council*. Available at: <https://app.remplan.com.au/murrayriver/economy/industries/gross-regional-product>.

²⁴ DPI (2017) *NSW Forestry Industry Roadmap – What does it mean for the Red Gum forestry industry?* Available at: https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/711860/redgum-forestry-roadmap.pdf.

²⁵ Australian Bureau of Statistics (2016) *Census*. Available at: <https://www.abs.gov.au/websitedbs/D3310114.nsf/Home/census>.

as well as the second largest red gum forest in Australia. It supports a range of wetland-dependant species, including several threatened species.^{26,27}

The Murrumbidgee FMPs include lands of the Wiradjuri, Nari-Nari, Mudi-Mudi, Gurendji and Yida-Yida Traditional Owners.^{28,29} There are many areas of spiritual, cultural and economic importance to the people of these nations. These communities have traditionally and continue to use water for cultural, spiritual, environmental, social and economic practices.³⁰ The Murrumbidgee FMPs acknowledge these important cultural values but do not provide specific information on flood-dependant cultural values.

The Lowbidgee includes the approximately 80,000-hectare Gayini (Nimmie-Caira) Project area, which is owned and managed by the Nari-Nari Tribal Council. The project aims to protect and conserve wildlife, develop sustainable agriculture and protect significant cultural heritage.³¹

Pastoral runs were established in the Murrumbidgee catchment area by European graziers in the 1820s, followed by grains crops. The Murrumbidgee Irrigation Area was established in 1912 and followed by the production of a wide range of horticultural crops such as rice in the 1920s. CSIRO reports that 53 percent of available surface water (including transfers from the Snowy Mountains Hydro-electric Scheme) is extracted for use and groundwater extraction is 17 percent of available resources.³² The Riverina area, including Hay and Jerilderie, has a gross regional product estimated at \$12.5 billion dollars, which represents 0.7 percent of Australia's gross domestic product.³³

²⁶ Department of Agriculture, Water and the Environment (2019) *Murrumbidgee catchment*. Available at: <http://www.environment.gov.au/water/cewo/catchment/murrumbidgee>.

²⁷ Including the Australian painted snipe, which is listed as endangered nationally (under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*) and in NSW (under the *Biodiversity Conservation Act 2016*); the Mossgiel daisy (*Brachyscome papillosa*), which is listed as vulnerable nationally and in NSW; The southern bell frog (*Litoria raniformis*), which is listed as endangered in NSW and vulnerable nationally; and the Australasian bittern, which is listed as endangered nationally and in NSW (see DPIE (n.d.) *Threatened biodiversity profile search*. Available at: <https://www.environment.nsw.gov.au/threatenedspeciesapp/>).

²⁸ Murrumbidgee River (Hay to Maude) FMP 2014, DPIE (2016) *Riverina- regional history*. Available at: <https://www.environment.nsw.gov.au/bioregions/Riverina-RegionalHistory.htm>. Horton, D.R. (1996) Aboriginal Studies Press, The Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS), and Auslig/Sinclair, Knight, Merz. (2020) AIATSIS map of Indigenous Australia. Available at: <https://aiatsis.gov.au/explore/articles/aiatsis-map-indigenous-australia>.

³⁰ DPIE (2019) *Culturally Appropriate First Nations Consultation – Wiradjuri Nation – Volume 3 of 3: Murrumbidgee River Valley (and Murray River)*. Available at: <https://www.mdba.gov.au/sites/default/files/pubs/nsw-great-artesian-basin-shallow-wrp-sch~ltation-wiradjuri-nation-volume-3-murrumbidgee-river-valley-murray-river-part-1.pdf>.

³¹ The Nature Conservancy (2020) *Exploring Gayini- Nari Nari Country*. Available at: <https://www.natureaustralia.org.au/what-we-do/our-priorities/land-and-freshwater/land-freshwater-stories/gayini///>.

³² Murray Darling Basin Authority (2020) *Murrumbidgee Catchment*. Available at: <https://www.mdba.gov.au/discover-basin/catchments/murrumbidgee>.

³³ Remplan (2019) *Riverina economic profile*. Available at: <https://app.remplan.com.au/rdariverina/economy/industries/gross-regional-product>.

4 FMP audit context

The FMPs were originally made under the *Water Act 1912* but were adopted as Minister's Plans under the Act in September 2015.³⁴

4.1 Purpose of FMPs under the Act

FMPs, like all water management plans, are subject to the objects, water management principles, requirements and general provisions in the Act.³⁵

The following specific principles related to floodplain management are stated in Section 5(6) of the Act:

- (a) *floodplain management must avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, acidity, waterlogging, decline of native vegetation or, where appropriate, salinity and, where possible, land must be rehabilitated, and*
- (b) *the impacts of flood works on other water users should be avoided or minimised, and*
- (c) *the existing and future risk to human life and property arising from occupation of floodplains must be minimised.*

Core provisions for FMPs are stated in Section 29 of the Act. Specifically, they must deal with:³⁶

- (a) *identification of the existing and natural flooding regimes in the area, in terms of the frequency, duration, nature and extent of flooding*
- (b) *the identification of the ecological benefits of flooding in the area, with particular regard to wetlands and other floodplain ecosystems and groundwater recharge*
- (c) *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 ecological impacts, including cumulative impacts*
- (d) *the risk to life and property from the effects of flooding.*

Technical guidance material outlines an approach to develop new FMPs under the Act and has been applied for FMPs in the northern NSW Murray-Darling Basin.³⁷ The resulting FMPs for the northern NSW Murray-Darling Basin are significantly different to the FMPs in this audit. The implications of this are considered in **Section 11**.

³⁴ The FMPs commenced under the Act on 21 September 2015. Section 166A of the *Water Act 1912* was repealed, and Clause 13(1) of Schedule 9 to the Act commenced on 21 September 2015 (see Commencement Proclamation under the Act dated 16 September 2015).

³⁵ Objects, water management principles, requirements and general provisions for all water management plans are stated in Section 3, Section 5, Section 16 and Section 17 of the Act, respectively.

³⁶ Section 30 of the Act states additional provisions for FMPs, identifying several matters the FMPs may deal with.

³⁷ Department of Industry (2014) *Rural floodplain management plans: Technical manual for plans developed under the Water Management Act 2000*. Available at: http://www.water.nsw.gov.au/__data/assets/pdf_file/0011/548606/floodplain_management_plans_draft_technical_manual.pdf.

4.2 Challenges to implementing the FMPs

The age of the FMPs, their structure and language, as well as changes in legislation and policy focus have created challenges for their implementation. These are outlined in the following sections.

4.2.1 The FMPs were developed under the *Water Act 1912*

The FMPs were adopted from 21 September 2015 as 'Minister's Plans' under the Act³⁸ but were developed under the *Water Act 1912*. This has added complexity in their interpretation and implementation.

The *Water Management (General) Regulations 2018* (the Regulations) provide specific mechanisms to implement the FMPs as 'converted' FMPs under the Act.³⁹ For example, they provide for the categories of 'complying works' and 'non-complying works',⁴⁰ which are not used in more recent FMPs developed under the Act.⁴¹ The FMPs refer to the Act but are written in terms of the provisions of the *Water Act 1912*.

4.2.2 The FMPs contain ambiguous directions

In addition to the legislative complexity described in the previous section, the FMPs are written in the style of advisory natural resource management plans, rather than as statutory instruments. They contain provisions that use a mix of regulatory and guidance language. For example, verbs used include terms that suggest mandatory requirements ('must', 'shall', 'require'), while others suggest more discretionary advice ('should', 'may', 'recommended', 'encouraged', 'proposed').

The appropriateness of the FMPs and their language and construction is beyond the scope of this audit.

4.2.3 Legislation in relation to compliance has changed

The FMPs focus on encouraging compliance. However, since the plans were written, there has been increasing community and government expectations for robust enforcement, which has been reflected in more recent water reforms.⁴² Once adopted as FMPs under the Act (and with concurrent commencement of flood work approval provisions under the Act), the offences under the Act apply to the construction and operation of flood works, and the obligations in the FMPs, including for compliance, are understood to fall on the agencies in accordance with their roles as set out in **Table 3**.

³⁸ The Commencement Proclamation No 92 under the *Water Management Act 2000* repeals Part 8 of the *Water Act 1912* and commences Part 3 of the Act.

³⁹ Clause 3 of the Regulations outlines that: 'converted floodplain management plan means a floodplain management plan adopted under section 166A of the former 1912 Act that, by operation of clause 13 of Schedule 9 to the Act, is taken to be a Minister's plan made under the Act in relation to floodplain management'.

⁴⁰ Clause 26 of the Regulations.

⁴¹ For example, NSW Government (2016) *Floodplain Management Plan for the Gwydir Valley Floodplain 2016*. Available at: <https://www.legislation.nsw.gov.au/#/view/regulation/2016/509/full>.

⁴² NSW Government (2017) *Securing Our Water: NSW Government Water Reform Action Plan*. Available at: <https://www.industry.nsw.gov.au/water-reform>; NRAR (2019) *Floodplain Management: Our Compliance Approach to Flood Works*. Available at: https://www.industry.nsw.gov.au/__data/assets/pdf_file/0003/273621/PUB19-445-Factsheet-Regulatory-Response-to-Floodplain-Management-16-Aug-19.pdf.

4.2.4 NSW water reforms and compliance has focussed on the northern Murray-Darling Basin

NSW Government agencies with a role in water management implementation are currently undertaking policy reforms, prioritising the implementation of the Murray-Darling Basin Plan, Water Resource Plans and Long-term Environmental Watering Plans. Work on floodplain management plan development has focussed on plans in the northern Murray-Darling Basin in combination with development of a floodplain harvesting regime. This has contributed to the FMPs subject to this audit having fewer resources assigned for implementation.

In relation to compliance and enforcement, the *Natural Resources Access Regulator Act 2017* specifically provides that NRAR's priorities are to be set independently. These regulatory priorities are reviewed on a regular basis and published.⁴³ Interviews with NRAR reinforced that the northern Murray-Darling Basin has been a regulatory priority in accordance with NRAR's risk assessments and therefore is the focus of proactive compliance activities. Given the southern floodplains are not currently a regulatory priority, NRAR monitors and inspects reactively in response to reports of alleged breaches of water laws, incidents or other intelligence received. NRAR also receives reports of suspicious water activities from members of the public and other regulators such as councils. No documented risk assessment was provided to the Commission as part of this audit. The Commission is not seeking to comment on the appropriateness of decisions regarding NRAR's compliance priorities.

4.2.5 Roles and responsibilities have changed over time

There has been a complex history of changes in government agencies in water management and regulation, and their roles and governance. The FMPs refer to agencies and, in some cases, non-government regulated entities that no longer exist.

An investigation by the NSW Ombudsman into water compliance and enforcement reported that the high level of restructuring and moving of water administration functions and regulation between different government agencies has resulted in significant impacts on staff, loss of expertise and corporate knowledge, and disruptions to systems, strategy and continuity of service delivery.⁴⁴

The roles and functions for agencies at the time of this audit are as set out in **Table 3**. Roles and responsibilities changed several times between 2005 and 2020, when the FMPs were developed and have been in force. Public information is available on roles for FMP administration in a range of documents. However, some of these are outdated, while others do not provide definition of roles to a level of detail for implementation.⁴⁵

⁴³ NRAR (2019) *Natural Resource Access Regulator Regulatory Priorities 2019 – 2021*. Available at: https://www.industry.nsw.gov.au/__data/assets/pdf_file/0020/227324/NRARs-regulatory-priorities-2019-to-2021.pdf.

⁴⁴ NSW Ombudsman (2017) *Investigation into water compliance and enforcement 2007-17*. Available at: https://www.ombo.nsw.gov.au/__data/assets/pdf_file/0012/50133/Investigation-into-water-compliance-and-enforcement-2007-17.pdf.

⁴⁵ Department of Primary Industries - NSW Office of Water (2014) *Floodplain management under the Water Management Act 2000: A guide to the changes*. Available at: https://www.industry.nsw.gov.au/__data/assets/pdf_file/0017/143153/floodplain-management-under-the-WMA-2000-a-guide-to-changes.pdf; Water NSW (2017) *WaterNSW Operating Licence 2017-2022*. Available at: https://www.waternsw.com.au/__data/assets/pdf_file/0004/126607/WaterNSW-Operating-Licence-2017-22.pdf; *Natural Resources Access Regulator Act 2017*; NRAR (2019) *Floodplain management, Our*

Table 3 outlines roles and responsibilities from 2015 onwards. Some parts of the FMPs (including required modifications and monitoring of performance indicators and floods) appeared to have less clearly defined agency responsibilities. For this audit, DPIE-Water is assumed to be responsible, except where other agencies are documented as being responsible (for example through the Water NSW Operating Licence and the *Natural Resources Access Regulator Act 2017*).

Prior to 2015 there were numerous agencies responsible for implementing various aspects of the floodplain management plans. These included the Department of Primary Industries (DPI) – NSW Office of Water (NOW),^{46,47} Department of Environment, Climate Change and Water (DECCW),⁴⁸ Department of Environment, Climate Change (DECC), Department of Natural Resources (DNR) as well as the Office of Environment and Heritage (OEH).

4.2.6 Challenges in resourcing ongoing FMP implementation, including required technical expertise

Interviews and internal documents provided by DPIE-Water and DPIE-EES suggested that roles for development of FMPs and technical work to support development of FMPs were largely externally funded on a temporary basis. DPIE-EES has been providing technical support to DPIE-Water for the development of FMPs in the northern Murray Darling Basin under the Healthy Floodplains Project. The funding for this project will cease in June 2021. DPIE-EES' role in supporting FMP development for the northern NSW Murray Darling Basin FMPs will be unfunded beyond this point.

The technical expertise within DPIE-EES currently supporting the Healthy Floodplains Project is not currently used to support the business as usual function of implementing FMPs in the southern NSW Murray Darling Basin, including support to approvals officers. Upon completion of the Healthy Floodplains Project there are no current plans to reallocate this technical expertise to support implementation. This loss of technical expertise would be significant. DPIE-Water is currently responsible for the preparation, consultation and development of FMPs, as well as FMP review and performance indicators.

Chapter 11 provides further details on constrained technical expertise, specifically in relation to hydraulic, environmental expertise to support FMP approvals assessment and enforcement.

compliance approach to flood works. Available at:

https://www.industry.nsw.gov.au/__data/assets/pdf_file/0003/273621/PUB19-445-Factsheet-Regulatory-Response-to-Floodplain-Management-16-Aug-19.pdf.

⁴⁶ *Public Sector Employment and Management (Departments) Order 2011* under the *Public Sector Employment and Management Act 2002*; transferred to Department of Primary Industries '... Office of Water'.

⁴⁷ NSW Ombudsman (2017) *Investigation into water compliance and enforcement 2007-17*. Available at: https://www.ombo.nsw.gov.au/__data/assets/pdf_file/0012/50133/Investigation-into-water-compliance-and-enforcement-2007-17.pdf.

⁴⁸ *Public Sector Employment and Management (General) Order 2007* under the *Public Sector Employment and Management Act 2002*; transferred to DECCW '... staff involved in ... floodplain management and policy (including the administration of the ... Floodplain Management Programs'. Staff principally involved in administration of the *Water Act 1912* and the Act were transferred to a different agency.

Table 3: Summary of NSW Government agency roles for FMP implementation

FMP function and associated audit criterion	Responsible agency 1 July 2020 ⁴⁹	Responsible agency 2015-2019	Responsible agency 2005-2015
Assessment, granting or refusal, and application of conditions for flood work approvals (Criterion 1)	WaterNSW ^{50,51}	DPI-Water (Jan 2015 to July 2016)	
	NRAR (for public authorities and State significant development) ⁵²	WaterNSW (from July 2016)	DPI-Water, ⁵³ previously NOW, ⁵⁴ DECCW ⁵⁵ , DECC, DNR
		NRAR (for public authorities and State significant development) from April 2018	
Compliance and enforcement of flood work approvals (Criterion 1)	NRAR ⁵⁶	DPI-Water (Jan 2015 to July 2016)	
		WaterNSW (July 2016 to April 2018)	DPI-Water, previously NOW, DECCW, DECC, DNR
		NRAR (from April 2018)	
Required modifications to flood works (Criterion 2)	DPIE-Water	DPI-Water (Jan 2015-2017)	
		Department of Industry (DoI) – Lands and Water (2017-2018)	DPI-Water, previously NOW, DECCW, DECC, DNR
Performance indicators (Criterion 3)	DPIE-Water	DoI-Water (2018-2019)	
		DPI-Water (Jan 2015-2017)	
		DoI-Lands and Water (2017-2018)	DPI-Water, previously NOW, DECCW, DECC, DNR
Flood monitoring (Criterion 4)	DPIE-Water	DoI-Water (2018-2019)	
		DoI-Water and predecessor agencies (role shared with OEH and other agencies)	OEH, previously DECCW, DECC, DNR
Environmental monitoring (Criterion 5)	DPIE-Water	DoI-Water and predecessor agencies (role shared with OEH and other agencies)	OEH, previously DECCW, DECC, DNR
FMP review (Criterion 6)	DPIE-Water	DPI-Water (Jan 2015-2017)	
		DoI-Lands and Water (2017-2018)	NOW, previously DECCW, DECC, DNR
		DoI-Water (2018-2019)	

⁴⁹ DPIE-Water is assumed to be responsible, except where other agencies are identified to be responsible (through the WaterNSW Operating Licence and the *Natural Resources Access Regulator Act 2017*). DPIE-Water officers confirmed these identified responsibilities and its role under the Act.

⁵⁰ WaterNSW Operating Licence Schedule A, Section A.2, Table A6 and A7. (WaterNSW administers all approvals or approval applications, excluding a list of exceptions, which are those held or submitted by: a major utility; a water supply authority; a council or county council; an irrigation corporation; the Commonwealth; another Australian jurisdiction; a NSW Government agency; a public school or public hospital; an authority that supplies water in another Australian jurisdiction; corporations owned by another Australian jurisdiction; or a NSW State owned corporation, or certain licences or licence applications, which includes those which relate to floodplain harvesting.

⁵¹ Deed of Business Transfer 2016 between DoI – Skills and Regional Development and WaterNSW, Schedule 1: WaterNSW and DPI-Water: Roles and Responsibilities; Approval management (p. 35).

⁵² NRAR (n.d.) *Licensing and approvals*. Available at: <https://www.industry.nsw.gov.au/natural-resources-access-regulator/licensing-and-approvals/licensing-and-approvals> states that NRAR is responsible for granting approvals to government agencies, including other NSW Government agencies, local councils and the Commonwealth; state owned corporations; major water utilities, water supply authorities, and local water utilities; licensed network operators under the *Water Industry Competition Act 2006*; mining companies; irrigation corporations; Aboriginal communities and businesses; floodplain harvesting; major developments (State significant developments and State significant infrastructure); schools and hospitals; and that WaterNSW is responsible for granting approvals to rural; landholders; rural industries and developments which are not State significant development or State significant infrastructure.

⁵³ *Public Sector Employment and Management (Departments) Order 2011* under the *Public Sector Employment and Management Act 2002*; transferred to DPI ‘... Office of Water’.

⁵⁴ NSW Ombudsman (2017) *Investigation into water compliance and enforcement 2007-17*. Available at: https://www.ombo.nsw.gov.au/__data/assets/pdf_file/0012/50133/Investigation-into-water-compliance-and-enforcement-2007-17.pdf.

⁵⁵ *Public Sector Employment and Management (General) Order 2007* under the *Public Sector Employment and Management Act 2002*; transferred to DECCW ‘... staff involved in ... floodplain management and policy (including the administration of the ...Floodplain Management Programs’ . Staff principally involved in administration of the *Water Act 1912* and the Act were transferred to a different agency.

⁵⁶ *Natural Resources Access Regulator Act 2017*.

5 Criterion 1 – Flood work approvals and enforcement

Criterion 1: The relevant NSW Government agencies have implemented plan provisions relating to Floodplain Works Approvals and the relevant zones and/or floodway network, including assessment, granting or refusal, conditioning and enforcement.

In relation to this criterion:

- all flood works require an approval
- applications for new and existing flood works must be determined in accordance with the relevant FMP and the Act
- approvals must be enforced in accordance with the Act.

The FMPs require their rules for approvals to be given effect via the consideration and determination of approvals applications and the imposition of conditions on approvals, all given effect through sections in the Act (mainly Chapter 3, Part 3 of the Act).⁵⁷

The Commission considers ongoing compliance and enforcement of approvals and their conditions to be an important part of giving effect to the provisions of the FMPs. The Act includes enforcement provisions and specific offences:

- constructing or using a flood work without an approval (Sections 91D) or in contravention of an approval (Section 91G)
- stop work orders and directions (Chapter 7).

The Act and Regulations have several requirements relating to flood work approvals. Key requirements examined include requirements for the assessing agencies to:

- notify applicants of a decision (sections 98 and 95(5) of the Act)
- circumstances for advertising applications (Clause 26(1) of the Regulations)
- endeavour to resolve issues raised by an objector (sections 95(5) and 95(6) of the Act)
- include discretionary conditions (sections 100(1)(a) and 100(1)(b) of the Act)⁵⁸
 - in general, the FMPs include an additional requirement that the general terms of approval should be comprehensive enough to cover all the constraints that may be applied to the approval⁵⁹
- if required by the Ministers, assess applications that include an assessment of the impacts of the proposed work (Clause 25 (1)(b) of the Regulations)
 - in general, the FMPs include additional requirements regarding what should be considered as part of these impact assessments and provide to varying degrees hydraulic, environmental and cultural requirements:
 - hydraulic criteria and considerations refer to requirements set out in Section 166C of the *Water Act 1912*, but also include to varying degrees FMP specific criteria such as afflux, velocities and flow distribution.

⁵⁷ NSW Government (2015) *Water Management (Application of Act to Flood Work Approvals) Proclamation 2015*. Available at: <https://www.legislation.nsw.gov.au/regulations/2015-558.pdf>.

⁵⁸ Note there are no provisions for mandatory conditions as part of these FMPs.

⁵⁹ This is true for all FMPs for which an application was received in the audit period.

- environmental criteria and consideration refer to Part 5 of the *Environmental Planning and Assessment Act 1979*, but also include FMP-specific considerations to varying degrees, including fish passage, connectivity to important ecosystems, impacts to flora and fauna (including threatened species), impacts to soil condition and structure, and consideration of cumulative impacts.
- cultural criteria and considerations refer to Part 5 of the *Environmental Planning and Assessment Act 1979*, but also include FMP-specific cultural considerations to varying degrees, including not destroying cultural sites and not blocking or restricting flows to scarred and carved trees that rely on flooding regimes.

The Act recognises the specific provisions in the FMPs through Section 95(3), which states that an approval may not be granted in contravention of the provisions of any relevant management plan.

5.1 Key findings

5.1.1 The assessment of approvals was in accordance with requirements

Approvals assessment, granting or refusal and application of conditions were carried out in line with requirements. However, some improvements could be made regarding how the hydraulic, environment and cultural impact assessments are carried out. (Finding F 1.1)

There were six applications for flood work approvals received and assessed by WaterNSW across the FMPs in the audit period:⁶⁰

- one within the Lachlan River (Hillston, Lake Brewster to Whealbah) FMP 2005 area
- three within the Billabong Creek (Walbundrie to Jerilderie) FMP 2006 area
- one within the Stage 3 Edward & Niemur (Moama-Moulemein Railway to Liewah and Mallan) FMP 2011 area
- one within the Stage 1 Edward and Wakool Rivers (Deniliquin to Moama-Moulamein Railway) FMP area.

No applications were received by NRAR during the audit period.

A number of aspects of the approvals assessments were examined against key requirements for the six approvals received. The Commission found the following:

- Approval holders were notified of the decision regarding the approval in accordance with requirements for all six applications.
- For the two applications concerning works identified as non-complying, advertising was carried out as required.
- Of the two advertised applications, one application received an objection. Consultation occurred between the applicant and the objector as required.
- Discretionary conditions were applied to all six approvals in accordance with requirements.

⁶⁰ Application and assessment documentation relevant to the audit period, provided by WaterNSW.

- There was evidence of recommendations made by assessing officers being approved by delegated determining officers as required by WaterNSW's internal procedures. This provided a point of quality assurance prior to an approval being granted to the applicant.
- All applications were accompanied with an impact assessment, and the assessment included consideration of the impacts of the work in accordance with requirements. However, the degree to which the applications fully assessed the hydraulic, environmental and cultural impacts varied for each application:
 - Each application included evidence of some form of hydraulic impact assessment where a hydraulic impact assessment was required. Inconsistencies were observed in the way hydraulic assessments were undertaken in relation to hydraulic modelling and the level of quantification of impacts documented to support engineering judgements.
 - Each application included evidence of some form of environmental impact assessment where an environmental assessment was required. Inconsistencies were observed in the way environmental assessments were undertaken in relation to the level of assessment undertaken in relation to threatened species and flood dependent ecosystems. Cumulative impacts of the proposed work in the context of other pre-existing structures were not assessed in any application assessment.
 - Each application showed some evidence of cultural assessment including a search using the Aboriginal Heritage Information Management System (AHIMS) and notification of Native Title Services. This assessment was carried out in accordance with procedures and is in line with legislation, although AHIMS is not comprehensive and Native Title Services does not cover every Aboriginal group. Improved FMPs (following FMP review) identify cultural values and assets for each plan area would assist in the assessment of potential impacts and management actions (see Chapter 10).

Evidence regarding how existing approvals were converted was not provided by WaterNSW.⁶¹ WaterNSW staff indicated that this was because the Water Licencing System is unable to report by FMP area. The Commission is therefore unable to comment on the status of pre-existing approvals under the Act. However, internal documents outlining the process followed was provided, which indicated that a controlled work approval was instantly and automatically converted to a flood work approval and any applications underway were assessed under the *Water Act 1912* in accordance with the Schedule 10 of the Act.

Chapter 11 discusses the opportunities for improving the way FMP provisions are being implemented.

5.1.2 Reactive compliance and enforcement occurred and is ongoing

A reactive compliance and enforcement regime was in place during the audit period and is ongoing (Finding F 1.2).

In interviews, NRAR outlined the following approaches to identify breaches in FMP works:

- proactive compliance, which includes monitoring, audit and remote sensing

⁶¹ This refers to approvals in existence prior to FMP adoption under the Act (21 September 2015) and their conversion under Schedule 10(20).

- reactive compliance, which includes following up reports from third parties made by phone, email or online forms.⁶²

Interviews with NRAR staff suggested that, prior to the establishment of NRAR, a large amount of proactive compliance was undertaken around 2010 to 2012 in FMP areas. However, this was not evidenced by documents provided for this audit. The report extracted from the Compliance Investigation Reporting and Management system (CIRaM) dating back to 2010 provides eight pre-2015 compliance cases.

In interviews, NRAR staff suggested that, since April 2018, NRAR has not undertaken proactive compliance monitoring of flood works in the FMPs to provide an indication of the proportion of flood works without an approval. Its proactive monitoring efforts have been prioritised for the northern Murray-Darling Basin (**Section 4.2.4**). However, NRAR has processes in place to react to compliance allegations, including some guidance for floodplain related offences. Internal documents provided by NRAR set out the approved processes, procedures, authorities, instruction and guidance for investigating alleged breaches of water regulations for NRAR investigations staff. It is not clear what procedures were followed by agencies responsible for compliance before NRAR was established in April 2018.

A CIRaM extract was provided by NRAR covering the period between 2010 and the present. The extract provided 125 compliance cases based on water sharing plan areas (56 in Lachlan plan areas, 48 in Murrumbidgee plan areas and 21 in Murray plan areas). CIRaM is unable to report by FMP area (see **Section 1.2**) but manual analysis identified 39 of these as occurring in the gazetted FMP areas and relevant to flood works (16 in the Lachlan FMPs, 14 in the Murrumbidgee FMPs and nine in the Murray FMPs).

The Commission undertook a high-level assessment of the action recorded against the 39 compliance cases confirmed as relevant to flood works and in the FMP areas. Of these, 34 were categorised as being finalised and the Commission considered that approximately 60 percent of these were resolved with a clear outcome, either having no compliance issue or a clearly documented action taken. For the remainder, it was unclear if or how the matter was resolved.

The five cases not finalised have occurred since the commencement of NRAR in 2018.

The quantity of unauthorised works offences⁶³ in the flood networks of the southern NSW FMPs is currently unknown by the audited agencies. No agency was able to provide evidence of the proportion of structures in these FMPs for which approvals are held. Interviews with NRAR and WaterNSW indicated that no proactive monitoring of works that are authorised but non-compliant with conditions or that are unauthorised has been undertaken. The Commission recognises NRAR's independent risk-based approach (see **Section 4.2.4**).

The lack of flood works applications since FMP commencement could mean that either there were no new flood works constructed or flood works were constructed without an approval. Similarly, in relation to existing flood works, the lack of applications since FMP commencement could mean that either there are no existing flood works without an approval or there are existing flood works without an approval. There is insufficient evidence to determine which scenario has occurred.

⁶² DPIE (n.d.) *Report suspicious activity*. Available at: <https://www.industry.nsw.gov.au/natural-resources-access-regulator/report-suspicious-water-activities/report-suspicious-activity>.

⁶³ Under the Act, Offence 91D (1) is 'constructing or using flood work without a flood work approval', and Offence 91D (2) is 'constructing or using flood work otherwise than as authorised by a flood work approval'.

Using the Digital Earth Australia maps resources, a rapid, preliminary review of the FMP areas for new works potentially built since 21 September 2015 was undertaken.⁶⁴ The rapid review suggests there may be at least one instance of unauthorised works in the following FMP areas:

- Lachlan River (Jemalong Gap to Condobolin) FMP
- Lachlan River Hillston (Lake Brewster to Whealbah) FMP
- Edward and Wakool Rivers Stage 1 (Deniliquin to Moama- Moulamein Railway) FMP 2011
- Murrumbidgee (Hay to Maude) FMP 2014.⁶⁵

Visual comparison of satellite images from 2015 and 2019 and annual water observations from 2018 identified areas where new irrigation areas and storages may have been developed. The works detected did not appear to align with applications made since September 2015 (as provided by WaterNSW). Further investigation would be required to confirm if any above ground works have been constructed and if they may be associated with applications and approvals granted before September 2015.

There are also other information sources potentially indicating unapproved works, for example:

- An internal 2010 flood report for the Lachlan River (Gooloogong to Jemalong Gap) 2011 indicated there were several potentially unauthorised flood works restricting floodwaters to be investigated. Some flood monitoring metadata was provided for the Lachlan Valley, but this did not provide an assessment of works.
- The required modifications in FMPs (see Criterion 2, **Chapter 6**) also identify potential unauthorised flood works or blockages to be investigated.
- Interviews with WaterNSW staff suggested that several structures may have been erected just prior to a flood event and then removed thereafter. It was suggested that, in some cases, the risk of compliance action for erecting a structure to protect an individual property during a flood is less than the benefit achieved by protecting a property. No evidence was obtained to confirm or deny this assertion during the audit.

Chapter 11 discusses the opportunities for improving the way FMP provisions are being implemented.

5.2 The importance of implementation of flood work approvals and enforcement

Flood work approvals are the key mechanism by which FMPs are given effect.⁶⁶ Implementing provisions of the FMP and the Act relating to the assessment, granting, application of conditions and enforcement of approvals reduce the likelihood of unauthorised or non-compliant flood works, and uncoordinated floodplain development without appropriate controls.

⁶⁴ Geoscience Australia (n.d.) *Digital earth Australia*. Available at: <http://www.ga.gov.au/dea> (accessed June 2020).

⁶⁵ *Ibid.*

⁶⁶ Approvals are enforceable so long as notification to the approval holder has occurred under Schedule 10(20) of the Act or under Section 98 of the Act, given Section 95(5), which states that an approval takes effect on the day on which notice of the decision to grant the approval has been given to the applicant.

A consistent approvals process in terms of the approach to impact assessment supported by detailed guidance and technical expertise is likely to reduce risk associated with adverse changes to flood flow patterns, which may lead to:

- increased flood liability on individual owners and occupiers of flood-prone property
- increased private and public losses of life and property resulting from floods
- reduced diversity and well-being of riverine and floodplain ecosystems that depend on flood inundation.

5.3 Criterion 1 findings and recommendations

Table 4 outlines the audit recommendations, aligned with key findings.

Table 4: Criterion 1 findings and recommendations

Findings	Recommendations
Criterion 1: The relevant NSW Government agencies have implemented plan provisions related to floodplain works approvals (approvals) and the relevant zones and /or floodway network, including assessment, granting or refusal, conditioning and enforcement.	
F 1.1 Approvals assessment, granting or refusal and conditioning were carried out in line with requirements. However, some improvements could be made regarding how the hydraulic, environment and cultural impact assessments are carried out.	No recommendation. See Chapter 11 for suggested actions.
F 1.2 A reactive compliance and enforcement regime was in place during the audit period and is ongoing.	No recommendation. See Chapter 11 for suggested actions.

6 Criterion 2 – Required modifications

Criterion 2: The relevant NSW Government agencies have implemented plan provisions in relation to modifications of existing works (for example required modifications or alternative as relevant).

The FMPs identify required modifications to be investigated or implemented by various assigned parties to address potential hydraulic restrictions to flood flows within the floodway network, including but not limited to the following types of actions at specific sites:

- modifications to existing flood works
- property inspections to assess for blockages to the floodway
- monitoring of works during floods to determine whether modifications are required
- consultation and assessment of flood impacts of likely maintenance or upgrades to highways and railways
- supply of hydraulic and environmental information for a flood work approval extension application.

The FMPs use different terminology for essentially the same provisions. For simplicity, the Commission has used the term ‘required modifications’ as shorthand for these sections. A summary of the number and priority (where applicable) of actions in these FMPs is provided in **Table 5**.

The required modifications provisions are mandatory with the following exceptions:

- Lachlan River Jemalong Gap to Condobolin FMP 2012
- Edward and Wakool Rivers Stage 4 (Noorang Rd to Wakool Murray Junction) FMP 2000 is mandatory but contains a mix of language, including ‘recommendations’
- Billabong Creek FMP 2000 is mandatory but contains a mix of language, including ‘recommendations’.

Table 5: Number and priority of FMP required modifications

FMP	Number and priority of actions ⁶⁷
Lachlan River Gooloogong to Jemalong Gap 2011	33 actions (26 properties) 7 High priority 6 Medium priority 10 Ongoing 10 Not assigned/no action required
Lachlan River Hillston, Lake Brewster to Whealbah 2005	139 actions 16 High priority 36 Medium priority 5 Low priority (no definition provided) 82 Not assigned/no action required
Edward and Wakool Rivers Stage 1 (Deniliquin to Moama-Moulamein Railway) FMP 2011	15 actions 7 High priority 4 Medium priority 2 Further investigation 2 Not assigned/no action required
Wakool River Stage 2 (Moama-Moulamein Railway to Gee Gee Bridge) FMP 2011	24 actions 11 High priority 10 Medium/moderate priority 3 Further investigation
Edward and Niemur Rivers Stage 3 (Moama-Moulamein Railway to Liewah and Mallan) FMP 2011	14 actions 8 High priority 5 Medium priority 1 Further investigation
Tuppall and Bullatale Creeks (Murray River Uptake to Deniliquin) FMP 2004	40 actions 8 High priority 12 Medium priority 1 Further investigation 19 Not assigned/no action required
Murrumbidgee River (Hay to Maude) FMP 2014	24 actions 3 High priority 7 Medium priority 5 Non-controlled works 6 Ongoing 3 Not assigned/dependent on other actions being implemented

⁶⁷ Each FMP defines the priority ranking of actions. Broadly, 'high priority' or 'priority 1' actions are measures considered very important to floodway network performance and should be implemented within 1 to 2 years of FMP adoption. 'Medium priority' or 'priority 2' actions are measures that are important or desirable for hydraulic or environmental objectives and should be implemented within 3 to 5 years of FMP adoption. **Ongoing works** and **further investigation** actions often have not been fully resolved and require more work and may be subject to review pending ongoing monitoring. **Non-controlled works** are measures that apply to roadworks vested in local government or NSW transport agencies that are not controlled works under Part 8 of the *Water Act 1912*. Implementation of the measures is recommended when future upgrades of the specific roads are undertaken.

Billabong Creek FMP 2006	39 actions
	15 Priority 1
	6 Priority 2
	18 On-going

6.1 Key finding

6.1.1 Required modifications have not been implemented

No evidence was provided to demonstrate that provisions related to required modifications to existing works have been implemented during the audit period (Finding F 2.1).

A total of 75 high priority and 86 medium priority actions were identified across the FMPs. The audited agencies did not provide evidence to demonstrate that the FMP provisions related to required modifications to pre-existing structures that may constrain or alter flood flows had been implemented during the audit period.

In interviews, NRAR staff indicated that significant proactive compliance was undertaken between 2010 and 2012 in the FMP areas, including work addressing the required modifications. Eight cases from before 2015 were able to be retrieved from CIRaM but it could not be identified if they related to the required modifications.

An internal report produced by the former OEHL in 2010 following floods in the Billabong Creek also indicated that action had been taken for a small number of the areas/structures (for example, flood control works) in the vicinity of the 39 required modifications in the FMP. The report recommended further investigation for a considerable number of sites, including additional sites not identified in the FMP that appeared to be restricting flows in the floodway network.

In interviews, NRAR staff indicated that a compliance audit of unauthorised works that may be identified as requiring modifications in the FMPs has not been carried out. It was also suggested that local councils, where identified in the FMPs, have not implemented the required modifications.

There was no evidence of systems, policies or procedures available for the audited agencies to oversee the implementation or track the status of the required modifications. The CIRaM system used by NRAR and Water Licensing System used by WaterNSW and NRAR do not include approvals identified as required modifications in FMPs where these apply. Data were not available from the CIRaM system to identify if compliance actions were related to the 2010 flood monitoring report recommendations or identified required modifications.

Required modifications were not considered as part of the approval renewals or extension process. They could not be taken into account as part of the approvals renewal process or the proactive or reactive compliance processes, except by manual reference to the FMPs, which was not regarded as practical for officers. As such, WaterNSW staff interviewed indicated that renewals or extensions have not been checked against the required modifications list.

The Commission recognises that implementation of required modifications is complex and there are a range of actions, measures and issues concerning legacy structures to address. There are operational and maintenance considerations, as well as monitoring and funding arrangements to be established. Further, responsibilities for implementation are assigned to

dual parties in some situations, and organisations have also been renamed and reorganised since the plans were established, such as NOW and the Roads and Traffic Authority. Finally, while some elements are of a compliance nature (NRAR), others concern policy and program issues (DPIE-Water), while others concern the administration of approvals (WaterNSW and NRAR).

This audit has not determined the required costs of an implementation program, but funding requirements are likely to be material. Given the interconnected nature of the flood plain structures, sequencing arrangements would also be a significant consideration, which would also require a significant level of landholder and land manager engagement.

In addition, the lists of required modifications in the FMPs are variable in age and would need to be revisited to determine the relevance and risk in the current landscape, cost and benefits to implementing the required modifications, for example as part of the FMP reviews (**Chapter 10**), and any variations required in the context of the current development in each landscape and contemporary models.

Chapter 11 discusses the challenges and factors that may have contributed to FMP provisions not being implemented.

6.2 Potential impacts of not implementing required modifications

Required modifications are an important mechanism by which the FMP floodway networks are finalised and potential constraints on flood flows are addressed. Potential impacts of not implementing the required modifications include:

- adverse changes to flood flow patterns, which may lead to increased:
 - flood liability on individual owners and occupiers of flood prone property⁶⁸
 - private and public losses of life and property resulting from floods
- reduced diversity and well-being of riverine and floodplain ecosystems that depend on flood inundation (as identified in the FMP and in **Chapter 3**).

The inability to track the status of required modifications also creates uncertainty if floodways identified in the FMP remain constrained by the structures identified as required modifications. This may impact the ability of floodways to convey floodwaters as intended by the FMPs.

⁶⁸ Section 733 of the *Local Government Act 1993* provides exemption from liability councils and others including the Crown, a public service employee and specifically to WaterNSW in connection with the granting of flood work approvals under the Act. These exemptions apply where the organisations and individuals were acting in 'good faith', which is defined by acting substantially in accordance with the principles of a manual relating to management of flood liable land, notified by the Minister for Planning (NSW Government (2005) *NSW Government Gazette No. 51 6 May 2005*. Available at: https://gazette.legislation.nsw.gov.au/so/download.w3p?id=Gaz_Gazette%20Split%202005_2005-51.pdf; NSW Government (2005) *Floodplain Development Manual: the management of flood liable land*. Available at: <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Floodplains/floodplain-development-manual.pdf>).

6.3 Criterion 2 findings and recommendations

Table 6 outlines the audit recommendations, aligned with key findings.

Table 6: Criterion 2 findings and recommendations

Findings	Recommendations
Criterion 2: The relevant NSW Government agencies have implemented plan provisions in relation to modifications of existing works (for example required modifications or alternative as relevant)	
F 2.1 No evidence was provided to demonstrate that provisions related to required modifications to existing works have been implemented during the audit period.	R 2.1 DPIE-Water, as the overseeing agency for FMPs, to develop and coordinate implementation of a strategy* to address the required modifications identified in the FMPs.

* This strategy should re-consider the risks (including consideration of costs and benefits) of existing structures in the FMP areas in the context of current natural and developed landscapes. Once the list of structures requiring modification is confirmed, the strategy should address:

- responsibilities of NSW Government agencies and other parties for implementation
- upfront and ongoing funding arrangements
- how to assess and record the status of required modifications
- how to prioritise and sequence implementation
- how to address extensions of flood work approvals that require modification
- an approach to landholder and land manager engagement for required modifications.

7 Criterion 3 – Performance indicators

Criterion 3: The relevant NSW Government agencies have implemented plan provisions in relation to performance indicators.

The Act does not specifically mandate giving effect to performance indicators. However, an assessment of performance indicators is expected to measure the success of the FMPs in achieving their objectives, and this would provide relevant information to inform legislated reviews of the FMPs (Criterion 6).

There are also mandatory requirements for performance indicator assessment in six of the FMPs. The Edward and Wakool Rivers Stage 4 (Noorang Rd to Wakool Murray Junction) FMP 2000 has no performance indicator provisions, and the following three FMPs include discretionary requirements for performance indicator assessment:

- Lachlan River, Hillston, Lake Brewster to Whealbah FMP 2005
- Tuppall and Bullatale Creeks (Murray River Uptake to Deniliquin) FMP 2004
- Billabong Creek FMP 2000.

The specific performance indicators that are described in the FMPs broadly relate to:

- the construction, maintenance or modification of flood control works in accordance with the FMP
- the passage of floodwaters through floodway networks
- the delivery of floodwaters to floodplain ecosystems.

7.1 Key finding

7.1.1 Performance indicators have not been assessed

Provisions related to performance indicators were not implemented within the audit period (Finding F 3.1).

Interviews with DPIE-Water and DPIE-EES staff indicated that no active monitoring has been undertaken over the audit period and there is no formal assessment of performance indicators available or planned.

There has been no assessment of whether existing works have been modified according to the FMP (see Criterion 2) and proactive compliance monitoring does not appear to have occurred for these FMPs over the audit period (see Criterion 1). It is unclear if all flood works have been constructed, maintained and modified in accordance with the FMP. However, the compliance database maintained by NRAR identifies several alleged breaches that have been investigated and, in some cases, resolved (see Criterion 1).

Some monitoring of whether the floodway network allows for the orderly passage of floodwaters has been carried out for some floods, such as the 2016 Lachlan floods. However, there is no documented assessment against this performance indicator.

A spatial dataset of flood-dependent ecosystems is available, and an annual environmental water outcomes report is published, with a focus on managed environmental watering, and includes reference to environmental outcomes and flood-dependent ecosystems receiving

floodwaters. However, the report is not an assessment of whether the floodway network allows delivery of floodwaters to the ecosystems.

A spatial dataset of the floodways and floodway network zones is available, as is spatial data showing locations that should be monitored in floods. Hydraulic model results from modelling of the 1990 'design flood' are also available. However, there is no documentation of assessment against performance indicators.

The Commission acknowledges that the implementation team within DPIE-Water is expanding to support implementation, monitoring and performance indicator measurement across water management plans. There are no specific performance indicators planned for these FMPs at present.

Chapter 11 discusses the challenges and factors that may have contributed to FMP provisions not being implemented.

7.2 Potential impact of not implementing performance indicators

Performance indicators are the key mechanism to measure the success of the strategies of FMPs in reaching FMP objectives. Potential impacts of not assessing performance indicators include:

- an inability to measure the success of the strategies of FMPs in reaching FMP objectives
- an inability to determine whether FMP implementation is in accordance with the objects and principles of the Act⁶⁹
- a limited information base to undertake the five-year review of the FMPs (Criterion 6) or ability to inform floodplain management decisions.

⁶⁹ Objects of the Act under Section 3(a) include 'to apply the principles of ecologically sustainable development'; Principles of the Act under Section 5(2)(a) include 'water sources, floodplains and dependent ecosystems (including groundwater and wetlands) should be protected and restored and, where possible, land should not be degraded, and 5(2)(d) the cumulative impacts of water management licences and approvals and other activities on water sources and their dependent ecosystems, should be considered and minimised'; Principles in relation to floodplain management under Section 5(6) of the Act include '(a) floodplain management must avoid or minimise land degradation, including soil erosion, compaction, geomorphic instability, contamination, acidity, waterlogging, decline of native vegetation or, where appropriate, salinity and, where possible, land must be rehabilitated, and (b) the impacts of flood works on other water users should be avoided or minimised, and (c) the existing and future risk to human life and property arising from occupation of floodplains must be minimised'.

7.3 Criterion 3 findings and recommendations

Table 7 outlines the audit recommendations, aligned with key findings.

Table 7: Criterion 3 findings and recommendations

Findings	Recommendations
Criterion 3: The relevant NSW Government agencies have implemented plan provisions in relation to performance indicators.	
F 3.1 Provisions related to performance indicators were not implemented within the audit period.	R 3.1 DPIE-Water to lead the assessment and monitoring of performance indicators and use these data to support decision making for FMP implementation and review.

8 Criterion 4 – Flood monitoring

Criterion 4: The relevant NSW Government agencies have implemented plan provisions in relation to flood monitoring.

The Act is silent on flood monitoring. However, Section 5 of the Act includes relevant water management principles, including that the ‘the principles of adaptive management should be applied, which should be responsive to monitoring and improvements in understanding of ecological water requirements’.

All the FMPs provide for flood monitoring. In general, monitoring activities referred to in FMPs include flow gauging, aerial and ground photography and observations and recordings of the hydrologic, hydraulic and environmental aspects of flooding. The specific objective and requirements of flood monitoring is described in each FMP. In general, the stated purpose of flood monitoring is to determine if floodway systems are performing adequately during floods and to identify any areas for improvement.

Some flood monitoring provisions are included for all FMPs. These requirements are described using variable language across the FMPs, ranging from mandatory to discretionary requirements.

Six of the FMPs provide no specific trigger for flood monitoring. The following four FMPs provide triggers for monitoring and require that floods close to the design flood should be monitored and that smaller floods should include monitoring of critical areas:

- Billabong Creek FMP 2006
- Murrumbidgee River (Hay to Maude) FMP 2014
- Lachlan River (Gooloogong to Jemalong Gap) FMP 2011
- Lachlan River (Hillston, Lake Brewster to Whealbah) FMP 2005.

Regardless of the nature of these requirements, it is reasonable to expect some flood monitoring to be undertaken to:

- assess the passage of floodwaters through floodway networks (Criterion 3)
- effectively inform the five-year review (Criterion 6)
- inform decision making regarding FMP implementation, including identification of improvements.

8.1 Key finding

8.1.1 Flood monitoring has not informed FMP implementation

Provisions relating to flood monitoring were not implemented within the audit period (Finding F 4.1).

Flood monitoring was not implemented during the audit period in accordance with the mandatory and discretionary provisions of the FMPs for the purpose of monitoring performance indicators, informing decision making for FMP implementation, or to inform the five-year plan review.

The maximum flood that has occurred since gazettal across all FMP areas occurred in 2016, which was within the audit period.⁷⁰ The draft long term water plans provide an indication of what flows would be likely to cause large overbank flows.⁷¹ The available information for the relevant gauges during the 2016 flood showed that the recorded gauge flows during the 2016 flood was greater than the minimum overbank flow thresholds presented in the long term water plans as relevant to each FMP area.⁷² On this basis, it could reasonably be expected that some level of flood monitoring would have been triggered in all FMPs during the audit period at least once. No evidence was provided of flood monitoring aligned with the FMP mandatory or discretionary provisions in relation to the maximum flood peaks over the audit period.

However, there has been some flood monitoring in the FMP areas since FMP commencement, which was undertaken for other purposes. For example, interviews and documentation indicated that SES, DPIE-EES and audited agencies were involved in flood response activities (including monitoring) in the 2016 Lachlan, Murrumbidgee and Billabong floods. A high-level assessment of metadata in internal documents suggests that some data may have been suited to assessing performance indicators concerning the floodway networks for the FMPs. However, DPIE-EES staff indicated that the monitoring data have not been used to measure the success of the strategies of meeting FMP objectives or to update or improve the FMPs.

There has been some other flood monitoring in the FMP areas over time. This information could be used to partially inform an assessment of the FMPs performance. Internal documents indicated that remote sensing imagery from satellite and aerial platforms is available for the following FMP areas:

- **Lachlan FMPs** – for the 1952, 1990 and 1998 floods for Jemalong to Condobolin, the 1998, 2000, 20005 and 2016 floods for Hillston and the 1990, 2005, 2012 and 2016 floods for Lachlan Goolagong to Jemalong. A range of historic digital and hard copy files of flood studies and hydraulic modelling dating from the 1990s and early 2000s have also been provided from DPIE-EES to DPIE-Water. An internal flood monitoring report by the Inland Flood Unit of OEH, provided details of activities undertaken after the December 2010 flood for Lachlan (Gooloogong to Jemalong Gap) FMP, including marking high flood levels in environmentally important areas, potential hydraulic restrictions sites and photographs.
- **Murray FMPs** – for the Edward and Wakool Rivers Stage 1 (Deniliquin to Moama-Moulamein Railway) 2011, Wakool River Stage 2 (Moama-Moulamein Railway to Gee Gee

⁷⁰ WaterNSW (2020) *Real time data - state overview*. Available at: <https://realtimedata.waterrnsw.com.au/>.

⁷¹ DPIE (2019) *Murrumbidgee Long Term Water Plan Part A: Murrumbidgee catchment. Draft for exhibition*, p. 38. Available at: <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-for-the-environment/murrumbidgee-long-term-water-plan-part-a-190152.pdf>; DPIE (2019) *Lachlan Long Term Water Plan. Part A: Lachlan catchment. Draft for exhibition*, p. 28. Available at: <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-for-the-environment/lachlan-long-term-water-plan-part-a-180583.pdf>; DPIE (2019) *Murray-Lower Darling Long Term Water Plan. Part A: Murray-Lower Darling catchment. Draft for exhibition*, p. 47. Available at: <https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-for-the-environment/murray-lower-darling-long-term-water-plan-part-a-190446.pdf>.

⁷² Available gauge information reviewed for: Iron Cottons Wier (412004), Hillston (412039), Hay (410136), Jerilderie (410016), Edward@Deniliquin (409003), Wakool@Stoney Crossing (409013). Information taken from: Water NSW (2020) *Real time data - state overview*. Available at: <https://realtimedata.waterrnsw.com.au/>. Note that for all FMPs, the relevant long term water plans provided a large overbank threshold, except Edward and Wakool Stage 4 (Noorong to Wakool Murray Junction) FMP 2000. For this FMP, the Neiumur River (4090048) gauge was used, upstream of the FMP floodplain, this gauge measured flows greater than the threshold provided in the long term water plan and so it is estimated that 2016 flood would also have resulted in overbank flows for the Edward and Wakool Stage 4 (Noorong to Wakool Murray Junction) FMP 2000.

Bridge) FMP 2011, Edward and Niemur Rivers Stage 3 (Moama-Moulamein Railway to Liewah and Mallan) FMP 2011 and Bullatale Creeks (Murray River Uptake to Deniliquin) FMP 2004. A range of historic digital and hard copy files of flood studies and hydraulic modelling have been provided to DPIE-Water from DPIE-EES.

- **Murrumbidgee FMPs** – for the 2010 Billabong Creek flood and for the 2005 and 1998 Murrumbidgee floods.⁷³ A range of historic digital and hard copy files of flood studies and hydraulic modelling dating from the 1990s and early 2000s have been provided to DPIE-Water from DPIE-EES. An internal flood monitoring report by the Inland Flood Unit of OEH, provides details of activities undertaken after the 2010 floods for the Billabong Creek FMP (prior to the audit period), including marking high flood levels in environmentally important areas, potential hydraulic restrictions sites and photographs, as well as a number of structures recommended to be investigated.⁷⁴

Chapter 11 discusses the challenges and factors that may have contributed to FMP provisions not being implemented.

8.2 Potential impact of not implementing flood monitoring

Potential impacts of not carrying out flood monitoring for the purpose of monitoring performance indicators, informing decision making for FMP implementation or to inform the five-year plan review include:

- an inability to assess the performance of the floodway network
- limited detection of problematic or potentially non-compliant structures that may cause adverse changes to the flood flow patterns to inform compliance and enforcement activities or strategic adaptive management strategies
- difficulty measuring the success of the strategies of FMPs in reaching FMP objectives
- limited information to undertake the five-year FMP review
- difficulty determining if FMP implementation is in accordance with the objects and principles of the Act.⁷⁵

⁷³ OEH (2010) *Billabong Creek: Walbundrie to Jerilderie Floodplain Management Plan: Flood Monitoring October-November 2010*. Available at: <https://floodata.ses.nsw.gov.au/flood-projects/billabong-creek-walbundrie-to-jerilderie-floodplain-management-plan-flood-monitoring>.

⁷⁴ *Ibid.*

⁷⁵ Objects of the Act under Section 3(a) include 'to apply the principles of ecologically sustainable development'; Principles of the Act under Section 5(2)(a) include that 'water sources, floodplains and dependent ecosystems (including groundwater and wetlands) should be protected and restored and, where possible, land should not be degraded, and 5(2)(d) the cumulative impacts of water management licences and approvals and other activities on water sources and their dependent ecosystems, should be considered and minimised'.

8.3 Criterion 4 findings and recommendations

Table 8 outlines the audit recommendations, aligned with key findings.

Table 8: Criterion 4 findings and recommendations

Findings	Recommendations
Criterion 4: The relevant NSW Government agencies have implemented plan provisions in relation to flood monitoring	
<p>F 4.1 Provisions relating to flood monitoring were not implemented within the audit period.</p>	<p>R 4.1 DPIE-Water to:</p> <ul style="list-style-type: none"> ▪ review FMP flood monitoring requirements in line with the principles, objects and key provisions of the Act ▪ ensure there are appropriate arrangements in place to implement these requirements in advance of flood events (across multiple agencies if appropriate), including: <ul style="list-style-type: none"> - funding arrangements - defined and agreed responsibilities for data collection and sharing. <p>This will support FMP performance indicator assessment and FMP review.</p>

9 Criterion 5 – Environmental monitoring

Criterion 5: The relevant NSW Government agencies have implemented plan provisions in relation to environmental monitoring.

The Act is silent on environmental monitoring. However, Section 5 of the Act includes relevant water management principles, including that the ‘the principles of adaptive management should be applied, which should be responsive to monitoring and improvements in understanding of ecological water requirements’.

Seven FMPs provide for environmental monitoring. Three FMPs do not include environmental monitoring provisions:

- Edward and Wakool Rivers Stage 4 (Noorang Rd to Wakool Murray Junction) FMP 2000
- Tuppal and Bullatale Creeks (Murray River Uptake to Deniliquin) FMP 2004
- Billabong Creek FMP 2006.

For the seven FMPs that provide for environmental monitoring, the specific objective and requirements of environmental monitoring is described in each FMP. In general, the stated purpose of environmental monitoring is to determine whether environmental measures are effective and assess the ecological impacts of floods.

The environmental monitoring requirements in the FMPs are described using variable language across the FMPs, ranging from mandatory to discretionary requirements. Regardless of the nature of these requirements, it is reasonable to expect some environmental monitoring to be undertaken to:

- measure the success of the strategies of FMPs in reaching FMP objectives (Criterion 3)
- effectively inform the five-year review (Criterion 6)
- inform decision making regarding FMP implementation including identification of improvements.

9.1 Key finding

9.1.1 Environmental monitoring has not informed FMP implementation

Provisions relating to environmental monitoring were not implemented within the audit period (Finding F 5.1).

Environmental monitoring provisions were not implemented in the audit period in accordance with the provisions of the FMPs for the purpose of monitoring performance indicators, informing decision making for FMP implementation or to inform the five-year plan review. However, some other environmental monitoring and reporting did occur.

Monitoring or assessment of whether the floodway network allows for the delivery of floodwaters to support floodplain ecosystems has not been carried out and there is no documentation of any assessment against the environmental performance indicator (Criterion 3). However, a spatial dataset of flood-dependent ecosystems was provided to the Commission. An annual environmental water outcomes report was also published, with a focus on managed environmental watering, including reference to environmental outcomes and

flood-dependent ecosystems receiving floodwaters.⁷⁶ No assessment was available against any of the FMPs' more detailed hydraulic, environmental, social and economic indicators.

In lieu of specific thresholds for triggering environmental monitoring, it could reasonably be expected that some level of environmental monitoring would be undertaken during flood monitoring (see **Section 8.1.1**), depending on the flood-dependent assets in each plan. No evidence was provided of environmental monitoring aligned with the FMP mandatory or discretionary provisions in relation to the maximum flood peaks over the audit period (see **Section 8.1.1**).

As with flood monitoring (Criterion 4), remote sensing imagery from satellite and aerial platforms is available, as well as historic digital and hard copy files. An internal flood monitoring report by the Inland Flood Unit of the former OEH provides details of activities undertaken after the December 2010 flood for Lachlan (Gooloogong to Jemalong Gap) FMP 2011 and the 2010 floods in the Billabong Creek FMP, including marking high flood levels in environmentally important areas, potential hydraulic restrictions sites and photographs.

Interviews with DPIE-Water staff indicated that the environmental monitoring described above was not undertaken in the audit period and was not used to measure the success of the strategies of FMPs in reaching objectives, or to improve inform management decisions regarding FMP implementation or to inform FMP review.

Chapter 11 discusses the challenges and factors that may have contributed to FMP provisions not being implemented.

9.2 Impact of not implementing environmental monitoring

Environmental monitoring is a key mechanism by which to measure the success of the strategies of FMPs in reaching their objectives. Potential impacts of not carrying out environmental monitoring and not using monitoring to assess performance of the FMPs include reduced information base regarding:

- adverse changes to flood flow patterns
- diversity and wellbeing of riverine and floodplain ecosystems that depend on flood inundation
- the success of the strategies of FMPs in reaching FMP objectives
- whether FMP implementation is in accordance with the objects and principles of the Act.⁷⁷

⁷⁶ OEH (2017) *Use of water for the environment in New South Wales: Outcomes 2016-17*. Available at: <https://www.environment.nsw.gov.au/research-and-publications/publications-search/use-of-water-for-the-environment-in-nsw-outcomes-2016-17>.

⁷⁷ Objects in Section 3(a) of the Act include 'to apply the principles of ecologically sustainable development'; Principles in Section 5(2)(a) of the Act include that 'water sources, floodplains and dependent ecosystems (including groundwater and wetlands) should be protected and restored and, where possible, land should not be degraded, and 5(2)(d) the cumulative impacts of water management licences and approvals and other activities on water sources and their dependent ecosystems, should be considered and minimised'.

9.3 Criterion 5 findings and recommendations

Table 9 outlines the audit recommendations, aligned with key findings.

Table 9: Criterion 5 findings and recommendations

Findings	Recommendations
Criterion 5: The relevant NSW Government agencies have implemented plan provisions in relation to environmental monitoring	
<p>F 5.1 Provisions relating to environmental monitoring were not implemented within the audit period.</p>	<p>R 5.1 DPIE-Water to:</p> <ul style="list-style-type: none"> ▪ review FMP environmental monitoring requirements in line with the principles, objects and key provisions of the Act ▪ ensure there are appropriate arrangements in place to implement these requirements in advance of flood events (across multiple agencies if appropriate), including: <ul style="list-style-type: none"> - funding arrangements - defined and agreed responsibilities for data collection, data sharing. <p>This will support FMP performance indicator assessment and review.</p>

10 Criterion 6 – Plan review

Criterion 6: The relevant NSW Government agencies have implemented plan provisions in relation to plan review

Section 43(2) of the Act requires that ‘within the fifth year after it was made, the Minister is to review each management plan ... for the purpose of ascertaining whether its provisions remain adequate and appropriate for ensuring the effective implementation of the water management principles’. Section 43 (3) requires that ‘such a review is to be conducted in consultation with the Minister for the Environment and the Natural Resources Commission’.⁷⁸

The water management principles in Section 5(2)(h) of the Act include that ‘the principles of adaptive management should be applied, which should be responsive to monitoring and improvements in understanding of ecological water requirement’. The water management principles in relation to floodplain management are outlined in **Section 4.1**.

Regardless of whether an FMP specifically refers to the review requirement, it still applies to all FMPs. Eight of the FMPs refer to Section 43 of the Act that requires the five-year review.⁷⁹ FMPs that did not specifically include FMP review provisions include:

- Billabong Creek FMP 2006
- Edward and Wakool Rivers Stage 4 (Noorang Rd to Wakool Murray Junction) FMP 2000.

Some FMPs also include other triggers that may require a review, including:

- changes in land use, impediments to implementation and changes to factors that influence decisions
- climate change
- changes to groundwater and soil moisture.

To give effect to the FMPs, DPIE-Water is expected to undertake review of the FMP either within the fifth year (September 2019 until September 2020) or earlier, should the above factors be triggered. The review is expected to use data and information from performance indicators, flood and environmental monitoring to measure the success of the strategies of FMPs in reaching FMP objectives (see Criterion 3).

⁷⁸ Consultation with the Commission became a requirement under Section 43(3) of the Act 43(3) in the version of the Act that commenced on the 27 June 2018.

⁷⁹ Tuppal and Bullatale Creek (Murray River Uptake to Deniliquin) FMP 2004, Edward and Wakool Rivers Stage 4 (Noorang Rd to Wakool Murray Junction) FMP 2000 and Billabong Creek FMP 2006 do not include specific reference to the five-year review required under Section 43 of the Act. However, Appendix A in the Billabong Creek FMP 2006 states that the ‘collected monitoring data will assist the Billabong Creek FMP performance review process. If found necessary, modifications to the Billabong Creek FMP can be recommended based on the findings of the review process’.

10.1 Key finding

10.1.1 FMP reviews have not been undertaken

Provisions relating to plan review were not implemented in accordance with the five-year timeframe prescribed by the Act (Finding F 6.1).

The FMP reviews have not been implemented in accordance with the five-year timeframe prescribed by the Act. In interviews, DPIE-Water staff indicated that there is no active review underway and currently, no reviews of these FMPs are scheduled (reviews are due between September 2019 and September 2020).

It is also unclear if additional triggers specified in the FMPs for an early review should have been activated. This appears to be due to the limited assessment of performance indicators and measurement of the success FMP strategies in meeting objectives, as outlined under Criteria 3, 4 and 5.

As part of Basin Plan implementation, the NSW Government has been implementing the Healthy Floodplains Project. This Commonwealth Government-funded program includes development and commencement of FMPs under the Act for the major floodplains in the northern NSW Murray-Darling Basin only,⁸⁰ as well as detailed work to bring water extraction under 'floodplain harvesting' within water licensing and approvals under the Act. DPIE-Water has indicated to undertake similar work for the southern NSW Murray Darling Basin floodplains it would need additional NSW Government funding.

Chapter 11 discusses the challenges and factors that may have contributed to FMP provisions not being implemented.

10.2 Impact of not implementing FMP reviews

The reviews of FMPs are important to understand if they are effective in managing and coordinating flood works on the floodplain and if their provisions are adequate and appropriate for ensuring the effective implementation of the water management principles of the Act.

The FMPs were drafted under the *Water Act 1912* but only adopted as Minister's plans under the Act in 2015. They have never been reviewed and the degree to which the FMPs include provisions to sufficiently address the objects, principles, core and additional provisions of the Act appears variable between FMPs.

It is not within the scope of this audit to undertake the FMP review⁸¹ but undertaking reviews and updating FMPs (should they result in remakes) may improve the ability to achieve outcomes through addressing the current FMP deficiencies. Remaking these FMPs is likely to lead to important benefits, including improving the:

⁸⁰ DoI (2018) *NSW Healthy Floodplains Project*. Available at: <https://www.industry.nsw.gov.au/water/plans-programs/healthy-floodplains-project/about>.

⁸¹ Section 43(3) of the Act requires the five-year review of the management plan in consultation with the Minister for the Environment and the Commission.

- spatial definition of floodway boundaries so they are clear at the property and paddock scale, and zoning to align with contemporary guidance and policy⁸² and better support approvals and enforcement processes
- appropriateness and spatial definition of the floodway network underpinned by updated modelling in line with the FMPs developed under the Healthy Floodplains Project to support the:
 - effectiveness of the floodway network in conveying floodwaters
 - management of the risks to towns, life and property, economic assets and floodplain dependent ecosystems
- clarity of roles and responsibilities to increase transparency and accountability of how risks to life and property are being managed and provide a consistent basis for managing floodplains between valleys
- clarity of governance arrangements, including clear compliance requirements to increase transparency and accountability (such as defining arrangements at the interface between urban and rural floodplain management plan areas)
- identification of cultural assets and values, and an associated cultural impacts assessment process
- controls in areas that are currently not covered by FMPs and are potentially susceptible to uncoordinated development (should the FMPs be updated to encompass areas currently not governed by an FMP)
- methods and approaches for environmental and flood monitoring to inform management decisions and FMP reviews in the future
- consideration of the listed required modifications in the context of the current development landscape, with any implementation requirements supported by a wholistic policy approach that considers implementation requirements such as coordination and funding
- inclusion of mandatory conditions, which would better support the approvals process.

10.3 Criterion 6 findings and recommendations

Table 10 outlines the audit recommendations, aligned with key findings.

Table 10: Criterion 6 findings and recommendations

Findings	Recommendations
Criterion 6: The relevant NSW Government agencies have implemented plan provisions in relation to plan review	
F 6.1 Provisions relating to plan review have not been implemented in accordance with the five-year timeframe prescribed by the Act.	R 6.1 DPIE-Water to review the FMPs as soon as practicable.

⁸² DoI (2014) *Rural floodplain management plans: Technical manual for plans developed under the Water Management Act 2000*. Available at: http://www.water.nsw.gov.au/__data/assets/pdf_file/0011/548606/floodplain_management_plans_draft_technical_manual.pdf.

11 Contributing factors to key findings and improvement opportunities

In addition to its findings and recommendations, the Commission identified several factors that have contributed to the audit conclusions. The Commission has suggested actions to address these factors and support its audit recommendations (Table 11). These should be considered by the audited agencies as part of future improvement opportunities for FMP implementation.

11.1 Required expertise to support FMP implementation

Limited expertise available to support ongoing FMP implementation [Contributing Factor (a)].

Interviews with NRAR and WaterNSW staff indicated that technical expertise is either in the form of retired experts contracting back to agencies or held in EES. These roles within EES were specifically funded to develop new FMPs in the northern Murray-Darling Basin (in line with reform and regulatory priorities) (Section 4.2.6) and are not formally available for the purpose of supporting the ongoing functions of approvals assessment, monitoring and review for the FMPs subject to this audit. This means that consultants are relied on heavily to perform flood studies.

DPIE-Water staff indicated that there is current uncertainty regarding what will happen to these hydraulic technical experts after the temporary funding ceased 30 June 2020. Should this expertise become unfunded, support for ongoing FMP functions will be less readily available, increasing agency reliance on external advice.

11.2 Procedures and guidance to support approval assessments

Procedures to guide the assessment process:

- are old and in draft form
- do not provide detailed guidance material to support a consistent approach and appropriate level of hydraulic, environmental and cultural impact assessment for flood works approval applications [Contributing Factor (b)].

WaterNSW and NRAR follow procedures to receive, assess, grant, or refuse, and condition flood work approvals:

- WaterNSW follow an internal manual for issuing and managing approvals. This procedure captures relevant legislation and outlines steps that must be taken in relation to approvals assessment process. Assessments are performed in line with the procedures and the key steps are captured in assessment checklists that are used by assessing officers.
- Internal documents provided to the Commission indicate that NRAR follows similar procedures to WaterNSW, with similar checklists covering similar items but these are slightly earlier versions of similar material.

The procedures currently being used by WaterNSW and NRAR were created between 2012 and 2016. They are generally in draft form and are due for review in line with contemporary agency arrangements and legislation.

The procedures are high level and have limited detailed guidance for officers undertaking assessments on how to undertake or facilitate and review an impact assessment related to hydraulic, environmental and cultural aspects of the application. This may lead to variation in the way applications are assessed by individual officers and variable extent of consideration given to all aspects of the impact assessment.

Interviews with NRAR staff indicated that no guidance was available in relation to processing multipurpose works approvals. On-farm storages and water supply channels within the floodplain network may be both a water supply work and flood work.

In interviews, WaterNSW staff acknowledged that it is relying on historical manuals and has indicated that it is currently in the process of reviewing all of its procedures, including procedures relating to assessing, granting and conditioning of flood work approvals to ensure they are in line with current legislation and are fit for purpose.

The Commission notes that FMP implementation guidelines were prepared by DPIE-EES as part of the required Healthy Floodplains Project for DPIE-Water should be available to NRAR and WaterNSW. Although these guidelines were written specifically for the northern Murray Darling Basin valleys, the technical guidelines could be used to undertake flood work assessments across NSW.

11.3 Sharing of spatial data between agencies

Inadequate sharing of spatial data between NSW Government agencies to support assessments of approvals and impacts from flood works [Contributing Factor (c)].

Interviews with NRAR staff indicated that there is no spatially enabled database for flood work applications and approvals. The lack of spatial information on the location of flood works location and extent of floodplains is a challenge for FMP administration. Specific limitations include that:

- assessment of the cumulative impact of flood works as required in the Act⁸³ cannot be undertaken without modelling the cumulative impacts which produces relevant derivative spatial data – there is currently no way to search for approvals by FMP area, which adversely affects the ability to understand how many approvals are in an FMP area and where works are in relation to each other
- production of flood studies to support applications cannot be carried out effectively – NRAR staff indicated that these are currently undertaken by consultants and officers cannot assess their accuracy or validity
- NRAR and WaterNSW staff indicated that they currently review flood studies produced by consultants and commissioned by applicants – it is difficult to review these studies without the spatial data for flood works, particularly the assessment of cumulative impacts
- NRAR and WaterNSW are required to assess environmental impacts when processing approvals, under Part 5 of the *Environmental Planning and Assessment Act 1979* and Section

⁸³ Section 29(c) of the Act states ‘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 ecological impacts, including cumulative impacts’.

97 of the Act.⁸⁴ WaterNSW staff indicated that the lack of spatial data inhibits a full assessment.

DPIE-Water indicated that it is currently working with WaterNSW to develop a digital data licence agreement. This will allow spatial data to be shared between DPIE-Water and WaterNSW. This is intended to improve the efficiency and effectiveness of the approvals process, including assessment of cumulative impacts.

DPIE-Water indicated that NRAR currently have access to DPIE-Water data sets as it is part of the DPIE cluster but the level of awareness of this by some NRAR assessing officers is low.

11.4 Systems for managing approvals and enforcement

Inadequate systems for managing approvals and enforcement in relation to:

- **spatial data capture**
- **informing overall compliance at the FMP scale**
- **enabling public transparency of flood works approvals [Contributing Factor (d)].**

There are systems and procedures in place for NRAR and WaterNSW to receive, assess, grant or refuse, and apply conditions to flood work approvals. However, there is a lack of systems functionality, which adversely affects the ability for officers to understand how many approvals are in an FMP area and where works are in relation to each other.

WaterNSW and NRAR use the Water Licencing System to support these processes for flood work approvals. This system and procedures were applied throughout the audit period. Currently, the Water Licencing System does not allow the officer using the system to tag an approval to a specific FMP area, and consequently a search for approvals by FMP area cannot be undertaken.

The Water Licencing System has no spatial capability other than point location, which is often not appropriate for flood works. NRAR staff indicated that there is also no linked spatial database for flood work applications and approvals. The lack of spatial information on the location of flood works and extent of floodplains reduces the effectiveness of FMP administration. Specific limitations noted by NRAR and WaterNSW staff in interviews include that the:

- assessment of the cumulative impact of flood works as required in the Act⁸⁵ cannot be accurately undertaken without spatial data
- production of flood studies to support applications cannot be carried out effectively

⁸⁴ Section 5.5 of the EP&A Act; Section 97(2) of the Act, which states 'a water management work approval is not to be granted unless the Minister is satisfied that adequate arrangements are in force to ensure that no more than minimal harm will be done to any water source, or its dependent ecosystems, as a consequence of the construction or use of the proposed water management work'.

⁸⁵ Section 29(c) of the Act states '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 ecological impacts, including cumulative impacts'.

- assessment of environmental impacts under Part 5 of the EP&A Act and Section 97 of the Act⁸⁶ cannot be fully assessed
- NRAR and WaterNSW cannot search for approvals by FMP area, which adversely affects the ability to understand how many approvals are in an FMP area and where works are in relation to each other.

Interviews indicated that the relevant agencies responsible for FMP compliance (see **Table 3**) have been using CIRaM to manage compliance allegations since 2010, including during the audit period. CIRaM is currently managed by NRAR. CIRaM does not have a data entry field for FMPs. While the system captures some spatial data (water sharing plan and local government area boundaries and coordinates), NRAR staff indicated that they cannot easily search or extract case data based on FMPs. NRAR staff advised that, historically, many fields in CIRaM have not been consistently used, so extracting information to understand spatially what has occurred in a specific FMP is difficult.

Finally, flood work approvals are not available to the public via the online NSW Water Register.⁸⁷ The Act requires that a register be available to the public, though does not specifically require that the approvals need to be identifiable spatially and by FMP area.⁸⁸ However, transparency and accountability would be increased through having relevant flood work approval and spatial information available via the online NSW Water Register.⁸⁹ In addition, without the information being available spatially and by FMP area, its usefulness for a variety of purposes including by the public as well as landholders, land managers, consultants, approvals and enforcement officers and inter-agency personnel is limited.

11.5 Landholder engagement and awareness raising

No evidence of landholder engagement undertaken by NSW Government agencies to raise the awareness of flood work approval obligations in order to reduce risks of non-compliance [Contributing Factor (e)].

The level of awareness among landholders of the need to hold and comply with flood work approvals is unknown.

WaterNSW,⁹⁰ NRAR⁹¹ and DPIE-Water⁹² provide information to applicants via their websites. This information, including application forms, are current. However, no agency has undertaken specific education focussed on the need to hold approvals for flood works in the FMP areas. NRAR and DPIE-Water staff with experience from such campaigns in the northern valleys

⁸⁶ Section 5.5 of the EP&A Act; Section 97 of the Act 97 states '(2) A water management work approval is not to be granted unless the Minister is satisfied that adequate arrangements are in force to ensure that no more than minimal harm will be done to any water source, or its dependent ecosystems, as a consequence of the construction or use of the proposed water management work'.

⁸⁷ WaterNSW (2019) *NSW Water Register*. Available at: <https://waterregister.watnsw.com.au/water-register-frame>.

⁸⁸ Section 113(3) of the Act.

⁸⁹ WaterNSW (2019) *NSW Water Register*. Available at: <https://waterregister.watnsw.com.au/water-register-frame> (note that, while search fields are available for the Lachlan FMPs, the search results in water use approvals, not flood work approvals).

⁹⁰ WaterNSW (n.d.) *Flood Work Approvals*. Available at: <https://www.watnsw.com.au/customer-service/water-licensing/approvals/flood-work-approvals>.

⁹¹ NRAR (n.d.) *Approval applications & fees*. Available at: <https://www.industry.nsw.gov.au/water/licensing-trade/approvals/applications-fees>.

⁹² DPIE-Water (n.d.) *Governance*. Available at: <https://www.industry.nsw.gov.au/water/licensing-trade/approvals/flood-work-approvals>.

indicated that it resulted in many applications for previously unapproved works. An increase in community awareness of flood work approval obligations may reduce the level of existing non-compliance through voluntary action taken by landholders and land managers and may also raise the level of reactive compliance undertaken by NRAR for these FMPs.

11.6 Suggested actions to address contributing factors

Table 11 provides a summary of the contributing factors identified by the Commission, with the relevant findings they are associated with in brackets), and suggested actions to resolve contributing factors and support the audit recommendations.

Table 11: Contributing factors to findings and suggested actions

Contributing factors to findings	Suggested actions to support recommendations
<p>a. Limited expertise available to support ongoing FMP implementation (F 1.1, F 1.2, F 2.1, F 3.1, F 4.1, F 5.1, F 6.1)</p>	<p>SA 1 DPIE-Water, NRAR and WaterNSW to make available under ongoing arrangements the relevant technical expertise required to implement their ongoing functions and roles in assessment, granting and conditioning of approvals, enforcement, monitoring and review of FMPs.</p>
<p>b. Procedures to guide the assessment process:</p> <ul style="list-style-type: none"> ▪ are old and in draft form ▪ do not provide detailed guidance material to support a consistent approach and appropriate level of hydraulic, environmental and cultural impact assessment for flood works approval applications [Contributing Factor (b)]. (F 1.1) 	<p>SA 2 DPIE-Water (overseeing agency), WaterNSW and NRAR (approval assessment agencies) to ensure procedures and guidance material to support the approvals assessment process are in line with the objects and principles of the Act and are consistently implemented.</p>
<p>c. There is limited sharing of spatial data between NSW Government agencies to support assessments of approvals and impacts from flood works. (F 1.1, F 1.2)</p>	<p>SA 3 DPIE-Water to make spatial data readily available to NRAR and WaterNSW to support the approvals assessment process, assessment of cumulative impacts of flood works and facilitate flood studies.</p>
<p>d. Systems for managing approvals and enforcement are not:</p> <ul style="list-style-type: none"> ▪ capturing spatial data ▪ informing overall compliance at the FMP scale ▪ enabling public transparency of flood works approvals. (F 1.1, F 1.2) 	<p>SA 4.1 WaterNSW (with input from NRAR) to update the Water Licensing System to enable capture relevant spatial information relating to approvals and to enable searching of this data by FMP area.</p> <p>SA 4.2 NRAR to enable the search of flood work compliance allegations by FMP area.</p> <p>SA 4.3 WaterNSW to update the NSW Water Register to include flood work approvals.</p>
<p>e. No evidence of landholder engagement undertaken by NSW Government agencies to raise the awareness of flood work approval obligations to reduce risks of non-compliance (F 1.2)</p>	<p>SA 5 DPIE-Water, NRAR and WaterNSW to define agency responsibilities for landholder and community education in relation to flood work approval obligations and take coordinated action to raise awareness.</p>

Appendix A - FMP area maps¹

Lachlan FMP maps

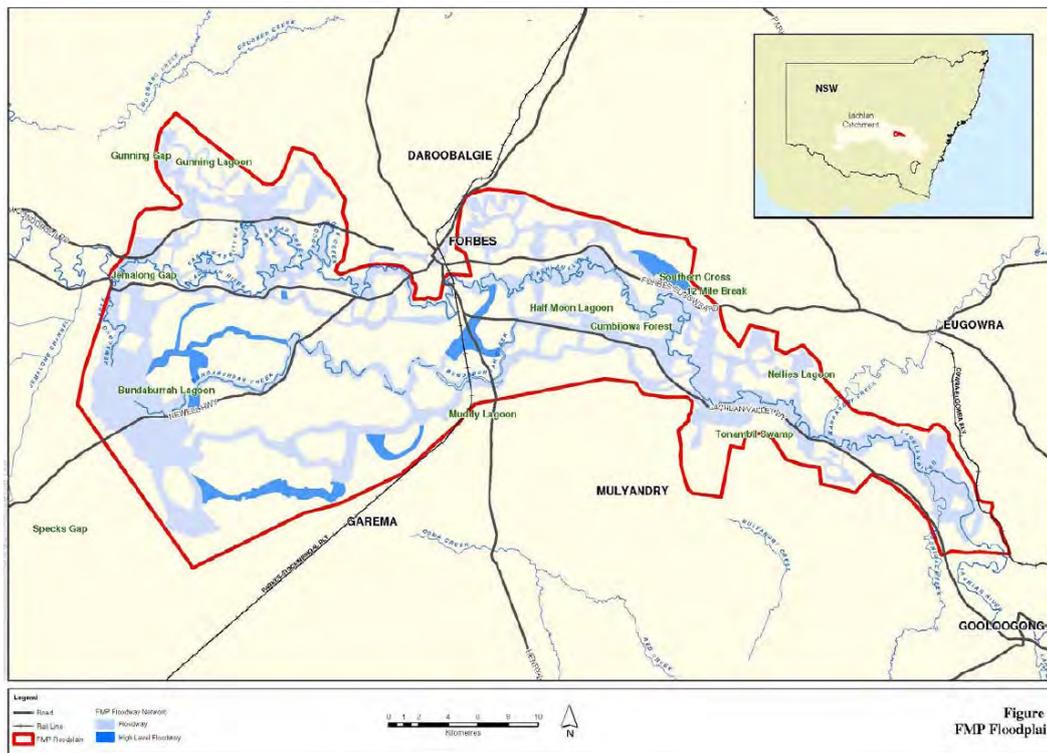


Figure 1: Lachlan River (Gooloogong to Jemalong Gap) FMP 2011 floodplain

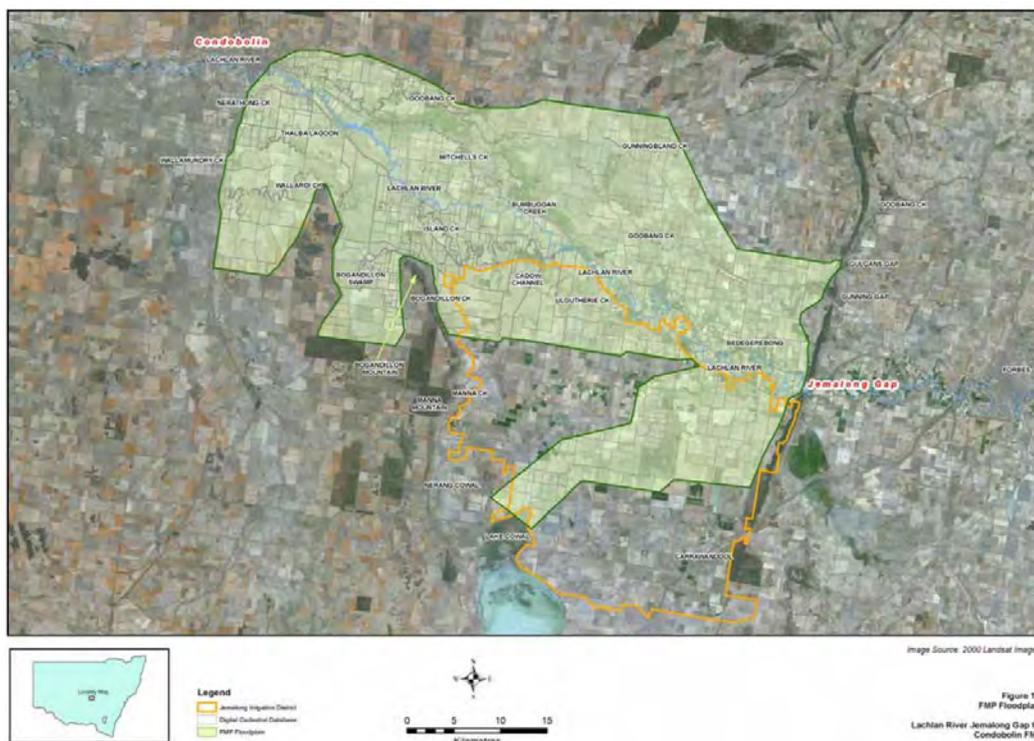


Figure 2: Lachlan River (Jemalong Gap to Condobolin) FMP 2012 floodplain

¹ Maps sourced from relevant FMP documents.

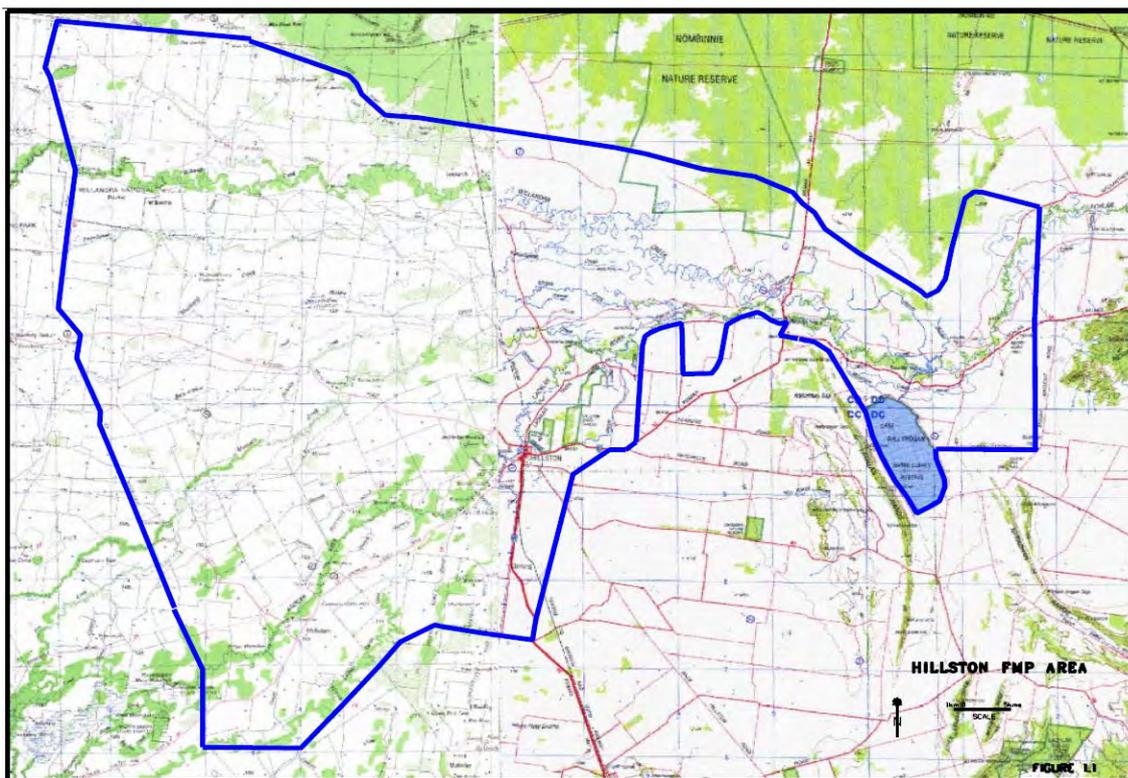


Figure 3: Lachlan River (Hillston- Lake Brewster to Whealbah) 2005 FMP floodplain (note that the town of Hillston is excluded elsewhere in the FMP)

Murray FMP maps

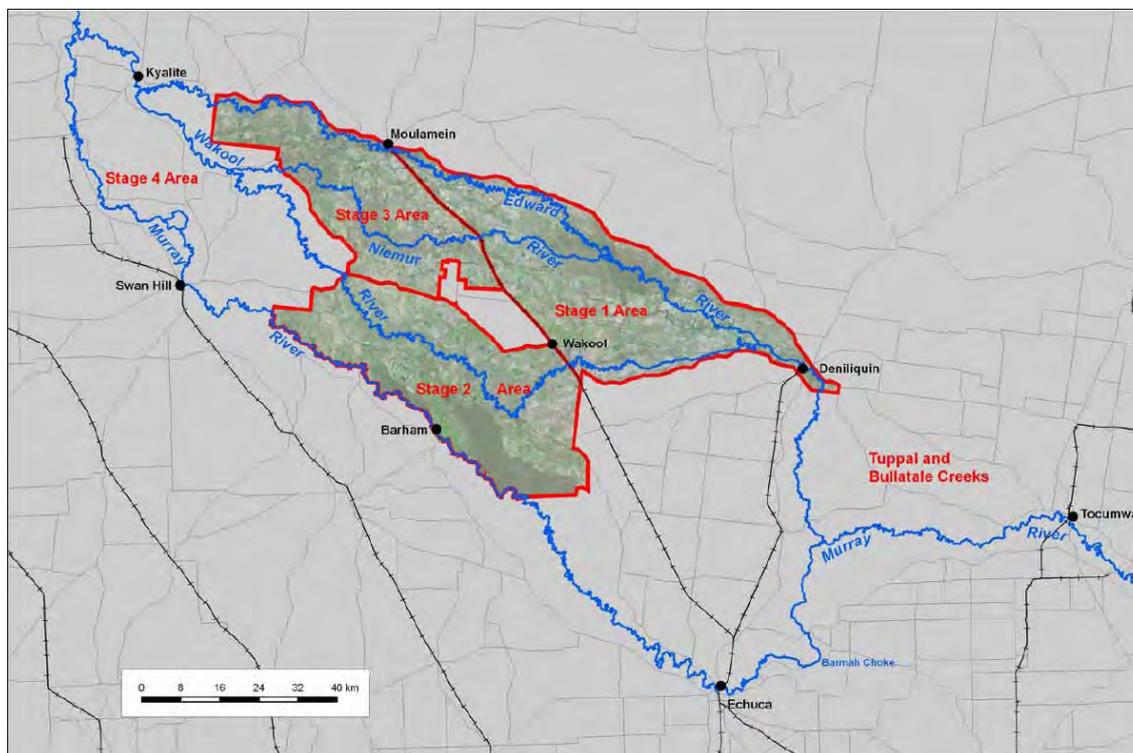


Figure 4: Central Murray system showing the 5 Murray FMP areas

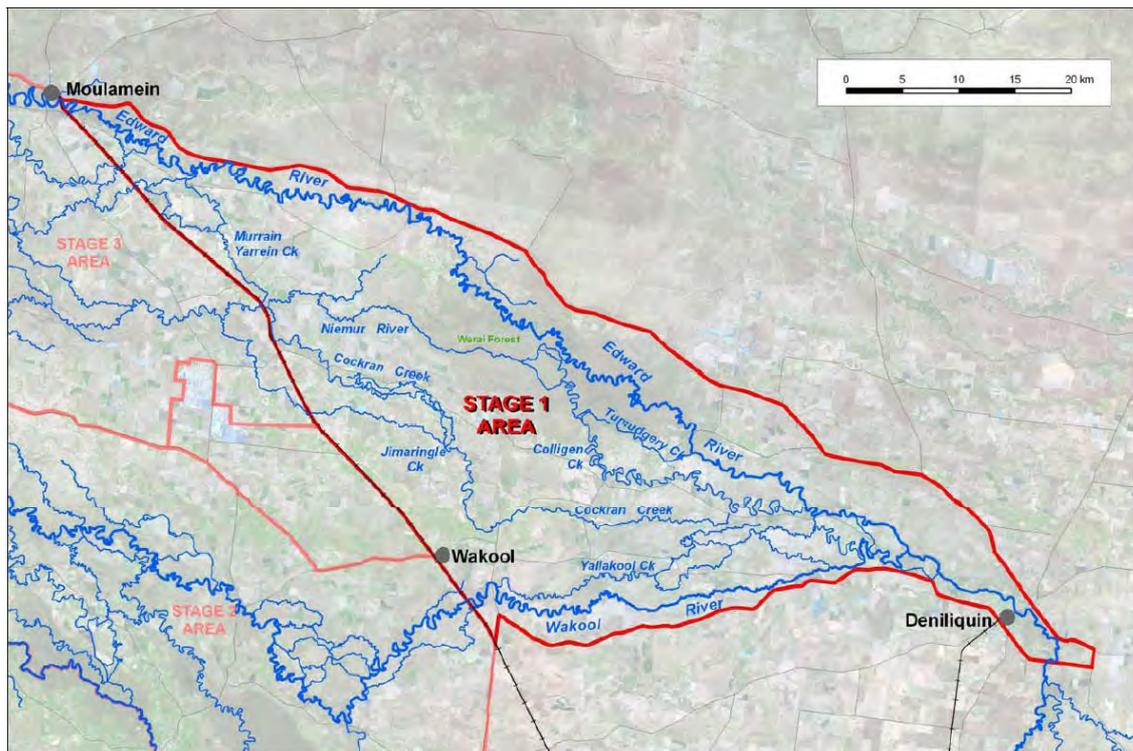


Figure 5: Edward and Wakool Rivers Stage 1 (Deniliquin to Moama-Moulamein Railway) FMP 2011 floodplain

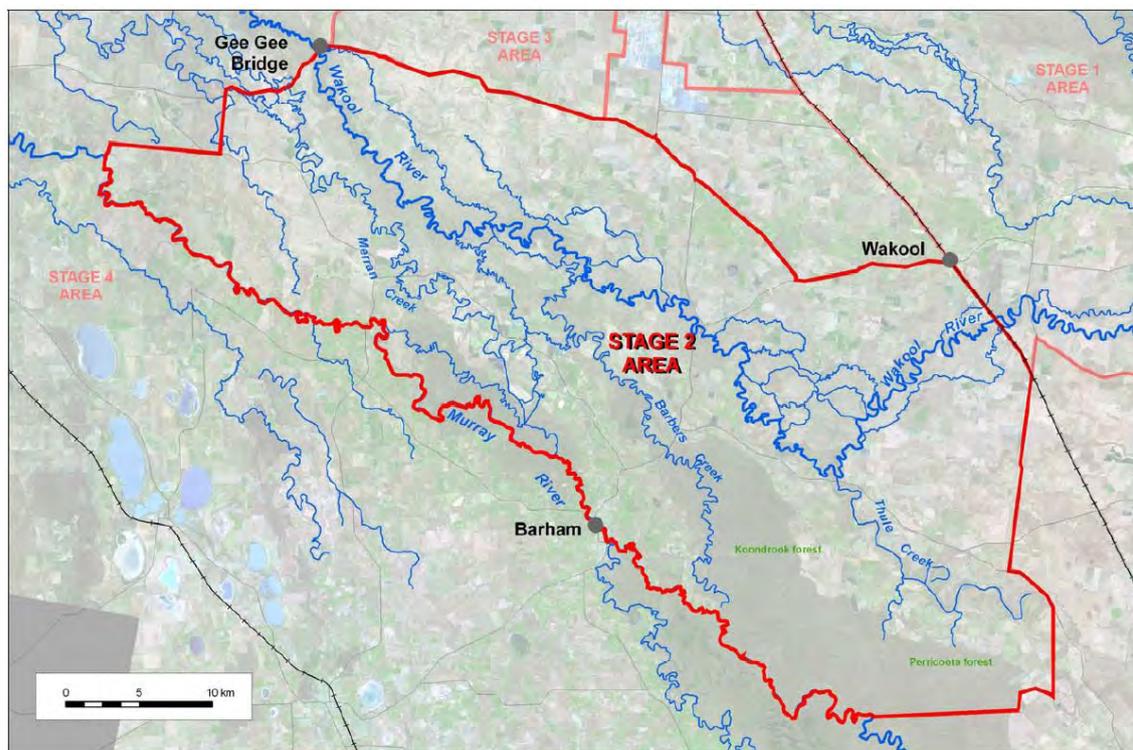


Figure 6: Wakool River Stage 2 (Moama-Moulamein Railway to Gee Gee Bridge) FMP 2011 floodplain

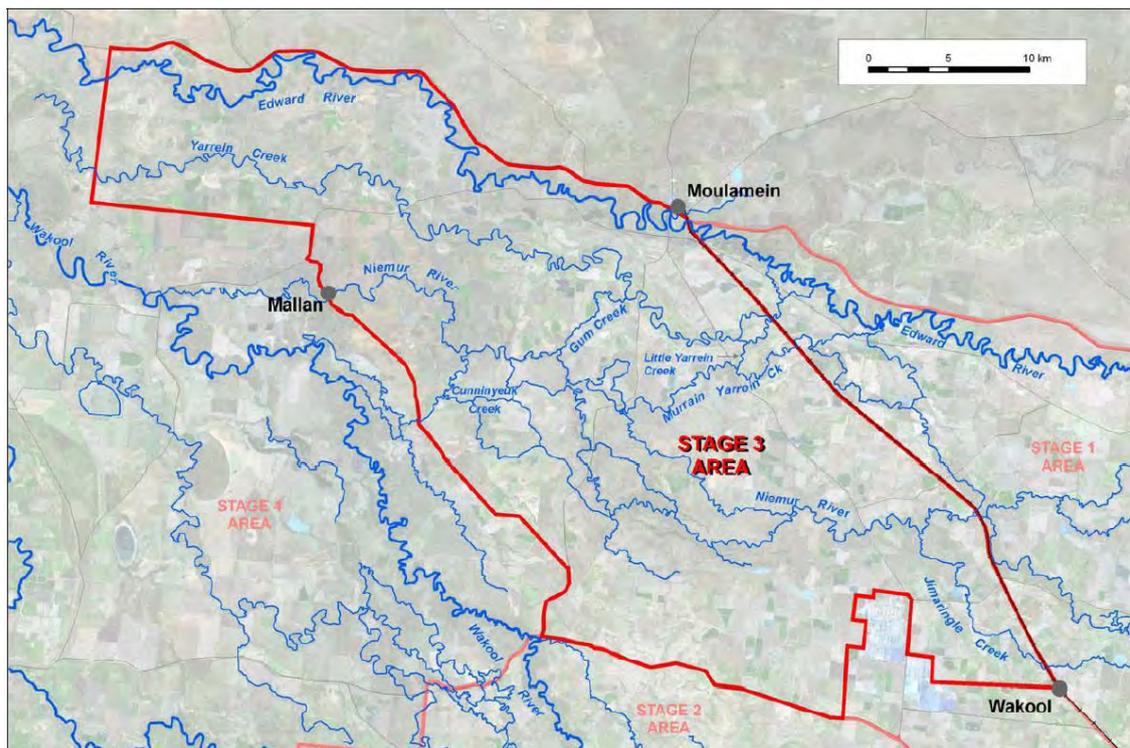


Figure 7: Edward and Niemur Rivers Stage 3 (Moama - Moulamein Railway to Liewah and Mallan) FMP 2011 floodplain

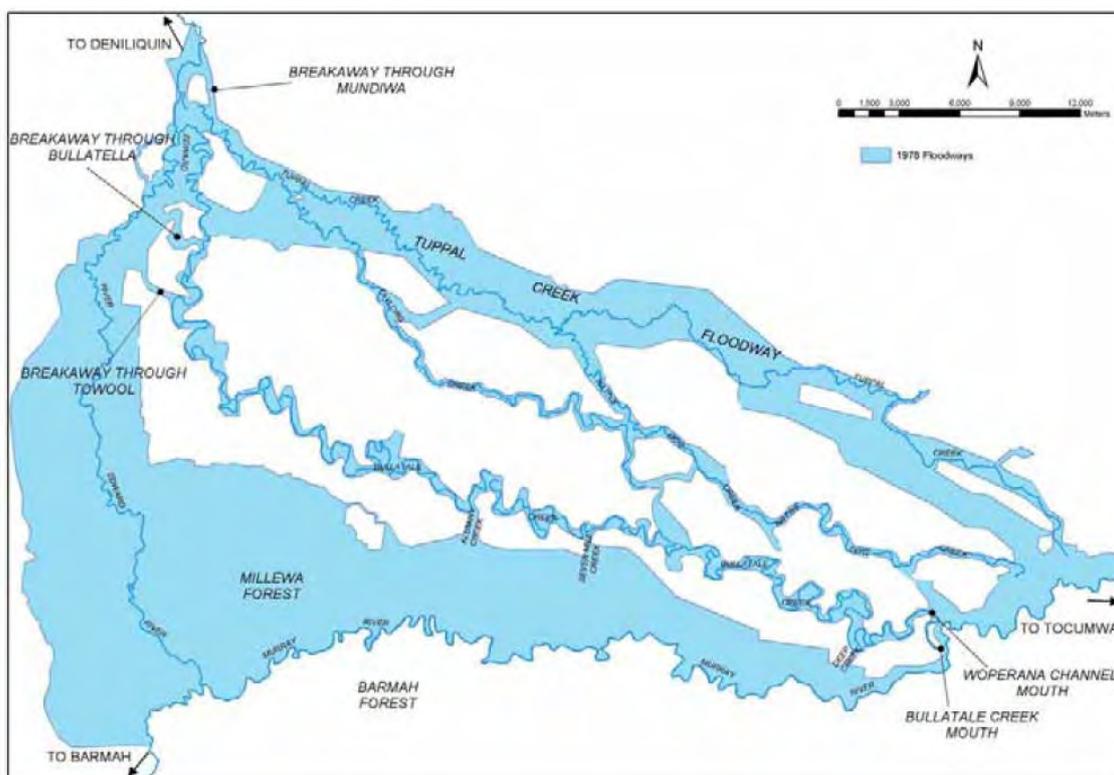


Figure 8: Tuppall and Bullatale Creeks (Murray River Uptake to Deniliquin) FMP 2004 floodplain

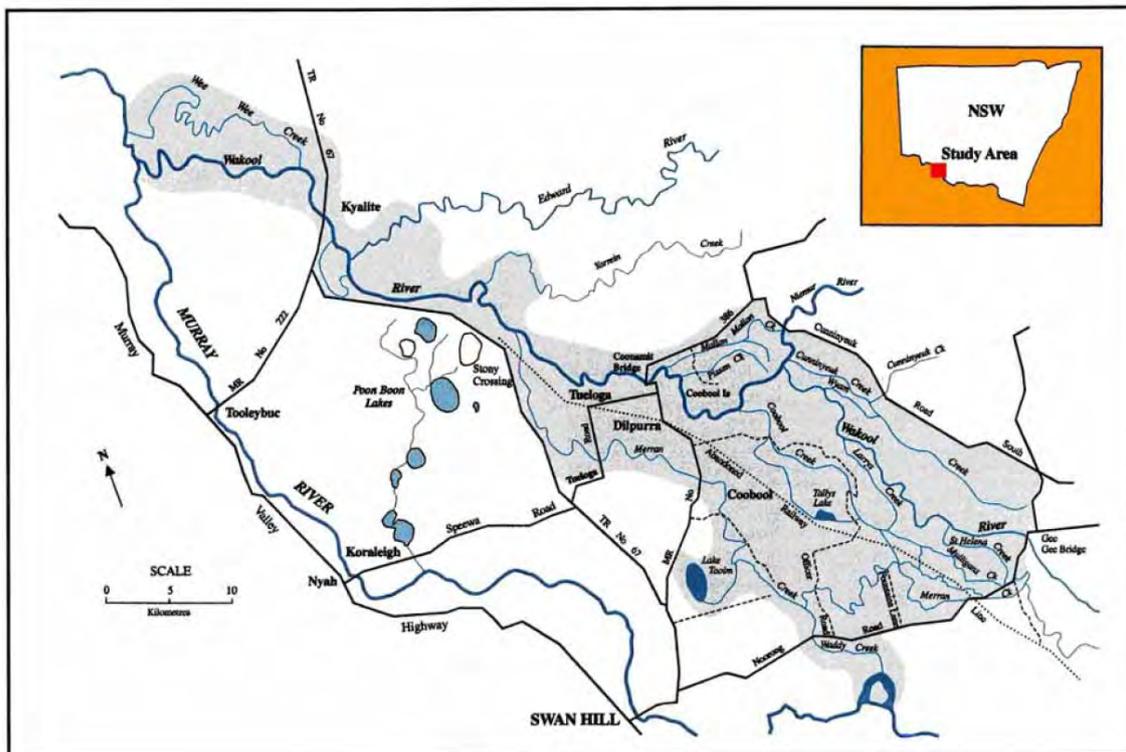


Figure 9: Edward and Niemur Rivers stage 4 (Noorang Rd to Wakool Murray Junction) FMP 2000 floodplain

Murrumbidgee FMP maps

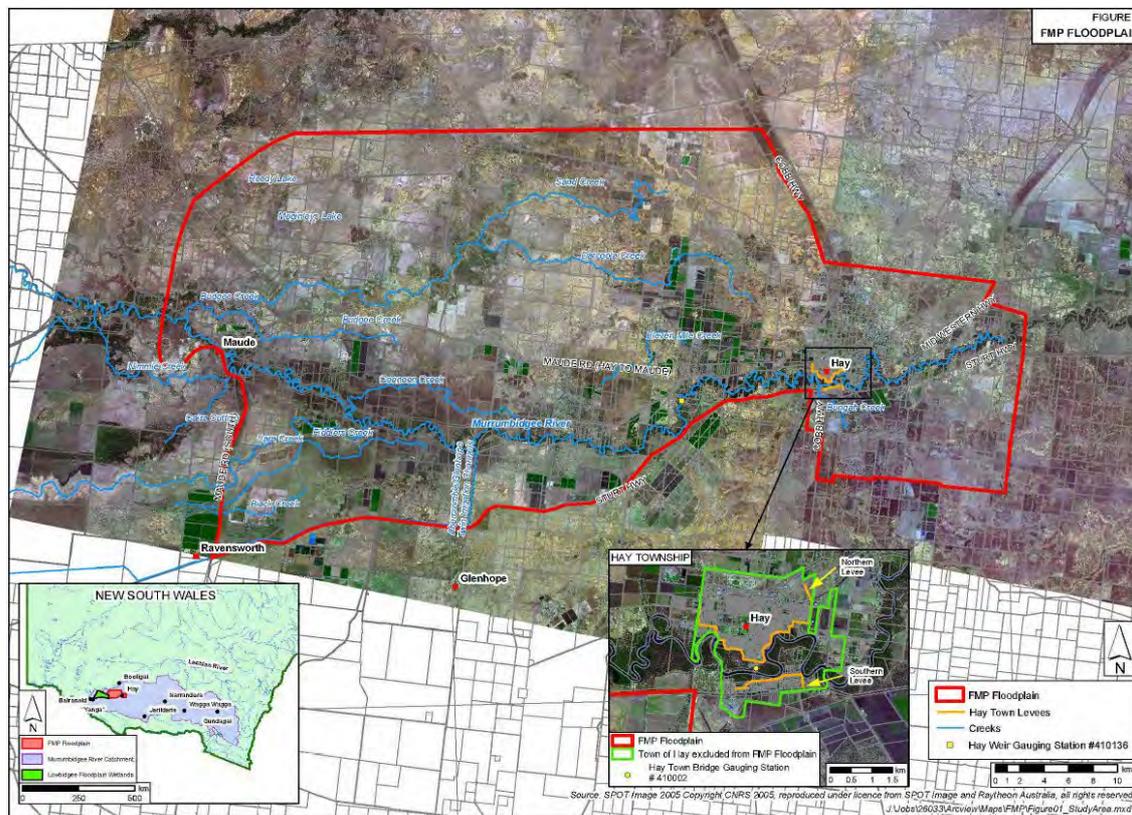


Figure 10: Murrumbidgee River-Hay to Maude FMP floodplain

