MACQUARIE EFFLUENT CREEKS ASSOCIATION
Central West NSW

[redacted]

7 November 2022

[redacted]
Department of Planning & Environment
4 Parramatta Square
PARRAMATTA NSW 2150

SENT VIA EMAIL TO [redacted]

Dear [redacted],

RE: PIPING OF THE EFFLUENT CREEKS UNDER DPIE DRAFT REGIONAL WATER STRATEGY - MACQUARIE-CASTLEREAGH

We refer to the above matter and look forward to our meeting today.

For your reference we have also annexed numerous snapshots from the Macquarie-Castlereagh Regional Water Strategy at the foot of this letter (Annexure A) which refer directly to the Macquarie Effluent Creeks Association (MECA) and the area we represent.

We understand our consultation today will be extremely important to the future of the effluent creeks. After submissions are complete on 18 November 2022, feedback will be considered and then the preferred actions will be finalised and implemented (see figure 1.1). The strategy has already determined (but with no evidence supplied by DPIE) that piping the Gunningbar, Duck and Upper Crooked Creeks meets a key regional challenge, passes a rapid cost-benefit analysis and a rapid environment assessment (page 116, point 9). Hence, time is of the essence.

We are of the belief that we are at a pivotal moment for the effluent creeks in the Macquarie Valley. If we do not act quickly, our lower network of creeks and rivers will become a pipeline and this will have a devastating impact on the native flora & fauna, the environment, agricultural land and the aboriginal culture & heritage of the area. We believe that our creeks are a key environmental, social and economic asset.

This strategy has been formulated to find efficiencies to supply the Macquarie Marshes, Regional Centres and Agriculture in other parts of the valley. Action 2.2 states that 'water savings' found from piping the creeks will be used to improve flows to the Marshes. It is our view that our environment should not be turned into a pipeline in order to allow another environment such as the Marshes to grow further. We believe the strategy is contradictory, hypocritical and counterintuitive. While the community consultation has themes of unconscionable behaviour.

For many years, we have been viewed as the smaller brother to the RAMSAR listed Macquarie Marshes. However, many of their world re-known landscapes are only 18km away and we share the majority of the same species of flora and fauna. We note that many attributes which make the Marshes special, can also be found along the effluent creeks – we simply do not have the same profile. We need to change that profile, change this strategy, and then start working on the rehabilitation of the creeks and its wetlands.

We have created this document to assist you in your amendments to the draft strategy. We've listed the key reasoning why, and then background of the area below;

RECOMMENDATIONS:

1. MECA requests removal of Action 2.2 of the Draft Strategy - which proposes a pipeline to replace the Gunningbar, Duck and Upper Crooked Creeks and return the system to variable' flows (See figure 1.2). We oppose any change to the permanent Regulated status of water in these Creeks.
2. MECA supports Action 2.4 of the draft strategy - which proposes investigations to improve connectivity to the Barwon Darling - which should include flows from the Gunningbar Creek and Lower Bogan (See figure 1.2).
3. MECA requests the replication of Action 4.2 and 4.8 of the Draft Strategy for the Effluent Creeks, which would lead to the restoration of creek beds (removal of silt and cumbungi) and protect and rehabilitate significant riparian, wetlands and floodplain areas along the creeks.

KEY REASONING:

1. **Lack of Consultation with stakeholders:**
   The Macquarie Effluent Creeks Association (MECA), Council and the Local Aboriginal Lands Council were not consulted prior to the short-listing of priorities in the draft. It seems the initial consultation engaged minimal stakeholders overall (see figure 1.3). With the proposed actions having significant impacts, this lack of consultation could be deemed unconsionable behaviour from DPIE.

2. **Consultation during a flood event:**
   The Effluent Creeks are currently experiencing large intermittent flooding event which has occurred since September 2022. Landholders along the creeks make up the majority of members within MECA. Due to the flooding, the Association has been unable to invest time in attending consultations or to make a submission. They we're only made aware of the strategy on 20 October, they held an extraordinary meeting on 31 October and engaged Associate Professor [redacted] on 3 November.

   This is not a satisfactory timeframe to make a submission on a strategy with such potential influence on the area. Further, there will be no community consultation sessions held in Nyngan or in Warren, but these Local Government areas will be impacted the most. Again the lack of consultation in the lower Macquarie Valley could be seen as unconscionable behaviour. We therefore seek an appropriate extension of time for our submission.

3. **Aboriginal Culture:**
   One of the strategies core objectives is to respect and protect cultures. The document states;
   "Aboriginal communities across NSW have told us that they need specific information on how the shortlisted actions will affect them."
   However, DPIE have not engaged the Nyngan Local Aboriginal Lands Council on the Draft Strategy and its effects on the effluent creeks in the area. The area holds a high cultural significance to our Aboriginal people, but DPIE have not given them specific information on

how a pipeline will degrade these sites. (See 'Background' section for more information and history).

4. **Protection of the Environment:**
   Another core objective of the strategy is that water sources, floodplains and ecosystems are protected. The effluent creeks area is rich in native flora & fauna similar to those species in the Marshes, which at their closest point is only 18km away.

   The creeks are rich in a diverse range of native birds, ducks, amphibians, fish and mammals. It is a breeding ground, watering point and sheltered habitat for our native fauna. If a pipeline is used to carry water, these species will move to another area, or worse will die. The proposed intermittent nature of flows from DPIE will create regular fish kills and boggy death traps for land-based fauna.

   The same sentiments can be used for the native flora, which is deep rooted along-side and within our creeks. Without water supply, these plants & trees will slowly die, and the environment will become barren. (See 'Background' section for more information on native flora and fauna).

5. **Equity in the Valley:**
   Fair and equitable sharing of water is also one of the strategies core objectives. If its own floodplains and wetlands are included in the measurement, the effluent creek system covers a land mass similar too, if not larger that than the Marshes. One environment is RAMSAR listed and award winning for its sparse shallow reed beds - the other is listed inefficient for its once deep natural channels & waterholes and the amount of water required to keep the environment replenished. (See 'Background' section for more information).

   MECA and the landholders of the area are tired of the bureaucracy involved in supporting the Effluent Creeks. The members all participate in meetings as unpaid volunteers and all have businesses to run. They can not afford to sit in monthly meetings on regulation and environmental flows. When our members are not present at these meetings, we are used as a proverbial punching bag for the rest of the valley's stakeholders such as the Macquarie Marshes and Macquarie Food & Fibre. Decisions are also made out of greed by other stakeholders on where our water can be used for their own gains.

   For example, under the strategy, water savings from the pipeline will not be used to provide stronger ephemeral flows to the creeks to flush out silt, but will be used elsewhere to grow other water holdings such as the Marshes and Irrigators. Another example is that DPIE is proposing the restoration of the riverbed in the Macquarie River and the Marshes, but will not assist in the restoration of the creek beds which they damaged with their own policies.

6. **Effect on Economy:**
   One of the strategies core objectives is to contribute to a strong economy.
   The economy of the Bogan Shire is heavily reliant upon two industries, mining and agriculture. Both industries heavily dependent upon water from the effluent creeks.

   The Tritton Mine at Girilambone requires 1-2megs a day to keep operations running. If the flow to the Tritton pump site stopped, the mine would be reliant on pumping its water from

the Bogan River which acts as a town water supply and is already stressed due to the dependence of the Nyngan and Cobar townships and their associated villages. If no water can be sourced, the Bogan Shires wealthiest business and largest employer would have to close.

Agriculture lines the sides of our effluent creeks, with the majority of landholders using the creeks for 'livestock and domestic' water. Cattle and sheep use the creeks for water and settle amongst the native trees, providing cover from pests and low-stress areas for lambing or calving. The floodplains and wetlands are shared between livestock and native fauna in a co-habituative nature. The Association believes that the creeks slow the effect of drought on the landscape. There are also four irrigation properties on the Gunningbar Creek and most landholders along the creeks hold low-security water licenses and could access water if ordered.

If the creeks were replaced by a pipeline, landholders believe that rural property prices would fall by over 30%, costing landholders hundreds of millions of dollars and compensation would be sought from DPIE for such a loss. It is also a key concern for Shire Councils with reduced income, employment and rates a reality.

7. **Maintain Regulated Status:**
   There is strong competition for water in the Macquarie Valley and this will only increase as our climate changes and demand tightens. The Association wishes to maintain the creeks regulated status to protect the area from other avaricious stakeholders in the Macquarie Valley.

   The lower Crooked Creek and the Talga Floodplain is an example where an unregulated status has destroyed part of the effluent creek system. The Lower Crooked Creek is supposed to experience one annual flow a year to fill waterholes and spread across the floodplain North of Canonba. Without this flow being regulated, the lower Crooked only experiences a flow once every 6-7 years when the rest of the system is flooding and is forgotten by other stakeholders. The Association has already lost this flow, we can not afford to lose our other creeks.

8. **Connectivity to within Murray Darling Basin (MDB):**
   Under action 2.4 of the draft, DPIE is exploring options to improve connectivity to the MDB. There are only two ways to access the MDB from the Macquarie Valley. Through the Gunningbar Creek and Lower Bogan, or through the Macquarie Marshes. (See background for more information)

   It is believed by most landholders that the Gunningbar Creek is the most efficient way to supply water to the Darling River from the Macquarie System. You can do so through the Marshes, but it requires bypass channels, re-routing and the water has to 'filter' through a number of reed-beds to make it through (i.e. many inefficiencies).

   If DPIE want to use the natural environment (with no man-made structures or channels) to carry water to the Darling River, then the Gunningbar and Duck Creeks are the appropriate delivery network. This would also have positive effects on the Lower Bogan River landholders.

9. **Aesthetics of the Landscape:**
   Many landholders have built their homes alongside the creeks and waterholes to experience riverine environment. If the creeks were run dry due the use of the pipelines, these waterholes would become foul-smelling and rancid due to associated fish kills, devaluing homes and destroying the liveability of the area. Further, the effluent creeks run like rich veins through our landscape, provide natural wind breaks and hydrate the land. If these creeks were destroyed, the mental health and wellbeing of residents in the area would be deeply affected.

10. **Costs of the Pipelines:**
    We are in the midst of conducting an audit on the number of landholders who are reliant on the effluent creeks for low-security or stock and domestic water. The task of auditing is difficult due to the large area that could be affected. The Creeks Association fear that due to the distance and numbers of offtakes required, the costs of installing such pipelines would be wasteful and exorbitant.

11. **The Consistent Flows to the Macquarie Marshes**
    The Macquarie Marshes generally receives its large environmental flows during winter and spring. However, the Macquarie River is consistently flowing and while the Marshes can reduce in size, the area is always kept wet. The Marshes were once reliant on ephemeral flows like the effluent creeks, but they will not be returned to the same ephemeral flows under this strategy. MECA believes this policy is therefore hypocritical and inequitable.

12. **Infrastructure Investments**
    MECA has invested large sums of money to upkeep the system. At landholders' own cost they constructed the Duck Creek Bypass Channel and the Beni-Billa Bypass Channel. These channels were created to ensure all micro-environments and landholders along the creeks received equitable flows. These large investments will be wasted if the creeks are piped. Landholders would be seeking compensation from DPIE for such a loss. These works also demonstrate a strong community spirit and involvement.

13. **Pipelines obstructing Waterways**
    Elsewhere in the valley, landholders have spent millions of dollars removing man-made infrastructure and barriers from alongside the Macquarie River and along its floodplains. This strategy aims at returning natural flows to the floodplains & waterways, giving it back to the environment. The draft strategy is counterintuitive to this successful work. Instead, DPIE will be building large pipelines which run across the landscape from property to property which will obstruct natural flows over land. They will also be taking water 'saved' from this environment and sending elsewhere. These actions in the future will be viewed as reckless and foolish by future generations.

BACKGROUND:

1.1 Aboriginal History:

Aboriginal occupation of the area and their use of its resources has occurred for at least 60,000 years, with the Wailwan, Wongaibon and Wiradjuri nations all sharing boundaries in the effluent creeks area. The Wailwan people held the largest land mass in the area, but these boundaries we're heavily contested over history[1]. This was especially the case when demand for food was tight in the west and so groups would venture to the north in search of waterholes along the creeks and into the Marshes. As late as 1889, a corroboree took place at Canonba[2].

There is strong evidence of this occupation remaining today, and the Aboriginal Community still has a strong attachment to the area. The creeks and its associated floodplains were used for many purposes. The people fished and hunted throughout the water rich environments and ate plants that grew in the area. The land besides the creeks and waterholes were used as campsites. Creeks were used for transport and recreation. There is evidence along the banks of these creeks with burial sites and scarred trees whose bark was used to make canoes and campsites. Artefacts such as axe-heads, spear-points, seed grinders and rolling stones can still be found.

1.2 European History:

European settlement of the Darling Riverine Plains region began following the early expeditions along the rivers in 1817. The river frontages along the Macquarie were taken up around the 1840's. Nyngan (or Nyingen as it was initially call) was first described by Major Mitchell in 1835 as an area having a long pond covered with aquatic weeds and supporting many birds, mainly ducks and brolgas (interpretation suggests this was the Bogan River).

After leaving Nyingen, Mitchell proceeded north where he recorded that he was greatly impressed by a creek with many ponds of water. This area is now known as "overflow country" on the Gunningbar Creek which extends right across to the Duck Creek to the Nyngan-Canonba Rd.

Mitchell returned to the area in 1847 on his third expedition and camped there for 2 weeks due to the reliability of the water on the Duck Creek. This reliable water led to the development of a village in the 1850's called Canonba, or colloquially as 'Brownstown' due to the major landholder being John Brown. A bridge across the Duck Creek was completed in 1874 and the tracks along the effluent creeks between Warren and Canonbar were heavily used by the Cobb and Co and livestock movements between Dubbo & Bourke. The area was so highly regarded due to its quality water between the Bogan and Macquarie Rivers and for that reason the town became the main settlement in the region west of Dubbo.[3]

1.3 Development and Regulation

Large Scale Irrigation development was facilitated by Burrendong Dam and areas of irrigated crops started to grow. Some of the major water management policy stages since that time included:

- Conversion of area based to volumetric irrigation entitlements in 1981
- Embargo on the issue of further irrigation entitlements 1982
- Macquarie Marshes Plans in 1986 and 1996
- 2004 Water Sharing Plan for the Macquarie and Cudgegong Regulated System

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[1] Nyngan on the Bogan

[2] "An Interesting Ceremony at Canonba, the Coronation of Jackey" – Armidale Express and New England General Advertiser, 17 December 1889, p.7.

[3] Plan of the Village of Old Canonba and Suburban Lands, *Trove*. Retrieved 27 September 2020.

The Marshes Plans and Water Sharing Plan successively confirmed the provision of regulated stock & domestic water supply and irrigation water to the Duck and Upper Crooked Creeks. The Plans also confirmed the stock and domestic replenishment flows to the lower Crooked and Marra Creeks.

These same plans confirmed the primacy of the Macquarie Marshes for receipt of environmental water from the Macquarie River, including the floodwaters from Burrendong flood mitigation zone.

There are currently four irrigators on the Gunningbar Creek below Warren. However, many landholders along these creeks hold low-security water licences.

1.4 The Effluent Creeks

An effluent creek is a water course which leaves the river and does not return to it. Historically the effluent creeks were ephemeral in nature, however they had water-holes ranging in sizes and depths which would hold the water until the next ephemeral flow.

Prior to the erection of Burrendong Dam, these creeks received fresh pulses from the Macquarie River and localised rain events which kept a healthy ecosystem in place. These creeks also feed floodplains such as the Talga Floodplain on the Crooked Creek, and the 'Green Swamp' or 'The Overflow' on the Gunningbar Creek.

Post Burrendong Dam, the creeks had an extended period of strong health and large allocations. The Talga Floodplain heavily benefited from these flows and was sustained a wetland for a large number of years without drying out (approximately 4000ac). However, with the introduction of irrigation and the demand for water increasing elsewhere in the catchment, these flows reduced over time. Now the Talga Floodplain receives a flow only sporadically every few years.

The Gunningbar, Duck and Upper Crooked Creek are now regulated. The Gunningbar is an offtake directly from the Macquarie above Warren which wraps around the town and then splits into the Duck and Crook Creeks. The Crooked Creek ends around Buckinguy, whilst the Gunningbar feeds the Beni-Billa Creek which links the Duck Creek and both the Gunningbar and Duck Creeks fall into the Bogan River above Girilambone. From there, the Bogan runs into the Barwon and into the Darling River.

It is believed by most landholders that the Gunningbar Creek is actually the most efficient way to supply water to the Darling River from the Macquarie System. You can do so through the Marshes, but it requires channels, re-routing and the water has to 'filter' through a number of reed-beds to make it through.

From verbal accounts of former landholder [redacted]), we know that during a drought in the 1930's the 'Water Department' planned to use the effluent creeks as most efficient way to deliver water from the Macquarie River to the town of Bourke on the Darling. It rained before the flow occurred, but it shows that previous generations understood the importance of the Creeks to the Murray Darling Basin.

You can see the current flowrates for the Creeks under this link; WaterInsights - WaterNSW

Being regulated streams, the creeks now have a constant slow flow. Whilst this made up for the loss of floodplains and larger pulses of water, over many years it has led to the creek beds becoming heavily silted. The slow flows have also led to the spread of native cumbungi which has slowed the flows further – choking the system and requiring maintenance to allow flows through. The slow-flows, silt and cumbungi has led to once deep waterholes being destroyed. This means that

ephemeral flows or pulses of water are unable to be efficiently captured and there are no natural reservoirs to supply the environment until the next flow.

There has been a number of studies on rehabilitating the creeks and its wetlands, but so far, we have not been a priority for the allocation of water. After years of trying to get Government Authorities to assist with the maintenance and rehabilitation, the MECA has now grown tired of meetings, bureaucracy and paperwork.

The Association is one of the oldest constituted water bodies in Western NSW and has been running since the mid 1940's. The group wants the next water strategy to either maintain the creeks until the next opportunity for change, but ideally, they would like to see a rehabilitation of the creeks in the longer term. In order to rehabilitate the creeks, the waterholes must be cleared of silt and the cumbungi reduced.

1.5 Ecology, Hydrology and the Environment

MECA has engaged Associate Professor [redacted] to complete a short research report prior to 18 November 2022. This report will include the effects of piping on the environment, native flora & fauna, creek beds, flood plains and future flows of the Gunningbar, Duck and Crooked Creeks. Local knowledge and past research provides the information below.

1.5.1 Native Fauna from the area:

There are a large number of native flora and fauna that are reliant upon our effluent creeks. Unfortunately, due to the lack of time for the submission we have not been able to complete a study of numbers, however from landholders records we do know that the following species live along the creeks environments.

Birds and Ducks

The birds and ducks of the effluent creeks are similar to the marshes. There are a large number of nests and rookeries. They include, but are not limited too;

1. Apostle bird	2. Honeyeater –blue faced
3. Babbler-grey crowned	4. Honeyeater - black
5. Babbler-chestnut crowned	6. Honeyeater –brown headed
7. Black fronted dotterel	8. Honeyeater-painted
9. Bowerbird – spotted	10. Honeyeater –singing
11. Brolga	12. Honeyeater –spiny cheeked
13. Budgerigar	14. Honeyeater- striped
15. Butcherbird-pied	16. Honeyeater- white fronted
17. Butcherbird-grey	18. Honeyeater-white plumed
19. Chat –orange	20. Ibis- straw necked
21. Chough-white-winged	22. Ibis- Australian white
23. Cockatiel	24. Jacky winter
25. Cormorant-little pied	26. Kestrel –nankeen
27. Cuckoo –black eared	28. Kingfisher-sacred
29. Cuckoo- fan-tailed	30. Kite- black
31. Cuckoo-horsfields bronze	32. Kite- black shouldered
33. Cuckoo-pallid	34. Kite-whistling
35. Cuckoo- shrike ground	36. Kookaburra -laughing
37. Cuckoo-shrike white-bellied	38. Lapwing –banded
39. Cuckoo-shrike black-faced	40. Lapwing –masked

41. Currawong- pied	42. Magpie –black backed
43. Dollar bird	44. Miner- noisy
45. Dove –diamond	46. Miner - yellow throated
47. Dove-peaceful	48. Nightjar – Aust. Owlet
49. Duck-Australasian shoveler	50. Nightjar - spotted
51. Duck –Aust. Shelduck	52. Oriole- olive backed
53. Duck- hardhead	54. Pardalote -striated
55. Duck –pink-eared	56. Parrot- blue bonnet (red vented)
57. Duck-pacific black	58. Parrot- eastern rosella
59. Duck-plumed whistler	60. Parrot - Mallee ringneck (buln-buln)
61. Duck-teal Aust. Grey	62. Parrot – red rumped
63. Duck-wood	64. Parrot – red winged (crimson wing)
65. Eagle-wedge tail	66. Parrot - superb
67. Egret -great	68. Pigeon - crested
69. Emu	70. Pigeon –bronze wing
71. Falcon -Aust.	72. Pipit – Richards
73. Falcon –little	74. Pratincole – Aust.
75. Falcon –stripe breasted	76. Rainbow bee eater
77. Fantail –grey	78. Raven –Aust. crow
79. Finch –double bar	80. Robin - eastern yellow
81. Finch –zebra	82. Robin –red capped
83. Flycatcher –restless	84. Robin –hooded (black and white)
85. Friarbird –little	86. Shrike-thrush - grey
87. Galah	88. Sittella – Varied
89. Goshawk –brown	90. Song lark –brown
91. Grebe- Australian	92. Song lark- rufous
93. Hawk –spotted harrier	94. Southern white brow
95. Heron –white faced	96. Starling –common
97. Heron – white necked	98. Swallow –welcome
99. Tawny frogmouth	100. Thornbill –chestnut rump
101. Triller –white winged	102. Thornbill – yellow rump
103. Wagtail –willy	104. Treecreeper –brown
105. Wee bill	106. Wren – purple backed
107. Whistler –rufous	108. Wren –superb fairy
109. Wood swallow –dusky	110. Wren –variegated
111. Wood swallow –masked	112. Wren –white winged
113. Wood swallow –white breasted	114. Quail –brown
115. Magpie Geese	116. Quail –little button

Amphibians and Reptiles

The frogs of the effluent creeks are similar to the marshes. We experience large breeding grounds of frog eggs each year; however European carp numbers have been detrimental. Our frogs include, but are not limited too;

1. Spade Footed Toad	2. Crucifix Toad
3. Green Tree Frog	4. Water Holding Frogs
5. Burrowing Frogs	6. Snake-necked Turtle
7. Carpet Python	8. Blue Tongue Lizard

9. Shingle-back Lizard	10. Goanna
11. Red Bellied Black Snake	12. King Brown Snake
13. Ghecko	14. Bandi-Bandi Snake
15. Legless Lizard	**More to be confirmed.**

Fish

The fish of the effluent creeks are similar to the marshes. They include, but are not limited too; Yellow Belly Bream, Boney Bream, Catfish, Crayfish and Murray Cod.

Mammals

The mammals of the effluent creeks are similar to the marshes. They include, but are not limited too; Eastern grey kangaroos, red kangaroo, wallaroo, swamp wallabies, wallabies, flying fox, fat-tailed dunnart, wombats, echidna, brushed-tailed possum, and multiple large colonies of river rats.

We hope that this information is sufficient to make an informed decision to support the Effluent Creeks submission.

Please do not hesitate to contact us if you have any queries.

We thank you for your ongoing support.

Kind Regards

[redacted]

ANNEXURE A:

Figure 1.1: Current Stage of Planning - Page 109 of Draft Strategy

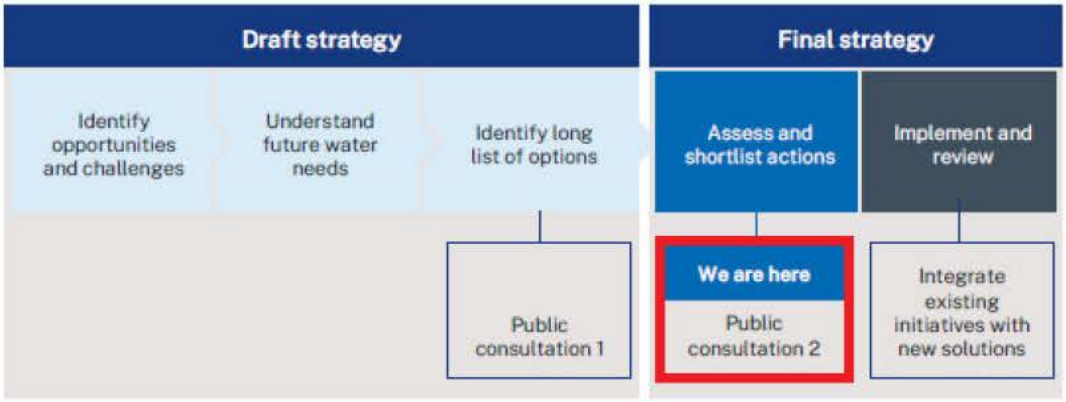


Figure 1.2: Priority 2.2 Summarised - Page 68 of Draft Strategy

Priority 2

Reduce water security risks in the region's west

Legend

- Reducing water supply risks for regional cities, towns and villages
- Supplying water to high priority needs in the lower river system and connected valleys
- Supporting a growing regional economy in a future of potentially reduced water availability
- Addressing barriers to Aboriginal water rights
- Maintaining and improving the health and resilience of the region's aquatic and floodplain ecosystems

Proposed action	Summary	Challenges addressed
Action 2.1 Investigate an additional off-river storage at Nyngan	Undertake detailed investigations for a third off-river, town water storage at Nyngan.	
Action 2.2 Create water savings through changed operation of regulated effluent creeks	Progress investigations to return the regulated Gunningbar, Duck and the upper part of Crooked Creek to a more variable flow regime with occasional periods of no flow, including alternative ways to supply water to the essential stock and domestic needs in dry periods through bores or pipelines.	
Action 2.3 Continue to investigate regional water security solutions for the lower Macquarie	Assess in detail the following options: • use some of the flood mitigation storage in Burrendong Dam for water supply • a new re-regulating weir in the mid-Macquarie (Gin Gin) • a regional pipeline connecting Dubbo to Nyngan and other towns.	
Action 2.4 Investigate ways to improve connectivity with the Barwon-Darling on a multi-valley scale	Develop the most effective coordinated options to improve connectivity across all Barwon-Darling tributaries through the Western Regional Water Strategy.	

Figure 1.3 Minimal Stakeholders Engaged in First Consultation - Page 70 of Draft Strategy

Figure 1.4 Elaboration on Proposed Action 2.2 – Page 70 of Draft Strategy

Proposed action 2.2: Create water savings through changed operation of regulated effluent creeks

Gunningbar Creek, Crooked Creek and Duck Creek all branch off the main trunk of the Wambuul/Macquarie River (refer to Figure 15) and are often termed as effluent creeks. Naturally, all 3 creeks would have flowed about 15% of the time. These creeks are now regulated and weirs on the Wambuul/Macquarie River and Gunningbar Creek allow water to flow into them whenever there is any flow in the Wambuul/Macquarie River, altering the ecological assets and processes that have now adapted to these conditions. As a result, it is rare for these creeks to stop flowing (Figure 16), and the ecological assets and processes have needed to adapt to these conditions.

Tritton mine, irrigation farms and livestock farmers rely on the water in these creeks. During dry periods large volumes of water are needed to deliver water to meet these needs. Supplying the stock and domestic needs on the effluent creeks through alternative means could save a substantial quantity of water that could be used to bolster town water security, be left in the river for environmental needs or support the drought resilience of industries.

This action proposes to return the Gunningbar, Duck and the upper part of Crooked Creek to a more natural regime with occasional periods of no flow. This action would be supported by investments in alternative ways to supply water to the essential stock and domestic needs in dry periods through bores or pipelines rather than the inefficient delivery of water down the creeks.

We have heard that the stock and domestic systems installed through irrigation networks such as in the Trangie Nevertire system, could be a good example to model these investments off. We also heard from councils that strategic lining of sections of the Albert Priest Channel followed by a further program of lining rest of the channel may be an option to consider.

This action would need to be supported by related ecological assessments and management actions, including a riparian fencing program. We have heard that many properties have come to rely on the creeks as 'fences' for stock movement, and for their aesthetic value in a dry landscape.

Changing the operation of Gunningbar, Duck and Crooked creeks could:

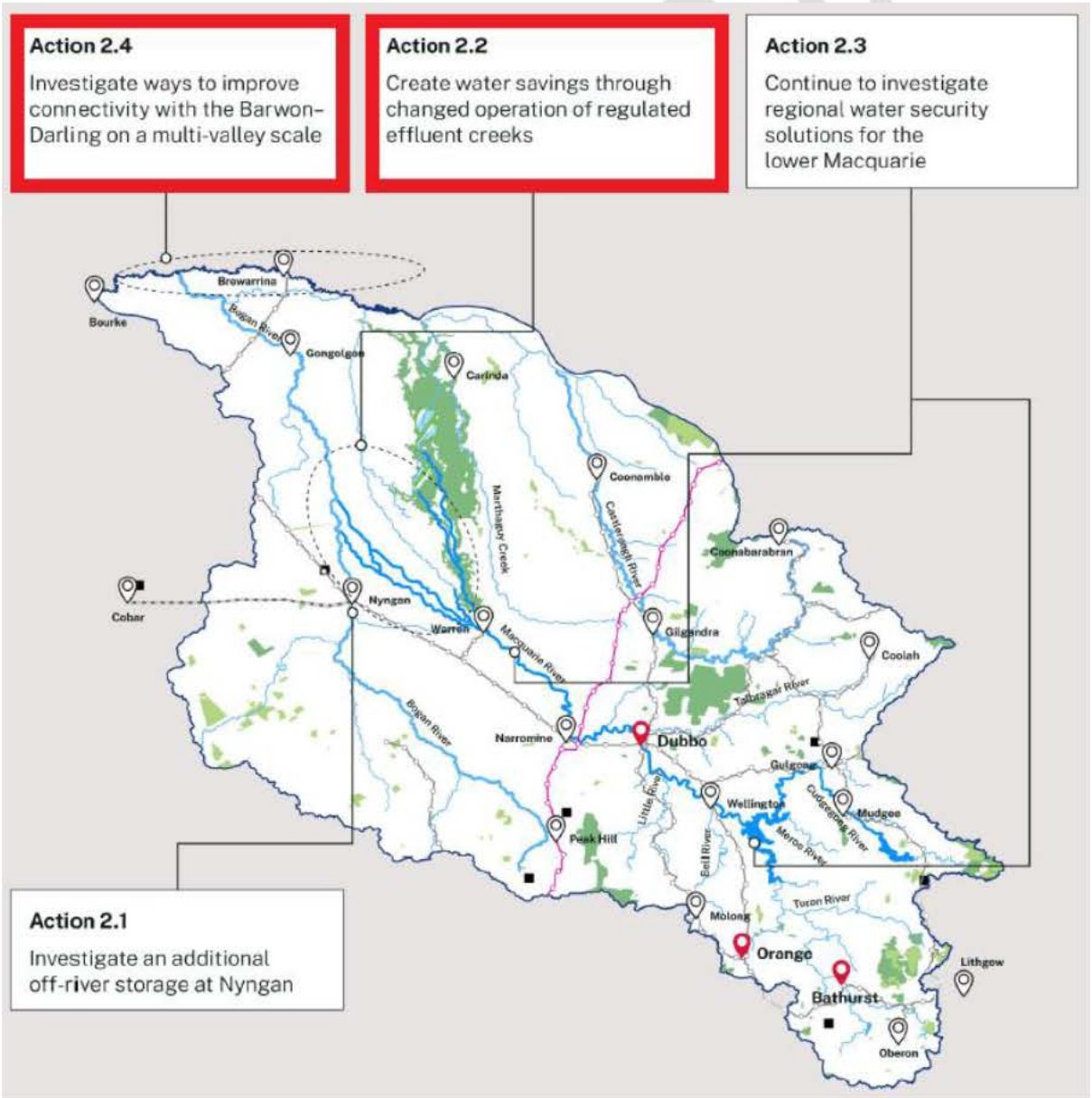
- save water that could be used for improved water supply reliability and flows into the Macquarie Marshes
- allow for more reliable water supplies for stock and domestic and high priority licences during times such as the recent drought when flows down the creeks had to be cut off.

Next Page (Page 71 of Draft Strategy)

There have been several previous investigations into this option that included technical analysis and consultation. There continues to be concerns from landholders about reduced access to creeks. Implementing this action will involve:

- identifying current stock and domestic users and needs for each creek, and evaluating potential alternative methods of supply (such as piping, bores, tanks and troughs)
- identifying the major stock users on each creek and determining the timing and volume of water they require
- identifying potential impacts, including environmental implications, and consulting with landholders, water users and key stakeholders
- upgrading the Macquarie River system model to more accurately estimate potential water savings from the options identified[49]
- confirming funding and ongoing operation and maintenance of any new works.

Figure 1.5 Map of Area and proposed Actions – Page 70 of Draft Strategy



From: [redacted]
To: [redacted]
Cc: DPIE W Regional Water Strategies Mailbox; [redacted]
Subject: Macquarie Effluent Creeks Association (MECA) Response I Draft Regional Water Strategy - Macquarie Castlereagh (Extension Granted)
Date: Monday, 28 November 2022 11:43:28 AM
Attachments: 2. MECA Formal Submission.pdf
1. MECA Submission Questionnaire.pdf
Importance: High

Good Morning [redacted],

Thank you for granting the extension to respond to this important proposal.

Please find attached the Creeks Association (MECA) response to the Draft Regional Water Strategy - Macquarie Castlereagh document.

1. The Questionnaire response from MECA
2. MECA Formal Submission to strongly oppose Action 2.2

Please do not hesitate to contact myself or [redacted] should you have any questions.

Regards,

[redacted]

MACQUARIE EFFLUENT CREEKS ASSOCIATION

Central West NSW

Submission:
New South Wales Department of Planning and Environment,
Draft Macquarie-Castlereagh Water Strategy

18 November 2022

Figure 1: Superb Parrot on Crooked Creek (Courtesy of [redacted]

[redacted]

[redacted]

[redacted]

On behalf of the Macquarie Effluent Creeks Association (MECA), I would like to thank you for reading our submission. Our Creeks are the lifeblood of our region and a defining characteristic for our landscape.

It is home to over 116 varieties of water & woodland birds, 14 varieties of frogs, multiple native fish, reptiles, and mammals. Additionally, its home to over 40 different members of our association who rely on the creeks for agricultural use and wish to preserve the area for future generations. They are integral to our economy, environment and our wellbeing. We also recognise the strong history, culture, and connection which our local Aboriginal people have with this land.

We hope this submission clearly expresses our position on the current draft plan and then provides a way forward through various strategies. Our vision is to maintain and rehabilitate a healthy creek system in the lower Macquarie. We look forward to working with you to achieve this.

[redacted]

[redacted]

[redacted]

We thank the Department of Planning and Environment for their second round of consultation. Having now built a relationship with your staff, MECA looks forward to working alongside DPIE to ensure our effluent creeks health becomes a priority within the Macquarie-Castlereagh finalised water strategy.

Although we are opposed to some of the proposed strategies, we also see this as a fantastic opportunity to raise our profile with the Government and other stakeholders in the area.

We share many characteristics with the world renown RAMSAR-listed Macquarie Marshes – but our area often feels neglected and forgotten. We hope the strategy can assist in changing that status.

Our goal of this submission is to maintain our regulated status and then work with you to restore and rehabilitate our creeks.

[redacted]

[redacted] is an Associate Professor in Aquatic Ecology [redacted]

He has experience working as an Associate Professor with the University of Southern Denmark and as a Senior Research Fellow with the University of New England.

In both 2009 and 2011 [redacted] provided snapshot assessments of Crooked, Duck, Marra and Gunningbar Creek and the lower Macquarie River between Carinda and close to its outflow into the Barwon River.

[redacted] also has extensive experience in wetlands and watercourses similar to the effluent creeks, having carried out studies on fish and water chemistry [redacted]

[redacted] has supplied the environmental, ecological and hydrological analysis within this submission.

Contents:

I. Background

The **Macquarie Effluent Creeks Association** (MECA) represents approximately 40 riparian landholders along seven creek channels. We are one of the oldest continuous water user bodies in western New South Wales, having been in operation since the mid-1940s.

Our members undertake a mix of irrigated and dryland cropping and floodplain grazing of livestock. We cover the regulated Gunningbar, Duck and Bena Billa creeks, the partially regulated Crooked Creek, and the unregulated Sandy, Belaringar and Marra creeks.

This submission first outlines our understanding of the flow management challenge for the Lower Macquarie Effluent Creeks System (hereafter LMECS), the history and current ways of use of this channel system, and its key environmental assets.

Last, we propose, as a way forward, a new management framework for flows along the LMECS and to support the generation of further knowledge on this ecosystem to support this framework. We propose to undertake this as a genuine partnership with the State Government and appropriate university expertise.

Figure 2: Great Egret on Crooked Creek, one of the many waterbirds which call the LMECS home (Courtesy of [redacted]

II. Key Recommendations

Considering the evidence below, MECA makes the following recommendations on the draft strategy;

1. **That DPIE <u>remove of Action 2.2</u> of the Draft Strategy - which proposes a pipeline to replace the Gunningbar, Duck and Upper Crooked Creeks and return the system to variable' flows. We oppose any change to the permanent Regulated status of water in these Creeks.**
2. **MECA <u>supports Action 2.4</u> of the draft strategy - which proposes investigations to improve connectivity to the Barwon Darling - which should include flows from the Gunningbar Creek and Lower Bogan (See figure 1.2).**
3. **MECA <u>requests the replication of Action 4.2 and 4.8</u> of the Draft Strategy for the LMECS, which would lead to the restoration of creek beds (removal of silt and cumbungi) and protect and rehabilitate significant riparian, wetlands and floodplain areas along the creeks.**

Figure 3: Native Rakali or Giant Water Rat which have many nests along the LMECS. A large colony can be found at the Killarney waterholes. (Courtesy [redacted])

III. Issue:

The Draft Macquarie-Castlereagh Regional Water Strategy proposes to alter the ways in which flows are shared across the lowland portion of the Macquarie River catchment. It includes Priority 2 to *Reduce water security risks in the region's west*.

Our interest is particularly in the proposed action 2.2, namely to *Create water savings through changed operation of regulated effluent creeks.* The central objective here is to investigate the *return [of] the regulated Gunningbar, Duck and upper part of the Crooked Creek to a more variable flow regime with occasional periods of no flow, including alternative ways to supply water to the essential stock and domestic needs in dry periods through bores or pipelines*.

These changes are proposed to create water savings from the effluent creeks system that could be (among other things) used to *improve water supply reliability and flows into the Macquarie Marshes*.

Our Association welcomes improved ways by which to manage the flow delivery to agricultural industries and ecological assets throughout western parts of the Macquarie catchment. Moreover, we recognise the importance of flow connectivity among lower Macquarie sub-catchments and between these channels and the Barwon River downstream.

However, we contend that the proposed flow management changes are contradictory and counterintuitive to the State Government's objective of improving the community, industry and environmental sustainability throughout our creek system, in particular, and across western New South Wales more broadly.

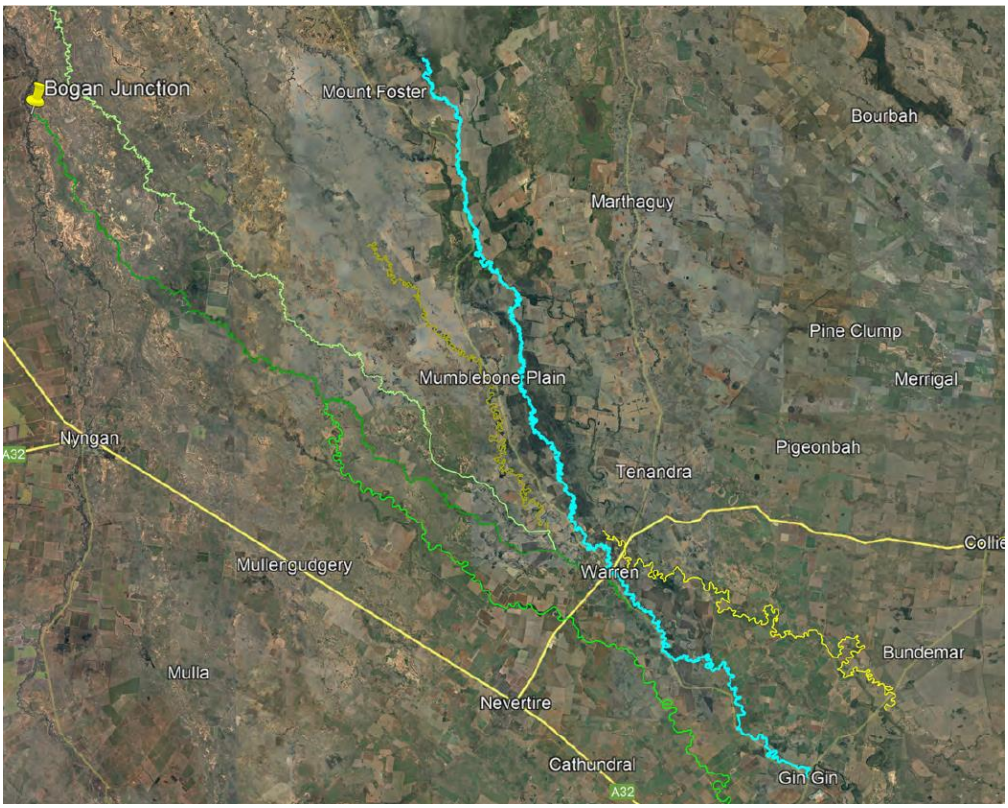


Figure 4: Satellite Image of the Macquarie Effluent Creeks which consists of over 1000km of stream channels

IV. The Structure of the Effluent Creeks

The LMECS is a lowland distributary channel network whose flows were historically of a highly ephemeral nature prior to regulation from Burrendong Dam and various downstream fixed-crest weirs from the late 1960s. The Gunningbar Creek flows off the Macquarie River slightly upstream of Warren, and the Duck and Crooked creeks depart from the Gunningbar shortly thereafter.

Further downstream, both the Gunningbar and Duck creeks provide an inter-catchment transfer of flows into the Bogan River. Upstream of Warren, the Belaringar Creek flows from the Macquarie River and into the Gunningbar Creek. Downstream of Warren, the Marra Creek also flows from the Macquarie River. It receives additional flow from the Crooked Creek about a third of the way downstream before eventually extending to the Barwon River.

The LMECS region has a network of significant aquatic ecological assets. This includes an extensive floodplain system, with large floodplain wetlands, numerous in-channel waterholes and a number of weir pools behind existing in-channel regulatory structures (Figure 5). The main floodplains with extensive wetland areas are the 'Talga' floodplain along the Crooked Creek, the Tipperary Creek floodout and 'Eenaweena' floodplain along Duck Creek, and the Green Swamp and Nyngan Overflow floodplains along

the Gunningbar Creek. Around 12 significant waterholes still exist along the LMECS, as do weir pools along each of the regulated watercourses. In this modified landscape, these all represent significant aquatic ecological assets that should be considered in any flow management planning.

Agricultural activities have utilized the LMECS region for over 160 years, including livestock grazing, dryland cropping and, more recently, irrigated cotton. The LMECS has a long history of use by Aboriginal nations as well. The Wongarbon and Wailwan Tribes have their traditional Country across the downstream portions of the LMECS, while the Wiradjuri Tribe's Country is upstream. (See 'History' on page 20 for more information).

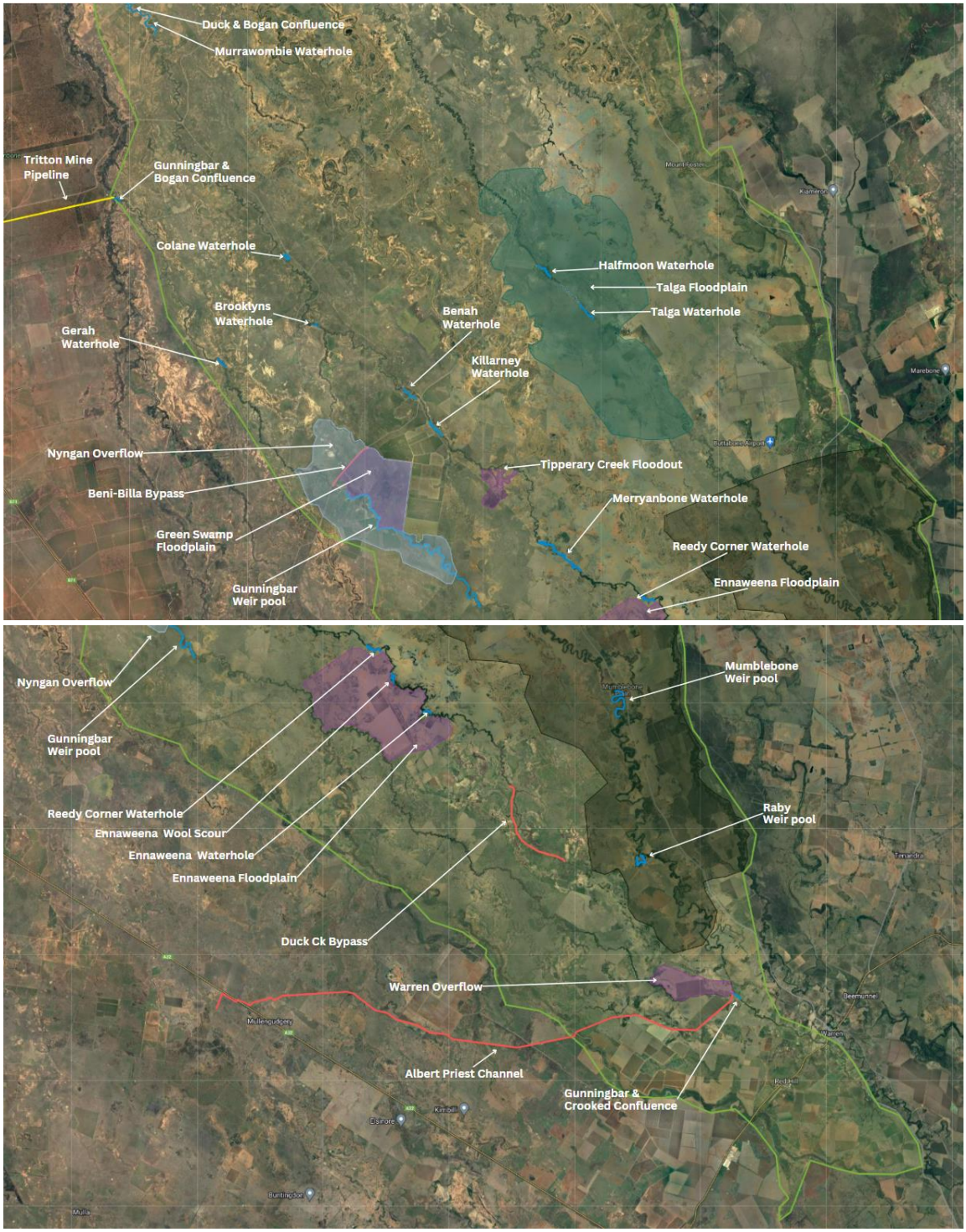


Figure 5: Satellite imagery indicating the location & extent of key floodplains, channels & waterholes throughout the LMECS region. The first image largely covers northern sites, while the second includes southern sites mostly not included in the first map. The outer boundary of the LMECS catchments is indicated in green in both images. A full image can be seen on the last page of this report.

V. Current Management of the Effluent Creeks Ecosystem

Figure 6: Duck Creek below Colane Station (Courtesy [redacted])

Flows along the LMECS are now largely regulated. The Gunningbar Creek receives regulated flows off the Macquarie River slightly upstream of Warren, and the Duck and Crooked creeks depart from the Gunningbar Creek shortly thereafter. Downstream of the 'Mumblebone' weir pool, flows along the Crooked Creek are essentially unregulated.

Similar to other regulated parts of the lowland Murray-Darling Basin, regulated portions of the LMECS have higher low-flow rates than was the case historically. This has increased the extent of in-channel aquatic habitat but likely decreased the aerial extent of floodplain wetlands. The ecological significance of this is discussed below. Current delivery of stock and domestic flows to downstream LMECS reaches requires approximately 23 ML in order to deliver 1 ML. Indications from Water NSW suggest the LMECS use around 10-15 GL a year.

VI. Review – existing public ecological knowledge of the Lower Macquarie effluent creek system

The LMECS now comprises over 1,000 km of semi-permanent stream channels with some permanent refuge pools. Flows along these channels support over 12,000 ha of riparian vegetation, including threatened groundwater-dependent ecosystems. They also service over 200,000 ha of the broader Macquarie-Bogan floodplain, and provide the only contiguous environmental corridor linking the Cobar Peneplain Bio Region in the west with the Brigalow Belt South Bio Region in the east. These features make the creeks a unique environmental asset to the region.

Figure 7: Salmon Striped Frog on Crooked Creek (Courtesy of [redacted])

The LMECS channels have a highly sinuous fluvial geomorphology, with an average channel sinuosity of 1.96 (range: Sandy Creek, 1.40, to Ewenmar Creek, 2.78). The limited knowledge of aquatic assemblages suggests a typical fish fauna for lowland western New South Wales channel systems (Table 1). Although the bulk of the observations in Table 1 were from quantitative sampling, the information presented here is in a presence-absence format. In addition, yabby (*Cherax destructor*) and freshwater prawn (*Macrobrachium australiense*) crustaceans are widespread throughout the LMECS (G. Wilson, pers. comm.). However, some fish species were unexpectedly absent (Australian smelt, *Retropinna semoni*; Murray rainbowfish, (*Melanotaenia fluviatilis*) or far less widespread (carp gudgeon, *Hypseleotris* sp.) in comparison to similar channel systems such as the Macquarie Marshes or Lower Gwydir (e.g. Wilson et al., 2009). It needs to be stressed that these observations are limited by being either a snap-shot assessment of only very few sites or else are from anglers whose records are biased towards their larger target species. Nevertheless, the species present (and as yet undetected) suggest that maintaining LMECS channel flows with some enhanced variability will be essential to improving these assemblages.

We are aware of only two lots of water chemistry sampling from four of the LMECS channels, although these were from 2009 and 2011 (Table 2). Sampling of the Lower Macquarie River in October 2009 was during an extensive drought period and turbidity was extremely high, conductivity moderate, and dissolved oxygen levels were variable. In mid 2011, following a flood period, turbidities were far lower but conductivity and dissolved oxygen levels were higher. Water temperatures reflected the differences in seasonal timing of the two sampling periods, while pH levels were similar over the study period and

between watercourses. Collectively, although the patterns suffer from the snap-shot nature of the assessment, the data suggest that allowing LMECS channels to dry down will lead to substantial declines in water quality.

Figure 8: Brolga's Dancing on the Talga Floodplain at 'Halfmoon' (Courtesy [redacted])

Few bird data exist specifically from the LMECS region, with the most observations available from 'Halfmoon' on the Crooked Creek (Table 3). Nevertheless, the LMECS may have been include in landscape-scale aerial survey by NSW NPWS and University of New South Wales researchers. Although the 'Halfmoon' data only of a qualitative presence-absence nature, they still suggest substantial species diversity throughout the region. Many of the species are connected to either wetlands, riparian zones or stream channel habitats, and a number of them are listed at state, national or international levels as being of high conservation concern (see also below). Again, a loss of in-channel flows will likely substantially impact this scenario.

Figure 9: Due to limited high flows, cumbungi has 'choked' parts of the creeks and increasing siltation. This reed requires large costs and permits to manage.

A survey of riparian plant assemblages and redgum population structure along the regulated portion of Crooked Creek was undertaken for the State Water Corporation by the consultancy firm Cardno (Cardno Ecology Lab, 2011). The data are relatively limited but indicate a diverse assemblage although mostly small diameter at breast height (dbh) population size structure for the dominant redgums.

Cardno Ecology Lab (2011) also provided brief comments on macrophyte presence along the regulated Crooked Creek. To the best of our knowledge, this is the only published survey information for these assemblages within the LMECS area.

Cumbungi (*Typha*) was found to the most widespread macrophyte along the study region and landholder observations confirm a similar pattern along other LMECS channels. Dense stands of cumbungi have formed along some channels, which is problematic as they restrict waterflow, increase the rate of siltation, and both produce and trap large amounts of organic matter which can reduce water quality through decomposition. Cumbungi also outcompetes with other native plants.

Floating macrophyte species like Pacific azolla (*Azolla* sp.) and duckweed (*Lemna* sp), emergent species like water couch (*Paspalum distichum*), spikey rush (*Juncus* and *Eleocharis* spp.), giant reed (*Phragmites australis*), and other species like ribbonweed (*Vallisneria*), water primrose (*Ludwigia repens*) and slender knotweed are also present.

Figure 10: Scar tree on Belaringar Creek (Courtesy of [redacted]

Table 1. Summary of known observations of fish species presence in the LMECS. Lower Macquarie River, Gunningbar Creek, Crooked Creek and Marra Creek sites were sampled in October 2009 and May-June 2011 as part of Torrible et al. (2011). Observations from Duck Creek, the Gunningbar – Duck Creek confluence and Murray cod and eel-tailed catfish at Fairview were from local angler feedback.

Species		Watercourse											
		Lower Macquarie River				Gunningbar Creek	Duck Creek			Crooked Creek		Marra Creek	Gunningbar and Duck creeks
Common name	Scientific name	Binghi Bridge	Glenacre	Riverview	Yanda	Fairview	Benah	Merryanbone	Killarney	Illabunda	Halfmoon	Williwarrina	confluence, on Murrawombie
Murray cod	*Maccullochella peeli*					✔	✔						✔
yellowbelly	*Macquaria ambigua*	✔	✔		✔							✔	
silver perch	*Bidyanus bidyanus*							✔	✔				
eel-tailed catfish	*Tandanus tandanus*					✔			✔				
moonfish	*Neosilurus hyrtlii*	✔	✔		✔							✔	
spangled perch	*Leiopotherapon unicolor*	✔	✔	✔	✔	✔				✔	✔	✔	
carp gudgeon	*Hypseleotris sp.*	✔		✔		✔					✔		
bony bream	*Nematolosa erebi*	✔	✔	✔	✔	✔						✔	
European carp	*Cyprinus carpio*	✔	✔		✔	✔				✔	✔	✔	
goldfish	*Carassius auratus*	✔	✔		✔	✔				✔	✔	✔	
mosquitofish	*Gambusia holbrooki*									✔		✔	

Table 2. Summary of known observations of water quality in the LMECS. Data are from G. Wilson and obtained using a Horiba water quality meter.

Timing	Watercourse	Site	Water temperature (°C)	Turbidity (NTU)	pH	Conductivity (µS)	Dissolved oxygen ($mg.L^{-1}$)
October 2009	Lower Macquarie River	Binghi Bridge	18.6	999	8.30	438	3.80
		'Glenacre'	21.7	999	8.14	348	7.70
		'Riverview'	29.7	999	7.84	514	6.35
May-June 2011	Lower Macquarie River	'Glenacre'	13.5	133	8.12	840	8.90
		Binghi Bridge	12.1	141	8.10	840	8.31
		'Yanda'	12.2	107	8.21	828	9.95
	Marra Creek	'Williwarrina'	15.0	303	8.37	609	11.30
	Crooked Creek	'Illabunda'	17.1	90	8.49	548	12.50
		'Halfmoon'	13.0	60	8.38	460	7.62
	Gunningbar Creek	'Fairview'	15.9	70	8.18	899	9.82

Table 3. Summary of observations of 115 bird species from the property 'Halfmoon' on the Crooked Creek. Data were obtained from Mr Michael Kennedy, 'Halfmoon'.

Apostle bird	Finch –double bar	Parrot- eastern rosella
Babbler-grey crowned	Finch –zebra	Parrot - Mallee ringneck (buln-buln)
Babbler-chestnut crowned	Flycatcher –restless	Parrot – red rumped
Black fronted dotterel	Friarbird –little	Parrot – red winged (crimson wing)
Bowerbird – spotted	Galah	Parrot - superb
Brolga	Goshawk –brown	Pigeon - crested
Budgerigar	Grebe- Australian	Pigeon –bronze wing
Butcherbird-pied	Hawk –spotted harrier	Pipit – Richards
Butcherbird-grey	Heron –white faced	Pratincole – Aust.
Chat –orange	Heron – white necked	Quail –brown
Chough-white-winged	Honeyeater –blue faced	Quail –little button
Cockatiel	Honeyeater – black	Rainbow bee eater
Cormorant-little pied	Honeyeater –brown headed	Raven –Aust. crow
Cuckoo –black eared	Honeyeater-painted	Robin - eastern yellow
Cuckoo- fan-tailed	Honeyeater –singing	Robin –red capped
Cuckoo-horsfields bronze	Honeyeater –spiny cheeked	Robin –hooded (black and white)
Cuckoo-pallid	Honeyeater- striped	Shrike-thrush - grey
Cuckoo- shrike ground	Honeyeater- white fronted	Sittella – Varied
Cuckoo-shrike white-bellied	Honeyeater-white plumed	Song lark –brown
Cuckoo-shrike black-faced	Ibis- straw necked	Song lark- rufous
Currawong- pied	Ibis- Australian white	Southern white brow
Dollar bird	Jacky winter	Starling –common
Dove –diamond	Kestrel –nankeen	Swallow –welcome
Dove-peaceful	Kingfisher-scared	Tawny frogmouth
Duck-Australasian shoveler	Kite- black	Thornbill –chestnut rump
Duck –Aust. Shelduck (Killarney)	Kite- black shouldered	Thornbill – yellow rump
Duck- hardhead	Kite-whistling	Treecreeper –brown
Duck –pink-eared	Kookaburra -laughing	Triller –white winged
Duck-pacific black	Lapwing –banded	Wagtail –willy
Duck-plumed whistler	Lapwing –masked	Wee bill
Duck-teal Aust. Grey	Magpie –black backed	Whistler –rufous
Duck-wood	Miner- noisy	Wood swallow –dusky
Eagle-wedge tail	Miner - yellow throated	Wood swallow –masked
Egret -great	Nightjar – Aust. Owlet	Wood swallow –white breasted
Emu	Nightjar - spotted	Wren – purple backed
Falcon -Aust.	Oriole- olive backed	Wren –superb fairy
Falcon –little	Pardalote -striated	Wren –variegated
Falcon –stripe breasted	Parrot- blue bonnet (red vented)	Wren –white winged
Fantail –grey		

VII. Species or assemblages of higher conservation concern across the study area

The LMECS is known to harbour a number of species and vegetation communities of high conservation concern that are represented in State or Commonwealth legislation or that are subject to international conservation agreements. We consulted the IUCN Red List, the Commonwealth EPBC Act and associated Species Profile and Threats Database, and the NSW Threatened Species list.

The vegetation communities and species below are all likely to be impacted by proposed changes to the current flow-delivery arrangements. We provide brief notes as to how we perceive any impacts could occur.

Figure 11: Magpie Geese on the Talga Floodplain (Courtesy of [redacted]

Threatened Ecological Communities under New South Wales environmental protection legislation

The following vegetation types occur throughout the LMECS region, and are recognised as Threatened

Ecological Communities as part of the Darling Riverine Plain Bioregion in New South Wales:

Carbeen Open Forest Community – occurs throughout the Castlereagh-Barwon Interim Biogeographic Regionalisation of Australia Sub-region, in association with the Floodplain Transition Woodlands.

Coolibah-Black box Woodland – found on self-mulching clay soils, areas of ephemeral floodplain wetland and along channel riparian zones. It occurs extensively across the North-west Floodplain Woodlands across lignum woodland floodplain wetlands and in the adjacent open woodlands.

Figure 12: Red Vented Blue Bonnet at 'Halfmoon' (Courtesy [redacted])

Each of these communities depends upon floodplain inundation for processes such as shoot growth, seed production and new plant recruitment. Reducing in-channel flows will make managed over-bank flooding a much harder task.

Murray cod, *Maccullochella peelii* A species which is making a come-back throughout much of the Murray-Darling Basin, although still requires considerable management to sustain population viability. It is long-lived and spawns in response to seasonal rises in water temperature. It lays demersal eggs on hard surfaces such as redgum snags following upstream spawning migrations. Eggs are guarded by the male adult until shortly after hatching, after which larvae then require appropriately-timed in-channel flows for drifting downstream for their dispersal and recruitment. Post-juvenile life history stages would rely upon any remaining deeper pools with the LMECS as refugia. Locally, we are aware of recent captures of Murray cod from Gunningbar Creek at 'Fairview', from Duck Creek at the 'Benah' homestead waterhole and on 'Murrawombie' at the confluence of the Bogan River and Gunningbar and Duck creeks. Loss of in-channel flows during spring would have a significant impact on the capacity for adult upstream migration and subsequent egg survival and downstream larval drift.

IUCN Red List – Least Concern/Increasing
EPBC – Vulnerable
NSW – Not listed

Silver perch, *Bidyanus bidyanus* A species with a very limited distribution throughout most parts of the Murray-Darling Basin, and now subject to no-take fishing rules within the Murray-Darling Basin. It is long-lived, and thought to spawn and maximise recruit survivorship during spring-summer flow pulses. Post-juvenile life history stages would rely upon any remaining deeper pools with the LMECS as refugia. This species has been recently caught at sites along Duck Creek at the 'Merryanbone' homestead waterhole/weir pool and at the 'Killarney' homestead waterhole and weir pool. A loss of in-channel flows during spring-summer in particular would significantly impact annual recruitment in this highly-threatened species.

IUCN Red List – Near Threatened/Stable
EPBC – Critically Endangered
NSW – Fully protected from fishing in western-flowing catchments

Eel-tailed catfish, *Tandanus tandanus* This species has a broad distribution throughout most parts of the Murray-Darling Basin, albeit mostly in low abundances, and is now subject to no-take fishing rules within the Murray-Darling Basin. It is long-lived and spawns in response to seasonal rises in water temperature. It lays demersal eggs in a benthic nest, which is guarded by the male adult until shortly after hatching. Larvae then require appropriately-timed in-channel flows for drifting downstream for their dispersal. Post-juvenile

life history stages would rely upon any remaining deeper pools with the LMECS as refugia. Catfish are known from the 'Fairview' weir pool on the Gunningbar Creek and the 'Killarney' homestead waterhole and weir pool on Duck Creek. We believe that abundances have dropped greatly due to the silt and high European carp numbers.

IUCN Red List – Least Concern/Stable
EPBC – Not listed
NSW – Fully protected from fishing in western-flowing catchments

Koala, *Phascolarctos cinereus* Koalas are largely tree-based but rely heavily on floodplain inundation in two ways. First, during drought times, they utilize surface water for drinking but, second, obtain their moisture from *Eucalyptus* foliage which requires ground moisture to maintain tree health. These trees are often dependent on overland flows to top up any soil moisture derived from antecedent rainfall. We are extremely concerned that, similar to the waterbirds scenario below, the proposed new flow delivery rules will significantly impact the local koala population.

IUCN Red List – Vulnerable/Decreasing
EPBC – Endangered
NSW – Endangered

Australian bustard, *Ardeotis australis* This large land-based bird occurs throughout inland Australia, albeit in far lower abundances than historically. In NSW, it is now largely restricted to the north-western catchments and this is thought to be the only breeding area within the State. Its current distribution includes the LMECS region. Although the preferred habitat is mostly sand ridges and other areas of higher elevation, such as the carbeen woodlands, it is still heavily dependent upon natural surface water sources for drinking. We are concerned that, similar to the waterbirds scenario below, the proposed new flow delivery rules will significantly impact the local bustard population.

IUCN Red List – Least Concern/Decreasing
EPBC – Not listed
NSW – Endangered

Australasian bittern, *Botaurus poiciloptilus* This is a wetland heron-like species associated with floodplain wetland habitats. It is particularly found around permanent wetlands with dense vegetation such as cumbungi (*Typha*) or spike rush (*Eleocharis*) in which it nests. It was estimated in 2008 and 2016 that there is likely to be less than 1000 mature individuals remaining in Australia, some of which have been observed in recent years within the LMECS region. Loss of options for supporting flows into LMECS floodplain channels and wetlands to maintain breeding habitat patches would be detrimental to local population viability.

IUCN Red List – Endangered/Decreasing
EPBC – Endangered
NSW – Endangered

Magpie goose, *Anseranas semipalmata* This and the following two species are iconic floodplain wetland birds from northern Australia. They were all once widespread throughout lowland portions of the Murray-Darling Basin, but are now rarely sighted here — hence their Vulnerable or Endangered status at the state level. In the LMECS region, all three are seen to varying degrees when wetland inundation occurs. There have been numerous sightings along the Duck Creek at 'Benah', 'Killarney' and at the 'Merryanbone' and 'Reedy Corner' waterholes. They are also common at the 'Halfmoon' and 'Talga' waterholes on the lower Crooked Creek. Brolgas are common within all parts of the LMECS area, but jabiru are rare. Our observations suggest that in-channel flows are also used by all three species.

IUCN Red List – Least Concern/Stable
EPBC – Not listed
NSW – Vulnerable

Brolga, *Grus rubicunda*

IUCN Red List – Least Concern/Decreasing
EPBC – Not listed
NSW – Vulnerable

Black-necked (or Jabiru) stork), *Ephippiorhynchus asiaticus*

IUCN Red List – Near Threatened/Decreasing
EPBC – Not listed
NSW – Endangered

Darling River snail, *Notopala sublineata* This medium-sized aquatic snail was once widespread throughout the lowland Murray-Darling Basin is almost become extinct across most of its previous distribution. However, it still occurs in smaller channels and ephemeral wetlands with less flow-regulation and lower carp abundances. Given its cryptic nature and size, its presence in LMECS channels is unknown but should be considered as part of future aquatic biodiversity assessments. This would help identify where increased flow variability can be best reinstated in this channel system.

IUCN Red List – Endangered/Unknown trend
EPBC – Not listed
NSW – Critically Endangered

Superb parrot, *Polytelis swainsonii* The superb parrot occurs throughout inland NSW, its population is highly fragmented and less than 5000 breeding pairs are now thought to be left in the wild. It particularly lives along riverine corridors and nests in tree hollows of species like river redgum or coolabah but also relies on riparian areas for foraging on various seeds and fruits. It is regularly sighted along the Gunningbar, Duck and Crooked creeks.

IUCN Red List – Least Concern/Increasing
EPBC – Vulnerable
NSW – Vulnerable

Threatening processes

We acknowledge that New South Wales has since May 2002 viewed alteration to the natural flow regime of watercourses, floodplain and wetlands as a key threatening process. We address this point further in our proposed framework for future flow deliveries, below.

VIII. The effluent creek system in the broader lowland Macquarie catchment context

The LMECS channels and floodplain are an essential part of the broader lowland portion of the Macquarie River catchment. Indeed, the 'West Marsh' wetland area was identified by Ren et al. (2010) as an integral part of the broader Macquarie Marshes. This area includes parts of the Milmiland, Marra, Crooked and Duck creeks. These authors also indicated that the 'West Marsh' is over 100,000 ha in area, of which around half is subject to flooding. This area would be increased if Gunningbar Creek floodplain wetlands were included. The regulated LMECS channels create a hydrological link across the region supporting vital environmental processes while also meeting landholders needs.

Figure 13: Flooding on the Lower Gunningbar Creek at 'Gerah' (Courtesy of [redacted])

Despite this importance of the LMECS and its floodplain, there has been virtually no research focus on the LMECS although a significant body of work does exist from the nearby Macquarie Marshes. The details above indicate the limited information that we are aware of on fish, water chemistry, birdlife and vegetation from the LMECS ecosystem. In comparison, Professor Richard Kingsford and colleagues from the University of New South Wales and staff from the Science Unit of the NSW Department of Planning and Environment have completed numerous projects on the Macquarie Marshes' ecology. Topics have particularly included those below, listed with some examples of past reporting. The two central points are (1) that a lot of information is lacking on the LMECS region, which is a substantial barrier to understanding the flow requirements of this ecosystem; and (2) that flow variability and delivery along channels and the inundation of floodplain wetland areas is essential for ecosystem health in regions like that of the LMECS.

Wetland flooding and wetland health Modelling of flow variability and the associated wetland flooding has been examined by Ren et al. (2010) and Thomas et al. (2011, 2015). These studies have demonstrated the importance of flow variability to flooding patterns across the Macquarie Marshes, and the importance of this link to maintaining ecological integrity across western New South Wales floodplain ecosystems. Bino et al. (2015) extended this work further to look at the integrity of wetland vegetation in the Macquarie Marshes between dry and wet periods. Again, the importance of wetland flooding was confirmed for the health and structure of wetland vegetation. It would be expected that similar relationships would occur across the LMECS region.

Aquatic foodwebs Kelleway et al. (2010) compared the trophic position of fish and crustacean species in the Macquarie Marshes (and Lower Gwydir Wetlands) and between before and after flow events. They found a significant effect of in-channel flow events on food-webs in these ecosystems. For the Macquarie Marshes, the trophic position of yabbies varied significantly with distance downstream, indicating that flow deliveries into downstream reaches is vital to channel ecological integrity.

Fish assemblages and recruitment [redacted] and colleagues undertook research on how flow conditions influence the recruitment of native and introduced fish species in Macquarie Marshes channels. Rayner et al. (2009) monitored fish assemblages before and after a managed environmental water release. They found that species diversity increased significantly after the flow event, although that abundances of introduced species were 3x that of native fishes. Rayner et al. (2015) investigated a further environmental flow release into the Macquarie Marshes albeit in late winter when water

Figure 15: Bandy-Bandy snake at 'Halfmoon' on Crooked Creek (Courtesy of [redacted]

Figure 14: Frog egg's at 'Halfmoon' on Crooked Creek (Courtesy of [redacted]*)*

Figure 16: Common Spade Foot Toad at 'Halfmoon' on Crooked Creek (Courtesy of [redacted]*)*

Figure 17: Baby Eastern Long-necked Turtle at 'Halfmoon' on Crooked Creek (Courtesy of [redacted]

Figure 18: White-faced Heron at 'Halfmoon' on Crooked Creek (Courtesy of [redacted]

temperatures were low. It was found that the colder water at this time of the year promoted the recruitment of introduced species over that of native species.

Figure 19: Pink Earred Duck at 'Halfmoon' on Crooked Creek (Courtesy of [redacted]

Waterbirds Declining flooding patterns have also been identified as having a large effect on waterbird populations. Kingsford & Thomas (1995) found that 86% of variability in floodplain flooding was explained by the volume of water released into the Macquarie Marshes, and that waterbird population structure was closely influenced by wetland inundation. A similar importance of maintaining flows into the Macquarie Marshes was concluded by Kingsford & Johnson (1998) and Kingsford & Auld (2005).

IX. Impacts on Industry, Aesthetics, Infrastructure & Eco-tourism

Impact on Industry

One of the strategies core objectives is to contribute to a strong economy. The economy of the Bogan Shire is heavily reliant upon two industries, mining and agriculture. Both industries heavily dependent upon water from the LMECS.

Figure 20: Tritton Copper Mine Operations (Courtesy of [redacted]

The Tritton Mine at Girilambone requires 1-2megs a day to keep operations running. It pumps this water from the confluence of the Gunningbar Creek and Bogan River, which is large waterhole on the effluent creeks. If the flow to the Tritton pump site stopped, the mine would be reliant on pumping its water from the Bogan River which acts as a town water supply and is already stressed due to the dependence of the Nyngan and Cobar townships and their associated villages. If no water can be sourced, the Bogan Shires wealthiest business and largest employer would have to close.

Agriculture lines the sides of our effluent creeks, with the majority of landholders using the creeks for 'stock and domestic' water. The LMECS area is renown across Australia for its merino studs and stations, which include Egelabra, Buttabone Stud Park, Raby, Mumblebone, Eenaweena, Merryanbone and Colane.

Sheep and cattle use the creeks for water and settle amongst the native trees, providing cover from pests and low-stress areas for lambing or calving. The floodplains and wetlands are shared between livestock and native fauna in a co-habituative nature. The Association believes that the creeks slow the effect of drought on the landscape. There are also four irrigation properties on the Gunningbar Creek and most landholders along the creeks hold low-security water licenses and could access water if ordered.

Figure 21: Egelabra Merino Stud in a nationally re-known breeder situated along the LMECS area. (Courtesy [redacted])

MECA has held an initial consultation with a property-valuer, and they have advised that if the LMECS were replaced by pipelines, rural property prices in the area would fall by over 30%. This would lead to millions of dollars in losses for landholders and compensation would have to be sought for the loss. It is also a key concern for Shire Councils with reduced income, employment and rates a reality.

Impact on Aesthetics of the Landscape:
Many landholders have built their homes alongside the LMECS and their waterholes to experience riverine environment. If the creeks were run dry due the use of the pipelines, these waterholes would become foul-smelling and rancid due to associated fish kills, devaluing homes and decreasing the livability of the area. The LMECS run like rich veins through the landscape, providing natural wind breaks and hydrating the land. If the LMECS were piped, MECA believes the mental health and wellbeing of residents in the area would be deeply affected.

Figure 22: The Merryanbone Homestead and Infrastructure on the weir-pool of the Duck Creek (Courtesy of [redacted])

Infrastructure Investments
MECA has invested large amounts to maintain the LMECS system. At landholders' own cost they constructed the Duck Creek Bypass Channel and the Beni-Billa Bypass Channel. These channels were created to ensure all micro-environments and landholders along the creeks received equitable flows. These large investments would be wasted if the creeks were piped. Landholders would again have to seek compensation for such a loss.

Figure 23: Part of the Duck Creek Bypass at Eenaweena (Courtesy of [redacted])

Impact on Recreation Fishing, Camping and Ecotourism
The LMECS are used by many recreational fishermen including the Gunningbar Fishing Club. Campers are often littered along various sites along the creeks and the area has fantastic potential for ecotourism, which could lower the financial impacts of drought in the future.

X. Inequities in the Macquarie Catchment

Varying policy treatment:
Fair and equitable sharing of water is another core objective of the strategy. The LMECS with its associated floodplains and wetlands covers a land mass similar too, if not larger, than the Macquarie Marshes. At their closest point the two environments are only 18km apart and originate from the same river. The Marshes are RAMSAR listed and award winning for their sparse shallow reed beds. Meanwhile the LMECS are described as inefficient for their once deep natural channels & waterholes and the small amount of water required to keep their environment replenished.

MECA and the landholders of the area are tired of the bureaucracy involved in supporting the LMECS. The members all run their own businesses and participate in meetings as unpaid volunteers. They are unable to afford to sit in monthly meetings on regulation and environmental flows. Unfortunately, when MECA are not present at these meetings, decisions are made by other stakeholders such as the Macquarie Marshes Environmental Landholders Association and Macquarie Food & Fibre. These stakeholders do not have the best interests of the LMECS at heart.

Figure 24: Two Hardhead Ducks on the waterhole at 'Halfmoon' (Courtesy of [redacted])

These interests often influence policy. For example, under this strategy the water savings from building a pipeline will not be used to provide stronger ephemeral flows to the LMECS to flush out siltation, but will be used elsewhere to grow other water holdings such as the Macquarie Marshes. Another example, is this

strategy proposes the restoration of the riverbed in the Macquarie River and Marshes, but has not considered assisting with the restoration of the creek beds along the LMECS.

Figure 25: A raft of Plumed Whistling Ducks the on waterhole at 'Halfmoon' (Courtesy of [redacted]

Generally, the Macquarie Marshes receives large environmental flows during winter and spring. However, the Macquarie River consistently flows, therefore while the Marshes can reduce in size, an area is always kept wet (unless the river is stopped when Burrendong reaches 1%). The Marshes were once reliant on ephemeral flows similar to the LMECS, but they will not be returned to the same ephemeral flows under this draft strategy. Unfortunately, by comparing these varying treatments of the LMECS and the Marshes many inequities become apparent.

Regulated status protects:

MECA notes the strong competition for water in the catchment and understands that it will only increase as the climate changes and demand tightens. MECA wish to maintain the Gunningbar, Duck and Upper Crooked Creeks regulated status to protect them from other stakeholders/competitors in the catchment.

Unfortunately, flow variability is non-existent without an allocation or support from the Macquarie Cudgegong Environmental Advisory Group (EWAG). Due to competing interests in the catchment, EWAG does not prioritise the LMECS. This is illustrated through EWAGS lack of support for unregulated parts of the LMECS such as the lower Crooked Creek and the Belaringar Creek which only experience flows once every 6-7 years when the whole valley is in flood. It is further illustrated by the lack of high flows along the LMECS during years of average rainfall and dam heights. There is a strong fear, that if the Gunningbar, Duck and Upper Crooked Creek were deregulated, they would not be prioritized by EWAG and their allocation would be used for other stakeholders.

Pre-Burrendong and regulation, the LMECS did experience variable flows, but evidence suggests that these flows would have been larger in volume then the current regulated flows which the LMECS receive. Burrendong now catches these traditional variable flows, and this has resulted in the LMECS losing a net amount of water annually. This net loss was then redistributed to other stakeholders in the catchment. Due to this, MECA have to protect the small regulated flows it still receives.

Figure 26: Sacred Kingfisher in tree on Talga Floodplain (Courtesy of [redacted]

XI. Future flow delivery into the Lower Macquarie effluent creeks and partnership for knowledge-generation

MECA wishes to be a part of the solution with future flow and ecosystem management across the LMECS region and is a firm advocate for decisions to be based on the best available science. We have reviewed what ecological knowledge is publicly available on the LMECS, considered the current ecological state of our channel and floodplain ecosystems, and considered the State Government draft proposal for how to manage future flows into our region. The following framework outlines our proposal for the management and guidance of stock and domestic and other flows into the LMECS under a finalised *Macquarie-Castlereagh Water Strategy*.

A framework from the MECA for future flow deliveries into the LMECS

Below is our outline of how we wish to see flow deliveries planned for our region into the future. We base this on seven key principles:

1. We recognise the presence of the above **threatened species and vegetation communities** throughout the LMECS region, and the need to safeguard species population viability and to avoid any loss in the distribution of species or vegetation communities;
2. That there is a **substantial history of flow regulation** into the LMECS and other threats that have led to wetland loss and declining riparian condition;
3. That past levels and patterns of flow regulation have led to increased **channel siltation** and substantial in-filling of deep waterholes;
4. That past flow management has led to the **shaping of aquatic and floodplain assemblages** around the current extent of surface water across the LMECS region;
5. That there are **challenges with the conveyance of stock and domestic flows** into downstream reaches of the LMECS but that transmission losses along upstream reaches have likely environmental benefits that are rarely unacknowledged,
6. That the LMECS channels and floodplains are **valuable ecological assets** in their own right, and that any **future volumetric savings** from the LMECS should be retained for use in the LMECS and not elsewhere; and
7. That the **current knowledge** of ecological status and responses to flow variability throughout the LMECS is inadequate to base future flow management rules on to achieve reliable local outcomes for this ecosystem.

We propose that the State Government does **not proceed** with the piping of stock and domestic flows to LMECS landholders. We feel that the piping process would not only be detrimental to the ecological health of the LMECS channels, but that it would also risk cultural sites. Moreover, given the low knowledge base for the LMECS ecosystem and the presence of the above threatened species and vegetation communities, this policy would be **contrary to the precautionary principle** of environmental management. Instead, we seek an alternative decision process for the immediate future.

Figure 27: Black Swans on the Duck Creek at "Reedy Corner" (Courtesy of [redacted]

However, we do encourage the **adoption of increased flow variability** along LMECS channels, within the constraints of future water availability. We do not wish to see LMECS channels dry out but believe that increasing flows through environmental water allocation could assist with improving LMECS water quality over the longer term through sediment reduction in foot of the channel. We also wish to avoid the loss of any deep in-channel waterholes, but rather to retain and improve these sites as essential aquatic biodiversity refugia.

It is our view that regulated LMECS flows have supported a water-dependent ecosystem that:

1) is near-natural and unique environment that provides vital habitat;
2) supports Commonwealth, state or territory listed threatened species and communities; and
3) as currently managed, is capable of supporting, significant biodiversity.

Beyond stock and domestic uses of flow deliveries into the LMECS, we wish to see two environmental benefits from future flow deliveries along the LMECS channels. The first is the maintenance and improvement of floodplain wetlands such as those of the 'Talga' Floodplain, Green Swamp and The Overflow. Second we would like to better understand the extent of in-channel ecological responses to flow deliveries, such as shifts in water chemistry and assemblages of fish and/or other faunas. Last, we are also willing to support the rehabilitation of channel environments, especially in relation to deep waterholes

being enhanced or in some cases reinstated. We would encourage and support desilting measures to enhance flow conveyance efficiencies, as well as cumbungi/*Typha* control if and where desirable.

Generating new scientific knowledge to guide the above framework

As noted above, the ecological knowledge being used to propose new flow-management processes for the LMECS has originated almost entirely from other western New South Wales channel systems or brief snap-shot assessments along LMECS channels. While a general understanding of the life history of individual floodplain species can be derived from a wider geography, meaningful relationships between flow variability and ecological processes, assemblages or habitat characteristic can only to be established locally. Our Association proposes to work in genuine partnership with the State Government and university expertise to help strengthen the scientific knowledge base directly from the LMECS ecosystem.

The LMECS offers a valuable opportunity from which to develop a stronger understanding of ecological responses to a variable flow regime in smaller western New South Wales floodplain ecosystems. It has multiple regulated and unregulated channels in close proximity to each other, as well as the partly regulated Crooked Creek, with both channel and floodplain wetland environments. The regulated channels offer an opportunity to manipulate flows in parallel to conditions in other regulated and unregulated channels to develop the strongest understanding possible of ecological responses to varying flow conditions. This should include the chance to compare various flow scenarios under any proposed future flow rules.

Figure 28: Talga Floodplain in Flood on 'Talga' (Courtesy of [redacted]

As a landholder and water user association, we are willing to support the generation of new knowledge on the ecology and rehabilitation of the LMECS and its associated floodplain wetlands. Some of the topics that we would be willing to consider partnerships for are listed below. We recognise that vegetation and bird knowledge is also badly lacking for the LMECS, but have focused on the ecology of wetland and in-channel habitats given that they would be directly affected by any altered flow management:

1) How do fish communities differ between LMECS channels, and can any patterns be related to exiting flow, physical habitat or water chemistry conditions? *Past surveys that were are aware of have been single snap-shot assessments of very few sites and without measurement of flow or other variables to allow consistent patterns and their variability to be characterised.*
2) What responses in the LMECS channels and adjacent floodplains can be achieved by managed flow pulses and/or natural flow events? *This could focus on a range of parameters, from water chemistry to aquatic fauna and flora to sediment characteristics.*
3) What is the ecological condition of sediments, vegetation and frogs in the main wetland systems alongside the LMECS channels? *Rehabilitation of wetland areas will require a baseline understanding of patterns in their ecological characteristics and how they vary in space and over time.*
4) Can effective mechanisms be trialed along LMECS channels to support the control of noxious species like European carp? *Netting techniques and options for cage structures at weirs have been used to reduce carp abundances from southern parts of the Murray-Darling Basin and along larger channels than those in the LMECS. We would like to explore the efficacy of these options along LMECS channels.*

We would welcome discussions with potential partners on any of these, in a spirit of collaboration and a shared desire to see improvements to the status of our surrounding environment.

XII. Options for Final Macquarie-Castlereagh Water Strategy:

Figure 29: Little Pied Cormorant at 'Halfmoon' on the lower Crooked Creek (Courtesy [redacted]

Considering the above information, MECA wish to work with DPIE on the following strategies for the LMECS area:

1. **DPIE supporting the Gunningbar, Duck and Upper Crooked Creeks to maintain their regulated status.**

2. **A negotiation to be held between MECA and DPIE regarding drought operation measures and the level of Burrendong Dam when flows to the LMECS may cease. MECA currently believes that flows should cease when Burrendong reaches 1.5% and wish to solidify a framework for these measures.**

3. **That DPIE support MECA's request to obtain a small allocation of environmental water from the Commonwealth Water Holder annually to increase flow variability in the creeks with some larger flows.**

4. **DPIE to supply funding to generate scientific knowledge of the LMECS area. The nominal figure of $30,000 for 3 years to support a PhD student from the University of Newcastle (or alike) is proposed by MECA.**

5. **DPIE to supply annual funding for the maintenance of Duck Creek Bypass and the Beni-Billa Bypass to increase efficiencies.**

6. **DPIE to supply annual funding for the eradication of cumbungi in the LMECS stream channels (supplying frog-friendly Roundup Biactive).**

7. **DPIE and MECA to partner to explore ways to remove silt from waterholes and weir pools to increase flow efficiencies. This option may require earthworks and excavation.**

Figure 30: Crucifix Toad at 'Halfmoon' on the lower Crooked Creek (Courtesy of [redacted]

In all instances, MECA will attempt to collaborate and negotiate with DPIE to reach an outcome which is in the best interests of the LMECS and the Macquarie-Castlereagh Catchment. We look forward to future consultations and working together to find a way forward.

XIII. History:

1.1 Aboriginal History:

Aboriginal occupation of the area and their use of its resources has occurred for at least 60,000 years, with the Wailwan, Wongaibon and Wiradjuri nations all sharing boundaries in the effluent creeks area. The Wailwan people held the largest land mass in the area, but these boundaries we're heavily contested over history. This was especially the case when demand for food was tight in the west and so groups would venture to the north in search of waterholes along the creeks and into the Marshes. As late as 1889, a corroboree took place at Canonba.

Figure 31: A portrait of a large group of Aboriginal Men and Women from 'Bogan River Tribe' (Courtesy of [redacted])

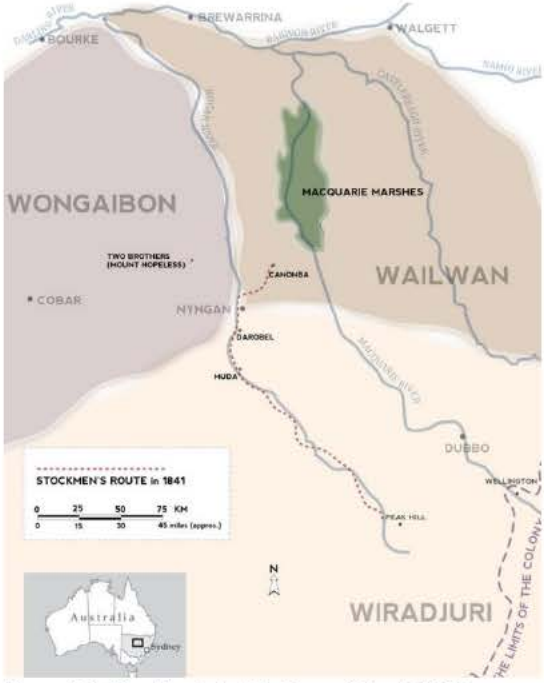


Figure 32: The Aboriginal Nations of the LMECS area

There is strong evidence of this occupation remaining today, and the Aboriginal Community still has a strong attachment to the area. The creeks and its associated floodplains were used for many purposes.

The people fished and hunted throughout the water rich environments and ate plants that grew in the area. The land besides the creeks and waterholes were used as campsites. Creeks were used for transport and recreation. There is evidence along the banks of these creeks with burial sites and scarred trees whose bark was used to make canoes and campsites. Artefacts such as axe-heads, spear-points, seed grinders and rolling stones can still be found.

1.2 European History:

European settlement of the Darling Riverine Plains region began following the early expeditions along the rivers in 1817. Explorer and surveyor John Oxley led an expedition through the LMECS area in 1818.

The descriptions of vegetation provided by Oxley for this area indicate a flat open terrain covered with acacia and eucalypt scrub with dense lignum and low shrub nearer the river (Whitehead 2004). Oxley's descriptions include:

"The country was still extremely flat and perfectly overrun with acacias, dwarf box (eucalyptus), some species of suffruticore attriplex and other shrubs;"

"The appearance of the country was much the same as yesterday; the whole ground we pass over being liable to flood and covered with eucalyptus or gum tree, acacia pendula and various other species of the extensive genus, one of which appeared quite new but not in flower. Four or five miles back from the river (east), the country rises and is not flooded, the soil being there much inferior, but covered with fine cypresses."

"The country this day was as various as can be imagined; low but not level; in some places covered with acacia pendule, chenopodiaceae, and polygonium juncium; and in others with good gum and box trees."

"Emus and Kangaroos are in abundance; but we have lately caught no fish, owing most likely to the coldness of the weather. Various birds altogether unknown to us were seen; and although the leading plants were the same as those found through nearly all of Australia, new ones were daily met with".

Figure 33: Brownstown or Canonba NSW c1874 (Courtesy of [redacted]

The river frontages along the Macquarie were taken up around the 1840's. Nyngan (or Nyingen as it was initially call) was first described by Major Mitchell in 1835 as an area having a long pond covered with aquatic weeds and supporting many birds, mainly ducks and brolgas (interpretation suggests this was the Bogan River).

After leaving Nyingen, Mitchell proceeded north where he recorded that he was greatly impressed by a creek with many ponds of water. This area is now known as "overflow country" on the Gunningbar Creek which extends right across to the Duck Creek to the Nyngan-Canonba Rd.

Mitchell returned to the area in 1847 on his third expedition and camped there for 2 weeks due to the reliability of the water on the Duck Creek. This reliable water led to the development of a village in the 1850's called Canonba, or colloquially as 'Brownstown' due to the major landholder being John Brown.

Figure 34: Refurbished Cobb & Co Coach now on display in Nyngan NSW (Courtesy of [redacted]

A bridge across the Duck Creek was completed in 1874 and the tracks along the effluent creeks between Warren and Canonba were heavily used by the Cobb and Co and livestock movements between Dubbo & Bourke. The area was so highly regarded due to its quality water between the Bogan and Macquarie Rivers and for that reason the town became the main settlement in the region west of Dubbo.[1] At one stage the 'Ponds of Canonba' on the Duck Creek supported a population of 500 people, with 4 coach services, 4 banks, 4 hotels and various other businesses.

Possibly the earliest written comments on the geomorphology and hydrology of the Macquarie effluent creeks system were by McKinney in 1885. In a report for the Water Conservation Royal Commission, he identified the potential for constructing a weir at Warren and excavating cuttings to direct flow into Burlong, Crooked and Gunningbar Creeks. These works were completed in 1896.

Poole (1898) noted that the Macquarie River levee banks below Gin Gin Weir were up to 1.5m above the surrounding lands. The Gunningbar Creek was originally few via overflows and outbreaks from a reach of the Macquarie River 10 to 23 miles (16 to 38km) upstream of Warren. Since settlement in the mid-1800s, significant breaks in the levee had been established and increasing proportions of flows enter Gunningbar Creek.

Gunningbar Creek bifurcated at the 'Overflow' with similar volume entering the Crooked Creek. The system was designed to allow the Gunningbar Creek to receive twice the flow that entered the Crooked Creek. The Crooked Creek itself bifurcated with an overflow into the Duck Creek. Poole (1898) also note that during floods, the Crooked Creek received water directly from the Macquarie River.

Poole report that silting up of the Crooked Creek was evident soon after the channel was established. He commented that a combination of sedimentation in the stream bed and the sediment accumulation on top of the bank would gradually result in the Crooked Creek breaking out from it left bank and moving overland

[1] Plan of the Village of Old Canonba and Suburban Lands, *Trove.* Retrieved 27 September 2020.

toward the Bogan/Darling system. Poole also noted that even relatively ill-defined drainage lines could develop into large channels further downstream.

Figure 35: Tawny Frogmouth at waterhole on 'Halfmoon' (Courtesy of [redacted]

1.3 Development and Regulation

Large Scale Irrigation development was facilitated by Burrendong Dam and areas of irrigated crops started to grow. Some of the major water management policy stages since that time included:

- Conversion of area based to volumetric irrigation entitlements in 1981
- Embargo on the issue of further irrigation entitlements 1982
- Macquarie Marshes Plans in 1986 and 1996
- 2004 Water Sharing Plan for the Macquarie and Cudgegong Regulated System

The Marshes Plans and Water Sharing Plan successively confirmed the provision of regulated stock & domestic water supply and irrigation water to the Duck and Upper Crooked Creeks. The Plans also confirmed the stock and domestic replenishment flows to the lower Crooked and Marra Creeks.
These same plans confirmed the primacy of the Macquarie Marshes for receipt of environmental water from the Macquarie River, including the floodwaters from Burrendong flood mitigation zone.
There are currently four irrigators on the Gunningbar Creek below Warren. However, many landholders along these creeks hold general-security water licenses.

Figure 36: One of the many Wedgetail Eagles on the Talga Floodplain (Courtesy [redacted]

Historically the LMECS were ephemeral in nature, however they had waterholes ranging in sizes and depths which would hold the water until the next ephemeral flow.

Prior to the erection of Burrendong Dam, these creeks received fresh pulses from the Macquarie River and localised rain events which kept a healthy ecosystem in place and fed floodplains such as the Talga Floodplain on the Crooked Creek, and the 'Green Swamp' or 'The Overflow' on the Gunningbar Creek.

Post Burrendong Dam, the creeks had an extended period of strong health and large allocations. The Talga Floodplain heavily benefited from these flows and was sustained a wetland for a large number of years without drying out (approximately 4000ac). However, with the introduction of irrigation and the demand for water increasing elsewhere in the catchment, these flows reduced over time. Now the Talga Floodplain receives a flow only sporadically every few years when the Macquarie River is in moderate flooding.

It is believed by most landholders that the Gunningbar Creek is actually the most efficient way to supply water to the Darling River from the Macquarie System. From verbal accounts of former landholder [redacted] we know that during a drought in the 1930's the 'NSW Water Department' planned to use the effluent creeks as most efficient way to deliver water from the Macquarie River to the town of Bourke on the Darling. It rained before the flow occurred, but it shows that previous generations understood the importance of the Creeks to the Murray Darling Basin.

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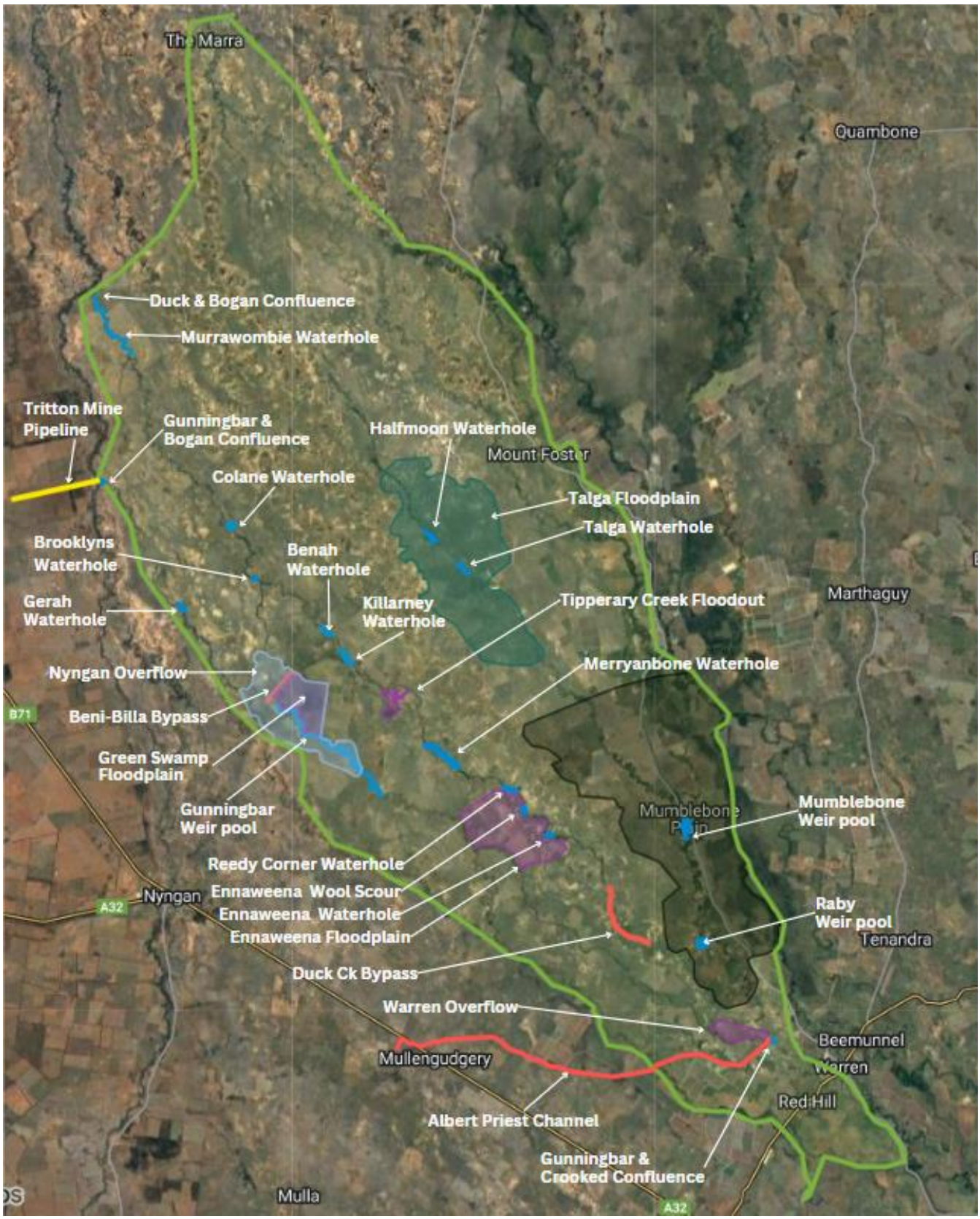

Figure 37: Map of Macquarie Effluent Creeks Area, including associated sites.

Department of Planning and Environment

Regional Water Strategies
Public Exhibition 2

Submission Questionnaire

Macquarie-Castlereagh Regional Water Strategy
Challenges and shortlisted actions

The NSW Government is taking action to improve long-term water security for Macquarie-Castlereagh. The Macquarie-Castlereagh Regional Water Strategy sets out a shortlist of proposed actions to help deliver healthy and resilient water resources for a liveable and prosperous region.

Your voice is important

This is your opportunity to let us know which actions you support and think should be implemented to help set the region up for the future.

This questionnaire will take approximately 15 minutes to complete, and your response can remain anonymous if you wish (see question 7).

Questions marked with an asterisk (*) require an answer.

If you have any questions about the questionnaire, please email: regionalwater.strategies@dpie.nsw.gov.au

You can also provide feedback via our submission platform.

1. Your details

* Email address: [redacted]

* Name: [redacted]

* Address: [redacted]

* Contact phone number: [redacted]

*** Do you identify as an Aboriginal person?** (select one)

☐ Yes ○ No ○ Choose not to answer

*** Are you making this submission as an individual or as a representative of an organisation?** (select one)

☐ Individual ○ Organisation

2. Organisation or business details

If making this submission as a representative of an organisation, who do you represent? (select one)

Government (select one)

☐ Commonwealth ☐ New South Wales ☐ State other ☐ Local

☐ Local Water Utility

Peak representative organisation (select one)

☐ Environment ☐ Industry ☐ Business group or business chamber ☐ Community

Aboriginal organisation (select one)

☐ Yes ☐ No

☐ **Other** (select and provide details) _____

☐ **N/A**

3. Regional water challenges

We have identified **five water challenges** that are most important to address in the Macquarie-Castlereagh region. More detail about each regional challenge is available in the Consultation Paper.

1 Reducing water supply risks for regional cities, towns and villages

Bathurst, Orange and Dubbo are large and growing regional cities in the Macquarie valley. These cities are expected to grow by 20–30% over the next 20 years. The water supplies for these cities also underpin the water security of surrounding smaller towns and communities during times of drought.

Even with recent investments in water security measures, Bathurst and Orange require further immediate investment over the next few years to ensure the security of their water supplies is maintained.

Groundwater is an important water source for towns in the region, being the primary source of supply for many towns and an important backup source for others. There is uncertainty about water security in severe drought for towns that use groundwater, especially from the alluvial groundwater systems.

2 Supplying water to high priority needs in the lower river system and connected valleys

The Macquarie River system is over 960km long and there are a range of high priority needs towards the end of the system, including:

- the towns of Warren, Nyngan and Cobar
- internationally significant Macquarie Marshes
- critical mineral mines
- landholders on rivers and creeks with stock and domestic water needs
- flows into the Barwon-Darling River that support communities, industries and the environment downstream

The long river system presents challenges for delivering water to the end of the system, particularly during dry periods, as a large portion of the water released from Burrendong Dam seeps into the dry riverbed and evaporates along the way.

A more variable and potentially drier climate will make it even more difficult to meet high priority needs towards the end of the river system, especially during dry periods.

3 Supporting a growing regional economy in a future of potentially reduced water availability

Agriculture and mining are major water-reliant industries in the Macquarie-Castlereagh region. The tourist economy is also important in the region's east and includes well-known food and wine destinations. Climate change could reduce water availability for these existing industries, leading to adverse economic and social impacts. While there is also significant potential for future development in high value industries, a shortage of reliable water supplies may hinder this growth.

4 Addressing barriers to Aboriginal water rights

The lands and waters of the Macquarie-Castlereagh region have been occupied by the Wiradjuri, Gomeroi, Ngemba, Wailwan and Ngiyamapaa Nations for over 60,000 years. They have always been closely linked to rivers, groundwater, billabongs and wetlands, and this relationship is essential to culture, community and connection to Country.

Water management arrangements, limited water ownership, and poor access to waterways and culturally important sites impact Aboriginal people's ability to care for Country. We need to support access to water improve our engagement with Aboriginal people, and secure flows for water dependent cultural sites—so we can all benefit from traditional knowledge in managing our water resources.

5 Maintaining and improving the health and resilience of the region's aquatic and floodplains ecosystems

Water infrastructure, water extraction, land management practices, and pest species have impacted water-dependent ecosystems and native species in the Macquarie-Castlereagh region. This includes the internationally Ramsar-listed Macquarie Marshes, which is ecologically, culturally, socially and economically important.

While water reforms have partially improved the condition and resilience of these environmental assets, there are parts of the catchment that are still in poor condition.

To maintain and improve the region's ecological assets into the future, we need to ensure that the right mix of flows are available at the times that they need them. This will become increasingly difficult under a drier future climate, where the potential for extended dry periods could increase the risk for many critical environmental assets.

Do you agree that these are the priority water challenges for the Macquarie-Castlereagh region that we need to focus on? (select one)

☐ Yes ☐ No

If no, please outline what you see as the priority water challenges in this region over the next 20 – 40 years?

On behalf of the Macquarie Effluent Creeks Association (MECA), we agree that the priority water challenges outlined are correct. MECA would like to see some emphasis on the Lower Macquarie Effluent Creeks (LMECS) included under point 5.

4. Addressing the challenges

We have developed three regional priorities with actions under each. We want to know which of the actions you support.

The regional priorities are:

1 Secure water supplies for growing regional cities and towns
2 Reduce water security risks in the region's west
3 Supporting industry and community climate adaptation
4 Best use of existing water for the environment

Priority 1: Secure water supplies for growing regional cities and towns

The actions shortlisted under this priority aim to:

- make better use of the available resources
- respond to the needs of a growing population
- respond to the risks associated with climate variability and change.

Proposed action		Do you support this action?
1.1	Confirm the level of water security needed to support regional cities	☐ Yes ☐ No
1.2	Establish a governance framework to coordinate actions under Priority 1	☐ Yes ☐ No
1.3	Develop guidelines for managing extreme events in the upper Macquarie	☐ Yes ☐ No
1.4	Adopt a stronger focus on urban water conservation and efficiency	☐ Yes ☐ No
1.5	Invest in innovative water supply options	☐ Yes ☐ No
1.6	Plan for the best long-term augmentation solution for the upper Macquarie	☐ Yes ☐ No
1.7	Reduce uncertainty in groundwater security for the region's towns	☐ Yes ☐ No
1.8	Support management of Oberon's town water quality issues	☐ Yes ☐ No

A) Do you have any comments on the proposed actions identified?

MECA has no comment on these proposed actions at this time.

Priority 2: Reduce water security risks for the Lower Macquarie

The actions shortlisted under this priority aim to:

- deliver water more efficiently to high priority needs and reduce town water security risks in the lower Macquarie region
- improve the drought resilience of industry in the lower Macquarie region.

Proposed action		Do you support this action?
2.1	Investigate an additional off-river storage at Nyngan	☐ Yes ☐ No
2.2	Create water savings through changed operation of regulated effluent creeks	☐ Yes ☐ No
2.3	Continue to investigate regional water security solutions for the lower Macquarie	☐ Yes ☐ No
2.4	Investigate ways to improve connectivity with the Barwon-Darling on a multi-valley scale	☐ Yes ☐ No

A) Do you have any comments on the proposed actions identified?

MECA strong disagrees with proposed action 2.2 for reasons outlined in their attached submission. MECA strongly supports the proposed action 2.2 and the use of the Gunningbar Creek and Lower Bogan River for the best connectivity to the Barwon-Darling catchment. Our reasoning outlined in the attached submission.

Priority 3: Support industry climate adaptation

The actions shortlisted under this priority aim to:

- strengthen the resilience of the regional economy, including existing businesses, industries and communities, and their adaptation to a drier, more severe future climate.

Proposed action		Do you support this action?
3.1	Invest in continuous improvement to surface and groundwater modelling	☐ Yes ☐ No
3.2	Improve public access to climate information and water availability forecasts	☐ Yes ☐ No
3.3	Support adoption of on-farm climate adaptation and water efficiency measures	☐ Yes ☐ No
3.4	Undertake research to inform reviews of groundwater extraction and condition limits	☐ Yes ☐ No
3.5	Develop ongoing arrangements for participation of local Aboriginal people in water management	☐ Yes ☐ No
3.6	Support place-based initiatives to deliver cultural outcomes for Aboriginal people	☐ Yes ☐ No
3.7	Support the development of new water related Aboriginal business opportunities in the Macquarie-Castlereagh region	☐ Yes ☐ No
3.8	Modernise the water management framework so it can continue to support sustainable economic diversification	☐ Yes ☐ No
3.9	Improve public access to the Macquarie Marshes	☐ Yes ☐ No

A) Do you have any comments on the proposed actions identified?

MECA has no comment on these proposed actions at this time.

Priority 4: Best use of existing water for the environment

The actions shortlisted under this priority aim to:

- limit or remove pressures and impacts related to water infrastructure
- enable water for the environment to be delivered to its best effect during wet and dry periods
- build knowledge of the region's water dependent ecosystems and assets, and the impacts of climate change on their health and resilience
- improve water resource health through better land management.

Proposed action		Do you support this action?
4.1	Modify or remove barriers to delivering water for the environment	☐ Yes ☐ No
4.2	Reinstate natural channel profiles in selected streams in the southern Macquarie Marshes	☐ Yes ☐ No
4.3	Mitigate impacts to fish communities	☐ Yes ☐ No
4.4	Remediate unapproved floodplain structures	☐ Yes ☐ No
4.5	Provide clarity and certainty for environmental needs during drought operations	☐ Yes ☐ No
4.6	Assess gaps in the flow regime and identify cooperative actions to improve ecological outcomes	☐ Yes ☐ No
4.7	Fully implement the NSW Floodplain Harvesting Program	☐ Yes ☐ No
4.8	Identify regionally significant riparian, wetland and floodplain areas to protect or rehabilitate	☐ Yes ☐ No

A) Do you have any comments on the proposed actions identified?

MECA requests the replication of Action 4.2 and 4.8 of the Draft Strategy for the LMECS, which would lead to the restoration of creek beds & water-holes (removal of silt and cumbungi), and protect and rehabilitate significant riparian, wetlands and floodplain areas along these creeks.

5. Other comments

A) Should any proposed actions in this Consultation Paper not be shortlisted and why?

MECA request that Action 2.2 of the Draft Strategy not be shortlisted. This action proposes a pipeline to replace the Gunningbar, Duck and Upper Crooked Creeks and return the system to variable' flows. MECA oppose any change to the permanent Regulated status of water in these Creeks. Please see our attached supporting documents for more information.

B) Should any other options in Attachment 1 of the Consultation Paper be shortlisted and why?

MECA has no comment for this question.

6. Implementation of the Macquarie-Castlereagh Regional Water Strategy

An Implementation Plan will be included in the final Macquarie-Castlereagh Regional Water Strategy.

A) Which actions should be implemented first and why?

If Action 4.2 and 4.8 of the Draft Strategy can be replicated for the LMECS, then MECA believes implementing these actions as soon as possible will led to efficiencies in the LMECS flows and large environmental benefits. See attached supporting documentation for more information.

Making your submission public

To promote transparency and open government, we intend to make all submissions publicly available on our website, or in reports. Your name or your organisation's name may appear in these reports with your feedback attributed.

If you would like your submission and/or feedback to be kept confidential, please let us know when making your submission.

If you request that your submission is to be kept confidential, it will not be published on our website or included in any relevant reports; however, it will still be subject to the *Government Information Public Access Act 2009*.

Your submission will be stored securely, consistent with the department's Records Management Policy and you have the right to request access to, and correction of, your personal information held by the department.

Further details can be found in our privacy statement available on our website.
www.industry.nsw.gov.au/privacy

7. Information on confidentiality and privacy *

I give permission for my submission to be publicly available on the NSW Department of Planning and Environment website.

☐ Yes ☐ No

I would like my personal details to be kept confidential.

☐ Yes ☐ No

8. Would you like to be kept updated on progress on the development and implementation of the Macquarie-Castlereagh Regional Water Strategy?

☐ Yes ☐ No

If yes, please provide your details below.

* Email address: [redacted]

* Name: [redacted]

* Address: [redacted]

* Contact phone number: [redacted]

9. How did you hear about the Public Exhibition of this strategy?

We are interested to know how you heard about the opportunity to make a submission. Please indicate the communication methods below:

- ☐ Newspaper
- ☐ Radio
- ☐ Department of Planning and Environment website
- ☐ Direct email
- ☐ Social media
- ☐ Have your say NSW Government website
- ☐ Communication from peak body
- ☐ Word of mouth
- ☐ Other (select and provide details) _____

10. Additional Information

If you would like to provide any supporting documents to help us understand your feedback, please email these from the same email you provided in this form or attach supporting documents to this form if you are returning your submission by mail.

All submissions on the draft Macquarie-Castlereagh Regional Water Strategy will be reviewed following the public exhibition period.

Please email your completed submission and any supporting documents to:

regionalwater.strategies@dpie.nsw.gov.au

CLICK HERE TO EMAIL SUBMISSION

Or post to:

Regional Water Strategies
Department of Planning and Environment
Locked Bag 5022
Parramatta NSW 2124

Submissions close Friday 18 November 2022, 11.59pm

Further details on all regional water strategies can be found on our website
www.dpie.nsw.gov.au/regional-water-strategies

Thank you for your submission.

NSW GOVERNMENT