

## Chapter 12 - Conclusion

### Contents

<b>12 CONCLUSION</b>	<b>12-2</b>
<b>12.1 Introduction</b>	<b>12-2</b>
<b>12.2 The action</b>	<b>12-2</b>
<b>12.3 Matters of national environmental significance</b>	<b>12-3</b>
<b>12.4 Impact pathways</b>	<b>12-3</b>
<b>12.5 Hydrological effects</b>	<b>12-3</b>
<b>12.6 Relevant impacts</b>	<b>12-8</b>
12.6.1 Ramsar wetlands in South Australia	12-13
<b>12.7 Safeguards and mitigation measures</b>	<b>12-13</b>
<b>12.8 Economic and social matters</b>	<b>12-14</b>
<b>12.9 Recommendation</b>	<b>12-15</b>
<b>12.10 Proposed conditions of approval</b>	<b>12-15</b>
<b>12.11 Conclusion</b>	<b>12-16</b>

### Tables

Table 12-1: Summary of hydrological and salinity effects to surface water	12-4
Table 12-2: Summary of hydrological effects to groundwater	12-6
Table 12-3: Likelihood of significant impact on MNES	12-9
Table 12-4: Summary of environmental management and mitigation measures	12-14

## 12 Conclusion

### 12.1 Introduction

This Public Environment Report (**PER**) has been prepared for the Commonwealth Department of the Environment, Water, Heritage and the Arts (**DEWHA**) for the assessment and approval of an action that may have an impact upon matters of national environmental significance (**MNES**) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**).

On the basis of a referral accepted on 6 October 2009, DEWHA determined on 6 November 2009 that the proposed action is a controlled action requiring approval under the EPBC Act, and that it is to be assessed through a public environment report.

The controlling provisions under the EPBC Act were determined to be:

- wetlands of international importance (sections 16 and 17B)
- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A).

This PER has been prepared in accordance with the Guidelines issued by DEWHA on 24 December 2009.

### 12.2 The action

The proposed action is the modified operation of the fully modernised Goulburn Murray Irrigation District (**GMID**) in northern Victoria. The modified operation is the product of the application of modern technology to the delivery of irrigation water, including channel automation and electronic metering.

The modified operation of the irrigation system in the GMID and associated Water Districts around the GMID periphery will employ modern technology to exercise greater control over the water resource and reduce incidental water losses.

Of the long term average annual water savings of up to 425 GL achieved through lifting the efficiency of the system from 70% to 85%, 75 GL will be diverted to Melbourne for water supply purposes, 175 GL will be allocated to the environment and 175 GL will be allocated to irrigators. With the exception of the 75 GL diverted to Melbourne, the effect of NVIRP will be to harvest and redirect water which is currently 'lost' through outfalls, leakage, seepage, evaporation and inaccurate metering to the environment and irrigators. Water savings are calculated after water has been allocated to manage any impacts on high environmental values, including MNES.

The productive and environmental use of this water will increase agricultural productivity and assist in the targeted protection of high value environmental assets.

## 12.3 Matters of national environmental significance

The following MNES were identified as being present or potentially present in the GMID and surrounding 40 km buffer using the Protected Matters Search Tool (PMST) and other information sources:

- 10 Ramsar wetlands of international importance:
  - 4 within or on the floodplain adjacent to the GMID
  - 6 outside of the GMID
- 61 threatened species and five threatened ecological communities (including one community that has been nominated for listing)
- 54 listed migratory species (all birds) and seven marine overfly species (including 4 species that are also listed as threatened).

## 12.4 Impact pathways

The ecological consequences of the project are related to hydrological changes. The NVIRP modernisation is expected to have four potential hydrological impacts (SKM 2008, SKM 2009a, SKM 2009b).

- reduction in gross water diversions to irrigation areas due to reduced need to supply losses
- reduction in channel seepage and bank leakage resulting in reduced recharge to the groundwater system, and consequently reduced watertable levels
- changes in lateral groundwater flows and salt and nutrient load into waterways
- reduction in channel outfall contributions to drains, wetlands and river flows due to improved technology and system operations.

The project will also alter water regimes in distribution and drainage channels due to rationalisation of the distribution network.

## 12.5 Hydrological effects

The four potential sources of hydrological changes outlined above were considered from a surface and groundwater perspective and are addressed at three scales:

- localised impacts to wetlands and waterways
- impacts within the GMID
- impacts to sites adjacent to the GMID.

The assessment considered the potential effects of modernisation on surface and groundwater hydrology and on altered salt loads on rivers and Ramsar wetlands. The hydrological effects of surface water and groundwater and changes to salinity on MNES are summarised in Table 12-1 and

Table 12-2.

**Table 12-1: Summary of hydrological and salinity effects to surface water**

Scale of potential effect	Sites likely to affected	Outcome of assessment
Local	Individual sites	Ten wetlands requiring Environmental Watering Plans ( <b>EWP</b> ), together with four waterways, with further consideration to be given to an additional site
Within GMID	Kerang Wetlands	<p>There will be no impact on wetland extent, hydrology, water quality or species for the majority of the wetlands.</p> <p>Johnson Swamp was short listed through the localised assessment process as being potentially impacted by reduced surface water. However the EWP concluded that mitigation water was not required to maintain the ecological character of Ramsar site as incidental irrigation outfalls are not contributing significantly to supporting high environmental values at the wetland.</p>
Adjacent / Downstream – direct effects	River Murray	<p><i>between Hume Reservoir and Yarrawonga Weir</i></p> <ul style="list-style-type: none"> <li>predicted to have a slight reduction in flow (and level) over the summer and autumn of 12-14 mm but no change in flow (or level) over the winter and spring.</li> </ul> <p><i>between Yarrawonga Weir and Torrumbarry Weir</i></p> <ul style="list-style-type: none"> <li>predicted to undergo a small reduction in flow and river level during parts of summer/autumn and winter/spring. However the total magnitude is very small (average difference of 0-7 mm) compared average water level in the river of 1.2-1.5 m.</li> <li>as the part of this reach upstream of Torrumbarry Weir is influenced by backwater effects of the weir pool, levels in this section of the river are not expected to be affected by NVIRP.</li> </ul> <p><i>downstream of Torrumbarry Weir</i></p> <ul style="list-style-type: none"> <li>predicted to experience a slight reduction in flow and river level over the winter/spring period (average difference of 0-9 mm) but no change in flow (or level) over the summer/autumn period.</li> </ul> <p><i>Salinity</i>            The output of the modelling indicates that at Torrumbarry the salinity change in most months is zero and at most 1 µS/cm. At points downstream, in most months the effect is a reduction in river salinity in the order of 1-3 µS/cm. This compares to background salinity levels along the River Murray 100-400 µS/cm.</p>

Scale of potential effect	Sites likely to be affected	Outcome of assessment
	Goulburn River	<p><i>upstream of Goulburn Weir</i></p> <ul style="list-style-type: none"> <li>predicted to undergo a reduction in river level of up to 67 mm compared to an average river level depth of 1.42 m. Despite this being a relatively small change, it is in the direction of the environmental flow recommendations which recognise high summer flows in the Goulburn River as a threat to the health of the river.</li> </ul> <p><i>downstream of Goulburn Weir</i></p> <ul style="list-style-type: none"> <li>predicted to incur a slight a reduction in flow (and level) over the summer/autumn period (average difference 0-45 mm) compared to an average river level depth of 1.56 m. No change in flow (or level) over the winter/spring period is expected.</li> </ul> <p><i>Salinity</i> Salinity is expected to reduce in order of 7 or 8 <math>\mu\text{S}/\text{cm}</math> and are attributed to the reservoir releases increasing to supply downstream demands and minimum passing flows</p>
Adjacent / Downstream – indirect effects	Barmah Forest	<p>There will be no direct impact to wetland extent or loss of wetland area.</p> <ul style="list-style-type: none"> <li>Hydrological changes will be minimal and most likely be too small to be measurable i.e. Barmah Forest will experience less than a 1 mm change in the flood peak height and average level.</li> </ul> <p>Effect on salinities is considered negligible and is most likely to be a reduction.</p>
	Gunbower Forest	<p>There will be no direct impact to wetland extent or loss of wetland area.</p> <ul style="list-style-type: none"> <li>Hydrological changes will be minimal and most likely be too small to be measurable. i.e. a 3 mm reduction in the flood peak height and an average reduction of 3 mm in average level.</li> </ul> <p>Effect on salinities is considered negligible and is most likely to be a reduction.</p>
	NSW Central Murray Forests	<p>There will be no direct impact to wetland extent or loss of wetland area.</p> <ul style="list-style-type: none"> <li>Will experience similar changes to Barmah Forest and Gunbower Forest. The Werai Forest will not be affected.</li> </ul> <p>No substantial change in water quality predicted.</p>

Scale of potential effect	Sites likely to affected	Outcome of assessment
	Hattah-Kulkyne Lakes	<p>There will be no direct impact to wetland extent or loss of wetland area.</p> <p>Hydrological changes will be minimal and most likely be too small to be measurable i.e. experience a 23 mm reduction in the flood peak height with an average reduction of 1 mm</p> <p>Effect on salinities is considered negligible and is most likely to be a reduction.</p>
	Riverland, Banrock Station Wetland Complex, Coorong, Lakes Alexandrina and Albert	<p>Located at a distance downstream such that there are numerous river locks and Lake Victoria in between, which will regulate flows and levels in the River Murray to the extent that there is expected to be no observable impact due to NVIRP at each of these sites.</p>
	Fivebough and Tuckerbil Swamps	<p>Located on the Murrumbidgee River and will not be affected by NVIRP.</p>
	Lake Albacutya	<p>Located the Wimmera basin and is not hydraulically connected to the GMID, therefore will not be affected.</p>

**Table 12-2: Summary of hydrological effects to groundwater**

Scale of potential effect	Sites likely to affected	Outcome of assessment
Local near Channel Effects	Individual sites	<p>Highly unlikely that channel seepage would provide meaningful volumes of water (&gt;25 ML/year) to support wetlands within 200 m of the channel.</p> <p>In highly unlikely cases where this is not the case, a method is recommended for NVIRP to investigate whether channel recharge groundwater is significant in MNES associated with the wetland.</p>
Within GMID	East of the Terrick Terrick Hills	<p>Water table reduction modelled to decrease by less than 1 m in the vast majority of the GMID. A drop of more than 5 m is predicted to occur in the Murray Valley Irrigation Area; however, this may be due to modelling assumptions that the current levels of intensive groundwater pumping in Murray Valley Irrigation Area will continue. This may give over-estimates of the drawdown in localised areas where pumping is concentrated. The reduction in watertables more widely in this area is considered representative of the likely effects of the NVIRP modernisation.</p> <p>Given the threat posed by the highly saline ground water, a reduction in the watertable is likely to be beneficial and will mean less intrusion of saline groundwater into the wetlands and waterways.</p>

Scale of potential effect	Sites likely to affected	Outcome of assessment
	West of the Terrick Terrick Hills	<p>Water table modelling shows a decrease in level between 0.2 -1.3 m. West of the Terrick Terrick Hills, groundwater salinity in the Upper Shepparton Formation is almost universally saline, up to 50,000 µS/cm.</p> <p>Reductions in the saline water table are likely to be beneficial, and will reduce intrusion of saline groundwater into the wetlands.</p>
	Kerang Lakes	<p>Water table modelling shows a reduction in level between 0.2 - 1.3 m. Not considered significant as seasonal fluctuations of this magnitude are common. Groundwater salinity in this area is almost universally saline, up to 50,000 µS/cm.</p> <p>Reductions in the saline water table are likely to be beneficial, and will reduce intrusion of saline groundwater into the wetlands.</p>
Downstream/ adjacent effects on the Floodplain Unit	Barmah Forest	<p>No change in water table depth below the Barmah Forest except at the margin of the forest, which may decrease by 0.9 m in the Upper Shepparton formation. This is likely to be beneficial, and will reduce intrusion of saline groundwater into the wetlands.</p> <p>The reduction of salt load flow towards the site is about 8% and is likely to reduce the threat of a high water table increasing groundwater salinity levels.</p>
	Gunbower Forest	<p>No change is expected in the watertable under the Gunbower Forest.</p> <p>The reduction of salt load flow towards the site is about 8% and is likely to reduce the threat of a high water table increasing groundwater salinity levels.</p>
	NSW Central Murray Forests	<p>These sites are down gradient to the Barmah and Gunbower forests. As there are no effects to the watertable under the Barmah and Gunbower forests, it is considered improbable that there will be any effects to these sites.</p> <p>The reduction of salt load flow towards the site is about 8% and is likely to reduce the threat of a high water table increasing groundwater salinity levels.</p>
	Hattah-Kulkynne Lakes	<p>The site is down gradient to the Gunbower Forest. As there are no effects to Gunbower Forest, it is considered improbable that there will be any effects to this site.</p>
	Riverland, Banrock Station Wetland Complex, Coorong, Lakes Alexandrina and Albert	<p>These sites are more than 300 km downstream of the project area, and is downstream of Lake Victoria (regulated off-stream storage). This is beyond the boundary of where hydrological effects can be reasonably expected to be detected.</p>
	Fivebough and Tuckerbil Swamps	<p>Located on the Murrumbidgee Floodplain upstream of the project area. There is no plausible impact pathway linking NVIRP to this site.</p>

Scale of potential effect	Sites likely to affected	Outcome of assessment
	Lake Albacutya	Located the Wimmera basin and is not hydraulically connected to the GMID; therefore will not be affected. There is no plausible impact pathway linking NVIRP to this site.

## 12.6 Relevant impacts

Table 12-3 summarises the likelihood of a significant impact on the ten Ramsar sites and 33 listed species and communities and 19 migratory species (noting that two species are both listed and migratory) considered in the assessment. A number of species were screened out of the assessment, with no further assessment conducted, because the species were:

- unlikely to occur regularly or in significant numbers and the GMID is therefore unimportant to the maintenance of their overall populations, or
- not wetland dependent and therefore not susceptible to the changes that modernised operations will cause.

The assessment showed that:

- no significant impacts were predicted for any Ramsar wetlands
- no significant impacts are expected for listed threatened flora species or ecological communities
- no significant impacts are expected for listed frog species
- no significant impacts to the listed fish species, Trout Cod and Macquarie perch. There could be impacts to the listed Murray Cod and Murray Hardyhead but these occur at wetlands and waterways for which an EWP will be developed and these will ensure that these species are not negatively affected by the modified operation of modernised GMID
- 20 threatened and migratory bird species listed under the EPBC Act were found to be susceptible to operational impacts from NVIRP through potential habitat loss and degradation at the 10 wetlands short-listed for the development of an EWP. To mitigate potential impacts, EWPs will be developed for these wetlands which will prevent habitat loss and degradation at affected wetlands and ensure that modernised operations do not result in a significant impact on MNES.

To mitigate potential impacts on listed plant, frog, fish and bird species, EWPs will be developed for the short-listed wetlands likely to be affected (see Chapter 5). These plans ensure that where changes in water regime can be attributed to modernised operations, supplementary water mitigate the impacts of changes to the water regime will be provided. These EWPs will prevent habitat loss and degradation at affected wetlands and ensure that modernised operations do not result in a significant impact on MNES. Where channel rationalisation may reduce capacity to deliver environmental flows to some high value wetlands, the Water Change Management Framework (**WCMF**) will ensure that values are recognised and infrastructure for delivering flows is maintained.

One of the water savings principles for all Victorian irrigation modernisation projects is that ‘water savings are the total (gross) volumes saved less the volume of water required to ensure no net impacts due to the project on high environmental values’. This means that mitigation water is allocated ahead of any water savings, providing assurance that significant impacts on MNES will be avoided, irrespective of the level of water savings achieved. While NVIRP is confident of achieving up to 425 GL of water savings, if lower water savings were to be achieved then the associated environmental effects would be correspondingly less. Irrespective of the water savings achieved, the mitigation water is provided.

The 175 GL water savings as an entitlement to the environment was not considered in the assessment. This results in a conservative assessment (i.e. showed worse case impacts) because it does not include the beneficial effects of the 175 GL for the environment. If the use of this water were taken into account, then there would be significant net benefits for MNES.

**Table 12-3: Likelihood of significant impact on MNES**

Species	EPBC listing	Likelihood of significant impact	Recommended management and mitigation measures (if relevant)
<b>Ramsar Wetlands</b>			
Kerang Wetlands	R	NO	NA
Barmah Forest	R	NO	NA
Gunbower Forest	R	NO	NA
NSW Central Murray Forests	R	NO	NA
Hattah-Kulkyne Lakes	R	NO	NA
Riverland	R	NO	NA
Banrock Station Wetland Complex	R	NO	NA
The Coorong, Lakes Alexandrina & Lake Albert	R	NO	NA
Fivebough and Tuckerbil Swamps	R	NO	NA
Lake Albacutya	R	NO	NA
<b>Flora</b>			
River Swamp Wallaby-grass ( <i>Amphibromus fluitans</i> )	V	NO	NA
Mueller Daisy ( <i>Brachyscome</i> )	V	NO	NA

Species	EPBC listing	Likelihood of significant impact	Recommended management and mitigation measures (if relevant)
<i>muelleroides</i> )			
Mclvor Spider-orchid ( <i>Caladenia audasi</i> )	E	NO	NA
Crimson Spider-orchid ( <i>Caladenia concolor</i> )	V	NO	NA
Rigid Spider-orchid ( <i>Caladenia tensa</i> )	E	NO	NA
Yellow-lip Spider-orchid ( <i>Caladenia xanthochila</i> )	E	NO	NA
Western Water-starwort ( <i>Callitriche cyclocarpa</i> )	V	NO	NA
Bald-tip Beard-orchid ( <i>Calochilus richiae</i> )	E	NO	NA
Clover Glycine ( <i>Glycine latrobeana</i> )	V	NO	NA
Euroa Guinea-flower ( <i>Hibbertia humifusa</i> subsp. <i>erigens</i> )	V	NO	NA
Winged Pepper-cress ( <i>Lepidium monoplacoides</i> )	E	NO	Develop and implement site-specific Environmental Watering Plans for specific saline waterways wetlands at risk.
Erect Pepper-cress ( <i>Lepidium pseudopapillosum</i> )	V	NO	NA.
Hoary Sunray ( <i>Leucochrysum albicans</i> subsp. <i>albicans</i> var. <i>tricolor</i> )	E	NO	NA
Chariot Wheels ( <i>Maireana cheelli</i> )	V	NO	Develop and implement site-specific Environmental Watering Plans for specific saline wetlands at risk.
Ridged Water-milfoil ( <i>Myriophyllum porcatum</i> )	V <sup>1</sup>	NO	NA
Spiny Rice-flower ( <i>Pimelea spinescens</i> subsp. <i>spinescens</i> )	C	NO	NA
Turnip Copperbur	E	NO	NA

<sup>1</sup> C = Critically Endangered, E = Endangered, M = Migratory, N = Nominated, R = Ramsar wetland of international importance, V = Vulnerable, O = Marine Overfly

Species	EPBC listing	Likelihood of significant impact	Recommended management and mitigation measures (if relevant)
<i>(Sclerolaena napiformis)</i>			
Stiff Groundsel <i>(Senecio behrianus)</i>	E	NO	NA
Slender Darling-pea <i>(Swainsona murrayana)</i>	V	NO	NA
Red Swainson-pea <i>(Swainsona plagiotropis)</i>	V	NO	NA
Yellow Swainson-pea <i>(Swainsona pyrophila)</i>	V	NO	NA
Mountain Swainson-pea <i>(Swainsona recta)</i>	E	NO	NA
<b>Communities</b>			
<i>Buloke Woodland</i>	E	NO	NA
<i>White Box Woodland</i>	C	NO	NA
<i>Inland Grey Box Woodland</i>	N	NO	NA
<b>Frogs</b>			
Growling Grass Frog <i>(Litorina raniformis)</i>	V	NO	NA
<b>Fish</b>			
Murray Hardyhead <i>(Craterocephalus fluviatilis)</i>	V	Potential risk	Develop and implement site-specific Environmental Watering Plans for specific waterways at risk.
Murray Cod <i>(Maccullochella peelii peelii)</i>	V	Potential risk	Develop and implement site-specific Environmental Watering Plans for specific waterways at risk.
Trout Cod <i>(Maccullochella macquariensis)</i>	E	NO	NA
Macquarie Perch <i>(Macquaria australasica)</i>	E	NO	NA
<b>Birds</b>			
Australian Painted Snipe <i>(Rostratula australis)</i>	M V	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Black-winged Stilt <i>(Himantopus himantopus)</i>	O	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Caspian Tern <i>(Hydrogogne caspia)</i>	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.

Species	EPBC listing	Likelihood of significant impact	Recommended management and mitigation measures (if relevant)
Cattle Egret ( <i>Ardea ibis</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Common Greenshank ( <i>Tringa nebularia</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Curlew Sandpiper ( <i>Calidris ferruginea</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Double-banded Plover ( <i>Charadrius bicinctus</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Eastern Great Egret (previously Great Egret) ( <i>Ardea modesta</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Glossy Ibis ( <i>Plegadis falcinellus</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Latham's Snipe ( <i>Gallinago hardwickii</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Marsh Sandpiper ( <i>Tringa stagnatilis</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Red-necked Avocet ( <i>Recurvirostra novaehollandiae</i> )	O	NO	Develop and implement site-specific Environmental Watering Plans for specific waterways and wetlands at risk.
Red-capped Plover ( <i>Charadrius ruficapillus</i> )	O	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Red-necked Stint ( <i>Calidris ruficollis</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Sharp-tailed Sandpiper ( <i>Calidris acuminata</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Superb Parrot ( <i>Polytelis swainsonii</i> )	V	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Swift Parrot ( <i>Lathamus discolor</i> )	E O	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Whiskered Tern ( <i>Chlidonias hybridus</i> )	O	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
White-bellied Sea-Eagle ( <i>Haliaeetus leucogaster</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.
Wood Sandpiper ( <i>Tringa nebularia</i> )	M	NO	Develop and implement site-specific Environmental Watering Plans for specific wetlands at risk.

The assessment indicates that, subject to the implementation of EWPs where specific wetlands or waterways may be affected, the action is not expected to have a significant impact on MNES.

The assessment also identified a number of potential benefits of modernisation, including lower watertables, resulting from the action, providing a benefit to terrestrial flora species and ecological communities in most cases in the GMID.

It is noted that, as a consequence of NVIRP, up to 75 GL (long term annual average) of savings will be converted to Victorian environmental entitlements and up to 100 GL (long term annual average) of savings will be held by the Commonwealth Environmental Water Holder. These will be callable, tradable environmental entitlements which will be used, amongst other environmental uses, to provide environmental water to Ramsar wetlands of international importance and to support MNES.

### **12.6.1 Ramsar wetlands in South Australia**

The assessment of potential impacts to Ramsar sites in South Australia indicate that for floodplain sites (Riverland and Banrock Station) the effects of NIVRP will be negligible. For the Coorong and the Lower Lakes, the nature of outfalls and the operation of the River Murray are such that very little, if any, of the estimated outfalls will reach the South Australian border let alone the Lower Lakes. Finally, the use of the 175 GL for the environment is expected to overwhelm any reductions in outfalls and will significantly enhance the health of Ramsar site in South Australia.

## **12.7 Safeguards and mitigation measures**

The WCMF is the means by which the project will identify and mitigate potential effects on specific sites with high environmental values, including MNES. Consistent with the principle of no net impact due to the project on high environmental values including MNES, an EWP will be developed for any site where the project may have adverse impacts on those values. Procedures and guidance materials have been developed to identify sites which require EWPs and the content and approval of EWPs. EWPs will be reviewed at least every two years and at other times where internal or external audit suggests there may be a need. In addition to the original short-listed sites, other sites may fall within this process if species are discovered or other new information comes to hand. The process is robust and designed to safeguard environmental assets into the future against any potential adverse effects from the project.

An Environmental Infrastructure Register (**EIR**) has been developed of irrigation infrastructure which is used, or could be used, to deliver environmental water to wetlands or waterways. This is to address the risk that channels which are not included in the backbone but provide water access to significant environmental assets could be decommissioned without regard to the need to retain capability to undertake environmental watering.

The environmental management and mitigation measures are summarised in Table 12-4.

**Table 12-4: Summary of environmental management and mitigation measures**

Management measure	Description	Status
Water Change Management Framework	Management framework setting out the specific assessment, management, mitigation, review and approval processes and methodologies to be implemented by the project	Approved by the Victorian Minister for Planning. To be updated in accordance with recommendations from Expert Review Panel
Environmental Watering Plans	Water supply protocol to protect the high environmental values of a wetland or waterway, which would otherwise be adversely affected without the additional management and mitigation measures set out in the Environmental Watering Plan	Requirement, process and content set out in the approved WCMF  Shortlist of 10 wetlands and 4 waterways requiring EWPs has been approved  One approved EWP (Johnson Swamp) completed  Four interim EWPs completed
Mitigation water	Water provided in order to ensure that the project has no net impact on high environmental values in wetlands and waterways. It is calculated before water savings	Set out in the approved WCMF. To be updated in accordance with recommendations from Expert Review Panel
Environmental Infrastructure Register	Register setting out infrastructure required to be maintained to deliver environmental water or to provide enhancement of water delivery, the latter as voluntarily agreed to by NVIRP	Implemented under the approved Water Change Management Framework

## 12.8 Economic and social matters

The modernisation of the irrigation system was prompted by the recognition that unless a significant urgent intervention was made, the GMID would not have a viable future. Extensive consultation confirmed public support for the project.

Economically, the project is expected to result in improvements in agricultural production and increases in regional economic activity as a result of greater activity in the local agricultural industry.

The major social benefit of NVIRP is that, in the long term, it secures the future of the GMID community by providing enhanced water security, facilitating employment growth and largely distributing benefits equitably through the community.

The benefits of NVIRP extend beyond the GMID however, with all Australians deriving a benefit from increased food and water security as well as better natural flows in the waterways.

There may be some households and localised areas that could be disadvantaged, mainly through relocations, rationalisation of infrastructure, and declining populations in select communities.

Irrigation has had a substantial adverse impact on environmental values in the GMID. Recognising that water in the region is intensively managed, in modernising the irrigation system the water regime will move towards a pre-irrigation regime, benefiting environmental values in the region. These benefits include:

- decreasing the seasonal flow inversion of natural waterways
- reducing groundwater recharge, affecting groundwater levels and salinity
- removing 'unseasonal' water delivery to wetlands, where this is adverse, assisting in restoring more natural wetting and drying cycles.

In site-specific instances where significant adverse effects on high environmental values may occur, NVIRP has a management and mitigation framework to address this.

The action will generate up to 425 GL (long-term annual average) water savings. Water savings generated will be used to:

- provide water for the environment (up to 175 GL long term annual average), improving the ability to maintain and enhance environmental values
- enhance water availability to support improved productivity in Victoria's Food Bowl region (up to 175 GL long term annual average), adding to the productivity improvements achieved through irrigation modernisation
- provide water to Melbourne (up to 75 GL long term annual average), increasing the security of supply.

## 12.9 Recommendation

A thorough and comprehensive assessment of the potential for significant impact on MNES has been conducted in relation to the action and presented in this PER.

The assessment indicates that, subject to the implementation of the management and mitigation measures summarised in Section 12.7, the action is not expected to have a significant impact on MNES.

It is therefore recommended that the controlled action of the modified operation of the fully-modernised GMID be approved under the EPBC Act.

## 12.10 Proposed conditions of approval

The following conditions of approval are suggested:

1. NVIRP must comply with the conditions specified in the Victorian Minister for Planning's decision of 20 April 2009 under the *Environment Effects Act 1978* (Vic) that an Environment Effects Statement is not required.

2. If the Minister believes that it is necessary or desirable for the better protection of relevant listed threatened species and ecological communities, listed migratory species and Wetlands of international importance, the Minister may request that NVIRP make specified revisions to the WCMF relevant to those MNES.
3. Unless otherwise agreed by the Minister, NVIRP must submit an annual report on performance regarding relevant listed threatened species and ecological communities, listed migratory species and wetlands of international importance. Prior to submission the annual report must have been independently audited by an appropriately qualified person, agreed by the Commonwealth Department of Environment, Water, Heritage and the Arts (**the Department**). The annual report must be published by NVIRP.
4. Unless otherwise agreed by the Minister, NVIRP must submit an annual report to the Minister for Water on the Commonwealth water savings achieved. Prior to submission the annual report must have been independently audited by an appropriately qualified person, agreed by the Department. The annual report must be published by NVIRP.
5. The Minister may require NVIRP to conduct an independent audit of compliance with the conditions of approval and submit a report to the Department. The independent auditor must be approved by the Department prior to the commencement of the audit. Audit criteria must be agreed by the Department and the audit report must address the criteria to the satisfaction of the Department.
6. If, at any time after two years from the date of this approval, the Minister notifies NVIRP that the Minister is not satisfied that there has been substantial commencement of the action, the action must not thereafter be commenced without the written agreement of the Minister.

## 12.11 Conclusion

NVIRP will generate up to 425 GL (long-term annual average) water savings which will be used to:

- provide water for the environment (up to 175 GL long term annual average), improving the ability to maintain and enhance environmental values
- enhance water availability to support improved productivity in Victoria's Food Bowl region (up to 175 GL long term annual average), adding to the productivity improvements achieved through irrigation modernisation
- provide water to Melbourne (up to 75 GL long term annual average), increasing the security of supply.

Economically, the project is expected to result in improvements in agricultural production and increases in regional economic activity as a result of greater activity in the local agricultural industry.

Over recent years, drought and fluctuating commodity prices have had negative impacts on the GMID community and its social sustainability. The major social benefit of NVIRP is that, in the long term, it secures the future of the GMID community by providing enhanced water security, facilitating employment growth and largely equitably distributing benefits through the community.

Environmentally, NVIRP will help secure the future of rivers and wetlands in northern Victoria through:

- providing up to 175 GL of callable, tradeable environmental entitlements - one of the most effective tools for managing stressed river and wetland systems in context of water scarcity and climate change
- moving the water regimes of wetlands and waterways towards more beneficial pre-irrigation conditions.

The assessment shows that NVIRP will have no significant adverse impacts on MNES and will have substantial economic, social and environmental benefits for northern Victoria. Through efficient use of available water, it will safeguard the productivity of the GMID, lessen the overall environmental footprint of irrigation in the region, and secure the future of northern Victoria's communities and environments.