

Chapter 7 - Proposed safeguards and mitigation measures

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7 Proposed safeguards and mitigation measures

7.1 Introduction

This chapter describes the safeguards and mitigation measures that Northern Victoria Irrigation Renewal Project (**NVIRP**) is putting in place to ensure that any detrimental impacts to matters of national environmental significance (**MNES**) which could result from the operation of the fully modernised irrigation system in the Goulburn-Murray Irrigation District (**GMID**) are fully mitigated.

From its inception, NVIRP was designed to ensure that, not only would it provide up to 175 GL of callable, tradeable environmental entitlements as a key environmental outcome, but that its implementation would not have a detrimental impact on wetlands and waterways of high environmental value and therefore on the species that depend on these assets.

A key recommendation to Government from the community-based Food Bowl Modernisation Committee was that the water savings resulting from NVIRP, which are to be split between the environment, irrigators and water supply for Melbourne, were to be net savings. This means that water must be provided to ensure there are no net impacts on high environmental values (including MNES) and that mitigation water is provided in advance of any calculation of formal water savings from the project. This recommendation was accepted by Government and is a key principle in the implementation of NVIRP. It is brought into operation through the Water Change Management Framework (**WCMF**) outlined in the sections below.

An essential component of the WCMF is an assessment of the species, communities, wetlands and waterways within or related to the GMID to determine which are:

- high environmental value including MNES (the basis of this report), and
- likely to be detrimentally affected by the more efficient operation of the modernised irrigation system which includes changes to groundwater levels, changes in surface flows and reduced outfalls and diversions, and therefore require mitigation.

These assessments have been described in detail in Chapters 5 and 6. They examined the likelihood of significant impacts and the need for associated recommended management and mitigation measures, where relevant, for the 10 Ramsar sites, 61 threatened species, 5 threatened ecological communities, 54 migratory species and 7 marine overfly species were identified as being present or potentially present in the GMID (noting that four species are both listed and migratory). Detailed assessment was conducted for 10 Ramsar sites, 33 listed species, 3 ecological communities and 19 migratory species (noting that two species are both listed and migratory). These were the MNES identified as potentially vulnerable to hydrological changes from the action.

No significant impacts on MNES are expected, subject to the development and implementation of Environmental Watering Plans (**EWP**) for the shortlisted wetlands and waterways likely to be affected by the changed water regime (see Chapter 5) to mitigate potential impacts on plants, frog, fish and bird species.

The assessment also noted the implementation of a protocol to investigate MNES where the reduction of channel seepage and leakage could affect delivery of worthwhile volumes to nearby wetlands.

These management and mitigation measures will be implemented through the application of the WCMF described below.

7.2 Content of WCMF

The WCMF is a requirement of the Victorian Minister for Planning's decision that an Environment Effects Statement (**EES**) was not required for NVIRP, as described in the referral accepted on 20 February 2009.

Its purpose is to describe the means by which NVIRP will protect high value aquatic and riparian ecological values (including MNES) through management of water allocations and flows that may be impacted by implementation of NVIRP within the modernised GMID.

The WCMF is included at Appendix 4.

7.2.1 WCMF components

It has five key components:

- An assessment framework which indicates whether a species, community, wetland or waterway of high environmental value is likely to be impacted by the operation of NVIRP primarily through changing its water regime. This is applied at both the site-specific and regional scales. The results of these assessments are reported in Chapters 5 and 6. In addition, the site-specific assessment also identifies sites where the modification of infrastructure could impact on the capacity to deliver environmental water. Where this is the case, there is a requirement on NVIRP to retain or improve the infrastructure.
- Specifications for EWPs to be developed for wetlands or waterways (either of high value or supporting species or communities of high environmental value) that are considered likely to be impacted. EWPs will include processes for management, monitoring, review and adaptive management of implementation.
- Requirement for an Environmental Infrastructure Register (**EIR**). Where the site-specific assessment identifies sites where the modification of infrastructure could impact on the capacity to deliver environmental water, NVIRP is required to retain or improve the infrastructure which is then recorded on the EIR.
- Principles for the provision of mitigation water as required by the EWPs which are consistent with and linked back to a Water Savings Framework issued by the Victorian Government specific to this project. As mentioned above, the key principle is that water savings are only calculated after taking out the volume of water needed to maintain sites of high environmental value that could be affected by the modernised irrigation system.

- A description of the ongoing roles, responsibilities and long-term arrangements for Goulburn-Murray Water Catchment Management Authority (**GMWCA**) and land managers to deliver and review the requirements of EWPs, beyond the life of the state-owned enterprise, NVIRP.

7.2.2 Expert review of the WCMF

The Minister for Planning required that an Expert Reference Panel (**ERP**) be appointed by the Victorian Minister for Environment to provide advice to the Minister for Water and the Secretary of DSE on the WCMF and the various stages of its implementation including assessment reports identifying waterways and wetlands requiring EWPs. The WCMF was approved by the Minister for Water as required by the Minister for Planning’s decision on 14 August 2009, after receiving advice from the ERP.

The ERP advised that the documentation prepared by NVIRP was acceptable and warranted being approved (refer Appendix 20 for the ERP’s advice). The ERP advised on future development of the WCMF, as set out in Section 7.10.

7.3 Environmental commitments

There is a range of the environmental commitments and performance requirements as required by Condition 3(i) of the Victorian Minister for Planning’s decision that an EES was not required for NVIRP. These are set out in the WCMF outlined in Table 7-1.

Table 7-1: Environmental commitments and performance requirements

Item	Performance Requirements	Reference
Environmental Commitment		
1.	Manage the ecological consequences of hydrological changes arising from implementation of NVIRP, including to avoid any diminishing ecological values in wetlands and waterways	
1.1	<p>Water savings</p> <p>Provide up to an additional 175 GL of water entitlements for the environment. (The management and allocation of this water is outside NVIRP’s scope. The water is expected to be used in accordance with regional priorities for environmental watering).</p>	Water Savings Framework (WSF)
1.2	<p>Wetlands, waterways and groundwater-dependent and seepage dependent ecosystems</p> <p>For wetlands, waterways, groundwater-dependent and seepage dependent ecosystems (‘sites’) with high environmental values which may be affected by the changed management of water supply and flows within the modified GMID system:</p> <ul style="list-style-type: none"> ▪ Identify and assess the potential effects of changed management of water supply infrastructure and delivery as a result of the implementation of NVIRP. ▪ Develop and implement measures to avoid and/or mitigate 	WCMF Short-listing reports of sites requiring EWPs

Item	Performance Requirements	Reference
	<p>impacts due to NVIRP implementation. Mitigation measures may include the provision of water and/or infrastructure to maintain environmental values.</p> <ul style="list-style-type: none"> ▪ Where practicable, develop and implement measures to enhance the environmental values. ▪ Document the arrangements in an EWP. EWP to include processes for monitoring, review and adaptive management of implementation. 	
1.3	<p>For other wetlands and waterways which are not identified as having high environmental values, in consultation with relevant authorities:</p> <ul style="list-style-type: none"> ▪ Maintain essential infrastructure for delivery of environmental water. ▪ Where practicable, improve the infrastructure for delivery of environmental water. 	<p>WCMF EIR</p>
1.4	<p>Flora and native vegetation</p> <p>Avoid and/or minimise the loss of <i>Flora and Fauna Guarantee Act (Vic)</i> and EPBC listed threatened flora species and communities and native vegetation ('flora') by:</p> <ul style="list-style-type: none"> ▪ Considering flora when identifying wetlands and waterways with high environmental values in the GMID system. ▪ Assessing the regional effects of the changed management of water supply and flows within the modified GMID system to wetlands and waterways with high environmental values on flora and, where required, develop and implement additional measures to avoid and/or mitigate impacts due to NVIRP implementation. 	<p>WCMF</p> <p>Short-listing reports of sites requiring EWPs</p> <p>EWPs</p>
1.5	<p>Fauna – aquatic and terrestrial</p> <p>Avoid and/or minimise impacts on FFG and EPBC listed threatened fauna species, native fauna species and listed migratory species ('fauna') by:</p> <ul style="list-style-type: none"> ▪ Considering fauna when identifying wetlands and waterways with high environmental values in the GMID system and ▪ Assessing the regional effects of the changed management of water supply and flows within the modified GMID system to wetlands and waterways with high environmental values on fauna and, where required, develop and implement additional measures to avoid and/or mitigate impacts due to NVIRP implementation. 	<p>WCMF</p> <p>Short-listing reports of sites requiring EWPs</p> <p>EWPs</p>
1.6	<p>Hydrogeology – groundwater levels</p> <p>Provide sufficient detail to allow assessment, reporting and mitigation of groundwater impacts on wetlands and waterways, resulting from the implementation of NVIRP.</p>	<p>WCMF</p> <p>Groundwater hydrology report</p>

Item	Performance Requirements	Reference
1.7	<p>Hydrogeology - Salinity</p> <p>Identify, assess and report changes to salinity of wetlands, waterways and soils as a result of implementation of NVIRP by:</p> <ul style="list-style-type: none"> ▪ Providing sufficient information to allow for the monitoring of salinisation of wetlands, waterways and soils as a consequence of the implementation of NVIRP ▪ Establishing likely regional salinity and groundwater level responses within the GMID ▪ Providing information in a form and timeframe relevant to established practices for reporting and accounting for salinity within the local CMA regions, Victoria and the Murray Darling Basin 	Report to relevant Catchment Management Authority
1.8	<p>Hydrogeology – acid sulphate soils (ASS)</p> <p>Provide sufficient detail to allow assessment, reporting and mitigation of potential ASS impacts and processes on wetlands and waterways requiring EWPs.</p>	WCMF Groundwater hydrology report
<p>Environmental Commitment</p> <p>2. Describe arrangements for the sourcing, allocation and management of water required to mitigate the project’s potential ecological impacts</p>		
2.1	<p>Management of water</p> <p>Environmental Watering Plans to:</p> <ul style="list-style-type: none"> ▪ Specify accountabilities for planning, requesting and delivering mitigation water; and ▪ Be approved before the operation of relevant works commences. <p>Organisations with accountabilities under the EWP to approve acceptance of their accountabilities and negotiate appropriate funding before the operation of relevant works commences.</p>	WCMF EWPs
2.2	<p>Sourcing and allocation of water</p> <p>Mitigation water to be sourced and allocated in accordance with the Water Savings Framework.</p>	WCMF EWPs

7.4 Approach to assessment, management and mitigation

7.4.1 Assessment conducted

As outlined in Chapter 5, preliminary desk top assessments were undertaken as part of the information provided to the Victorian Minister for Planning. This led to a preliminary list of wetlands and waterways required to be considered for EWPs as part of the Minister for Planning's decision (SKM 2008). These have now been confirmed by the full assessments described in Chapters 5 and 6 in relation to MNES.

Under the WCMF, the assessment, management and mitigation approach will apply to any additional sites if, in the future, new information becomes available or preliminary site investigations or monitoring suggest that further investigation is appropriate. This is provided for in the management review process in the WCMF.

7.4.2 Site-specific assessment

Figure 7-1 provides an overview of the assessment, management and mitigation approach outlined in the WCMF for site-specific assessment. The regional aspects of assessment relevant to MNES are set out in this PER.

As outlined in Chapter 5, it will include a precautionary procedure to identify wetlands with MNES near channels where seepage and leakage is proposed to be reduced. This procedure will:

- identify MNES
- assess the dependence of the wetland on groundwater supplied as a result of the channel, using the protocol set out in the Groundwater Hydrology Report (SKM, 2009b).

In the unlikely event that the wetland has MNES and is shown to be dependent on groundwater supplied by the channel then either modernisation will not take place in this location or an EWP for the wetland will be established.

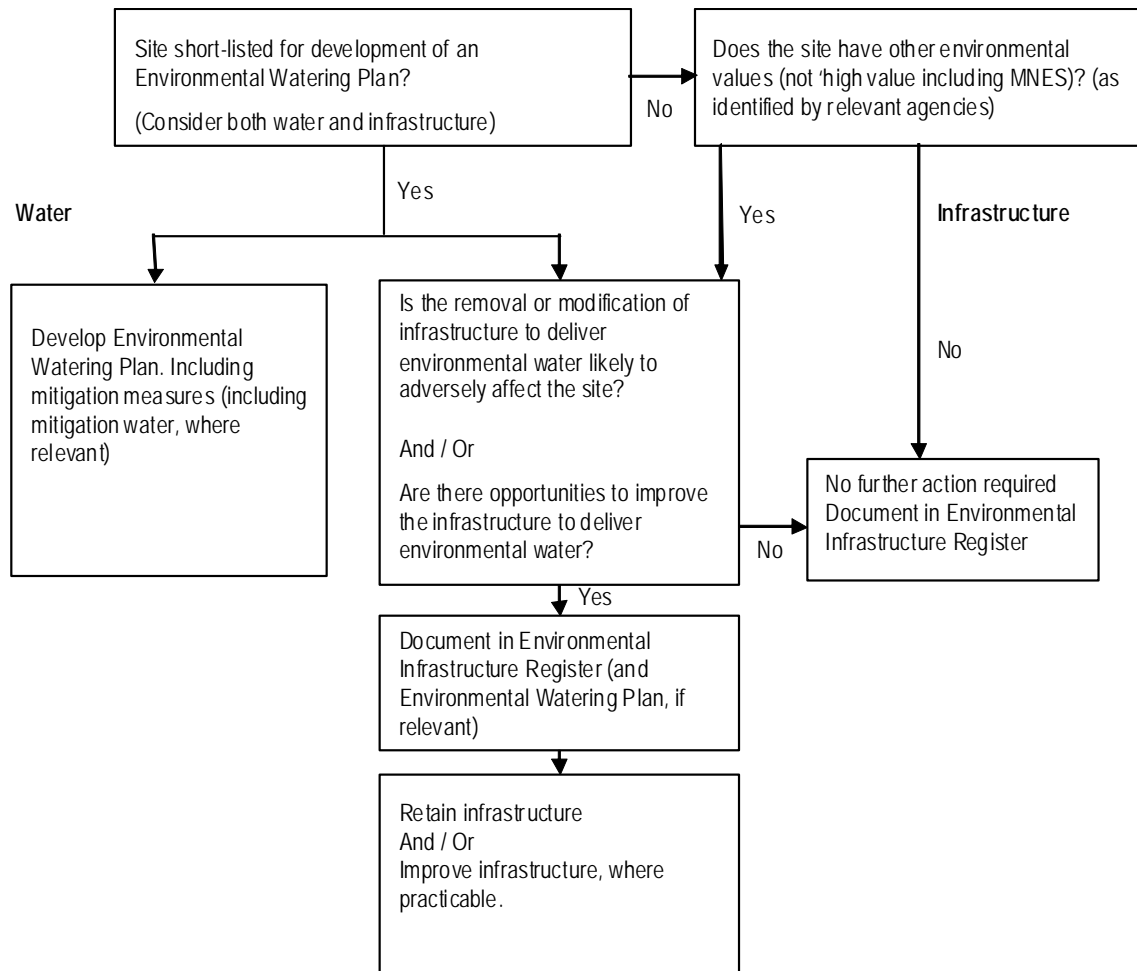


Figure 7-1: Approach to site-specific assessment, management and mitigation

7.5 Environmental Watering Plans

EWPs are the instrument through which any adverse localised impacts of the operation of modernised system on wetlands and waterways will be mitigated.

7.5.1 Sites requiring EWPs

Desktop assessment (SKM 2008) identified a number of sites potentially at risk from the implementation of the modernised system. Further shortlisting investigations were conducted (Feehan 2009, Hydro Environmental 2009a) to determine whether these sites required the development and implementation of an EWP. These reports are provided in Appendix 16 and Appendix 17.

The assessment, outlined in Chapters 5 and 6, show that EWPs are required for 10 wetlands and 4 waterways to mitigate impacts on relevant MNES. A further waterway, Nine Mile Creek, has been recommended for further investigation to determine whether it is at risk. These are listed in Table 7-2 and shown in Figure 7-2. All of the sites were identified in the Victorian Planning Minister's decision. This assessment was reviewed by the ERP (see Appendix 20) and endorsed by the Secretary DSE.

A discussion of how this list of sites was arrived at is provided in Chapter 5.

Table 7-2: Wetlands and waterways requiring Environmental Watering Plans

Wetland / Waterway	Reference (1994 Wetlands register)	Environmental Watering Plan status
Wetland		
Johnson Swamp	355320	Final. Reviewed by ERP and approved by Minister for Water
Lake Elizabeth	551457	Interim approved by Minister for Water. Final EWP in preparation
Lake Murphy	587335	Interim approved by Minister for Water. Final EWP in preparation
McDonald Swamp	344450	In preparation
Lake Leaghur	524142	In preparation
Lake Yando	507077	In preparation
Little Lake Boort	450990	In preparation
Little Lake Meran	541289	In preparation
Lake Meran	533238	In preparation
Round Lake	366715	In preparation
Waterway		
Loddon River (Note: refers to 2 reaches of the Loddon River)	Torrumbarry Irrigation Area and Pyramid Boort Irrigation Area	Interim approved by Minister for Water. Final EWP in preparation
Campaspe River	Within Rochester Irrigation Area	Interim approved by Minister for Water. Final EWP in preparation
Twelve Mile Creek	-	In preparation
Broken Creek	-	In preparation
Nine Mile Creek	Immediately downstream of Serpentine Creek outfall	Further investigation required

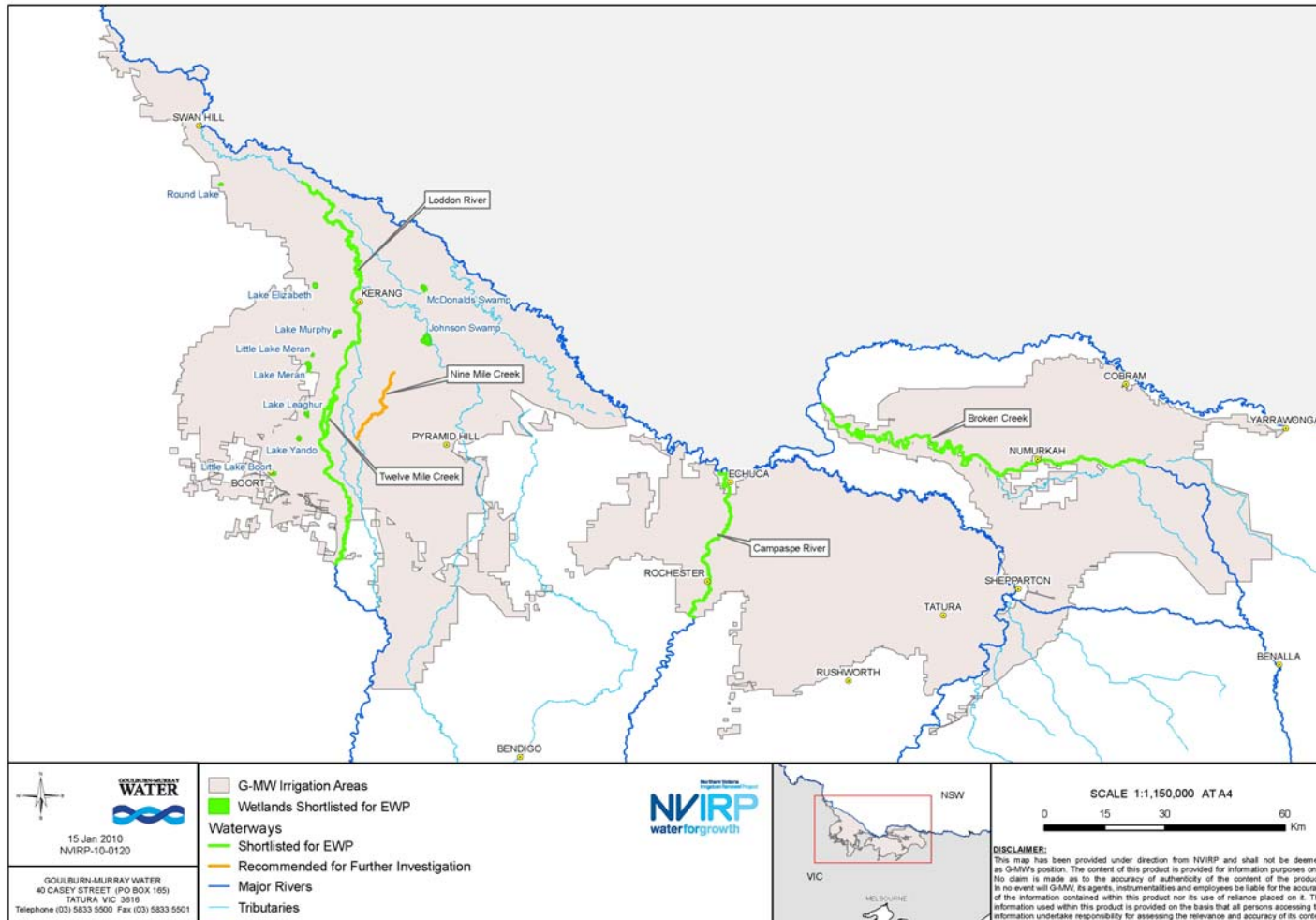


Figure 7-2: Location of wetlands and waterways requiring Environmental Watering Plans (river lengths requiring EWPs are indicative only).

7.5.2 Sites which do not require EWP

The final sites requiring an EWP are shown in Table 7-2. However as part of the initial desktop assessment and shortlisting process described in Chapter 5, a number of additional sites were investigated in detail at the local scale and shown that they either did not support high environmental values or were not impacted by the action (see Table 7-3). Therefore EWPs will not be developed for these sites. This assessment was reviewed by the ERP (see Appendix 20) and endorsed by the Secretary DSE.

Table 7-3: Wetlands and waterways which do not require Environmental Watering Plans

Wetland / Waterway	Reference	Reason
Wetland		
Hunt's Swamp	312051	Only receives water from catchment/floodplain and road and tailwater drainage, therefore no impact
Dunn's Swamp	577650	Only receives water from runoff collected by road culverts and floodplain, therefore no impact
Thunder Swamp	558639	Only receives water from active floodplain of Myers Creek, therefore no impact
Black Box Swamp	569655	Only receives water from a private drainage system and runoff collected by road culverts and floodplain, therefore no impact
Wharparilla Flora Reserve	950996	Currently receives high flow water through the Rochester drainage system therefore no impact
Richardson's Lagoon	810092	Irrigation induced flows prevented from entering the wetland. Receives environmental water from the River Murray and high flow water from Lockington drainage system, therefore no impact
Murphy's Swamp	825022	Only receives high flow water from Bamawm Drain, therefore no impact from the NVIRP
Bray's Swamp (313709)	310694	Receives high flow water from the Mosquito 24 drainage system and environmental water through channel system when required, therefore no impact
Bray's Swamp (310694)	313709	Receives high flow water from the Mosquito 24 drainage system and environmental water through channel system when required, therefore no impact
Merrigum Swamp	323733	Only receives high flow water from the Mosquito main depression drainage system, therefore no impact
Golf Course (Tresco) Lake	372703	Only receives water from a significant tile and surface drainage system and overflow water from surrounding Lakes, therefore no impact from the NVIRP
Little Wallenjoe Swamp	088586	Only receives water from the upstream Wanalta Wetland system, therefore no impact

Wetland / Waterway	Reference	Reason
Kanyapella Basin	Multiple	Receives water from the Tongala drain of the Yambuna Creek system, with Warrigal Creek and Coram Drain also supplying water. The exiting surface water drainage system is unable to provide the water regime or volume required to maintain the wetland sufficiently therefore there is no impact
Kinnairds Swamp	619057	The Muckatah Surface Water Management Scheme was implemented to reduce irrigation induced flows from entering the Swamp and provide a more natural flood regime. There is no impact
Waterway		
Bannacher and Pennyroyal Creeks	-	No expected change in flow regime, therefore no impact
Bullock Creek	-	No expected change in flow regime, therefore no impact
Calivil Creek	-	No expected change in flow regime, therefore no impact
Pennyroyal Creek	Downstream of Serpentine Creek outfall	No expected change in flow regime, therefore no impact
Pyramid Creek	-	No expected change in flow regime, therefore no impact
Sevens Creek	-	No expected change in flow regime, therefore no impact
Sheepwash Creek	-	No expected change in flow regime, therefore no impact
Tongalong Creek	-	No expected change in flow regime, therefore no impact
Tullah Creek	-	No expected change in flow regime, therefore no impact
Wells Creek	-	No expected change in flow regime, therefore no impact
Yambuna Creek	-	No expected change in flow regime, therefore no impact

7.5.3 Indicative schedule and status report

Currently four interim EWPs have been prepared and approved by the Victorian Minister for Water on advice of the ERP (see Table 7-2).

At this stage, EWPs for all of the sites listed in Table 7-2 are scheduled to be approved before the commencement of the 2010/2011 irrigation season. At this stage all the EWPs are intended to be final EWPs. Depending on the progress of the investigations, it is possible that it may be decided to prepare an interim EWP (see Section 7.5.6).

7.5.4 Process and content of EWPs

The process for developing an EWP includes:

- scope and collate relevant information
- define ecological objectives and associated water requirements

- identify risks and threats
- assess infrastructure requirements
- identify need to provide mitigation water and, if needed, determine the quantification, timing and frequency of the mitigation water
- develop recommendations on governance arrangements and adaptive management
- consult and engage stakeholders
- obtain agreement of system operator, land manager and environmental water manager.

The WCMF (Appendix 4) sets out the minimum content requirements for an EWP. In summary this includes:

- background
- environmental values
- consultation
- water regime
 - natural
 - current (before implementation of NVIRP modernisation works)
 - proposed (after implementation of NVIRP modernisation works)
- opportunities to deliver water
- potential risks or adverse impacts
- on-going management and governance arrangements.

For illustrative purposes, Appendix 5 is the approved EWP for Johnson Swamp.

7.5.5 Timing of development of EWPs

To ensure that EWPs are fully developed and based on the most up to date data, EWPs will be developed on a site-by-site basis in accordance with the project's operational roll-out. It is both impractical and undesirable for them to be developed concurrently for all sites. Each EWP will be submitted for review and, ultimately, approved within the timeframe appropriate to the coming into operation of the relevant part of the modernised GMID.

7.5.6 Interim EWPs

Where practicable, NVIRP will develop EWPs, in preference to interim EWPs, for sites prior to the operation of relevant works. However, interim EWPs may be prepared where one or more of the following occurs:

- insufficient data on the environmental values is available
- insufficient data on the hydrology is available, including contribution of incidental irrigation water (e.g. volume and seasonality)

- there is insufficient understanding of the materiality of the interactions between the environmental values and the altered hydrology as a result of the implementation of NVIRP.

When sufficient data and understanding are available to develop long-term management and mitigation measures, a final EWP will replace the interim EWP.

7.5.7 Process and content for interim EWPs

Interim EWPs will:

- adopt a precautionary approach and present no greater risk of harm to the wetland or waterway, than it is currently subject to
- retain all current options to provide environmental water to the wetland or waterway, including through the irrigation infrastructure
- incorporate management and mitigation measures which are reversible, should the subsequent EWP recommend different measures.
- interim EWPs will have the risk management approach incorporated, focusing on:
 - managing and mitigating the short term risks (operation of the irrigation system in year one only) associated with reduced irrigation water contribution
 - identifying the data and methodology required to progress the interim EWP to an EWP
 - identifying and implementing monitoring required in order to address risks until the EWP is developed.

The key activities in developing an 'interim' risk based EWP will include:

- determining wetland and waterway values and reporting on existing flow recommendations
- determining relative hydrological components (including preliminary outfalls assessment)
- identifying risks and potential impacts in year one associated with operation of the modified GMID
- developing an adaptive management framework
- identifying key information gaps to be addressed in EWPs.

The WCMF (Appendix 4) sets out the minimum content requirements for an interim, risk-based EWP. In summary this includes:

- background
- values
- current hydrological regime and proposed changes
- risk management framework

- short term adaptive management framework
- next steps and knowledge gaps (in the context of EWPs).

7.5.8 EWP review and approval

EWPs or interim EWPs will be approved by the Victorian Minister for Water on advice from the ERP prior to operation of any infrastructure which affects the supply of incidental environmental water to that site.

The draft EWP will be reviewed by the Technical Advisory Committee (**TAC**) on the environment established by NVIRP (described in Chapter 11). This committee has extensive local environmental knowledge and will enhance the quality of the EWP.

Prior to being submitted to the Victorian Minister for Water, each EWP or interim EWP will be agreed to by the relevant:

- land manager
- water supply manager
- catchment manager.

The ERP will then review each EWP or interim EWP and provide feedback to NVIRP and advice to the Victorian Minister for Water.

7.5.9 EWP reporting

NVIRP will submit an annual report to the Secretary of DSE, not later than 31 March. The report will include a statement of completed versus planned EWPs or interim EWPs.

7.5.10 EWP monitoring

Monitoring, reporting and auditing procedures are detailed in each EWP, as determined by the ecological objectives outlined in each plan. Monitoring requirements will be designed to be consistent with the Catchment Management Authorities' existing monitoring programs.

7.5.11 Provision of mitigation water for EWPs

Mitigation water required to meet the needs of EWPs can be provided from a range of sources including:

- the project's gross water savings (i.e. the savings set aside as part of mitigation of high environmental values, with the remaining savings (net savings) allocated as per Government commitments)
- unregulated flows (where they occur - including flood mitigation releases from major storages and runoff from the local non-irrigated catchments)
- drainage flows into the irrigation distribution system from irrigation practices on-farm (where agreed by the system operator that they will continue to occur)
- existing passing flow requirements as specified in bulk entitlements
- obligations on the loss provision as specified in bulk entitlements

- outside the irrigation system, managed transfer of water from allocation established in inter-valley trade accounts (where agreed with the system operator) may also be used. In these situations additional losses incurred as a result of the transfer will be covered by the system operator.

If one of these sources of mitigation water cannot be supplied, the volume that they contribute will be made up from one of the other sources above. Sources of mitigating water will be selected to ensure water can be delivered in accordance with the delivery requirements as specified in the environmental watering plans.

Operating arrangements will be developed to specify the procedures to deploy mitigation water, where relevant, according to the specifications in the EWPs.

The operating arrangements will be developed by the system operator, NVIRP and the environmental water manager and will be submitted to the Secretary of DSE or his/her delegate for endorsement.

The operating arrangements may be interim or final in nature. For each waterway or wetland these arrangements must be in place before any mitigation water is deployed.

7.5.12 Costs of mitigation measures

As a requirement under the Water Change Management Framework, NVIRP is committed to developing and implementing any mitigation measures (including mitigation water) as identified in the relevant EWPs. However, it is not possible at this time to determine the costs associated with mitigation measures as the nature of potential impacts are site specific and can only be determined progressively through the development of EWPs.

7.6 Environmental Infrastructure Register

The WCMF requires NVIRP to establish an Environmental Infrastructure Register 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 register is being developed in consultation with environmental water managers and land managers and will include, as a minimum:

- name of wetland/waterway
- details of irrigation infrastructure currently used to deliver environmental water to wetlands/waterways
- structure identification
- structure type
- irrigation infrastructure that could be used to deliver environmental water to wetlands/waterways
- description of the requirement for or interest in retaining the infrastructure

- the authorities (e.g. CMA and land manager) associated with the management of that wetland or waterway.

Where landholders are consulted regarding possible rationalisation of infrastructure listed on the EIR, the relevant environmental water manager/land manager will be advised and included in negotiations about the future of the infrastructure. Where infrastructure is no longer required for irrigation delivery and no other practicable supply arrangement can be identified for the wetland, ownership of the infrastructure may be transferred to the relevant environmental water manager/land manager.

Where practicable, NVIRP will also improve infrastructure for delivery of environmental water. This might, for example, include the replacement of water delivery channels with pipes to reduce the ongoing recurrent costs of channel operation and maintenance and improve efficiency by reducing leakage, seepage and evaporative losses.

Additions to the EIR must be approved by the land manager, environmental water manager and system operator following completion of each EWP or, where no EWP is required, following specific advice from the TAC.

7.7 Environmental monitoring, reporting and auditing

7.7.1 Monitoring and incident response

NVIRP will monitor and report changes in hydrological and ecological conditions in relevant waterways or wetlands. This monitoring and review is incorporated into the WCMF and embodied in the project's Environmental Management System (**EMS**) which is consistent with ISO 14001.

7.7.2 Auditing

NVIRP will measure its performance and progress annually against:

- the EMS and WCMF
- the environmental commitments
- compliance with legislative requirements
- internal objectives and targets related to the control of significant environmental aspects.

Recommendations and conclusions from audits are reported to NVIRP's Executive Manager to assign appropriate actions. Results are used to facilitate continual improvement of the EMS and overall environmental performance.

7.7.3 Independent audits

NVIRP will appoint an independent auditor to audit the implementation of the WCMF. The audit will evaluate the project's performance on the basis of:

- documentation review
- interviews with members of the Technical Advisory Committee and other key stakeholders
- any other relevant information available to or obtained by the auditor.

The auditor may engage such technical assistance as may be necessary for him/her to complete effective audits.

An annual audit will be conducted during NVIRP's life. The Secretary DSE, or delegate, will be consulted in confirming the detailed scope of the audit. The appointee will be agreed with the Secretary DSE.

The independent auditor will present a report of audit findings not later than 31 March each year. Where the audit identifies substantive issues, this may trigger a review of the WCMF or subordinate documents (e.g. short listing reports or EWPs).

A copy of the independent auditor's report will be provided to DSE.

The Secretary DSE, or delegate may direct additional audits to be conducted by the appointed independent auditor at any time and on any matters related to the environmental performance of the management of water allocations and flows within the GMID.

7.8 Management review

Each EWP will contain a review process within it.

In addition, NVIRP will review the WCMF as part of the adaptive management approach, in order to continually improve.

Subject to relevant approvals, if the scope of NVIRP changes or the circumstances addressed by the WCMF or EWPs change, the shortlist of EWPs will require review and additional and/or revised processes and methodologies may be required.

Every two years, NVIRP will review the:

- Water Change Management Framework
- shortlisting reports
- EWPs prepared
- environmental infrastructure register.

The outcomes of the review will document:

- any required revisions to the WCMF, including changes and/or additions to processes and methodologies
- any additional and/or revised EWPs required
- any revision to the Regional Environmental Assessment Report and/or Groundwater Assessment Report required
- issuing of current versions of documents so that relevant parties have the most recent versions of documents.

NVIRP will implement agreed actions from the outcome of the management review.

7.9 Handover

NVIRP will prepare a final report to the Secretary DSE every five years and at the end of the project:

- listing all the EWPs prepared
- confirming that all roles and responsibilities under the EWPs have been transferred and accepted
- confirming that legal and organisational arrangements have been put in place to guarantee mitigation water delivery in accordance with the EWPs
- confirming that adequate funding arrangements are in place for meeting obligations under EWPs when NVIRP (the organisation) no longer exists
- completing and transferring responsibility for the EIR to DSE (final report only).

7.10 Future development of the WCMF

In reviewing the WCMF and providing advice to the Victorian Minister for Water, the ERP advised that the key priorities for development, before the 2010/2011 irrigation season, should be:

- Establishment of the methods for defining the attributes (sourcing and allocation) of mitigation water and incorporation into the Water Savings Protocol. It was recognised by the ERP that this responsibility lies with DSE rather than NVIRP. The WCMF will be updated to reflect policy developments in sourcing and allocation of mitigation water.
- Completion of revisions to the WCMF and ensuring that the WCMF is ready to use. This was completed prior to the 2009/2010 irrigation season.
- Initiation of the scoping and outlining of the process for undertaking the Regional Environmental Assessment. Chapters 5 and 6 provide regional scale assessment of MNES.
- Finalisation of the Groundwater Assessment Report. Findings and implications relating to wetlands, waterways and groundwater-dependent ecosystems, are to be drawn out and ready to be activated. SKM (2009b) and Chapter 5 address this recommendation.
- Updating of the shortlists of wetlands and waterways in response to the Groundwater Assessment Report including any update of methods. The WCMF will be updated to include a precautionary protocol regarding assessment of MNES in the unlikely event that the reduction of channel seepage and leakage could affect delivery of worthwhile volumes to nearby wetlands (see Chapter 5).
- Development of a process or provisional methods for the assessment of the groundwater or seepage dependent ecosystems. The WCMF will be updated to include a protocol regarding assessment of MNES in areas where the reduction of channel seepage and leakage could affect delivery of worthwhile volumes to nearby wetlands (see Chapter 5).

The ERP concluded that, notwithstanding the requirements for future work, the NVIRP documents provided an adequate response outlining the means by which the NVIRP will protect aquatic and riparian ecological values through management of water allocations and flows that may be impacted by the operation of the modernisation works undertaken by NVIRP in the GMID within the 2009/2010 irrigation season. The ERP believed that the management review provisions outlined in the WCMF were appropriate in ensuring continual improvement.

7.11 Conclusion

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 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 7-4.

Table 7-4: 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 Short-list 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