



Design and Construction of Stage AB of the Googong Water Recycling Plant (WRP)

Contract Number WRP01

Flora and Fauna Management Plan

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1 Introduction

1.1 Context

This Flora and Fauna Management Plan (FFMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the Googong Township IWC Project Stage AB WRP.

Refer to Section 1 and Section 2 of the CEMP for additional detail on the scope of Stage AB WRP to which this FFMP applies.

This FFMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA), the Statement of Commitments (SoC), the safeguards listed in the Googong Township water cycle project Environmental Assessment (EA), submissions report, and all applicable legislation.

1.2 Background

The Googong Township water cycle project EA assessed the impacts of construction and operation of the IWC Project on flora and fauna.

As part of EA development, a detailed assessment was prepared to address the Director-General's Requirements issued by the Department of Planning and Infrastructure (DP&I). The flora and fauna assessment was addressed in Section 11 and Appendix F of the EA.

The EA concluded that there were unlikely to be significant flora and fauna impacts associated with the construction and operation of the IWC Project, following the implementation of the proposed mitigation measures identified in the EA.

The Googong Township Project was also referred to the Commonwealth Department of the Environment (DoE) (formerly known as the Department of Sustainability, Environment, Water, Population and Communities [DSEWPaC]) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to potential impacts on matters of national environmental significance, including migratory species, threatened species and communities. The Googong Township Project was declared a controlled action under the EPBC Act, and subsequently approved on 19 May 2011, subject to conditions.

A pre-construction field survey of the Stage AB WRP area that may potentially be affected by construction activities was undertaken by ecological consultants Biosis, in July 2013, to assess and map the vegetation within, and identify the presence of, or habitat flora and fauna species and ecological communities and which has been relied up to prepare this FFMP.

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1.3 Environmental Management System overview

The overall Environmental Management System for Stage AB WRP and approach to managing environmental impacts during construction is described throughout the CEMP.

This FFMP forms part of the environmental management framework for Stage AB WRP, as described in Section 1.6 of the CEMP. In accordance with CoA C20(e), this Plan has been developed in consultation with the Office of Environment and Heritage (OEH), Queanbeyan City Council (QCC) and the Commonwealth Department of Environment (DoE).

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2 Purpose and objectives

2.1 Purpose

The purpose of this Plan is to describe how Googong Township Pty Ltd (GTPL) and John Holland Propriety Limited (JHPL) will manage and protect flora and fauna during construction of Stage AB WRP.

This Plan also assists in ensuring that the construction of Stage AB WRP meets the environmental objectives and targets as defined in Section 3.5 of the CEMP.

2.2 Objectives

The key objective of the FFMP is to ensure that impacts to flora and fauna are minimised. To realise this objective, the following will be undertaken:

- Ensure appropriate controls and procedures are implemented during construction activities to avoid or minimise potential adverse impacts to flora and fauna (refer to Section 5.1).
- Ensure appropriate measures are implemented to address the relevant CoA and SoC, and the safeguards detailed in the EA and submissions report (refer to Sections 3.2 and 3.3).
- Ensure appropriate measures are implemented to comply with all relevant legislation and other requirements as described in Section 3.1 of this Plan.

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3 Environmental requirements

3.1 Relevant legislation and guidelines

Section 3.1 of the CEMP identifies the legal and other requirements applicable to the IWC Project and the construction of Stage AB WRP. This section identifies the key legislation and guidelines applicable to managing flora and fauna.

Legislative requirements

Environmental Planning and Assessment Act 1979 (EP&A Act)

As outlined in Section 3.1 of the CEMP, the IWC Project has been assessed and approved by the Planning Assessment Commission under delegation from the Minister for Planning and Infrastructure (DP&I) under Part 3A (now repealed) of the EP&A Act.

Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) – Commonwealth

The Googong Township Project was referred to the DoE under the EPBC Act due to potential impacts on matters of national environmental significance, including migratory species, threatened species and communities. The Googong Township Project was declared a controlled action under the EPBC Act, and subsequently approved on 19 May 2011, subject to conditions.

This FFMP will comply with the conditions of the EPBC Act approval, where relevant. The relevant conditions of approval, and a reference to where the condition is addressed in this Plan or other management documents are included in Table 3.

Other legislation

- *National Parks and Wildlife Act 1974*
- *Threatened Species Conservation Act 1995.*
- *Noxious Weeds Act 1993.*
- *Pesticides Act 1999.*

The relevant provisions of other applicable legislation are further explained in the register of legal and other requirements included in Appendix M of the CEMP.

Relevant guidelines

The following guidelines and documents have been reviewed in the preparation of this FFMP:

- *Queanbeyan City Council Development Construction Specification C212 – Clearing and grubbing* (QCC, 2011).

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3.2 Minister's Conditions of Approval

The CoA relevant to this Plan are listed in Table 1. A cross reference is also included to indicate where the condition is addressed in this Plan or other management documents.

Table 1 Conditions of Approval relevant to flora and fauna management

| CoA No. | Condition requirements | Document reference |
|---------|---|---|
| B11 | The Proponent shall limit the clearing of native vegetation to the minimum extent practicable. Details regarding the procedures for clearing vegetation, minimising the extent of clearing and the extent and location of these reductions shall be included in the Flora and Fauna Management Plan prepared in accordance with condition C20. | Table 5 (FF7, FF8) Appendix B |
| B12 | All hollow bearing trees shall be retained to the greatest extent practicable. Where this is not feasible, trees containing hollows shall be inspected by a suitably qualified ecologist prior to disturbance, and where native fauna are located using the tree hollows, procedures shall be developed and implemented under the guidance of the qualified ecologist to minimise impacts on the native fauna. Details of actions to be taken and measures to monitor their effectiveness shall be included in the Flora and Fauna Management Plan. | Table 5 (FF8, FF9, FF14, FF15) Section 7.2 Appendix B Appendix C |
| B13 | Where possible, the removal of trees which form potential habitat for the Speckled Warbler (<i>Chthonicola sagittata</i>) shall occur outside of the August to January period breeding season of the species. If clearing cannot be avoided during this time, the area must be inspected by a qualified ecologist prior to any disturbance to identify potential nesting sites. If a nesting site is observed and it contains young, the area must be retained for at least 3 weeks to allow the young to fledge. | Table 5 (FF14, FF15) Appendix B |
| B14 | The Proponent shall establish and maintain in perpetuity a dedicated area of land on the project site for the conservation of the Pink-tailed Worm Lizard (<i>Aprasia parapulchella</i>) as outlined in the plan prepared in accordance with condition D9 and shown in Appendix 2 (of the Project Approval). | Pink-tailed Worm-lizard Protection and Management Plan Note. Construction of Stage AB WRP takes place outside and more than 50 metres from the conservation area |
| C20 (e) | A Flora and Fauna Management Plan to outline measures to protect, and minimise the loss of, terrestrial, riparian and aquatic native vegetation and native fauna habitat as a result of construction of the project. The Plan shall be prepared in consultation with OEH, DSEWPaC and Queanbeyan City Council, and include, but not necessarily be limited to: | This Plan Section 1.3 |
| | (i) procedures for pre-construction surveys to identify key flora and fauna features within and adjacent to the construction area; | Table 5 (FF4, FF6) Appendix A |
| | (ii) procedures to accurately determine the total area, type and condition of vegetation community to be cleared; | Section 4.2 Table 5 (FF4, FF6, FF7) Appendix A |

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| CoA No. | Condition requirements | Document reference |
|---------|---|--|
| | (iii) plan/s showing terrestrial vegetation communities, important flora and fauna habitat areas, EECs, threatened species (Hoary Sunray <i>Leucochrysum albicans</i> var. <i>tricolor</i> , Speckled Warbler <i>Chthonicola sagittata</i> and Pink-tailed Legless Lizard <i>Aprasia parapulchella</i>), weeds and areas to be cleared. The plans shall also identify vegetation adjoining the site which contains important habitat areas and/or threatened species, populations or ecological communities; | Table 5 (FF5, FF14) Appendix E |
| | (iv) methods to avoid and manage potential impacts on flora and fauna species and their habitat which may be directly or indirectly affected by the project, such as location of fencing to exclude access to sensitive areas, procedures for vegetation clearing or soil removal/stockpiling and procedures for re-locating hollows or installing nesting boxes and managing weeds; | Table 5 (FF6, FF7, FF8, FF9, FF10, FF11, FF14, FF15, FF17, FF18, FF19, FF20) Appendix A Appendix B Appendix C Appendix D |
| | (v) measures for conserving and reusing topsoil; | Table 5 (FF11, FF17, FF18, FF20) Appendix D |
| | (vi) procedures to be implemented for controlling weeds and feral pests; | Table 5 (FF13, FF16, FF17, FF18, FF19, FF20, FF21, FF22) Appendix D |
| | (vii) rehabilitation details and success criteria; | Table 5 (FF12) Appendix D Landscape Management Plan |
| | (viii) a program for reporting on the effectiveness of flora and fauna management measures; and | Section 6.5 |
| | (ix) a procedure to review management methods where they are found to be ineffective. | Section 7 Section 8.3, 8.4 and 8.5 of CEMP |

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3.3 Statement of Commitments

The SoC relevant to this Plan are listed Table 2. A cross reference is also included to indicate where the commitment is addressed in this Plan or other management documents.

Table 2 Statement of Commitments relevant to flora and fauna management

| Objective | Ref. No. | Commitment | Timing | Document reference |
|------------------------------------|----------|--|----------------------------------|---|
| Protect native flora and fauna | F1 | <p>A flora and fauna management plan will be prepared prior to construction as part of the CEMP. All feasible and reasonable measures will be undertaken to minimise the impact of construction on native vegetation and fauna including:</p> <ul style="list-style-type: none"> • Minimising the disturbance of native flora and hollow-bearing trees. • Implementing weed control measures. • Revegetating with endemic species. • Minimising soil disturbance. • Implementing clearing protocols to protect flora and fauna. | Prior to and during construction | <p>This Plan Table 5 (FF7, FF8, FF9, FF10, FF13, FF14, FF15, FF17, FF18, FF19, FF20) Appendix B Appendix C Appendix D</p> |
| Protect threatened flora and fauna | F2 | <p>The Flora and fauna management plan (within the CEMP) will contain specific additional measures for threatened species, including:</p> <ul style="list-style-type: none"> • Only approved works will be undertaken within 5m of a threatened species and exclusion fencing will be erected around threatened flora species and threatened fauna habitats and maintained in place until such time as construction works are completed, unless otherwise approved by OEH. | Prior to and during construction | <p>Note pre-clearing survey did not reveal presence of any threatened species. No specific mitigation measures are required. Table 5 (FF7, FF14, FF15) and Appendix B will help to ensure protection of native fauna.</p> |
| | | <p>Site-specific management measures will be implemented for the protection of the Pink-Tailed Worm Lizard near the site proposed for SPS2 and at Hill 800, and for the Hoary Sunray near the BWPS site, including exclusion zones, signage and pre-construction surveys. These works will be undertaken under the supervision of an appropriately qualified ecologist</p> | | <p>Pink-tailed Worm-lizard Protection and Management Plan Note construction of Stage AB WRP will not take place near the listed areas.</p> |

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| Objective | Ref. No. | Commitment | Timing | Document reference |
|---|----------|---|--|---|
| Avoid impacts on and monitor changes to aquatic ecology | A1 | <p>Aquatic ecology impacts are considered under WQ4.</p> <p>A water quality and aquatic ecology monitoring program will be developed to monitor construction and operation impacts of the Project on waterways (refer to WQ4 for further details). The monitoring program will include siting of the aquatic ecology monitoring location to ensure viable comparison with historical and other recent river ecology data.</p> <p>Riparian vegetation, weeds and invasive scrub will be managed within the Googong township site. This will include surveying, mapping and managing invasive species.</p> | Prior to and during construction, and during operation | Table 5 (FF13, FF17, FF18, FF19, FF20, FF21) Water Management Plan |
| Monitor impacts on waterways | WQ4 | <p>A monitoring program to assess the potential impacts of the Project on the Queanbeyan River (including water quality, flow, fish migration, macrophytes and macro invertebrate communities) will be undertaken.</p> <ul style="list-style-type: none"> • Details of the monitoring program will be determined in consultation with relevant government authorities/stakeholders (including the OEH, DPI and, potentially, ACTEW Corporation). Such consultation will ensure the sharing of available data for the Queanbeyan River for comparative and impact assessment purposes. • A new monitoring site within the Queanbeyan River is proposed to measure water quality and aquatic ecology impacts over the medium term. This site will be located near the confluence of Googong Creek and Queanbeyan River (and will be sited to enable comparison with data collected from upstream and downstream sites). • Monitoring will commence approximately 12 months prior to commissioning the water recycling plant. | Prior to, during construction and during operation | Water Management Plan |

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3.4 EPBC Act Conditions of Approval

The EPBC Act conditions of approval relevant to this Plan are listed in Table 3. A cross reference is also included to indicate where the condition is addressed in this Plan or other management documents.

Table 3 EPBC Conditions of Approval relevant to flora and fauna management

| CoA No. | Condition requirements | Document reference |
|---------|---|--------------------|
| EPBC 2 | <p>To prevent impacts on listed threatened species and ecological communities, and the environment on Commonwealth land, the person taking the action must prepare and submit a Googong Foreshores Interface Management Strategy for the Minister's approval. The strategy must include measures to:</p> <ul style="list-style-type: none"> i. Induct construction workers and contractors about requirements to protect threatened species and the environment on Commonwealth land; ii. Provide indicative environmental management checklists to assist with monitoring the implementation of environmental management obligations during construction works; iii. Establish and main fences; iv. Identify and implement erosion and sedimentation control measures; v. Identify and implement appropriate weed hygiene measures; vi. Protect and maintain the Googong Foreshores buffer area; vii. Provide details of financial contributions for the publishing, monitoring and review of the Googong Foreshores Plan of Management; viii. Provide details of financial contributions for capital and recurrent costs associated with the implementation of the Googong Foreshores Plan of Management; ix. Manage community and water supply impacts, including measures from the Queanbeyan Local Environment Plan (Googong) 2009; x. Provide details of an environmental education program, which must include information about the protection of water quality in the Googong reservoir; xi. Indicate timing and frequency of monitoring to determine impacts and effectiveness of mitigation measures; xii. Provide performance indicators, specifying outcomes to be achieved and reports of compliance at key milestones; xiii. Undertake corrective actions if management measures are not achieved; xiv. Clearly state the person or persons responsible for each management measure; and xv. Provide details of how the area to be managed under the Googong Foreshores Interface Management Strategy will be managed in perpetuity. <p>The area to be managed under the Googong Foreshores Interface Management Strategy is defined by Figure 1 at Appendix 1. This map must be included in the Googong Foreshores Interface Management Strategy.</p> <p>The person taking the action must not commence construction of neighbourhoods 1B, 4 or 5, as defined by Figure 8 at Appendix 2, until the Minister has approved the Strategy.</p> <p>The approved Googong Foreshores Interface Management Strategy must be implemented.</p> | Table 5 (FF1, FF2) |

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4 Environmental aspects and impacts

The following sections summarise existing vegetation communities, threatened flora, fauna and habitat at the Stage AB WRP site. Identified impacts are then reviewed. The key reference documents are Section 11 and Appendix F of the EA and the pre-construction survey undertaken in July 2013. As part of this survey, a study area of 3.92 hectares was inspected. The study area incorporated the Stage AB WRP site and a buffer of land which could potentially be disturbed, depending on construction methodology. The study area is marked as the construction footprint in the environmental constraints map included at Appendix E.

4.1 Environmental aspects

Endangered ecological communities

No endangered ecological communities (EECs) were identified during the survey within the study area.

Vegetation and flora species

The study area is of low ecological value as the area has been grazed at a moderate or high intensity for many years, resulting in the removal of all but the most resilient native flora. Only five remnant trees remain within the study area.

Dominant native species include Redgrass (*Bothriochloa macra*) and Corkscrew Grass (*Austrostipa scabra*). Several exotic species including African Lovegrass (*Eragrostis curvula*), Blackberry (*Rubus fruticosus*) and Serrated Tussock (*Nassella trichotoma*) were also recorded. No native forbs (herbaceous flowering plants) were recorded during the field survey, which is consistent with the intensive grazing history of the study area. The species list developed during the survey is presented in Table 4.

Table 4 Flora recorded during the field survey (July 2013)

| Scientific name | Common Name |
|--------------------------------|-----------------|
| Native trees | |
| <i>Eucalyptus bridgesiana</i> | Apple Box |
| <i>Eucalyptus polyanthemos</i> | Red Box |
| Native Groundstorey | |
| <i>Austrostipa scabra</i> | Corkscrew |
| <i>Bothriochloa macra</i> | Redgrass |
| <i>Chloris truncata</i> | Windmill Grass |
| <i>Juncus australis</i> | Leafless Rush |
| <i>Panicum effusum</i> | Hairy Panic |
| <i>Rytidosperma spp.</i> | Wallaby Grasses |

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| Scientific name | Common Name |
|-----------------------------|-------------------|
| Exotic | |
| <i>Eleusine tristachya</i> | Goosegrass |
| <i>Eragrostis curvula</i> | African Lovegrass |
| <i>Hypochaeris radicata</i> | Cat's Ear |
| <i>Nassella trichotoma</i> | Serrated Tussock |
| <i>Phalaris aquatica</i> | Phalaris |
| <i>Plantago lanceolata</i> | Ribwort Plantain |
| <i>Rubus fruticosus</i> | Blackberry |
| <i>Vulpia spp.</i> | Fescue |

Threatened flora

All threatened flora species in the region are considered to have a 'negligible' likelihood of occurring within the study area.

Fauna habitats

There are five remnant trees situated within the study area, including two dead trees/stags. Each of these was examined for hollows, nests and other notable habitat values. Three of the trees (the two stags and one mature Apple Box tree) contain hollows, and appear to be currently in use, or have recently been used by native fauna.

It was observed during the survey that one of the other trees (Red Box) contained an old stick nest, which is likely to have belonged to Australian Ravens (*Corvus coronoides*) or Magpies (*Gymnorhina tibicen*).

Some small areas of rock outcrop/scatter are present within the study area.

Extensive evidence of pig rooting (soil disturbance to dig for roots) by Feral Pigs (*Sus scrofa*) was observed during the field survey. This was restricted to the channel/drainage line running northwest to southeast within the study area.

European Rabbit (*Oryctolagus cuniculus*) droppings were observed during the field survey however no warrens were observed within the study area.

Threatened fauna

Birds

Threatened birds such as the Scarlet Robin (*Petroica boodang*), a species known to occur in the locality, may occasionally move through the area. However, the study area contains no midstorey vegetation and is therefore of very low value to woodland bird species. The area is also unlikely to be of value to Little Eagles (*Hieraaetus morphnoides*).

Mammals

No threatened mammals are likely to utilise the study area.

Reptiles

No threatened reptiles are likely to utilise the study area.

Aquatic habitat

No aquatic habitat falls within the study area.

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Weeds

The study area contains several exotic species, three of which are noxious weeds. The location, extent and severity of noxious weeds in the study area is described in Table 7 of Appendix D

Based upon the classification described in the Weed and Pest Management Strategy (refer Appendix D), the study area has been classed as 'moderate/scattered weed infestation'.

In addition to the weeds of concern, several exotic species common to rural areas in the ACT region were recorded (refer Table 7 of Appendix D). These species are not considered to be of concern and their prominence within the study area is likely to be a result of the intensive grazing history of the study area.

4.2 Flora and fauna impacts

Threatened species

The study area is of low ecological value and it is unlikely that any threatened fauna species would utilise the study area. In addition, given the absence of EECs and threatened fauna, there is unlikely to be any significant impacts to threatened flora and fauna protected by environment legislation.

Clearing of native vegetation and fauna habitat

The construction of Stage AB WRP would result in the removal of up to three hollow bearing trees and two other trees. The trees are not threatened species but do provide potential habitat for native fauna. There are two main risks to native fauna as a result of tree removal:

- Risk of immediate injury/death during tree removal process.
- Removal of habitat – hollow bearing trees provide habitat for animals such as bats, gliders, possums and parrots. One of the hollow bearing trees is considered to be of low value, however the others appear to be currently in use or have been used recently by native fauna.

Measures to avoid impacts to native fauna are addressed in Table 5, Appendix B (Vegetation Clearance Procedure) and Appendix C (Hollow Relocation and Nest Box Strategy).

Spread of weeds

Noxious and other weeds are present in the study area and may be spread through the use of equipment, reuse of weed infested top soil or other construction activities.

Measures to avoid weed impacts are addressed in Appendix D (Weed and Pest Management Strategy)

Disturbance of soils, consequential erosion and sedimentation

Impacts and mitigation measures to address risks of erosion and sedimentation are addressed in the Soil and Water Management Plan (Appendix A to the CEMP).

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5 Environmental control measures

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5.1 Flora and fauna mitigation and management measures

A range of environmental requirements and control measures are identified in the various environmental documents, including the CoA, SoC and the EA. Specific measures and requirements to address impacts on flora and fauna are outlined in Table 5.

Table 5 Mitigation measures

| ID | Measure | When to implement | Reference | Responsibility |
|-----|---|-------------------------------------|---------------------------------|--|
| FF1 | A Googong Foreshores Interface Management Strategy (GFIMS) will be prepared and approved prior to construction of Stage AB WRP. The GFIMS was approved by the Commonwealth Department of Environment on 20 December 2013. | Prior to construction; construction | EPBC CoA 2 | GTPL Assistant Project Director |
| FF2 | <p>Conditions of the Googong Foreshores Interface Management Strategy as they are relevant to the construction of Stage AB WRP will be implemented by the contractors. This CEMP has been prepared so that it is consistent with the aims and strategies of the GFIMS (weed removal, erosion and sedimentation controls etc). In addition the following will be implemented:</p> <ul style="list-style-type: none"> Fencing of construction site to limit access to the foreshores area. <p>Information to contractors on the importance of the foreshores area (e.g through tool box talks, and information included in site office in accordance with Section 5.1.1.2 of the GFIMS).</p> | Prior to construction; construction | EPBC CoA 2 | Project Manager Environment Manager |
| FF3 | All project personnel will be provided training on the requirements of this Plan through site inductions, toolbox talks or specific training. | Prior to construction; construction | CoA A8 | Environment Manager |
| FF4 | If required, a Project Ecologist will be appointed prior to the commencement of construction to provide technical advice and assist in implementing the management measures (eg. nest boxes). All trees within the project area have been removed. | Prior to construction | CoA C20(e)(i) CoA C20(e)(ii) | Project Manager |

| ID | Measure | When to implement | Reference | Responsibility |
|---|---|-------------------------------------|--|--|
| FF5 | The Flora and Fauna Constraints Map at Appendix E will be reviewed and updated as required. | Prior to construction; construction | CoA C20(e)(iii) SoC F2 | Environment Manager |
| Vegetation clearing, protection and management | | | | |
| FF6 | A pre-construction clearing survey will be carried out by a qualified ecologist prior to construction in accordance with the Pre-construction Clearing Survey Procedure (Appendix A). Note pre-clearing survey was completed in July 2013. | Prior to construction; construction | CoA C20(e)(i) CoA C20(e)(ii) CoA C20(e)(iv) | GTPL Assistant Project Director |
| FF7 | The limits of clearing will generally be limited to the construction footprint boundary shown in the Flora and Fauna Constraints Map (Appendix E) and should be clearly marked on construction work plans and on site prior to clearing. | Construction | CoA B11 CoAC20(e)(ii) CoA C20(e)(iv) SoC F1 SoC F2 | Environment Manager |
| FF8 | The two trees located outside the Stage AB WRP layout should be retained where possible. Where works are to take place within 20 metres of the two trees exclusion fencing and 'no-go zone' signage, should be erected, where appropriate. Exclusion fencing is to include the use of fencing or flaggings suitable to indicate a 'no clearing zone'. | Prior to construction; construction | CoA B11 CoA B12 CoA C20(e)(iv) SoC F1 | Environment Manager |
| FF9 | Nest boxes will be installed at the Googong Foreshores to offset the loss of hollow bearing trees where feasible and reasonable, as per the Hollow Relocation and Nest Box Strategy (Appendix C). Nest box installation will be undertaken so as to limit damage to existing vegetation and prior to tree clearance. Tree clearing has been completed by others and the installation of nest boxes would not be applicable to JHPL works. The loss of hollow bearing trees will be further compensated by the replanting of appropriate replacement native trees in the WRP site as part of landscaping works in accordance with the Landscape Management Plan for Stage AB WRP. | Construction | CoA B12 CoA C20(e)(iv) SoC F1 | Environment Manager |
| FF10 | Erosion and sediment controls will be installed prior to and during clearing, in order to protect adjacent vegetation and watercourses. Refer to Soil and Water Management Plan (Appendix A of CEMP). | Prior to construction; construction | SoC F1 | Project Manager Environment Manager |
| FF11 | Topsoil will be stripped and stockpiled for reuse. Topsoil and other soil stockpiles will not be located outside the construction footprint shown in the in the Flora and Fauna Constraints Map (Appendix E). | Construction | CoA C20(e)(iv) CoA C20(e)(v) | Environment Manager |

| ID | Measure | When to implement | Reference | Responsibility |
|---------------------|---|-------------------------------------|---|---------------------|
| FF12 | Disturbed areas will be rehabilitated to a condition consistent with the pre-construction state, in accordance with the Landscape Management Plan. | Construction | CoA C20(e)(vii) | Environment Manager |
| FF13 | Weed management measures, such as weed spraying will be implemented in accordance with the Weed and Pest Management Strategy (Appendix D). | Prior to construction; construction | CoA C20(e)(iv) CoA C20(e)(vi) SoC F1 SoC A1 | Environment Manager |
| FF14 | Hollow bearing trees will be identified on the Flora and Fauna Constraints Map (Appendix E) | Prior to construction; construction | CoA B12 CoA B13 CoA C20(e)(iii) CoA C20(e)(iv) SoC F1 SoC F2 | Environment Manager |
| FF15 | The Project Ecologist will undertake searches for native fauna for all hollow-bearing trees immediately prior to removal and will relocate any fauna. Refer to the Vegetation Clearance Procedure (Appendix B) and Hollow Relocation and Nest Box Strategy (Appendix C). This would not be applicable to works by JHPL. | Prior to construction; construction | CoA B12 CoA B13 CoA C20(e)(iv) SoC F1 SoC F2 | Environment Manager |
| FF16 | Pest management measures, such as landscape control will be implemented in accordance with the Weed and Pest Management Strategy (Appendix D). | Prior to construction; construction | CoA C20(e)(vi) | Environment Manager |
| Revegetation | | | | |
| FF17 | The top 50 – 100 mm of topsoil will be stripped, scalped for weeds and stockpiled separately. Weed infested topsoil will be reused as fill where possible, and will not be reused for landscaping. Site preparation works would be completed by others and it is expected that this requirement would be complied with. | Construction | CoA C20(e)(iv) CoA C20(e)(v) CoA C20(e)(vi) SoC A1 SoC F1 | Project Manager |

| ID | Measure | When to implement | Reference | Responsibility |
|--|--|-------------------|---|-----------------|
| FF18 | Weed free topsoil will be respread for landscaping purposes. Where possible, topsoil will be stripped and reinstated by soil horizon (B horizon reinstated first and finishing with A horizon). | Construction | CoA C20(e)(iv) CoA C20(e)(v) CoA C20(e)(vi) SoC A1 SoC F1 | Project Manager |
| Weed and pest management. Refer to Weed and Pest Management Strategy (Appendix D) | | | | |
| FF19 | Prior to vegetation clearance, woody weeds will be removed. This will include the physical removal and stump poisoning (ie cut-and-daub technique) for Blackberry as shown in the Flora and Fauna Constraints Map (refer Appendix E). | Construction | CoA C20(e)(iv) CoA C20(e)(vi) SoC A1 SoC F1 | Project Manager |
| FF20 | <ul style="list-style-type: none"> Any topsoil that is imported from offsite for use in landscaping will be weed free. Topsoil will be stripped from areas of 'high weed infestation' and buried as fill or disposed of off site. Topsoil from moderate and low weed infestation categories will be stripped and stockpiled separately. Topsoil will only be reused in an area of the same weed category. | Construction | CoA C20(e)(iv) CoA C20(e)(v) CoA C20(e)(vi) SoC A1 SoC F1 | Project Manager |
| FF21 | No domestic pets will be brought on site. | Construction | CoA C20(e)(vi) | Project Manager |
| FF22 | Vegetation will not be left in piles to create potential habitat for rabbits and other vermin. | Construction | CoA C20(e)(vi) | Project Manager |

6 Compliance management

6.1 Roles and responsibilities

The project team's roles and responsibilities are outlined in Section 4.1 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in Section 5 of this Plan.

6.2 Training

All personnel working on site will undergo site induction training relating to flora and fauna issues. The induction training will address elements related to flora and fauna management including:

- The objectives and requirements of this Plan.
- Relevant legislation.
- Pre-clearing and clearing protocols.
- Environmental exclusion fencing and 'no-go zones'.
- General flora and fauna management measures.
- Weed control measures.

Targeted training for personnel directly involved in vegetation clearing would be provided as required. Training would be developed and delivered through environmental work method statements and toolbox talks.

Further details regarding induction and training are outlined in Section 5 of the CEMP.

6.3 Inspections

Inspection of actual or potential impacts to flora and fauna will occur as required for the duration of construction.

The Environment Manager will undertake weekly environmental inspections and will evaluate flora and fauna management and mitigation measures. This will include ensuring that hollow bearing trees have been appropriately removed and there are no additional threats to threatened species, endangered ecological communities or habitats in addition to that already permitted. It will also include inspection of retained vegetation and any environmental exclusion fencing. These inspections will be documented on the weekly checklist.

The Environmental Representative will inspect the site regularly to inspect flora and fauna management controls.

Requirements and responsibilities in relation to inspections are documented in Section 8.1 of the CEMP.

Field Code Changed

6.4 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this Plan, CoA, SoC and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in Section 8.4 of the CEMP.

6.5 Reporting

Results and outcomes of inspections, monitoring and auditing will be reported internally on a monthly basis. Six-monthly construction compliance reports will be prepared to report on compliance with the IWC Project Approval. Reporting requirements and responsibilities are documented in Section 8.5 of the CEMP.

Field Code Changed

7 Review and improvement

7.1 Non-conformity, corrective and preventative actions

A non-conformance is an action or omission that does not conform with the requirements of this Plan or any legal and other requirements. Any member of the project team or the Environmental Representative can identify a non-conformance or opportunity for improvement. Section 8.3 of the CEMP identifies the process for identifying, reporting, recording and reviewing non-conformances. This will ensure continual improvement.

7.2 Management plan update and amendment

The processes described in Section 7 and Section 8 of the CEMP (relating to incidents, inspections, monitoring and auditing) may result in the need to update or revise this Plan. This will occur as needed.

Field Code Changed

Appendix A Pre-construction Clearing Survey Procedure

A.1 Distribution

There are no restrictions on the distribution or circulation of this procedure within the Googong IWC Project Stage AB WRP.

A.2 Purpose

This procedure details the requirements for conducting a flora and fauna survey on site prior to the commencement of construction.

The procedure will assist to identify any additional mitigation measures required to manage impacts on flora and fauna.

A.3 Induction/training

Where required, project personnel will be made aware of this procedure through toolbox talks.

A.4 Scope

This procedure is applicable to all activities conducted by GTPL or the contractors/subcontractors that have the potential to impact on vegetation or fauna habitat. This procedure includes the following key elements:

- Confirm location of biodiversity features.
- Identify habitat trees.
- Locate suitable habitat for fauna that may require relocation.
- Update management measures.

Field Code Changed

A.5 Procedure

Identify biodiversity features

- Review the environmental assessment and submissions report and any other ecological investigations carried out on site to identify the known and potential locations of threatened flora (eg Hoary Sunray (*Leucochrysum albicans* var. *tricolor*)), threatened fauna (eg Speckled Warbler (*Chthonicola sagittata*)) and endangered ecological communities (eg White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grasslands).

Conduct pre-clearing survey

- Prior to the commencement of clearing, the ecologist is to conduct an on site survey to check for the presence of threatened flora and fauna species identified in the assessment as likely to occur.
- Record the location of hollow-bearing trees, threatened flora and trees containing threatened fauna, including (where relevant):
 - GPS location.
 - Species.
 - Type of habitat.
 - Size of hollow.
 - Type of hollow.

Locate suitable habitat for fauna relocation

- Identify (including GPS location) nearby habitat that would be suitable for the release of fauna that may require relocation.

Update management measures

- GTPL or the contractors will incorporate the results of the pre-construction clearing survey into the CEMP, Flora and Fauna Management Plan and Flora and Fauna Constraints Map as required. This may include:
 - The location of threatened flora and fauna identified.
 - The location of nearby habitat that would be suitable for the release of fauna.
 - Any additional biodiversity management measures, eg an update to identified 'no-go zones' or weeds of concern.

Field Code Changed

Appendix B Vegetation Clearance Procedure

B.1 Distribution

There are no restrictions on the distribution or circulation of this procedure within the Googong IWC Project Stage AB WRP.

B.2 Purpose

This procedure details the requirements for clearing and grubbing of vegetation on site. It will be used to identify the limits to clearing.

This procedure relates to the measures to be put in place prior to, during and following clearing of vegetation.

B.3 Induction/training

Where required, project personnel will be made aware of this procedure through toolbox talks or targeted training.

B.4 Scope

This procedure is applicable to all activities conducted by the contractors or subcontractors that have the potential to impact on vegetation or fauna habitat. This procedure includes the following key elements:

- Inspect vegetation prior to commencement of clearing.
- Implement environmental controls.
- Remove vegetation.
- Inspect site after felling.
- Manage cleared vegetation.

B.5 Procedure

Mark out clearing limits

- In consultation with the Environment Manager, identify the limits of clearing. The limits of clearing will generally be limited to the construction footprint shown in the Flora and Fauna Constraints Map in Appendix E.
- Install fencing or flagging to identify the clearing limits.

Field Code Changed

Pre-clearing activities

- Within the clearing limits, mark all habitat trees (refer Flora and Fauna Constraints Map in Appendix E). A habitat tree includes hollow bearing trees and any trees that contain nests or cavities that may act as a hollow.
- Should any threatened flora or fauna species be unexpectedly encountered, the Environment Manager and Project Ecologist would determine the significance, assess impacts and identify management measures, approvals/licences or permits required, in consultation with the Office of Environment and Heritage (OEH), Department of Primary Industries – Fisheries Conservation and Aquaculture and Department of Environment (DoE) as appropriate.
- If grubbing is to take place, erosion and sediment controls are to be in place prior to grubbing.

Obtain approval to clear

- The Environment Manager should issue the approval to clear, indicating that clearing limits and environmental controls are adequate.

Non-woody vegetation

- Where the Project Ecologist has not identified the presence of habitat features, non-woody vegetation (grasses and groundcover species) can be removed.
- Grasses and groundcover species should be incorporated into the stripping of topsoil to retain any organic material and stockpiled according to the Soil and Water Management Plan (CEMP Appendix A).

Tree clearing process

- The Project Ecologist is to be on site for felling of all habitat trees.
- Fell habitat trees carefully, allowing trees to be lowered to the ground.
- The Project Ecologist is to inspect the felled habitat trees for fauna. Fauna identified should be captured, inspected for injury and relocated to suitable habitat (as identified by the Project Ecologist).

Management of cleared vegetation

- Mulch remaining native vegetation and stockpile for reuse in rehabilitation works and erosion control.

Reporting

- The Environment Manager should record the outcomes of the clearing process, including:
 - Clearing dates, areas cleared, surveyed limits to clearing etc.
 - Confirm details of habitat trees, the number of trees, nests etc.
 - Fauna species present, captured and located.
 - Fauna injured or killed.
 - Discussion on the effectiveness of methods.
 - Recommendations, if any, to review and improve the vegetation clearing procedure.

Field Code Changed

Appendix C

Hollow Relocation and Nest Box Strategy

C.1 Distribution

There are no restrictions on the distribution or circulation of this procedure within the Googong IWC Project Stage AB WRP.

C.2 Purpose

This procedure details the requirements to mitigate the impacts of vegetation clearance on hollow-dependent fauna. It outlines the procedures for relocating hollows and/or installing nest boxes.

C.3 Induction/training

All project personnel will be provided with a general site induction including an outline of their responsibilities relating to reducing impacts on flora and fauna. Personnel involved in vegetation clearance and nest box installation will be inducted into this procedure. If required, additional training will be provided through toolbox talks.

C.4 Scope

This procedure is applicable to all activities conducted by the contractors or subcontractors that are involved in the removal of hollow bearing trees.

C.5 Hollow bearing trees

Three hollow bearing trees supporting eight hollows were recorded within the study area. For each hollow bearing tree the following data were collected:

- Location of tree using GPS (accurate +/- three metres).
- Species of tree (and whether living or dead).
- Estimation of hollow size based upon volume and entrance size (small, medium or large).
- Approximate height of tree (metres).
- Approximate tree DBH (diameter at breast height); and
- Additional information including potential native fauna occupant type or likely current occupancy (i.e. parrot, glider, possum, bat etc.).

Field Code Changed

Details on the hollow bearing trees is provided in Table 6). The locations of hollowing bearing trees is provided in Appendix E (Flora and Fauna Constraints Maps).

Table 6 Hollow data set

| Tree ID | Tree Species | DBH | Height | Hollow type, size and characteristics |
|---------|---|--------|--------|---|
| HBT1 | Stag (dead) | 40 cm | 7 m | 1 small – low potential for bats The stag appears to be termite-eaten and is of low value. |
| HBT2 | Stag (dead) | 80 cm | 15 m | 1 large (large birds/possums/bats) 2 medium (parrots/possums/bats) 1 small (possums/gliderns/small birds/bats) |
| HBT3 | Apple Box (<i>Eucalyptus bridgesiana</i>) | 120 cm | 15 m | 3 small – one appears to be currently or recently used by a small arboreal mammal, likely a Sugar Glider (<i>Petaurus breviceps</i>). The other two are of low quality. |

C.6 Nest boxes

- Given the poor quality of HBT1 and its hollow, nest box installation to mitigate the impact of the loss of this tree is not recommended.
- A total of 14 nest boxes will be required to offset the loss of the seven hollows in HBT2 and HBT3 to be removed for construction activities associated with Stage AB WRP.
- While the relocation of hollows is preferred, it is difficult and not feasible or likely to be worthwhile for this stage of works.
- A range of boxes will be installed including a mixture of insectivorous bat roosts, small glider boxes, possum boxes and medium nest boxes suitable for parrots.
- The loss of hollow bearing trees will be further compensated by the replanting of appropriate replacement native trees in the WRP site as part of landscaping works in accordance with the Landscape Management Plan for Stage AB WRP.

C.7 Procedure

Identify host trees and seek landowner permission to install nest boxes prior to vegetation clearing

- Potential host trees should be chosen from those within the Googong Foreshores or the Googong Foreshores/Googong Township Interface Area.
- The availability of these trees will be confirmed through negotiations with the relevant landowners.
- Once permission to install nest boxes is granted, the specific host trees within these patches will be chosen by the Project Ecologist, in consultation with the Environment Manager and landowner.
- Order nest boxes.

Install nest boxes prior to vegetation clearing

- All nest boxes will be installed prior to the commencement of vegetation clearance.

Field Code Changed

- Nest boxes will be mounted between two and eight metres above the ground, depending on target fauna group, subject to advice from the Project Ecologist.
- A maximum of two nest boxes will be placed in each chosen host tree.

Implement the Vegetation Clearing Procedure

The Vegetation Clearing Procedure (Appendix B) outlines the steps to be taken during vegetation clearing.

Monitoring

- Monitoring will be undertaken in the spring or summer following the clearance of vegetation (ie Spring or Summer 2014).
- All nest boxes/relocated hollows will be inspected for fauna occupation.
- Monitoring will be conducted by the Project Ecologist.
- If monitoring of nest boxes determines that pest birds or invertebrates such as Mynas, Starlings or honeybees have taken up residence, pest control may be required.

Field Code Changed

Appendix D Weed and Pest Management Strategy

D.1 Distribution

There are no restrictions on the distribution or circulation of this procedure within the Googong IWC Project Stage AB WRP.

D.2 Purpose

This procedure details the requirements for managing weeds and feral pests.

D.3 Induction/training

All project personnel will be provided with a general site induction including an outline of their responsibilities relating to weed management. Personnel involved in weed management will be inducted into this procedure. If required, additional training will be provided through toolbox talks.

D.4 Scope

This procedure is applicable to all activities conducted by the project contractors or subcontractors that have the potential to introduce or spread weeds/feral pests.

D.5 Weed and pest species present

Weed Species

During the pre-clearing survey several exotic species were identified, including three species of noxious weed. The location, extent and severity of the weed infestations are provided in Table 7. The area of the small Blackberry (*Rubus fruticosus*) infestation is shown in the Flora and Fauna Constraints Map (refer Appendix E).

In addition to the weeds of concern, several exotic species common to rural areas in the ACT region were recorded, including Cat's Ear (*Hypochaeris radicata*), Goosegrass (*Eleusine tristachya*), Phalaris (*Phalaris aquatica*), Fescue (*Vulpia spp*) and Ribwort Plantain (*Plantago lanceolata*). These species are not considered to be of concern and their prominence within the study area is likely a result of the intensive grazing history of the study area.

Field Code Changed

Table 7 Weed species recorded during the field survey (July 2013)

| Species name | Level of concern | Weed of National Significance? | Noxious Weed Category* | Location and extent of infestation |
|---|------------------|--------------------------------|------------------------|--|
| African Lovegrass (<i>Eragrostis curvula</i>) | High | No | 4 | This species occurs at highest density in the northern part of the study area near Googong Dam Road. Due to the time of year it could not be accurately mapped, however it was not observed in the southernmost extent of the study area. |
| Serrated Tussock (<i>Nasella trichotoma</i>) | Low | Yes | 4 | One tussock was recorded in the centre of the study area. No other plants were recorded. The single tussock was removed by the ecologists at the time of the survey. It is likely that the species will germinate from seed within the soil seed bank following disturbance of the study area during construction. |
| Blackberry (<i>Rubus fruticosus</i>) | Moderate | Yes | 4 | Approximately five small plants were recorded within the study area (refer Appendix E). |

* From the NSW Department of Primary Industries website for Queanbeyan LGA.

Weed infestation classification

The Stage AB WRP site has been classified as comprising:

- Moderate/scattered weed infestation. This includes areas with a predominantly native groundstorey or a groundstorey dominated by naturalised exotic pasture species of low-moderate concern (such as *Phalaris*) and moderate weed infestation. Weeds present in these areas are mostly common agricultural land weed species although there may be scattered plants or small clumps of Weeds of National Significance, which will require targeted control to prevent them becoming a more significant problem.

Pest fauna

- Extensive evidence of rooting (soil disturbance to dig for roots) by Feral Pigs (*Sus scrofa*) has been identified in the channel/drainage line that runs northwest to southeast within the study area.
- European Rabbit (*Oryctolagus cuniculus*) droppings were observed during field survey, however no warrens were recorded within the study area.

D.6 Procedure

The following measures will be adopted during all clearing and construction works. Construction personnel will be informed of the importance of these measures during toolbox talks.

These measures are also included in Table 5, where appropriate.

Management measures during construction

- Earth moving vehicles will, as far as possible, be cleaned of dirt before entering the Stage AB WRP site and when leaving areas of 'high weed infestation'.

Field Code Changed

- Construction personnel will, as far as possible, clean their boots and clothing of all seed laden material prior to leaving high weed infested areas.
- Any topsoil that is imported from offsite for use in landscaping will be weed free.
- Topsoil will be stripped from areas of 'high weed infestation' and buried as fill or disposed of off site.
- Stripped topsoil will not be utilised outside the construction boundary.
- No domestic pets will be brought on site.

Targeted weed control

- Prior to vegetation clearance, woody weeds will be removed. This will include the physical removal and stump poisoning (ie cut-and-daub technique) for Blackberry (refer Appendix E).
- Targeted weed control includes the spraying/poisoning and/or physical removal of specific weed species within the site. Targeted control is not considered warranted prior to construction provided the construction mitigation measures (above) are implemented.
- Targeted weed control will be carried out for two consecutive years by others following construction/revegetation/landscaping. Any African Lovegrass, Blackberry or Serrated Tussock that re-establishes will be controlled with targeted spraying and physical removal. Details would be included in the operational environment management plan.

Pest control

- To avoid the creation of additional areas of rabbit harbour, cleared vegetation will be mulched for use in erosion and sedimentation control or landscaping.
- Vegetation will not be left in piles to create potential habitat for rabbits and other vermin.
- If monitoring of nest boxes determines that pest birds or invertebrates such as Mynas, Starlings or honeybees have taken up residence, pest control may be required.

Monitoring and rehabilitation

Landscaping and rehabilitation will be carried out as per the Landscape Management Plan.

Where possible the following measures will be implemented:

- Seeding of areas for rehabilitation will include only native species of local provenance, as advised by the Project Ecologist.
- Sowing is to occur immediately after the completion of construction.
- The sowing rate will aim to deliver a minimum 200 germinable seeds per square metre. This is to prevent significant weed establishment.

Upon completion of the landscaping works (including areas of native grass seeding) annual monitoring will be undertaken by others to monitor the success of the revegetation works and to identify areas where additional weed management is required. This will be undertaken with the objective of ensuring that total weed infestation is maintained at a maximum of 5%, with the complete eradication of any Weeds of National Significance or Noxious Weeds.

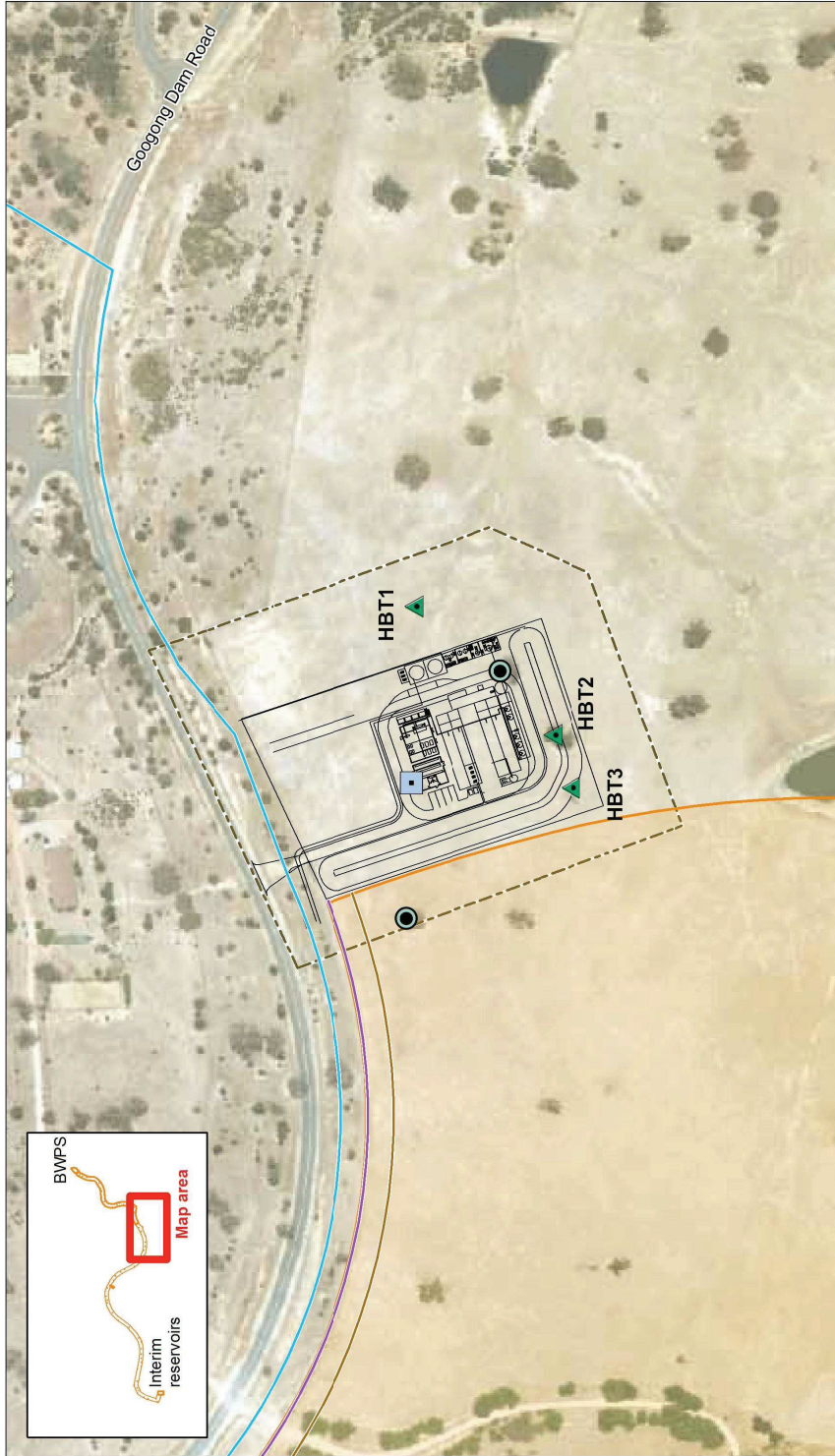
Species that may require future management include the African Lovegrass, the Blackberry and the Serrated Tussock.

Field Code Changed

Appendix E **Flora and Fauna
Constraints Map**

Field Code Changed

Field Code Changed



Source Biosis
Drawing no. 12083g_06b

Indicative only, subject to detailed design

Legend

- Potable water mains
- Recycled water mains
- Sewage mains
- Blackberry (Weed of National Significance)
- Hollow-bearing Tree
- Tree
- Layout of water recycling plant
- Stage 1 township boundary
- Construction Footprint

0 25 50 75 100m

Manildra Roberts