Biodiversity Management Plan

Chaffey Dam Safety Upgrade and Augmentation

Document No. JH/C680/06

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Terms and Definitions

Term	Definition
AMS	Activity Method Statement
AS/NZS	Australian Standard/New Zealand Standard
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
CEEC	Critically Endangered Ecological Community
DoE	Commonwealth Department of the Environment
DPE	NSW Department of Planning and Environment
DPI	Department of Primary Industries (a division within NSW Trade and Investment)
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EM	Environmental Manager (Project)
EMS	Environmental Management System
EPA	NSW Environment Protection Authority
EPA Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conversation Act 1999
EPBC Approval	Approval decision under sections 130(1) and 133 of the EPBC Act in relation to EPBC Approval 2012/6523
EPL	Environment Protection Licence
ER	Environmental Representative
HSC	Health and Safety Committee
ITP	Inspection and Test Plan
JH	John Holland
MNES	Matters of National Environmental Significance
NOW	NSW Office of Water (in the department of Primary Industries)

Term	Definition
NPW Act	National Parks and Wildlife Act 1974
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PM	Project Manager
POEO Act	Protection of the Environment Operations Act 1997
SEP	Site Environment Plan
SQE	Safety, Quality and Environment
SQERM	Safety Quality and Environment Risk Management
Project Infrastructure Approval	Infrastructure Approval SSI-5039 and accompanying Conditions of Approval (CoA), dated 27 February 2014
Project EIS	Environmental Impact Statement (EIS) for the Chaffey Dam Augmentation and Safety Upgrade prepared by Worley Parson, dated 07 December 2012 and Preferred Infrastructure Report (PIR) for the Chaffey Dam Augmentation and Safety Upgrade prepared by WorleyParsons, dated 15 March 2013
SSI	Chaffey Dam Safety Upgrade and Augmentation project
The Proponent	State Water
TMP	Traffic Management Plan
TRA	Task Risk Assessment
WRA	Workplace Risk Assessment

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1. Introduction

1.1 Purpose and Application

This Biodiversity Management Plan is a key element of the overall Construction Environmental Management Plan (CEMP) and describes how John Holland will manage obligations and performance with regards to aspects and potential impacts associated with flora and fauna during the delivery of the project.

This plan has been developed to ensure the requirements of the Project Planning Approval, associated environmental documentation and contract requirements are satisfied to ensure the successfully delivery of the Chaffey Dam Safety Upgrade and Augmentation. This plan is applicable to the construction phase of the project.

1.2 Background

The Environmental Impact Statement (EIS) for the Chaffey Dam Augmentation and Safety Upgrade prepared by Worley Parson, dated 07 December 2012 considered flora and fauna impacts during the construction phase of the project and detailed mitigation measures that would reduce the impacts to biodiversity.

The project will have impacts on Endangered Ecological Community (EEC) and Critical Endangered Ecological Community (CEEC), and two threatened species. These constitute impacts on Matters of National Significance (MNES) requiring approval from the Commonwealth Environment Minister under the Environment Protection and Biodiversity Conservation Act 1999. NSW Planning and Environment have provided specific project approval conditions relating to Biodiversity.

This Biodiversity Management Plan has been developed to manage the flora and fauna on the project during construction activities. A pro-active approach will be undertaken for areas within the project boundaries with an aim to contribute to the maintenance and protection of existing biodiversity values and minimise the potential long term effects of clearing required for construction works on the surrounding vegetation communities and habitats.

1.3 Flora and Fauna Objective

The following biodiversity objectives apply to the construction phase of the project

- Minimise impacts on flora and fauna
- Minimise impact to threatened species and populations
- Retain and enhance existing flora and fauna habitats where possible
- Actively manage to stop the spread of weeds and plant pathogens

1.4 Environmental Management Documentation

This Biodiversity Management plan forms a key element of the suite of environmental Management documents for the project as shown below in Figure 1.

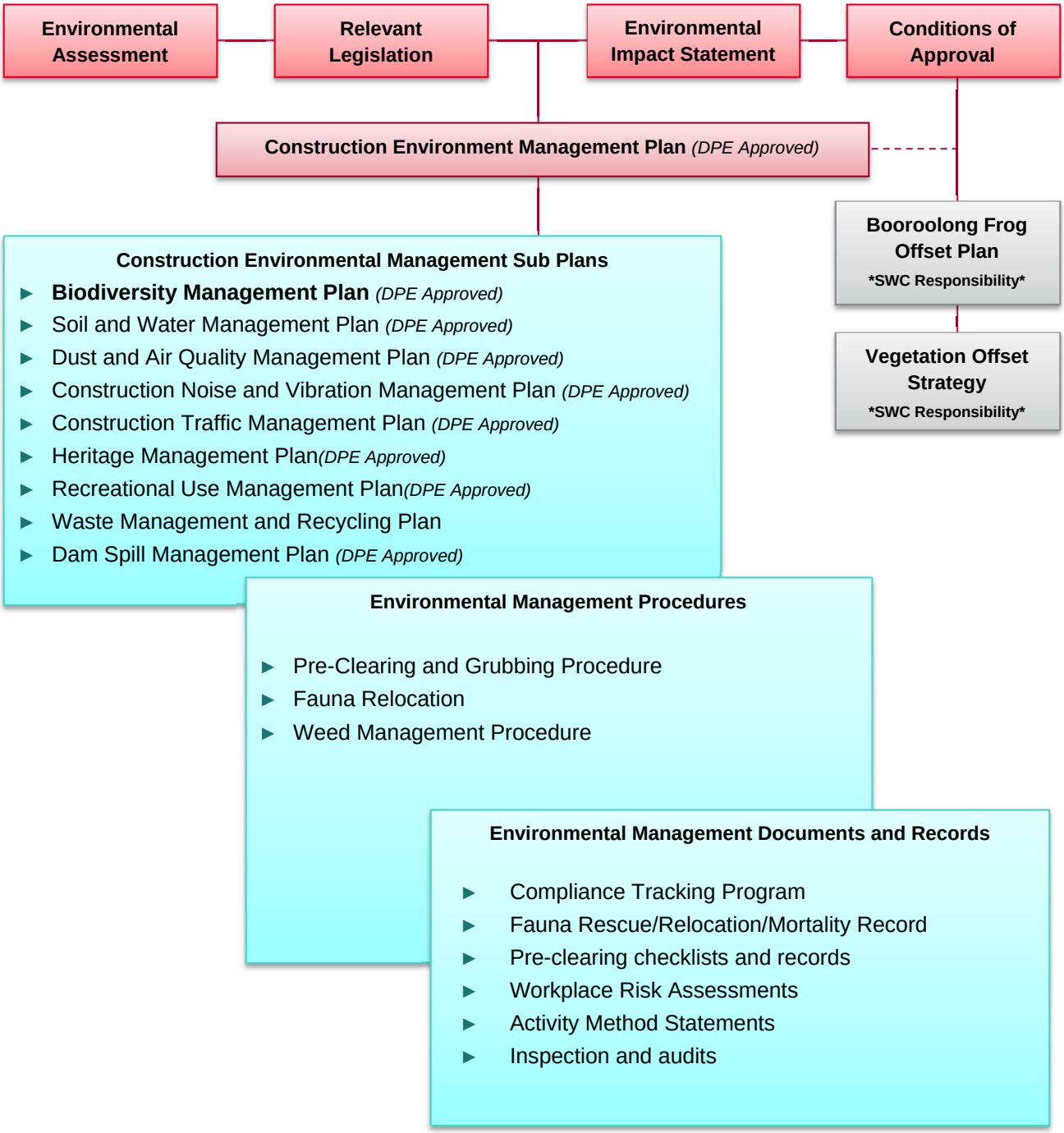

Figure 1 – Environmental Management Documentation

1.5 Review and Ongoing Development

The plan will be reviewed annually and/or under the following conditions –

- Significant change to the Scope of Works
- If required as a result of an audit or incident
- If State Water or the Environmental Representative formally requests the change
- If the Project Director determines that it is appropriate

1.6 Consultation

The following stakeholders have been consulted in the preparation of this Plan -

Table 1- Consultation

Stakeholder	Method / Dates
DOE	Review of DRAFT Management Plan 07/08/2014
North West LLS	Review of DRAFT Management Plan 06/08/2014
OEH	Review of DRAFT Management Plan 06/08/2014
DPI (NSW Fisheries)	Review of DRAFT Management Plan 06/08/2014

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2. Legal and Other Requirements

2.1 Legislation

The following is legislation that is applicable to flora and fauna management –

- Environmental Planning and Assessment Act 1979 (EP&A Act)
- Fisheries Management Act 1994 (FM Act)
- National Parks and Wildlife Act, 1974 (NPW Act)
- Threatened Species and Conservation Act, 1995 and amendments (TSC Act)
- Native Vegetation Act, 2003 (NV Act)
- Noxious Weeds Act, 1993 (NW Act)
- Pesticides Act 1999
- Environmental Protection and Biodiversity Conservation Act, 1999 (Cth) (EPBC Act)

Section 2 of the CEMP provides further detail of the obligations for John Holland resulting from the above legislation.

2.2 Guidelines and Standards

Additional guidelines and standards have also been referenced during the development of this document and procedures in this plan -

- Noxious and Environmental Weed Control Handbook 5th Edition, NSW Department of Primary Industries
- Standards Australia, AS 4970 Protection of trees on development sites

3. Roles and Responsibilities

All John Holland personnel and subcontractors have a role in ensuring that the strategies and procedures set out in this plan are implemented. Key roles and responsibilities have been outlined below –

Table 2 - Roles and Responsibilities

Role	Responsibilities
Project Manager	Manage the delivery of the Project including overseeing implementation of flora and fauna management as Contractors Representative
Environment Manager	Providing assistance and advice to all Project personnel to fulfil the requirements of this Plan Undertaking and assessing data from inspections, monitoring and reporting Assisting with the implementation of flora and fauna related management procedures Handling / addressing complaints and providing Project-wide advice to ensure consistent approach and outcomes are achieved Ensuring appropriate training and awareness programs are developed and implemented Liaising with relevant authorities and organisations as necessary
Senior Project Engineer	Liaising with the Environmental Manager (EM) to ensure appropriate corrective and preventative actions are developed and implemented in accordance with this Plan whilst maintaining constructability
Superintendent and Supervisors	Managing and / minimising impacts associated with flora and fauna as a result of construction activities Ensuring personnel are fully briefed on the relevant flora and flora management requirements prior to work commencing
Project and Site Engineers	Ensuring that appropriate flora and fauna management measures are implemented and maintained on site Developing Activity Method Statements and Task Risk Assessments in consultation with the EM and construction personnel In the event of identified potential or actual breaches, implementing appropriate corrective or preventative actions to fulfil the requirements of this Plan.
Construction Personnel	Informing the supervisor of any flora and fauna issues as they rise

Role	Responsibilities
Project Ecologist	Undertake pre-clearing inspections Attend site and provide management advice in the event that threatened species are discovered Provide ongoing advice in relation to flora and fauna management issues

4. Existing Environment

4.1 Flora

4.1.1 Vegetation Communities

Seven vegetation communities were identified in the study area, these vegetation types are described briefly below and mapped in Figure 1. A detailed description is provided in the EIS, Appendix 8 Terrestrial and Aquatic Flora and Fauna Impact Assessment

- Box – gum grassy woodlands, Brigalow Belt South and Nandewar (EEC and CEEC)
- Silvertop Stringybark grassy open forests, eastern Nandewar and New England Tablelands
- Derived grasslands, Brigalow Belt South and Nandewar (EEC)
- River Oak Riparian Woodland, eastern NSW
- Wetlands and marshes, inland NSW
- Planted non-indigenous native vegetation
- Exotic non-native vegetation

4.1.2 Box – gum grassy woodlands, Brigalow Belt South and Nandewar

This is the most common and widespread wooded community across the site, primarily occurring on the lower slopes and flats surrounding the dam and is dominated by Yellow-Box (eucalyptus melliodora) and Blakelys Red Gum (eucalyptus blakelyi).

This community is listed as an Endangered Ecological Community (EEC) under the TSC Act with better quality remnants in good condition also quantifying as the Critically Endangered Ecological Community (CEEC) listed under the EPBC Act. Areas of this community in good condition can also provide habitat for threatened flora.

4.1.3 Silvertop Stringybark grassy open forests, eastern Nandewar and New England Tablelands

This community typically occurs on the upper slopes and ridge tops surrounding the dam and is characterised by the presence or dominance of Silvertop Stringybark (Eucalyptus laevopinea). All occurrences of this vegetation type is considered to be in good condition excluding areas of the south facing slope above the Ribbon Gum dominated area on the western foreshore. Large patches of Blackberry also occurred within this community to the east of the South Bowlo Fishing Club on the northern foreshore of the dam

4.1.4 Derived grasslands, Brigalow Belt South and Nandewar

The derived grasslands community currently occurs as a native pasture and was generally in a poor condition across the site and exhibited a low diversity groundcover of native grasses dominated by Slender rat tail Grass, Queensland bluegrass and Red-leg Grass.

Despite its degraded condition, this community is also considered an EEC under state legislation.

4.1.5 River Oak Riparian Woodland, eastern NSW

This community is distinguished by the River Oak (Casuarina cunninghamiana) which occurs along isolated patches of the shoreline of the upper reaches of the dam and the Peel River. This vegetation is mostly in poor condition.

4.1.6 Wetlands and marshes, inland NSW

The wetlands occur as an isolated area on the southern shore of the dam and is considered to be in a moderate condition.

4.1.7 Planted non-indigenous native vegetation

Specific areas around the dam have been planted with native vegetation that is not naturally occurring at the site.

4.1.8 Exotic non-native vegetation

Exotic dominated vegetation occurs commonly as isolated patches around the dam and more extensively in the form of cropped paddocks on the southern shore of the dam. Around the dam wall Coolatai Grass (Hyparhenia hitra) forms almost pure stands and poses a major threat to natural biodiversity.

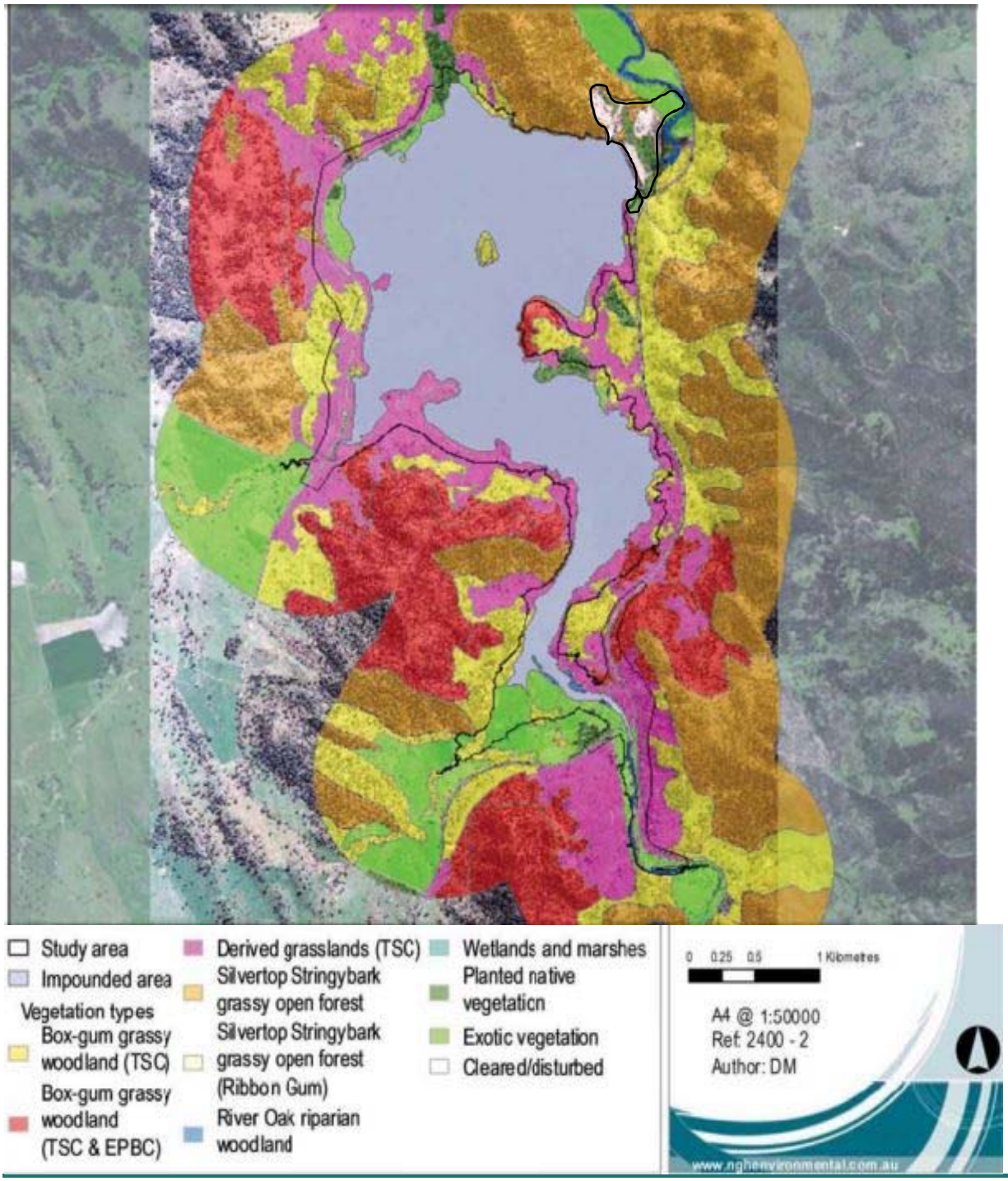


Figure 2- Vegetation Communities

4.2 Weeds

Common pasture weeds are prevalent throughout the area surrounding the existing reservoir. Noxious weeds listed for the Tamworth Regional Control Area are also present. Large infestations of Blackberry (*Rubus fruticosus aggregate) occur around the existing foreshore. Coolatai Grass is abundant and while it is not listed as noxious under the control area of Tamworth Regional Council, in many parts of NSW it is declared a Class 3 noxious weed under the NSW Noxious Weeds Act 1993.

Other noxious weeds including Sweet Briar (*Rosa rubiginosa), Prickly Pear (*Opuntia stricta), St John's Wort (*Hypericum gramineum), African Boxthorn (*Lycium ferocissimum), Willows (*Salix spp.) and Bathurst Burr (*Xanthium spinosum) occur commonly as isolated individuals or patches. Blackberry, African Boxthorn, Prickly Pear and Willows (all except Salix babylonica, S.x calodendron and S.x reichardtii) are listed Weeds of National Significance (WoNS).

4.3 Fauna

As part of the detailed terrestrial and aquatic biodiversity assessment undertaken by nghenvironmental, three threatened species were detected including one mammal, one amphibian and one reptile as shown in Figure 3. One migratory species was also recorded.

- Threatened and migratory birds

  One migratory species listed under the EPBC Act, the White-bellied Sea-eagle was recorded, no threatened bird species were observed during the assessments.

- Microbats

  One species, the Eastern Bentwing-bat (Miniopterus schreibersii oceanensis), listed as vulnerable under the TSC Act was identified. This species roosts in caves, derelict mines and man made structures, it is likely they are roosting in the rocky habitats available on the upper slopes in the locality surrounding the dam, using Chaffey Dam primarily as foraging habitat.

- Booroolong Frog

  The new FSL will inundate up to eleven potential and known Booroolong frog habitat locations.

- Border-Thick Tailed Gecko

  The Border Thick tailed Gecko is known to occur on the dam wall. Artificial habitat is provided by the large rocks on the existing dam wall. Suitable habitat for the Gecko is extensive on Goat Mountain and most likely in the surrounding shrubby rocky remnants.

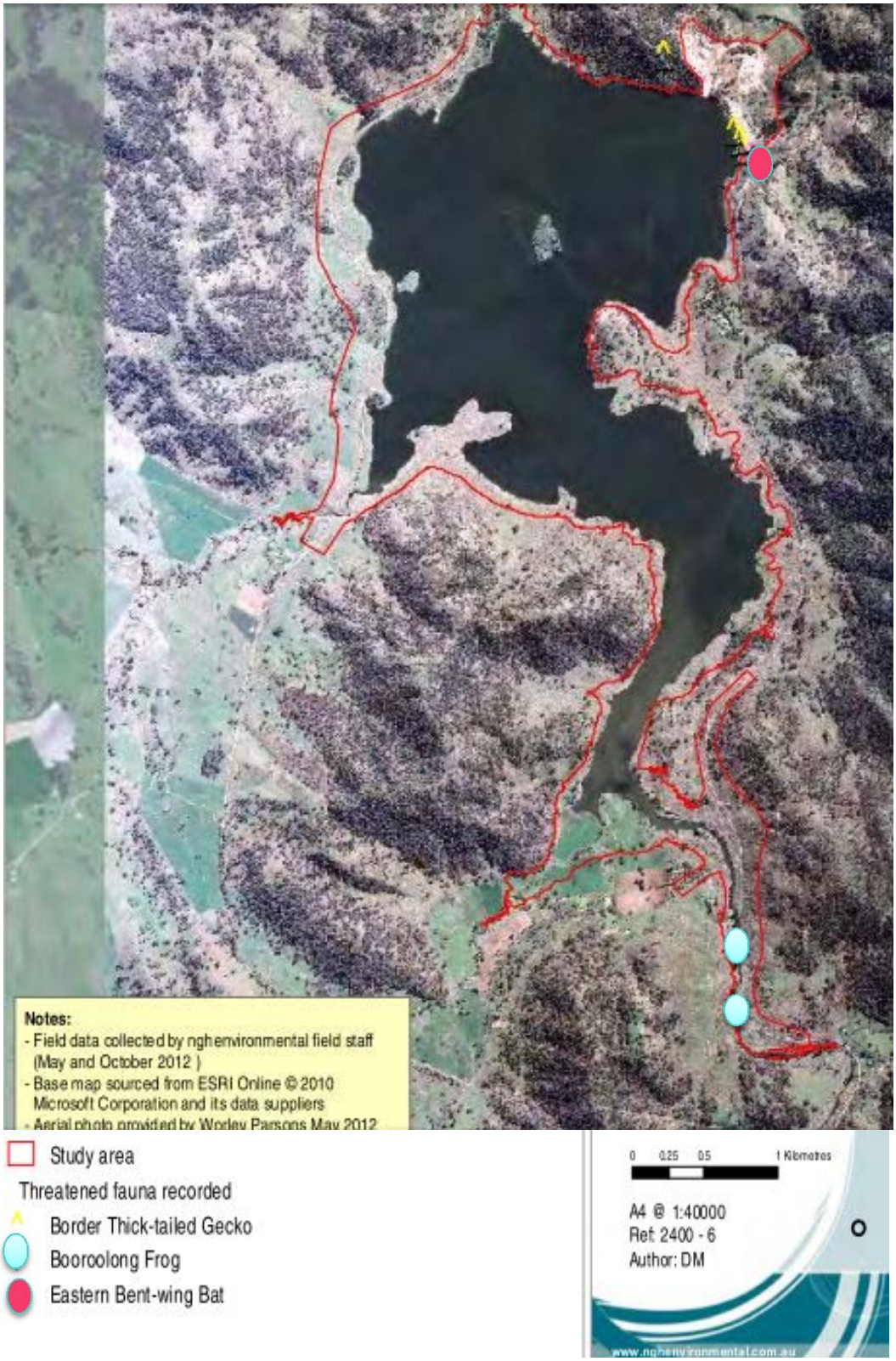


Figure 3 - Threatened Species

4.3.1 Fauna Habitat Features

Fauna habitats contain a range of microhabitat features including tree hollows, fallen timber, ground litter layer and riparian habitats. A large portion of the area contains variable (mostly moderate to poor) quality habitat, including large areas of grassland, planted and exotic habitat. The woodland habitat to be impacted by the Project is patchy and isolated.

4.3.2 Riparian and Aquatic Habitat

The riparian zone comprises a diverse range of habitats, including the reservoir, Peel River, creek banks and drainage lines, narrow bands of aquatic vegetation, some patches of Eucalypt woodland and grassland along the reservoir foreshore.

The aquatic habitat of Chaffey Dam is open water with limited fringing and aquatic vegetation present. This may be due to the frequent fluctuations in the dam water level that is preventing the establishment of these habitats.

The Chaffey Dam Reservoir is classified as a Key Fish Habitat in accordance with DPI (Fisheries) definition and mapping.

The riparian zone is generally cleared of vegetation or less than 10m wide, where vegetation is present it includes grassy ground cover and banks are generally consolidated by River Sheoak (Allocasuarina cunninghamiana).

5. Threatened and Endangered Species

5.1.1 Endangered Ecological Communities

Of the vegetation that occurs within the construction footprint, one community broadly named 'Box – gum grassy woodlands' meets the definition of a listed Endangered Ecological Community. The definition and name of the community is slightly different under the TSC Act and EPBC Act and is further described below

- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC (EPBC Act)
- White Box Yellow Box Blakely's Red Gum Woodland (TSC Act)

5.1.2 Threatened Species of Animals

The threatened fauna species which are listed under both the EPBC and Threatened Species Conservation Act are -

- Booroolong Frog
- Border Thick-tailed Gecko

5.1.3 Threatened Aquatic Species

The threatened aquatic known to occur or have the potential to occur are

- Silver Perch (Endangered population under the Fisheries Management Act)
- Murray Cod (Vulnerable species under the EPBC Act)
- River Snail ((Endangered population under the Fisheries Management Act)
- The Murray Darling Basin population of the eel-tailed catfish (EM-FM Act)

6. Aspects and Potential Impacts

The SQERM planning process as outlined in the CEMP will further highlight specific construction activities where flora and fauna will be disturbed, removed or relocated during construction works. The table below outlines aspects and potential impacts –

Table 3 - Summary of aspects and potential impacts

Aspect	Potential Impact
► Clearing of vegetation communities for - Road realignment (EEC) and bridge construction - Laydown areas / Offices - Haul Roads ► Major earthworks activities (cut, fill and stockpile) ► Removal of fauna habitat - loss of hollow bearing trees, removal of woody debris - Dam Wall construction Temporary loss of artificial habitat ► Working within/adjacent to waterways - Raising Morning Glory spillway - Peel Creek crossing - Nundle Bridge construction ► Temporary reduction of dam water level during construction of Morning Glory Spillway ► Weed Invasion ► Death or injury to fauna due to construction activities	In total, approx. 20ha of native vegetation will be affected by construction works (Refer Appendix E - This is only an estimates as final design is still to be completed.) ► NSW White Box-Yellow Box-Blakely's Red Gum Woodland (EEC) ► Commonwealth White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC) ► Exotic Vegetation Clearing of vegetation/woody debris resulting in disruption to flora, fauna and established ecological community function The Border Thick-tailed Gecko is known to occur on the dam wall, the construction works will remove a small amount of the gecko's artificial habitat. A temporary impact of approx. 0.2ha results from the removal of rocks at the crest of the existing wall in order to construct the vertical wall addition. Removal of mature trees that provide habitat to fauna and soil stabilisation Vegetation removal and grubbing increases the risk of soil erosion Over clearing outside of approved boundaries Pollution to waters Movement of soil attached to vehicles and machinery introducing disease Increase in potential for weed dispersal from edge effects and construction activities Spread of Chytridiomycosis

7. Flora and Fauna Management

The impacted flora and fauna on the site

The table below details mitigation measures to be undertaken to manage fauna and flora impacts during construction activities in addition to the items below -

- Condition B7 requires that State Water will have Biodiversity Offset Strategy approved by the Director General prior to construction works occurring
- Pre clearing surveys will be conducted to mitigate potential impacts and identify risks to flora, fauna and habitat prior to construction activities occurring
- The procedures in Appendix B, C, D will be implemented to manage flora and fauna impacts associated with construction works for the project
- Hygiene protocol, Booroolong Frog Appendix D for the control of diseases in frogs as per *Threatened Species Management Information No. 6* will be implemented if entering known or potential frog sites
- The project induction will include identification of sensitive flora and fauna areas, flora and fauna awareness, protection of ecological sites and the pre-clearance process
- All sensitive areas (Refer Section 3.1.1 of CEMP) within the project corridor will be indicated on *Site Environmental Plans* (SEPs).
- Protective fencing or marking and environmental signage will be installed around all sensitive areas (Refer Section 3.1.1 of CEMP) restricting on-site construction movements by vehicles or personnel into these areas

Table 4 Specific Controls

Endangered Species	Control Measures
Booroolong Frog	An ecologist will conduct a pre-construction survey of the possible frog habitats and any frog discovered will be relocated to suitable habitats. The ecologist will conduct a training session for procedures if the construction team encounter a frog.
Border Thick-tailed Geckos	An ecologist will conduct a pre-construction survey of the possible Gecko habitats. Any Geckos discovered will be relocated to the wildlife corridor in Goat Mountain. Clearing and rock removal will begin from the south-eastern end of the dam wall and work northwest along the ridge to enable all fauna in the impact area to escape along the ridge to the wildlife corridor. Materials used to raise the dam will be the same as those currently on the dam wall.
Flora White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC, White Box-Yellow Box-Blakeley's Red Gum Woodland EEC	An Ecologist will conduct a pre-clearing survey for tree removal using a GPS to mark the location for the extent of the clearing. The areas of EEC will be fenced and marked to ensure clearing does not occur beyond approved areas. Disturbed areas will be made good where applicable.

Murray Cod	Fish corridors will be maintained and passage not impeded. River crossings will be designed in consultation with NSW Fisheries. To reduce impact on aquatic fauna sediment controls will be placed downstream of construction activities to stop sedimentation of the waterways. Spill control measures will be used to prevent hydrocarbon spills from entering the waterway.

Table 5 - Mitigation Measures

Mitigation Measures	Project Phase
Existing cleared, disturbed and sealed areas will be identified and used preferentially for vehicle and machinery access, materials laydown and stockpiling wherever practicable to minimise disturbance to native vegetation, including areas of derived grassland	Pre-construction Construction
Flora White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC, White Box-Yellow Box-Blakeley's Red Gum Woodland EEC The Ecologist will survey the trees for removal and mark the habitat trees and features, clearly mark the clearing limits (Surveyed with a GPS) and clearly mark the CEEC and EEC areas not to be cleared.	Pre-construction
Pre-clearance surveys will be conducted prior to construction activities. John Holland will engage an ecologist to conduct pre-clearance surveys to locate and remove fauna as close as possible to the commencement of construction activity as possible. In particular ► Any individual Border Thick-tailed Geckos found on the Dam Wall will be relocated to a safe location in the wildlife corridor or Goat Mountain ► Any Booroolong Frog will be relocated to a suitable site identified by the ecologist	Pre-construction
Fauna handlers will be used to capture and relocate any fauna encountered during construction activities. Capture and relocation of fauna encountered during the construction phase of the project will be managed by the Fauna Rescue and Relocation procedure in Appendix B and/or D. To manage impacts to the Border Thick-Tailed Gecko during the dam wall works - ► Clearing and rock removal will begin from the south-eastern end of the wall and work northwest along the ridge to enable all fauna in the impact area to escape along the ridge to the wildlife corridor ► Materials used to raise the dam wall will be the same as those currently present on the wall ► State Water will ensure stock will be prevented from entering the wildlife corridor and the habitat between the dam wall and Goat Mountain	Construction
Watercourse crossings to be designed in consultation and with approval from Department of Fisheries. ► When designing the Peel River crossings up and downstream of Chaffey Dam, the design will not contribute to sediment load and flow will be maintained to ensure viability of aquatic communities and to ensure the passage of fish. The Soil and Water Management Plan will detail erosion and sediment controls to minimise impacts to waterways during construction activities.	Pre-construction
Plan in-stream works to minimise contact time and minimise impacts on the waterway and disturbance to banks	Pre-construction
Exclusion zones for riparian zones that do not need to be accessed would be established before works start to avoid any disturbances of the banks	Pre-construction
During water crossing works, should large woody debris need to be removed for any construction activities the following will be implemented:	Construction

Mitigation Measures	Project Phase
► Fisheries NSW will be notified a minimum of three days prior to removal of any large woody debris ► Lopping (trimming) will be considered as a first option ► In stream realignment will be considered as the next option ► If realignment is unfeasible, relocation within the river channel is preferable to removal ► Removal should be considered as a last resort	
Provisions requiring weed control measures employing chemicals to be conducted in a manner that does not impact on water quality within the reservoir	Construction
Equipment to remain within dedicated work areas	Construction
Laydown sites for excavated spoil, equipment and construction materials will be weed-free or treated for weeds	Pre-construction Construction
Sediment control materials will be weed free such as weed free hay bales or geotextiles	Construction
Any imported materials such as sand and gravel will be sourced from sites which do not show evidence of noxious weeds or diseases that may be harmful to native vegetation. If any imported materials result in the occurrence of weeds, measures will be implemented to eliminate weeds before they have the opportunity to spread	Construction
Monitoring of measures and ongoing adaptive management to control weeds throughout construction and operation of the Project. Any increase in weed infestations should be managed to eliminate or reduce weed infestation	Construction
Laydown areas and stockpile sites should be located at least 40m from any waterways where possible and should be adequately protected to avoid or minimise any potential pollution of waterways through adequate erosion and sediment controls.	Pre-construction Construction
Works should be staged so that construction activities that need to be undertaken within waterways (e.g. bridge construction) are undertaken during low reservoir levels	Pre-construction Construction
Emergency spill response procedures to avoid spillages of fuels, chemicals and fluids into any adjacent waterway. Spill kits to be onsite at all times – including a floating boom for works over water	Construction
Murray Cod To reduce impact on aquatic fauna sediment controls will be placed downstream of construction activities to stop sedimentation of the waterways Spill control measures will be used to prevent hydrocarbon spills from entering the waterway	Construction

7.1 Vegetation Clearing

A suitably qualified ecologist will manage and direct all aspects of vegetation clearing including identification of potential habitats and undertaking of wildlife rescues.

The following will be followed -

- Boundaries of areas for clearing will be surveyed and clearly delineated using tape prior to clearing. Habitat trees/features will be marked with flagging tape and/or spray paint
- Vegetation adjacent to the areas being cleared will be protected to prevent accidental clearing
- All non-marked trees and features will be removed first
- All remaining, marked habitat trees will be knocked (gently tapped with construction equipment) the day before the day of clearing, and groundcover features such as logs will be gently rolled and searched for the presence of animals
- 24hours after the clearance of non-marked vegetation, each habitat tree will be removed and searched for the presence of animals –

- Marked trees will be shaken prior to felling using a bulldozer or similar equipment and then left for a short period of time to allow any fauna using the hollows to be observed
- Hollow-bearing trees will be slowly pushed over or cut into sections and removed, with care to avoid damage to hollows
- Fauna rescue personnel will instruct the equipment operators; in some circumstances sections of a tree containing a hollow or habitat may be individually removed prior to felling

- Removed habitat features that will be used for habitat enhancement or in rehabilitation works, will be relocated to adjacent habitat or stored for use in rehabilitation works
- Fauna found during the clearance searches will be either left to move into adjacent habitat on its own accord or captured and released into adjacent suitable habitat, at a time suitable for the subject species.

The Vegetation Clearing Procedure is further outlined in Appendix A. This process will be followed to gain approval for removal of vegetation within the project boundary. This will mitigate potential risk associated with vegetation clearance activities.

No vegetation clearing outside the project boundary will occur without the necessary approvals in place. Site survey will be conducted after the activities to record the location and size of areas cleared, this information will be reported to State Water.

7.2 Rehabilitation

Areas impacted by construction activities will be rehabilitated as soon as is reasonably practicable in accordance with the construction contract, Section 4 Clearing and Vegetation/Revegetation and includes -

John Holland will complete revegetation works within the following timeframes

- Revegetation of areas with slopes 3H to 1V or flatter, over an area of 1ha as soon as practically possible
- Revegetation of areas with slopes steeper than 3H to 1V, over an area of 1ha as soon as practically possible
- During construction, rehabilitation sites will be appropriately prepared with topsoil, mulch and other biomass material
- A combination of
  - Native seeding – using seed that is only fresh, clean and new not wet, mouldy or otherwise impaired seed. Seeding type includes Japanese millet (Summer and Spring), Rye Corn (Winter and Autimn), Barrel Medic, Wallaby Grass, Lucerne, Cocksfott, Windmill Grass and Fescue.
  - Hydro-seeding- Use recycled paper fibre as a seed carrier
  - Hydro-mulching with organic material, produced from finely chopped sugarcane mulch and shredded recycled paper
- Water to be used on re-vegetated areas must be potable or obtained from a source which contains no toxins or pollutants or any substance which would adversely growth
- Monitoring of rehabilitated areas – all seeded vegetation must achieve 60% soil-surface coverage before soil and erosion controls can be removed. Monitoring will occur during the weekly inspections.

State Water will have a Rehabilitation Plan for the establishment of riparian vegetation surrounding the new FSL.

7.3 Pesticides

Any use of herbicides will be strictly in accordance with the *Pesticides Act 1999*, product label, and the *Project Safety Management Plan*. Where approved herbicides are required to be used to control weed species near water, ie creeks, drainage depressions and stormwater drains, extra care is to be taken to limit overspray. All herbicides will only be used during suitable weather conditions. Herbicides are not to be used without the prior approval of the Environment Manager or delegate.

7.4 Pest Control

If pest control is required, a qualified subcontractor will be engaged to undertake the work.

8. Training, Monitoring and Reporting

8.1 Training

Relevant personnel will receive training appropriate for their role in flora and fauna management on the project. This includes

- ‘Identification and Handling of Frogs’ as per “Threatened Species Management Information Circular No. 6, hygiene protocol for the control of disease in frogs” Department of Environment and Climate Change (NSW) April 2008 by a suitably trained Ecologist
- Fauna Relocation (Border Thick Tailed Gecko) by qualified ecologist
- Weed management

Ongoing toolbox talks on the requirements of flora and fauna management will raise awareness to the wider project team.

- Clearing and grubbing procedures

8.2 Monitoring

Review of aspects and potential impacts associated with management of flora and fauna will be included in regular inspections with appropriate records maintained.

Monitoring will essentially comprise of the following:

- Daily monitoring of construction activities via onsite visual inspections by Supervisors
- Environment Manager or delegate to conduct weekly environmental inspections and include visual monitoring for threatened species and weed infestation. A monitoring checklist detailing mitigation measures in this Biodiversity Management plan will be used.
- Fauna mortality as a result of construction related traffic and activities ie. ensure survey during site clearing activities

8.3 Reporting

Documents specific to the management of flora and fauna are detailed below -

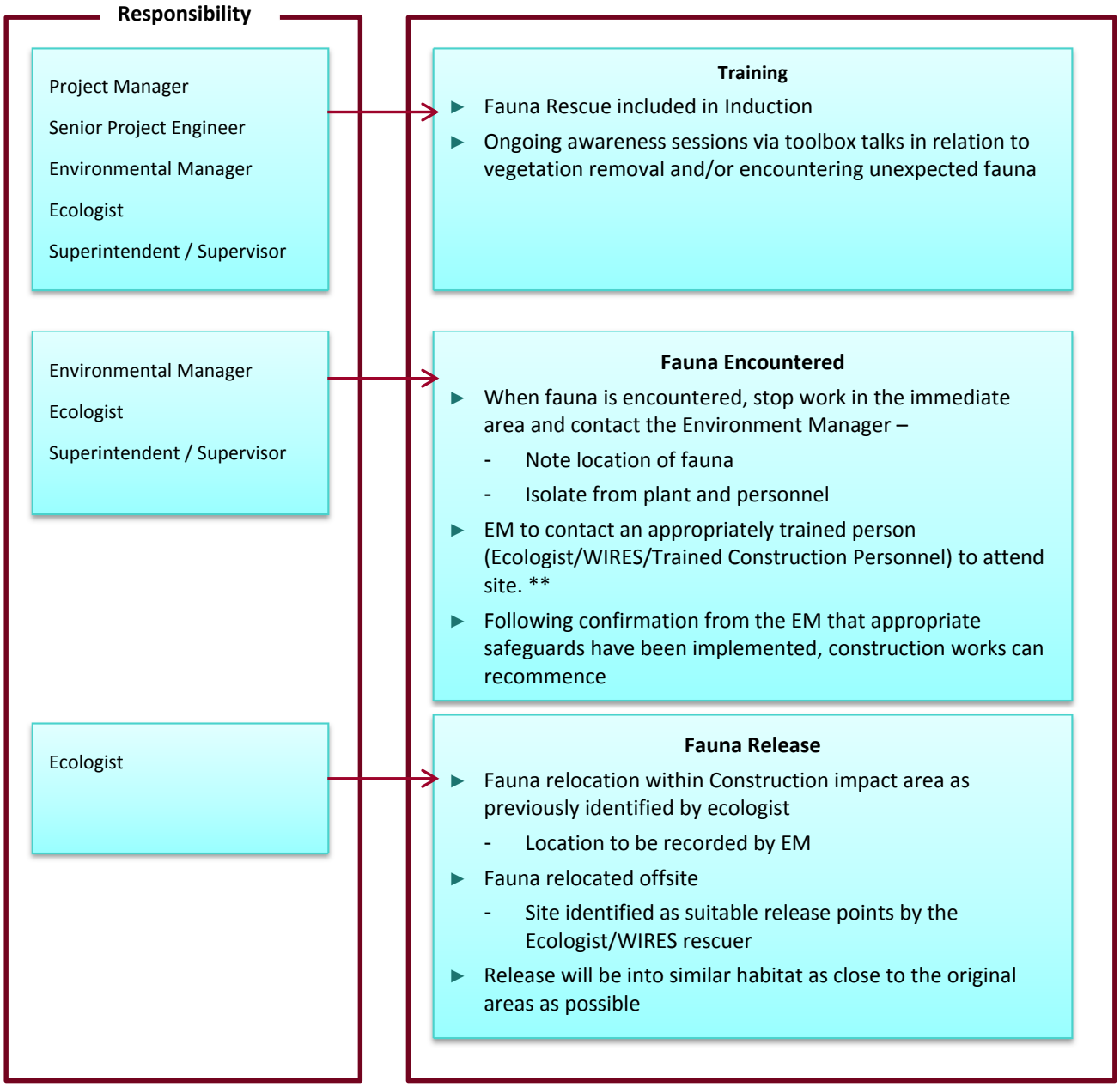
- Pre-clearing Ground Disturbance Inspection Checklist and Permit
- Fauna Rescue/Relocation/Mortality Record
- Weekly Site Environment Checklist
- Daily Inspections – Supervisors Diary
- In the event of any observed fish kills within or immediately downstream of the works zone, standard Incident Reporting as per Section 5 of the CEMP will be followed and DPI reporting protocols will be followed as per http://www.dpi.nsw.gov.au/fisheries/habitat/threats/fish-kills
- Following completion of vegetation clearing activities, spatial data will be supplied to State Water detailing location and areas cleared.

Reporting will also be in accordance with CEMP Section 5.4.

Appendix A – Vegetation Clearing Procedure

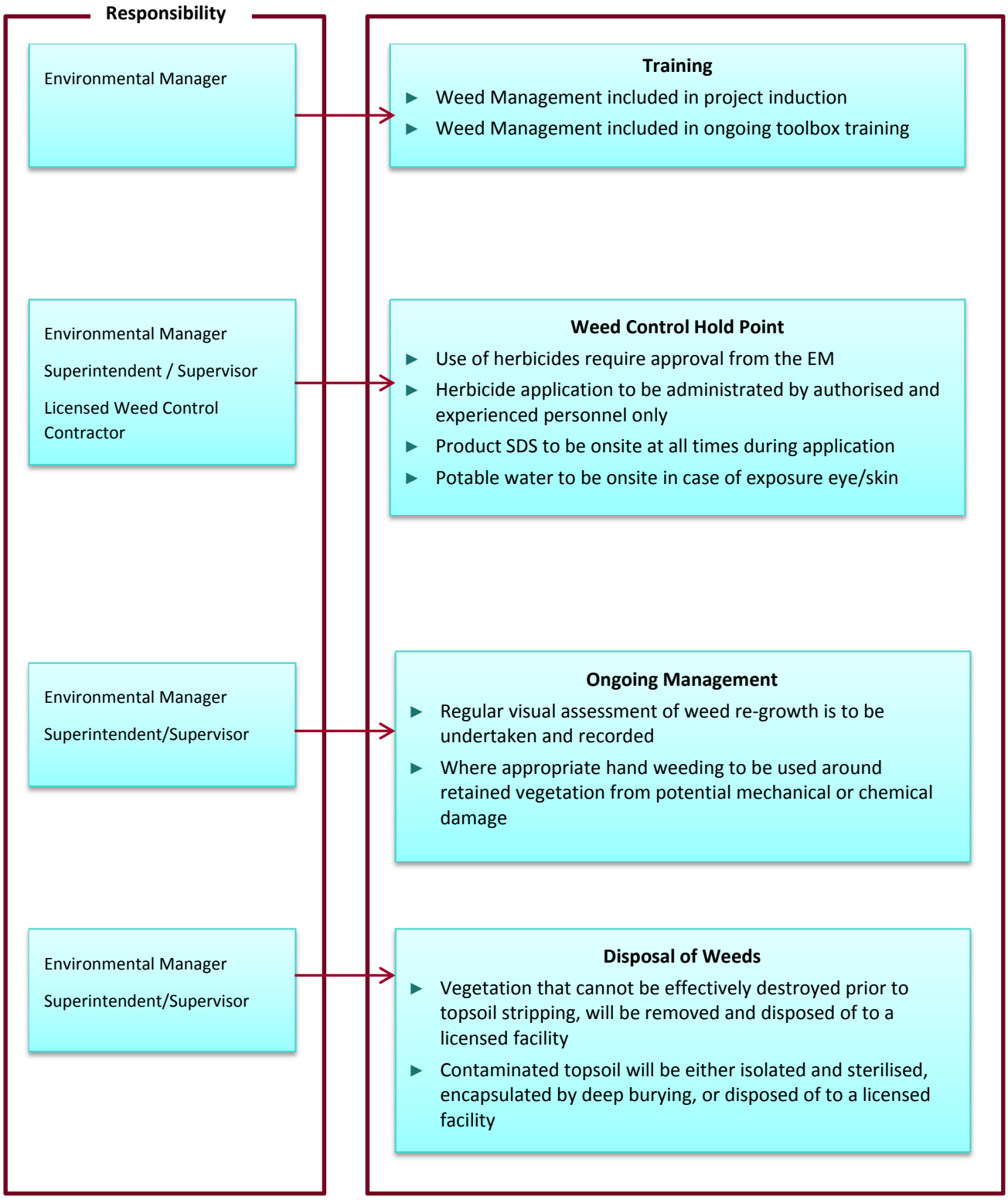
Responsibility	Action to Be Taken
Project Manager Senior Project Engineer Environmental Manager Ecologist Superintendent / Supervisor	**Training** ► All personnel are to be inducted, and receive ongoing training via toolbox talks in relation to correct management processes to be undertaken for the removal of vegetation ► Specific training will be provided to personnel responsible for planning and implementation of vegetation removal controls
Environmental Manager Ecologist Superintendent / Supervisor Survey Team	**Delineate vegetation to be cleared** ► Vegetation proposed for removal to be delineated by tape/ fencing and/or signage ► Approved limit of clearing to be set out by the survey team
Environmental Manager Ecologist	**Fauna and Habitat Identification** ► Pre-clearing inspection of vegetation and fencing to be undertaken by the projects Ecologist
Engineer Environmental Manager Arborist Superintendent / Supervisor	**HOLD POINT** ► An Erosion and Sediment Control Plan (ECSP) will be developed and implemented prior to vegetation removal (grubbing) commencing to ensure suitable controls are installed to mitigate soil and erosion and sedimentation risks. ► Complete and submit Pre-Clearing Ground Disturb Inspection Checklist and Permit for approval by the Environmental manager or delegate ► NO clearing/work is to occur without written approval
Environmental Manager or delegate	**Approval to Clear** ► Issued once erosion and sediment controls are in place and fauna/habitat tree inspection completed
	Remove Vegetation ► Two Stage Clearing (when habitat trees present) - Stage 1 – Remove non habitat trees Wait 24hrs to allow any fauna to evacuate - Stage 2 – Remove habitat trees Remove vegetation and mulch to Green Waste, re-use on site where possible unless directed by Ecologist to leave

Appendix B - Fauna Rescue and Relocation Procedure During Construction Works



** Refer *Appendix D Hygiene Protocol for the Control of disease in Frogs* if the fauna is the Booroolong Frog.

Appendix C – Weed Management Procedure



Appendix D – Hygiene Protocol for the Control of disease in Frogs

Responsibility

Environmental Manager

Environmental Manager

Superintendent / Supervisor

Ecologist

Training

- Hygiene Management practices for frogs included in project induction
- Hygiene Management practices for frogs included in ongoing toolbox training
- Targeted training for specific construction personnel to relocate and handle frogs

Field Hygiene Kit

- A field hygiene kit will be available and contain; Small Styrofoam esky, Disposable gloves, Disinfectant solutions, Wash bottle, Scrubbing brush, Small bucket and Plastic bags

Hold Point – Frog Handling

- Frogs only to be handled with approval from the EM
- EM contact Ecologist/Trained Construction personnel
- Frogs only to be removed from site or handled when absolutely necessary.
- "One frog – one glove" policy. A new pair of disposal gloves to be used for each frog to be handled
- "One frog – one bag" policy. Place in bag with some damp leaf litter and partially inflated before sealing. Separate bags to be used to contain each frog. Bags are not to be re-used.

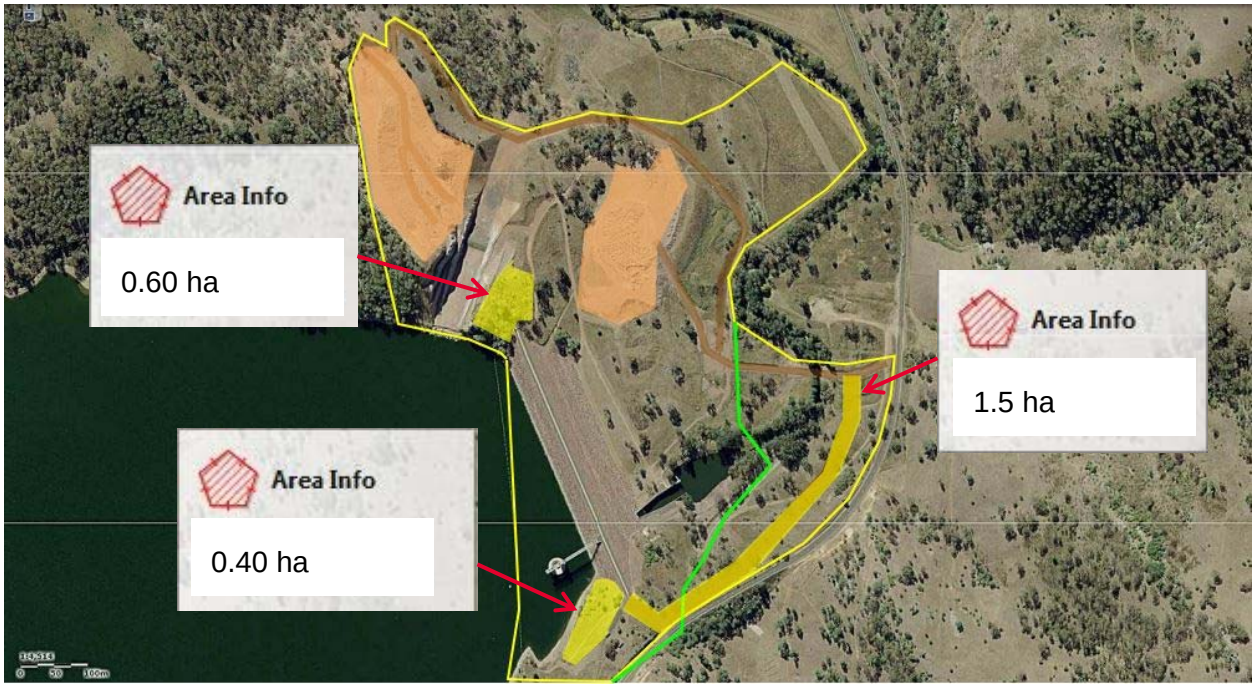
Ongoing Management

- Footwear – Footwear must be thoroughly cleaned and disinfected prior to entering the frog site and after leaving
- Vehicles – If a vehicle is used to transverse a known frog site, which could result in mud and water being transferred to other bodies of water or frog sites then wheels are to be cleaned and disinfected

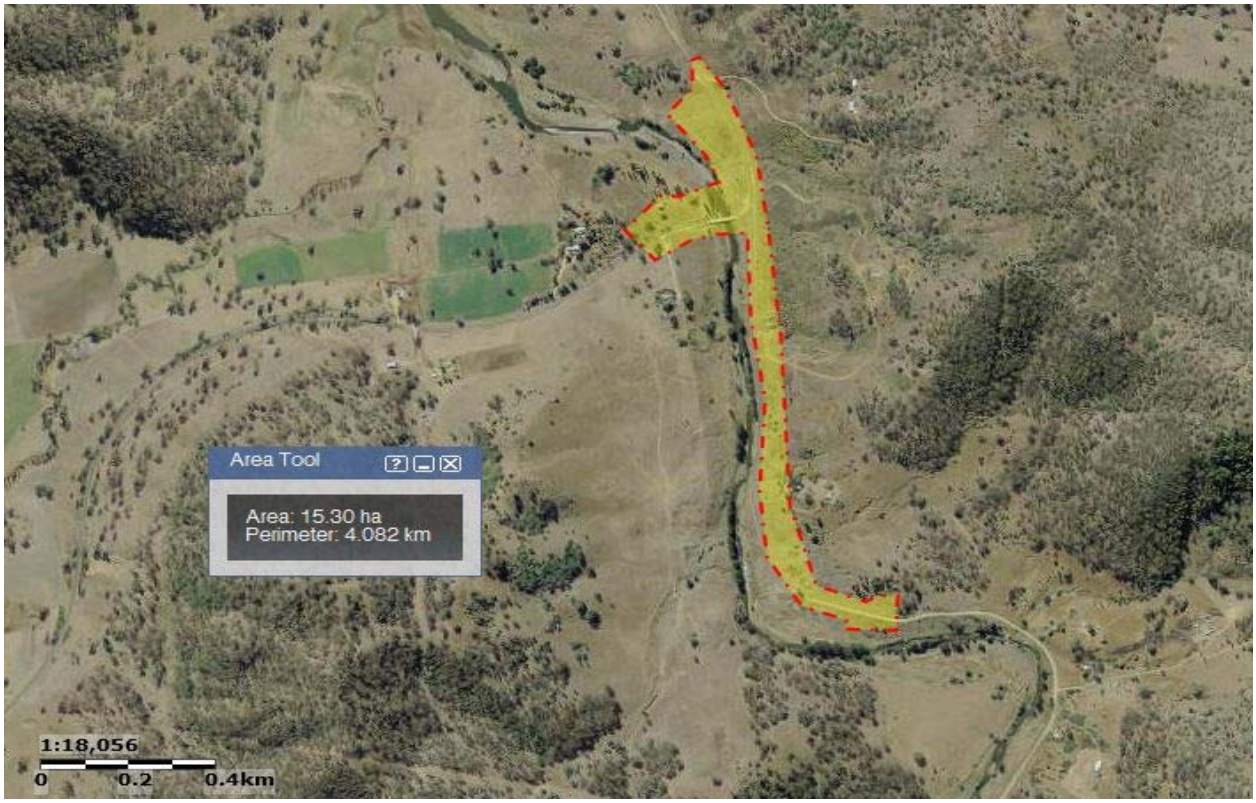
Sick or dead frog

- Contact ecologist or frog specialist Appendix 2 – *Hygiene Protocol for the control of disease in frogs.*

Appendix E – Vegetation Clearing



Chaffey Dam Vegetation Clearance Areas – 2.5 ha (approximately)



Nundle-Tamworth Roadworks Vegetation Clearance Areas** – Total 15.30ha (Approx)

To be revised when Final Design is issued.

Chaffey Dam Fact Sheet

Listed Flora and Fauna to be Considered During Construction Activities

Flora / Fauna	Commonwealth Listing	NSW Listing	Other Notes
Terrestrial Biodiversity			
Litoria booroolongensis (Booroolong Frog)	Endangered	Endangered	Recorded during field survey
Underwoodisaurus sphyrurus (Border Thick-tailed Gecko)	Vulnerable	Vulnerable	Recorded during field survey

Chaffey Dam Fact Sheet

Listed Flora and Fauna to be Considered During Construction Activities

Flora / Fauna	Commonwealth Listing	NSW Listing	Other Notes
White Box-Yellow Box-Blakey's Red Gum grassy woodland and derived native woodland	Critically Endangered Ecological Community	n/a	
White Box-Yellow Box-Blakey's Red Gum Woodland	n/a	Endangered Ecological Community	
Noxious Weeds			
Coolatai Grass		Class 3 under NSW Noxious Weeds Act 1993	

Compliance Matrix

No.	SSI-5039 Infrastructure Approval Condition / Commitment	Implementation Stage Pre-Construction (P), Construction (C), Operation (O)			Implementation Plan	Document Reference OR Documents to be Produced	Responsibility
		P	C	O			
B6	Clearing of native vegetation, known threatened species habitat and rocky outcrops during construction and inundation shall be limited to the following: Total Native Vegetation Impacts (includes EEC) 161.71 ha Box Gum Woodland (listed under the TSC Act) 150ha Box-Gum Grass Woodland (listed under the EPBC Act) 7.5ha Booroolong Frog habitat (listed under the TSC and EPBC Acts) 4.09ha		C		Incorporate requirements of condition into Biodiversity Management Plan Clearing contractors should use a GPS system to ensure they clear the correct locations, do not exceed the allowed area of clearing and maintain a record of the location and size of areas cleared.	Section 7.1 – Vegetation Clearing Appendix A and E	JH
B10	Following completion of construction, or in the case of Booroolong Frog habitat, immediately upon the reservoir reaching the new FSL, the Proponent shall confirm, through recalculation, that the extent of biodiversity impacts was commensurate with and not greater than that specified in Condition B6.		C	O	Incorporate requirements of condition into CEMP. Clearing contractors should use a GPS system to ensure they clear the correct locations, do not exceed the allowed area of clearing and maintain a record of the location and size of areas cleared. These records can then be aligned with vegetation mapping used in the EIS to determine extent of each community / habitat cleared. State Water (rather than JHG) to assess the extent and location of inundation immediately upon the reservoir reaching the new FSL to	Section 7.1 –Vegetation Clearing Section 8.3 -Reporting	State Water JH

No.	SSI-5039 Infrastructure Approval Condition / Commitment	Implementation Stage Pre-Construction (P), Construction (C), Operation (O)			Implementation Plan	Document Reference OR Documents to be Produced	Responsibility
					determine the area of Booroolong Frog habitat impacted.		
C2 a)	The Proponent shall ensure that the following specific requirements are considered in developing the sub-plans or procedures identified in condition C1, further to any guidelines contained within the Guideline for the Preparation of Environmental Management Plans (Department of Planning, Infrastructure and Natural Resources 2004): a) **Biodiversity**, to be prepared and implemented in consultation with DOE, OEH, North West LLS and DPI (NSW Fisheries) and include the following:	**P**			Incorporate requirements of condition into Biodiversity Plan	Section 1.6 - Consultation	State Water JH
	(i) details of all vegetation clearing activities (including EECs) and methods to minimise biodiversity impact including specific species and seasonal variations, and pre-clearing surveys of hollow bearing trees;		**C**		Incorporate requirements of condition into Biodiversity Plan	Section 6 – Aspects and Potential Impacts Section 7 – Flora and Fauna Management Section 7.1 – Vegetation Clearing	JH
	(ii) methods for, and monitoring of, reinstatement work of native vegetation as soon as possible after construction, including establishment of riparian vegetation surrounding the new FSL; and		**C**	**O**	Incorporate requirements of condition into Biodiversity Plan	Section 8.2 – Rehabilitation	State Water JH

No.	SSI-5039 Infrastructure Approval Condition / Commitment	Implementation Stage Pre-Construction (P), Construction (C), Operation (O)			Implementation Plan	Document Reference OR Documents to be Produced	Responsibility
	(iii) weed management and minimisation methodologies;		**C**		Incorporate requirements of condition into Biodiversity Plan	Section 7 – Flora and Fauna Management	JH
	(iv) strategies to mitigate the impacts of the project upon the Booroolong Frog, Border Thick-tailed Gecko, Murray Cod, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC, and White Box-Yellow Box-Blakely's Red Gum Woodland EEC; and		**C**		Incorporate requirements of condition into Biodiversity Plan	Section 7 – Flora and Fauna Management	JH
	(v) procedures to clearly define work areas (including access trails) using a combination of posts, fencing or markers, and suitably marked up maps, as appropriate, and restricting all on-site construction movements by vehicles or personnel to these areas.	**P**	**C**		Incorporate requirements of condition into CEMP and Biodiversity Plan	Section 7 – Flora and Fauna Management Section 3.1 – Risk Identification and Management CEMP	JH