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Murrumbidgee to Googong Water Transfer

EPBC Act - Biodiversity Management and Offset Plan

December 2010

Delivered by the Bulk Water Alliance

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Certificate of approval for issue of documents

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Contents

List of Figures

List of Tables

Abbreviations

ABBREVIATION	DESCRIPTION
ACT	Australian Capital Territory
ACTEW	ACTEW Corporation Limited
DECCW	Department of Environment, Climate Change and Water
DEWHA	Department of the Environment, Water, Heritage and the Arts
EIS	Environmental Impact Statement
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
LRMP	Landscape Rehabilitation and Management Plan
ORMP	Offset Rehabilitation Management Plan
PER	Public Environment Report
TAMS	Department of Territory and Municipal Services
TEC	Threatened Ecological Community
SEWPAC	Department of Sustainability, Environment, Water, Population and Communities

1 Introduction

In recent years the Australian Capital Territory (ACT) region has experienced severe drought conditions which have resulted in a substantial reduction of inflows into regional storages. As a result, Canberra and Queanbeyan have been subject to water restrictions for nine years. Permanent water conservation measures were introduced in 2005. Level three water restrictions have applied for the last three years. The risk of drought, together with predicted climate change and long term population growth, is driving the need for a more reliable water supply for the ACT.

The Murrumbidgee to Googong Water Transfer is one of the recommended options for delivering improved water security for the ACT and surrounding NSW region including Queanbeyan. It involves pumping water from the Murrumbidgee River (within the ACT) and transferring it via an underground pipeline to Burra Creek (in NSW), from where it will flow for approximately 13.2 km to the Googong Reservoir. The proposed transfer of water will supplement natural inflows to the reservoir, which have decreased by about 85% from 2001 to 2009. Googong Reservoir supplies water to Queanbeyan and the ACT following treatment at the Googong Water Treatment Plant.

The project involves construction and operation of infrastructure with the capacity to transfer up to 100 ML/day of water a distance of approximately 12 km from the Murrumbidgee River to Burra Creek. Although the project will be designed with the capacity to transfer up to 100 ML/day (up to 36.5 GL/year), projections indicate that initially, the average amount of water transferred will be 9.5 to 11.5 GL/year due to environmental and operational parameters.

The infrastructure required to transfer the water includes an intake/low lift pump station, a high lift pump station, an underground pipeline, an outlet structure, ancillary infrastructure (power supply) and mini-hydro power generator.

The project is being undertaken by ACTEW. ACTEW is an ACT Government owned company with assets and investments in water, wastewater, electricity, gas and telecommunications. ACTEW owns the water and wastewater assets and business in the ACT, and supplies water and wastewater services to the region through its partnership with ActewAGL.

1.1 Legislation

On 29 October 2010 the Federal Minister for Sustainability, Environment, Water, Population and Communities granted approval for the Murrumbidgee to Googong Water Transfer project (M2G) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Additional to Australian Government approval, the project has also been granted approval by the ACT and NSW governments.

1.2 Project Location

The pipeline will be located to the south and south-west of Canberra, in the general vicinity of the villages of Williamsdale and Burra. The pipeline will run from Angle Crossing in the ACT through to Burra Creek in NSW. Figure 1 provides the regional context and location of the project.

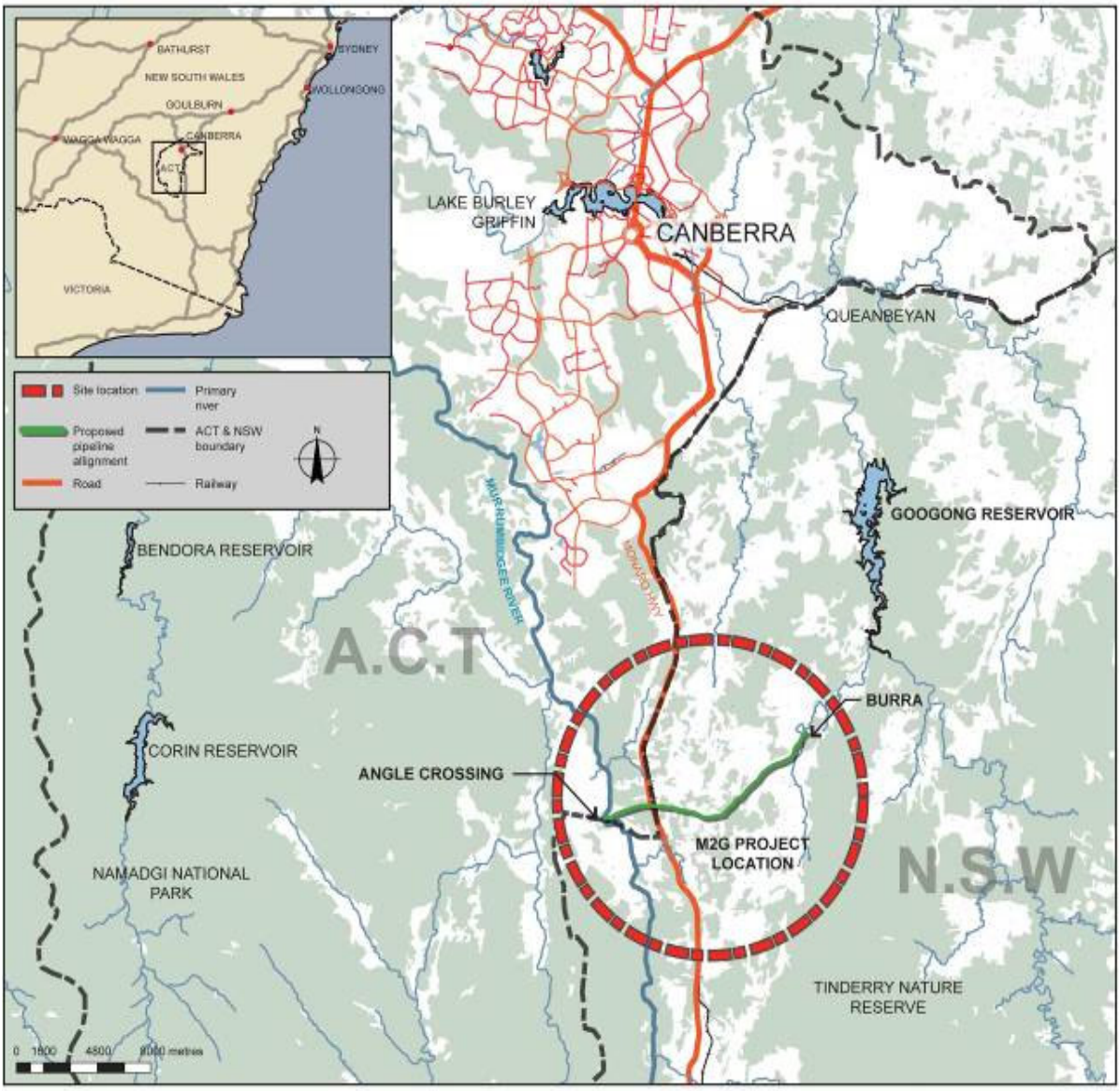

Figure 1: Location of the project in a regional context.

1.3 Purpose of this Plan

This Report (the EPBC Act - Biodiversity Management and Offset Report) has been developed to specifically address the requirements of *Condition 3* of the EPBC Act approval (2009/5124), as outlined in Table 1.

Table 1: Commonwealth Approval Condition 3

(A reference is provided to the section within this report that addresses each sub-condition).

Condition	Relevant section
3. The person taking the action must submit a Biodiversity Management and Offset Plan to address impacts on listed threatened species and ecological communities to the Minister for approval prior to commencing construction. The Biodiversity Management and Offset Plan must include the following:	
a) A description of the survey effort already undertaken for listed threatened species and ecological communities, and any extra surveys that may be required pre-construction as described in condition 3. b);	Section 2
b) An outline of the methodology of additional flora surveys, by a botanist with expertise in surveying for the Small Purple-pea (*Swainsona recta*), Hoary Sunray (*Leucochrysum albicans var tricolour*) and Button Wrinklewort (*Rutidosis leptorrhynchoides*). The surveys must be conducted at the correct time of year and specifically target the parts of the project area that are most likely to provide habitat for the species, particularly in areas that were not surveyed for the species previously;	Section 2
c) Precise mapping showing the location of all known Small Purple-pea, Hoary Sunray and Button Wrinklewort plants in the project area, the location of the areas of greatest potential for having additional plants of these species in the project area and the precise location of the pipeline easement. These maps must be provided to the Department but must not be published at a scale that indicates individual plants;	Section 3; Appendix B
d) Demonstrate how construction of the pipeline and associated activities will avoid removing any individuals of the Small Purple-pea, or, if removal is necessary, provide details of a Small Purple-pea land offset, management and planting programs to ensure no net loss to the population;	Section 4; Section 6
e) Describe how the alignment of the pipeline easement minimises impacts on the Small Purple-pea, Hoary Sunray, Button Wrinklewort and Pink-Tailed Worm Lizard (*Aprasia parapulchella*);	Section 4;
f) Explain how the extent and condition of EPBC listed threatened ecological communities (TEC's) was determined;	Section 2
g) Detailed mapping of TEC's, including habitat condition, including the project area and other areas proposed to be used as offsets;	Appendix B
h) A description of how the Small Purple-pea, Hoary Sunray and Button Wrinklewort And Pink-tailed Worm Lizard will be managed during construction of the pipeline;	Section 4
i) A description of how native vegetation (including TEC's) will be rehabilitated after the construction of the pipeline;	Section 5
j) A description of how any threatened plants will be propagated and re-established;	Section 6
k) A description of how weed management and rehabilitation of native vegetation and threatened species habitat will be undertaken and funded in the long-term; and	Section 5
l) Commitments to managing and protecting in perpetuity any parcel of land set aside as an	Section 6

offset.	
Construction may not commence in any areas that contain habitat for the Small Purple-pea, Hoary Sunray Button Wrinklewort and Pink-Tailed Worm Lizard or in TEC's until the plan is approved. The approved plan must be implemented.	

2 Flora and Fauna Surveys

Condition 3.a)

A description of the survey effort already undertaken for listed threatened species and ecological communities, and any extra surveys that may be required pre-construction as described in condition 3.b);

Condition 3.b)

An outline of the methodology of additional flora surveys, by a botanist with expertise in surveying for the Small Purple-pea (Swainsona recta), Hoary Sunray (Leucochrysum albicans var tricolour) and Button Wrinklewort (Rutidosis leptorrhynchoides). The surveys must be conducted at the correct time of year and specifically target the parts of the project area that are most likely to provide habitat for the species, particularly in areas that were not surveyed for the species previously;

Condition 3.f)

Explain how the extent and condition of EPBC listed threatened ecological communities (TEC's) was determined;

Comprehensive flora and fauna surveys have been undertaken along the pipeline easement and in the broader surrounding area by Biosis Research Pty Ltd (2009); and Eco Logical Australia (2010). Table 2 provides a summary of survey activity and timing.

Table 2: Surveys undertaken within the pipeline easement.

Survey Time	Type
December 2005	Preliminary site surveys (Biosis)
October-November 2007	Preliminary site surveys (Biosis)
September 2008- January 2009	Flora and fauna surveys (Biosis)
May 2009	Additional surveys undertaken in central and west sections (Biosis)
September-October 2010	Pre-Clearance surveys conducted for threatened species and other habitat values (Eco Logical Australia)

The survey methods used by Biosis Research Pty Ltd and Eco Logical Australia Pty Ltd are outlined below. The full report by Eco Logical Australia can be found at Appendix A.

2.1 EIS/PER Survey Effort

To inform the development of an Environmental Impact Statement (EIS) and later the Public Environment Report (PER), Biosis Research Pty Ltd conducted a comprehensive array of surveys of the broader project area over a 5 year period. These surveys comprised a combination of preliminary habitat and vegetation surveys, aerial photography mapping, on-ground vegetation mapping as well as targeted flora and fauna surveys for specific species. The survey effort involved more than 156 person hours on site between 2005 and 2009, 80 hours of vegetation mapping and more than 20km of walked transects.

The specific methodology used by Biosis Research Pty Ltd is described in Appendix H of the EIS. All surveys have been undertaken in accordance with the NSW *Threatened Biodiversity Survey & Assessment Guidelines for development and activities* (DEC 2004).

A summary of the EIS survey effort is provided below.

- General flora searches were carried out within the proposed pipeline route and a 200 m buffer area:
  - Random meanders carried out within all accessible native vegetation areas with an estimated walking distance in excess of 20 km;
  - 156 person hours.
- Vegetation mapping, aerial photo interpretation, GIS and ground truthing of derived maps:
  - 80 hours.
- Targeted Pink-tailed Worm Lizard surveys
  - 2598 rocks turned at 5 sample sites.

Preliminary vegetation assessments were undertaken in December 2005 and again in October and November 2007. Detailed flora surveys commenced in September 2008 and continued at various intervals to May 2009. Specific survey techniques used are described below.

2.1.1 Vegetation Mapping

The extent of the vegetation communities, including threatened ecological communities was assessed using the following methods by Biosis Research. The initial investigations of vegetation type and distribution were undertaken by viewing aerial photography, local vegetation mapping, including the ACT Government mapping and regional vegetation modelling (Falding 2002). This enabled the identification of distinct stands of vegetation on site and an estimate of the type of community that those patches represent based on topography and other characteristics. The vegetation mapping was then ground truthed to determine the accuracy of the desktop mapping and correct any errors. The following data was then collected from within each property or vegetation unit:

- Location i.e. property number and location marked on map;
- Vegetation type, structure and condition; and
- Habitat description: land uses, fauna habitat features such as tree hollows and species, fire history and other disturbances.

Vegetation boundaries were determined and hand-drawn onto aerial photographs in the field. These maps were later digitised and updated during the course of the project. The mapping includes TECs characterised under the NSW, ACT and Commonwealth criteria.

2.1.2 Plot Based Vegetation Surveys

Combined with the vegetation mapping and the random meander surveys, plot based vegetation surveys were undertaken to refine vegetation mapping and provide precise information on floristic composition and condition. Fifteen sample plots (20 x 20 m quadrats) were placed across the study area to provide a quantitative and comparable sample of the different vegetation components. Plot-based surveys also provide an additional method to search for inconspicuous plant species that may be overlooked during random or less detailed surveys. A modified Braun-Blanquet assessment of cover abundance was used (Rehwinkel 2007) (see Table 3 below). The relative conservation value of each site was determined through the application of a regionally

based assessment criteria (Rehwinkel 2007) for grassland and grassy woodland ecosystems of the Southern Tablelands of NSW.

Table 3: Modified Braun-Blanquet cover abundance scale as per Rehwinkel (2007).

COVER ABUNDANCE	COVER ABUNDANCE ESTIMATE
r	< 5 % cover and solitary (<4 individuals)
+	< 5 % cover and few (4-15 individuals)
1	< 5 % cover and numerous/scattered (>15 individuals)
2	5 % - 25 % cover
3	26 % - 50 % cover
4	51 % - 75 % cover
5	>75 % cover

2.1.3 General Flora Surveys

Flora searches were carried out within the proposed pipeline route and a 200 m buffer area by Biosis Research in 2009. Additional searches were made in adjacent vegetation where appropriate. Random meander surveys (Cropper 1993) were carried out over accessible parts of the study area in order to determine the extent and location of vegetation types, and to carry out searches for threatened plant species. A general survey was then carried out within the proposed alignment in order to compile a list of plant species occurring within the approximate areas of disturbance.

2.1.4 Fauna Surveys

Preliminary observations of habitat type within the local area were conducted in December 2006 and October/November 2007. Detailed habitat assessments commenced on 3 September 2008 and species survey were conducted between September 2008 and February 2009. Reptile surveys continued up to the end of February 2009.

Due to the expected presence of the Pink-tailed Worm Lizard in particular, targeted surveys for this species were undertaken. The most appropriate method to survey for Pink-tailed Worm Lizard is rock turning. Surface or 'floating' rocks between 10 and 55 cm (occasionally larger) in diameter were turned over and inspected for Pink-tailed Worm Lizard or their sloughs. The approach to the surveys was as follows:

- Rocky outcrops were identified.
- A series of 10 m wide transects were used in extensive or linear outcrops
- Random searches were undertaken in smaller or isolated areas of outcropping rock, such as knolls.
- Where evidence of the species was encountered a wider search was undertaken in the immediate area.
- The number of rocks turned was tallied against the number of specimens found.

All rocks were immediately returned to position in which they were found. Targeted surveys were conducted between early September 2008 and early December 2008, although incidental searches were conducted during other field activities. A supplementary report was prepared in 2009 detailing the surveys undertaken for the Pink Tailed Worm Lizard.

2.2 Additional (pre-clearance) Survey Effort

The development of the Murrumbidgee to Googong pipeline is subject to environmental approvals by the Commonwealth, NSW and ACT governments. The relevant agencies under each jurisdiction are:

- the ACT Planning and Land Authority (ACTPLA),
- the NSW Department of Planning (DoP), and
- the Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPAC).

In granting approval all three jurisdictions have requested additional pre-clearance surveys within the pipeline easement for threatened species, with all three regulatory agencies making particular mention of the Small Purple-pea, *Swainsona recta*.

Prior to surveys being undertaken, Eco Logical Australia conducted a desktop review using previous mapping data (Biosis 2009) and site verification to determine the extent and scope of the area that required surveys. A detailed plan for conducting pre-clearance surveys was then developed in consultation with BWA. Key components of the survey methodology were the timing of surveys to coincide with optimum seasonal conditions.

Eco Logical Australia undertook ecological surveys during September and October 2010 along the pipeline easement. The survey methodology was designed to identify species and habitats of conservation value that may be directly impacted by construction of the proposed pipeline.

The methodology was based around accepted general survey principles (vegetation surveys and rock-rolling) and aimed to specifically determine the presence of a number of threatened species and habitat features of conservation value, including:

- Small Purple Pea (*Swainsona recta*);
- Hoary Sunray (*Leucochrysum albicans var. Tricolor*);
- Button Wrinklewort (*Rutidosis leptorrhynchoides*);
- Silky Swainson-pea (*Swainsona sericea*);
- Pink-tailed Worm Lizard (*Aprasia parapulchella*);
- Hollow bearing trees; and
- Wombat burrows.

These pre-clearance surveys, in particular those for *Swainsona recta*, were designed to meet the requirements of the NSW, ACT and Commonwealth government approval conditions. The survey methodology for *Swainsona recta* (which was primarily repeated for all flora species) was endorsed by the relevant Agencies in each jurisdiction, being TAMS, DECCW and DEWHA (now SEWPaC)

Pre-clearance surveys for species and habitats were conducted over 8 days from 28 September to 26 October 2010. Climate conditions (taken from BOM: Tidbinbilla, ACT) during these times ranged from 10°C to 24°C maximum. There was 174 mm of rainfall during the survey period. Approximately 19 mm of rain had fallen in the 2 weeks prior to surveys commencing. The timing and climatic conditions were considered ideal for flora and fauna surveys.

The entire 12 km, 40 m wide pipeline easement and the alternative alignment (refer to section 3.6) were surveyed by walking traverses. Specific areas were targeted for specific flora and fauna surveys based on the presence of suitable habitat.

The report at Appendix A provides the detailed methodologies and results of these surveys and a general summary of survey effort is provided below.

- Targeted flora and fauna surveys:
    - 64 person hours of targeted threatened plants surveys, including *Swainsona recta* surveys;
    - 32 person hours of targeted Pink-tailed Worm Lizard surveys.
- Hollow bearing tree surveys:
    - 34 person hours of hollow bearing tree surveys.
- Wombat surveys:
    - 16 person hours of targeted wombat surveys.

3 Flora and Fauna Results and Mapping

Condition 3.c)

Precise mapping showing the location of all known Small Purple-pea, Hoary Sunray and Button Wrinklewort plants in the project area, the location of the areas of greatest potential for having additional plants of these species in the project area and the precise location of the pipeline easement. These maps must be provided to the Department but must not be published at a scale that indicates individual plants;

Condition 3.g)

Detailed mapping of TEC's, including habitat condition, including the project area and other areas proposed to be used as offsets;

The results of the surveys undertaken for the project are outlined below. The outline provided below is focused on the threatened flora and fauna found on site, as well as the TEC's located on site.

Detailed mapping has been developed for the site which includes all of the survey data collected to date. The maps are attached in Appendix B.

3.1 Threatened Flora Species

3.1.1 Small Purple-pea

During the pre-clearance surveys in October 2010 (Attachment B) a total of four (4) Small Purple-pea individuals were recorded within the pipeline easement. All four specimens are located east of the Monaro Hwy at the point where the pipeline crosses the disused Goulburn-Cooma Railway line. Two specimens were recorded within the rail corridor in NSW and two specimens were recorded in the adjacent paddock just to the west of the rail corridor in the ACT. Through micro alignment of the pipeline all four specimens will be avoided and will be retained in-situ (see Appendix C).

Additionally, a significant population of the species (in excess of 70 plants) occurs within the Goulburn-Cooma Railway Corridor approximately 80 m north of the proposed pipeline.

3.1.2 Hoary Sunray

The Hoary Sunray was not documented within the pipeline easement, however, it was documented in a few locations within the larger study area.

3.1.3 Button Wrinklewort

The Button Wrinklewort was not documented within the pipeline easement, however, it was documented in a few locations within the larger study area.

3.2 Threatened Fauna Species

3.2.1 Pink Tailed Worm Lizard

Extensive surveys have been undertaken for the Pink-Tailed Worm Lizard by both Biosis Research and Eco Logical Australia. The surveys conducted by Biosis Research, 2009, did not find any presence of the species within the pipeline easement despite extensive survey effort. In September - October 2010 Eco Logical Australia conducted pre-clearance surveys in all suitable habitats within the pipeline easement. During these

surveys Pink-Tailed Worm Lizard individuals were recorded in one area within or adjacent to the pipeline easement (refer to maps at Appendix B). Within the surrounding rocky area, approximately 100 rocks were rolled revealing a total of three (3) lizards within this habitat area (two individuals were observed beneath a single rock). The habitat would be considered to be of moderate quality with grazing occurring sporadically and a number of exotic grass species present. No other Pink-Tailed Worm Lizards were recorded within the pipeline easement.

It is recommended that further surveys for Pink-Tailed Worm Lizards be conducted immediately prior to construction works in potential habitat areas. Any Pink-Tailed Worm Lizards or other fauna observed during these surveys should be relocated to nearby habitat of the same or higher habitat value away from the pipeline impact zone.

3.3 Threatened Ecological Communities

The ecological communities that were found on site have been mapped based on the flora and vegetation surveys conducted by Biosis Research in 2009 (refer to section 2). The types and extent of vegetation recorded is contained in the report at Appendix A. Two listed ecological communities listed under the EPBC Act are present within the project area: *Natural Temperate Grasslands of the Southern Tablelands and the ACT;* and *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*

Additionally detailed mapping provided in Appendix B outlines the distribution of threatened ecological communities (all jurisdictions) in and surrounding the pipeline easement.

4 Impact Mitigation

Condition 3.d)

Demonstrate how construction of the pipeline and associated activities will avoid removing any individuals of the Small Purple-pea, or, if removal is necessary, provide details of a Small Purple-pea land offset, management and planting programs to ensure no net loss to the population;

Condition 3.e)

Describe how the alignment of the pipeline easement minimises impacts on the Small Purple-pea, Hoary Sunray, Button Wrinklewort and Pink-Tailed Worm Lizard (Aprasia parapulchella);

Condition 3.h)

A description of how the Small Purple-pea, Hoary Sunray and Button Wrinklewort and Pink-tailed Worm Lizard will be managed during construction of the pipeline;

Condition 3.j)

A description of how any threatened plants will be propagated and re-established;

Construction of the project will result in the removal of 16.7ha of native vegetation, this includes two communities listed under the EPBC Act. The listed communities are *Natural Temperate Grasslands of the Southern Tablelands and the ACT* and *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.* Within the wider study area, Box Gum Grassy Woodland extends from the upper slopes of the Murrumbidgee River corridor to the western slopes of the Gibraltar 'saddle' and again on the lower eastern slopes of the 'saddle', although its extent and condition varies greatly according to the level of vegetation clearing, crop production and grazing.

There are four EPBC listed species which are known to occur in the area that are commonly associated with this community. These are the Small Purple Pea (*Swainsona recta*), Hoary Sunray (*Leucochrysum albicans var. tricolor*), the Button Wrinklewort (*Rutidosis leptorynchoides*) and the Pink Tailed Worm Lizard (*Aprasia parapulchella*).

4.1 Threatened Flora Management

An outline of the mitigation measures for each species is provided below. Further detail regarding the mitigation measures and management of threatened species on site can be found in Appendix D (Offset and Rehabilitation Management Plan).

4.1.1 Small Purple-pea

The route of the pipeline has been designed to have a minimal impact on the species through the implementation of a range of mitigation measures. In the development and assessment of the project ACTEW committed to protecting identified populations of the Small Purple-pea during construction through the following measures in order of priority:

- avoidance (micro-alignment of the pipeline)
- translocation; and
- offset (propagation).

As detailed in section 3, a total of four (4) Small Purple-pea individuals were recorded within the pipeline easement and could be directly impacted by the project. In response to the detection of these 4 individuals the pipeline has been micro-aligned to avoid all four specimens resulting in zero impacts (see Appendix C). As result of the micro-alignment and avoidance of all Small Purple-pea individuals salvage and translocation will not be necessary.

Note: A site visit with SEWPAC and DECCW was undertaken on 3 December 2010 to confirm that all Swainsona recta will be avoided by the pipeline.

All four specimens have been fenced off from the construction area and signposted to clearly indicate that the areas are environmentally sensitive and must be protected.

Sensitive area diagrams have been produced indicating the location of the 4 specimens and all construction personnel working in this area will be briefed on the presence and need to avoid fenced off areas.

Additionally, as no individuals will be lost an offset or compensatory propagation plan will not be required for this species it is worth noting that:

- the biodiversity offset area proposed (Appendix D) to compensate for impacts on ecological communities, contains suitable habitat for this species and a Small Purple-pea individual was recorded on this site during Spring 2009 surveys; and
- ACTEW is proposing to fund and manage a conservation propagation program for this species in conjunction with CSIRO and the National Botanic Gardens. Specific details of this program are currently being developed.

These additional measures will result in an improved conservation outcome for the Small Purple-pea as a result of the project.

4.1.2 Hoary Sunray

The Hoary Sunray was not identified within the route of the pipeline. As such, there will be no direct impact on the species through loss of individuals.

In addition the biodiversity offset area proposed (Appendix D) to compensate for impacts on ecological communities, contains suitable habitat for this species and an overall conservation gain for the species may result.

4.1.3 Button Wrinklewort

The Button Wrinklewort was not identified within the route of the pipeline. As such, there will be no direct impact on the species through loss of individuals.

In addition the biodiversity offset area proposed (Appendix D) to compensate for impacts on ecological communities, contains suitable habitat for this species and an overall conservation gain for the species may result.

4.2 Threatened Fauna Management

An outline of the mitigation measures for the Pink-Tailed Worm Lizard is provided below.

4.2.1 Pink-tailed Worm-lizard

The Pink-tailed Worm Lizard was recorded at a single location within the ACT section of the pipeline easement, and has a seemingly wide distribution within the Murrumbidgee River corridor (and Molonglo River corridor), including known populations within the biodiversity offset area.

In order to minimise the impacts on Pink-tailed Worm Lizard and rocky outcrop habitats, the following mitigation measures are proposed:

- Alignment has been selected to avoid rocky outcrops (habitat) wherever possible;
- In areas of potential habitat that will be directly impacted the corridor width has been reduced to the narrowest possible based on construction needs, topography and human safety requirements;
- Further pre-clearance targeted surveys to be conducted (by qualified ecologist) within 48hrs prior to construction works to identify any individuals in the construction zone. Individuals found will be caught and relocated to suitable habitat nearby;
- Replacement of suitable sized stones, as habitat rehabilitation as soon as practicable after construction;
- Rehabilitation areas will be monitored and maintained post-construction for a minimum 2 year period after the commencement of rehabilitation; and
- Strict protocols during and after all operations will be followed, in order to minimise the potential for weed invasion. Active post-construction weed management for a minimum 2 year period.

4.3 Threatened Ecological Community Management

An outline of the mitigation measures for Box-Gum Woodland is provided below.

4.3.1 Box-Gum Woodland

Across all jurisdictions a total area of 11.82 ha of Box-Gum Woodland will be impacted. Of this 5.0 hectares meets the definition under the EPBC Act for *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*

The pipeline has been designed to minimise the impacts on the community by reducing the width of the easement to the smallest possible width in sensitive areas. Management actions that will be undertaken on site will be managed during the construction phase under the Construction Environmental Management Plan and the Terrestrial Ecology Management Plan.

Post- construction management of this community will be managed under the Landscape Rehabilitation Management Plan. The residual impacts to the community of 5.72 hectares that cannot be avoided will be offset. Refer to the Offset and Rehabilitation Management Plan (Appendix D).

4.3.2 Natural Temperate Grassland

A small area (1.7 ha) of Natural Temperate Grassland will be impacted as a result of the project. The area impacted is located at the western end of the pipeline overlooking the Murrumbidgee River. Management of the community throughout the construction phase of the project will be through the implementation of the Construction Environmental Management Plan and the Terrestrial Ecology Management Plan and post-construction through the Landscape Rehabilitation Management Plan.

A direct offset for this loss has not been included within the Offset Plan, rather the proposed offset area contains many biodiversity values and benefits (refer to Section 6) that provide sufficient offset for the overall project impacts. These include areas of derived native grassland and open woodlands containing a very similar floristic composition to the area of Natural Temperate Grassland to be impacted. The provision of a single, large consolidated offset area means that the offset land can be managed in a strategic way for multiple values.

5 Site Rehabilitation

Condition3.i)

A description of how native vegetation (including TEC's) will be rehabilitated after the construction of the pipeline;

Condition 3k)

A description of how weed management and rehabilitation of native vegetation and threatened species habitat will be undertaken and funded in the long-term;

5.1 Rehabilitation and Land Management Plan

The Landscape Rehabilitation and Management Plan specifically addresses the methods, techniques and timing for rehabilitating after the construction activities as they relate to the pipeline easement and other areas impacted during the construction phase of the development. This plan also addresses how the site will be decommissioned, shaped and rehabilitated upon completion of construction activities. All rehabilitation works will be undertaken by the Bulk Water Alliance in accordance with this plan.

The following table (Table 4: Post- Construction risk assessment matrix) adapted from the LRMP outlines the risks associated with different activities on site during the rehabilitation phase and post-rehabilitation. Those impacts which have been given a 'High' rating have been discussed further in this section.

Table 4: Post- Construction risk assessment matrix

Aspect	Potential impact	Mitigation Measure	Risk Category
Vegetation clearing and Grubbing	Impacts to threatened species	• Conduct accurate pre-clearance surveys and clearly identify vegetation that is to be retained for retention. • Relocate fauna out of potential habitat prior to clearing. • Toolbox construction crew and subcontractors on presence of threatened species and endangered ecological communities. *(More mitigation measures listed in the Terrestrial and Aquatic Ecology management plans)*	Medium
	Impact on terrestrial fauna and their habitats	• Engage a suitably qualified ecologist to monitor clearing of vegetation and to inspect hollow bearing trees. *(More mitigation measures listed in the Terrestrial and Aquatic Ecology management plans)*	Medium
	Weeds are spread from infested areas into weed free areas	• M2G team and subcontractors to strictly adhere to the Weed Management Strategy (Appendix D) and to observe wash down procedures for the project. • Toolbox construction crew and subcontractors on presence of weed species, wash down procedures, weed management strategies and to notify environment personnel	High

Aspect	Potential impact	Mitigation Measure	Risk Category
		should they discover weeds in weed free area.	
Post construction (Rehabilitation phase)	Poor germination of native and/or exotic species	• Investigate options for irrigating areas during drought periods. • Assess seeding methodology (incl. treatment of seed) and re-sow with same or alternative method depending on the assessment. • Hold off on sowing areas until there is adequate soil moisture and/or chance of precipitation occurring post sowing. • Where possible, avoid sowing during Summer months when rainfall is infrequent. • Assess risk of erosion potential and take appropriate action in consultation with M2G Soil Conservationist.	Medium
	Infestation of weeds along the pipeline route	• Take appropriate action in accordance with the Weed Management Strategy • Toolbox construction crew and subcontractors on presence of weed species, wash down procedures, weed management strategies and to notify environment personnel should they discover weeds in weed free area	Medium
Post Rehabilitation	Poor germination of native and/or exotic species	• Investigate options for irrigating areas during drought periods. • Assess seeding methodology (incl. treatment of seed) and re-sow with same or alternative method depending on the assessment. • Hold off on sowing areas until there is adequate soil moisture and/or chance of precipitation occurring post sowing. • Where possible, avoid sowing during Summer months where rainfall is infrequent. • Assess risk of erosion potential and take appropriate action in consultation with M2G Soil Conservationist.	Low
	Infestation of weeds along the pipeline route	• Take appropriate action in accordance with the Weed Management Strategy • Toolbox construction crew and subcontractors on presence of weed species and to notify environment personnel should they discover weeds in weed free area	Medium
	Landholder feedback with respect to landscape rehabilitation	• CESM Manager to engage with landholder throughout all phases of rehabilitation to gauge their feedback on success, or otherwise, of the rehabilitation • Within reason, landholder requests are to be considered and acted upon.	Low

5.2 Weed Management

A Weed Management Strategy has been developed. The objectives of this strategy are summarised below:

The overall aim of the strategy is to allow land disturbed by the pipeline construction to be returned to its previous condition by preventing weed spread during construction and controlling weeds prior to, during and following the rehabilitation works program.

In order to achieve this, appropriate steps will be undertaken to ensure that all weed vectors (carries of weed seed) are thoroughly cleaned, especially machinery but also including vehicles and personnel.

The overall objective of the weed strategy is to ensure that all works

- minimise the spread of noxious weeds;
- comply with the relevant legislative requirements; and
- protect public and private land from weed invasion.

Particular emphasis will be placed on:

1. Areas of native vegetation, particularly areas of endangered ecological communities and threatened species habitat.
2. Agricultural land where higher weed seed banks in the soil can quickly degrade land productivity and cause on-going problems.

The main weed species present within the pipeline corridor include, but are not limited to:

- African Lovegrass
- St John's Wort
- Blackberry
- Sweet Briar
- Patterson's Curse

All areas within the pipeline corridor have been categorised as either having a low, medium or high risk of weed infestation and management activities have been developed accordingly. As such, weed management activities will be specific to the type of weed species being controlled i.e. African Lovegrass will be controlled via spot spraying and Blackberry will be controlled by mechanical removal.

In order to minimise the likelihood of weed infestations occurring as a result of the project, the following measures will be implemented:

- Spot Spraying or Mechanical Removal of existing weeds prior to, during and after construction.
- Good vehicular hygiene to minimise spread of seed heads and soil between infected and clean areas.
- Minimising the time that bare soil is present on site to minimise the opportunities available for weed invasion and colonisation.
- Installation of fencing around ecologically sensitive areas.

Weed management of the areas to be rehabilitated will be undertaken prior to, during and after establishment of native species. Weed management practices will comply with NSW and ACT legislative requirements for management of noxious weeds and to protect public and private lands disturbed by construction and rehabilitation activities.

5.3 Monitoring

Ecological monitoring will be undertaken on site for a minimum of 2 years post development to determine the success of rehabilitation measures and to establish the recovery of the site. The following Key Performance Indicators will be used to assess the site.

- No significant long term disturbance to flora and fauna outside the required corridor except where deemed unavoidable for construction access – minimal number of large trees removed;
- Successful rehabilitation and enhancement of vegetation communities and habitat areas, as measured against pre-construction assessment;

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The revegetated areas will be assessed using the criteria in the following table to determine the success of the plantings. The sites will be assessed using a combination of plot and transect surveys to quantify the success of the revegetation efforts.

Table 5: Revegetation performance targets

Vegetation community	Key Performance Targets
Non-native vegetation	**Ground cover** - > 70% vegetation cover of the species sown **Weeds** – better than or equal to the current presence of declared weeds and < 20% cover of exotic species not sown.
Native vegetation	**Ground cover** - > 70% vegetation cover of the native species sown. **Weeds** – better than or equal to the current presence of declared weeds and < 20% cover of exotic species not sown.
High conservation value woodland	**Ground cover** - > 70% vegetation cover of the native species sown and survival of native ground and tree species. **Weeds** – better than or equal to the current presence of declared weeds and < 20% cover of exotic species not sown. **Native species** (planting success) – all species listed for seeding and planting are present.

6 Offset Management

Condition 3.l)

Commitments to managing and protecting in perpetuity any parcel of land set aside as an offset.

An Offset and Rehabilitation Management Plan (Appendix D) has been developed, a summary of which is included here.

6.1.1 The Offset Property

ACTEW currently own a large land parcel at Williamsdale in the southern part of the ACT. The property is located just south of Williamsdale and is bounded by the:

- Monaro Highway to the east;
- NSW border to the south;
- Angle crossing road to the north; and
- Murrumbidgee River corridor nature reserve to the west.

The property is 242 ha in total and supports a number of essential utility infrastructure facilities, including power transmission lines; a portion of the proposed M2G pipeline; and a power sub-station. In addition, the property contains substantial areas of high biodiversity value, including listed Box-Gum Woodland and complementary flora and fauna habitat values. Two (adjacent) areas of the property have already been put aside as conservation areas to compensate for the construction of the TransGrid 330 kV substation that will be constructed within the property and the ActewAGL transmission line (to the north). ACTEW will set aside two additional areas within the Williamsdale property. These areas will be secured and managed as an offset for the M2G pipeline project.

6.1.2 Offset areas

Offset calculations have been established based on the condition of the ecological community to be lost. Based on this the following approach has been adopted:

- Loss of good /moderate condition woodland to be offset at a ratio of at least 8 to 1.
- Poor condition woodland to be offset at a ratio of at least 4 to 1.

Using these calculations, an offset of 65 ha of Box-Gum Woodland would be required (see Table 68).

Table 6: Box-Gum Woodland offset.

Box-Gum Woodland Condition	Amount Lost (ha)	Offset Ratio	Offset Area (ha)
Good or moderate	5.72	8 to 1	45.76
Poor	6.1	4 to 1	24.4
Total	**11.82**		**70.16**

Of the 11.82 ha of Box-Gum Woodland to be impacted, 5.72 ha meets the EPBC Act ecological community definition for the "*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community*".

The actual M2G offset comprises two sections of the Williamsdale property that are both adjacent to the two existing offset areas (TransGrid and ActewAGL). The total area of the two sections proposed as the M2G offset exceeds the above calculated offset requirement and is 92 ha in size, 72.51 ha of which meets the EPBC Act definition for the "*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland Ecological Community*".

Additionally, areas of moderate or poor quality will provide an opportunity for rehabilitation and enhancement resulting in improved conservation outcomes compared to the vegetation being impacted by the project.

To ensure that the boundary of the offset area is easily determined on the ground, it will be pegged out using survey pegs.

6.2 Level of Protection

It is ACTEW's priority and the long-term goal for the combined offset area (M2G, TransGrid, ActewAGL) to be transitioned from private (ACTEW) management to the ACT Government. Through this transition, the land would be legislated (through the Territory Plan) as a Nature Reserve area and incorporated into the already adjacent Murrumbidgee River corridor nature reserve. This process will require the agreement of the ACT Government and an amendment to the Territory Plan.

ACTEW is currently engaging with the ACT Government regarding the transfer of the proposed Biodiversity Offset land at Williamsdale to be incorporated into the ACT Government Nature Reserve system. However, at this stage it is not possible to predict with absolute certainty the outcomes of these negotiations. It is, however, understood that the ACT Government is prepared to consider this proposal. ACTEW will continue to pursue this option vigorously.

Handover of the land will increase the size of the nature reserve and add important connectivity to the river corridor.

In the meantime, the offset property is subject to a Land Management Agreement (LMA) under the ACT *Planning and Development Act 2007*. The LMA for the Williamsdale property (Appendix E) is currently being used (in part) for the management and security of the two existing offsets, previously approved under the EPBC Act. The LMA will be revised to include the M2G offsets to provide a consistent mechanism to manage the offset areas. The Offset and Rehabilitation Management Plan (Appendix D) discusses the management framework and priorities for the offset area. Given that ACTEW hold the lease for this land, the offset will be implemented at the time that this plan is approved and endorsed by regulators. Management will continue in-perpetuity through the LMA and the leaseholder (currently ACTEW) until such time that the property is handed over to the ACT Government.

If the ACT Government decides that it does not wish to incorporate the offset site into the Nature Reserve System, the site will continue to be managed by ACTEW under the LMA. As ACTEW are the owner of the offset land they are responsible for the implementation of the LMA.

If ACTEW relinquish control of the offset site, then prior to the transfer of land occurring, ACTEW must amend this plan so that it outlines the new offset arrangements. The amended plan must then be submitted to SEWPAC for approval. The transfer of land cannot occur until SEWPAC have approved the amended plan.

7 References

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ACTEW 2010b, Murrumbidgee to Googong Water Transfer, Construction Environmental Management Plan.

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Falding M 2002, A Planning Framework for Natural Ecosystems of the ACT and NSW Southern Tablelands' NSW National Parks and Wildlife Service, Hurstville

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8 Appendices

Appendix A - Pre-clearance Survey Report (Eco Logical Australia 2010)

Appendix B – Biodiversity Survey results (Maps)

Appendix C – *Swainsona recta* Pipeline Re-alignment Map

Appendix D – Offset and Rehabilitation Management Plan

Appendix E – Land Management Agreement – M2G Offset