



TANAMI NEWMONT GAS PIPELINE

REHABILITATION PLAN

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REVISION 1

March 2018



Tanami Newmont Gas Pipeline

Rehabilitation Plan

Prepared for **AGIT**

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Project Number	17PER_7814	
Project Manager	David Morley (08) 6218 2200 Level 1, Bishops See 235 St Georges Terrace, Perth WA 6000	
Prepared by	Katrina Zeehandelaar-Adams, Michelle Doak, Nicole McAlinden	
Reviewed by	Andrew Whitford, Ailsa Kerswell	
Approved by	Warren McGrath	
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Abbreviations

Abbreviation	Description	
AGIT	AGI Tanami Pty Limited	
DBNGP	Dampier to Bunbury Natural Gas Pipeline	
DPIR	Department of Primary Industry and Resources	
EMP	Environmental Management Plan	
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999	
GPS	Global Positioning System	
ha	Hectare	
HDD	Horizontal Directional Drilling	
km	Kilometre	
m	Metre	
mm	Millimetre	
MNES	Matters of National Environmental Significance	
NT EPA	Northern Territory Environment Protection Authority	
RoW	Right of Way	
TNP	Tanami Newmont Gas Pipeline	
TPWC Act	Territory Parks and Wildlife Conservation Act 2006	
WA	Western Australia	
WONS	Weeds of National Significance	

1 Introduction

1.1 Project background

AGI Tanami Pty Limited (AGIT) proposes to construct and operate the Tanami Newmont Gas Pipeline (TNP), a 440 km buried pipeline to connect the existing Amadeus Gas Pipeline to the Granites and Dead Bullock Soak mines (the Project Area; **Figure 1-1**). The pipeline will transport natural gas to displace the use of diesel fuel at the two mines.

The pipeline alignment passes through Aboriginal Freehold, Pastoral Land and Crown Land tenures. The pipeline will be buried, with five small above ground facilities; two meter stations, two scraper stations, and a facility at the commencement of the TNP to tie-in to the Amadeus Gas Pipeline. Temporary disturbance is required for a 25 m wide construction Right of Way (RoW) along the alignment as well as construction camps, access tracks, and temporary water storage during construction.

Construction of the TNP is expected to commence in May 2018 and be completed by March 2019 with 'first gas' to the Granites and Dead Bullock Soak mines by March 2019.

1.2 Purpose and scope

This document has been prepared to outline the reinstatement and rehabilitation work that will be undertaken for the TNP. The majority of the alignment (excluding permanent facilities and 26 ha of required access tracks) will be rehabilitated. As a result, over the majority of the length of the pipeline alignment, the entire width of the construction RoW will be rehabilitated and over time allowed to return to native vegetation.

This Rehabilitation Plan is consistent with the Project Environmental Management Plan (EMP); however, it contains further targeted information regarding the approach to rehabilitation of habitat for Matters of National Environmental Significance (MNES). The MNES that are specifically relevant are:

- Dwarf Desert Spike-rush *Eleocharis papillosa* (EPBC and TPWC Vulnerable)
- Greater Bilby *Macrotis lagotis* (EPBC and TPWC Vulnerable)
- Great Desert Skink *Liopholis kintorei* (EPBC and TPWC Vulnerable)
- Night Parrot Pezoporus occidentalis (EPBC Endangered)
- Princess Parrot Polytelis alexandrae (EPBC Vulnerable).

This Rehabilitation Plan builds upon the information contained in the Project EMP. The EMP should be referred to for detailed information regarding the Project, environmental management framework, environmental values, risk assessment and environmental management system.

AGIT are ultimately responsible for successful rehabilitation of the construction RoW to meet the specific completion criteria outlined in this Rehabilitation Plan, however, there are actions that will be implemented by third parties where relevant (e.g. the Construction Contractor will implement the majority of actions based on a standard pipeline reinstatement and rehabilitation approach). Issues associated specifically with heritage values will be addressed in consultation with the Traditional Owners (i.e. via the CLC).

Figure 1-1: Regional location of the Project



www.ecoaus.com.au r: SM Date: 19/12/2017

Prepared by: SM

Temporary construction camp

2 Environmental values

Environmental values relevant to this Rehabilitation Plan have been detailed in the Project EMP. This Rehabilitation Plan focuses on habitat values for MNES. The following threatened flora and fauna species are relevant to the Project Area:

- Dwarf Desert Spike-rush (*Eleocharis papillosa*)
- Greater Bilby (Macrotis lagotis)
- Great Desert Skink (Liopholis kintorei)
- Night Parrot (*Pezoporus occidentalis*)
- Princess Parrot (*Polytelis alexandrae*).

A summary of the habitat requirements and expected residual impacts to potential habitat for each of the above species is presented in **Table 2-1**. Habitat mapping for each MNES is provided in **Appendix A**. Habitat mapping will continue to be refined following pre-clearance surveys and based on the results of trench fauna monitoring during construction.

SPECIES	HABITAT DESCRIPTION	POTENTIAL RESIDUAL IMPACTS
Dwarf Desert Spike- rush (<i>Eleocharis</i> <i>papillosa</i>)	Ephemeral wetlands, predominantly freshwater or semi-saline swamps. It has also been recorded growing in vegetation communities dominated by <i>Eucalyptus</i> <i>coolabah, Halosarcia</i> species, <i>Chenopodium</i> <i>auricomum</i> and <i>Eragrostis</i> species. Due to access restrictions during the flora and vegetation survey, potential suitable habitat for the Dwarf Desert Spike-rush within the Project Area could not be defined (Mattiske 2017). The results of a pre- clearance survey and monitoring during construction will further inform the potential for occurrence of this species in the pipeline alignment.	Based on the known habitat requirements of the species, watercourse crossings have been mapped as potential Dwarf Desert Spike-rush habitat within the Project Area. Sections of thirty-nine watercourses (the majority of which are ephemeral, flowing infrequently and unpredictably) will be temporarily impacted by the Project through pipeline crossing, with all 39 crossings to be rehabilitated post- construction. Of these, four watercourse crossings will require HDD due to the environmental sensitivity of the watercourse.
Greater Bilby (<i>Macrotis lagotis</i>)	The Greater Bilby is known to inhabit <i>Triodia</i> hummocks, <i>Melaleuca</i> and <i>Acacia</i> shrubs on predominantly loamy or lateritic sandy soils in paleochannels and in proximity to recent records in the north and the south of the Project area. Potential habitat in the pipeline alignment includes <i>Eucalyptus/Corymbia/Acadia</i> woodlands over Spinifex, and <i>Melaleuca</i> and <i>Acacia</i> shrublands over <i>Triodia</i> hummocks on sandplains and paleodrainage channels	Up to 742.11 ha (<10%) of the mapped potential Greater Bilby habitat in the 300 m survey corridor will be temporarily impacted by the Project. Post-construction, the majority of the Project Area will be rehabilitated, leaving a residual impact to approximately 26 ha, which represents 0.35% of the mapped potential Greater

Table 2-1: MNES habitat r	equirements within th	he Proiect Area and	residual impacts
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SPECIES	HABITAT DESCRIPTION	POTENTIAL RESIDUAL IMPACTS
	and in proximity to recent records in the north and the south of the Project Area.	Bilby habitat in the 300 m survey corridor.
	Approximately 7,635 ha of potential suitable habitat has been mapped within a 300 m survey corridor containing the Project Area (Appendix A).	
Great Desert Skink (<i>Liopholis kintorei</i>)	 <i>Triodia pungens</i> and <i>Melaleuca glomerata</i> on sandplains and paleochannels within <i>Eucalyptus/Corymbia/Acacia</i> woodlands over <i>Triodia</i> habitat, and Shrublands over <i>Triodia</i> on Sandplains habitat, in particular in paleodrainage channels. Approximately 7,602 ha of potential suitable habitat has been mapped within the Project Area (Appendix A). 	Up to 743 ha (<10%) of the mapped potential Great Desert Skink habitat in the 300 m survey corridor, will be temporarily impacted by the Project. Post-construction, the majority of the Project Area will be rehabilitated, leaving a residual impact to approximately 26 ha, which represents 0.33% of the mapped potential Great Desert Skink habitat in the 300 m
		survey corridor.
Night Parrot (<i>Pezoporus</i> <i>occidentalis</i>)	<i>Triodia</i> dominated grasslands or chenopod shrublands. Potentially also <i>Astrebla</i> dominated shrubby samphire and chenopod associations with scattered trees and shrubs. Approximately 6,662 ha of potential suitable habitat has been mapped within a 300 m survey corridor containing the Project Area (Appendix A).	Up to 652ha (<10%) of the mapped potential Night Parrot habitat in the 300 m survey corridor will be temporarily impacted by the Project. Post-construction, the majority of the Project Area will be rehabilitated, leaving a residual impact of up to 16 ha, which represents 0.32% of the mapped potential Night Parrot habitat in
		the 300 m survey corridor.
Princess Parrot (<i>Polytelis alexandrae</i>)	Sand dunes and sand flats, open savanna woodlands and shrublands, consisting of scattered stands of <i>Eucalyptus, Casuarina</i> or <i>Allocasuarina</i> , with an understorey of <i>Acacia</i> , <i>Eremophila, Grevillea, Hakea, Senna</i> and ground cover of <i>Triodia</i> . Nests are usually in hollows of <i>Eucalyptus</i> or <i>Allocasuarina</i> in riverine or littoral areas. Approximately 4,909 ha of potential suitable habitat has been mapped within a 300 m survey corridor containing the Project Area (Appendix A).	Up to 472 ha (<10%) of the mapped potential Princess Parrot habitat in the 300 m survey corridor will be temporarily impacted by the Project. Post-construction, the majority of the Project Area will be rehabilitated, leaving a residual impact of up to 25 ha, which represents less than 0.5% of the mapped potential Princess Parrot habitat in the 300 m survey corridor.

³ Environmental impacts to be mitigated

Rehabilitation will be required for all areas cleared for construction purposes that are not required for operational use. The Project will involve initial temporary impact to 1,161 ha of native vegetation. Post-construction, the majority of the Project Area will be rehabilitated, leaving a residual impact to 25.93 ha. Effective rehabilitation will manage potential impacts from:

- Long-term loss of flora and vegetation communities;
- Soil disturbance and soil compaction;
- Introduction and/or spread of weed species;
- Long-term disturbance, fragmentation and loss of fauna habitat (including for MNES); and
- Landform instability (reducing the potential for erosion and sedimentation of surrounding water bodies).

Implementation of the Project EMP will address specific management requirements relevant to construction in terms of fire, soils and sediment, surface and groundwater, flora and vegetation, terrestrial fauna, and weeds. There are some factors beyond the control of AGIT that could affect the achievement of rehabilitation outcomes, such as climate change, occurrence of rainfall (drought or flooding) and fire. It will be endeavoured to achieve the completion criteria in spite of these potential occurrences. The factors that represent a risk to rehabilitation success are further addressed in Section 3.1 below.

Monitoring at both impact and control sites will be undertaken to determine progress towards achievement of completion criteria, and to identify where contingency actions need to be implemented to manage any risks to the rehabilitation outcomes (**Section 7**).

3.1 Limitations and risks

A number of factors that represent risk to the success of this Rehabilitation Plan are described below. The rehabilitation completion criteria (**Table 5-2**), management actions (**Table 6-1**), and corrective actions (**Table 7-2**) have been designed to try to minimise these risks wherever possible. In addition, a range of sub-plans will be implemented to ensure risks to rehabilitation are minimised; refer to the Project EMP for more information.

- Increase in weed cover and diversity: Weeds can be introduced and/or spread to the Project area via vehicles and equipment. New species can be introduced, or existing infestations can be spread into new areas. Weeds could prevent or delay the re-establishment of native species in rehabilitation areas.
- **Erosion:** erosion is a likely risk as a result of construction activities, particularly at watercourse crossings. Erosion as a result of water flow could prevent the successful rehabilitation of MNES habitats and native vegetation.
- **Extreme weather**: extreme or unexpected weather events, such as flooding or drought, could wash away topsoil, modify landforms through erosion, or prevent seedling germination due to lack of rainfall. These negative impacts could prevent successful rehabilitation from occurring.
- **Fire:** wildfires, particularly unusually hot or out of control fires, have the potential to burn new growth, thereby preventing successful rehabilitation.
- Introduced fauna: introduced herbivores, such as cattle, rabbits and camels, could graze on new growth, thereby limiting the potential for regeneration of native vegetation. Introduced predators, such as cats and foxes, show preference for open areas for hunting, which could negatively impact on native fauna attempting to recolonise rehabilitated areas.

A Rehabilitation approach and rationale

The crucial first step in ensuring successful rehabilitation of the Project is in the design phase. This project has been designed to enable micro-siting before construction to avoid and minimise impacts to sensitive environmental values including active Greater Bilby or Great Desert Skink burrows. Where the alignment intersects sensitive values, including established trees particularly near sensitive watercourses and Sacred Sites, HDD may be utilised to minimise and avoid impact.

This design phase has been informed by ecological surveys to determine the vegetation and fauna habitats that occur and any specific features that are relevant (e.g. watercourses, rocks or logs for habitat complexity). A range of construction methods and management measures have been identified in detailed construction management sub-plans and these will contribute to the successful rehabilitation of the pipeline corridor. The measures contained in these sub-plans are summarised in **Appendix C**. Construction management measures are described fully in the Project EMP.

4.1 Reinstatement and rehabilitation

Reinstatement is the process which occurs post-construction and involves removing temporary infrastructure and re-installing the pre-existing landforms and soil profiles, with rehabilitation taking this process further and re-establishing the vegetation such that it is consistent with the species composition and density that previously existed.

While reinstatement and rehabilitation is staged as part of the construction process, the method of reinstatement and rehabilitation is structured from the early design and planning phases.

Once construction activities are predominantly complete in a section of the pipeline alignment, reinstatement and rehabilitation can commence. These activities will occur progressively to limit the time between removal of vegetation and re-establishment. The construction RoW will be re-contoured to match the surrounding landforms and erosion controls constructed where necessary. Separately stockpiled topsoil will then be respread evenly across the RoW and any stockpiled vegetation placed across the RoW to assist in soil retention, provision of seed stock and fauna shelter.

Reseeding or revegetation (using appropriate species) of temporary disturbance areas of the construction RoW may be undertaken to restore vegetation cover if and where areas do not respond to the initial rehabilitation treatment, as evaluated by monitoring. Rehabilitation completion criteria and corrective actions are set out in Sections 5 and 7 respectively.

AGIT has conducted and successfully completed reinstatement and rehabilitation works on over 3,000 km of gas transmission pipelines (this is outlined further in Section 4.2). Rehabilitation will be consistent with this standard process, with potential for targeted management actions to be implemented, in particular, rehabilitation zones as relevant.

4.1.1 Rehabilitation zones

For the purposes of this Rehabilitation Plan, two distinct rehabilitation zones have been defined based on ecological survey work undertaken to date. They include the following:

- Native vegetation zone (habitat not supporting MNES); and
- MNES habitat zone, including areas of:
 - Dwarf Desert Spike-rush habitat;
 - o Greater Bilby and/or Great Desert Skink habitat;

- Night Parrot habitat; and
- Princess Parrot habitat.

The native vegetation zone and the MNES habitat zone are mutually exclusive. The MNES habitat zone is defined wherever potential habitat is identified for the MNES listed. Areas with no potential habitat for any of the MNES are classified as the native vegetation zone. These zones are fully described in **Table 4-1**, which includes greater detail on the relevant habitat values for each of the MNES that can trigger the MNES rehabilitation zone.

REHABILITATION ZONE	ZONE DESCRIPTION
Native vegetation zone	Defined as all native vegetation within the Project Area, excluding areas mapped as MNES habitat zones below. Native vegetation has been defined and mapped as vegetation communities by Mattiske (2017).
MNES habitat zone (Dwarf Desert Spike-rush habitat)	Due to access restrictions during the flora and vegetation survey, potential suitable habitat for the Dwarf Desert Spike-rush within the Project Area could not be defined (Mattiske 2017). For the purposes of this Rehabilitation Plan, preliminary Dwarf Desert Spike-rush habitat zones have been mapped as watercourses known to occur in the Project Area (Appendix A). A targeted pre-clearance survey will include watercourses and creek lines not surveyed in previous surveys. This rehabilitation zone would not be applied should the pre-clearance survey and monitoring during construction confirm species not or unlikely to be present. Requirements would revert to whatever other MNES habitat zone applies; if none to native vegetation.
MNES habitat zone (Greater Bilby and Great Desert Skink habitat)	Preliminary mapping includes <i>Eucalyptus/Corymbia/Acacia</i> woodlands over <i>Triodia</i> hummocks, and <i>Melaleuca</i> and <i>Acacia</i> shrublands over <i>Triodia</i> hummocks, on sandplains and paleodrainage channels and in proximity to recent records in the north and the south of the Project Area (Appendix A).
MNES habitat zone (Night Parrot habitat)	Preliminary mapping includes <i>Triodia</i> dominated grasslands and <i>Astrebla</i> dominated shrubby samphire and chenopod associations with scattered trees and shrubs within the Project Area (Appendix A). This rehabilitation zone would not be applied should preclearance survey and monitoring during construction confirm species not or unlikely to be present. Requirements would revert to whatever other MNES habitat zone applies; if none to native vegetation.
MNES habitat zone (Princess Parrot habitat)	Preliminary mapping includes sandplain woodlands and shrublands, dominated by scattered <i>Eucalyptus, Casuarina</i> or <i>Allocasuarina</i> , with an understorey of <i>Acacia, Eremophila, Grevillea, Hakea, Senna</i> and ground cover of <i>Triodia</i> ; and riparian areas dominated by large <i>Eucalyptus</i> or <i>Allocasuarina</i> within the Project Area (Appendix A). Rehabilitation completion criteria in this zone relates only to understorey and ground cover species. This rehabilitation zone would not be applied should pre-clearance survey and monitoring during construction confirm species not or unlikely to be present. Requirements would revert to whatever other MNES habitat zone applies; if none to native vegetation.

The Rehabilitation Plan is intended to be adaptive such that new information about MNES habitats can be taken into account in refining rehabilitation zone mapping. If a species is considered unlikely to occur in a particular area based on further survey or monitoring information, that area will no longer be mapped as habitat for that MNES. If no MNES are considered to have potential habitat in an area, then the area is no longer considered to be the MNES habitat zone and would instead revert to the native vegetation zone. Conversely, if further information suggests that an area is potential or actual MNES habitat, then mapping will be updated accordingly and that area would be placed into the MNES habitat zone.

Initial habitat mapping has been completed based on reconnaissance field surveys conducted in late 2017 (see **Appendix A**). Further pre-clearance survey work to ground-truth and more accurately determine MNES habitat is planned for March 2018, with refinements to mapping to follow. Rehabilitation zones will be updated accordingly to reflect the greater level of survey effort and understanding of environmental values in the project area. Rehabilitation zones may also be updated during trenching, for example if direct evidence of MNES presence is detected in an area previously not considered potential MNES habitat.

4.1.2 Monitoring sites

Based on the existing information available for vegetation and fauna habitats, preliminary monitoring sites for each rehabilitation zone have been selected from which an assessment against the completion criteria can occur (**Appendix B**). Each monitoring site will comprise one rehabilitation site and one corresponding control site. Fifteen monitoring sites have been selected, including three for each rehabilitation zone to ensure appropriate replication of monitoring across the length of the Project Area (**Appendix B**).

Monitoring sites will be located within the 'core' of rehabilitation zones to minimise the impacts of edge effects and to avoid transitional vegetation/habitats. Paired control sites will be located on undisturbed land within 300 m of the construction RoW but outside of the disturbance area. They will be established in the same native vegetation communities or MNES habitat zone as the rehabilitation sites, to assist comparisons between rehabilitation and control area sites.

A pre-clearance survey prior to the commencement of ground disturbance activities will confirm that these monitoring sites are representative of each zone, to and ensure appropriate coverage along the pipeline alignment. If required, alternative monitoring sites will be established to ensure optimal siting within habitats and along the alignment.

4.1.3 Pre-clearance survey

A pre-clearance survey of the 25 m construction RoW has been undertaken to increase knowledge of the habitat types available and the potential for MNES presence. This survey included:

- targeted searches for MNES occurrence and in areas of suitable habitat;
- further definition and validation of the key habitat elements for each MNES that comprise the preliminary habitat zones;
- validation of preliminary rehabilitation monitoring sites;
- baseline photograph recording of the rehabilitation monitoring sites; and
- validation of existing presence of Class A Weeds of National Significance .

The findings of this survey will be used to further refine knowledge of MNES in the pipeline alignment and the preliminary habitat zone descriptions, mapping and the locations of the monitoring sites, as described in **Section 4.1.1**.

4.2 Proponent experience with previous rehabilitation

The proponent has a proven track record of rehabilitation success in arid environments, including for the original Dampier to Bunbury Natural Gas Pipeline (DBNGP) constructed in 1981, the DBNGP Stage 5 Looping Expansion Project, in Western Australia (WA). Rehabilitation for the DBNGP commenced in 2007. In 2012, a performance review was undertaken in accordance with Condition 5-1 of Ministerial Statement 735, which requires the proponent to submit a Performance Review every five years after the start of construction to the WA Environmental Protection Authority (Strategen 2012). Soil and vegetation cover were the key focus for rehabilitation completion criteria for the DBNGP project. Results of compliance audits over the five-year period found no potential non-compliances with conditions relating to management of soil cover and vegetation rehabilitation (Strategen 2012). Regarding soil cover, no evidence of soil erosion or sedimentation was observed or reported by any landholders (Strategen 2012). Three of the four completion criteria (native species richness 50% of adjacent area, native species foliage cover 40% of adjacent area, and weed foliage cover similar to adjacent area) were met overall for vegetation rehabilitation in the Pilbara and Gascoyne regions of the project area (Loops 0 - 6). Three of the six survey sites failed to meet the native species density criterion of 2 plants/m²; however, all survey sites had an average native species density equal to or greater than that of their respective control plots (Strategen 2012). The performance review found that 'construction impacts on watercourses were temporary and fully rehabilitated, utilising proven techniques to minimise future erosion potential' (Strategen 2012). Additionally, watercourse flows were managed to ensure no interruption to downstream ecological or anthropogenic uses (Strategen 2012).

In addition, the project incorporated methods that enhanced rehabilitation with the use of fauna management, acid sulphate soil treatment techniques, and the utilisation of Gluon with helicopter applications to cover sand dunes rehabilitation works where using trucks was limited. The DBNGP expansion project received an Earth award from the Civil Construction Federation of Australia on the successful use of the technique.

AGIG also completed successful rehabilitation of the Fortescue River Gas Pipeline (FRGP). The project included a 270 km pipeline from the DBNGP to Fortescue Metal Group's Solomon Hub operations in the Pilbara region of Western Australia. Construction commenced in 2014 and was completed in March 2015. Successful close out of completion criteria was achieved within three years. Rehabilitation programs are underway on the Wheatstone – Ashburton West Pipeline (87 km), the Onslow Lateral Pipeline (24 km) and the Tubridgi Gas Storage project.

5 Objectives and completion criteria

Environmental targets and performance indicators have been prescribed in line with rehabilitation objectives for the Project (**Table 5-1**).

REHABILITATION ZONE	OBJECTIVE	PERFORMANCE STANDARD	TARGET	MEASUREMENT CRITERIA
Native vegetation	To re-establish vegetation in line with pre-disturbance conditions.	Completion criteria (Table 5-2)	Meet rehabilitation completion criteria.	Site specific established completion criteria.
MNES habitat (Dwarf Desert Spike Rush, Greater Bilby & Great Desert Skink, Night Parrot, and Princess Parrot)	To re-establish MNES habitats in line with pre- disturbance conditions.	Completion criteria (Table 5-2)	Meet rehabilitation completion criteria.	Site specific established completion criteria.

Table 5-1: Rehabilitation performance management

Rehabilitation completion criteria have been designed for each rehabilitation zone and are indicated in **Table 5-2**.

The appropriateness of these criteria will be continually reviewed throughout their application based on the outcomes of monitoring results.

Table 5-2: Rehabilitation completion criteria

ASPECT	COMPLETION CRITERIA
Native vegetation rehabilitation zone	
Native flora species density (plants per m ²)	Perennial native flora species diversity is equal to or greater than 50% of that of the adjacent control area.
Native flora species richness (per plot)	Perennial native flora species richness is equal to or greater than 50% of that of the adjacent control area and reflects the species composition present in the pre-disturbed habitat type. Note that within 4 m either side of the pipeline, the completion criteria will only apply to ground cover species and not to tree species, which are not suitable to grow in close proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.
Native flora species foliage cover (%)	Percentage of foliage cover of perennial native flora species indigenous to each vegetation community is equal to or greater than 50% of that of the adjacent control area and reflects the pre-disturbed habitat type. Note that within 4 m either side of the pipeline, the completion criteria will only apply to ground cover species and not to tree species, which are not suitable to grow in close proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.
Weed foliage cover (%)	Percentage of foliage cover of Declared species under the <i>Weeds Management Act</i> , Weeds of National Significance (WONS) and Buffel grass (<i>Cenchrus ciliaris</i>) is not greater than that of the adjacent control area at 12 months, 24 months and 36 months.

ASPECT	COMPLETION CRITERIA	
MNES habitat rehabilitation zone		
Native flora species density (plants per m ²)	Perennial native flora species density is equal to or greater than 70% of that of the adjacent control area and reflects the Dwarf Desert Spike-rush habitat rehabilitation zone requirements (watercourse/riparian vegetation).	
Native flora species richness (per plot)	Perennial native flora species richness is equal to or greater than 70% of that of the adjacent control area and reflects the species composition present in the pre-disturbed habitat type. Note that within 4 m either side of the pipeline, the completion criteria will only apply to ground cover species and not to tree species, which are not suitable to grow in close proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.	
Native flora species foliage cover (%)	Percentage of foliage cover of perennial native flora species indigenous to each vegetation community is equal to or greater than 70% of that of the adjacent control area and reflects the pre-disturbed habitat type. Note that within 4 m either side of the pipeline, the completion criteria will only apply to ground cover species and not to tree species, which are not suitable to grow in close proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.	
Weed foliage cover (%)	Percentage of foliage cover of Declared species under the <i>Weeds Management Act</i> , Weeds of National Significance (WONS) and Buffel grass (<i>Cenchrus ciliaris</i>) is not greater than that of the adjacent control area at 12 months, 24 months and 36 months.	

6 Rehabilitation management actions

The Project Area will be reinstated in accordance with Project approval conditions, guidance and regulatory requirements. Specific actions have been identified to assist in achieving rehabilitation objectives and completion criteria for the Project, as indicated in **Table 6-1**.

PARAMETER	REHABILITATION MANAGEMENT ACTION	RESPONSIBILITY
Overall	Progressive rehabilitation shall be undertaken to minimise the amount of disturbance time.	AGIT (implemented by Construction Contractor)
Infrastructure	All temporary infrastructure, signage and other installations other than those required for environmental or safety reasons shall be removed once backfilling and tie-ins are completed.	AGIT (implemented by Construction Contractor)
Waste	All waste materials (e.g. bags, pegs, skids, pillows) shall be removed from the construction areas once backfilling and tie-ins are completed.	AGIT (implemented by Construction Contractor)
Soils	Following the completion of earthworks, trench spoil subsoil and topsoil shall be returned in that order such that the soil profile is reinstated.	AGIT (implemented by Construction Contractor)
Soils	Trenches/excavations shall be backfilled with stockpiled subsoil material following pipe laying to match the natural height and contours of the pre-construction landscape.	AGIT (implemented by Construction Contractor)
Soils	Compaction relief shall be undertaken by scarifying or ripping as required along the contours, prior to respreading of topsoil.	AGIT (implemented by Construction Contractor)
Erosion	The beds of watercourses to be restored to the original gradient and the bank to the natural contours post disturbance.	AGIT (implemented by Construction Contractor)
Erosion	Backfill crown to be graded and shaped as closely as practicable to pre-existing contours and flow patterns of riverbed and riparian zone.	AGIT (implemented by Construction Contractor)
Erosion	Banks to be reinstated in a manner that minimises erosion potential and does not alter natural streamflow - this may include the installation of rock gabions, rip rap, cement/s and hessian bags.	AGIT (implemented by Construction Contractor)
Erosion	As per the ESCP, specific biodegradable erosion controls may be left in situ to minimise erosion and promote rehabilitation	AGIT (implemented by Construction Contractor)
Soils and vegetation	Topsoil and then cleared native vegetation will be re-spread over graded surfaces in an even layer to match the natural soil horizons.	AGIT (implemented by Construction Contractor)
Habitat	Structural habitat elements such as timber and rocks shall be reinstated over the rehabiliation area, including; small amounts of rocks and stones generated by the construction process.	AGIT (implemented by Construction Contractor)
Greater Bilby and Great Desert Skink	To ensure these species can dig burrows, compaction relief shall be undertaken to ensure soil compaction is similar to that of pre- disturbance.	AGIT (implemented by Construction Contractor)
Princess Parrot	Where nest hollows are removed through vegetation clearing, replacement nest boxes will be installed in adjacent control areas mapped as potential suitable habitat for the species (would not be applied should pre-clearance survey and monitoring during construction confirm species not/unlikely to be present).	AGIT (implemented by Construction Contractor)

Table 6-1: Rehabilitation management actions

PARAMETER	REHABILITATION MANAGEMENT ACTION	RESPONSIBILITY
Dwarf Desert Spike-rush	If found during pre-clearance surveys and cannot be avoided (see EMP Section 6.2) for avoidance measures), investigate feasibility of removing and storing individuals for replanting during rehabilitation (would not be applied should pre-clearance survey and monitoring during construction confirm species not/unlikely to be present).	AGIT (implemented by Construction Contractor)

After the completion criteria have been met, ongoing future management will comprise maintenance works (e.g. weed control).

7 Rehabilitation monitoring and contingencies

7.1 Monitoring

The monitoring program (**Table 7-1**) has been designed to ensure that rehabilitation objectives and completion criteria are achieved, indicating reinstatement has been undertaken to the appropriate standard and rehabilitation is successful. Monitoring focuses on the success of revegetation of cleared areas to ensure that habitats capable of supporting MNES known or with potential to occur in the project area, are reestablished.

Following the completion of construction, 10 m by 50 m quadrats will be established at each of the predetermined monitoring (rehabilitation and control) sites. Each quadrat will be permanently demarcated with fixed markers (e.g. fence dropper) and GPS coordinate locations of each quadrat corner will be recorded.

Within each quadrat, the following data will be recorded (as relevant to the completion criteria):

- Site number
- Native flora species density (plants per m²)
- Native flora species richness (per quadrat)
- Native flora species foliage cover (%)
- Weed foliage cover (%)
- Indicators of the presence of fauna (e.g. scats, burrows, tracks)
- General observations (i.e. feral animal disturbance, fire occurrence).

Rehabilitation monitoring will occur at rehabilitation and control sites annually, at a time of year when floristic material allowing plant identification is most likely to be available for most species to minimise the effects of seasonality. This is in accordance with the requirements of the Northern Territory 'Guidelines for Assessment of Impacts on Terrestrial Biodiversity' (NT EPA 2013). For the Project Area, this will generally be the end of the wet season (approximately around March/April) to coincide with optimal plant growth (Department of Industry, Tourism and Resources 2006). Monitoring will continue for a minimum of three years and continue until the completion criteria are achieved.

Methods to record the above data should follow the 'Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping' (Brocklehurst *et al* 2007).

Photo monitoring points will be established at representative locations within each monitoring site and recorded with a GPS. At each point, two photographs will be taken along each direction of the pipeline corridor. It is preferable for a tripod or measuring stick to be utilised to ensure the photo is taken from the same vertical height each time. All photos will be date stamped and photo number recorded with appropriate details (monitoring site number and direction of photo).

Data collection will be comparable and repeatable between monitoring sites and across monitoring years. After each monitoring event, data collected from each rehabilitation site will be compared with its corresponding control site, and results will be compared across the entire Project Area. Each subsequent year of monitoring will compare results to the previous years' monitoring results, including an assessment of each rehabilitation zone against the completion criteria (**Table 5-2**). If completion criteria are not met within three years of monitoring, annual monitoring should continue and corrective actions (**Table 7-2**) implemented where relevant.

 Table 7-1 below provides an overview of monitoring and recording commitments.

MONITORING	DETAILS	TIMING	RESPONSIBILITY	RECORDS
Site closure Inspection	Inspect the suitability of reinstatement efforts.	Once, upon construction completion.	AGIT (implemented by Construction Contractor)	Field Inspection checklist
Native vegetation rehabilitation zone monitoring	Monitor native vegetation rehabilitation sites and adjacent control areas to monitor aspects against completion criteria.	Monitor annually for a minimum of 3 years post-construction until the rehabilitated areas have regenerated to meet completion criteria or will be met on advice of an environmental specialist.	AGIT HSE Manager	Annual Rehabilitation Monitoring Report
MNES habitat rehabilitation zone monitoring (areas of Dwarf Desert Spike Rush habitat)*	 Monitor native vegetation rehabilitation sites and adjacent control areas to monitor aspects against completion criteria. Specific focus for Dwarf Desert Spike-rush monitoring will include: Successful translocation of individuals (if relevant) and presence of the species. 	Monitor annually for a minimum of 3 years post-construction until the rehabilitated areas have regenerated to meet completion criteria or will be met on advice of an environmental specialist.	AGIT HSE Manager	Annual Rehabilitation Monitoring Report
MNES habitat rehabilitation zone monitoring (areas of Greater Bilby and Great Desert Skink habitat)	 Monitor native vegetation rehabilitation sites and adjacent control areas to monitor aspects against completion criteria. Monitoring for Great Desert Skink will include: Re-establishment of <i>Triodia pungens</i> and <i>Melaleuca glomerata</i> on sandplains, and <i>Eucalyptus/</i> <i>Corymbia/Acacia</i> woodlands over spinifex habitat and Shrublands over spinifex on Sandplains habitat, including if possible, areas in proximity to long unburnt spinifex habitat (3 to 15 years). Evidence of the species, such as direct observation, scats or burrows. Monitoring for Greater Bilby will include: Re-establishment of <i>Eucalyptus/Corymbia/Acacia</i> woodlands over <i>Triodia</i> hummocks. and 	Monitor annually for a minimum of 3 years post-construction until the rehabilitated areas have regenerated to meet completion criteria or will be met on advice of an environmental specialist.	AGIT HSE Manager	Annual Rehabilitation Monitoring Report

 Table 7-1: Rehabilitation monitoring and recording

MONITORING	DETAILS	TIMING	RESPONSIBILITY	RECORDS
	 Melaleuca and Acacia shrublands over Triodia hummocks. Extent of Buffel Grass incursion in the rehabilitated RoW (note that Buffel Grass can displace spinifex, the preferred habitat for Greater Bilby). Evidence of the species, such as direct observation, scats, tracks or burrows. 			
MNES habitat rehabilitation zone monitoring (areas of Night Parrot habitat)*	 Monitor native vegetation rehabilitation sites and adjacent control areas to monitor aspects against completion criteria. Monitoring will include: Re-establishment of <i>Triodia</i> dominated grasslands and <i>Astrebla</i> dominated shrubby samphire and chenopod associations with scattered trees and shrubs. 	Monitor annually for a minimum of 3 years post-construction until the rehabilitated areas have regenerated to meet completion criteria.	AGIT HSE Manager	Annual Rehabilitation Monitoring Report
MNES habitat rehabilitation zone monitoring (areas of Princess Parrot habitat)*	 Monitor native vegetation rehabilitation sites and adjacent control areas to monitor aspects against completion criteria. Monitoring will include: Re-establishment of sandplain woodlands and shrublands dominated by scattered <i>Eucalyptus, Casuarina</i> or <i>Allocasuarina</i>, with an understorey of <i>Acacia, Eremophila, Grevillea, Hakea, Senna</i> and ground cover of <i>Triodia</i>; and riparian areas dominated by large <i>Eucalyptus</i> or <i>Allocasuarina</i>. Evidence of the species, such as direct observation or via call playback. 	Monitor annually for a minimum of 3 years post-construction until the rehabilitated areas have regenerated to meet completion criteria.	AGIT HSE Manager	Annual Rehabilitation Monitoring Report

* Not undertaken if pre-clearance survey and monitoring during construction indicate species unlikely to be present. If opportunistic observations of Princess or Night Parrot are recorded during rehabilitation monitoring, the habitat rehabilitation monitoring would be reinstated for this species.

7.2 Contingencies and corrective actions

If monitoring indicates that objectives and completion criteria for rehabilitation are not being achieved, or are unlikely to be achieved within two to five years, contingencies and corrective actions will be enacted (**Table 7-2**).

Table 7-2: Rehabilitatior	contingencies and	corrective action
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TRIGGER	ACTION		
Native vegetation rehabilitation zo	ne		
Native flora species density, richness or foliage cover has not achieved at least 50% of adjacent control areas at any time from year 3 onwards.	 Investigate cause of reduced recruitment (this could include review of weather conditions, review of threatening processes such as erosion or fire). Remediate cause if possible, which could include implementing additional revegetation techniques (direct seeding or planting seedlings) or addressing any threatening processes that may be influencing results. Monitor the effectiveness of any measures implemented during future annual monitoring events, until completion criterion is achieved. 		
Weed foliage cover (%) for Declared, WONS or Buffel grass is greater than that in adjacent control areas.	 Investigate cause for higher weed cover (this could include reviewing access to area or, weed control approaches). Implement weed control to reduce weed foliage cover where this is required, and address any threatening processes that may be influencing results. Monitor the effectiveness of any measures implemented during future annual monitoring events, until completion criterion is achieved. 		
MNES habitat rehabilitation zone			
Native flora species density, richness or foliage cover less than 50% of adjacent control areas.	 Investigate cause of reduced recruitment (this could include review of weather conditions, review of threatening processes such as erosion or fire). Remediate cause if possible, which could include implementing additional revegetation techniques (direct seeding or planting seedlings) focused on restoring key habitat values for MNES, or addressing any threatening processes that may be influencing results. In place of remediation, implement fauna monitoring to determine if MNES are utilising rehabilitated areas based on presence/absence of direct or indirect evidence including burrows, tracks, scats and other evidence. Monitoring may be linked to other monitoring programs occurring in the region. Monitor the effectiveness of any measures implemented during future annual monitoring events, until completion criterion is achieved. 		
Weed foliage cover (%) for Declared, WONS or Buffel grass is greater than that in adjacent control areas.	 Investigate cause for higher weed cover (this could include reviewing access to area or, weed control approaches). Implement weed control to reduce weed foliage cover where this is required, and address any threatening processes that may be influencing results. Monitor the effectiveness of any measures implemented during future annual monitoring events, until completion criterion is achieved. 		

Contingency and corrective actions would be implemented, as required, until completion criteria are achieved. This is expected to occur within three to five years of initial works being completed by the construction contractor. If, in the unlikely event that contingency and corrective actions still fail to meet the requirements of the completion criteria, an alternative course of action will be devised that is jointly agreed upon by all relevant stakeholders (i.e. AGIT, DoEE and DPIR).

8 Report and revision

8.1 Reporting

An annual Rehabilitation Monitoring Report will be prepared that will identify the following:

- any changes to rehabilitation approach, actions and monitoring due to new knowledge in regards to presence/absence of MNES
- a summary of monitoring results in comparison to objectives and completion criteria;
- any contingency actions implemented; and
- any other issues encountered (e.g. fire occurrence).

The status of rehabilitation progress against the completion criteria (whether they have been met or the level of achievement), will be reported annually to relevant Government agencies (i.e. Federal Department of the Environment and Energy, Northern Territory Department of Primary Industry and Resources and Department of Environment and Natural Resources).

8.2 Revision

The AGIT environmental management system provides for ongoing review and improvement of existing systems and controls. The Rehabilitation Plan would form part of this process and as a result completion management may be adapted in response to the outcomes of rehabilitation monitoring, improved methods or increased knowledge.

The appropriateness of completion criteria will be continually reviewed throughout their application using monitoring results. Any changes would be made in agreement with the Commonwealth.

References

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Appendix A MNES Habitat Mapping



Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat



bing

Legend

Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat Princess Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

- **MNES** habitat
 - Dwarf Desert Spike-rush potential habitat
 - Greater Bilby and Great Desert Skink potential habitat

Princess Parrot potential habitat



600





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat Princess Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat

Princess Parrot potential habitat



600



Pipe alignment corridor Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat

Princess Parrot potential habitat



Tanami Gas Pipeline MNES Habitat - Map 7 of 75

bing

Legend

Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

- Dwarf Desert Spike-rush potential habitat
- Greater Bilby and Great Desert Skink potential habitat
- 777 Night Parrot potential habitat
- Princess Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

- Dwarf Desert Spike-rush potential habitat
- Greater Bilby and Great Desert Skink potential habitat
- 777 Night Parrot potential habitat
- Princess Parrot potential habitat





- Pipe alignment corridor
- Right-of-Way (RoW) corridor
- **MNES** habitat
 - Dwarf Desert Spike-rush potential habitat
 - Greater Bilby and Great Desert Skink potential habitat
- Might Parrot potential habitat





Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat

Princess Parrot potential habitat




Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat







Pipe alignment corridor
Right-of-Way (RoW) corridor

MNES habitat



Tanami Gas Pipeline MNES Habitat - Map 13 of 75



Pipe alignment corridor
Right-of-Way (RoW) corridor

MNES habitat







Pipe alignment corridor
Right-of-Way (RoW) corridor

MNES habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat





Pipe alignment corridor
Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat





Right-of-Way (RoW) corridor

MNES habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Dwarf Desert Spike-rush potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Dwarf Desert Spike-rush potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Dwarf Desert Spike-rush potential habitat





Pipe alignment corridor
Right-of-Way (RoW) corridor

MNES habitat

Dwarf Desert Spike-rush potential habitat



Tanami Gas Pipeline MNES Habitat - Map 28 of 75



Legend

Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Dwarf Desert Spike-rush potential habitat





bing

Legend

Pipe alignment corridor
Right-of-Way (RoW) corridor

MNES habitat

- Dwarf Desert Spike-rush potential habitat
- Princess Parrot potential habitat







Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Dwarf Desert Spike-rush potential habitat

Princess Parrot potential habitat



600



Right-of-Way (RoW) corridor

MNES habitat

Dwarf Desert Spike-rush potential habitat



Tanami Gas Pipeline MNES Habitat - Map 32 of 75



Legend

Pipe alignment corridor
Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat



1 Metres Datum/Projection: GDA 1994 MGA Zone 52 www.ecoaus.com.au



Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat

Princess Parrot potential habitat



600



Pipe alignment corridor
Right-of-Way (RoW) corridor

MNES habitat

Dwarf Desert Spike-rush potential habitat

- Greater Bilby and Great Desert Skink potential habitat
- Night Parrot potential habitat
- Princess Parrot potential habitat





Pipe alignment corridor
Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat







Pipe alignment corridor Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

- **MNES** habitat
 - Greater Bilby and Great Desert Skink potential habitat
- Night Parrot potential habitat
 - Princess Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat Night Parrot potential habitat





Night Parrot potential habitat





Pipe alignment corridor Right-of-Way (RoW) corridor

MNES habitat

- Dwarf Desert Spike-rush potential habitat
- Greater Bilby and Great Desert Skink potential habitat
- Night Parrot potential habitat 1
- Princess Parrot potential habitat



600

www.ecoaus.com.au



Pipe alignment corridor Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat

Princess Parrot potential habitat



600



Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat

Princess Parrot potential habitat



www.ecoaus.com.au Prepared by: SM Date: 8/02/2018



Night Parrot potential habitat




Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat

Princess Parrot potential habitat



600



MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





bing

Legend

Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat



600 Metres Datum/Projection: GDA 1994 MGA Zone 52 www.ecoaus.com.au

bing

Legend

Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat





Greater Bilby and Great Desert Skink potential habitat





Greater Bilby and Great Desert Skink potential habitat









MNES habitat

Greater Bilby and Great Desert Skink potential habitat





Greater Bilby and Great Desert Skink potential habitat Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat





Greater Bilby and Great Desert Skink potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat

Princess Parrot potential habitat





Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor

Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat





Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat



bing

Legend

Pipe alignment corridor
 Right-of-Way (RoW) corridor

MNES habitat

Greater Bilby and Great Desert Skink potential habitat

Night Parrot potential habitat



Appendix B Rehabilitation Monitoring Sites

The spatial locations of rehabilitation monitoring sites are based on areas considered likely to provide suitable habitat for MNES, and coincide with the relevant habitat types. Locations indicated below are indicative only and will be further refined following completion of the pre-clearance survey.

SITE NUMBER	SITE TYPE	LATITUDE (GDA 94)	LONGITUDE (GDA 94)
11A	Rehabilitation	-22.392935	131.979203
11B	Control	-22.392477	131.977001
12A	Rehabilitation	-21.966048	131.286696
12B	Control	-21.966194	131.284861
13A	Rehabilitation	-21.648604	131.073409
13B	Control	-21.650265	131.073391
14A	Rehabilitation	-21.100997	130.767628
14B	Control	-21.10066	130.766126
15A	Rehabilitation	-20.531583	130.268662
15B	Control	-20.531444	130.270181

Table B-1: Indicative monitoring sites for the native vegetation rehabilitation zone

Table B-2: Indicative monitoring sites for the MNES habitat zone (Dwarf Desert Spike-rush habitat)

SITE NUMBER	SITE TYPE	LATITUDE (GDA 94)	LONGITUDE (GDA 94)
1A	Rehabilitation	-22.804516	132.607025
1B	Control	-22.805565	132.603843
3A	Rehabilitation	-22.761198	132.499137
3B	Control	-22.761899	132.498735
4A	Rehabilitation	-22.125323	131.398996
4B	Control	-22.12571	131.398061
6A	Rehabilitation	-21.805747	131.179921
6B	Control	-21.806843	131.17918
8A	Rehabilitation	-21.513618	130.988488
8B	Control	-21.513933	130.987555

SITE NUMBER	SITE TYPE	LATITUDE (GDA 94)	LONGITUDE (GDA 94)
2A	Rehabilitation	-22.771449	132.516379
2B	Control	-22.772951	132.517712
5A	Rehabilitation	-21.812043	131.188455
5B	Control	-21.813445	131.189222
7A	Rehabilitation	-21.515303	130.989109
7B	Control	-21.516046	130.988376
9A	Rehabilitation	-20.707745	130.484293
9B	Control	-20.70841	130.483338
10A	Rehabilitation	-20.530892	129.971142
10B	Control	-20.529927	129.970279

Table B-3: Indicative monitoring sites for the MNES habitat zone (Greater Bilby and Great Desert Skink habitat)

Table B-4: Indicative monitoring sites for the MNES habitat zone (Night Parrot habitat)

SITE NUMBER	SITE TYPE	LATITUDE (GDA 94)	LONGITUDE (GDA 94)
2A	Rehabilitation	-22.771449	132.516379
2B	Control	-22.772951	132.517712
5A	Rehabilitation	-21.812043	131.188455
5B	Control	-21.813445	131.189222
7A	Rehabilitation	-21.515303	130.989109
7B	Control	-21.516046	130.988376
9A	Rehabilitation	-20.707745	130.484293
9B	Control	-20.70841	130.483338
10A	Rehabilitation	-20.530892	129.971142
10B	Control	-20.529927	129.970279

SITE NUMBER	SITE TYPE	LATITUDE (GDA 94)	LONGITUDE (GDA 94)
1A	Rehabilitation	-22.804516	132.607025
1B	Control	-22.805565	132.603843
4A	Rehabilitation	-22.125323	131.398996
4B	Control	-22.12571	131.398061
5A	Rehabilitation	-21.812043	131.188455
5B	Control	-21.813445	131.189222
7A	Rehabilitation	-21.515303	130.989109
7B	Control	-21.516046	130.988376
10A	Rehabilitation	-20.530892	129.971142
10B	Control	-20.529927	129.970279

Table B-5: Indicative monitoring sites for the MNES habitat zone (Princess Parrot habitat)

Appendix C Summary of construction management measures

Table C-1: Summary of Construction management measures.

PARAMETER	MANAGEMENT ACTION	RESPONSIBILITY	
Terrestrial fauna and habitat sub-plan			
Pre-clearance	A pre-clearance survey shall be undertaken prior to ground disturbance and vegetation clearing to identify key habitat elements for Matters of National Environmental Significance including Greater Bilby, Great Desert Skink, Night Parrot or Princess Parrot, and their habitat.	AGIT (Implemented by Construction Contractor)	
Greater Bilby	A pre-clearance survey shall be undertaken to search for burrows in areas of hummock grassland and in paleodrainage channels.	AGIT (implemented by Construction Contractor / Licensed Fauna spotter/handler	
Great Desert Skink	A pre-clearance survey shall be undertaken to search for burrows in hummock grasslands in areas of red sandy soils, and in paleodrainage lines with <i>Melaleuca, Triodia</i> and termite mounds.	AGIT (implemented by Construction Contractor / Licensed Fauna spotter/handler	
Greater Bilby/ Great Desert Skink	Where identified and practicable, direct disturbance to burrows will be avoided by micro-siting of the pipeline route. If burrows are encountered, fauna will be flushed from burrows and allowed the opportunity to move on. If individuals do not move on, a wildlife handler shall translocate individuals to pre-approved areas outside of the construction RoW, which contains suitable habitat for the species.	AGIT (implemented by Construction Contractor / Licensed Fauna spotter/handler	
Vegetation Clearing	Clearing shall be undertaken in a manner to avoid known occurrences and habitat of threatened fauna, as far as practicable, including the retention of habitat trees.	AGIT (implemented by Construction Contractor)	
Flora and vegetat	ion sub-plan		
Bog-rush	Pre-clearing assessment to identify presence of threatened Bog- rush <i>Schoenus centralis</i> shall be undertaken.	AGIT (implemented by Construction Contractor)	
Dwarf Desert Spike-rush	A pre-clearance survey at watercourse crossings shall be undertaken to detect previously unrecorded populations of Dwarf Desert Spike-rush, following rainfall, where practicable.	AGIT (implemented by Construction Contractor)	
Clearing	Where threatened flora species are identified in the pre- clearance survey, impacts shall be avoided where practicable through micro-siting.	AGIT (implemented by Construction Contractor)	
Clearing	Vegetation clearing shall be kept to the minimum amount necessary to allow access or approved works.	AGIT (implemented by Construction Contractor)	
Clearing	Clearing of tall trees along the edges of the construction RoW shall be avoided where possible and/or branches pruned (where feasible) rather than felling.	AGIT (implemented by Construction Contractor)	
Clearing	Overhanging branches shall be trimmed using the 'three-cut method' to prevent bark stripping.	AGIT (implemented by Construction Contractor)	
Clearing	Vegetation shall not be burned.	AGIT (implemented by Construction Contractor)	
Stockpiles	Cleared vegetation shall be stockpiled separately to soils.	AGIT (implemented by Construction Contractor)	

PARAMETER	MANAGEMENT ACTION	RESPONSIBILITY
Stockpiles	Vegetation stockpiles shall be managed in accordance with the Environmental Management Plan.	AGIT (implemented by Construction Contractor)
Weed sub-plan		
Pre-clearance	A pre-clearance inspection shall be undertaken, to validate existing presence of Class A Weeds of National Significance (WONS) prior to construction.	AGIT (implemented by Construction Contractor)
New weeds	New weeds infestations shall be removed and destroyed as soon as practicable.	Senior HSE Advisor / Construction Contractor
Weed control	Weed control shall take place prior to seed set and be carried out in all areas affected by the Project.	AGIT (implemented by Construction Contractor)
Operational procedures	All soil, topsoil, rehabilitation materials and vehicle movements into the Project area shall comply with Clean on Entry procedures.	AGIT (implemented by Construction Contractor)
Topsoil management	Topsoil shall be stockpiled in areas with similar weed risk and not with topsoil from lower weed risk areas.	AGIT (implemented by Construction Contractor)
Soils and sedime	nt sub-plan	
Erosion	If erosion is identified, erosion and sediment control structures shall be constructed, such as sediment traps or drainage controls. NT Erosion and Sediment Control Guidelines shall be used	AGIT (implemented by Construction Contractor)
Erosion	Stockpiles shall be strategically located so as not to impede surface water flows or stock movements.	AGIT (implemented by Construction Contractor)
Soil quality	Within the disturbance footprint, topsoil shall be graded to a depth of 100 mm to 150 mm and stockpiled separately.	AGIT (implemented by Construction Contractor)
Soil quality	Topsoil, subsoil and trench spoil disturbed during earthworks shall be stockpiled separately such that the soil profile may be maintained during backfilling.	AGIT (implemented by Construction Contractor)
Soil quality	Topsoil and subsoil excavated from the bed of a watercourse shall be stockpiled separately and returned to the bed of the watercourse.	AGIT (implemented by Construction Contractor)
Soil quality	Stockpiles shall be at a maximum height of 2 m unless otherwise agreed in consultation with the Department of Primary Industry and Resources (DPIR).	AGIT (implemented by Construction Contractor)
Soil quality	Stockpiles shall be located to avoid creek and drainage line banks and associated vegetation.	AGIT (implemented by Construction Contractor)
Soil quality	Soil shall not be stockpiled where it has the potential to result in sedimentation of land or surface water (e.g. on slopes that drain immediately to a creek or drainage line). Topsoil containment measures e.g. berms and sediment fencing shall be used as necessary	AGIT (implemented by Construction Contractor)
Soil quality	Topsoil and subsoil shall be stockpiled where it can be easily recovered and shall not be lost by wind/water erosion.	AGIT (implemented by Construction Contractor)
Hazardous Materials and Spill Response sub-plan		
Waste	Contaminated materials such as absorbent pads and soil shall be appropriately contained and disposed of in accordance with regulatory requirements at an approved waste management facility.	AGIT (implemented by Construction Contractor)



- Map 1 of 5

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- Control (\bullet)
- Rehabilitation (\bullet)

AaAhGs AkAhAa

Indicative monitoring site locations - Native vegetation - Map 2 of 5



Pipe alignment corridor

Right-of-Way (RoW) corridor

Indicative monitoring site

• Control

Rehabilitation

Vegetation unit (Matiske 2017)
Cleared

AaApAh






Pipe alignment corridor

Right-of-Way (RoW) corridor

Indicative monitoring site

Control (\bullet)

Rehabilitation (\bullet)

Vegetation unit (Matiske 2017) Cleared

CoEgAs





Prepared by: SM Date: 8/02/2018

Rehabilitation

 (\bullet)

Indicative monitoring site locations - Native vegetation - Map 5 of 5





Right-of-Way (RoW) corridor

Indicative monitoring site

- Control
- Rehabilitation

Cleared CcEgCo CoCcEp

Vegetation unit (Matiske 2017)



Indicative monitoring site locations - MNES habitat zones - Map 1 of 7



Legend

- Pipe alignment corridor
- Right-of-Way (RoW) corridor Indicative monitoring site
- Control
- Rehabilitation

MNES habitat

- Dwarf Desert Spike-rush potential habitat
- Greater Bilby and Great Desert Skink potential habitat
- 777 Night Parrot potential habitat
 - Princess Parrot potential habitat



1A

• 1B



- Pipe alignment corridor
- Right-of-Way (RoW) corridor Indicative monitoring site
- Control
- Rehabilitation

- Dwarf Desert Spike-rush potential habitat
- Greater Bilby and Great Desert Skink potential habitat
- Might Parrot potential habitat



Indicative monitoring site locations - MNES habitat zones - Map 3 of 7



- Pipe alignment corridor
- Right-of-Way (RoW) corridor

Indicative monitoring site

- Control (\bullet)
- Rehabilitation (\bullet)

MNES habitat

- Dwarf Desert Spike-rush potential habitat
- Princess Parrot potential habitat







- Pipe alignment corridor
- Right-of-Way (RoW) corridor Indicative monitoring site
- Control
- Rehabilitation

- Dwarf Desert Spike-rush potential habitat
- Greater Bilby and Great Desert Skink potential habitat
- Wight Parrot potential habitat
 - Princess Parrot potential habitat





- Pipe alignment corridor
- Right-of-Way (RoW) corridor Indicative monitoring site
- Control (\bullet)
- Rehabilitation (\bullet)

- Dwarf Desert Spike-rush potential habitat
- Greater Bilby and Great Desert Skink potential habitat
- Night Parrot potential habitat 1
 - Princess Parrot potential habitat







- Pipe alignment corridor
- Right-of-Way (RoW) corridor
- Indicative monitoring site
- Control
- Rehabilitation

- Greater Bilby and Great Desert Skink potential habitat
- Night Parrot potential habitat
 - Princess Parrot potential habitat





- Pipe alignment corridor
- Right-of-Way (RoW) corridor
- Indicative monitoring site
- Control
- Rehabilitation

- Greater Bilby and Great Desert Skink potential habitat
- Night Parrot potential habitat
 - Princess Parrot potential habitat











HEAD OFFICE

Suite 2, Level 3 668-672 Old Princes Highway Sutherland NSW 2232 T 02 8536 8600 F 02 9542 5622

CANBERRA

Level 2 11 London Circuit Canberra ACT 2601 T 02 6103 0145 F 02 9542 5622

COFFS HARBOUR

22 Ray McCarthy Drive Coffs Harbour NSW 2450 T 02 6651 5484 F 02 6651 6890

PERTH

Level 1, Bishop's See 235 St Georges Terrace Perth WA 6000 T 08 6218 2200 F 02 9542 5622

MELBOURNE

Level 1, 436 Johnston St Abbotsford, VIC 3076 T 1300 646 131

SYDNEY

Suite 1, Level 1 101 Sussex Street Sydney NSW 2000 T 02 8536 8650 F 02 9542 5622

NEWCASTLE

Suites 28 & 29, Level 7 19 Bolton Street Newcastle NSW 2300 T 02 4910 0125 F 02 9542 5622

ARMIDALE

92 Taylor Street Armidale NSW 2350 T 02 8081 2685 F 02 9542 5622

WOLLONGONG

Suite 204, Level 2 62 Moore Street Austinmer NSW 2515 T 02 4201 2200 F 02 9542 5622

BRISBANE

Suite 1, Level 3 471 Adelaide Street Brisbane QLD 4000 T 07 3503 7192

1300 646 131 www.ecoaus.com.au

HUSKISSON

Unit 1, 51 Owen Street Huskisson NSW 2540 T 02 4201 2264 F 02 9542 5622

NAROOMA

5/20 Canty Street Narooma NSW 2546 T 02 4302 1266 F 02 9542 5622

MUDGEE

Unit 1, Level 1 79 Market Street Mudgee NSW 2850 T 02 4302 1234 F 02 6372 9230

GOSFORD

Suite 5, Baker One 1-5 Baker Street Gosford NSW 2250 T 02 4302 1221 F 02 9542 5622

ADELAIDE

2, 70 Pirie Street Adelaide SA 5000 T 08 8470 6650 F 02 9542 5622