Tanami Gas Pipeline Annual Rehabilitation Monitoring Report 2020

Australian Gas Infrastructure Group

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Abbreviations

Abbreviation	Description
AGIG	Australian Gas Infrastructure Group
BoM	Bureau of Meteorology
ELA	Eco Logical Australia
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ha	hectare
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for the Conservation of Nature
km	kilometre
m	metre
mm	millimetre
MNES	Matters of National Environmental Significance
NT	Northern Territory
RoW	Right of Way
TNP	Tanami Newmont Gas Pipeline
TPWCA	Northern Territory *Parks and Wildlife Conservation Act 2006*
WoNS	Weeds of National Significance

Executive Summary

Eco Logical Australia was engaged by Australian Gas Infrastructure Group in March 2020 to undertake vegetation rehabilitation monitoring along the Tanami Newmont Gas Pipeline, a 440 kilometre pipeline connecting the existing Amadeus Gas Pipeline to the Granites and Dead Bullock Soak mines to transport natural gas to displace the use of diesel fuel at the two mines. Assessment of botanical values were undertaken in view of minimum standards outlined in the flora and vegetation rehabilitation completion criteria, as specified in the approved Australian Gas Infrastructure Group *Tanami Newmont Gas Pipeline Rehabilitation Plan*, prepared by Eco Logical Australia in 2018.

A total of seventeen vegetation monitoring sites, each comprising an impact (rehabilitation) quadrat and an adjacent control quadrat (34 quadrats in total), were established between 16th and 21st March 2020. Monitoring sites were selected to ensure appropriate spatial distance and replication of sites within each of the Rehabilitation Zones identified and outlined in the *Tanami Newmont Gas Pipeline Rehabilitation Plan*, namely: native vegetation zone, MNES habitat zone (Dwarf Desert Spike-rush habitat), MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat) and MNES habitat zone (Princess Parrot habitat).

No Threatened flora listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded during the field survey. Four flora species listed as Data Deficient and one species listed as Infraspecific under the Northern Territory *Parks and Wildlife Conservation Act 2006* were recorded, namely *Heliotropium parviantrum* (Data Deficient), *Heliotropium subreniforme* (Data Deficient), *Sida* sp. excedentifolia (J.L. Egan 1925) (Data Deficient), *Tribulus minutus* (Data Deficient) and *Tribulus brachyodon* (Infraspecific).

A total of four introduced (weed) species were recorded, namely **Cenchrus ciliaris*, **Citrullus colocynthis*, **Cynodon dactylon* and **Eragrostis minor*. Of these, none are listed as Declared Weeds or Weeds of National Significance in the Northern Territory (Department of Environment and Natural Resources 2019).

All rehabilitation zones satisfied minimum standards outlined in the completion criteria for native flora species richness and weed species foliage cover, while three of the four rehabilitation zones satisfied requirements for native perennial flora species density. High rainfall, particularly in the northern region of the pipeline, has likely led to pulse recruitment and therefore high numbers of individual plants in rehabilitation zones. Future surveys will better reflect the viability and survival rates of seedlings.

MNES habitat zone (Dwarf Desert Spike-rush habitat), which has representative sites in the southern portion of the Tanami Newmont Gas Pipeline, failed to meet completion criteria requirements for native perennial flora species density. Southern sections of the Tanami Newmont Gas Pipeline received noticeably less rainfall than the central and northern sections and it is likely that this resulted in lower seedling emergence and survival rates at monitoring sites representing this rehabilitation zone.

All rehabilitation zones failed to meet minimum requirements for native perennial flora species foliage cover. Low native perennial foliage cover would be expected for such early phase rehabilitation and this is likely to improve over time given the robust native perennial species richness and plant densities recorded.

1. Introduction

1.1 Project background

Australian Gas Infrastructure Group (AGIG) completed the construction of the Tanami Newmont Gas Pipeline (TNP), a 440-kilometre (km) pipeline connecting the existing Amadeus Gas Pipeline to the Granites and Dead Bullock Soak mines to transport natural gas to displace the use of diesel fuel at the two mines. The TNP passes through Aboriginal Freehold, Pastoral Land and Crown Land tenures.

Temporary disturbance of a 25 metre (m) Right of Way (RoW) was required to construct the TNP as well as four construction camps, access tracks and a temporary water storage during construction. The total area impacted covered 1,161 hectares (ha) of native vegetation.

Majority of the alignment, excluding permanent facilities and 26 ha of required access tracks, has been rehabilitated post-construction and allowed to return to native vegetation. 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 flora and fauna habitat (including for MNES); and
- Landform instability (reducing the potential for erosion and sedimentation of surrounding water bodies).

1.2 Objectives

Eco Logical Australia (ELA) was engaged by AGIG to undertake rehabilitation monitoring at 17 vegetation monitoring sites along the TNP, of which each comprises an impact (rehabilitation) and an adjacent control quadrat (34 quadrats in total). Vegetation monitoring sites were selected to ensure appropriate spatial distance and replication of sites within each of the Rehabilitation Zones identified and outlined in the approved *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a)

The purpose of this report is to assess progress of rehabilitation after 12 months towards achievement of approved completion criteria, as outlined in the *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a) and to identify where contingency actions need to be implemented to manage any risks to rehabilitation outcomes.

1.3 Legislative context

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's key piece of environmental legislation. The EPBC Act enables the Australian Government to join with the states and territories in providing a truly national scheme of environment and heritage protection and biodiversity conservation. The EPBC Act focuses Australian Government interests on the protection of Matters of National Environmental Significance (MNES), with the states and territories having responsibility for matters of state and local significance.

The Northern Territory *Parks and Wildlife Conservation Act 2006* (TPWCA) is the primary legislative framework for managing the protection and conservation of biodiversity in the Northern Territory. The TPWCA legislative framework includes mechanisms for the classification and management of wildlife; classification and control of feral animals; permitting requirements to take wildlife and; designation and management of protected lands. The TPWCA determines the conservation status of flora and fauna species utilising an analogous classification system and criteria to that developed by the International Union for the Conservation of Nature (IUCN).

Classification categories for flora listed under the Commonwealth EPBC Act and the Northern Territory TPWCA are listed in **Appendix A**.

1.4 Completion criteria

AGIG are ultimately responsible for the successful rehabilitation of the construction RoW to meet approved completion criteria, as outlined in the AGIG *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a; **Table 1-1)**.

Table 1-1: Rehabilitation completion criteria (ELA 2018a)

Aspect	Native vegetation rehabilitation zone completion criteria	MNES habitat rehabilitation zone completion criteria
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.	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 quadrat)	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.	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 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.	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.

Aspect	Native vegetation rehabilitation zone completion criteria	MNES habitat rehabilitation zone completion criteria
Weed foliage cover (%)	Percentage of foliage cover of Declared species under the Weeds Management Act, Weeds of National Significance (WONS) and Buffel grass (*Cenchrus ciliaris*) is not greater than that of the adjacent control area at 12 months, 24 months and 36 months.	Percentage of foliage cover of Declared species under the Weeds Management Act, Weeds of National Significance (WONS) and Buffel grass (*Cenchrus ciliaris*) is not greater than that of the adjacent control area at 12 months, 24 months and 36 months.

Figure 1-1: Vegetation monitoring site overview

Site 15
Site 10
Site 9
Site 14
Site 8
Site 7
Site 13
Site 6
Site 5
Site 12
Site 4
Site 17
Site 11
Site 16
Site 2
Site 3
Site 1

465 m
509 m
789 m
634 m
838 m
546 m
1075 m
1397 m
1510 m

Legend

- Tanami Newmont Gas Pipeline
- Vegetation monitoring site

0 25 50
Kilometres
Datum/Projection:
GDA 1994 MGA Zone 52

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Prepared by: SM Date: 13/05/2020

2. Environmental setting

2.1 Climate

The Tanami Gas Pipeline Project Area traverses' bioregions with typically arid to semiarid and tropical climates and monsoonal influences, with monsoonal events typically occur over the 'wet season' between November and April (Bastin and the ACRIS Management Committee 2008).

Rabbit Flat weather station (station number 15666; climate data 1996-present) and Alice Springs Desert Park weather station (station number 15679; climate data 2011-present) are the nearest Bureau of Meteorology (BoM) weather stations to either end of the TNP with active, complete and uncompromised rainfall data sets. In the 12 months preceding the field survey in March 2020, the areas received a total of 285.5 millimetres (mm) and 100.4 mm of rainfall (Rabbit Flat and Alice Springs Desert Park, respectively) which is below the long-term average of 462.7 mm and 242.5 mm for the same areas. In the three months prior to the field survey, the area received a total of 250.4 mm of rainfall in the north (Rabbit Flat), which is comparable to the long-term average of 281.8 mm for the same time period, and 61.6 mm of rainfall in the south (Alice Springs Desert Park), which is less than the long-term average of 121.4 mm for the same time period (BoM 2020).

Temperature data was not available at Alice Springs Desert Park station. The next nearest weather station with a complete temperature dataset was Alice Springs Airport (station number 15590, climate data 1996-present). Mean maximum temperatures in the region range from 20°C in June to 40.8°C in December in the north (Rabbit Flat) and 26.6°C in June to 43.4°C in December in the south (Alice Springs Airport). Mean minimum temperatures in the region range from 3.3°C in August to 24.2°C in January in the north (Rabbit Flat) and 6.8°C in July to 25.5°C in January in the south (Alice Springs Airport). Rainfall and temperature data are presented in **Figure 2-1**.

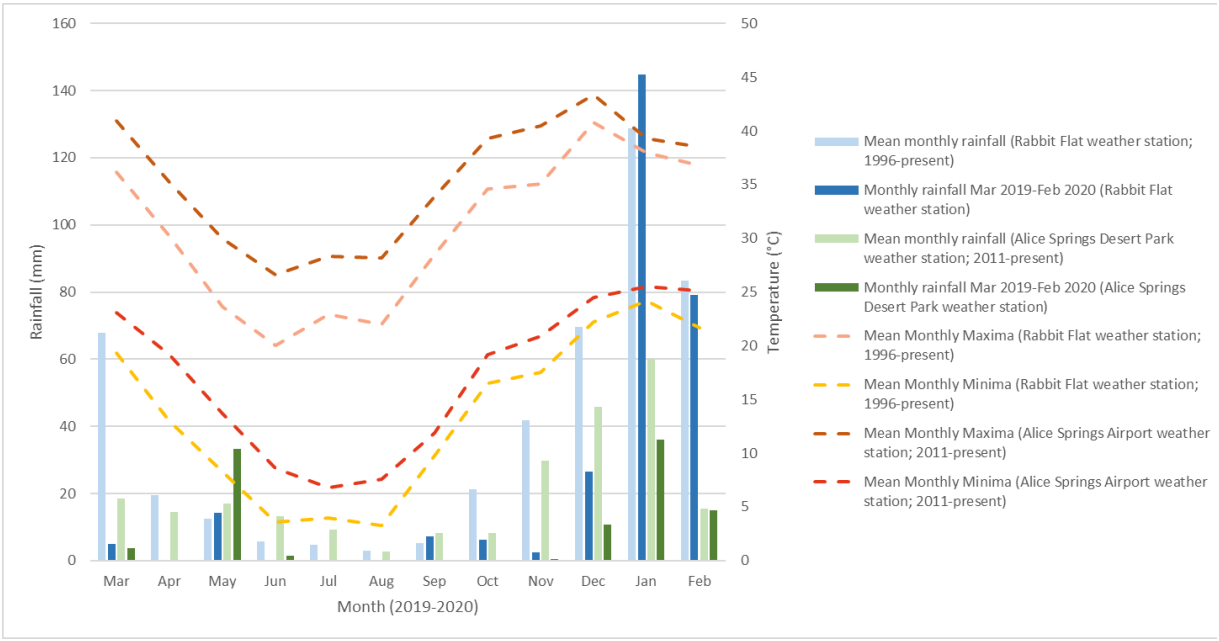

Figure 2-1: Rainfall data recorded from the Rabbit Flat (15666) and Alice Springs Desert Park (15679) weather stations 12 months prior to the field survey compared to the long-term average; Mean maximum and mean minimum temperature data recorded from the Rabbit Flat (15666) and Alice Springs Airport (15590) weather stations (BoM 2020)

2.2 Regional context

2.2.1 Interim Biogeographical Regionalisation for Australia

The Interim Biogeographic Regionalisation for Australia (IBRA) Version 7 divides Australia into 89 bioregions and 419 subregions across Australia, based on a range of biotic and abiotic factors, including climate variability, vegetation, fauna, geology and landform (Thackway and Cresswell 1995). The TNP traverses three bioregions and six sub-regions, namely Burt Plain (Yuendumu [BRT01] and Atartinga [BRT02] subregions), Great Sandy Desert (Mackay [GDS02], Lake Bennett [GSD05] and Lake Lewis [GSD06] subregions) and Tanami (Tanami Desert [TAN01] subregion) bioregions.

2.2.2 Regional landscape and vegetation

The Burt Plain bioregion is characterised by plain and low rock ranges. Vegetation is predominantly mulga and other *Acacia* woodlands with short grasses and forbs, and spinifex grasslands (Bastin and the ACRIS Management Committee 2008). The Great Sandy Desert bioregion is characterised by red sand plains, dune fields and remnant rocky outcrops. Vegetation is predominantly spinifex grasslands, low woodlands and shrubs (Bastin and the ACRIS Management Committee 2008). The Tanami bioregion is characterised by featureless sand plains with small areas of alluvial plains, low ridges and stony rises. Vegetation is predominantly spinifex hummock grassland with a tall-sparse shrub overstory (Bastin and the ACRIS Management Committee 2008).

2.3 Environmental values

Environmental values relevant to the TNP focuses on habitat values for MNES. More specifically, Threatened flora and fauna species relevant to the TNP include:

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

Distinct rehabilitation zones for both native vegetation and MNES habitat for species outlined above were defined, with vegetation monitoring sites chosen to ensure appropriate replication within each of the five defined zones, as outlined in the *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a; **Table 2-1**). Several monitoring sites are recognised as potentially supporting multiple MNES and are therefore represented within more than one rehabilitation zone. For example, monitoring site 10 was established in habitat potentially supporting Greater Bilby, Great Desert Skink, Night Parrot and Princess Parrot.

Table 2-1: Rehabilitation zones outlined in the *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a)

Rehabilitation zone	Zone description (ELA 2018a)	Representative monitoring sites
Native vegetation zone	Defined as all native vegetation within the Project Area, excluding areas mapped as MNES habitat zones below.	11, 12, 13, 14, 15, 17
MNES habitat zone (Dwarf Desert Spike-rush habitat)	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.	1, 3, 4, 6, 8

Rehabilitation zone	Zone description (ELA 2018a)	Representative monitoring sites
MNES habitat zone (Greater Bilby and Great Desert Skink habitat)	*Eucalyptus*/*Corymbia*/*Acacia* woodlands over *Triodia* hummocks, and *Melaleuca* and *Acacia* shrublands over *Triodia* hummocks, on sandplains and paleodrainage channels and in proximity to recent records in the north and the south of the Project Area.	2, 5, 7, 9, 10, 16
MNES habitat zone (Night Parrot habitat)	*Triodia* dominated grasslands and *Astrebla* dominated shrubby samphire and chenopod associations with scattered trees and shrubs within the Project Area.	2, 5, 7, 9, 10, 16
MNES habitat zone (Princess Parrot habitat)	Sandplain woodlands and shrublands, dominated by scattered *Eucalyptus*, *Casuarina* or *Allocasuarina*, with an understorey of *Acacia*, *Eremophila*, *Grevillea*, *Hakea*, *Senna* and ground cover of *Triodia*; and riparian areas dominated by large *Eucalyptus* or *Allocasuarina* within the Project Area. Rehabilitation completion criteria in this zone relates only to understorey and ground cover species.	1, 4, 5, 7, 10

3. Methodology

3.1 Field survey

3.1.1 Survey team and timing

The field survey was undertaken from 16th to 21st March 2020 by Dr. Jeff Cargill (Senior Botanist), Daniel Brassington (Botanist), Jeni Morris (Ecologist) and Jane Cameron (Graduate Ecologist). The survey teams' relevant qualifications, experience and licences are provided below in **Table 3-1**.

Table 3-1: Survey team

Name	Qualification	Relevant experience	Licence
Dr. Jeff Cargill	BSc. Hons. PhD Environmental Sciences	Jeff has over 13 years' experience in botanical and ecological studies throughout WA and the NT including baseline vegetation studies (reconnaissance and detailed surveys), threatened and priority flora surveys, biological data analysis and rehabilitation and vegetation monitoring programs. Jeff undertook the 2017 Flora and Vegetation Assessment of the TNP. He has also completed rehabilitation monitoring for the CS2-Tubridgi-Wheatstone Natural Gas Pipeline and the Fortescue River Gas Pipeline.	Permit number: 66439
Daniel Brassington	BSc. Hons. Environmental Science	Daniel has over 10 years' experience in botanical surveys and environmental services throughout Western Australia. This includes baseline vegetation studies (reconnaissance and detailed surveys), threatened and priority flora surveys, rehabilitation and vegetation monitoring, targeted species surveys, weed control, seed collection and processing, nursery operations and revegetation operations. Daniel has an extensive background in both mining and consulting, particularly in remote areas.	Permit number: 66439
Jeni Morris	BSc. Conservation and Wildlife Biology	Jeni has over 4 years' experience undertaking flora and fauna surveys in the arid zones of WA and the NT, including baseline, Targeted Threatened species surveys and rehabilitation monitoring programs. Jeni undertook the flora and fauna pre-clearance survey for the TNP in 2018.	Permit number: 66439
Jane Cameron	BSc. Wildlife Conservation Biology	Jane Cameron is a recent wildlife conservation biology graduate working for ELA in the capacity of a Graduate Ecologist. Jane has undertaken a combination of field and office work across a variety of disciplines including approvals, ecology, mine closure and hydrogeology.	N/A

A total of 34 sites (17 rehabilitation and 17 control quadrats) were selected in order ensure appropriate replication of monitoring across the length of the TNP, and within each of the rehabilitation zones outlined in Section 2.3 above. Sites were selected based on preliminary sites outlined in the *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a), further refined in the *Pre-clearance Survey Report* (ELA 2018b) and from ground-truthing during the field survey. GPS coordinate locations of monitoring sites are provided in **Appendix B**.

A 10 x 50 m rehabilitation and control quadrat were established at each vegetation monitoring site. Control quadrats were permanently demarcated with a steel fence dropped in the north-west corner, and wooden fence droppers in the north-east, south-east and south-west corners. Due to safety reasons associated with the nature and depth of the high-pressure gas pipeline, rehabilitation quadrats were not permanently demarcated with metal fence droppers and demarcated with GPS coordinates and reference photos only.

Within each quadrat, the following information was recorded (as relevant to the completion criteria and in accordance with approved methodology outlined in the '*Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping'* (Brocklehurst et al. 2007):

- Site number and quadrat type (rehabilitation or control), coordinates, time and date;
- Native flora species density (number of plants per m^2);
- 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); and
- General observations (i.e. feral animal disturbance, fire occurrence, signs of erosion).

Rehabilitation quadrats were established within the 'core' of rehabilitated areas to minimise the impacts of edge effects and to avoid transitional vegetation/habitats. Paired control quadrats were established outside of the disturbance area, in intact (undisturbed) vegetation within 300 m of the construction RoW. Each control quadrat was established in the same native vegetation communities or MNES habitat zone as the rehabilitation quadrat to assist comparisons between rehabilitation and control. Photo monitoring points were established at each vegetation monitoring site to provide a visual comparison between sites, with two photographs taken at each site: one at the northwest and one at the southeast corner of each quadrat.

3.1.2 Data analysis

Perennial native richness, foliage cover and weed foliage cover per 10 x 50 m quadrat and perennial native species density per m^2 were calculated for control and rehabilitation quadrats. The mean and standard error for each factor was then calculated for control and rehabilitation quadrats within each rehabilitation zone. Rehabilitation areas were then compared against controls in view of the completion criteria. Tree species, namely *Corymbia* spp. and *Eucalyptus* spp. were removed from the analysis for rehabilitation quadrats, as specified in the approved completion criteria outlined in Section 1.4. It is noted that certain *Acacia* species have the potential to grow in tree form (Mulga), and these will be excluded on an individual basis where appropriate.

3.1.3 Specimen identification and nomenclature

Flora specimen identification was undertaken by ELA Botanists Dr. Jeff Cargill and Daniel Brassington. Additional specimens were confirmed by Northern Territory (NT) Herbarium (Alice Springs Branch) Senior Botanist Peter Jobson. Where considered appropriate, specimens that meet NT specimen lodgement requirements (e.g. Threatened flora, range extensions) will be submitted along with Threatened and Priority Report forms to the NT government.

3.2 Survey limitations and constraints

Constraints and limitations for the rehabilitation monitoring are summarised in **Table 3-2**.

Table 3-2: Survey limitations

Constraint	Limitation
Sources of information	**Not a constraint**: The TNP has been well surveyed, with a number of flora and vegetation survey reports able to be utilised for the purpose of this survey.
Scope of work	**Not a constraint**: The survey requirement for rehabilitation monitoring in accordance with the *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a) and the *Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping* (Brocklehurst *et al*. 2007) was adequately met.
Completeness of survey	**Not a constraint**: The area was surveyed to the satisfaction of the scope.
Intensity of survey	**Not a constraint**: Survey effort was considered adequate to meet the objectives of the scope. A total of 34 quadrats (17 rehabilitation and 17 control) were established across the TNP, with a sufficient number established per rehabilitation zone.
Timing, weather, season, cycle	**Not a constraint**: Rehabilitation monitoring was undertaken in March 2020, the 'wet season' 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). Below average rainfall was recorded from Alice Springs Desert Park weather station (station number 15679) in the months preceding the field survey, resulting in drier conditions within the southernmost monitoring sites. Consequently, in some cases the positive identification of annual and cryptic perennial species was difficult. The validity of results, however, was not compromised, with criteria based on the differentiation of perennial species and weeds within a given quadrat and not the positive identification of the individual itself.
Disturbances	**Not a constraint**: Disturbances within the monitoring sites included the presence of weeds, disturbance from cattle activity (grazing, scats and trampling) and evidence of heat stress. These disturbances did not negatively impact the ability to meet the requirements outline in the scope of works.
Resources	**Not a constraint**: The personnel conducting this field survey were suitably qualified to identify flora specimens, having previously undertaken flora and vegetation assessments for the TNP.
Accessibility	**Not a constraint**: All areas of the TNP were able to be accessed by vehicle or on foot. Access restrictions were enforced for the two northernmost sites (10 and 15) located within the Newmont Mine lease. These sites were relocated south into representative habitat. Rehabilitation quadrats for the original locations were established, with photo monitoring points established in the adjacent control quadrats, in the event that access is granted in those areas in the future.

4. Results

4.1 Flora

A total of 191 vascular plant taxa (187 native and 4 introduced) were recorded, representing 96 plant genera and 41 plant families. The majority of taxa recorded represented the Poaceae (42 taxa), Fabaceae (39 taxa) and Malvaceae (19 taxa) families. Total species richness was higher in rehabilitation areas, with 136 species being recorded compared to 126 in control areas. Species lists and a species by site matrix are presented in **Appendix B** and **Appendix C**, respectively.

4.2 Rehabilitation zones

Native vegetation zone:

Control: 74 vascular plant taxa, representing 50 plant genera and 23 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (21 taxa), Fabaceae (17 taxa) and Zygophyllaceae (4 taxa) families. Of the 74 vascular plant taxa recorded, none were introduced (weed) species.

Rehabilitation: 83 vascular plant taxa, representing 52 plant genera and 24 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (24 taxa), Fabaceae (16 taxa) and Malvaceae (8 taxa) families. Of the 83 vascular plant taxa recorded, two were introduced (weed) species.

MNES habitat zone (Dwarf Desert Spike-rush habitat):

Control: 73 vascular plant taxa, representing 51 plant genera and 39 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (19 taxa), Fabaceae (14 taxa) and Malvaceae (5 taxa) families. Of the 73 vascular plant taxa recorded, four were introduced (weed) species.

Rehabilitation: 66 vascular plant taxa, representing 47 plant genera and 22 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (17 taxa), Fabaceae (10 taxa) and Malvaceae (7 taxa) families. Of the 66 vascular plant taxa recorded, three were introduced (weed) species.

MNES habitat zone (Greater Bilby and Great Desert Skink habitat) and MNES habitat zone (Night Parrot habitat):

Control: 65 vascular plant taxa, representing 44 plant genera and 23 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (17 taxa), Fabaceae (12 taxa) and Malvaceae (7 taxa) families. Of the 65 vascular plant taxa recorded, one was an introduced (weed) species.

Rehabilitation: 59 vascular plant taxa, representing 42 plant genera and 20 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (18 taxa), Fabaceae (12 taxa) and Commelinaceae / Zygophyllaceae (3 taxa in each) families. Of the 59 vascular plant taxa recorded, two were introduced (weed) species.

MNES habitat zone (Princess Parrot habitat):

Control: 67 vascular plant taxa, representing 52 plant genera and 24 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (15 taxa), Fabaceae (14 taxa) and Malvaceae (5 taxa) families. Of the 67 vascular plant taxa recorded, two were introduced (weed) species.

Rehabilitation: 67 vascular plant taxa, representing 48 plant genera and 19 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (17 taxa), Fabaceae (15 taxa) and Zygophyllaceae (4 taxa) families. Of the 67 vascular plant taxa recorded, three were introduced (weed) species.

4.3 Flora of significance

No Threatened flora species listed under the Commonwealth EPBC Act were recorded within vegetation monitoring sites. A total of four species listed as Data Deficient (DD) under the Northern Territory TPWCA and one species listed as Infraspecific (INFRA) were recorded within the vegetation monitoring sites (**Table 4-1**; **Figure 4-1**). Classification categories for flora of significance are listed in **Appendix A**. A breakdown of flora of significance recorded is provided in **Appendix E**.

Table 4-1: Flora of significance recorded at monitoring sites across the TNP

Species	Conservation status (TPWCA)	Site(s)	Quadrat type	Total # individuals
Heliotropium parviantrum	DD	15	Rehabilitation	20
Heliotropium subreniforme	DD	7	Rehabilitation	15
Sida sp. excedentifolia (J.L. Egan 1925)	DD	3, 11, 17	Rehabilitation	28
Tribulus minutus	DD	4, 5, 6, 12	Control	8
Tephrosia brachyodon	INFRA	3	Rehabilitation	4

4.4 Introduced (weed) species

A total of four introduced (weed) species were recorded within the vegetation monitoring sites, namely **Cenchrus ciliaris*, **Citrullus colocynthis*, **Cynodon dactylon* and **Eragrostis minor*. Of these, none are listed as Declared Weeds or Weeds of National Significance (WoNS) in the Northern Territory (Department of Environment and Natural Resources 2019). **Cenchrus ciliaris* was recorded from within eight sites across the length of the TNP; comprising four control quadrats (1, 2, 8 and 9) and four rehabilitation quadrats (1, 7, 8 and 15). **Citrullus colocynthis* was recorded from one control quadrat (6). **Cynodon dactylon* was recorded from three sites; one control quadrat (1) and two rehabilitation quadrats (1 and 8). **Eragrostis minor* was recorded from five sites; one control quadrat (6) and four rehabilitation quadrats (5, 6, 15 and 17). A breakdown of introduced (weed) species recorded is provided in **Appendix F**.

4.5 Fulfilment of completion criteria

Results across the 17 established vegetation monitoring sites were averaged for each of the five rehabilitation zones and assessed against approved completion criteria outlined in the AGIG *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a). An overview of results is presented in **Table 4-2**.

4.5.1 Native vegetation zone

The native vegetation zone, represented by six vegetation monitoring sites (11, 12, 13, 14, 15 and 17) satisfied three of the four completion criteria (**Table 4-2**). These being: native perennial flora species density (Control: 0.09 ± 0.03; Rehabilitation 0.25 ± 0.13), native perennial flora species richness (Control: 11.67 ± 1.91; Rehabilitation: 11.67 ± 1.17) and; weed foliage cover (Control: 0; Rehabilitation: 0). Native flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 22.54 ± 6.58; Rehabilitation: 4.46 ± 1.51). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

4.5.2 MNES habitat zone (Dwarf Desert Spike-rush)

The MNES habitat zone (Dwarf Desert Spike-rush), represented by five vegetation monitoring sites (1, 3, 4, 6 and 8) satisfied two of the four completion criteria (**Table 4-2**). These being: native perennial flora species richness (Control: 11.20 ± 1.53; Rehabilitation: 9.20 ± 1.46) and; weed foliage cover (Control: 0.80 ± 0.10; Rehabilitation: 0.21 ± 0.04). Native perennial flora species density (Control: 0.03 ± 0.01; Rehabilitation 0.02 ± 0.01) and native flora species foliage cover (Control: 16.77 ± 6.02; Rehabilitation: 7.04 ± 6.63) failed to meet the minimum requirement outlined in the completion criteria. A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

4.5.3 MNES habitat zone (Greater Bilby and Great Desert Skink habitat)

The MNES habitat zone (Greater Bilby and Great Desert Skink habitat), represented by six vegetation monitoring sites (2, 5, 7, 9, 10 and 16) satisfied three of the four completion criteria (**Table 4-2**). These being: native perennial flora species density (Control: 0.10 ± 0.04; Rehabilitation 0.20 ± 0.13), native perennial flora species richness (Control: 10.00 ± 1.91; Rehabilitation: 7.00 ± 2.66) and; weed foliage cover (Control: 0.03 ± 0.003; Rehabilitation: 0.01 ± 0.002). Native flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 25.70 ± 8.79; Rehabilitation: 2.96 ± 1.49). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

4.5.4 MNES habitat zone (Night Parrot habitat)

The MNES habitat zone (Night Parrot habitat), represented by six vegetation monitoring sites (2, 5, 7, 9, 10 and 16) satisfied three of the four completion criteria (**Table 4-2**). These being: native perennial flora species density (Control: 0.10 ± 0.04; Rehabilitation 0.20 ± 0.13), native perennial flora species richness (Control: 10.00 ± 1.91; Rehabilitation: 7.00 ± 2.66) and; weed foliage cover (Control: 0.03 ± 0.003; Rehabilitation: 0.01 ± 0.002). Native flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 25.70 ± 8.79; Rehabilitation: 2.96 ± 1.49). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

4.5.5 MNES habitat zone (Princess Parrot habitat)

The MNES habitat zone (Princess Parrot habitat), represented by five vegetation monitoring sites (1, 4, 5, 7 and 10) satisfied three of the four completion criteria (**Table 4-2**). These being: native perennial flora species density (Control: 0.09 ± 0.05; Rehabilitation 0.23 ± 0.16), native perennial flora species richness (Control: 11.80 ± 2.37; Rehabilitation: 9.40 ± 2.66) and; weed foliage cover (Control: 0.50 ± 0.10; Rehabilitation: 0.02 ± 0.002). Native flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 18.42 ± 5.50; Rehabilitation: 3.29 ± 1.74). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

Table 4-2: Assessment of each of the rehabilitation zones (individual sites combined) assessed against each of the approved completion criteria

Rehabilitation zone	Representative sites	Native flora species density (plants per m2)	Native flora species richness (per quadrat)	Native flora species foliage cover (%)	Weed foliage cover (%)
Native vegetation zone	11, 12, 13, 14, 15, 17	PASS	PASS	FAIL	PASS
MNES habitat zone (Dwarf Desert Spike-rush habitat)	1, 3, 4, 6, 8	FAIL	PASS	FAIL	PASS
MNES habitat zone (Greater Bilby and Great Desert Skink habitat)	2, 5, 7, 9, 10, 16	PASS	PASS	FAIL	PASS
MNES habitat zone (Night Parrot habitat)	2, 5, 7, 9, 10, 16	PASS	PASS	FAIL	PASS
MNES habitat zone (Princess Parrot habitat)	1, 4, 5, 7, 10	PASS	PASS	FAIL	PASS

4.6 Photo monitoring points

Photo monitoring points were established at each vegetation monitoring site to provide a visual comparison between sites, with two photographs taken at each: one at the northwest and one at the southeast corner of each 10 x 50 m quadrat. Photo monitoring is presented in **Appendix H**.

Figure 4-1: Flora of significance recorded at monitoring sites across the TNP

Legend

Tanami Newmont Gas Pipeline

Flora of Significance

- *Heliotropium parviantrum* (DD)
- *Heliotropium subreniforme* (DD)
- *Sida* sp. excedentifolia (J.L. Egan 1925) (DD)
- *Tephrosia brachyodon* (INFRA)
- *Tribulus minutus* (DD)

0 25 50
Kilometres
Datum/Projection:
GDA 1994 MGA Zone 52

N

ecological AUSTRALIA
A TETRA TECH COMPANY

Prepared by: SM Date: 13/05/2020

5. Summary and discussion

ELA was commissioned by AGIG to undertake rehabilitation monitoring along the Tanami Newmont Gas Pipeline, a 440-kilometre pipeline connecting the existing Amadeus Gas Pipeline to the Granites and Dead Bullock Soak mines to transport natural gas to displace the use of diesel fuel at the two mines.

A total of seventeen vegetation monitoring sites, each comprising an impact (rehabilitation) quadrat and an adjacent control quadrat (34 quadrats in total), were established between 16th and 21st March 2020. Vegetation monitoring sites were selected to ensure appropriate spatial distance and replication of sites within each of the Rehabilitation Zones identified and outlined in the *Tanami Newmont Gas Pipeline Rehabilitation Plan*, namely' native vegetation zone', 'MNES habitat zone (Dwarf Desert Spike-rush habitat)', 'MNES habitat zone (Greater Bilby and Great Desert Skink habitat)', 'MNES habitat zone (Night Parrot habitat)' and 'MNES habitat zone (Princess Parrot habitat)'.

No Threatened flora listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded during the field survey. A total of four flora species listed as Data Deficient (DD) under the Northern Territory *Parks and Wildlife Conservation Act 2006* (TPWCA 2006) and one species listed as Infraspecific (INFRA) were recorded, namely *Heliotropium parviantrum* (DD), *Heliotropium subreniforme* (DD), *Sida* sp. excedentifolia (J.L. Egan 1925) (DD), *Tribulus minutus* (DD) and *Tribulus brachyodon* (INFRA). All of these species, with the exception of *Tribulus minutus* (DD), occurred within rehabilitation quadrats. Species in these generas tend to respond well to disturbance and so would be expected to colonise previously disturbed areas. Future surveys will determine whether these are viable populations of these species.

One induvial of *Corymbia opaca* was recorded from within the vegetation monitoring site 4 rehabilitation quadrat. Early intervention to remove this individual would be recommended to avoid establishment of these large, deep rooted trees above the natural gas pipeline.

A total of four introduced (weed) species were recorded within the vegetation monitoring sites, namely **Cenchrus ciliaris*, **Citrullus colocynthis*, **Cynodon dactylon* and **Eragrostis minor*. Of these, none are listed as Declared Weeds or Weeds of National Significance (WoNS) in the Northern Territory (Department of Environment and Natural Resources 2019). All rehabilitation zones satisfied the completion criteria for weed species foliage cover, with low numbers of weed species and densities recorded generally across the vegetation monitoring sites. Future surveys will determine whether weed populations increase and therefore require weed control and management.

All rehabilitation zones satisfied the completion criteria for native flora species richness, while three of the four rehabilitation zones passed the requirements for native perennial flora species density. High rainfall, particularly in the northern region of the pipeline, has likely led to pulse recruitment and therefore high numbers of individual plants in rehabilitation zones. Future surveys will better reflect the viability/survival rates of seedlings. The rehabilitation zone that failed to meet the requirements for native perennial flora species density, namely 'MNES habitat zone (Dwarf Desert Spike-rush habitat)', has representative sites in the southern portion of the TNP. As the southern portion of the TNP received lower than average rainfall in the 12 months preceding the field survey, this may account for the lower seedling survival rates at these sites.

All rehabilitation zones failed to meet the requirements for native perennial flora species foliage cover. Poor native perennial foliage cover would be expected for such early phase rehabilitation and this is likely to improve over time given the robust native perennial species richness and plant densities recorded.

Rehabilitation areas appeared stable with no significant erosion zones observed during the field survey. Future monitoring, particularly in the event of major cyclonic events, will provide further information on landform stability and drainage.

6. References

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Appendix A Framework for conservation significant flora and fauna ranking

CATEGORIES OF THREATENED SPECIES UNDER THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)

Threatened fauna and flora may be listed in any one of the following categories as defined in Section 179 of the EPBC Act. Species listed as 'conservation dependent' and 'extinct' are not Matters of National Environmental Significance and therefore do not trigger the EPBC Act.

Category	Definition
Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	Taxa known to survive only in captivity or as a naturalised population well outside its past range; or taxa has not been recorded in its known and/or expected habitat at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered (CE)	Taxa considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Taxa considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Taxa considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	Taxa has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	Taxa has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
Data Deficient (DD)	There is inadequate information to make a direct, or indirect, assessment of taxa's risk extinction based on its distribution and/or population status.
Not Evaluated (NE)	Taxa has not yet been evaluated against the criteria.
Migratory (M)	Not an IUCN category. Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: • the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animal) for which Australia is a range state; • the agreement between the Government of Australian and the Government of the People's Republic of China for the Protection of Migratory Birds and their environment (CAMBA); • the agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); or • the agreement between Australia and the Republic of Korea to develop a bilateral migratory bird agreement similar to the JAMBA and CAMBA in respect to migratory bird conservation and provides a basis for collaboration on the protection of migratory shorebirds and their habitat (ROKAMBA).

CONSERVATION CODES FOR NORTHERN TERRITORY FLORA

Categories for classification	Description
Extinct (EX)	A species is extinct when there is no reasonable doubt that the last individual has died. To call a species extinct, there must have been surveys carried out to look for the species across its previously known range. The survey needs to also consider the life cycle of the species and the times of year when it might be located there.
Extinct in the wild (EW)	A species is extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population/s outside the range they once lived in. Calling a species needs for there to have been similar surveys to those done for extinct species.
Critically endangered (CR)	A species is critically endangered when all the evidence shows that the species meets at least one of the IUCN criteria A to E for critically endangered. It is then at an extremely high risk of extinction in the wild. In cases where a species may be extinct but where not all surveys have been done to show the species absence, the species may be classified in a possibly extinct subcategory. These species are considered threatened in the NT.
Endangered (EN)	A species is endangered when all evidence shows that it meets at least one of the IUCN criteria A to E for endangered species, indicating it is facing a high risk of extinction in the wild. These species are considered threatened in the NT.
Vulnerable (VU)	A species is vulnerable when all the evidence shows that it meets at least one of the IUCN criteria A to E for vulnerable, indicating that it is facing a high risk of extinction in the wild. These species are considered threatened in the NT.
Near threatened (NT)	A species is near threatened when it is not classified in one of the above threatened categories, but it is close to being or is likely to be in a threatened category soon.
Least concern (LC)	A species is least concern when there is sufficient information available to make an assessment and it is not classified as critically endangered, endangered, vulnerable or near threatened. Species that are widespread with high numbers are in this category.
Data deficient (DD)	A species is data deficient when there is not enough information to make a direct, or indirect, assessment of its risk of extinction based on distribution and/or population. Data deficient is not a category of threatened species, but data deficient species should not be assumed to be safe. A species in this category may be well studied and well known but there is not enough specific data on numbers and distribution. Species in this category need more information and future research will probably show that they need to be classified as threatened.
Not evaluated (NE)	A species is not evaluated when it is has not been assessed against the criteria. This may be because the species is a rare visitor to the Territory or that the taxonomy of the species has recently changed or is unclear.
Infraspecific (INFRA)	A species which has more than one subspecies, one of which may be listed as a conservation listed species.

Appendix B GPS location coordinates of monitoring sites

Vegetation monitoring site	Quadrat type	Easting	Northing
1	Rehabilitation	254339	7476152
	Control	254001	7476021
2	Rehabilitation	244970	7479633
	Control	245064	7479701
3	Rehabilitation	243182	7480763
	Control	243233	7480821
4	Rehabilitation	747488	7551363
	Control	747548	7551385
5	Rehabilitation	726210	7586380
	Control	726306	7586432
6	Rehabilitation	724112	7587896
	Control	724126	7587997
7	Rehabilitation	706317	7619580
	Control	706202	7619558
8	Rehabilitation	706220	7619848
	Control	706278	7619914
9	Rehabilitation	667090	7690798
	Control	667194	7690803
10	Rehabilitation	655957	7707562
	Control	656048	7707614
11	Rehabilitation	806746	7520645
	Control	806834	7520696
12	Rehabilitation	736102	7569207
	Control	736218	7569193
13	Rehabilitation	714564	7604643
	Control	714672	7604679
14	Rehabilitation	683597	7665666
	Control	683652	7665767
15	Rehabilitation	644804	7722796
	Control	644919	7722815
16	Rehabilitation	230752	7493546
	Control	230921	7493759
17	Rehabilitation	760187	7545245
	Control	760264	7545440

Appendix C Flora species list

Family	Species	Rehabilitation	Control
Acanthaceae	*Rostellularia adscendens* subsp. *adscendens* var. pogonanthera		x
Aizoaceae	*Trianthema triquetrum*	x	x
Amaranthaceae	*Alternanthera angustifolia*		x
Amaranthaceae	*Alternanthera* sp.		x
Amaranthaceae	*Amaranthus cochleitepalus*	x	
Amaranthaceae	*Gomphrena lanata*		x
Amaranthaceae	*Gomphrena leptophylla*		x
Amaranthaceae	*Ptilotus obovatus*		x
Amaranthaceae	*Ptilotus polystachyus*	x	
Apocynaceae	*Carissa lanceolata*		x
Asteraceae	*Pluchea dunlopii*		x
Asteraceae	*Pluchea ferdinandi-muelleri*	x	x
Asteraceae	*Pluchea* sp.	x	
Asteraceae	*Pluchea tetranthera*		x
Boraginaceae	*Heliotropium diversifolium*		x
Boraginaceae	*Heliotropium parviantrum* (DD)	x	
Boraginaceae	*Heliotropium subreniforme* (DD)	x	
Boraginaceae	*Heliotropium tanythrix*	x	x
Boraginaceae	*Trichodesma zeylanicum* var. *zeylanicum*	x	
Brassicaceae	*Stenopetalum nutans*	x	
Celastraceae	*Stackhousia intermedia*	x	
Chenopodiaceae	*Dysphania glomulifera*	x	
Chenopodiaceae	*Dysphania* sp.	x	
Chenopodiaceae	*Einadia nutans* subsp. *eremaea*		x
Chenopodiaceae	*Enchylaena tomentosa*	x	x
Chenopodiaceae	*Rhagodia eremaea*		x
Chenopodiaceae	*Salsola australis*	x	x
Chenopodiaceae	*Sclerolaena cornishiana*	x	
Chenopodiaceae	*Sclerolaena costata*	x	
Cleomaceae	*Cleome viscosa*	x	x
Commelinaceae	*Bonamia erecta*	x	x
Commelinaceae	*Commelina ensifolia*		x
Commelinaceae	*Evolvulus alsinoides* var. *villosicalyx*	x	x
Commelinaceae	*Ipomoea muelleri*	x	x
Commelinaceae	*Ipomoea* sp.	x	
Cucurbitaceae	**Citrullus colocynthis*		x
Cucurbitaceae	*Cucumis* sp.	x	

Family	Species	Rehabilitation	Control
Cyperaceae	*Bulbostylis barbata*	x	
Cyperaceae	*Cyperus iria*	x	x
Cyperaceae	*Fimbristylis ammobia*	x	x
Cyperaceae	*Fimbristylis caespitosa*		x
Cyperaceae	*Fimbristylis dichotoma*	x	x
Cyperaceae	*Fimbristylis oxystachya*	x	x
Elatinaceae	*Bergia henshallii*		x
Euphorbiaceae	*Euphorbia biconvexa*	x	x
Euphorbiaceae	*Euphorbia ferdinandi*	x	
Euphorbiaceae	*Euphorbia papillata* var. *papillata*		x
Euphorbiaceae	*Euphorbia tannensis*	x	x
Fabaceae	*Acacia adsurgens*		x
Fabaceae	*Acacia aneura*	x	
Fabaceae	*Acacia aptaneura*	x	x
Fabaceae	*Acacia bivenosa*		x
Fabaceae	*Acacia cuthbertsonii* subsp. *cuthbertsonii*		x
Fabaceae	*Acacia elachantha*	x	x
Fabaceae	*Acacia incurvaneura*		x
Fabaceae	*Acacia kempeana*	x	x
Fabaceae	*Acacia melleodora*		x
Fabaceae	*Acacia pruinocarpa*	x	x
Fabaceae	*Acacia sericophylla*	x	x
Fabaceae	*Acacia sibirica*	x	x
Fabaceae	*Acacia* sp. (1)	x	
Fabaceae	*Acacia* sp. (2)	x	
Fabaceae	*Acacia tenuissima*		x
Fabaceae	*Acacia tetragonophylla*		x
Fabaceae	Fabaceae sp. (juvenile) (1)		x
Fabaceae	Fabaceae sp. (juvenile) (2)		x
Fabaceae	*Glycine canescens*	x	x
Fabaceae	*Indigofera colutea*	x	
Fabaceae	*Indigofera linifolia*	x	x
Fabaceae	*Indigofera linnaei*	x	x
Fabaceae	*Leptosema chambersii*	x	x
Fabaceae	*Muelleranthus stipularis*	x	x
Fabaceae	*Paraneurachne muelleri*		x
Fabaceae	*Rhynchosia minima*	x	
Fabaceae	*Senna artemisioides* nothosubsp. *artemisioides*	x	
Fabaceae	*Senna artemisioides* subsp. *filifolia*		x
Fabaceae	*Senna artemisioides* subsp. *helmsii*	x	x

Family	Species	Rehabilitation	Control
Fabaceae	*Senna artemisioides* subsp. *oligophylla*	x	x
Fabaceae	*Senna pleurocarpa*	x	
Fabaceae	*Senna venusta*	x	
Fabaceae	*Tephrosia* sp.		x
Fabaceae	*Tephrosia* sp. D Kimberley Flora (R.D.Royce 1848)	x	x
Fabaceae	*Tephrosia supina*	x	x
Fabaceae	*Tephrosia brachyodon* (INFRA)	x	
Fabaceae	*Vigna lanceolata*	x	
Fabaceae	*Vigna lanceolata* var. *latifolia*		x
Fabaceae	*Zornia albiflora*	x	x
Goodeniaceae	*Goodenia armitiana*	x	x
Goodeniaceae	*Goodenia hirsuta* subsp. run-on areas	x	
Goodeniaceae	*Goodenia* sp.	x	
Goodeniaceae	*Scaevola parvifolia* subsp. *parvifolia*	x	x
Lamiaceae	*Dicrastylis exsuccosa*		x
Lamiaceae	*Teucrium teucriiflorum* (previously *Spartothamnella teucriiflora*)		x
Lauraceae	*Cassytha* sp.	x	
Loranthaceae	*Lysiana murrayi*		x
Malvaceae	*Abutilon macrum*	x	x
Malvaceae	*Abutilon otocarpum*	x	x
Malvaceae	*Abutilon* sp.	x	
Malvaceae	*Androcalva loxophylla*		x
Malvaceae	*Corchorus* sp.	x	
Malvaceae	*Gossypium australe*		x
Malvaceae	*Hibiscus burtonii*	x	x
Malvaceae	*Hibiscus leptocladus*	x	x
Malvaceae	*Hibiscus* sp.	x	
Malvaceae	*Hibiscus sturtii* var. *campychlamys*		x
Malvaceae	Malvaceae. sp. (1)		x
Malvaceae	Malvaceae. sp. (2)		x
Malvaceae	Malvaceae. sp. (3)		x
Malvaceae	*Seringia nephrosperma*		x
Malvaceae	*Sida platycalyx*	x	
Malvaceae	*Sida rohlenae* subsp. *rohlenae*	x	
Malvaceae	*Sida* sp. excedentifolia (J.L. Egan 1925) (DD)	x	
Malvaceae	*Sida* sp. Kathleen Springs (A. C. Beauglehole 26934)	x	
Malvaceae	*Sida* sp. Wakaya Desert (P. K. Latz 11894)	x	
Marsileaceae	*Marsilea hirsuta*	x	
Montiaceae	*Calandrinia balonensis*	x	
Montiaceae	*Calandrinia ptychosperma*	x	

Family	Species	Rehabilitation	Control
Montiaceae	*Calandrinia pumila*	x	
Montiaceae	*Calandrinia* sp.		x
Myrtaceae	*Corymbia opaca*	x	x
Myrtaceae	*Eucalyptus camaldulensis* subsp. *arida*		x
Myrtaceae	*Eucalyptus gamophylla*		x
Myrtaceae	*Melaleuca glomerata*	x	x
Myrtaceae	*Melaleuca lasiandra*	x	x
Nyctaginaceae	*Boerhavia coccinea*	x	x
Phrymaceae	*Peplidium aithocheilum*	x	
Phyllanthaceae	*Phyllanthus erwinii*	x	x
Poaceae	**Cenchrus ciliaris*	x	x
Poaceae	**Cynodon dactylon*	x	x
Poaceae	**Eragrostis minor*	x	x
Poaceae	*Aristida contorta*	x	x
Poaceae	*Aristida holathera* var. *holathera*	x	x
Poaceae	*Aristida inaequiglumis*		x
Poaceae	*Aristida latifolia*	x	x
Poaceae	*Cymbopogon ambiguus*		x
Poaceae	*Dactyloctenium radulans*	x	x
Poaceae	*Digitaria brownii*	x	
Poaceae	*Digitaria divaricatissima*		x
Poaceae	*Echinochloa colona*		x
Poaceae	*Enneapogon cylindricus*	x	x
Poaceae	*Enteropogon ramosus*		x
Poaceae	*Eragrostis cumingii*	x	x
Poaceae	*Eragrostis eriopoda*	x	x
Poaceae	*Eragrostis eriopoda* var. Sandy Fireweed	x	x
Poaceae	*Eragrostis falcata*	x	x
Poaceae	*Eragrostis leptocarpa*	x	x
Poaceae	*Eragrostis tenellula*		x
Poaceae	*Eriachne aristidea*	x	
Poaceae	*Eriachne armittii*	x	x
Poaceae	*Eriachne helmsii*		x
Poaceae	*Eriachne obtusa*	x	x
Poaceae	*Eriachne pulchella* subsp. *dominii*	x	
Poaceae	*Eriachne pulchella* subsp. *pulchella*	x	
Poaceae	*Iseilema membranaceum*	x	
Poaceae	*Monachather paradoxus*	x	
Poaceae	*Paspalidium basicladum*	x	
Poaceae	*Paspalidium clementii*	x	x

Family	Species	Rehabilitation	Control
Poaceae	*Paspalidium rarum*	x	x
Poaceae	*Perotis rara*	x	x
Poaceae	Poaceae sp. (sterile)		x
Poaceae	*Sporobolus australasicus*		x
Poaceae	*Tragus australianus*	x	
Poaceae	*Triodia basedowii*	x	x
Poaceae	*Triodia pungens*	x	x
Poaceae	*Triodia schinzii*		x
Poaceae	*Triodia* sp.		x
Poaceae	*Tripogonella loliiformis* (previously *Tripogon loliiformis*)		x
Poaceae	*Urochloa piligera*	x	
Poaceae	*Yakirra australiensis* var. *australiensis*	x	x
Polygalaceae	*Polygala dependens*	x	
Portulacaceae	*Portulaca filifolia*	x	x
Portulacaceae	*Portulaca oleracea*	x	
Portulacaceae	*Portulaca oleracea* var. *undoolya*		x
Proteaceae	*Grevillea wickhamii* subsp. *aprica*		x
Proteaceae	*Hakea chordophylla*		x
Proteaceae	*Hakea macrocarpa*		x
Pteridaceae	*Cheilanthes sieberi* subsp. *sieberi*		x
Rubiaceae	*Synaptantha tillaeacea* var. *tillaeacea*	x	
Santalaceae	*Anthobolus leptomerioides*		x
Sapindaceae	*Atalaya hemiglauca*		x
Scrophulariaceae	*Eremophila gilesii* subsp. *gilesii*		x
Scrophulariaceae	*Eremophila latrobei* subsp. *glabra*		x
Solanaceae	*Solanum centrale*	x	x
Solanaceae	*Solanum quadriloculatum*	x	x
Surianaceae	*Stylobasium spathulatum*	x	x
Zygophyllaceae	*Tribulopis angustifolia*	x	x
Zygophyllaceae	*Tribulus hirsutus*	x	x
Zygophyllaceae	*Tribulus macrocarpus*	x	x
Zygophyllaceae	*Tribulus minutus* (DD)		x
Zygophyllaceae	*Tribulus terrestris*	x	
Zygophyllaceae	*Tribulus astrocarpus*	x	x

Appendix D Species by site matrix

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
Acanthaceae	*Rostellularia adscendens* subsp. *adscendens* var. *pogonanthera*							x																											
Aizoaceae	*Trianthema triquetrum*															x	x	x	x											x					
Amaranthaceae	*Alternanthera angustifolia*											x																							
Amaranthaceae	*Alternanthera* sp.	x																																	
Amaranthaceae	*Amaranthus cochleitepalus*											x												x											
Amaranthaceae	*Gomphrena lanata*					x		x																											
Amaranthaceae	*Gomphrena leptophylla*																		x																
Amaranthaceae	*Ptilotus obovatus*									x												x				x									
Amaranthaceae	*Ptilotus polystachyus*																							x											
Apocynaceae	*Carissa lanceolata*									x																									
Asteraceae	*Pluchea dunlopii*									x																									
Asteraceae	*Pluchea ferdinandi-muelleri*													x		x		x								x									
Asteraceae	*Pluchea* sp.																					x													
Asteraceae	*Pluchea tetranthera*																										x								
Boraginaceae	*Heliotropium diversifolium*																											x							
Boraginaceae	*Heliotropium parviantrum*																													x					
Boraginaceae	*Heliotropium subreniforme*													x																					
Boraginaceae	*Heliotropium tanythrix*			x	x	x	x		x	x		x										x	x	x	x	x								x	

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
Boraginaceae	*Trichodesma zeylanicum* var. *zeylanicum*	x																																	
Brassicaceae	*Stackhousia intermedia*																													x					
Celastraceae	*Sporobolus australasicus*												x																						
Chenopodiaceae	*Dysphania glomulifera*											x																							
Chenopodiaceae	*Dysphania* sp.									x																									
Chenopodiaceae	*Einadia nutans* subsp. *eremaea*																					x													
Chenopodiaceae	*Enchylaena tomentosa*															x	x		x			x													x
Chenopodiaceae	*Rhagodia eremaea*																					x													
Chenopodiaceae	*Salsola australis*	x	x			x													x																
Chenopodiaceae	*Sclerolaena cornishiana*																					x													
Chenopodiaceae	*Sclerolaena costata*	x																																	
Cleomaceae	*Cleome viscosa*	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		x			x	x	x	x	x		x		x			x	x
Commelinaceae	*Bonamia erecta*									x				x															x						
Commelinaceae	*Commelina ensifolia*																								x										
Commelinaceae	*Evolvulus alsinoides* var. *villosicalyx*			x	x	x	x	x	x	x	x		x									x	x	x	x	x					x		x		
Commelinaceae	*Ipomoea muelleri*								x	x		x	x																						
Commelinaceae	*Ipomoea* sp.																																	x	
Cucurbitaceae	**Citrullus colocynthis*												x																						
Cucurbitaceae	*Cucumis* sp.									x												x													
Cyperaceae	*Bulbostylis barbata*					x		x		x		x										x								x					
Cyperaceae	*Cyperus iria*									x		x	x											x											

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
Cyperaceae	*Fimbristylis ammobia*													x				x	x																
Cyperaceae	*Fimbristylis caespitosa*																		x																
Cyperaceae	*Fimbristylis dichotoma*					x	x		x		x		x												x										x
Cyperaceae	*Fimbristylis oxystachya*																			x						x				x					
Elatinaceae	*Bergia henshallii*										x																				x				
Euphorbiaceae	*Euphorbia biconvexa*												x				x																		
Euphorbiaceae	*Euphorbia ferdinandi*									x		x		x								x													
Euphorbiaceae	*Euphorbia papillata var. papillata*						x		x		x				x																				
Euphorbiaceae	*Euphorbia tannensis*			x	x			x	x	x	x			x								x				x	x							x	
Fabaceae	*Acacia adsurgens*										x																x								
Fabaceae	*Acacia aneura*											x																							
Fabaceae	*Acacia aptaneura*				x		x		x			x											x	x										x	x
Fabaceae	*Acacia bivenosa*	0															x											x		x					
Fabaceae	*Acacia cuthbertsonii* subsp. *cuthbertsonii*						x																												
Fabaceae	*Acacia elachantha*																									x			x	x					
Fabaceae	*Acacia incurvaneura*												x											x											
Fabaceae	*Acacia kempeana*				x				x														x										x	x	
Fabaceae	*Acacia melleodora*																			x															
Fabaceae	*Acacia pruinocarpa*				x						x																								
Fabaceae	*Acacia sericophylla*																			x						x			x						
Fabaceae	*Acacia sibirica*										x		x									x			x										
Fabaceae	*Acacia* sp. (1)																					x													
Fabaceae	*Acacia* sp. (2)										x																								
Fabaceae	*Acacia tenuissima*																														x				

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
Fabaceae	*Acacia tetragonophylla*												x																						
Fabaceae	Fabaceae sp. (juvenile) (1)																						x												
Fabaceae	Fabaceae sp. (juvenile) (2)																																		x
Fabaceae	*Glycine canescens*							x	x																										
Fabaceae	*Indigofera colutea*									x						x																			
Fabaceae	*Indigofera linifolia*							x	x	x	x			x																x					
Fabaceae	*Indigofera linnaei*							x	x	x												x		x										x	
Fabaceae	*Leptosema chambersii*																												x	x					
Fabaceae	*Muelleranthus stipularis*										x								x			x													
Fabaceae	*Paraneurachne muelleri*																				x														
Fabaceae	*Rhynchosia minima*													x																					
Fabaceae	*Senna artemisioides* nothosubsp. *artemisioides*							x																											
Fabaceae	*Senna artemisioides* subsp. *filifolia*																						x												
Fabaceae	*Senna artemisioides* subsp. *helmsii*					x	x	x	x		x	x	x											x	x									x	x
Fabaceae	*Senna artemisioides* subsp. *oligophylla*									x		x	x													x	x								x
Fabaceae	*Senna pleurocarpa*																											x							
Fabaceae	*Senna venusta*																													x					
Fabaceae	*Synaptantha tillaeacea* var. *tillaeacea*									x		x																							

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
Fabaceae	*Tephrosia* sp.						x																												
Fabaceae	*Tephrosia* sp. D Kimberley Flora (R.D.Royce 1848)													x														x	x	x					
Fabaceae	*Tephrosia supina*									x	x																								
Fabaceae	*Vigna lanceolata*																							x											
Fabaceae	*Vigna lanceolata* var. *latifolia*	x																																	
Fabaceae	*Zornia albiflora*									x				x	x										x										
Goodeniaceae	*Goodenia armitiana*																									x			x						
Goodeniaceae	*Goodenia hirsuta* subsp. run-on areas																																	x	
Goodeniaceae	*Goodenia* sp.																													x					
Goodeniaceae	*Scaevola parvifolia* subsp. *parvifolia*																			x	x							x	x	x	x				
Lamiaceae	*Dicrastylis exsuccosa*																												x						
Lamiaceae	*Tephrosia brachyodon*					x																													
Lauraceae	*Cassytha* sp.															x																			
Loranthaceae	*Lysiana murrayi*																								x										
Malvaceae	*Abutilon macrum*					x		x	x															x											
Malvaceae	*Abutilon otocarpum*			x	x		x			x				x		x						x		x				x						x	
Malvaceae	*Abutilon* sp.					x																													
Malvaceae	*Androcalva loxophylla*																			x															
Malvaceae	*Corchorus* sp.					x																													
Malvaceae	*Gossypium australe*										x																								
Malvaceae	*Hibiscus burtonii*								x	x																									
Malvaceae	*Hibiscus leptocladus*																					x	x												

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
Malvaceae	*Hibiscus* sp.																													x					
Malvaceae	*Hibiscus sturtii* var. *campychlamys*																					x		x										x	
Malvaceae	Malvaceae. sp. (1)									x																									
Malvaceae	Malvaceae. sp.(2)											x																							
Malvaceae	Malvaceae. sp. (3)															x																			
Malvaceae	*Seringa nephrosperma*																											x							
Malvaceae	*Sida platycalyx*																							x						x				x	
Malvaceae	*Sida rohlenae* subsp. *rohlenae*	x																																	
Malvaceae	*Sida* sp. excedentifolia (J.L. Egan 1925)					x																x												x	
Malvaceae	*Sida* sp. Kathleen Springs (A.C.Beauglehole 26934)																					x		x											
Malvaceae	*Sida* sp. Wakaya Desert (P.K.Latz 11894)					x																												x	
Marsileaceae	*Marsilea hirsuta*											x																							
Montiaceae	*Calandrinia balonensis*			x																				x											
Montiaceae	*Calandrinia ptychosperma*									x		x																							
Montiaceae	*Calandrinia pumila*											x																							
Montiaceae	*Calandrinia* sp.					x																													
Myrtaceae	*Corymbia opaca*							x														x													

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
Myrtaceae	*Eucalyptus camaldulensis* subsp. *arida*		x																																
Myrtaceae	*Eucalyptus gamophylla*																										x						x		
Myrtaceae	*Melaleuca glomerata*														x	x	x																		
Myrtaceae	*Melaleuca lasiandra*													x	x			x	x																
Nyctaginaceae	*Boerhavia coccinea*				x	x	x	x	x	x	x	x	x								x	x	x	x	x			x						x	x
Phrymaceae	*Peplidium aithocheilum*											x																							
Phyllanthaceae	*Phyllanthus erwinii*									x			x											x	x										
Poaceae	**Cenchrus ciliaris*	x	x		x									x		x	x		x											x					
Poaceae	**Cynodon dactylon*	x	x													x																			
Poaceae	**Eragrostis minor*									x		x	x																	x				x	
Poaceae	*Aristida contorta*								x	x					x		x								x					x					
Poaceae	*Aristida holathera var. holathera*	x	x	x	x		x	x			x			x		x		x	x	x	x	x				x		x	x	x	x	x		x	
Poaceae	*Aristida inaequiglumis*				x																		x												
Poaceae	*Aristida latifolia*																							x	x										
Poaceae	*Cymbopogon ambiguus*		x																																
Poaceae	*Dactyloctenium radulans*							x	x	x		x										x		x	x									x	x
Poaceae	*Digitaria brownii*																							x											
Poaceae	*Digitaria divaricatissima*																						x												
Poaceae	*Echinochloa colona*												x																						
Poaceae	*Enneapogon cylindricus*						x	x	x													x	x											x	

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
Poaceae	*Enteropogon ramosus*																						x												
Poaceae	*Eragrostis cumingii*									x		x	x						x			x	x	x	x										
Poaceae	*Eragrostis eriopoda*				x									x						x										x					
Poaceae	*Eragrostis eriopoda* var. Sandy Fireweed																				x								x						
Poaceae	*Eragrostis falcata*															x	x																		
Poaceae	*Eragrostis leptocarpa*							x	x	x		x											x	x											
Poaceae	*Eragrostis tenellula*												x																						
Poaceae	*Eriachne aristidea*									x																				x					
Poaceae	*Eriachne armitii*																					x			x										
Poaceae	*Eriachne helmsii*																						x												
Poaceae	*Eriachne obtusa*																	x	x		x														
Poaceae	*Eriachne pulchella* subsp. *dominii*																													x					
Poaceae	*Eriachne pulchella* subsp. *pulchella*					x																													
Poaceae	*Iseilema membranaceum*																							x											
Poaceae	*Monachather paradoxus*			x		x				x												x		x		x					x				
Poaceae	*Paspalidium basicladum*			x																															
Poaceae	*Paspalidium clementii*				x			x														x	x												
Poaceae	*Paspalidium rarum*									x	x	x	x									x		x	x					x				x	
Poaceae	*Perotis rara*				x			x		x		x	x									x	x	x											
Poaceae	Poaceae sp. (sterile)																									x									
Poaceae	*Teucrium teucriiflorum*																						x												

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
	(previously *Spartothamnella teucriiflora)*																																		
Poaceae	*Tragus australianus*			x																														x	
Poaceae	*Triodia basedowii*			x	x	x	x																												
Poaceae	*Triodia pungens*									x	x			x	x	x	x		x		x					x	x			x	x				
Poaceae	*Triodia schinzii*																				x								x						
Poaceae	*Triodia* sp.																															x			
Poaceae	*Tripogonella loliiformis (*previously *Tripogon loliiformis)*				x				x																										x
Poaceae	*Urochloa piligera*																							x											
Poaceae	*Yakirra australiensis* var. *australiensis*										x			x	x	x	x	x	x	x	x					x		x		x	x				
Polygalaceae	*Polygala dependens*									x																				x					
Portulacaceae	*Portulaca filifolia*						x	x		x	x	x	x	x			x					x		x											
Portulacaceae	*Portulaca oleracea*			x		x		x		x		x										x		x						x				x	
Portulacaceae	*Portulaca oleracea* var. *undoolya*						x		x		x		x																						
Proteaceae	*Grevillea wickhamii* subsp. *aprica*																														x				
Proteaceae	*Hakea chordophylla*										x																								
Proteaceae	*Hakea macrocarpa*																			x							x								
Pteridaceae	*Cheilanthes sieberi* subsp. *sieberi*								x																										
Rubiaceae	*Stylobasium spathulatum*																									x					x				
Santalaceae	*Anthobolus leptomerioides*						x																									x			
Sapindaceae	*Atalaya hemiglauca*		x						x																										

Family	Species	1*		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17	
		R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C	R	C
Scrophulariaceae	*Eremophila gilesii* subsp. *gilesii*						x																x												
Scrophulariaceae	*Eremophila latrobei* subsp. *glabra*								x																								x		x
Solanaceae	*Solanum centrale*									x	x										x						x								
Solanaceae	*Solanum quadriloculatum*							x														x	x												
Surianaceae	*Stenopetalum nutans*																					x													
Zygophyllaceae	*Tribulopis angustifolia*			x	x		x			x	x							x	x	x		x	x		x			x		x				x	x
Zygophyllaceae	*Tribulus hirsutus*																											x	x						
Zygophyllaceae	*Tribulus macrocarpus*						x			x																									
Zygophyllaceae	*Tribulus minutus*								x		x		x												x										
Zygophyllaceae	*Tribulus terrestris*							x				x												x										x	
Zygophyllaceae	*Tribulus astrocarpus*						x	x	x	x												x			x									x	x

*1=Vegetation Monitoring Site 1 etc., R=Rehabilitation quadrat, C= control quadrat

Appendix E Summary of flora of significance recorded across the TNP

Species	Conservation status (TPWCA)	Monitoring site	Quadrat type	# of plants
Heliotropium parviantrum	Data deficient	15	Rehabilitation	20
Heliotropium subreniforme	Data deficient	7	Rehabilitation	15
Sida sp. excedentifolia (J.L. Egan 1925)	Data deficient	11	Rehabilitation	10
Sida sp. excedentifolia (J.L. Egan 1925)	Data deficient	17	Rehabilitation	5
Sida sp. excedentifolia (J.L. Egan 1925)	Data deficient	3	Rehabilitation	13
Tribulus minutus	Data deficient	12	Control	1
Tribulus minutus	Data deficient	4	Control	2
Tribulus minutus	Data deficient	5	Control	2
Tribulus minutus	Data deficient	6	Control	3
Tephrosia brachyodon	Infraspecific	3	Rehabilitation	4

Appendix F Summary of introduced (weed) species recorded across the TNP

Species	WoNS or Declared Pest?	Monitoring site	Quadrat type	# of plants
**Cenchrus ciliaris*	No	15	Rehabilitation	1
**Cenchrus ciliaris*	No	1	Rehabilitation	4
**Cenchrus ciliaris*	No	1	Control	6
**Cenchrus ciliaris*	No	2	Control	2
**Cenchrus ciliaris*	No	7	Rehabilitation	3
**Cenchrus ciliaris*	No	8	Rehabilitation	20
**Cenchrus ciliaris*	No	8	Control	23
**Cenchrus ciliaris*	No	9	Control	2
**Citrullus colocynthis*	No	6	Control	2
**Cynodon dactylon*	No	1	Rehabilitation	4
**Cynodon dactylon*	No	1	Control	20
**Cynodon dactylon*	No	8	Rehabilitation	20
**Eragrostis minor*	No	15	Rehabilitation	2
**Eragrostis minor*	No	17	Rehabilitation	10
**Eragrostis minor*	No	5	Rehabilitation	100
**Eragrostis minor*	No	6	Rehabilitation	55
**Eragrostis minor*	No	6	Control	8

Appendix G Assessment of individual monitoring sites within the TNP against minimum standards outlined in approved completion criteria (AGIG *Tanami Newmont Gas Pipeline Rehabilitation Plan*; ELA 2018a)

Monitoring site	Rehabilitation zone	Native flora species density (plants per m²)			Native flora species richness (per quadrat)			Native flora species foliage cover (%)			Weed foliage cover (%)		
		Control	Rehabilitation	Pass (y/n)	Control	Rehabilitation	Pass (y/n)	Control	Rehabilitation	Pass (y/n)	Control	Rehabilitation	Pass (y/n)
1	MNES habitat zone (Dwarf Desert Spike-rush habitat), MNES habitat zone (Princess Parrot habitat)	0.0016	0.0008	n	7	5	y	3.23	0.12	n	0.5	0.01	y
2	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat)	0.0442	0.0074	n	10	4	n	66.14	0.04	n	0.02	0	y
3	MNES habitat zone (Dwarf Desert Spike-rush habitat)	0.0404	0.0116	n	12	14	y	10.92	0.18	n	0	0	y
4	MNES habitat zone (Dwarf Desert Spike-rush habitat), MNES habitat zone (Princess Parrot habitat)	0.0316	0.012	n	16	9	n	31.29	0.82	n	0	0	y
5	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat), MNES habitat zone (Princess Parrot habitat)	0.049	0.294	y	18	19	y	30.65	8.06	n	0	0	y
6	MNES habitat zone (Dwarf Desert Spike-rush habitat)	0.0282	0.0144	n	12	8	n	7.27	0.49	n	0	0	y
7	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat), MNES habitat zone (Princess Parrot habitat)	0.2636	0.8184	y	6	10	y	15.76	6.98	n	0	0.01	n

Monitoring site	Rehabilitation zone	Native flora species density (plants per m²)			Native flora species richness (per quadrat)			Native flora species foliage cover (%)			Weed foliage cover (%)		
		Control	Rehabilitation	Pass (y/n)	Control	Rehabilitation	Pass (y/n)	Control	Rehabilitation	Pass (y/n)	Control	Rehabilitation	Pass (y/n)
8	MNES habitat zone (Dwarf Desert Spike-rush habitat)	0.0486	0.048	y	9	10	y	31.15	33.57	y	0.3	0.2	y
9	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat)	0.1228	0.0562	n	9	3	n	7.18	2.21	n	0.01	0	y
10	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat), MNES habitat zone (Princess Parrot habitat)	0.1118	0.0186	n	12	4	n	11.16	0.45	n	0	0	y
11	Native vegetation zone	0.1858	0.1628	y	21	16	y	18.55	5.78	n	0	0	y
12	Native vegetation zone	0.0316	0.0208	y	11	13	y	16.29	1.16	n	0	0	y
13	Native vegetation zone	0.1466	0.8458	y	9	9	y	43.48	7.94	n	0	0	y
14	Native vegetation zone	0.0736	0.4084	y	11	8	y	4.79	9.29	y	0	0	y
15	Native vegetation zone	0.0496	0.0366	y	9	12	y	41.29	1.07	n	0	0	y
16	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat)	0.029	0.0006	n	5	2	n	23.31	0.02	n	0	0	y
17	Native vegetation zone	0.028	0.0554	y	9	12	y	10.81	1.5	n	0	0	y

Appendix H Photo monitoring points

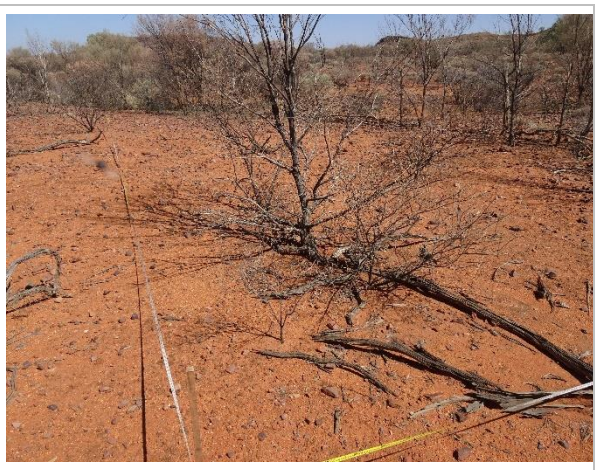
Monitoring site 1 (16/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 2 (16/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

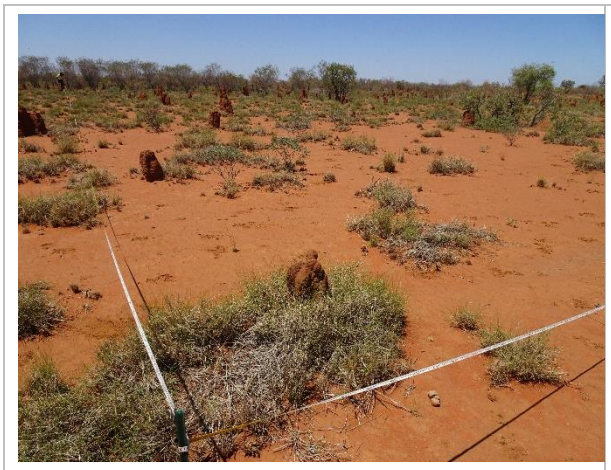
Monitoring site 3 (16/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 4 (17/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 5 (18/03/2020)



Control – photo from the northwest

Control – photo from the southeast

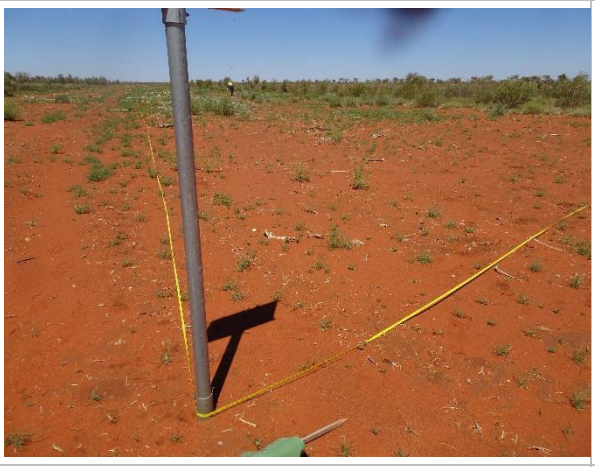
Rehabilitation – photo from the northwest

Rehabilitation – photo from the southeast

Monitoring site 6 (18/03/2020)

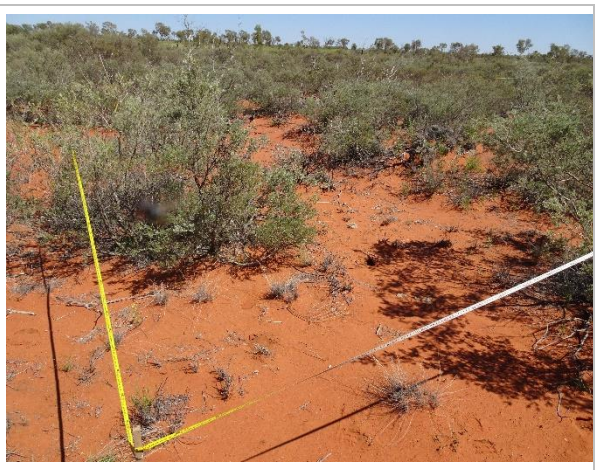
	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 7 (19/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 8 (19/03/2020)

Control – photo from the northwest



Control – photo from the southeast

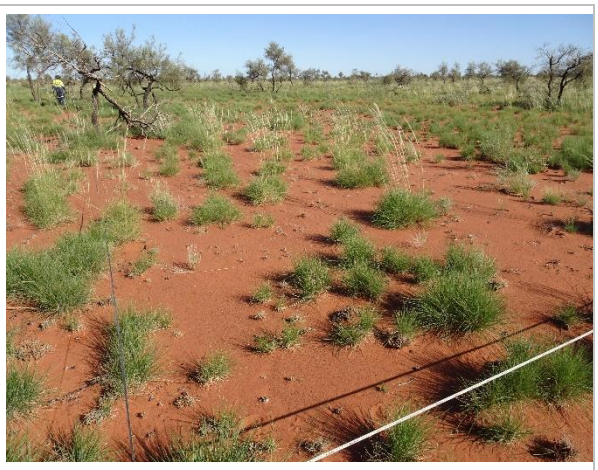
Rehabilitation – photo from the northwest

Rehabilitation – photo from the southeast

Monitoring site 9 (20/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 10 (20/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 11 (17/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 12 (18/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 13 (19/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 14 (19/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

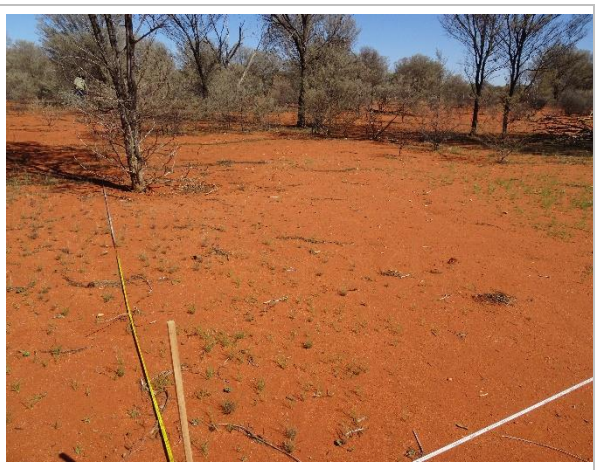
Monitoring site 15 (20/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 16 (16/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

Monitoring site 17 (17/03/2020)

	
Control – photo from the northwest	**Control – photo from the southeast**
	
Rehabilitation – photo from the northwest	**Rehabilitation – photo from the southeast**

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