

Tanami Gas Pipeline Annual Rehabilitation Monitoring Report 2022

Australian Gas Infrastructure Group

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Template 2.8.1

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Abbreviations

Abbreviation	Description
AGIG	Australian Gas Infrastructure Group
BoM	Bureau of Meteorology
DD	Data Deficient
ELA	Eco Logical Australia
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ha	hectare
IBRA	Interim Biogeographic Regionalisation for Australia
INFRA	Infraspecific
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 <i>Parks and Wildlife Conservation Act 2006</i>
WoNS	Weeds of National Significance

Executive Summary

Eco Logical Australia was commissioned by Australian Gas Infrastructure Group in 2022 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. 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 surveyed from 11 to 17 July 2022. Vegetation monitoring sites were consistent with the 2020 baseline and 2021 monitoring surveys, except for site 17 rehabilitation quadrat, which was moved in 2022 as the previously established quadrat had been cleared. Vegetation monitoring sites were initially chosen 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. One flora species listed as Data Deficient (DD) under the Northern Territory *Parks and Wildlife Conservation Act 2006* and one species listed as Infrspecific (INFRA) were recorded, namely *Sida* sp. *excedentifolia* (J.L. Egan 1925) (DD) and *Tephrosia brachyodon* (INFRA). Both species were recorded within at least one control and rehabilitation quadrat.

A total of three introduced (weed) species were recorded within the vegetation monitoring sites, namely **Cenchrus ciliaris*, **Cynodon dactylon* and **Eragrostis minor*. Of these, none are listed as Declared Weeds or Weeds of National Significance (WoNS) in the Northern Territory.

All rehabilitation zones met the completion criteria for native perennial flora species density and all rehabilitation zones, except the Dwarf Desert Spike-rush habitat zone, met the completion criteria for native perennial flora species richness. Species density and species richness decreased in all rehabilitation zones in 2022 compared to 2021. This was primarily driven by the number of individual *Yakirra australiensis* var. *australiensis* recorded in site 13 rehabilitation quadrat in 2022 (500 individuals) compared to 2020 (4,000 individuals) and 2021 (5,000 individuals). The Tanami Newmont Gas Pipeline received below average rainfall in the three months preceding the field survey therefore this may have contributed to the species senescence. There was also substantial pulse recruitment following the cyclonic rainfall event in 2021, so a drop off in 2022 was expected as not all emergent seedlings recorded would have survived the first year.

Dwarf Desert Spike-rush habitat was the only MNES habitat rehabilitation zone to meet the minimum requirement outlined in the completion criteria for native perennial flora species foliage cover. However, general results indicate a positive development trajectory toward satisfying completion criteria with all MNES habitat rehabilitation zones recording an increase in foliage cover across the three survey periods. Low foliage cover in comparison to controls would be expected for early phase

rehabilitation, and this is likely to continue to improve over time given the robust native perennial species richness and plant densities recorded.

Three of the five rehabilitation zones did not meet the completion criteria for weed foliage cover, with this was result due to the presence of **Cenchrus ciliaris* in site 7 rehabilitation quadrat but not in the control quadrat, and the greater cover of **Cenchrus ciliaris* (1%) in site 8 rehabilitation quadrat than the control quadrat (0.6%). Weed foliage cover was greater in rehabilitation quadrats than in control quadrats for the first time in 2022 for Greater Bilby and Great Desert Skink and Night Parrot habitat zones. Future surveys will determine whether weed populations increase and therefore require weed control and management.

Significant erosion was observed within site 6 rehabilitation quadrat. Heavy rainfall in 2021 and January/February 2022 increased waterflow in the minor creekline, resulting in expansion of the channel bed and undercutting of the creek bank. Some sheet and pedestal erosion were observed within site 10 rehabilitation quadrat. Early intervention would be recommended to stabilise the landform in both areas.

One individual of *Corymbia opaca* was recorded within the vegetation monitoring site 4 and 11 rehabilitation quadrat. Early intervention to remove this individual, and any other individuals within the vicinity, would be recommended to avoid establishment of these large, deep-rooted trees above the natural gas pipeline.

1. Introduction

1.1. Project background

Australian Gas Infrastructure Group (AGIG) completed 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 a third consecutive year of annual rehabilitation monitoring at 17 vegetation monitoring sites along the TNP (Figure 1-1), of which each comprises an impact (rehabilitation) and an adjacent control quadrat (34 quadrats in total). Vegetation monitoring sites, established by ELA in 2020, were established 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 progression of rehabilitation towards achievement of approved completion criteria to provide a comparison of results between 2020, 2021 and 2022, 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	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

Aspect	Native vegetation rehabilitation zone completion criteria	MNES habitat rehabilitation zone completion criteria
	<p>grow in close proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.</p>	<p>proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.</p>
Weed foliage cover (%)	<p>Percentage of foliage cover of Declared species under the Weeds Management Act, 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.</p>	<p>Percentage of foliage cover of Declared species under the Weeds Management Act, 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.</p>

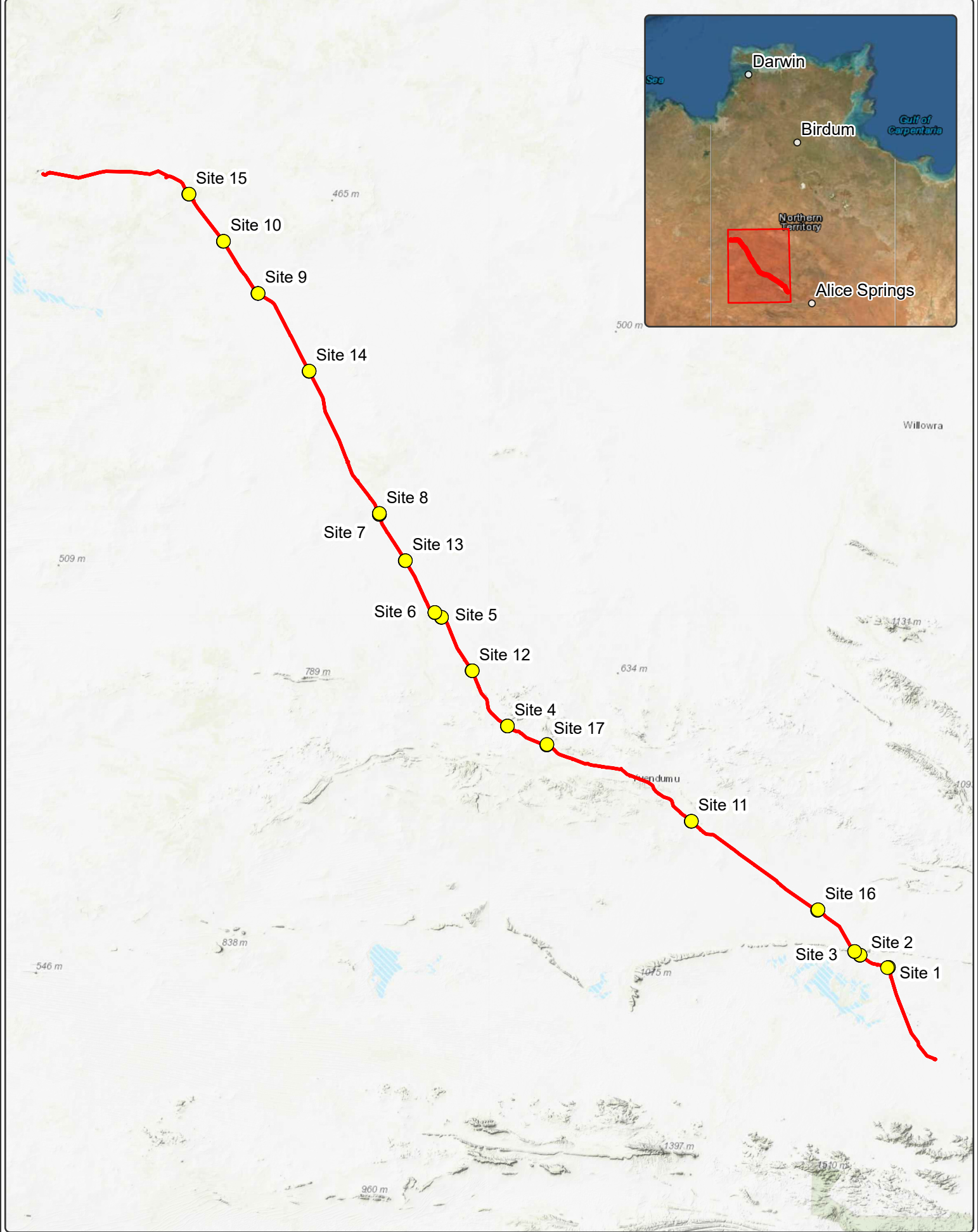


Figure 1-1: Vegetation monitoring site overview

- Tanami Newmont Gas Pipeline
- Vegetation monitoring site



Datum/Projection:
GDA 1994 MGA Zone 52
22PER20889-RD Date: 31/08/2022



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 July 2022 field survey, the region received a total of 206.2 millimetre (mm) and 472.2 mm at Rabbit Flat and Alice Springs Desert Park respectively. This is below the long-term average for Rabbit Flat (456.3 mm) and above the long-term average for Alice Springs Desert Park (260 mm). In the three months preceding the field survey, the north (Rabbit Flat) received 6.4 mm which is significantly below the long-term average (34.3 mm) for the same time period, and the south (Alice Springs Desert Park) received 26.4 mm which is less than the long-term average (42.5 mm) (BoM 2022).

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 1940-present). Mean maximum temperatures in the region ranged from 25.9°C in June to 38.9°C in November and December in the north (Rabbit Flat) and 19.9°C in June and July to 36.5°C in January in the south (Alice Springs Airport). Mean minimum temperatures in the region range from 6.7°C in July to 24.2°C in January in the north (Rabbit Flat) and 3.9°C in July to 21.6°C in January in the south (Alice Springs Airport).

Rainfall and temperature data are presented in Figure 2-1 below.

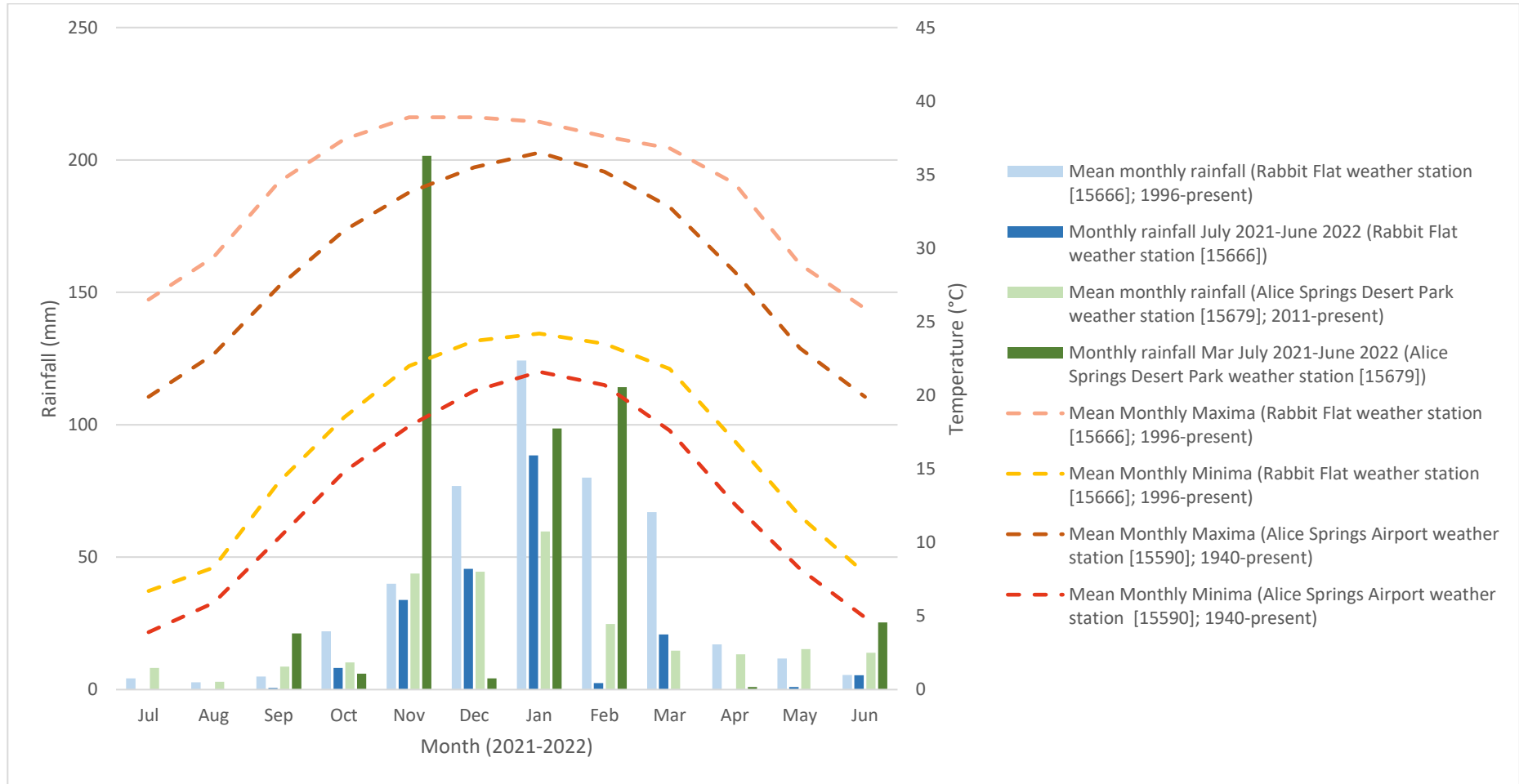


Figure 2-1: Rainfall data recorded from the Rabbit Flat (15666) and Alice Springs Desert Park (15679) weather stations 12 months prior to the field survey compared to the long-term average; Mean maximum and mean minimum temperature data recorded from the Rabbit Flat (15666) and Alice Springs Airport (15590) weather stations (BoM 2022)

2.2. Regional context

2.2.1. Interim Biogeographic 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
MNES habitat zone (Greater Bilby and Great Desert Skink habitat)	<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.	2, 5, 7, 9, 10, 16
MNES habitat zone (Night Parrot habitat)	<i>Triodia</i> dominated grasslands and <i>Astrebla</i> 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 <i>Eucalyptus</i> , <i>Casuarina</i> or <i>Allocasuarina</i> , with an understorey of <i>Acacia</i> , <i>Eremophila</i> , <i>Grevillea</i> , <i>Hakea</i> , <i>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. 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 11 to 17 July 2022 by Dr. Jeff Cargill (Principal Botanist), Daniel Marsh (Botanist), Jeni Morris (Ecologist) and Briana Wingfield (Ecologist). The survey team’s relevant qualifications, experience and licences are provided below in **Table 3.1**.

Table 3.1: Survey team

Name	Qualification	Relevant experience	Relevant permits / licences
Dr. Jeff Cargill	BSc. Hons. PhD Environmental Sciences	Jeff has over 14 years’ experience in botanical and ecological studies throughout WA and the NT including baseline vegetation studies (Reconnaissance and Detailed surveys), Targeted Threatened and Priority flora and fauna surveys, biological data analysis and rehabilitation and vegetation monitoring programs. Jeff completed the 2020 and 2021 rehabilitation monitoring of the TNP and the 2017 Flora and Vegetation Assessment of the TNP. Jeff has also completed rehabilitation monitoring for the CS2-Tubridgi-Wheatstone Natural Gas Pipeline and the Fortescue River Gas Pipeline.	NT Parks and Wildlife permit number: 68917 CLC Permit and Authority number: P73764
Daniel Marsh	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, threatened and priority ecological community surveys and weed surveys. Daniel has an extensive background in both mining and consulting, particularly in remote areas.	N/A
Jeni Morris	BSc. Conservation and Wildlife Biology	Jeni has over 6 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 completed the 2020 and 2021 monitoring of the TNP and undertook the flora and fauna pre-clearance surveys for the TNP in 2018.	NT Parks and Wildlife permit number: 68917 CLC Permit and Authority number: P73764
Briana Wingfield	BSc. Hons Conservation and Wildlife Biology and Environmental Science	Briana is an ecologist over 9 years’ experience undertaking environmental survey and assessment over a range of Australian ecosystems, including Baseline fauna surveys (Detailed/Level 2), Targeted Threatened species surveys, rehabilitation monitoring and habitat assessment. Briana has conducted field surveys in the Pilbara, Goldfields, Swan Coastal Plain and Southwest regions of Western Australia. Briana completed rehabilitation monitoring for Newmont at the Woodcutters mine in Batchelor, NT in 2013 and completed the West Erragulla Pipeline flora and fauna survey for AGIG in 2020.	CLC Permit and Authority number: P73764

3.1.2. Rehabilitation monitoring

A total of 34 vegetation monitoring sites (17 rehabilitation and 17 control quadrats; 10 x 50 m in size) were established in 2020 to ensure spatial distance and replication of sites 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). GPS coordinate locations of monitoring sites are provided in **Appendix B**. Site 17 rehabilitation quadrat was relocated in 2022, as the previously established quadrat had been cleared.

Control quadrats were permanently demarcated with a steel fence dropper in the north-west corner, and wooden fence droppers in the north-east, south-east and south-west corners. Rehabilitation quadrats were not permanently demarcated with metal fence droppers, but rather demarcated with GPS coordinates and reference photos only, due to safety reasons associated with the nature and depth of the high-pressure gas pipeline.

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 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); and
- General observations (i.e. feral animal disturbance, fire occurrence, signs of erosion).

Photo monitoring points were completed 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.

3.1.3. Data analysis

Perennial native richness, foliage cover and weed foliage cover per 10 x 50 m quadrat and perennial native species density per m² 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.

3.1.4. Flora nomenclature

Nomenclature for all flora species and classification categories for flora of significance follows that presented in FloraNT (NT Government 2022).

3.2. Survey limitations and constraints

Constraints and limitations for the rehabilitation monitoring are summarised in **Table 3.2**. Two constraints were identified.

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 <i>Tanami Newmont Gas Pipeline Rehabilitation Plan</i> (ELA 2018a) and the <i>Northern Territory Guidelines and Field Methodology for Vegetation Survey and Mapping</i> (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	Potential constraint: The ‘wet season’ in the Northern Territory stretches from November to April, during which floristic material allowing plant identification is most likely to be available for most species. The field survey was undertaken in July 2022 (initially planned for earlier in 2022 but Covid-19 related issues meant rescheduling). Therefore the field survey was completed out of the recommended season. In the three months preceding the field survey, the TNP received below average rainfall (see Section 2.1). Conditions may have therefore affected the presence of flora species.
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 in north-eastern WA and NT.
Accessibility	Potential constraint: Majority of the rehabilitation sites, established by ELA in 2021, were able to be accessed by vehicle or on foot over the duration of the field survey. Site 17 rehabilitation quadrat was relocated in 2022 as the previously established quadrat had been cleared.

4. Results

4.1. Flora

A total of 195 vascular plant taxa (192 native and three introduced) were recorded, representing 92 plant genera and 34 plant families. The majority of taxa recorded represented the Poaceae (48 taxa), Fabaceae (37 taxa) and Amaranthaceae (20 taxa) families. Total species richness was higher in control areas, with 160 species being recorded compared to 133 in rehabilitation areas. Species lists and a species by site matrix are presented in **Appendix C** and **Appendix D** respectively.

4.2. Rehabilitation zones

Native vegetation zone:

Control: 88 vascular plant taxa, representing 54 plant genera and 22 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (28 taxa), Fabaceae (15 taxa) and Amaranthaceae (10 taxa) families. Of the vascular plant taxa recorded, two were introduced (weed) species.

Rehabilitation: 84 vascular plant taxa, representing 50 plant genera and 20 plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the Poaceae (20 taxa), Fabaceae (20 taxa) and Malvaceae (10 taxa) families. No introduced (weed) species were recorded in this rehabilitation zone.

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

Control: 85 vascular plant taxa, representing 54 plant genera and 27 plant families were recorded within the Dwarf Desert Spike-rush habitat zone. The majority of taxa recorded represented the Poaceae (30 taxa), Fabaceae (11 taxa) and Malvaceae (eight taxa) families. Of the vascular plant taxa recorded, three were introduced (weed) species.

Rehabilitation: 59 vascular plant taxa, representing 40 plant genera and 17 plant families were recorded within the Dwarf Desert Spike-rush habitat zone. The majority of taxa recorded represented the Poaceae (19 taxa), Fabaceae (eight taxa) and Amaranthaceae (eight taxa) families. Of the 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: 77 vascular plant taxa, representing 50 plant genera and 23 plant families were recorded within the Greater Bilby and Great Desert Skink and Night Parrot habitat zones. The majority of taxa recorded represented the Poaceae (20 taxa), Fabaceae (14 taxa) and Amaranthaceae and Malvaceae (six taxa) families. No introduced (weed) species were recorded in this rehabilitation zone.

Rehabilitation: 68 vascular plant taxa, representing 42 plant genera and 19 plant families were recorded within the Greater Bilby and Great Desert Skink and Night Parrot habitat zones. The majority of taxa recorded represented the Poaceae (17 taxa), Fabaceae (17 taxa) and Malvaceae (eight taxa) families. Of the vascular plant taxa recorded, one was an introduced (weed) species.

MNES habitat zone (Princess Parrot habitat):

Control: 75 vascular plant taxa, representing 54 plant genera and 24 plant families were recorded within the Princess Parrot habitat zone. The majority of taxa recorded represented the Poaceae (25 taxa), Fabaceae (12 taxa) and Amaranthaceae (six taxa) families. Of the vascular plant taxa recorded, two were introduced (weed) species.

Rehabilitation: 59 vascular plant taxa, representing 37 plant genera and 14 plant families were recorded within the Princess Parrot habitat zone. The majority of taxa recorded represented the Fabaceae (16 taxa), Poaceae (15 taxa) and Malvaceae (seven taxa) families. Of the vascular plant taxa recorded, two 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. One species listed as Data Deficient (DD) under the Northern Territory TPWCA and one species listed as Intraspecific (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**. Reference source not found..

Table 4.1: Flora of significance recorded at monitoring sites across the TNP

Species	Conservation status (TPWCA)	Monitoring site	Quadrat type	# individuals
<i>Sida</i> sp. excedentifolia (J.L. Egan 1925)	DD	3A	Rehabilitation	5
<i>Sida</i> sp. excedentifolia (J.L. Egan 1925)	DD	3B	Control	15
<i>Sida</i> sp. excedentifolia (J.L. Egan 1925)	DD	11A	Rehabilitation	10
<i>Tephrosia brachyodon</i>	INFRA	3A	Rehabilitation	4
<i>Tephrosia brachyodon</i>	INFRA	3B	Control	49

4.4. Introduced (weed) species

A total of three introduced (weed) species were recorded within the vegetation monitoring sites, namely **Cenchrus ciliaris*, **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 five sites across the length of the TNP; comprising four control quadrats (1, 4, 8 and 17) and two rehabilitation quadrats (7 and 8). **Cynodon dactylon* was recorded from two sites; one control quadrat (1) and two rehabilitation quadrats (1 and 8). **Eragrostis minor* was recorded from two sites; two control quadrats (6 and 12) and one rehabilitation site (6). A breakdown of introduced (weed) species recorded is provided in **Appendix E**.

4.5. Erosion

Significant erosion was observed within site 6 rehabilitation quadrat (**Plate 1**). Heavy rainfall preceding the survey increased waterflow in the minor creekline, resulting in expansion of the channel bed and undercutting of the creek bank.

Some sheet and pedestal erosion was observed within site 10 rehabilitation quadrat (Plate 2).



Plate 1: Erosion recorded at site 6 – rehabilitation quadrat



Plate 2: Erosion recorded at site 10 – rehabilitation quadrat

4.6. 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.

4.6.1. 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: 0.16 ± 0.05 ; Rehabilitation 0.10 ± 0.03), native perennial flora species richness (Control: 13.67 ± 1.96 ; Rehabilitation: 15.00 ± 2.13) and weed foliage cover (Control: 0; Rehabilitation: 0). Native perennial flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 38.75 ± 6.42 ; Rehabilitation: 15.62 ± 4.43). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix F**.

4.6.2. 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 density (Control: 0.06 ± 0.02 ; Rehabilitation 0.05 ± 0.02) and native perennial flora species foliage cover (Control: 21.86 ± 6.61 ; Rehabilitation: 17.95 ± 10.95). Native perennial flora species richness (Control: 14.60 ± 1.72 ; Rehabilitation: 9.60 ± 3.41) and weed foliage cover (Control: 0.18 ± 0.12 ; Rehabilitation: 0.40 ± 0.40) 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 F**.

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

The MNES habitat zone (Greater Bilby and Great Desert Skink habitat and Night Parrot habitat), represented by six vegetation monitoring sites (2, 5, 7, 9, 10 and 16) satisfied two of the four completion criteria (**Table 4.2**). These being: native perennial flora species density (Control: 0.12 ± 0.02 ; Rehabilitation 0.20 ± 0.07) and native perennial flora species richness (Control: 13.00 ± 2.62 ; Rehabilitation: 12.17 ± 2.52). Native perennial flora species foliage cover (Control: 46.70 ± 10.65 ; Rehabilitation: 29.72 ± 7.58) and weed foliage cover (Control: 0; Rehabilitation: 0.003 ± 0.0003) 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 F**.

4.6.4. 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: 0.11 ± 0.03 ; Rehabilitation 0.13 ± 0.08), native perennial flora species richness (Control: 12.60 ± 2.66 ; Rehabilitation: 10.80 ± 3.69) and weed foliage cover (Control: 0.06 ± 0.06 ; Rehabilitation: 0.01 ± 0.00). Native perennial flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 39.69 ± 10.43 ; Rehabilitation: 21.19 ± 11.57). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix F**.

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 m ²)	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	PASS	FAIL	PASS	FAIL
MNES habitat zone (Greater Bilby and Great Desert Skink habitat)	2, 5, 7, 9, 10, 16	PASS	PASS	FAIL	FAIL
MNES habitat zone (Night Parrot habitat)	2, 5, 7, 9, 10, 16	PASS	PASS	FAIL	FAIL
MNES habitat zone (Princess Parrot habitat)	1, 4, 5, 7, 10	PASS	PASS	FAIL	PASS

4.7. Comparison of results against completion criteria 2020-2022

A summary of the 2022 survey results for the native vegetation rehabilitation zone and MNES habitat rehabilitation zones against 2020 and 2021 results is presented in Table 4.3 below.

Native perennial flora species density significantly decreased in the native vegetation zone in 2022 compared to 2020 and 2021, however this result was primarily driven by the number of individual *Yakirra australiensis* var. *australiensis* plants recorded in site 13 rehabilitation quadrat in 2022 (500 individuals) compared to 2020 (4,000 individuals) and 2021 (5,000 individuals). However this zone still met the completion criteria for the 2022 monitoring period. All MNES habitat rehabilitation zones native flora species density decreased (though not significantly) in 2022 from 2021, however all zones met the completion criteria for the 2022 monitoring period.

Native perennial flora species richness decreased across all rehabilitation zones from 2021 to 2022, however majority of the zones, except Dwarf Desert Spike-rush habitat zone, increased from 2020 to 2022 and met the completion criteria for the 2022 monitoring period.

Dwarf Desert Spike-rush habitat was the only MNES habitat rehabilitation zone to meet the minimum requirement outlined in the completion criteria for native perennial flora species foliage cover. However, general results indicate a positive development trajectory toward satisfying completion criteria with all MNES habitat rehabilitation zones recording an increase in foliage cover across the three survey periods.

Three of the five rehabilitation zones did not meet the completion criteria for weed foliage cover, with this result was due to the presence of **Cenchrus ciliaris* in site 7 rehabilitation quadrat but not in the control quadrat, and the greater cover of **Cenchrus ciliaris* (1%) in site 8 rehabilitation quadrat than the control quadrat (0.6%). Weed foliage cover was greater in rehabilitation quadrats than in control quadrats for the first time in 2022 for Greater Bilby and Great Desert Skink and Night Parrot habitat zones.

4.8. Photo monitoring points

Photo monitoring points across 2020, 2021 and 2022 are presented in **Appendix G**.

Table 4.3: Comparison of results against completion criteria from 2020 to 2022

Aspect ¹	Native vegetation rehabilitation zone completion criteria	Native vegetation zone ²			MNES habitat rehabilitation zone completion criteria	Dwarf Desert Spike-rush habitat			Greater Bilby and Great Desert Skink habitat			Night Parrot habitat			Princess Parrot habitat		
		2020	2021	2022		2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022
Native flora species density (% of control)	Perennial native flora species diversity is equal to or greater than 50% of that of the adjacent control area.	302.63	325.67	77.64*	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).	57.7	191.7	78.53	192.6	222.5	173.40	192.6	222.5	173.40	250.0	133.2	114.17
Native flora species richness (% of control)	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.	95.08	135.71	109.86	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.	82.1	105.3	65.75	70.0	106.7	93.59	70.0	106.7	93.59	79.7	112.3	85.71
Native flora species foliage cover (% of control)	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.	20.29	46.08	40.99	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.	42.0	68.8	82.11	11.5	49.4	63.64	11.5	49.4	63.64	17.8	35.2	53.38
Weed foliage cover: is rehabilitation greater than control (y/n)?	Percentage of foliage cover of Declared species under the Weeds Management Act, 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.	No	No	No	Percentage of foliage cover of Declared species under the Weeds Management Act, 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.	No	Yes	Yes	No	No	Yes	No	No	Yes	No	No	No

¹Results for native perennial flora species density, richness and foliage cover in rehabilitation areas (above) are presented as a total percentage of the adjacent control areas, in order to show a comparison of results, indicating the development trajectory of each rehabilitation zone.

²As site 17 rehabilitation quadrat was relocated in 2022, the above only compares sites 11, 12, 13, 14, 15 for the native vegetation zone across 2020, 2021 and 2022.

*This result is primarily driven by the number of individual *Yakirra australiensis* var. *australiensis* recorded within site 13 rehabilitation quadrat in 2022 (500 individuals) compared to 2020 (4,000 individuals) and 2021 (5,000 individuals).



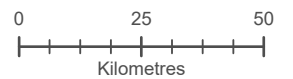
Figure 4-1: Flora of significance recorded at monitoring sites across the TNP

— Tanami Newmont Gas Pipeline

Flora of Significance

■ *Sida sp. excedentifolia* (J.L. Egan 1925; DD)

▲ *Tephrosia brachyodon* (INFRA)



Datum/Projection:
GDA 1994 MGA Zone 52

21PER20889-RD Date: 1/09/2022



5. Discussion and recommendations

The following summary and recommendations are specific are based on the methodology outlined in Section 3 (Table 5.1).

Table 5.1: Summary, changes over time and recommendations of each rehabilitation zone across the TNP

Rehabilitation zone	Summary	Changes over time	Recommendations
Native vegetation zone	<p>A total of 84 vascular plant taxa (all native) were recorded in the rehabilitation quadrats of the native vegetation zone. No introduced (weed) species were recorded. Native perennial flora species richness was 15.00 ± 2.13, flora species density was 0.10 ± 0.03 and foliage cover was 15.62 ± 4.43.</p> <p>The native vegetation zone satisfied three of the four completion criteria for 2022:</p> <ul style="list-style-type: none"> Perennial native flora species diversity is equal to or greater than 50% of that of the adjacent control area was met; 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 was met; 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 was not met; and Percentage of foliage cover of Declared species under the Weeds Management Act, 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 was met. 	<p>Site 17 rehabilitation quadrat was relocated in 2022 as the previously established quadrat had been cleared for a camp for another project. Therefore the discussion below only uses data for sites 11, 12, 13, 14 and 15 for the native vegetation zone across the three survey periods.</p> <p>Native flora species density and native flora species richness both met the completion criteria in 2022. However native flora species density significantly decreased in 2022 compared to 2020 and 2021. This was primarily driven by the number of individual <i>Yakirra australiensis</i> var. <i>australiensis</i> recorded in site 13 rehabilitation quadrat in 2022 (500 individuals) compared to 2020 (4,000 individuals) and 2021 (5,000 individuals). Native flora species richness also decreased in 2022 compared to 2020 and 2021. The TNP received below average rainfall in the three months preceding the field survey therefore this may have contributed to the species senescence. There was also substantial pulse recruitment following the cyclonic rainfall event in 2021, so a drop off in 2022 was expected as not all emergent seedlings recorded would have survived the first year.</p> <p>Whilst native flora species foliage cover did not meet the completion criteria in 2022, the results indicate a positive trajectory toward satisfying completion criteria with an increase in foliage cover across the three survey periods.</p> <p>Weeds have not been recorded in this rehabilitation zone across the three survey periods.</p>	<p>One individual of <i>Corymbia opaca</i> was recorded within the vegetation monitoring site 11 rehabilitation quadrat. Early intervention to remove this individual, and any individuals in the vicinity, would be recommended to avoid establishment of these large, deep-rooted trees above the natural gas pipeline.</p> <p>Continue monitoring to ensure completion criteria are achieved.</p>

Rehabilitation zone	Summary	Changes over time	Recommendations
<p>MNES habitat zone (Dwarf Desert Spike-rush habitat)</p>	<p>A total of 59 vascular plant taxa (56 native and three introduced) were recorded in the rehabilitation quadrats of the native vegetation zone. The introduced (weed) species <i>*Cenchrus ciliaris</i>, <i>*Cynodon dactylon</i> and <i>*Eragrostis minor</i> (annual), were recorded. Native perennial flora species richness was 9.60 ± 3.41, flora species density was 0.05 ± 0.02, foliage cover was 17.95 ± 10.95 and weed foliage cover was 0.40 ± 0.40.</p> <p>The MNES habitat zone (Dwarf Desert Spike-rush habitat) satisfied two of the four completion criteria for 2022:</p> <ul style="list-style-type: none"> • Perennial native flora species diversity is equal to or greater than 50% of that of the adjacent control area was met; • 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 was not met; • 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 was met; and • Percentage of foliage cover of Declared species under the Weeds Management Act, 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 was not met. 	<p>Native flora species density met the completion criteria in 2022 and native flora species richness was 5% off the completion criteria (70%). However native flora species density and native flora species richness decreased in 2022 compared to 2021. Several species which recorded a high number of individuals in 2021 weren't present in some of the 2022 quadrats, or occurred in significantly less numbers. The TNP received below average rainfall in the three months preceding the field survey therefore this may have contributed to species. There was also substantial pulse recruitment following the cyclonic rainfall event in 2021, so a drop off in 2022 was expected as not all emergent seedlings recorded would have survived the first year.</p> <p>Dwarf Desert Spike-rush habitat was the only MNES habitat rehabilitation zone to meet the minimum requirement outlined in the completion criteria for native perennial flora species foliage cover in 2022.</p> <p>Weed foliage cover was greater in rehabilitation than control in 2021 and 2022. This result was due to the greater cover of <i>*Cenchrus ciliaris</i> (1%) in site 8 rehabilitation quadrat than the control quadrat (0.6%).</p>	<p>Significant erosion was observed within site 6 rehabilitation quadrat. Heavy rainfall preceding the survey increased waterflow in the minor creekline, resulting in expansion of the channel bed and undercutting of the creek bank. Early intervention would be recommended to stabilise the landform in this area.</p> <p>One individual of <i>Corymbia opaca</i> was recorded within the vegetation monitoring site 4 rehabilitation quadrat. Early intervention to remove this individual, and any other individuals within the vicinity, would be recommended to avoid establishment of these large, deep-rooted trees above the natural gas pipeline.</p> <p>Undertake weed control across the habitat zone, particularly <i>*Cenchrus ciliaris</i> (Buffel grass) to promote native recruitment.</p> <p>Continue monitoring to ensure completion criteria are achieved.</p>

Rehabilitation zone	Summary	Changes over time	Recommendations
<p>MNES habitat zone (Greater Bilby and Great Desert Skink habitat) and MNES habitat zone (Night Parrot habitat)</p>	<p>A total of 68 vascular plant taxa (67 native and one introduced) were recorded in the rehabilitation quadrats of the native vegetation zone. The introduced (weed) species <i>*Cenchrus ciliaris</i> was recorded. Native perennial flora species richness was 12.17 ± 2.52, flora species density was 0.20 ± 0.07, foliage cover was 29.72 ± 7.58 and weed foliage cover was 0.003 ± 0.0003.</p> <p>The MNES habitat zone (Greater Bilby and Great Desert Skink habitat) and MNES habitat zone (Night Parrot habitat) satisfied two of the four completion criteria for 2022:</p> <ul style="list-style-type: none"> • Perennial native flora species diversity is equal to or greater than 50% of that of the adjacent control area was met; • 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 was met; • 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 was not met; and • Percentage of foliage cover of Declared species under the Weeds Management Act, 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 was not met. 	<p>Native flora species density and native flora species richness both met the completion criteria in 2022. However native flora species density and native flora species richness decreased in 2022 compared to 2021. Some of the species with the highest number of individuals in 2020 and 2021 weren't present in some of the 2022 quadrats or in significantly less numbers. The TNP received below average rainfall in the three months preceding the field survey therefore this may have contributed to the species senescence in the quadrats. There was also substantial pulse recruitment following the cyclonic rainfall event in 2021, so a drop off in 2022 was expected as not all emergent seedlings recorded would have survived the first year.</p> <p>Whilst native flora species foliage cover did not meet the completion criteria in 2022, the results over time indicate a positive trajectory toward satisfying completion criteria with an increase in foliage cover across the three survey periods.</p> <p>Weed foliage cover was greater in rehabilitation quadrats than in control quadrats for the first time in 2022. This result was due to the presence of <i>*Cenchrus ciliaris</i> in site 7 rehabilitation quadrat but not in the control quadrat.</p>	<p>Some sheet and pedestal erosion was observed within site 10.</p> <p>Undertake weed control across the habitat zone, particularly <i>*Cenchrus ciliaris</i> (Buffel grass) to promote native recruitment.</p> <p>Continue monitoring to ensure completion criteria are achieved.</p>

Rehabilitation zone	Summary	Changes over time	Recommendations
MNES habitat zone (Princess Parrot habitat)	<p>A total of 59 vascular plant taxa (57 native and two introduced) were recorded in the rehabilitation quadrats of the native vegetation zone. The introduced (weed) species <i>*Cenchrus ciliaris</i> and <i>*Cynodon dactylon</i> were recorded. Native perennial flora species richness was 10.80 ± 3.69, flora species density was 0.13 ± 0.08, foliage cover was 21.19 ± 11.57 and weed foliage cover was 0.01 ± 0.00.</p> <p>The MNES habitat zone (Princess Parrot habitat) satisfied three of the four completion criteria for 2022:</p> <ul style="list-style-type: none"> • Perennial native flora species diversity is equal to or greater than 50% of that of the adjacent control area was met; • 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 was met; • 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 was not met; and • Percentage of foliage cover of Declared species under the Weeds Management Act, 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 was met. 	<p>Native flora species density and native flora species richness both met the completion criteria in 2022. However native flora species density and native flora species richness decreased in 2022 compared to 2021. Some of the species with the highest number of individuals in 2021 weren't present in some of the 2022 quadrats or in significantly less numbers. The TNP received below average rainfall in the three months preceding the field survey therefore this may have contributed to the species senescence in the quadrats. There was also substantial pulse recruitment following the cyclonic rainfall event in 2021, so a drop off in 2022 was expected as not all emergent seedlings recorded would have survived the first year.</p> <p>Whilst native flora species foliage cover did not meet the completion criteria in 2022, results over time indicate a positive trajectory toward satisfying completion criteria.</p> <p>Across the three survey periods, weed foliage cover in rehabilitation areas has not exceeded that of the controls.</p>	<p>Some sheet and pedestal erosion was observed within site 10.</p> <p>One individual of <i>Corymbia opaca</i> 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.</p> <p>Continue monitoring to ensure completion criteria are achieved.</p>

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)	<p>Not an IUCN category.</p> <p>Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including:</p> <ul style="list-style-type: none"> • 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*	760265	7545359
	Control	760264	7545440

* Site 17 rehabilitation quadrat was relocated in 2022 as the previously established quadrat had been cleared.

Appendix C Flora species list

Family	Scientific name	Control	Rehab
Acanthaceae	<i>Rostellularia adscendens</i> var. <i>pogonathera</i>	X	
Aizoaceae	<i>Trianthema pilosum</i>	X	
Aizoaceae	<i>Trianthema triquetrum</i>	X	X
Amaranthaceae	<i>Alternanthera angustifolia</i>	X	X
Amaranthaceae	<i>Alternanthera denticulata</i>		X
Amaranthaceae	<i>Dysphania glomulifera</i>	X	
Amaranthaceae	<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	X	X
Amaranthaceae	<i>Einadia nutans</i> subsp. <i>eremaea</i>	X	
Amaranthaceae	<i>Enchylaena tomentosa</i>	X	X
Amaranthaceae	<i>Gomphrena diffusa</i> subsp. <i>arenicola</i>		X
Amaranthaceae	<i>Gomphrena lanata</i>	X	
Amaranthaceae	<i>Gomphrena leptophylla</i>	X	
Amaranthaceae	<i>Gomphrena</i> sp.		X
Amaranthaceae	<i>Ptilotus calostachyus</i>	X	X
Amaranthaceae	<i>Ptilotus fusiformis</i>	X	X
Amaranthaceae	<i>Ptilotus obovatus</i>	X	
Amaranthaceae	<i>Ptilotus polystachyus</i>	X	
Amaranthaceae	<i>Ptilotus schwartzii</i>	X	X
Amaranthaceae	<i>Ptilotus</i> sp.	X	
Amaranthaceae	<i>Salsola australis</i>	X	X
Amaranthaceae	<i>Sclerolaena convexula</i>		X
Amaranthaceae	<i>Sclerolaena cornishiana</i>	X	X
Amaranthaceae	<i>Sclerolaena deserticola</i>		X
Asteraceae	<i>Blumea tenella</i>		X
Asteraceae	<i>Pluchea dunlopii</i>	X	X
Asteraceae	<i>Pluchea ferdinandi-muelleri</i>	X	X
Asteraceae	<i>Pluchea tetranthera</i>	X	
Asteraceae	<i>Pterocaulon sphacelatum</i>	X	X
Boraginaceae	<i>Halgania solanacea</i> var. Mt Doreen (G.M. Chippendale 42X6)		X
Boraginaceae	<i>Heliotropium tanythrix</i>	X	X
Caryophyllaceae	<i>Polycarpaea corymbosa</i>	X	
Cleomaceae	<i>Cleome viscosa</i>	X	X
Convolvulaceae	<i>Bonamia deserticola</i>		X
Convolvulaceae	<i>Bonamia erecta</i>	X	X

Family	Scientific name	Control	Rehab
Convolvulaceae	<i>Bonamia media</i>	X	
Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	X	X
Convolvulaceae	<i>Ipomoea costata</i>		X
Convolvulaceae	<i>Ipomoea muelleri</i>	X	X
Cucurbitaceae	<i>Citrullus colocynthis</i>	X	
Cyperaceae	<i>Bulbostylis barbata</i>	X	
Cyperaceae	<i>Cyperus blakeanus</i>		X
Cyperaceae	<i>Cyperus iria</i>	X	X
Cyperaceae	<i>Cyperus vaginatus</i>	X	
Cyperaceae	<i>Fimbristylis ammobia</i>	X	
Cyperaceae	<i>Fimbristylis caespitosa</i>	X	
Cyperaceae	<i>Fimbristylis dichotoma</i>	X	X
Elatinaceae	<i>Bergia henshallii</i>	X	
Elatinaceae	<i>Bergia</i> sp.		X
Euphorbiaceae	<i>Euphorbia biconvexa</i>	X	
Euphorbiaceae	<i>Euphorbia ferdinandi</i> var. <i>ferdinandi</i>		X
Euphorbiaceae	<i>Euphorbia</i> sp.	X	X
Euphorbiaceae	<i>Euphorbia tannensis</i>	X	X
Fabaceae	<i>Acacia adsurgens</i>	X	X
Fabaceae	<i>Acacia ancistrocarpa</i>	X	
Fabaceae	<i>Acacia aneura</i>		X
Fabaceae	<i>Acacia aptaneura</i>	X	X
Fabaceae	<i>Acacia bivenosa</i>	X	
Fabaceae	<i>Acacia colei</i>	X	X
Fabaceae	<i>Acacia cuthbertsonii</i> subsp. <i>cuthbertsonii</i>	X	X
Fabaceae	<i>Acacia elachantha</i>	X	X
Fabaceae	<i>Acacia incurvaneura</i>	X	
Fabaceae	<i>Acacia kempeana</i>	X	X
Fabaceae	<i>Acacia melleodora</i>	X	X
Fabaceae	<i>Acacia pruinocarpa</i>	X	X
Fabaceae	<i>Acacia sericophylla</i>	X	X
Fabaceae	<i>Acacia sibirica</i>	X	X
Fabaceae	<i>Acacia</i> sp.	X	X
Fabaceae	<i>Acacia</i> sp. (Urandangie L.Pedley 2X25)		X
Fabaceae	<i>Acacia stipuligera</i>	X	X
Fabaceae	<i>Acacia tenuissima</i>	X	X
Fabaceae	<i>Indigofera linifolia</i>	X	X

Family	Scientific name	Control	Rehab
Fabaceae	<i>Indigofera linnaei</i>		X
Fabaceae	<i>Leptosema anomalum</i>		X
Fabaceae	<i>Leptosema chambersii</i>	X	
Fabaceae	<i>Muelleranthus stipularis</i>	X	X
Fabaceae	<i>Panicum decompositum</i>		X
Fabaceae	<i>Petalostylis cassioides</i>		X
Fabaceae	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	X	
Fabaceae	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	X	X
Fabaceae	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	X	X
Fabaceae	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>		X
Fabaceae	<i>Senna pleurocarpa</i>		X
Fabaceae	<i>Senna</i> sp.		X
Fabaceae	<i>Senna venusta</i>		X
Fabaceae	<i>Tephrosia brachyodon</i>	X	X
Fabaceae	<i>Tephrosia</i> sp.	X	
Fabaceae	<i>Tephrosia</i> sp. D Kimberley Flora (R.D.Royce 1848)	X	X
Fabaceae	<i>Tephrosia supina</i>	X	X
Fabaceae	<i>Vigna lanceolata</i> var. <i>latifolia</i>	X	
Goodeniaceae	<i>Goodenia armitiana</i>	X	X
Goodeniaceae	<i>Goodenia azurea</i> subsp. <i>azurea</i>		X
Goodeniaceae	<i>Goodenia triodiophila</i>	X	X
Goodeniaceae	<i>Scaevola parvifolia</i> subsp. <i>parvifolia</i>	X	X
Gyrostemonaceae	<i>Codonocarpus cotinifolius</i>	X	
Lamiaceae	<i>Dicrastylis exsuccosa</i>	X	
Lamiaceae	<i>Dicrastylis lewellinii</i>	X	X
Lauraceae	<i>Cassytha</i> sp.	X	X
Malvaceae	<i>Abutilon macrum</i>	X	X
Malvaceae	<i>Abutilon otocarpum</i>	X	X
Malvaceae	<i>Androcalva loxophylla</i>	X	X
Malvaceae	<i>Corchorus sidoides</i>		X
Malvaceae	<i>Gossypium australe</i>	X	X
Malvaceae	<i>Hibiscus burtonii</i>	X	X
Malvaceae	<i>Hibiscus leptocladus</i>	X	
Malvaceae	<i>Hibiscus</i> sp.	X	X
Malvaceae	<i>Hibiscus sturtii</i> var. <i>camplyochlamys</i>	X	
Malvaceae	<i>Hibiscus sturtii</i> var. <i>truncatus</i>	X	
Malvaceae	<i>Malvaceae</i> sp.	X	

Family	Scientific name	Control	Rehab
Malvaceae	<i>Seringia nephrosperma</i>	X	X
Malvaceae	<i>Sida platycalyx</i>		X
Malvaceae	<i>Sida</i> sp.	X	X
Malvaceae	<i>Sida</i> sp. <i>excedentifolia</i> (J.L. Egan 1925)	X	X
Malvaceae	<i>Sida</i> sp. Rabbit Flat (B.J. Carter 626)	X	
Malvaceae	<i>Sida</i> sp. Wakaya Desert (P.K.Latz 11894)	X	X
Malvaceae	<i>Waltheria indica</i>		X
Marsileaceae	<i>Marsilea hirsuta</i>	X	X
Myrtaceae	<i>Corymbia opaca</i>	X	X
Myrtaceae	<i>Eucalyptus camaldulensis</i> subsp. <i>arida</i>	X	
Myrtaceae	<i>Eucalyptus gamophylla</i>	X	
Myrtaceae	<i>Melaleuca glomerata</i>	X	X
Myrtaceae	<i>Melaleuca lasiandra</i>	X	X
Nyctaginaceae	<i>Boerhavia coccinea</i>	X	X
Phyllanthaceae	<i>Phyllanthus erwinii</i>	X	X
Plantaginaceae	<i>Stemodia glabella</i>	X	X
Plantaginaceae	<i>Stemodia</i> sp.		X
Poaceae	* <i>Cenchrus ciliaris</i>	X	X
Poaceae	* <i>Cynodon dactylon</i>	X	X
Poaceae	* <i>Eragrostis minor</i>	X	X
Poaceae	<i>Aristida contorta</i>	X	X
Poaceae	<i>Aristida holathera</i>	X	X
Poaceae	<i>Aristida holathera</i> var. <i>holathera</i>	X	X
Poaceae	<i>Aristida inaequiglumis</i>	X	X
Poaceae	<i>Aristida latifolia</i>	X	
Poaceae	<i>Cymbopogon ambiguus</i>	X	
Poaceae	<i>Dactyloctenium radulans</i>	X	X
Poaceae	<i>Digitaria brownii</i>	X	
Poaceae	<i>Digitaria divaricatissima</i>	X	
Poaceae	<i>Echinochloa colona</i>	X	
Poaceae	<i>Enneapogon cylindricus</i>	X	X
Poaceae	<i>Enneapogon polyphyllus</i>	X	X
Poaceae	<i>Enteropogon ramosus</i>	X	
Poaceae	<i>Eragrostis cumingii</i>	X	X
Poaceae	<i>Eragrostis cylindriflora</i>	X	
Poaceae	<i>Eragrostis eriopoda</i>	X	X
Poaceae	<i>Eragrostis eriopoda</i> subsp. Sandy fireweed (P.K. Latz 129X8)	X	

Family	Scientific name	Control	Rehab
Poaceae	<i>Eragrostis falcata</i>	X	X
Poaceae	<i>Eragrostis leptocarpa</i>	X	X
Poaceae	<i>Eragrostis</i> sp.	X	
Poaceae	<i>Eragrostis speciosa</i>	X	X
Poaceae	<i>Eragrostis tenellula</i>	X	
Poaceae	<i>Eriachne aristidea</i>	X	X
Poaceae	<i>Eriachne armitii</i>		X
Poaceae	<i>Eriachne helmsii</i>	X	
Poaceae	<i>Eriachne obtusa</i>	X	X
Poaceae	<i>Eriachne pulchella</i> subsp. <i>dominii</i>	X	
Poaceae	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>		X
Poaceae	<i>Eriachne</i> sp.	X	
Poaceae	<i>Eulalia aurea</i>	X	
Poaceae	<i>Iseilema membranaceum</i>		X
Poaceae	<i>Monachather paradoxus</i>	X	X
Poaceae	<i>Panicum laevinode</i>	X	X
Poaceae	<i>Panicum</i> sp.	X	
Poaceae	<i>Paraneurachne muelleri</i>	X	X
Poaceae	<i>Paspalidium basicladum</i>	X	X
Poaceae	<i>Paspalidium clementii</i>	X	X
Poaceae	<i>Paspalidium rarum</i>	X	X
Poaceae	<i>Perotis rara</i>	X	X
Poaceae	<i>Triodia basedowii</i>	X	X
Poaceae	<i>Triodia pungens</i>	X	X
Poaceae	<i>Triodia schinzii</i>	X	
Poaceae	<i>Tripogon loliiformis</i>	X	
Poaceae	<i>Yakirra australiensis</i> var. <i>australiensis</i>	X	X
Poaceae	<i>Sporobolus australasicus</i>	X	X
Portulacaceae	<i>Portulaca oleracea</i> var. <i>Undoolya</i> (R.A.Perry 3267)	X	
Portulacaceae	<i>Calandrinia balonensis</i>	X	X
Portulacaceae	<i>Calandrinia</i> sp.	X	
Portulacaceae	<i>Calotis porphyroglossa</i>	X	
Proteaceae	<i>Grevillea wickhamii</i> subsp. <i>aprica</i>	X	
Proteaceae	<i>Hakea chordophylla</i>	X	
Proteaceae	<i>Hakea macrocarpa</i>	X	X
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	X	
Rubiaceae	<i>Spermacoce occidentalis</i>	X	

Family	Scientific name	Control	Rehab
Rubiaceae	<i>Synaptantha tillaeacea</i>		X
Santalaceae	<i>Anthobolus leptomerioides</i>	X	
Sapindaceae	<i>Dodonaea viscosa</i>		X
Scrophulariaceae	<i>Eremophila gilesii</i> subsp. <i>gilesii</i>	X	X
Scrophulariaceae	<i>Eremophila latrobei</i> subsp. <i>glabra</i>	X	
Scrophulariaceae	<i>Eremophila</i> sp.	X	X
Solanaceae	<i>Solanum centrale</i>	X	X
Solanaceae	<i>Solanum coactiliferum</i>		X
Solanaceae	<i>Solanum quadriloculatum</i>	X	X
Solanaceae	<i>Solanum</i> sp.		X
Surianaceae	<i>Stylobasium spathulatum</i>	X	X
Zygophyllaceae	<i>Tribulopsis angustifolia</i>	X	
Zygophyllaceae	<i>Tribulus hirsutus</i>		X

Appendix D Species by site matrix

Family	Species	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17		
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B		
Acanthaceae	<i>Rostellularia adscendens</i> var. <i>pogonathera</i>									X																											
Aizoaceae	<i>Trianthema pilosum</i>		X																																		
Aizoaceae	<i>Trianthema triquetrum</i>														X	X																					
Amaranthaceae	<i>Alternanthera angustifolia</i>		X					X		X	X	X	X											X	X												
Amaranthaceae	<i>Alternanthera denticulata</i>					X																															
Amaranthaceae	<i>Dysphania glomulifera</i>															X																					
Amaranthaceae	<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>					X				X	X																										
Amaranthaceae	<i>Einadia nutans</i> subsp. <i>eremaea</i>																						X														
Amaranthaceae	<i>Enchylaena tomentosa</i>															X			X															X			
Amaranthaceae	<i>Gomphrena diffusa</i> subsp. <i>arenicola</i>																	X																			
Amaranthaceae	<i>Gomphrena lanata</i>						X		X																												X
Amaranthaceae	<i>Gomphrena leptophylla</i>																			X																	
Amaranthaceae	<i>Gomphrena</i> sp.																																			X	
Amaranthaceae	<i>Ptilotus calostachyus</i>																							X								X					
Amaranthaceae	<i>Ptilotus fusiformis</i>														X										X				X								
Amaranthaceae	<i>Ptilotus obovatus</i>																						X			X											
Amaranthaceae	<i>Ptilotus polystachyus</i>						X																X														
Amaranthaceae	<i>Ptilotus schwartzii</i>					X																	X						X								
Amaranthaceae	<i>Ptilotus</i> sp.										X																										
Amaranthaceae	<i>Salsola australis</i>	X																																		X	
Amaranthaceae	<i>Sclerolaena convexula</i>																																			X	
Amaranthaceae	<i>Sclerolaena cornishiana</i>			X		X	X	X	X							X				X														X	X		
Amaranthaceae	<i>Sclerolaena deserticola</i>					X																															
Asteraceae	<i>Blumea tenella</i>																							X													
Asteraceae	<i>Pluchea dunlopii</i>		X							X	X	X																									
Asteraceae	<i>Pluchea ferdinandi-muelleri</i>														X	X	X						X		X												
Asteraceae	<i>Pluchea tetranthera</i>																										X										
Asteraceae	<i>Pterocaulon sphacelatum</i>				X																	X		X													
Boraginaceae	<i>Halgania solanacea</i> var. Mt Doreen (G.M. Chippendale 42X6)																																	X			
Boraginaceae	<i>Heliotropium tanythrix</i>					X	X	X													X	X														X	
Caryophyllaceae	<i>Polycarpaea corymbosa</i>						X			X																											
Cleomaceae	<i>Cleome viscosa</i>	X	X	X	X	X	X	X	X	X	X	X	X			X		X			X	X		X							X					X	
Convolvulaceae	<i>Bonamia deserticola</i>									X																											
Convolvulaceae	<i>Bonamia erecta</i>													X													X	X									

Family	Species	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
Convolvulaceae	<i>Bonamia media</i>										X																									
Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>			X	X	X	X	X	X	X	X	X	X	X								X	X	X	X	X						X	X	X	X	
Convolvulaceae	<i>Ipomoea costata</i>									X																										
Convolvulaceae	<i>Ipomoea muelleri</i>									X		X	X									X														
Cucurbitaceae	<i>Citrullus colocynthis</i>												X																							
Cyperaceae	<i>Bulbostylis barbata</i>																						X													
Cyperaceae	<i>Cyperus blakeanus</i>																	X																		
Cyperaceae	<i>Cyperus iria</i>									X														X												
Cyperaceae	<i>Cyperus vaginatus</i>		X																																	
Cyperaceae	<i>Fimbristylis ammobia</i>																		X																	
Cyperaceae	<i>Fimbristylis caespitosa</i>																		X																	
Cyperaceae	<i>Fimbristylis dichotoma</i>					X	X		X		X	X											X	X											X	
Elatinaceae	<i>Bergia henschallii</i>										X																									
Elatinaceae	<i>Bergia</i> sp.									X																										
Euphorbiaceae	<i>Euphorbia biconvexa</i>												X																							
Euphorbiaceae	<i>Euphorbia ferdinandi</i> var. <i>ferdinandi</i>							X		X	X											X														
Euphorbiaceae	<i>Euphorbia</i> sp.		X		X							X																								
Euphorbiaceae	<i>Euphorbia tannensis</i>			X				X	X	X	X					X									X				X		X				X	
Fabaceae	<i>Acacia adsurgens</i>									X	X															X										
Fabaceae	<i>Acacia ancistrocarpa</i>																												X							
Fabaceae	<i>Acacia aneura</i>																					X														
Fabaceae	<i>Acacia aptaneura</i>				X		X	X	X														X	X									X	X		
Fabaceae	<i>Acacia bivenosa</i>															X															X		X			
Fabaceae	<i>Acacia coleii</i>	X	X																																	
Fabaceae	<i>Acacia cuthbertsonii</i> subsp. <i>cuthbertsonii</i>					X	X																													
Fabaceae	<i>Acacia elachantha</i>													X											X	X			X							
Fabaceae	<i>Acacia incurvaneura</i>												X											X												
Fabaceae	<i>Acacia kempeana</i>				X			X																								X	X			
Fabaceae	<i>Acacia melleodora</i>													X	X							X														
Fabaceae	<i>Acacia pruinocarpa</i>				X					X																										
Fabaceae	<i>Acacia sericophylla</i>																			X	X				X			X								
Fabaceae	<i>Acacia sibirica</i>												X									X		X	X											
Fabaceae	<i>Acacia</i> sp.																											X			X	X				
Fabaceae	<i>Acacia</i> sp. (Urandangie L.Pedley 2X25)																																X			
Fabaceae	<i>Acacia stipuligera</i>																												X	X	X					
Fabaceae	<i>Acacia tenuissima</i>									X																					X	X				

Family	Species	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
Fabaceae	<i>Indigofera linifolia</i>									X	X																									
Fabaceae	<i>Indigofera linnaei</i>							X		X																										
Fabaceae	<i>Leptosema anomalum</i>																																X			
Fabaceae	<i>Leptosema chambersii</i>																																X			
Fabaceae	<i>Muelleranthus stipularis</i>										X														X									X		
Fabaceae	<i>Panicum decompositum</i>																								X											
Fabaceae	<i>Petalostylis cassioides</i>																																		X	
Fabaceae	<i>Senna artemisioides</i> subsp. <i>filifolia</i>																																		X	
Fabaceae	<i>Senna artemisioides</i> subsp. <i>helmsii</i>					X	X	X	X	X	X	X	X									X		X											X	
Fabaceae	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>							X		X		X													X	X									X	X
Fabaceae	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>																						X												X	
Fabaceae	<i>Senna pleurocarpa</i>																											X								
Fabaceae	<i>Senna</i> sp.							X																											X	
Fabaceae	<i>Senna venusta</i>																			X														X		
Fabaceae	<i>Tephrosia brachyodon</i>					X	X																													
Fabaceae	<i>Tephrosia</i> sp.				X																															
Fabaceae	<i>Tephrosia</i> sp. D Kimberley Flora (R.D.Royce 1848)														X					X									X	X						
Fabaceae	<i>Tephrosia supina</i>									X	X																									
Fabaceae	<i>Vigna lanceolata</i> var. <i>latifolia</i>		X																																	
Goodeniaceae	<i>Goodenia armitiana</i>										X														X							X				
Goodeniaceae	<i>Goodenia azurea</i> subsp. <i>azurea</i>																																		X	
Goodeniaceae	<i>Goodenia triodiophila</i>																																X	X		
Goodeniaceae	<i>Scaevola parvifolia</i> subsp. <i>parvifolia</i>																			X	X							X	X	X	X	X	X	X		
Gyrostemonaceae	<i>Codonocarpus cotinifolius</i>				X																														X	
Lamiaceae	<i>Dicrastylis exsuccosa</i>																																		X	
Lamiaceae	<i>Dicrastylis lewellinii</i>																																		X	X
Lauraceae	<i>Cassytha</i> sp.															X	X									X								X		
Malvaceae	<i>Abutilon macrum</i>					X		X	X																X											X
Malvaceae	<i>Abutilon otocarpum</i>			X	X	X	X		X	X	X			X								X			X								X		X	X
Malvaceae	<i>Androcalva loxophylla</i>																			X	X															
Malvaceae	<i>Corchorus sidoides</i>																																		X	
Malvaceae	<i>Gossypium australe</i>									X	X															X										
Malvaceae	<i>Hibiscus burtonii</i>				X			X			X											X	X					X		X				X	X	
Malvaceae	<i>Hibiscus leptocladus</i>																							X	X											
Malvaceae	<i>Hibiscus</i> sp.									X		X																								
Malvaceae	<i>Hibiscus sturtii</i> var. <i>campylochlamys</i>																																			X

Family	Species	1 A	1 B	2 A	2 B	3 A	3 B	4 A	4 B	5 A	5 B	6 A	6 B	7 A	7 B	8 A	8 B	9 A	9 B	10 A	10 B	11 A	11 B	12 A	12 B	13 A	13 B	14 A	14 B	15 A	15 B	16 A	16 B	17 A	17 B				
Malvaceae	<i>Hibiscus sturtii</i> var. <i>truncatus</i>						X																																
Malvaceae	<i>Malvaceae</i> sp.																X																						
Malvaceae	<i>Seringia nephrosperma</i>																																X	X		X			
Malvaceae	<i>Sida platycalyx</i>																						X		X		X									X			
Malvaceae	<i>Sida</i> sp.										X				X		X						X		X											X			
Malvaceae	<i>Sida</i> sp. <i>excedentifolia</i> (J.L. Egan 1925)						X	X															X																
Malvaceae	<i>Sida</i> sp. <i>Rabbit Flat</i> (B.J. Carter 626)																																				X		
Malvaceae	<i>Sida</i> sp. <i>Wakaya Desert</i> (P.K.Latz 11894)				X		X																				X						X		X	X	X		
Malvaceae	<i>Waltheria indica</i>								X																														
Marsileaceae	<i>Marsilea hirsuta</i>												X	X												X													
Myrtaceae	<i>Corymbia opaca</i>								X															X		X													
Myrtaceae	<i>Eucalyptus camaldulensis</i> subsp. <i>arida</i>			X																																			
Myrtaceae	<i>Eucalyptus gamophylla</i>																											X									X		
Myrtaceae	<i>Melaleuca glomerata</i>															X	X	X																					
Myrtaceae	<i>Melaleuca lasiandra</i>														X	X			X																				
Nyctaginaceae	<i>Boerhavia coccinea</i>								X		X	X	X	X										X		X		X											
Phyllanthaceae	<i>Phyllanthus erwinii</i>								X		X															X		X											
Plantaginaceae	<i>Stemodia glabella</i>						X	X																															
Plantaginaceae	<i>Stemodia</i> sp.																											X											
Poaceae	* <i>Cenchrus ciliaris</i>			X					X						X		X	X																				X	
Poaceae	* <i>Cynodon dactylon</i>		X	X													X																						
Poaceae	* <i>Eragrostis minor</i>												X	X													X												
Poaceae	<i>Aristida contorta</i>				X		X		X	X			X											X		X										X	X		
Poaceae	<i>Aristida holathera</i>				X	X	X	X					X											X				X		X						X	X		
Poaceae	<i>Aristida holathera</i> var. <i>holathera</i>									X	X		X	X				X		X						X		X						X					
Poaceae	<i>Aristida inaequiglumis</i>				X	X	X			X			X											X	X								X			X			
Poaceae	<i>Aristida latifolia</i>										X		X											X		X													
Poaceae	<i>Cymbopogon ambiguus</i>								X																														
Poaceae	<i>Dactyloctenium radulans</i>								X			X												X														X	
Poaceae	<i>Digitaria brownii</i>																																					X	
Poaceae	<i>Digitaria divaricatissima</i>																																						X
Poaceae	<i>Echinochloa colona</i>													X																									
Poaceae	<i>Enneapogon cylindricus</i>						X	X	X															X	X											X	X		
Poaceae	<i>Enneapogon polyphyllus</i>				X		X				X															X									X				
Poaceae	<i>Enteropogon ramosus</i>																																						X
Poaceae	<i>Eragrostis cumingii</i>						X			X	X	X	X	X														X											X

Family	Species	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	
Poaceae	<i>Eragrostis cylindriflora</i>		X																																	
Poaceae	<i>Eragrostis eriopoda</i>			X	X	X								X		X				X						X		X		X	X	X				
Poaceae	<i>Eragrostis eriopoda</i> subsp. Sandy fireweed (P.K. Latz 129X8)																			X							X		X							
Poaceae	<i>Eragrostis falcata</i>					X		X				X				X	X																			
Poaceae	<i>Eragrostis leptocarpa</i>			X		X	X	X	X	X		X	X										X	X									X			
Poaceae	<i>Eragrostis</i> sp.												X																							
Poaceae	<i>Eragrostis speciosa</i>		X															X																		
Poaceae	<i>Eragrostis tenellula</i>												X												X											
Poaceae	<i>Eriachne aristidea</i>				X					X	X		X													X				X						
Poaceae	<i>Eriachne armitii</i>																							X												
Poaceae	<i>Eriachne helmsii</i>																						X													
Poaceae	<i>Eriachne obtusa</i>					X	X											X	X		X															
Poaceae	<i>Eriachne pulchella</i> subsp. <i>dominii</i>										X																									
Poaceae	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>					X																														
Poaceae	<i>Eriachne</i> sp.												X																							
Poaceae	<i>Eulalia aurea</i>		X																					X												
Poaceae	<i>Iseilema membranaceum</i>																								X											
Poaceae	<i>Monachather paradoxus</i>			X	X																	X	X									X				
Poaceae	<i>Panicum laevinode</i>					X																	X	X												
Poaceae	<i>Panicum</i> sp.							X				X													X											
Poaceae	<i>Paraneurachne muelleri</i>				X					X													X											X		
Poaceae	<i>Paspalidium basicladum</i>			X																														X		
Poaceae	<i>Paspalidium clementii</i>							X														X	X													
Poaceae	<i>Paspalidium rarum</i>							X	X			X										X		X	X										X	
Poaceae	<i>Perotis rara</i>																						X	X												
Poaceae	<i>Triodia basedowii</i>			X	X	X																											X	X		
Poaceae	<i>Triodia pungens</i>									X	X			X	X		X	X	X	X	X				X	X	X		X	X						
Poaceae	<i>Triodia schinzii</i>																			X								X								
Poaceae	<i>Tripogon loliiformis</i>					X		X																											X	
Poaceae	<i>Yakirra australiensis</i> var. <i>australiensis</i>										X														X											
Poaceae	<i>Sporobolus australasicus</i>							X	X		X	X	X																						X	
Portulacaceae	<i>Portulaca oleracea</i> var. <i>Undoolya</i> (R.A.Perry 3267)										X																								X	
Portulacaceae	<i>Calandrinia balonensis</i>			X																													X	X		
Portulacaceae	<i>Calandrinia</i> sp.				X																															
Portulacaceae	<i>Calotis porphyroglossa</i>											X																								
Proteaceae	<i>Grevillea wickhamii</i> subsp. <i>aprica</i>																																	X		

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

Species	WoNS or Declared Pest?	Monitoring site	Quadrat type	# of plants
<i>*Cenchrus ciliaris</i>	No	1B	Control	5
<i>*Cenchrus ciliaris</i>	No	4B	Control	1
<i>*Cenchrus ciliaris</i>	No	7A	Rehabilitation	1
<i>*Cenchrus ciliaris</i>	No	8A	Rehabilitation	40
<i>*Cenchrus ciliaris</i>	No	8B	Control	33
<i>*Cenchrus ciliaris</i>	No	17B	Control	20
<i>*Cynodon dactylon</i>	No	1A	Rehabilitation	5
<i>*Cynodon dactylon</i>	No	1B	Control	10
<i>*Cynodon dactylon</i>	No	8A	Rehabilitation	40
<i>*Eragrostis minor</i>	No	6A	Rehabilitation	150
<i>*Eragrostis minor</i>	No	6B	Control	5
<i>*Eragrostis minor</i>	No	12B	Control	850

Appendix F 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 m ²)			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)	0.012	0.001	n	11	1	n	2.84	0.02	n	0.300	0.020	y
2	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat)	0.123	0.107	y	18	10	n	83.80	32.59	n	0.000	0.000	y
3	MNES habitat zone (Dwarf Desert Spike-rush habitat)	0.065	0.075	y	18	20	y	15.13	18.93	y	0.000	0.000	y
4	MNES habitat zone (Dwarf Desert Spike-rush habitat), MNES habitat zone (Princess Parrot habitat)	0.140	0.025	n	16	14	y	36.10	6.06	n	0.000	0.000	y
5	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat), MNES habitat zone (Princess Parrot habitat)	0.133	0.166	y	21	23	y	39.97	39.46	y	0.000	0.000	y
6	MNES habitat zone (Dwarf Desert Spike-rush habitat)	0.049	0.055	y	18	9	n	17.71	4.84	n	0.000	0.000	y
7	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat), MNES habitat zone (Princess Parrot habitat)	0.181	0.432	y	6	9	y	60.08	57.64	y	0.000	0.020	n
8	MNES habitat zone (Dwarf Desert Spike-rush habitat)	0.034	0.080	y	10	4	n	37.53	59.90	y	0.600	2.000	n
9	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat)	0.087	0.115	y	7	8	y	23.17	19.80	y	0.000	0.000	y
10	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat), MNES habitat zone (Princess Parrot habitat)	0.097	0.019	n	9	7	y	59.46	2.75	n	0.000	0.000	y
11	Native vegetation zone	0.384	0.144	y	23	22	y	25.36	9.67	n	0.000	0.000	y
12	Native vegetation zone	0.063	0.033	y	13	11	y	28.08	1.59	n	0.000	0.000	y
13	Native vegetation zone	0.146	0.144	y	10	16	y	56.04	14.72	n	0.000	0.000	y
14	Native vegetation zone	0.110	0.207	y	14	9	y	30.02	31.48	y	0.000	0.000	y
15	Native vegetation zone	0.064	0.069	y	11	20	y	61.44	24.90	n	0.000	0.000	y
16	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat)	0.080	0.379	y	17	16	y	13.74	26.09	y	0.000	0.000	y
17	Native vegetation zone	0.189	0.034	n	11	12	y	31.54	11.37	n	0.000	0.000	y

Appendix G Photo monitoring points 2020-2022













Monitoring site 1

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast













Monitoring site 2

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast













Monitoring site 3

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast













Monitoring site 4

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast







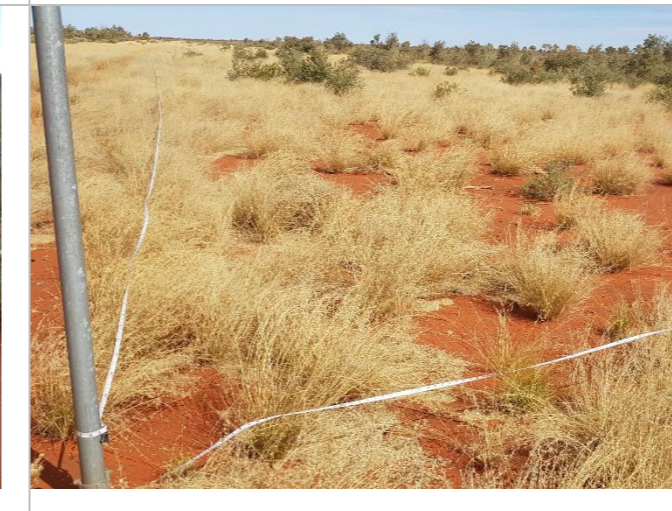

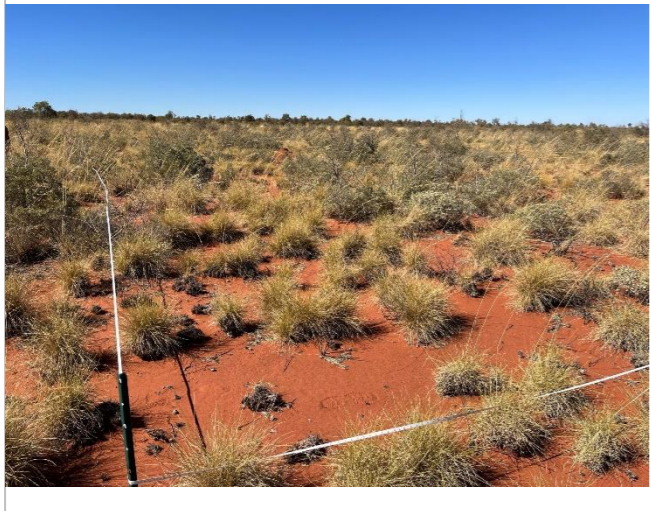



Monitoring site 5

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast


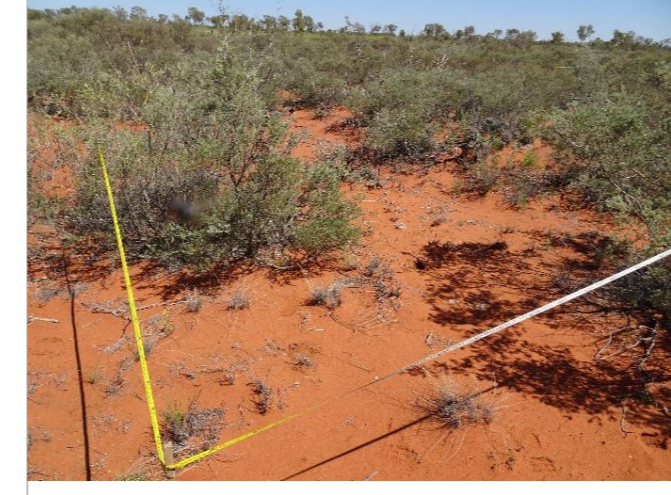










Monitoring site 6

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast







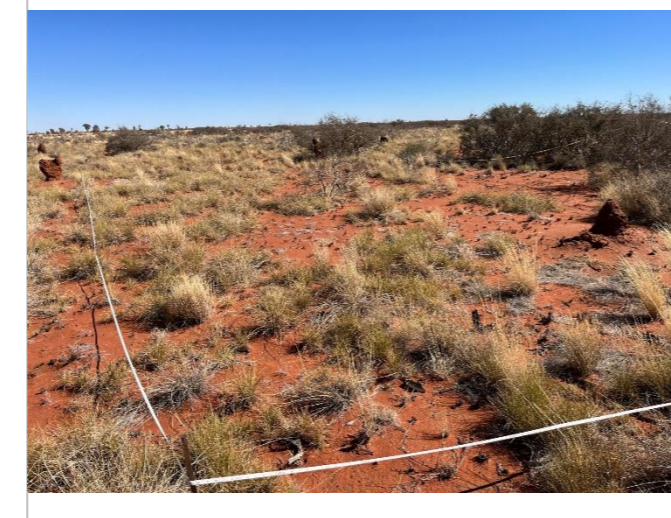
Monitoring site 7

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast












Monitoring site 8

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast













Monitoring site 9

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast













Monitoring site 10

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast













Monitoring site 11

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast













Monitoring site 12

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast













Monitoring site 13

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast











Monitoring site 14

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast













Monitoring site 15

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast

Monitoring site 16

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast

Monitoring site 17

2020				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2021				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation – photo from the northwest	Rehabilitation – photo from the southeast
2022				
	Control – photo from the northwest	Control – photo from the southeast	Rehabilitation* – photo from the northwest	Rehabilitation* – photo from the southeast

* 17 rehabilitation quadrat was moved in 2022 as the 2020/2021 quadrat had been cleared for a camp for another project.

