
TANAMI GAS PIPELINE
ANNUAL COMPLIANCE ASSESSMENT REPORT
EPBC 2017 / 7997

E-REP-059

Rev 1

Document History

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1. INTRODUCTION

On 1 June 2018, the Department of Environment and Energy (DoEE or Department) approved the Tanami Gas Pipeline (TNP) project under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The TNP is a 440km natural gas pipeline and associated infrastructure connecting the existing Amadeus Gas Pipeline to the Granites and Dead Bullock Soak mines, near Yuendumu, Northern Territory (NT) (EPBC 2017/7997).

This report covers activities between 1 June 2020 and 31 May 2021. The pipeline was in operational phase during the period.

1.1 Proponent

The proponent for the project is the AGI Tanami Pty Limited (AGIT) (ACN 622 012 560).

AGIT is operated as part of the Australian Gas Infrastructure Group (AGIG) and is 100% owned by a consortium comprising CK Infrastructure Holdings Limited (CKI), CK Asset Holdings Limited (CKA) and Power Asset Holdings Limited (PAH). These are all part of the CK Group, a leading global investor in energy and other infrastructure, in the UK, Australia and other developed countries.

AGIT relies on the services of DBNGP (WA) Nominees Pty Ltd (DBP), the owner of the Dampier to Bunbury Natural Gas Pipeline (DBNGP), for the provision of labour and equipment to enable AGIT to undertake its business. The services are provided under a support services agreement. DBP is part of AGIG.

1.2 Objectives and Scope

The objective of this document is to review the compliance with conditions set out in EPBC 2017/7997. Specifically, the scope of this document covers the period commencing 1 June 2020 through to 31 May 2021.

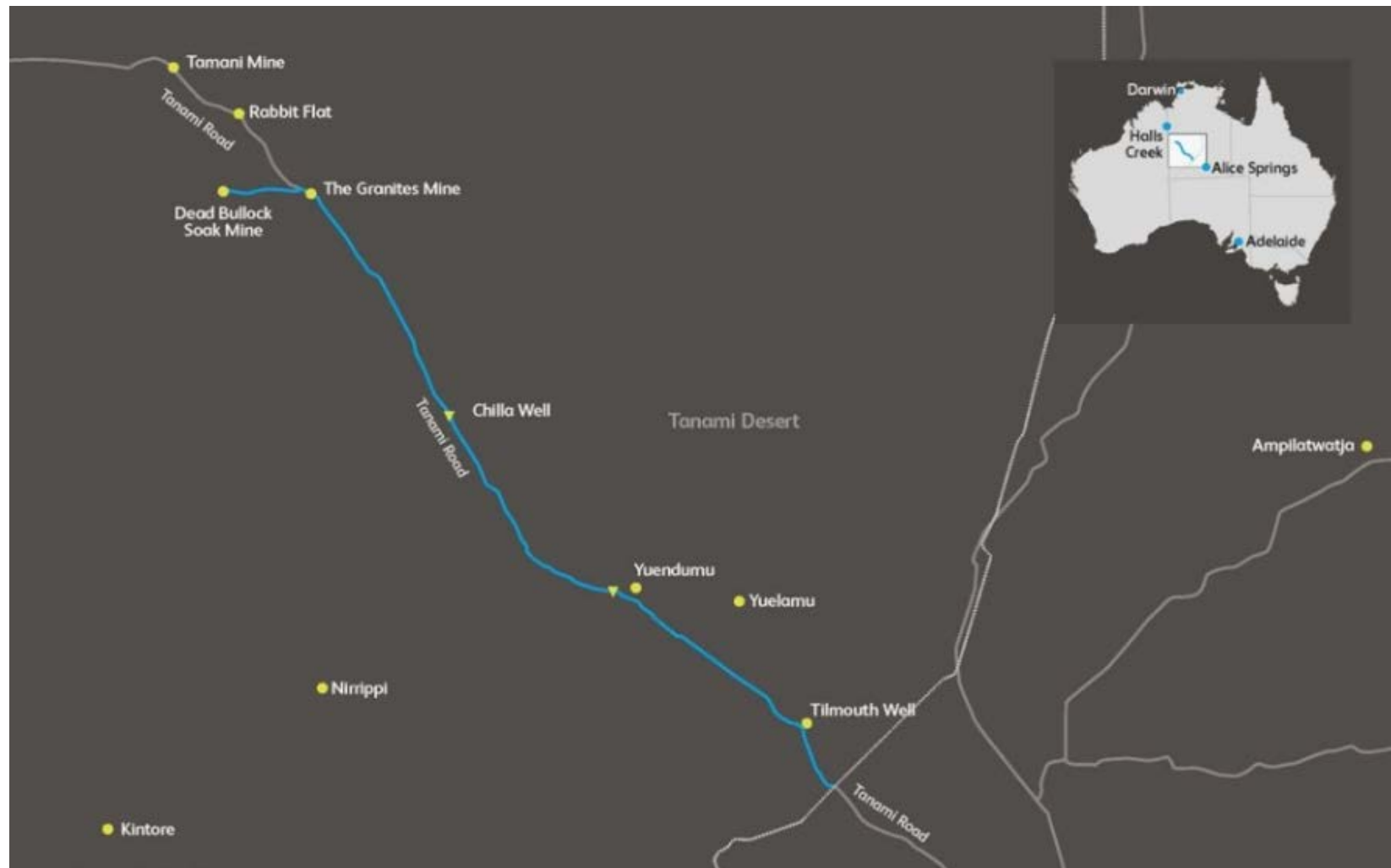


Figure 1: Location of the Tanami Gas Pipeline

2. ACTIVITY DESCRIPTION

During the reporting period the normal operation of the TNP continued. This entailed the following main activities:

- Maintenance and operational activities of the pipeline and associated facilities;
- Third party crossing management and supervision; and
- Rehabilitation monitoring.

An additional environmental impact assessment was completed to review the impacts of installation of a track along 257km of the existing disturbed area. This included updates to the Construction Environment Management Plan (CEMP). This was submitted in July 2020 to the Department and planning work is underway to complete these changes in late 2021 based on available resources and site access taking into consideration the COVID management plans in the NT.

AGIT conducted a Health, Safety and Environment (HSE) Field Audit during the reporting period (Appendix C).

2.1 Identified new risks

The additional potential environmental impacts from the access track installation and its irregular use for cathodic protection annual surveys was reviewed and included in the revised CEMP submitted for approval in July 2020. No other new or additional risks were identified.

It was noted that due to the weather (rains) and closure of roads, the rehabilitation monitoring program was split into two timeframes. The third party independent consultant confirmed that this was not assessed as to provide a negative impact as to the rehabilitation results based on a slightly delayed completion date of the monitoring.

3. COMPLIANCE ASSESSMENT

A compliance assessment was conducted against EPBC 2017/7997 for the period 1 June 2020 through to 31 May 2021 (Table 3). This assessment was conducted in accordance with the Department of Environment Annual Compliance Report Guidelines (DoE 2014).

Conditions have been assessed and assigned a compliance status as defined in Table 1 below noting that construction related conditions that were previously reported as compliant have been reported as not applicable.

A declaration of accuracy forms part of this submission and is included at Appendix A.

Table 1: Compliance status definitions and abbreviations

Compliance Status Terms	Abbrev	Definition
Compliant	C	'Compliance' is achieved when all the requirements of a condition have been met, including the implementation of management plans or other measures required by those conditions.
Non-compliant	NC	A designation of 'non-compliance' should be given where the requirements of a condition or elements of a condition, including the implementation of management plans and other measures, have not been met.
Not applicable	NA	A designation of 'not applicable' should be given where the requirements of a condition or elements of a condition fall outside of the scope of the current reporting period. For example a condition which applies to an activity that has not yet commenced.

Table 2: Audit Table

Condition number	Condition	Status	Evidence / Comments
1	For the protection of listed threatened species the approval holder must do the following: a. Clear no more than 1,136 ha of vegetation; b. Not clear any vegetation outside the pipe alignment corridor, except as required to establish up to four work camp sites; c. Implement the plans referred to in these conditions.	Compliant	a. 1,120 hectares was conducted for construction of the pipeline in the previous reporting period. No clearing or construction activities were undertaken during the period. b. No clearing was undertaken in the reporting period. c. The plans referred to in these conditions continued to be implemented during the reporting period. A revised CEMP was submitted to the Department in July 2020. See Condition 14 response for more details.
2	For the protection of Greater Bilby (<i>Macrotis lagotis</i>) and Great Desert Skink (<i>Liopholis kintorei</i>), the approval holder must do the following: a. Undertake pre-clearance surveys to determine presence of burrows in the construction right of way; b. Avoid destruction or damage to burrows, including (without limitation) micro-siting the pipeline; c. Comply with the Trench Clearing Procedure and Construction Environmental Management Plan.	NA	No clearing or construction activities were undertaken during the period.
3	For the protection of Night Parrot (<i>Pezoporus occidentalis</i>), the approval holder must do the following: a. Implement the Night Parrot Management Plan;	NA	a. The Night Parrot Management Plan continues to be implemented on the project.

<p>b. Notwithstanding any other condition, undertake surveys for Night Parrot in accordance with the Night Parrot Survey Guidelines;</p> <p>c. If Night Parrot is detected on or in the vicinity of the pipe alignment corridor:</p> <p>i. immediately cease all work within 5 km of the place where Night Parrot was detected; and,</p> <p>ii. notify the Department and Night Parrot Recovery Team; and,</p> <p>iii. not recommence work within the area specified in condition 3.c.i. until approved by the Minister in writing;</p> <p>d. If one or more Night Parrot individuals is injured or killed, and, in the opinion of the Department, the death or injury arises from or was contributed to in any way by the proposed action or the presence of the approval holder on or in the vicinity of the pipe alignment corridor, the approval holder must report the injury or death to the Department within 48 hours, and contribute \$50,000 per individual to a fund or program nominated by the proponent and approved by the Department.</p>	<p>b. Previously reported and completed (EPBC 2017/7997 Compliance Assessment Report 2018-2019, E-REP-035).</p> <p>c. No Night Parrots have been detected on the project.</p> <p>d. No Night Parrots have been detected on the project</p>
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4	<p>For the protection of Dwarf Desert Spike-rush (<i>Eleocharis papillosa</i>), the approval holder must comply with the Construction Environmental Management Plan. In particular, the approval holder must avoid disturbance of environmentally sensitive areas by utilising directional drilling methods.</p>	Compliant	<p>The CEMP controls continued to be implemented in terms of waterway crossings and avoidance of environmentally sensitive areas. A revised CEMP was submitted to the Department in July 2020. See Condition 14 response for more details.</p> <p>No clearing or construction activities were undertaken during the period.</p>
5	<p>For the protection of Princess Parrot (<i>Polytelis alexandrae</i>), the approval holder must undertake pre-clearance surveys for Princess Parrot to determine whether Princess Parrot is present in an area proposed to be cleared, and must avoid disturbance of any individuals, especially nesting birds, and must take all reasonably practicable measures to avoid trees containing hollows suitable for breeding.</p>	NA	<p>No clearing or construction activities were undertaken during the period.</p>
6	<p>For the protection of listed threatened species, the approval holder must undertake rehabilitation work in accordance with the Rehabilitation Plan.</p>	Compliant	<p>All construction rehabilitation requirements completed as per previous report (EPBC 2017/7997 Compliance Assessment Report 2018-2019, E-REP-035).</p> <p>Rehabilitation Plan requirements for monitoring are reported under Condition 8.</p>
7	<p>Notwithstanding any other condition or provision of a plan, unless the Department determines otherwise, the approval holder must continue rehabilitation work until the completion criteria</p>	Compliant	<p>All construction rehabilitation requirements completed as per previous report.</p> <p>Rehabilitation Plan requirements for monitoring are reported under Condition 8.</p>

	are met for all areas that are subject to the Rehabilitation Plan.		
8	<p>The approval holder must engage a suitably qualified independent expert approved by the Department to assess the level of success of rehabilitation and undertake the following tasks:</p> <ul style="list-style-type: none"> a. Assess the construction right of way before any clearance is undertaken, to determine and record the baseline condition of the area, and determine the appropriate locations of the monitoring and control sites; b. Assess the success of rehabilitation three years after substantial completion of the project, to determine the extent that the completion criteria have been met; c. Produce and submit to the Department a report on the success of rehabilitation (Rehabilitation Report), within three months of the three year anniversary of substantial completion of the project; d. If required by the Department, undertake additional assessments, as directed by the Department, until the completion criteria have been met. 	Compliant	<p>a. The Department approved Ecological Australia (ELA) consultants to conduct rehabilitation monitoring as per correspondence 12 August 2018.</p> <p>The construction right of way pre-clearance survey was completed as part of the approvals work in March 2018.</p> <p>As per the Rehabilitation Plan, the first annual monitoring to inform the success of rehabilitation was completed in March 2020. This report is included as Appendix B.</p> <p>Sub-Conditions b, c and d - NA</p>
9	If, based on the Rehabilitation Report provided by the approval holder in accordance with condition 8.c., the Department considers that the completion criteria have not been met in respect of a portion of cleared area, the approval holder will be required to provide an offset, in the form of a financial contribution, and may be required to undertake additional rehabilitation activities as	NA	

	<p>specified by the Department. The financial contribution payable by the approval holder will be calculated as follows: Financial contribution = \$1,500 x Area where Area means the area that does not meet the completion criteria, in hectares.</p>		
10	<p>If a financial contribution is payable in accordance with condition 9, the approval holder and the Department will work together to agree on appropriate arrangements before any payment is made, taking into account the potential habitat that was cleared, and the matters of national environmental significance that are likely to have been impacted by the failure to meet the completion criteria in the relevant timeframe.</p>	NA	
11	<p>The approval holder must advise the Department in writing of the actual date of commencement and substantial completion within 14 days after commencement or substantial completion, as relevant.</p>	NA	Previously reported and completed.
12	<p>The approval holder must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement the plans required by this approval, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Department's website. The results of audits</p>	Compliant	<p>Records are kept and either supplied to the Department via annual reporting, available on request or through the AGIG website (as per Condition 20).</p> <p>No external audits were completed during construction of the pipeline.</p>

	may also be publicised through the general media.		
13	<p>Within three months of every 12 month anniversary of commencement, the approval holder must publish a report on its website addressing compliance with each of the conditions of this approval, including implementation of plans as specified in the conditions (compliance report). Documentary evidence providing proof of the date of publication of the compliance report, and non-compliance with any of the conditions of this approval, must be provided to the Department at the same time as the compliance report is published. The approval holder is not required to provide compliance reports after all obligations under these conditions have been met, and two consecutive compliance reports that demonstrate compliance with all obligations under these conditions have been provided to the Department.</p>	Compliant	<p>This report will be published on the AGIG website (https://www.agig.com.au/articles/tanami-gas-pipeline) as part of the requirements under this condition. Evidence of the publication will be provided to DoEE at the same time in terms of a link to the website.</p> <p>The report will be published prior to 1 September 2021.</p> <p>The Annual Compliance Report for 2020 is available on the website.</p>
14	<p>The approval holder may choose to revise a plan required by these conditions without submitting it for approval under section 143A of the EPBC Act, if the taking of the action in accordance with the revised plan would not be likely to have a new or increased impact. If the approval holder makes this choice they must:</p> <ol style="list-style-type: none"> a. notify the Department in writing that the approved plan has been revised no later than four weeks before implementing the revised plan; b. provide the Department with an electronic copy of the revised plan, and an explanation of 	Compliant	<ol style="list-style-type: none"> a. A revised CEMP was submitted to the Department on 7 July 2020. The revised CEMP addressed the inclusion of the maintenance access track to enable safe and reliable access to locations for cathodic protection (pipeline integrity) annual checks, access for any required civil works (firebreaks at facilities, drainage and erosion management) and access to sites in case of an emergency (alternate routes). The Department followed this up with additional information request (in terms of the proposed date of implementation of the plan) on 17 July 2020.

	<p>the differences (and reasons for them) between the revised plan and approved plan, no later than four weeks before the proposed implementation date for the revised plan;</p> <p>c. implement the revised plan on or after the proposed implementation date unless the Minister gives the approval holder notice that the Minister considers the revised plan is likely to have a new or increased impact; and</p> <p>d. notify the Department of the actual date of implementation of the revised plan.</p>		<p>b. AGIG provided an electronic copy of the revised plan including an explanation of the updates with both the submission (7 July and additional information 23 July)</p> <p>c. AGIG provided the Department on 23 July 2021 the proposed implementation date of 31 August 2021. This is compliant with the four week period required.</p>
15	<p>The approval holder may revoke its choice under condition 14 at any time by notice to the Department. If the approval holder revokes the choice to implement a revised plan, without approval under section 143A of the Act, the plan previously approved by the Minister must be implemented.</p>	NA	
16	<p>If the Minister gives a notice to the approval holder that the Minister is satisfied that the taking of the action in accordance with the revised plan would be likely to have a new or increased impact, then:</p> <p>a. Condition 14 does not apply, or ceases to apply, in relation to the revised plan; and,</p> <p>b. The approval holder must implement the plan previously approved by the Minister.</p>	NA	
17	<p>To avoid any doubt, condition 16 does not affect any operation of conditions 14 and 15 in the period before the day the notice is given.</p>	NA	
18	<p>At the time of giving the notice the Minister may also notify that, for a specified period of time, condition 16 does not apply for one or more specified plans.</p>	NA	

19	Conditions 14-18 are not intended to limit the operation of section 143A of the EPBC Act, which allows the approval holder to submit a revised plan to the Minister for approval	NA	
20	Unless otherwise agreed to in writing by the Minister, the approval holder must publish all plans and reports referred to in these conditions of approval on its website. Each of these documents must be published on the website within one month of being approved by the Minister or being submitted to the Department under the relevant condition.	Compliant	<p>All plans and procedures as referenced in these conditions (as listed below) are published on the AGIG website at (https://www.agig.com.au/articles/tanami-gas-pipeline). Before this all preliminary documentation and plans were available at www.dbp.net.au .</p> <ul style="list-style-type: none"> • Construction Environment Management Plan (CEMP) • Rehabilitation Plan • Trench Clearing Procedure • Night Parrot Management Plan • Night Parrot Monitoring Report (aural and field survey) • Annual Compliance Report 2018-2019 and 2019-2020 • 2020 Rehabilitation Monitoring Report <p>The revised CEMP (Condition 14) was updated on the website on 31st August 2020.</p>

4. REHABILITATION MONITORING

Ecological Australia (ELA) was approved by the Department in August 2018 to undertake the required rehabilitation works under Condition 8 of the approval.

The annual rehabilitation monitoring as per the approved Rehabilitation Plan was undertaken in March and June 2021 (due to weather the eastern section was inaccessible in March). The monitoring report is available in Appendix B. As per Condition 20, the report is will be made available publically through the AGIG website once the final version has been receipted.

The provisional report has indicated the results in Table 3. However due to a delay at the Alice Springs Herbarium the full species identification process has not yet been completed.

Native perennial flora species density (plants per m²) and native flora species richness (per plot) increased across all revegetation zones, with all zones meeting completion criteria for the 2021 monitoring period. All rehabilitation zones failed to meet the minimum requirement outlined in the completion criteria for native flora species foliage cover. However, results indicate a positive development trajectory toward satisfying completion criteria with all habitat zones recording an increase in foliage cover % between the two survey periods. On average the native flora species foliage cover increased from 20% to 43% from the previous year.

Four of the five rehabilitation zones, namely the native vegetation, Greater Bilby and Great Desert Skink, Night Parrot and Princess Parrot zones, met completion criteria for weed coverage in 2021. Dwarf Desert Spike-rush failed to meet completion criteria for weed foliage cover in 2021, with the percentage of foliage of *Cenchrus ciliaris (Buffel grass) recording greater cover within the adjacent control area at 24 months.

Table 3: Rehabilitation monitoring summary (Year 2)

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

5. CONCLUSION

During the reporting period, AGIT conducted operations in compliance with the approved CEMP and the Operations Environment Plan approved by the NT Department of Primary Industry and Resources.

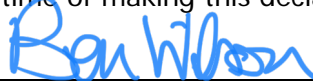
There continued to be no Night Parrots found (or evidence of) during operations.

Annual rehabilitation monitoring commenced in 2020 and progress to date is positive with two out of the four criteria being met.

APPENDIX A – DECLARATION OF ACCURACY

In making this declaration, I am aware that sections 490 and 491 of the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act) make it an offence in certain circumstances to knowingly provide false or misleading information or documents. The offence is punishable on conviction by imprisonment or a fine, or both. I declare that all the information and documentation supporting this compliance report is true and correct in every particular. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration

Signed



Full name (please print)

Ben Wilson

Position (please print)

Chief Executive Officer

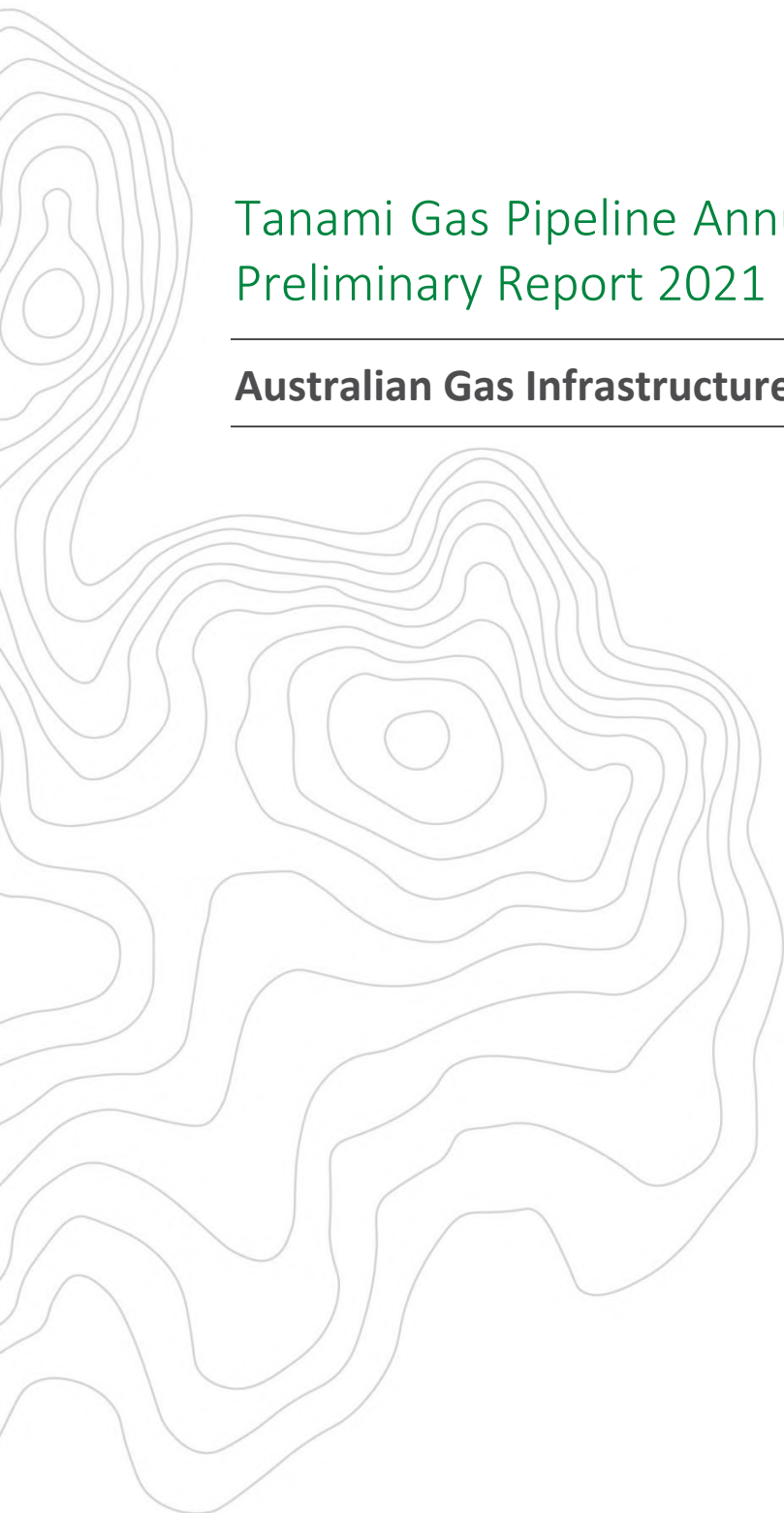
Organisation (please print including ABN/ACN if applicable)

AGI Tanami Pty Limited – ABN 21 622 012 560

Date

31/8/21

APPENDIX B – REHABILITATION MONITORING REPORT



Tanami Gas Pipeline Annual Rehabilitation Monitoring Preliminary Report 2021

Australian Gas Infrastructure Group

DOCUMENT TRACKING

Project Name	Tanami Gas Pipeline Rehabilitation Monitoring Preliminary Report 2021
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Project Manager	Jeni Morris
Prepared by	Jeni Morris
Reviewed by	Jeff Cargill
Approved by	Jeff Cargill
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Abbreviations

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

Executive Summary

Eco Logical Australia was engaged by Australian Gas Infrastructure Group in 2021 to undertake vegetation rehabilitation monitoring along the Tanami Newmont Gas Pipeline, a 440 kilometre pipeline connecting the existing Amadeus Gas Pipeline to the Granites and Dead Bullock Soak mines to transport natural gas to displace the use of diesel fuel at the two mines. Assessment of botanical values were undertaken in view of minimum standards outlined in the flora and vegetation rehabilitation completion criteria, as specified in the approved Australian Gas Infrastructure Group *Tanami Newmont Gas Pipeline Rehabilitation Plan*, prepared by Eco Logical Australia in 2018.

A total of seventeen vegetation monitoring sites, each comprising an impact (rehabilitation) quadrat and an adjacent control quadrat (34 quadrats in total), were surveyed across two periods in 2021, from 21 to 25 March 2021 and from 14 to 19 June by Dr. Jeff Cargill (Senior Botanist), Daniel Brassington (Botanist), Emily Chetwin (Botanist) and Jeni Morris (Ecologist).

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), 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).

It is noted that the current report serves to provide preliminary results only, with a more detailed and complete report to follow. Due to delays in taxonomic identification from the Alice Spring Herbarium, a complete species list has yet to be compiled. As a result, sections of the current report are incomplete (e.g., species lists and totals), and comparisons against completion criteria will be subject to change.

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

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

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

All rehabilitation zones failed to meet the requirements for native perennial flora species foliage cover, however results recorded indicate a positive development trajectory toward completion criteria for all habitat zones, with all zones recording an increase in percentage foliage cover. Low native perennial foliage cover would be expected for such 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 four rehabilitation zones (Native Vegetation, Greater Bilby and Great Desert Skink, Night Parrot and Princess Parrot habitat) satisfied the completion criteria for weed species foliage cover, with low numbers of weed species and densities recorded generally across the vegetation monitoring sites in these zones. The Dwarf Desert Spike-rush MNES habitat zone did not satisfy completion criteria for weed species foliage cover, with the percentage of foliage of *Cenchrus ciliaris* (Buffel grass) recording greater cover within the adjacent control area at 24 months. Future surveys will determine whether weed populations increase and therefore require weed control and management.

Significant erosion was observed within site 6, with both the rehabilitation and control sites affected. 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. All other rehabilitation areas appeared stable with no significant erosion zones observed during the field survey. Future monitoring, particularly in the event of major cyclonic events, will provide further information on landform stability and drainage.

1. Introduction

1.1 Project background

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

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

Majority of the alignment, excluding permanent facilities and 26 ha of required access tracks, has been rehabilitated post-construction and allowed to return to native vegetation. Effective rehabilitation will manage potential impacts from:

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

1.2 Objectives

Eco Logical Australia (ELA) was engaged by AGIG to undertake a second year of annual consecutive rehabilitation monitoring at 17 vegetation monitoring sites along the TNP, of which each comprises an impact (rehabilitation) and an adjacent control quadrat (34 quadrats in total). Vegetation monitoring sites, 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 progress of rehabilitation towards achievement of approved completion criteria, as outlined in the *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a), to provide a comparison of results between 2020 and 2021, and to identify where contingency actions need to be implemented to manage any risks to rehabilitation outcomes.

It is noted that the current report serves to provide preliminary results only, with a more detailed and complete report to follow. Due to delays in taxonomic identification from the Alice Spring Herbarium, a complete species list has yet to be compiled. As a result, sections of the current report are incomplete (e.g., species lists and totals), and comparisons against completion criteria will be subject to change.

1.3 Legislative context

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's key piece of environmental legislation. The EPBC Act enables the Australian

Government to join with the states and territories in providing a truly national scheme of environment and heritage protection and biodiversity conservation. The EPBC Act focuses Australian Government interests on the protection of Matters of National Environmental Significance (MNES), with the states and territories having responsibility for matters of state and local significance.

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

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

1.4 Completion criteria

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

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

Aspect	Native vegetation rehabilitation zone completion criteria	MNES habitat rehabilitation zone completion criteria
Native flora species density (plants per m ²)	Perennial native flora species diversity is equal to or greater than 50% of that of the adjacent control area.	Perennial native flora species density is equal to or greater than 70% of that of the adjacent control area and reflects the Dwarf Desert Spike-rush habitat rehabilitation zone requirements (watercourse/riparian vegetation).
Native flora species richness (per quadrat)	Perennial native flora species richness is equal to or greater than 50% of that of the adjacent control area and reflects the species composition present in the pre-disturbed habitat type. Note that within 4 m either side of the pipeline, the completion criteria will only apply to ground cover species and not to tree species, which are not suitable to grow in close proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.	Perennial native flora species richness is equal to or greater than 70% of that of the adjacent control area and reflects the species composition present in the pre-disturbed habitat type. Note that within 4 m either side of the pipeline, the completion criteria will only apply to ground cover species and not to tree species, which are not suitable to grow in close proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.
Native flora species foliage cover (%)	Percentage of foliage cover of perennial native flora species indigenous to each vegetation community is equal to or greater than 50% of that of the adjacent control area and reflects the pre-disturbed habitat type. Note that within 4 m either side of the pipeline, the completion criteria will only apply to ground cover species and not to tree species, which are not suitable to grow	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

Aspect	Native vegetation rehabilitation zone completion criteria	MNES habitat rehabilitation zone completion criteria
	in close proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.	species will be allowed to recover outside of the 8 m corridor.
Weed foliage cover (%)	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.	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.

Figure 1-1: Vegetation monitoring site overview

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).

The field survey was undertaken over two survey periods: from 21 to 25 March 2021 and from 14 to 19 June, due to access issues caused by inclement weather. Results presented for the March field survey utilised the Bureau of Meteorology (BoM) Alice Springs Airport weather station (station number 15590; climate data 1940-present), as the survey was undertaken in the southern portion of the TNP. Results presented for the June field survey utilised the BoM Rabbit Flat weather station (station number 15666; climate data 1996-present), as the survey was undertaken in the northern portion of the TNP.

In the 12 months preceding the field survey in March 2021, a total of 235.3 millimetres (mm) of rainfall was recorded from the Alice Springs Airport weather station, which is slightly less than the long-term average of 278.7 mm (BoM 2021). In the three months prior to the field survey in March, the area received a total of 114.9 mm of rainfall, which is comparable to the long-term average of 119.7 mm for the same time period (BoM 2021).

In the 12 months preceding the field survey in June 2021, a total of 566.6 mm of rainfall was recorded from the Rabbit Flat weather station, which is above the long-term average of 466.5 mm (BoM 2021). In the three months prior to the field survey in June, the area received a total of 91 mm of rainfall, which is slightly less than the long-term average of 98.8 mm for the same time period (BoM 2021).

Mean maximum temperatures in the region range from 25.9°C in June to 38.9°C in November in the north (Rabbit Flat) and 19.9°C in June to 36.4°C in January in the south (Alice Springs Airport). Mean minimum temperatures in the region range from 6.8°C in July to 24.2°C in January in the north (Rabbit Flat) and 4°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** and **Figure 2-2** below.

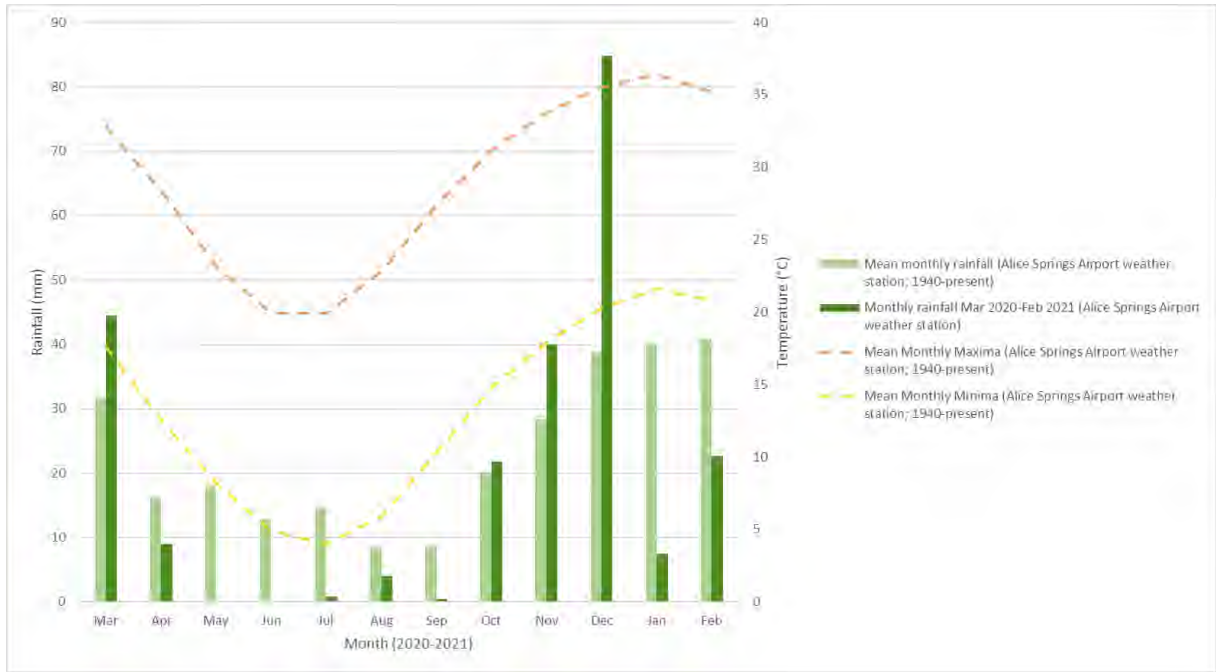


Figure 2-1: Rainfall and temperature data recorded from the Alice Springs Airport (15590) weather stations 12 months prior to the field survey in March compared to the long-term average (BoM 2021)

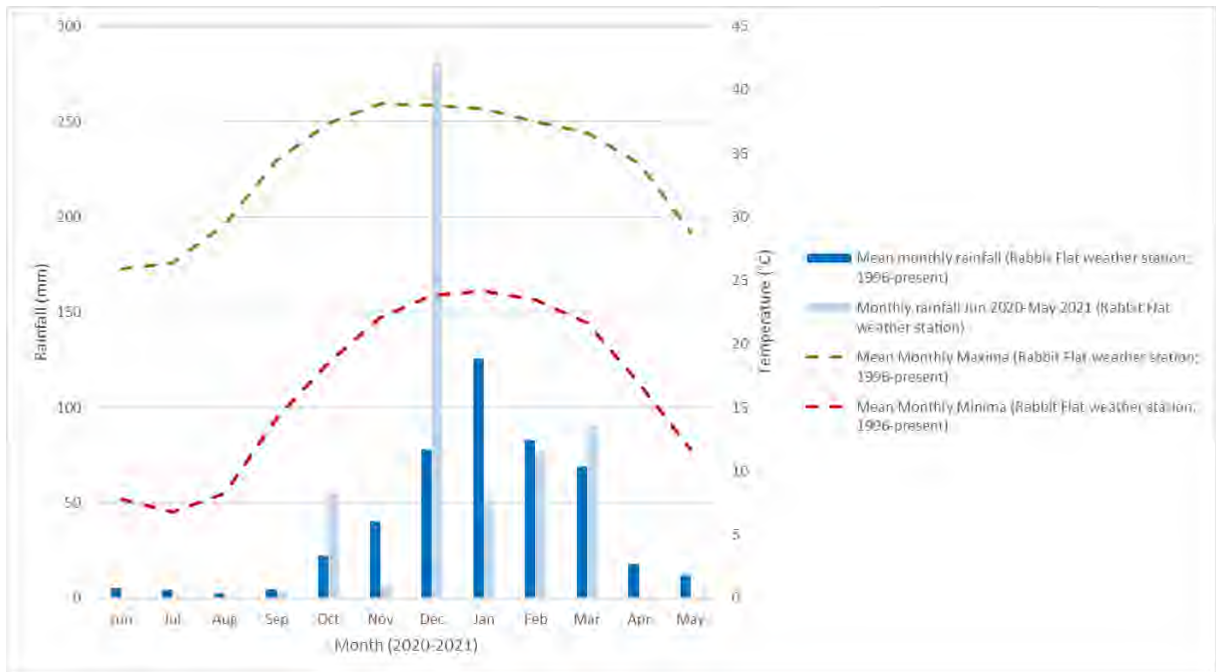


Figure 2-2: Rainfall and temperature data recorded from the Rabbit Flat (15666) weather stations 12 months prior to the field survey in June compared to the long-term average (BoM 2021)

2.2 Regional context

2.2.1 Interim Biogeographical Regionalisation for Australia

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

2.2.2 Regional landscape and vegetation

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

2.3 Environmental values

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

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

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

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

Rehabilitation zone	Zone description (ELA 2018a)	Representative monitoring sites
Native vegetation zone	Defined as all native vegetation within the Project Area, excluding areas mapped as MNES habitat zones below.	11, 12, 13, 14, 15, 17
MNES habitat zone (Dwarf Desert Spike-rush habitat)	For the purposes of this Rehabilitation Plan, preliminary Dwarf Desert Spike-rush habitat zones have been mapped as watercourses known to occur in the Project Area.	1, 3, 4, 6, 8
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 21 to 25 March 2021 and from 14 to 19 June by Dr. Jeff Cargill (Senior Botanist), Daniel Brassington (Botanist), Emily Chetwin (Botanist) and Jeni Morris (Ecologist). The survey teams' relevant qualifications, experience and licences are provided below in **Table 3-1**.

Table 3-1: Survey team

Name	Qualification	Relevant experience	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 rehabilitation monitoring of the TNP and the 2017 Flora and Vegetation Assessment of the TNP. He has also completed rehabilitation monitoring for the CS2-Tubridgi-Wheatstone Natural Gas Pipeline and the Fortescue River Gas Pipeline.	NT Parks and Wildlife permit number: 68917 CLC Permit and Authority number: P67263; P68157
Daniel Brassington	BSc. Hons. Environmental Science	Daniel has over 10 years' experience in botanical surveys and environmental services throughout Western Australia. This includes baseline vegetation studies (reconnaissance and detailed surveys), threatened and priority flora surveys, rehabilitation and vegetation monitoring, targeted species surveys, weed control, seed collection and processing, nursery operations and revegetation operations. Daniel has an extensive background in both mining and consulting, particularly in remote areas. Daniel completed the 2020 rehabilitation monitoring of the TNP.	NT Parks and Wildlife permit number: 68917 CLC Permit and Authority number: P67263; P68157
Emily Chetwin	BSc Geology. Masters. Hons.	Emily is a botanist with over three years' experience undertaking flora and vegetation across multiple bioregions of Western Australia. She has conducted Detailed and Reconnaissance baseline flora and vegetation surveys, targeted Threatened species surveys, rehabilitation and vegetation monitoring and assessment, habitat assessments and bushland condition assessments.	NT Parks and Wildlife permit number: 68917 CLC Permit and Authority number: P67263; P68157
Jeni Morris	BSc. Conservation and Wildlife Biology	Jeni has over 5 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 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: P67263; P68157

A total of 34 sites (17 rehabilitation and 17 control quadrats; 10 x 50 m in size) were originally established in 2020 to ensure appropriate replication of monitoring across the length of the TNP, and within each of the rehabilitation zones outlined in Section 2.3 above. Sites were selected based on preliminary sites outlined in the *Tanami Newmont Gas Pipeline Rehabilitation Plan* (ELA 2018a), further refined in the *Pre-clearance Survey Report* (ELA 2018b) and from ground-truthing during the field survey. GPS coordinate locations of monitoring sites are provided in **Appendix B**.

Control quadrats were previously 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 and 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.

3.1.2 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.

3.1.3 Specimen identification and nomenclature

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

3.2 Survey limitations and constraints

Constraints and limitations for the rehabilitation monitoring are summarised in **Table 3-2**. There were no constraints 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	<p>Not a 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.</p> <p>The initial field survey was undertaken in March 2021, in accordance with the requirements of the Northern Territory <i>‘Guidelines for Assessment of Impacts on Terrestrial Biodiversity’</i> (NT EPA 2013). In the three months preceding the field survey in March, above average rainfall was recorded from the Rabbit Flats weather station (410.2 mm compared to 287 mm, respectively), while rainfall recorded at the Alice Springs Airport weather station in the three months preceding the field survey in March was comparable to the long-term average for the same time period (114.9 mm and 119.7 mm, respectively; BoM 2021). Conditions during the March field survey were therefore considered adequate to identify cryptic annual and perennial species.</p> <p>Due to access constraints in March (inaccessible roads due to flooding), the remainder of the field survey was completed out of season in June 2021. In the three months preceding the field survey in June, rainfall recorded at the Rabbit Flats weather station was comparable to the long-term average for the same time period (91 mm and 98.8 mm, respectively), while above average rainfall was recorded from the Alice Springs Airport weather station (99 mm compared to 66 mm, respectively; BoM 2021). Consequently, in some cases the positive identification of annual and cryptic perennial species was difficult. The validity of results, however, was not compromised, with criteria based on the differentiation of perennial species and weeds within a given quadrat and not the positive identification of the individual itself.</p>
Disturbances	Not a constraint: Disturbances within the monitoring sites included the presence of weeds, disturbance from cattle activity (grazing, scats and trampling) and evidence of heat stress. These disturbances did not negatively impact the ability to meet the requirements outline in the scope of works.
Resources	Not a constraint: The personnel conducting this field survey were suitably qualified to identify flora specimens, having previously undertaken flora and vegetation assessments for the TNP.
Accessibility	Not a constraint: All rehabilitation monitoring sites, originally established by ELA in 2021, were able to be accessed by vehicle or on foot over the duration of the field surveys.

4. Results

The following results section provides preliminary results only, with more detailed and complete results to follow. Due to delays in taxonomic identification from the Alice Spring Herbarium, a complete species list has yet to be compiled. As a result, sections of the current report are incomplete and/or subject to change including species lists and totals, occurrence of significance flora, occurrence of weed species and comparisons against completion criteria.

A '#' notated below indicates data yet to be confirmed and to be provided in final report.

4.1 Flora

A total of # vascular plant taxa (# native and # introduced) were recorded, representing # plant genera and # plant families. The majority of taxa recorded represented the # (# taxa), # (# taxa) and # (# taxa) families. Total species richness was higher/lower in rehabilitation areas, with # species being recorded compared to # in control areas. Species lists and a species by site matrix are presented in **Appendix B** and **Appendix C**, respectively.

4.2 Rehabilitation zones

Native vegetation zone:

Control: # vascular plant taxa, representing # plant genera and # plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the # (# taxa), # (# taxa) and # (# taxa) families. Of the # vascular plant taxa recorded, # were introduced (weed) species.

Rehabilitation: # vascular plant taxa, representing # plant genera and # plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the # (# taxa), # (# taxa) and # (# taxa) families. Of the # vascular plant taxa recorded, # were introduced (weed) species.

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

Control: # vascular plant taxa, representing # plant genera and # plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the # (# taxa), # (# taxa) and # (# taxa) families. Of the # vascular plant taxa recorded, # were introduced (weed) species.

Rehabilitation: # vascular plant taxa, representing # plant genera and # plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the # (# taxa), # (# taxa) and # (# taxa) families. Of the # vascular plant taxa recorded, # were introduced (weed) species.

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

Control: # vascular plant taxa, representing # plant genera and # plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the # (# taxa), # (# taxa) and # (# taxa) families. Of the # vascular plant taxa recorded, # were introduced (weed) species.

Rehabilitation: # vascular plant taxa, representing # plant genera and # plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the # (# taxa), # (# taxa) and # (# taxa) families. Of the # vascular plant taxa recorded, # were introduced (weed) species.

MNES habitat zone (Princess Parrot habitat):

Control: # vascular plant taxa, representing # plant genera and # plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the # (# taxa), # (# taxa) and # (# taxa) families. Of the # vascular plant taxa recorded, # were introduced (weed) species.

Rehabilitation: # vascular plant taxa, representing # plant genera and # plant families were recorded within the native vegetation zone. The majority of taxa recorded represented the # (# taxa), # (# taxa) and # (# taxa) families. Of the # vascular plant taxa recorded, # were introduced (weed) species.

4.3 Flora of significance

No Threatened flora species listed under the Commonwealth EPBC Act were recorded within vegetation monitoring sites. A total of two 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**. A breakdown of flora of significance recorded is provided in **Appendix E**.

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

Species	Conservation status (TPWCA)	Site(s)	Quadrat type	Total # individuals
<i>Sida</i> sp. <i>excedentifolia</i> (J.L. Egan 1925)	DD	3, 11, 17	Rehabilitation and control	318
<i>Tribulus minutus</i>	DD	4, 5	Control	3
<i>Tephrosia brachyodon</i>	INFRA	3	Rehabilitation and control	10

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 eight sites across the length of the TNP; comprising six control quadrats (1, 2, 4, 8, 9 and 17) and two rehabilitation quadrats (7 and 8). **Cynodon dactylon* was recorded from three sites; one control quadrat (1) and two rehabilitation quadrats (1 and 8). **Eragrostis minor* was recorded from one rehabilitation site (6). A breakdown of introduced (weed) species recorded is provided in **Appendix F**.

4.5 Erosion

Significant erosion was observed within site 6, with both the rehabilitation and control sites affected (**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.



Plate 1: Erosion recorded at site 6 – rehabilitation plot

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: 0.14 ± 0.04 ; Rehabilitation 0.37 ± 0.15), native perennial flora species richness (Control: 14.17 ± 2.10 ; Rehabilitation: 19.00 ± 2.45) and; weed foliage cover (Control: 0; Rehabilitation: 0.07 ± 0.07). Native flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 40.89 ± 5.41 ; Rehabilitation: 17.75 ± 4.41). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

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: 0.05 ± 0.03 ; Rehabilitation 0.10 ± 0.07) and native perennial flora species richness (Control: 11.40 ± 3.17 ; Rehabilitation: 11.80 ± 4.73). Native flora species foliage cover (Control: 21.93 ± 7.32 ; Rehabilitation: 17.75 ± 4.41) and; weed foliage cover (Control: 0.14 ± 0.10 ; Rehabilitation: 0.20 ± 0.20) failed to meet the minimum requirement outlined in the completion criteria. A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

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

The MNES habitat zone (Greater Bilby and Great Desert Skink habitat), represented by six vegetation monitoring sites (2, 5, 7, 9, 10 and 16) satisfied three of the four completion criteria (**Table 4-2**). These being: native perennial flora species density (Control: 0.14 ± 0.03 ; Rehabilitation 0.30 ± 0.13), native perennial flora species richness (Control: 15.00 ± 2.68 ; Rehabilitation: 15.67 ± 3.31) and; weed foliage cover (Control: 0.02 ± 0.02 ; Rehabilitation: 0.01 ± 0.01). Native flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 43.29 ± 8.00 ; Rehabilitation: 21.30 ± 7.96). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

4.6.4 MNES habitat zone (Night Parrot habitat)

The MNES habitat zone (Night Parrot habitat), represented by six vegetation monitoring sites (2, 5, 7, 9, 10 and 16) satisfied three of the four completion criteria (**Table 4-2**). These being: native perennial flora species density (Control: 0.14 ± 0.03 ; Rehabilitation 0.30 ± 0.13), native perennial flora species richness (Control: 15.00 ± 2.68 ; Rehabilitation: 15.67 ± 3.31) and; weed foliage cover (Control: 0.02 ± 0.02 ; Rehabilitation: 0.01 ± 0.01). Native flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 43.29 ± 8.00 ; Rehabilitation: 21.30 ± 7.96). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

4.6.5 MNES habitat zone (Princess Parrot habitat)

The MNES habitat zone (Princess Parrot habitat), represented by five vegetation monitoring sites (1, 4, 5, 7 and 10) satisfied three of the four completion criteria (**Table 4-2**). These being: native perennial flora species density (Control: 0.11 ± 0.03 ; Rehabilitation 0.14 ± 0.08), native perennial flora species richness (Control: 13.40 ± 3.87 ; Rehabilitation: 14.40 ± 4.88) and; weed foliage cover (Control: 0.04 ± 0.004 ; Rehabilitation: 0.01 ± 0.01). Native flora species foliage cover failed to meet the minimum requirement outlined in the completion criteria (Control: 42.75 ± 10.93 ; Rehabilitation: 14.98 ± 10.85). A breakdown of each monitoring site assessed against the completion criteria is presented in **Appendix G**.

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

Rehabilitation zone	Representative sites	Native flora species density (plants per 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	PASS	FAIL	FAIL
MNES habitat zone (Greater Bilby and Great Desert Skink habitat)	2, 5, 7, 9, 10, 16	PASS	PASS	FAIL	PASS
MNES habitat zone (Night Parrot habitat)	2, 5, 7, 9, 10, 16	PASS	PASS	FAIL	PASS
MNES habitat zone (Princess Parrot habitat)	1, 4, 5, 7, 10	PASS	PASS	FAIL	PASS

4.7 Comparison of results against completion criteria 2021-2021

A summary of the 2021 survey results for the native vegetation rehabilitation zone and MNES habitat rehabilitation zones against 2020 results is presented in **Table 4-3** below.

Native perennial flora species density (plants per m²) and native flora species richness (per plot) increased across all revegetation zones, with all zones meeting completion criteria for the 2021 monitoring period. All rehabilitation zones failed to meet the minimum requirement outlined in the completion criteria for native flora species foliage cover. However, results indicate a positive development trajectory toward satisfying completion criteria with all habitat zones recording an

increase in foliage cover % between the two survey periods (**Table 4-3**). Four of the five rehabilitation zones, namely the native vegetation, Greater Bilby and Great Desert Skink, Night Parrot and Princess Parrot zones, met completion criteria for weed coverage in 2021. Dwarf Desert Spike-rush failed to meet completion criteria for weed foliage cover in 2021, with the percentage of foliage of *Cenchrus ciliaris* (Buffel grass) recording greater cover within the adjacent control area at 24 months.

4.8 Photo monitoring points

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

Table 4-3: Comparison of results against completion criteria from 2020 to 2021.

Aspect	Native vegetation rehabilitation zone completion criteria	Native vegetation zone		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		2020	2021	2020	2021	2020	2021	2020	2021
Native flora species density (% of control) ¹	Perennial native flora species diversity is equal to or greater than 50% of that of the adjacent control area.	296.9	256.0	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	187.2	192.6	219.8	192.6	219.8	250.0	130.1
Native flora species richness (% of control) ¹	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.	100.0	134.1	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	103.5	70.0	104.4	70.0	104.4	79.7	107.5
Native flora species foliage cover (% of control) ¹	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	19.8	43.4	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	42.0	68.3	11.5	49.2	11.5	49.2	17.8	35.0

Aspect	Native vegetation rehabilitation zone completion criteria	Native vegetation zone		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		2020	2021	2020	2021	2020	2021	2020	2021
	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.			not suitable to grow in close proximity to the pipeline. Tree species will be allowed to recover outside of the 8 m corridor.								
Weed foliage cover: 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	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	No	No	No	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.

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

5. Summary and discussion

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

A total of seventeen vegetation monitoring sites, each comprising an impact (rehabilitation) quadrat and an adjacent control quadrat (34 quadrats in total), were surveyed between 21 to 25 March 2021 and from 14 to 19 June 2021. Vegetation monitoring sites were consistent with those completed as part of the 2020 baseline monitoring survey. 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)'.

It is noted that the current report serves to provide preliminary results only, with a more detailed and complete report to follow. Due to delays in taxonomic identification from the Alice Spring Herbarium, a complete species list has yet to be compiled. As a result, sections of the current report are incomplete (e.g., species lists and totals), and comparisons against completion criteria will be subject to change.

No Threatened flora listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were recorded during the field survey. A total of two flora species listed as Data Deficient (DD) under the Northern Territory *Parks and Wildlife Conservation Act 2006* (TPWCA 2006) and one species listed as Intraspecific (INFRA) were recorded, namely *Sida* sp. *excedentifolia* (J.L. Egan 1925) (DD), *Tribulus minutus* (DD) and *Tephrosia brachyodon* (INFRA). Of these, all were recorded within control quadrats, while only *Sida* sp. *excedentifolia* (J.L. Egan 1925) and *Tephrosia brachyodon* were recorded within rehabilitation quadrats.

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

A total of 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).

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

All rehabilitation zones failed to meet the requirements for native perennial flora species foliage cover, however results recorded indicate a positive development trajectory toward completion criteria for all habitat zones, with all zones recording an increase in foliage cover percent overall. Poor native perennial foliage cover would be expected for such 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 four rehabilitation zones (Native Vegetation, Greater Bilby and Great Desert Skink, Night Parrot and Princess Parrot habitat) satisfied the completion criteria for weed species foliage cover, with low numbers of weed species and densities recorded generally across the vegetation monitoring sites in these zones. The Dwarf Desert Spike-rush MNES habitat zone did not satisfy completion criteria for weed species foliage cover, with the percentage of foliage of *Cenchrus ciliaris* (Buffel grass) recording greater cover within the adjacent control area at 24 months. Future surveys will determine whether weed populations increase and therefore require weed control and management.

Significant erosion was observed within site 6, with both the rehabilitation and control sites affected. 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. All other rehabilitation areas appeared stable with no significant erosion zones observed during the field survey. Future monitoring, particularly in the event of major cyclonic events, will provide further information on landform stability and drainage.

6. References

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Appendix A Framework for conservation significant flora and fauna ranking

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

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

Category	Definition
Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	Taxa known to survive only in captivity or as a naturalised population well outside its past range; or taxa has not been recorded in its known and/or expected habitat at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered (CE)	Taxa considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Taxa considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Taxa considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	Taxa has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	Taxa has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
Data Deficient (DD)	There is inadequate information to make a direct, or indirect, assessment of taxa's risk extinction based on its distribution and/or population status.
Not Evaluated (NE)	Taxa has not yet been evaluated against the criteria.
Migratory (M)	Not an IUCN category. Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: <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	760187	7545245
	Control	760264	7545440

Appendix C Flora species list

Family	Scientific name	Rehabilitation	Control
Acanthaceae	<i>Rostellularia adscendens</i> subsp. <i>adscendens</i> var. <i>pogonantha</i>		X
Aizoaceae	<i>Trianthema triquetrum</i>	X	X
Amaranthaceae	<i>Alternanthera angustifolia</i>		X
Amaranthaceae	<i>Alternanthera denticulata</i>	X	
Amaranthaceae	<i>Gomphrena lanata</i>	X	X
Amaranthaceae	<i>Gomphrena leptophylla</i>		X
Amaranthaceae	<i>Ptilotus calostachyus</i>		X
Amaranthaceae	<i>Ptilotus fusiformis</i>		X
Amaranthaceae	<i>Ptilotus obovatus</i>		X
Amaranthaceae	<i>Ptilotus polystachyus</i>	X	X
Amaranthaceae	<i>Ptilotus schwartzii</i>	X	X
Amaranthaceae	<i>Ptilotus</i> sp. 1		X
Amaranthaceae	<i>Ptilotus</i> sp. 2		X
Apocynaceae	<i>Vincetoxicum lineare</i>	X	X
Asteraceae	<i>Centipeda minima</i>	X	
Asteraceae	<i>Leucochrysum stipitatum</i>		X
Asteraceae	<i>Pluchea dunlopia</i>		X
Asteraceae	<i>Pluchea ferdinandi-muelleri</i>	X	X
Asteraceae	<i>Pluchea tetranthera</i>		X
Asteraceae	<i>Pterocaulon</i> sp.	X	
Boraginaceae	<i>Heliotropium tanythrix</i>	X	X
Brassicaceae	<i>Stenopetalum nutans</i>	X	
Caryophyllaceae	<i>Polycarpaea corymbosa</i>	X	X
Celastraceae	<i>Stackhousia intermedia</i>	X	
Chenopodiaceae	<i>Dysphania glomulifera</i>		X
Chenopodiaceae	<i>Dysphania kalpari</i>	X	
Chenopodiaceae	<i>Dysphania melanocarpa</i>	X	
Chenopodiaceae	<i>Dysphania melanocarpa</i> forma <i>melanocarpa</i>	X	
Chenopodiaceae	<i>Dysphania rhadinostachya</i>	X	
Chenopodiaceae	<i>Dysphania rhadinostachya</i> subsp. <i>rhadinostachya</i>	X	X
Chenopodiaceae	<i>Einadia nutans</i> subsp. <i>eremaea</i>		X
Chenopodiaceae	<i>Enchylaena tomentosa</i>	X	X
Chenopodiaceae	<i>Maireana tomentosa</i>	X	
Chenopodiaceae	<i>Rhagodia eremaea</i>		X
Chenopodiaceae	<i>Salsola australis</i>	X	X

Family	Scientific name	Rehabilitation	Control
Chenopodiaceae	<i>Sclerolaena convexula</i>	X	
Chenopodiaceae	<i>Sclerolaena cornishiana</i>	X	
Chenopodiaceae	<i>Sclerolaena deserticola</i>	X	
Cleomaceae	<i>Arivela viscosa</i>	X	X
Commelinaceae	<i>Commelina ensifolia</i>		X
Convolvulaceae	<i>Bonamia erecta</i>		X
Convolvulaceae	<i>Bonamia media</i>	X	X
Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>	X	
Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>	X	X
Convolvulaceae	<i>Ipomoea muelleri</i>	X	X
Cucurbitaceae	<i>Citrullus colocynthis</i>		X
Cucurbitaceae	<i>Cucumis argenteus</i>	X	
Cyperaceae	<i>Abildgaardia oxystachya</i>	X	X
Cyperaceae	<i>Bulbostylis barbata</i>	X	X
Cyperaceae	<i>Cyperus iria</i>	X	X
Cyperaceae	<i>Cyperus vaginatus</i>		X
Cyperaceae	<i>Fimbristylis ammobia</i>	X	X
Cyperaceae	<i>Fimbristylis caespitosa</i>		X
Cyperaceae	<i>Fimbristylis dichotoma</i>	X	X
Elatinaceae	<i>Bergia henschallii</i>		X
Euphorbiaceae	<i>Euphorbia australis</i>	X	
Euphorbiaceae	<i>Euphorbia biconvexa</i>	X	X
Euphorbiaceae	<i>Euphorbia drummondii</i>	X	X
Euphorbiaceae	<i>Euphorbia ferdinandi</i>	X	
Euphorbiaceae	<i>Euphorbia ferdinandii</i> subsp. <i>ferdinandii</i>	X	X
Euphorbiaceae	<i>Euphorbia papillata</i> var. <i>papillata</i>		X
Euphorbiaceae	<i>Euphorbia tannensis</i>	X	X
Fabaceae	<i>Acacia ?pruinocarpa</i>	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	X
Fabaceae	<i>Acacia cuthbertsonii</i> subsp. <i>cuthbertsonii</i>		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

Family	Scientific name	Rehabilitation	Control
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. 1		X
Fabaceae	<i>Acacia</i> sp. 2		X
Fabaceae	<i>Acacia</i> sp. 3	X	
Fabaceae	<i>Acacia stipuligera</i>	X	
Fabaceae	<i>Acacia tenuissima</i>	X	X
Fabaceae	<i>Glycine canescens</i>	X	X
Fabaceae	<i>Indigofera linifolia</i>	X	X
Fabaceae	<i>Indigofera linnaei</i>	X	X
Fabaceae	<i>Leptosema chambersii</i>		X
Fabaceae	<i>Muelleranthus stipularis</i>	X	X
Fabaceae	<i>Petalostylis cassioides</i>	X	
Fabaceae	<i>Rhynchosia minima</i>	X	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 glutinosa</i>	X	
Fabaceae	<i>Senna pleurocarpa</i>	X	
Fabaceae	<i>Senna</i> sp.	X	
Fabaceae	<i>Senna venusta</i>	X	
Fabaceae	<i>Sesbania cannabina</i>		X
Fabaceae	<i>Swainsona</i> sp.	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
Fabaceae	<i>Zornia albiflora</i>	X	
Goodeniaceae	<i>Goodenia armitiana</i>	X	X
Goodeniaceae	<i>Goodenia connata</i>		X
Goodeniaceae	<i>Goodenia lamprosperma</i>		X
Goodeniaceae	<i>Goodenia vilmorinae</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

Family	Scientific name	Rehabilitation	Control
Lamiaceae	<i>Dicrastylis lewellinii</i>		X
Lauraceae	<i>Cassytha</i> sp. 1		X
Lauraceae	<i>Cassytha</i> sp. 2	X	
Malvaceae	<i>Abutilon cryptopetalum</i>	X	
Malvaceae	<i>Abutilon fraseri</i> subsp. <i>Fraseri</i>	X	
Malvaceae	<i>Abutilon macrum</i>	X	X
Malvaceae	<i>Abutilon otocarpum</i>	X	X
Malvaceae	<i>Androcalva loxophylla</i>		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. 1	X	
Malvaceae	<i>Hibiscus</i> sp. 2	X	
Malvaceae	<i>Hibiscus sturtii</i> var. <i>campyklamys</i>		X
Malvaceae	<i>Hibiscus sturtii</i> var. <i>truncatus</i>		X
Malvaceae	<i>Melhanianthus oblongifolia</i>	X	
Malvaceae	<i>Seringa nephrosperma</i>		X
Malvaceae	<i>Sida calyxhymenia</i>	X	
Malvaceae	<i>Sida fibulifera</i>	X	
Malvaceae	<i>Sida platycalyx</i>	X	
Malvaceae	<i>Sida rohlena</i> subsp. <i>rohlena</i>	X	
Malvaceae	<i>Sida</i> sp. <i>excedentifolia</i> (J.L. Egan 1925)	X	X
Malvaceae	<i>Sida</i> sp. Kathleen Springs (A.C.Beauglehole 26934)	X	
Malvaceae	<i>Sida</i> sp. Wakaya Desert (P.K.Latz 11894)	X	X
Marsileaceae	<i>Marsilea hirsuta</i>	X	X
Montiaceae	<i>Calandrinia balonensis</i>	X	X
Montiaceae	<i>Calandrinia ptychosperma</i>	X	X
Montiaceae	<i>Calandrinia</i> sp. 1		X
Montiaceae	<i>Calandrinia</i> sp. 2		X
Montiaceae	<i>Calandrinia</i> sp. 3		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
N/A	Collection_001	X	
N/A	Collection_002	X	

Family	Scientific name	Rehabilitation	Control
N/A	Collection_003	X	
N/A	Collection_004	X	
N/A	Collection_005	X	
N/A	Collection_006	X	
N/A	Collection_007	X	
N/A	Collection_008	X	
N/A	Collection_009	X	
N/A	Collection_010	X	
N/A	Collection_011	X	
N/A	Collection_012	X	
N/A	Collection_013	X	
N/A	Collection_014	X	
N/A	Collection_015	X	
N/A	Collection_016	X	
N/A	Collection_017	X	
N/A	Collection_018	X	
N/A	Collection_019	X	
N/A	Collection_020	X	
N/A	Collection_021	X	
N/A	Collection_022	X	
N/A	Collection_023	X	
N/A	Collection_024	X	
N/A	Collection_025	X	
N/A	Collection_026	X	
N/A	Collection_027	X	
N/A	Collection_028	X	
N/A	Collection_029	X	
N/A	Collection_030	X	
N/A	Collection_031	X	
N/A	Collection_032	X	
N/A	Collection_033	X	
N/A	Collection_034	X	
N/A	Collection_035	X	
N/A	Collection_036	X	
N/A	Collection_037	X	
N/A	Collection_038	X	
N/A	Collection_039	X	
N/A	Collection_040	X	

Family	Scientific name	Rehabilitation	Control
N/A	Collection_041	X	
N/A	Collection_042	X	
N/A	Collection_043	X	
N/A	Collection_044	X	
N/A	Collection_045		X
N/A	Collection_046		X
N/A	Collection_047		X
N/A	Collection_048		X
N/A	Collection_049		X
N/A	Collection_050		X
N/A	Collection_051		X
N/A	Collection_052		X
N/A	Collection_053		X
N/A	Collection_054		X
N/A	Collection_055		X
N/A	Collection_056		X
N/A	Collection_057		X
N/A	Collection_058		X
N/A	Collection_059		X
N/A	Collection_060		X
N/A	Collection_061		X
N/A	Collection_062		X
N/A	Collection_063		X
N/A	Collection_064		X
N/A	Collection_065		X
N/A	Collection_066		X
Nyctaginaceae	<i>Boerhavia coccinea</i>	X	X
Phyllanthaceae	<i>Phyllanthus erwinii</i>	X	X
Plantaginaceae	<i>Stemodia glabella</i>	X	
Plantaginaceae	<i>Stemodia viscosa</i>	X	
Poaceae	* <i>Cenchrus ciliaris</i>	X	X
Poaceae	* <i>Cynodon dactylon</i>	X	X
Poaceae	* <i>Eragrostis minor</i>	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

Family	Scientific name	Rehabilitation	Control
Poaceae	<i>Chloris</i> sp.	X	
Poaceae	<i>Cymbopogon ambiguus</i>		X
Poaceae	<i>Dactyloctenium radulans</i>	X	X
Poaceae	<i>Digitaria brownii</i>	x	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	
Poaceae	<i>Enteropogon ramosus</i>		X
Poaceae	<i>Eragrostis cumingii</i>	X	X
Poaceae	<i>Eragrostis eriopoda</i>	X	X
Poaceae	<i>Eragrostis eriopoda</i> subsp. sandy fire weed (P.K Latz 12908)		X
Poaceae	<i>Eragrostis falcata</i>	X	X
Poaceae	<i>Eragrostis leptocarpa</i>	X	X
Poaceae	<i>Eragrostis minor</i>		X
Poaceae	<i>Eragrostis tenellula</i>		X
Poaceae	<i>Eriachne aristidea</i>	X	X
Poaceae	<i>Eriachne armitii</i>	X	X
Poaceae	<i>Eriachne helmsii</i>		X
Poaceae	<i>Eriachne obtusa</i>	X	X
Poaceae	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>	X	
Poaceae	<i>Eulalia aurea</i>		X
Poaceae	<i>Iseilema membranaceum</i>	X	
Poaceae	<i>Monachather paradoxus</i>	X	X
Poaceae	<i>Panicum decompositum</i>	X	
Poaceae	<i>Panicum laevinode</i>	X	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>Sporobolus australasicus</i>	X	X
Poaceae	<i>Tragus australianus</i>	X	
Poaceae	<i>Triodia basedowii</i>	X	X
Poaceae	<i>Triodia pungens</i>	X	X
Poaceae	<i>Triodia schinzii</i>	X	X
Poaceae	<i>Triodia</i> sp. (no material)		X
Poaceae	<i>Tripogonella loliiiformis</i>		X

Family	Scientific name	Rehabilitation	Control
Poaceae	<i>Urochloa piligera</i>	X	
Poaceae	<i>Yakirra australiensis</i>	X	X
Poaceae	<i>Yakirra australiensis</i> var. <i>australiensis</i>	X	X
Polygalaceae	<i>Polygala dependens</i>	X	
Portulacaceae	<i>Portulaca filifolia</i>	X	X
Portulacaceae	<i>Portulaca oleracea</i> var. <i>undoolya</i>		X
Portulacaceae	<i>Portulaca oleracea</i>	X	X
Portulacaceae	<i>Portulaca pilosa</i>	X	
Proteaceae	<i>Grevillea wickhamii</i> subsp. <i>aprica</i>		X
Proteaceae	<i>Hakea chordophylla</i>		X
Proteaceae	<i>Hakea macrocarpa</i>		X
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>		X
Rubiaceae	<i>Spermacoce occidentalis</i>		X
Rubiaceae	<i>Synaptantha tillaeacea</i>	X	
Santalaceae	<i>Anthobolus leptomerioides</i>		X
Sapindaceae	<i>Atalaya hemiglauca</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
Solanaceae	<i>Nicotiana rosulata</i> subsp. <i>ingulba</i>	X	
Solanaceae	<i>Solanum centrale</i>	X	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	X
Zygophyllaceae	<i>Tribulopsis angustifolium</i>	X	X
Zygophyllaceae	<i>Tribulus astrocarpus</i>	X	X
Zygophyllaceae	<i>Tribulus hirsutus</i>	X	
Zygophyllaceae	<i>Tribulus macrocarpus</i>	X	X
Zygophyllaceae	<i>Tribulus minutus</i>		X
Zygophyllaceae	<i>Tribulus terrestris</i>	X	
Zygophyllaceae	<i>Tribulus astrocarpus</i>	X	

Appendix D Species by site matrix

Family	Species	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B	9A	9B	10A	10B	11A	11B	12A	12B	13A	13B	14A	14B	15A	15B	16A	16B	17A	17B	
Acanthaceae	<i>Rostellularia adscendens</i> subsp. <i>adscendens</i> var. <i>pogonantha</i>								X																											
Aizoaceae	<i>Trianthema triquetrum</i>							X								X	X	X	X																X	
Amaranthaceae	<i>Alternanthera angustifolia</i>		X								X		X																							
Amaranthaceae	<i>Alternanthera denticulata</i>			X		X																													X	
Amaranthaceae	<i>Gomphrena lanata</i>					X	X		X																											
Amaranthaceae	<i>Gomphrena leptophylla</i>																																			
Amaranthaceae	<i>Ptilotus calostachyus</i>																								X											
Amaranthaceae	<i>Ptilotus fusiformis</i>														X																			X		
Amaranthaceae	<i>Ptilotus obovatus</i>										X												X													
Amaranthaceae	<i>Ptilotus polystachyus</i>			X	X		X															X	X	X									X	X		
Amaranthaceae	<i>Ptilotus schwartzii</i>							X														X	X													
Amaranthaceae	<i>Ptilotus</i> sp. 1																																		X	
Amaranthaceae	<i>Ptilotus</i> sp. 2										X																									
Apocynaceae	<i>Vincetoxicum lineare</i>																							X											X	
Asteraceae	<i>Centipeda minima</i>																							X												
Asteraceae	<i>Leucochrysum stipitatum</i>				X																															
Asteraceae	<i>Pluchea dunlopia</i>										X																									
Asteraceae	<i>Pluchea ferdinandi-muelleri</i>														X	X	X										X									
Asteraceae	<i>Pluchea tetranthera</i>																																			
Asteraceae	<i>Pterocaulon</i> sp.																							X												
Boraginaceae	<i>Heliotropium tanythrix</i>			X	X	X	X		X													X	X			X									X	
Brassicaceae	<i>Stenopetalum nutans</i>																					X														
Caryophyllaceae	<i>Polycarpha corymbosa</i>			X		X	X	X	X	X	X								X				X										X	X	X	
Celastraceae	<i>Stackhousia intermedia</i>																																		X	
Chenopodiaceae	<i>Dysphania glomulifera</i>																X																			
Chenopodiaceae	<i>Dysphania kalpari</i>															X																			X	
Chenopodiaceae	<i>Dysphania melanocarpa</i>																						X													
Chenopodiaceae	<i>Dysphania melanocarpa</i> forma <i>melanocarpa</i>								X																										X	
Chenopodiaceae	<i>Dysphania rhadinostachya</i>					X				X												X				X										
Chenopodiaceae	<i>Dysphania rhadinostachya</i> subsp. <i>Rhadinostachya</i>			X	X	X	X															X												X		
Chenopodiaceae	<i>Einadia nutans</i> subsp. <i>eremaea</i>																						X													
Chenopodiaceae	<i>Enchylaena tomentosa</i>															X	X		X				X										X	X		
Chenopodiaceae	<i>Maireana tomentosa</i>																						X													
Chenopodiaceae	<i>Rhagodia eremaea</i>																						X													
Chenopodiaceae	<i>Salsola australis</i>								X																										X	X
Chenopodiaceae	<i>Sclerolaena convexula</i>																						X													
Chenopodiaceae	<i>Sclerolaena cornishiana</i>			X		X																	X													
Chenopodiaceae	<i>Sclerolaena deserticola</i>						X																													
Cleomaceae	<i>Arivela viscosa</i>		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X			X	X	X	X			X						X	X	
Commelinaceae	<i>Commelina ensifolia</i>																								X											
Convolvulaceae	<i>Bonamia erecta</i>																																		X	
Convolvulaceae	<i>Bonamia media</i>																																		X	
Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>									X					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	X	
Convolvulaceae	<i>Ipomoea muelleri</i>	X							X	X		X	X									X													X	
Cucurbitaceae	<i>Citrullus colocynthis</i>												X																							
Cucurbitaceae	<i>Cucumis argenteus</i>																						X													

Family	Species	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B	9A	9B	10A	10B	11A	11B	12A	12B	13A	13B	14A	14B	15A	15B	16A	16B	17A	17B			
Cyperaceae	<i>Abildgaardia oxystachya</i>																				X					X												
Cyperaceae	<i>Bulbostylis barbata</i>			X		X		X		X						X		X				X	X									X		X				
Cyperaceae	<i>Cyperus iria</i>									X	X		X											X	X													
Cyperaceae	<i>Cyperus vaginatus</i>		X																																			
Cyperaceae	<i>Fimbristylis ammobia</i>																	X	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																										X	
Euphorbiaceae	<i>Euphorbia australis</i>																																					X
Euphorbiaceae	<i>Euphorbia biconvexa</i>				X								X			X																						
Euphorbiaceae	<i>Euphorbia drummondii</i>			X		X																													X	X		
Euphorbiaceae	<i>Euphorbia ferdinandi</i>									X		X																										
Euphorbiaceae	<i>Euphorbia ferdinandii</i> subsp. <i>Ferdinandii</i>																					X	X															
Euphorbiaceae	<i>Euphorbia papillata</i> var. <i>papillata</i>						X				X																											
Euphorbiaceae	<i>Euphorbia tannensis</i>			X	X	X		X	X	X	X				X								X		X					X			X	X	X	X	X	
Fabaceae	<i>Acacia ?pruinocarpa</i>					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	X	
Fabaceae	<i>Acacia cuthbertsonii</i> subsp. <i>cuthbertsonii</i>						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												
Fabaceae	<i>Acacia sibirica</i>												X									X			X													
Fabaceae	<i>Acacia</i> sp. 1														X																							
Fabaceae	<i>Acacia</i> sp. 2																																					
Fabaceae	<i>Acacia</i> sp. 3																																					
Fabaceae	<i>Acacia stipuligera</i>																																					X
Fabaceae	<i>Acacia tenuissima</i>									X																												X
Fabaceae	<i>Glycine canescens</i>							X	X																													
Fabaceae	<i>Indigofera linifolia</i>								X	X	X				X																							X
Fabaceae	<i>Indigofera linnaei</i>			X				X	X	X												X																X
Fabaceae	<i>Leptosema chambersii</i>																																					X
Fabaceae	<i>Muelleranthus stipularis</i>			X							X																											X
Fabaceae	<i>Petalostylis cassioides</i>																																					X
Fabaceae	<i>Rhynchosia minima</i>								X						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
Fabaceae	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>							X		X			X													X	X											X
Fabaceae	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>																					X																
Fabaceae	<i>Senna glutinosa</i>																					X																
Fabaceae	<i>Senna pleurocarpa</i>																																					X
Fabaceae	<i>Senna</i> sp.							X																														

Family	Species	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B	9A	9B	10A	10B	11A	11B	12A	12B	13A	13B	14A	14B	15A	15B	16A	16B	17A	17B				
Fabaceae	<i>Senna venusta</i>																																				X		
Fabaceae	<i>Sesbania cannabina</i>		X																																				
Fabaceae	<i>Swainsona</i> sp.					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	X	X										
Fabaceae	<i>Tephrosia supina</i>									X	X																												
Fabaceae	<i>Vigna lanceolata</i> var. <i>latifolia</i>		X																																				
Fabaceae	<i>Zornia albiflora</i>									X					X																								
Goodeniaceae	<i>Goodenia armitiana</i>									X	X															X			X										
Goodeniaceae	<i>Goodenia connata</i>																																					X	
Goodeniaceae	<i>Goodenia lamprosperma</i>																			X																			
Goodeniaceae	<i>Goodenia vilmorinia</i>					X	X																																
Goodeniaceae	<i>Scaevola parvifolia</i> subsp. <i>parvifolia</i>																				X	X					X	X	X	X	X	X	X	X	X	X			
Gyrostemonaceae	<i>Codonocarpus cotinifolius</i>																																					X	
Lamiaceae	<i>Dicrastylis exsuccosa</i>																																					X	
Lamiaceae	<i>Dicrastylis lewellinii</i>																																					X	
Lauraceae	<i>Cassytha</i> sp. 1																																					X	
Lauraceae	<i>Cassytha</i> sp. 2																			X																			
Malvaceae	<i>Abutilon cryptopetalum</i>									X																													
Malvaceae	<i>Abutilon fraseri</i> subsp. <i>fraseri</i>																					X																	
Malvaceae	<i>Abutilon macrum</i>					X		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																	
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	
Malvaceae	<i>Hibiscus leptocladus</i>																						X																
Malvaceae	<i>Hibiscus</i> sp. 1																																					X	
Malvaceae	<i>Hibiscus</i> sp. 2					X																																	
Malvaceae	<i>Hibiscus sturtii</i> var. <i>campychlams</i>																						X															X	
Malvaceae	<i>Hibiscus sturtii</i> var. <i>truncatus</i>										X																												
Malvaceae	<i>Melhanian oblongifolia</i>								X																														
Malvaceae	<i>Seringa nephrosperma</i>																																					X	
Malvaceae	<i>Sida calyxhymenia</i>																																					X	
Malvaceae	<i>Sida fibulifera</i>								X															X															
Malvaceae	<i>Sida platycalyx</i>																					X	X		X													X	
Malvaceae	<i>Sida rohlena</i> subsp. <i>rohlena</i>			X																																			
Malvaceae	<i>Sida</i> sp. <i>excedentifolia</i> (J.L. Egan 1925)					X	X															X																X	
Malvaceae	<i>Sida</i> sp. Kathleen Springs (A.C. Beaglehole 26934)																							X															
Malvaceae	<i>Sida</i> sp. Wakaya Desert (P.K. Latz 11894)			X		X																																X	X
Marsileaceae	<i>Marsilea hirsuta</i>											X	X											X	X														
Montiaceae	<i>Calandrinia balonensis</i>			X		X									X																							X	X
Montiaceae	<i>Calandrinia ptychosperma</i>					X	X																															X	
Montiaceae	<i>Calandrinia</i> sp. 1				X																																		
Montiaceae	<i>Calandrinia</i> sp. 2						X																																
Montiaceae	<i>Calandrinia</i> sp. 3								X																														
Myrtaceae	<i>Corymbia opaca</i>							X															X																

Family	Species	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B	9A	9B	10A	10B	11A	11B	12A	12B	13A	13B	14A	14B	15A	15B	16A	16B	17A	17B	
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																		
N/A	Collection_001																																		X	
N/A	Collection_002																																		X	
N/A	Collection_003																																		X	
N/A	Collection_004																																		X	
N/A	Collection_005																																		X	
N/A	Collection_006																																		X	
N/A	Collection_007																																		X	
N/A	Collection_008																																		X	
N/A	Collection_009																																		X	
N/A	Collection_010																										X								X	
N/A	Collection_011																																		X	
N/A	Collection_012																																		X	
N/A	Collection_013													X												X									X	
N/A	Collection_014																	X																		
N/A	Collection_015																	X																		
N/A	Collection_016																	X																		
N/A	Collection_017									X								X																		
N/A	Collection_018																	X								X										
N/A	Collection_019																	X																		
N/A	Collection_020																										X									
N/A	Collection_021							X							X																					
N/A	Collection_022													X																						
N/A	Collection_023									X				X																						
N/A	Collection_024																									X										
N/A	Collection_025																									X										
N/A	Collection_026																									X										
N/A	Collection_027							X	X		X													X												
N/A	Collection_028									X																										X
N/A	Collection_029									X																										
N/A	Collection_030									X														X												
N/A	Collection_031									X																										
N/A	Collection_032									X																										
N/A	Collection_033									X																										
N/A	Collection_034																							X												
N/A	Collection_035																							X												
N/A	Collection_036																							X												
N/A	Collection_037																							X												
N/A	Collection_038																							X												X
N/A	Collection_039																							X												
N/A	Collection_040							X																												X
N/A	Collection_041							X																												
N/A	Collection_042							X																												
N/A	Collection_043							X																												
N/A	Collection_044																																			X

Family	Species	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B	9A	9B	10A	10B	11A	11B	12A	12B	13A	13B	14A	14B	15A	15B	16A	16B	17A	17B	
N/A	Collection_045																												X				X			
N/A	Collection_046																																	X		
N/A	Collection_047																																	X		
N/A	Collection_048																																	X		
N/A	Collection_049																											X						X		
N/A	Collection_050																					X														
N/A	Collection_051																			X																
N/A	Collection_052																			X																
N/A	Collection_053																X																			
N/A	Collection_054																X																			
N/A	Collection_055																X																			
N/A	Collection_056												X																							
N/A	Collection_057										X														X											
N/A	Collection_058												X																							
N/A	Collection_059										X																									
N/A	Collection_060										X																									
N/A	Collection_061										X																									
N/A	Collection_062										X																									
N/A	Collection_063										X																									
N/A	Collection_064								X		X																									
N/A	Collection_065																								X											
N/A	Collection_066																																			X
Nyctaginaceae	<i>Boerhavia coccinea</i>			X	X	X	X	X	X	X	X	X	X						X		X	X	X	X	X		X					X		X		
Phyllanthaceae	<i>Phyllanthus erwinii</i>								X	X	X													X	X											
Plantaginaceae	<i>Stemodia glabella</i>						X																													
Plantaginaceae	<i>Stemodia viscosa</i>									X																						X				
Poaceae	<i>*Cenchrus ciliaris</i>		X		X				X					X		X	X		X																X	
Poaceae	<i>*Cynodon dactylon</i>	X	X													X																				
Poaceae	<i>*Eragrostis minor</i>											X																								
Poaceae	<i>Aristida contorta</i>							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					X		
Poaceae	<i>Aristida inaequiglumis</i>			X	X	X				X												X	X	X							X		X			
Poaceae	<i>Aristida latifolia</i>										X												X		X											
Poaceae	<i>Chloris</i> sp.																							X												
Poaceae	<i>Cymbopogon ambiguus</i>								X																											
Poaceae	<i>Dactyloctenium radulans</i>						X		X	X	X							X				X		X							X		X	X		
Poaceae	<i>Digitaria brownii</i>																						X											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		
Poaceae	<i>Enteropogon ramosus</i>																							X												
Poaceae	<i>Eragrostis cumingii</i>				X			X	X	X		X							X	X			X	2	X	X					X		X	X		
Poaceae	<i>Eragrostis eriopoda</i>			X	X	X									X		X				X		X				X		X		X	X	X			
Poaceae	<i>Eragrostis eriopoda</i> subsp. sandy fire weed (P.K Latz 12908)																				X						X				X		X			
Poaceae	<i>Eragrostis falcata</i>															X	X																			

Family	Species	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B	9A	9B	10A	10B	11A	11B	12A	12B	13A	13B	14A	14B	15A	15B	16A	16B	17A	17B	
Poaceae	<i>Eragrostis leptocarpa</i>			X		X	X	X	X	X		X											X	X											X	
Poaceae	<i>Eragrostis minor</i>												X												X											
Poaceae	<i>Eragrostis tenellula</i>												X												X											
Poaceae	<i>Eriachne aristidea</i>			X	X	X				X	X									X						X				X						
Poaceae	<i>Eriachne armitii</i>																					X			X											
Poaceae	<i>Eriachne helmsii</i>																						X													
Poaceae	<i>Eriachne obtusa</i>																	X	X		X															
Poaceae	<i>Eriachne pulchella</i> subsp. <i>pulchella</i>							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 decompositum</i>																							X												X
Poaceae	<i>Panicum laevinode</i>			X		X																X	X													
Poaceae	<i>Paraneurachne muelleri</i>					X				X											X											X	X			
Poaceae	<i>Paspalidium basicladum</i>			X		X																										X	X			
Poaceae	<i>Paspalidium clementii</i>				X		X															X	X													
Poaceae	<i>Paspalidium rarum</i>							X	X	X			X									X		X	X				X					X	X	
Poaceae	<i>Perotis rara</i>			X	X	X		X		X												X	X													
Poaceae	<i>Sporobolus australasicus</i>							X	X	X	X	X	X												X					X				X	X	
Poaceae	<i>Tragus australianus</i>			X				X																											X	
Poaceae	<i>Triodia basedowii</i>			X	X	X	X																									X	X			
Poaceae	<i>Triodia pungens</i>									X	X			X	X											X	X	X		X						
Poaceae	<i>Triodia schinzii</i>																				X	X				X		X	X	X						
Poaceae	<i>Triodia</i> sp. (no material)																																		X	
Poaceae	<i>Tripogonella loliiformis</i>				X		X		X																											X
Poaceae	<i>Urochloa piligera</i>																							X												
Poaceae	<i>Yakirra australiensis</i>																															X	X			
Poaceae	<i>Yakirra australiensis</i> var. <i>australiensis</i>										X			X	X	X	X	X	X	X						X				X						
Polygalaceae	<i>Polygala dependens</i>																									X				X						
Portulacaceae	<i>Portulaca filifolia</i>			X	X	X	X	X		X		X	X	X			X					X		X							X			X		
Portulacaceae	<i>Portulaca oleracea</i> var. <i>undoolya</i>							X		X		X													X											X
Portulacaceae	<i>Portulaca oleracea</i>			X	X	X		X		X		X										X	X	X					X		X	X	X			
Portulacaceae	<i>Portulaca pilosa</i>															X																				
Proteaceae	<i>Grevillea wickhamii</i> subsp. <i>aprica</i>																															X				
Proteaceae	<i>Hakea chordophylla</i>										X												X							X						
Proteaceae	<i>Hakea macrocarpa</i>																										X									
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>																																			
Rubiaceae	<i>Spermacoce occidentalis</i>																																			
Rubiaceae	<i>Synaptantha tillaeacea</i>						X																										X			
Santalaceae	<i>Anthobolus leptomerioides</i>																																			X
Sapindaceae	<i>Atalaya hemiglauca</i>																																			
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	X
Solanaceae	<i>Nicotiana rosulata</i> subsp. <i>ingulba</i>			X																																
Solanaceae	<i>Solanum centrale</i>				X	X	X			X	X													X			X							X		
Solanaceae	<i>Solanum quadriloculatum</i>																						X	X												
Solanaceae	<i>Solanum</i> sp.																																			X

Family	Species	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B	9A	9B	10A	10B	11A	11B	12A	12B	13A	13B	14A	14B	15A	15B	16A	16B	17A	17B
Surianaceae	<i>Stylobasium spathulatum</i>																	X	X						X						X				
Zygophyllaceae	<i>Tribulopsis angustifolia</i>				X		X				X								X	X		X							X					X	
Zygophyllaceae	<i>Tribulopsis angustifolium</i>			X		X																X									X	X			
Zygophyllaceae	<i>Tribulus astrocarpus</i>				X	X	X																												
Zygophyllaceae	<i>Tribulus hirsutus</i>																										X								
Zygophyllaceae	<i>Tribulus macrocarpus</i>			X		X				X												X	X											X	
Zygophyllaceae	<i>Tribulus minutus</i>								X		X																								
Zygophyllaceae	<i>Tribulus terrestris</i>							X																											
Zygophyllaceae	<i>Tribulus astrocarpus</i>							X																										X	

Appendix E Summary of flora of significance recorded across the TNP

Species	Conservation status (TPWCA)	Monitoring site	Quadrat type	# of plants
<i>Sida</i> sp. <i>excedentifolia</i> (J.L. Egan 1925)	DD	3B	Control	8
<i>Sida</i> sp. <i>excedentifolia</i> (J.L. Egan 1925)	DD	11A	Rehabilitation	8
<i>Sida</i> sp. <i>excedentifolia</i> (J.L. Egan 1925)	DD	17A	Rehabilitation	2
<i>Sida</i> sp. <i>excedentifolia</i> (J.L. Egan 1925)	DD	3A	Rehabilitation	300
<i>Tribulus minutus</i>	DD	4B	Control	1
<i>Tribulus minutus</i>	DD	5B	Control	2
<i>Tephrosia brachyodon</i>	INFRA	3B	Control	6
<i>Tephrosia brachyodon</i>	INFRA	3A	Rehabilitation	4

Appendix F 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	17B	Control	30
<i>*Cenchrus ciliaris</i>	No	1B	Control	5
<i>*Cenchrus ciliaris</i>	No	2B	Control	2
<i>*Cenchrus ciliaris</i>	No	4B	Control	3
<i>*Cenchrus ciliaris</i>	No	8B	Control	25
<i>*Cenchrus ciliaris</i>	No	9B	Control	5
<i>*Cenchrus ciliaris</i>	No	7A	Rehabilitation	4
<i>*Cenchrus ciliaris</i>	No	8A	Rehabilitation	40
<i>*Cynodon dactylon</i>	No	1B	Control	11
<i>*Cynodon dactylon</i>	No	1A	Rehabilitation	5
<i>*Cynodon dactylon</i>	No	8A	Rehabilitation	20
<i>*Eragrostis minor</i>	No	6A	Rehabilitation	20



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

Monitoring site	Rehabilitation zone	Native flora species density (plants per 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)	0.001	0.000	n	3	1	n	3.06	0.01	n	0.2	0	y
2	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat)	0.069	0.094	y	13	15	y	49.65	16.96	n	0.02	0	y
3	MNES habitat zone (Dwarf Desert Spike-rush habitat)	0.054	0.382	y	16	27	y	11.69	7.71	n	0	0	y
4	MNES habitat zone (Dwarf Desert Spike-rush habitat), MNES habitat zone (Princess Parrot habitat)	0.163	0.022	n	21	18	y	40.51	2.96	n	0.02	0	y
5	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat), MNES habitat zone (Princess Parrot habitat)	0.105	0.224	y	23	30	y	45.14	10.12	n	0	0	y
6	MNES habitat zone (Dwarf Desert Spike-rush habitat)	0.016	0.027	y	9	5	n	16.94	1.11	n	0	0	y
7	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat), MNES habitat zone (Princess Parrot habitat)	0.195	0.438	y	7	15	y	65.71	57.87	y	0	0.05	n









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)
8	MNES habitat zone (Dwarf Desert Spike-rush habitat)	0.026	0.055	y	8	8	y	37.45	63.11	y	0.5	1	n
9	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat)	0.109	0.129	y	11	8	y	23.85	11.99	n	0.1	0	y
10	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat), MNES habitat zone (Princess Parrot habitat)	0.084	0.028	n	13	8	n	59.31	3.93	n	0	0	y
11	Native vegetation zone	0.244	0.398	y	24	26	y	27.36	23.42	y	0	0	y
12	Native vegetation zone	0.049	0.447	y	9	16	y	33.13	15.72	n	0	0	y
13	Native vegetation zone	0.160	1.033	y	12	16	y	57.29	8.66	n	0	0	y
14	Native vegetation zone	0.094	0.209	y	14	11	y	36.92	31.26	y	0	0	y
15	Native vegetation zone	0.058	0.073	y	12	26	y	57.8	24.85	n	0	0	y
16	MNES habitat zone (Greater Bilby and Great Desert Skink habitat), MNES habitat zone (Night Parrot habitat)	0.252	0.876	y	23	18	y	16.08	26.9	y	0	0	y
17	Native vegetation zone	0.260	0.053	n	14	19	y	32.83	2.56	n	0.4	0	y

Appendix H Photo monitoring points 2020-2021









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









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









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









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

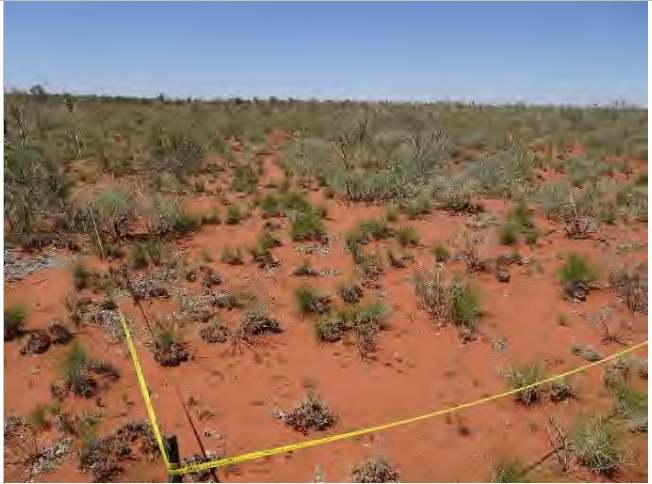







Monitoring site 5

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









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









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









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









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









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









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









Monitoring site 12

<p>2020</p>				
	<p>Control – photo from the northwest</p>	<p>Control – photo from the southeast</p>	<p>Rehabilitation – photo from the northwest</p>	<p>Rehabilitation – photo from the southeast</p>
<p>2021</p>				
	<p>Control – photo from the northwest</p>	<p>Control – photo from the southeast</p>	<p>Rehabilitation – photo from the northwest</p>	<p>Rehabilitation – photo from the southeast</p>









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









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









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

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

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



APPENDIX C – HSE AUDIT

ZERO HARM

Tanami Systems Audit

HSE-AUD-082

Rev #	Date	Prepared By	Reviewed By	Approved By	Description
0.1	29/1/2021	M Brown	John Wilson		Issued for review
1.0	31/1/2021	M Brown		A Hynes	Initial Report

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1. DETAILS

Date: 29th January 2021

Location: Tanami Gas Pipeline – Desktop

Participants: Mark Brown (Lead Auditor)

2. OVERVIEW

- All relevant documentation and work orders around required inspections of the Tanami assets were in place including HSE, mechanical and electrical inspections as required under the Pipeline Management Plan (PMP), Asset Management Plan (AMP) and Environment Plan (EP).
- Training checks on all the employees that have recently attended site identified no opportunities for improvement. All mandatory and site-specific training was evidenced as compliant however varied between personnel and what the minimum requirement was (i.e. operations induction, construction induction, Newmont inductions).
- Overall, the audit results were positive including the management of the asset during 2020 travel restrictions.

3. RESULTS

Detailed assessment against all audit criteria is provided in Appendix A. Performance against each obligation is recorded as either *Compliant*, *Opportunity for Improvement*, or *Non-Compliant* with the tool marked where assessment was not undertaken against the scope of works. All findings have been risk assessed in regards to Risk Management in line with audit processes within DBP.

No non-compliances were identified throughout the audit. Two opportunities for improvement, of low and negligible risk respectively arose. The OFI's are based around clarity of training requirements and correct references in the PMP.

3.1 Good Practice

Obligation	Comments
<p><i>On the Permit does it have:</i></p> <ul style="list-style-type: none"> -The scope of work is clearly described and communicated; -Personnel are identified who may authorise particular work; -The Supervisor of the work is identified (i.e. the Permit Holder); -The Supervisor of the work is not the Supervisor of any other work (i.e. the Permit Holder can only hold one permit); -Supporting information relevant to the work scope is identified (i.e. drawings, procedures, work instructions); -Are all persons performing work under the permit scope signed on to the permit -Permit holder and PIO are separate people if other people are involved with the task that are qualified and present when the permit is opened 	<p>Upon review of a selection of the work packs returned relating to the asset, all permits were available and completed in full. Permits also referenced the correct work instructions and were accompanied by risk assessment tools.</p>

<p><i>Monthly aerial surveillance shall assess for evidence of potential or impact to the pipeline. Aerial surveillance reports shall be prepared containing photography overlain by the pipeline licence boundary. Where the Aerial Surveillance Officer (ASO) identifies activity outside of the pipeline licence area, this shall be communicated</i></p>	<p>The ability to gain relevant information through Aerial Surveillance reports (ASR) is important to ensure subsidence and crossings are being maintained as per the Safety Case and Operational Environment Plan. These reports are in depth, consistent and track issues until they are resolved.</p> <p>Recent erosion (Dec 2020 and Jan 2021) was identified in the ASR and a full erosion report was completed by the Lands team. This creates the basis of the work pack for the repair works required.</p>
<p><i>AMP requirements are referenced as part of the Work Orders in Maximo.</i></p>	<p>Enables easy cross referencing to AMP requirements and updates to AMP can be easily traced into the WO system.</p>

3.2 Findings

Finding	Obligation	Improvement	Risk
Opportunity for Improvement	Training compliance review of Tanami Operations Induction (against Construction Induction and Newmont Inductions)	Mandatory training not consistent or clear in terms of application to personnel	Low
Opportunity for Improvement	Referenced documents in PMP (WI's) should be updated to reflect correct WI	Minor updates to PMP to ensure referenced documents are correct	Negligible

4. ACTIONS

Issue	Action	Due Date	Responsibility
Mandatory training for site work	Review requirements for personnel working on asset to ensure mandatory minimums are set, understood and documented	31/3/2021	HSE / Training
References to WI in PMP not correct (requires updating)	Minor updates to PMP to ensure referenced documents are correct	On next review of document	Jeff Kong

5. CONCLUSION

The desktop audit focusses on ensuring safety critical element controls, asset management activities and frequency and EP inspection or controls were implemented and completed through the work order system (Maximo). There was clear evidence that the controls and processes were taken from the source documents and applied to the project and this has been implemented. The use of larger work orders (such as mechanical and electrical maintenance) for a variety of tasks and to cover multiple frequencies helps to address the remote nature of the asset and travel requirements involved.

Appendix A: Detailed Review

Activity	Frequency (from AMP/EP/PM)	Reference / Evidence	Compliance
Aerial Surveillance	1M	3000138974	C
Clearing and Civil works	24M	3000140817	C
Above Ground piping inspections	12M	3000134815	C
Pressure piping inspections	24M	3000134815	C
PSV Inspections	12M	3000138647	C
Valve maintenance	6M and 12M	3000131374	C
Earthing and CP	12M	3000138988	C
Pressure vessel inspections	24M	3000131101	C
Coriolis meter inspection (AVT)	3M	3000131125	C
Heater Inspections	24M	3000134815	C
RCD Inspections	12M	3000134815	C
Battery Inspections	6M	3000134815	C
Battery discharge test	12M	3000134815	C
Solar Testing	12M	3000134815	C
Hut Alarm Testing	12M	3000134815	C
Weeds	12M	3000134815	C
Pest Control	12M	3000134815	C
Firebreaks	12M	3000134815 PM301657	C
Signage Inspections	12M	3000134815	C
Line of sight inspection	12M	3000134815	C
HSE Inspection (inc Fire ext)	6M	3000141704 – Chubb Report	C
First aid kit inspections (vehicle)	6M	3000137981	C
AVT	#M	3000138582 – Inlet AVT 3000131125 – DBS AVT	C
PTW	NA	068027 / 068275	C
JHA / Take 5	NA	3000134815	C

APPENDIX 1 – EVIDENCE & IMAGES

NA – Desktop Audit

APPENDIX 2 - ASSESSMENT AGAINST AUDIT CRITERIA

Name	Description	Company Level	Compliance Class	Expiry Years
MPC construction site induction	Tanami project specific	AGIG	General	1.00
Northern Territory Electrical License	required by all electricians working on Tanami	AGIG	Electrical Licerice	5.00
Tanami Construction Induction	Tanami project construction induction	AGIG	General	3.00
Tanami medical	Tanami project specific	AGIG	General	1.00
Tanami Operations Induction	Tanami Ops induction	AGIG	Operations	3.00



1 to 5 of 5 Compliances

TANAMI COMPLIANCE LIST - INTUITION

APPENDIX D – AERIAL SURVEILLANCE REPORT

NT – TANAMI – AERIAL PATROL REPORT
 Tanami Gas Pipeline

**SURVEILLANCE REPORT MUST BE EMAILED TO THE FOLLOWING ASAP AT THE
 COMPLETION OF THE FLIGHT**

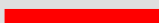

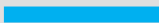
DAMPIER BUNBURY PIPELINE

 Rakai, Tawake
tawake.rakai@agiq.com.au



DAMPIER BUNBURY PIPELINE

 Smith, James
james.smith@agiq.com.au

Aircraft Type	Pilot Name	Area Covered	Weather Conditions (include temp; visibility, wind and rain)	
VH-LAE	Francis Lee	TNP Inlet Station – DBS Mine M/S	Mostly clear, spotted rain. South West 7km/hr winds. 38.8 degrees	
W/O No	Employee Name	Date of Surveillance	Start Time	Completion Time
3000136920	Nicholas Hiley	19/11/2020	06:03 hrs	09:39 hrs

Summary of Report	<ul style="list-style-type: none"> Updated images and information of facilities & points of interest. Overall the condition of the Corridor is terrific. No unauthorized works or malicious acts were found. All facilities and points of interest are secure and in good condition.
Note:	<ul style="list-style-type: none"> This flight was conducted tracking from the TNP Inlet Station to the DBS Mine M/S and included the Granites M/S & Lateral. The following 3 x descriptions (and definitions) are used in the report to describe the severity of subsidence and water erosion; <ul style="list-style-type: none"> Minor: Considered to be subsidence/water erosion that appears to be no greater than 100mm in depth. Moderate: Subsidence/water erosion that appears to have a depth between 100 - 300mm. Significant: Subsidence/water erosion that appears to have the potential to be greater than 300mm in depth.
Legend:	Corridor and Pipe locations are only approximations of actual locations. <ul style="list-style-type: none">  Easement boundary  Pipeline  Areas of interest

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 Tanami Gas Pipeline

Location	Comment
NP Inlet Station & Inlet Pipe KP 0	<ul style="list-style-type: none"> All appeared correct and secure.  

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New Well Rd
KP 13.438

- The road crossing appeared to remain in good condition.


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Tanami Gas Pipeline

Gravel Track to
Water Bore
RN16883
KP 21.832

- Below image shows the current condition of the road crossing.
- No changes to the laydown yard since time of last flight.



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Tanami Gas Pipeline

<p>Tilmouth Rd House Compound</p>	<ul style="list-style-type: none"> • All appeared correct at Tilmouth compound. • AGIG Personnel onsite on and off over the past 2 weeks. All appeared correct and secure. • Onsite store has had first order submitted and will be completed on next 3 monthly maintenance scheduled in February 2021
<p>Napperby Creek KP 34.655</p>	<ul style="list-style-type: none"> • Below image shows the current condition of Napperby creek including upstream bank. 

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Tanami Gas Pipeline



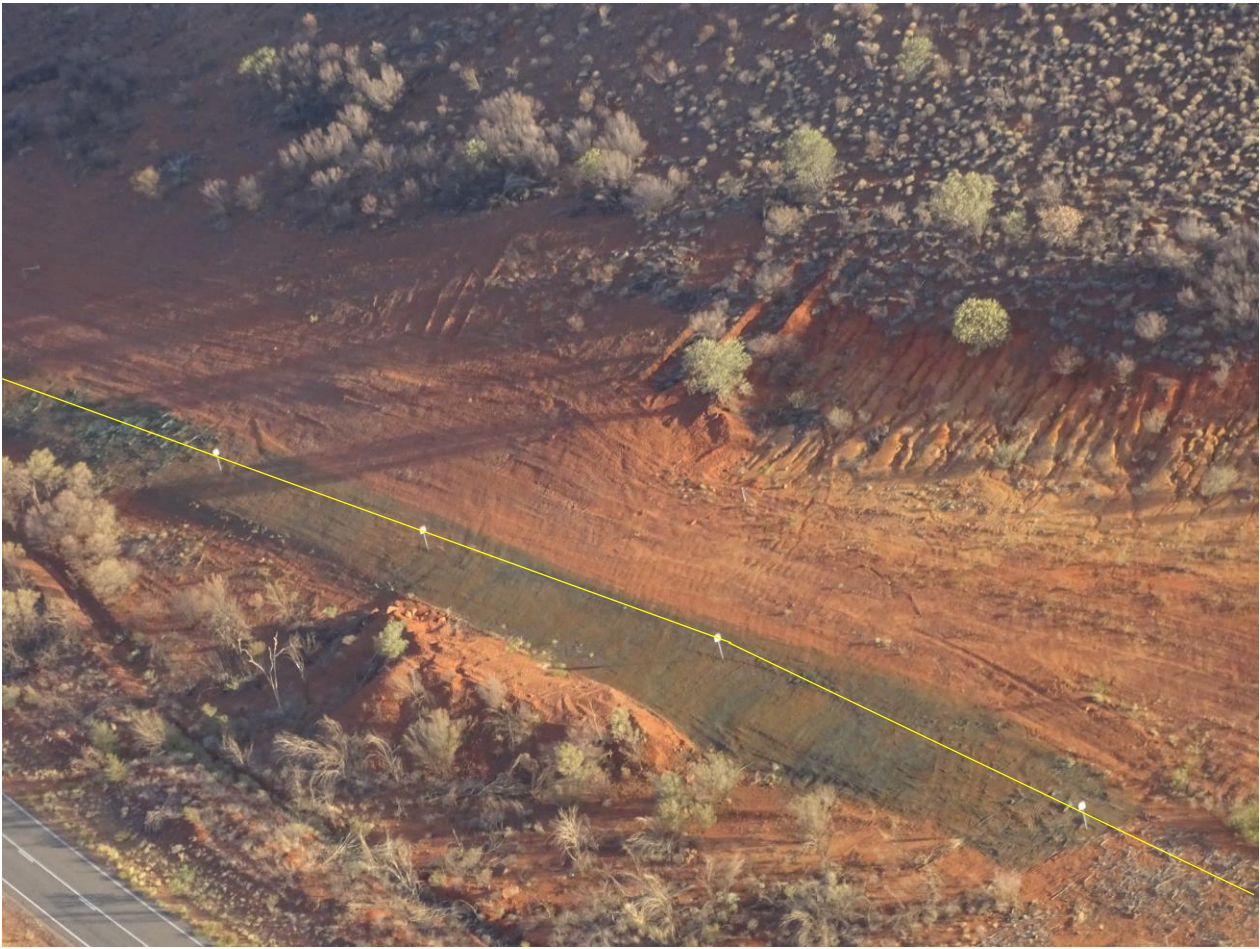
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Tanami Gas Pipeline

KP 48.000

- Below image shows the condition of the easement at KP 48.000



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Tanami Gas Pipeline



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Tanami Gas Pipeline

Camp
1/Laydown No.2
KP 65.503

- Below image shows the current condition of the previous camp/laydown yard.



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Tanami Gas Pipeline

Yeulamu Rd
Gravel
KP 100.150

- Below image shows the current condition of the road crossing.



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Tanami Gas Pipeline

ROW
KP 108.000

- Below image shows the ROW looking downstream.



NT – TANAMI – AERIAL PATROL REPORT
Tanami Gas Pipeline

Road to Bore &
Gravel Pit
KP 119.985

- Below image shows the previously reported increased activity within the Gravel Pit.
- No obvious changes since time of last flight.



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Tanami Gas Pipeline

Yuendumu Rd
Gravel
KP 137.916

- Road crossing appeared in good condition.



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Tanami Gas Pipeline



NT – TANAMI – AERIAL PATROL REPORT

Tanami Gas Pipeline

Road to
 Yuendumu Rd
 Gravel
 KP 140.043


- Road crossing appeared in good condition.
- Lands Officer met with representative of the Central Desert Council based in Yuendumu. An Asset Protection Works APW has been submitted to Land Management for the upgrade of both Yuendumu access roads.
- The main Yuendumu Road entrance and Tanami Road up until Yuendumu will be bituminised by the NT State Government.
- Central Desert Shire has received Federal funding to bituminize second Yuendumu access road (below)
- Works have had approval for unsupervised works and are expected to be completed by the end of 2020.
- At time of flight no ground works have commenced. Site meeting was conducted onsite on the 11/11/2020 with roads team leader Colin from Central Desert Council.



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<p>Track to Yuendumu Airport Gravel KP 140.883</p>	<ul style="list-style-type: none"> • Road crossing appeared in good condition. 
<p>SS1 Yuendumu KP 144.906</p>	<ul style="list-style-type: none"> • Appeared correct and secure.


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Tanami Gas Pipeline



Mission Creek
T2 KP 153.038
KP 153.038

- Appeared to remain in a good condition.

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Tanami Gas Pipeline

<p>Keridi Creek Tributary T2 & Keridi Creek T2 KP 156.262</p>	<ul style="list-style-type: none">• Appeared to remain in good condition. 
<p>Mount Doreen Station Rd KP 159. 927</p>	<ul style="list-style-type: none">• No change to the road crossing.

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Tanami Gas Pipeline

Mount Doreen Station
KP 159.966 –
213.160


- Lands Officer and FMO TL completed Landowner Visit at Mount Doreen Station with Managers Britany and Nicko.
- Mount Doreen station is approx. 7000km squared and runs 15000 head of cattle at any one time.
- To complete one bore run on the eastern side of the station is 350km long.
- The Mount Doreen drive way is 77km each way and the start is approx. 30km north of Yuendumu.
- Below images show the entrance to Mount Doreen Station.



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Tanami Gas Pipeline



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<p>Camp 2/Laydown No.3 KP 170.616</p>	<ul style="list-style-type: none"> Below image shows the previous laydown/camp area. 
<p>Gintys Bore Access Road KP 173.100</p>	<ul style="list-style-type: none"> No change to the current condition of the road crossing.

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Tanami Gas Pipeline

Yaloojarrie
Creek T1
& Tributaries
KP 179.962 –
KP 181.364

- No significant changes observed to the creek and its tributaries.





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Yaloojarrie
Creek
Tributaries
KP 184.200
KP185.000

- No change observed to the creeks tributaries, with rock pitching areas.




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Tanami Gas Pipeline

<p>Yaloojarrie Creek Tributaries KP 188.900</p>	<ul style="list-style-type: none"> The water crossing at this location appeared in good condition; no change to rock pitching. 
<p>Watercourse T3 KP 198.071</p>	<ul style="list-style-type: none"> The water crossing at this location appeared in good condition; no change to rock pitching.
<p>Watercourse T3 KP 198.384</p>	<ul style="list-style-type: none"> The water crossing at this location appeared in good condition; no change to rock pitching. 

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Tanami Gas Pipeline

<p>Watercourse T3 KP 198.666</p>	<ul style="list-style-type: none"> The water crossing at this location appeared in good condition; no change to rock pitching.
<p>Gravel Road KP 218.100</p>	<ul style="list-style-type: none"> No change observed to the current condition of the road crossing. 

NT – TANAMI – AERIAL PATROL REPORT
Tanami Gas Pipeline

Flood Out Creek T2 KP 228.158	<ul style="list-style-type: none">• All appeared correct at Flood Out Creek crossing.
Swale drain KP234.100	<ul style="list-style-type: none">• No change to the current condition of the swale drain crossing.  <p>The image is an aerial photograph showing a long, narrow, dark-colored swale drain crossing a reddish-brown, arid landscape. A yellow line is overlaid on the image, tracing the path of the swale drain. The terrain is flat with sparse, low-lying vegetation. The swale drain appears to be a well-maintained channel, likely used for water management or erosion control. The yellow line starts from the top left, follows the curve of the swale drain, and extends towards the bottom right of the frame.</p>

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Tanami Gas Pipeline

KP 241.139

- All correct at the swale drain crossing at KP 241.139



Mount Theo Rd
KP 263.239

- No change observed to the current condition of the Mount Theo Road Crossing.



NT – TANAMI – AERIAL PATROL REPORT
Tanami Gas Pipeline

Watercourse T2
Chilla Well
KP 266.640

- All appeared correct at the watercourse at KP 266.640.



NT – TANAMI – AERIAL PATROL REPORT
Tanami Gas Pipeline

SS2 Chilla Well
KP 279.374

- Appeared correct and secure.




Camp
3/Laydown
KP 286.291

- All correct at previous camp/laydown yard.



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Tanami Gas Pipeline

<p>Camp 4/Laydown No.1 KP 385.321</p>	<ul style="list-style-type: none"> All appeared correct. 
<p>Mount Davidson/ Billabong Borefield Rd KP 390.576</p>	<ul style="list-style-type: none"> All correct at the road crossing.
<p>KP 395.100</p>	<ul style="list-style-type: none"> All correct at the Granites Airstrip.

NT – TANAMI – AERIAL PATROL REPORT
Tanami Gas Pipeline

Off take/Valve
for Granites
lateral
KP 397.837

- All appeared correct.



Granites Meter
Station
KP 0.69

- All correct and secure at Granites Meter Station.
- Below images shows the workshop on site.
- FMO's have been onsite the last week completing 3 & 6 monthly maintenance.



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Swale drain
KP 403.98

- All appeared correct.



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Tanami Gas Pipeline

DBS Haul Road
KP 436. 992

- Below image shows the current condition of the haul road crossing point.
- Sewer crossing of the TNP has been completed. The image shows the open trench to the side of the TNP corridor.



Dead Bullock
Soak Meter
Station
KP 440.000

- Below image shows the current condition of the DBS Meter Station.



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Tanami Gas Pipeline

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