Macedon Gas Development Ministerial Statement 844 2024 Compliance Assessment Report

Woodside Energy Global Pty Ltd

January 2025

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1. Introduction

The Macedon gas project is operated by Woodside Energy Global Pty Ltd (herein referred to as Woodside) and develops natural gas from the Macedon field in production licence WA-42-L for Western Australia's domestic gas market.

The project comprises a pipeline from subsea production wells to an onshore gas processing facility, located in the Ashburton North Strategic Industrial Area (ANSIA), approximately 17 kilometres southwest of Onslow. After the gas is processed, it is transferred via a sales gas pipeline to the Dampier to Bunbury Natural Gas Pipeline (DBNGP, Figure 1).

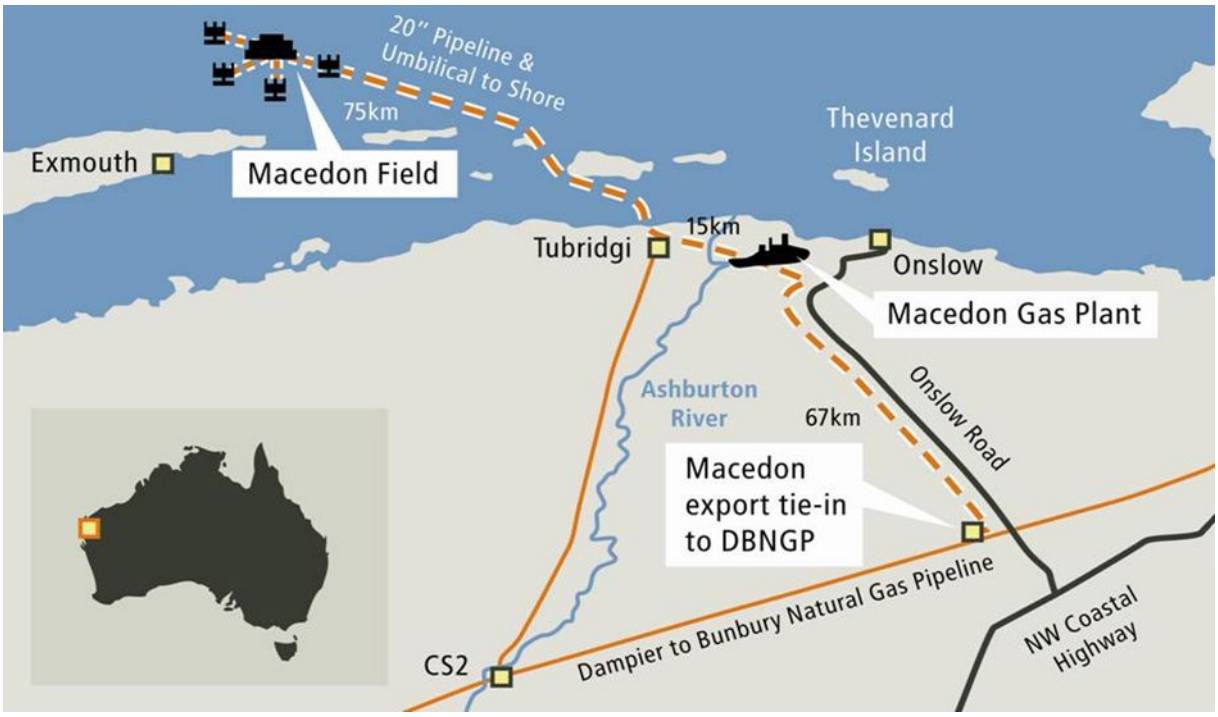

Figure 1 - Macedon Gas Development Location

The Macedon Gas Plant lease area for the gas processing facility and associated infrastructure, including the ground flares and evaporation pond areas are shown in Figure 2.

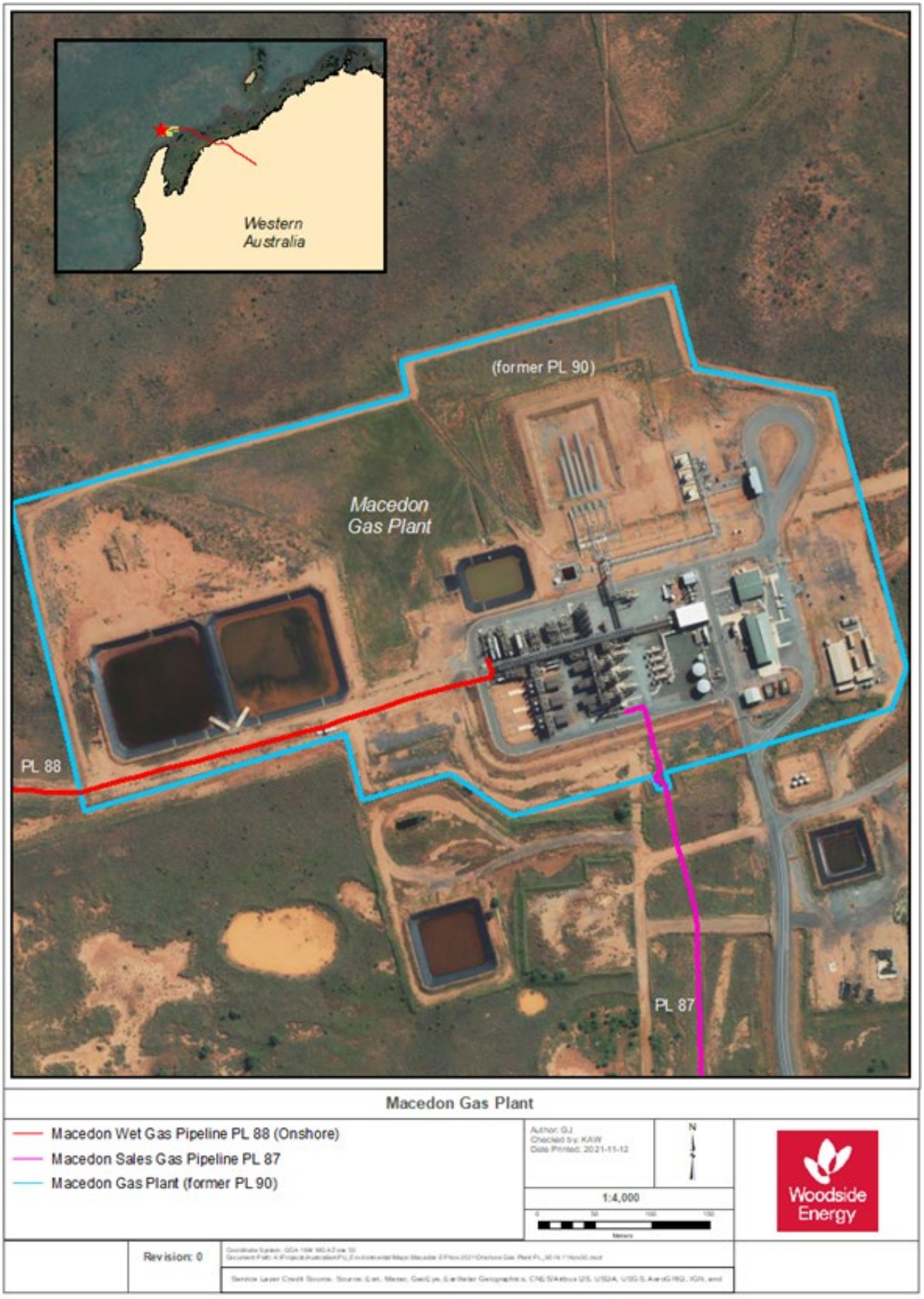

Figure 2 - Macedon Gas Development leases and layout

1.1 Purpose of the compliance assessment report

The purpose of this compliance assessment report (CAR) is to assess compliance at the Macedon Gas Plant with the Environment Protection Authority (EPA) Statement 844 dated 28 October 2010 in accordance with the Compliance Assessment Plan.

This CAR covers activities undertaken during the period 1 January 2024 to 31 December 2024.

1.2 Compliance assessment reporting requirements

This report meets the intent of the compliance reporting requirements as defined in the Macedon Gas Project Compliance Assessment Plan (PMA-BHP-EN-EIA-0002).

1.3 Endorsement of the compliance assessment report

This compliance assessment report has been endorsed by the Vice President FPSO and Macedon.

2. Project Status

2.1 Current status of project (construction, operation, etc.)

The project is currently in the operational phase.

2.2 Project activities covered by period of compliance assessment report

This CAR covers the following project activities undertaken in the period 1 January 2024 to 31 December 2024:

1. Operations, 1 January 2024 to 31 December 2024.

3. Compliance with Ministerial Statement 844

3.1 Compliance with conditions

Operation of the Macedon Gas Project is compliant with Ministerial Statement No. 844 as reported in Table 2, with the exception of Condition 8-1(2).

3.2 Rehabilitation monitoring

In March 2012, BHP Petroleum Pty Ltd (now Woodside Energy Global Pty Ltd) as Operator commenced rehabilitation of 285 hectares of an area approved for clearing for gas pipelines. Monitoring of the rehabilitation was required to demonstrate that, within three years of commencement of rehabilitation, the reinstated vegetation had species diversity not less than 60 percent of the known original species diversity and weed coverage which was equal to or less than the pre-clearing levels (Condition 8 of Ministerial Statement 844).

Monitoring of transects along the Macedon Gas Pipeline was completed by Astron in 2010 (the baseline survey prior to clearing) and then post-rehabilitation in 2013, 2014 and 2015 by Astron, and by Biota Environmental Sciences in 2017, 2019, 2021, 2022, 2023 and 2024.

For the 2024 reporting year, the field survey was completed in July 2024 (Biota, 2024; Appendix A). Ten rehabilitation sites were assessed in historically disturbed areas, with seven of these also having an associated analogue site located in a nearby undisturbed area. Monitoring was completed according to the methodology established by Astron (2012). To summarise the development of vegetation along the rehabilitation transects, each transect was also ranked according to a predefined rehabilitation scale. A summary of the results from the 2024 Rehabilitation Monitoring Survey is provided below and the full report is provided in Appendix A.

A total of 69 native vascular flora species were recorded from the 17 transects resampled in 2024. Two weed species were recorded from the study area (**Cenchrus ciliaris* and **C. setiger*).

With regards to the criteria for the rehabilitation areas listed for Condition 8 of MS844:

(1) Species diversity is not less than 60 per cent of the known original species diversity.

All transects exceeded 60% of the original species richness. In the absence of threatening factors such as weed invasion, revegetation in the study area is ‘Excellent’ in the north-western transects but ‘Very Poor’ in the south-eastern transects. It would be expected to continue to develop towards a floristic community and composition more aligned with pre-clearing levels in the longer term.

(2) Weed coverage is equal to or less than that of pre-cleared levels.

Condition 8-1(2) has been reported as non-compliant annually since the 2021 Compliance Assessment Report. The non-compliance is due to the large population of the introduced tussock grasses **Cenchrus ciliaris* (Buffel Grass) and **C. setiger* (Birdwood Grass), which are highly widespread through the region. *Cenchrus* spp. are aggressive and effective competitors for resources and space, with the potential to increase the fuel load (leading to more frequent and/or hotter fires), and regenerate quickly following fire and cessation of drought.

In addition to the widespread nature of the grasses, there are several external factors that may contribute to the weed coverage within the temporary cleared areas along the pipeline. The external weed sources for introduction of weeds include the following:

- fire, seasonal rainfall, biological processes and surrounding land use management (eg. pastoral and grazing activities)
- the pipeline ROW access is not restricted - in 2024 cattle tracks were observed

The criterion for Condition in MS844 relating to weed coverage has again not been met for rehabilitation transects BHPPD-23, BHPPD-28, BHPPD-29, BHPPD-30 and BHPPD-31 in 2024 with regard to the introduced tussock grasses **Cenchrus ciliaris* (Buffel Grass) and **C. setiger* (Birdwood Grass).

When comparing the 2024 result to that of 2023, **Cenchrus ciliaris* and **C. setiger* have decreased in abundance (as measured by their percent cover along the line transect) at BHPPD-23 and BHPPD-29, increased significantly at BHPPD-28 and slightly at BHPPD-30 and BHPPD-31, and effectively remained the same at BHPPD-31. The Macedon Gas Pipeline Rehabilitation Survey 2024 (Appendix A) indicated that provided continued spraying of these species within the rehabilitated areas is undertaken at the appropriate times and intensity of effort over the course of the next several seasons, it would be expected that the cover of **Cenchrus* spp. will at the very least decrease and begin to trend towards pre-clearing levels. Since the last survey was completed in April 2023, spraying was conducted in April 2023, August 2023 and April 2024.

Woodside responded to a request for additional information relating to Condition 8 of MS844 from Department of Water and Environment Regulation (DWER) on 7 June 2024 and will continue to engage with DWER as required.

3.3 Greenhouse gas

3.3.1 GHG emissions and intensity

Annual Scope 1 and 2 GHG emissions associated with the operation of the project for the period 1 January 2024 to 31 December 2024 were 86,823 tonnes of carbon dioxide equivalent (t CO_2-e); CO2-e emissions intensity for the period was 8.03 t CO_2-e per 1,000 barrels of oil equivalent production. Emissions for the 2024 reporting year were slightly higher than previous years due to installation and commencement of the Low Pressure Operations Gas Compressor in late 2024. This project allows for front-end wet gas compression in order to maintain plateau production and to compensate for a decline in reservoir pressure over time. As per the Final Environmental Protection Statement relevant to Ministerial Statement 844 , it is expected that with this compressor operation there will be an increase in annual CO2-e emissions to approximately 180,000 t CO2-e, which the emissions associated with the Macedon Gas Project were below for the reporting period.

3.3.2 GHG reduction measures investigated

Details of improvements in equipment, technology or procedures were investigated prior to development of the Macedon Gas Project in 2010 through an energy optimisation study. The aim of the study was to identify cost effective projects, which would reduce energy and greenhouse gas emissions across operations of the Macedon Gas Project and incorporate these into the design of the Macedon Gas Project.

Woodside continues to identify and evaluate GHG reduction opportunities through internal processes designed to evaluate and, where viable, implement greenhouse gas abatement measures. In addition, Woodside routinely tracks emissions against targets to further identify opportunities for reduction. Emission reduction opportunities are identified through the annual Macedon decarbonisation plan, which also includes a methane action plan to measure and mitigate reduction opportunities.

The following greenhouse gas emissions reductions were investigated in 2024 to support GHG reductions at the Woodside operated Macedon Gas plant, with further investigations ongoing to determine feasibility of implementation:

- Potential for integration of solar and a battery energy storage system to reduce fuel gas use at the Macedon Gas plant.
- Investigations to improve the accuracy of the high pressure flare meters.

3.3.3 GHG reduction measures implemented

Recent GHG emissions reduction and investigation initiatives implemented at the Macedon Gas Plant in 2024 included the following:

- Single Gas Turbine Generator (GTG) Fuel Gas Saving. The opportunity reviewed the reliability of the GTG machines to determine adequate supply could be provided to the Macedon plant via one GTG, as opposed to the previous 2 GTGs. From January 2024 and during normal operations, Macedon has one GTG permanently online, with an emissions saving estimated of 23.8Kt CO_2e-.
- Monitoring to validate equipment operates in accordance with design expectations to inform future emission reduction opportunities. The changes in monitoring included:
    - inclusion of methane in the stack emissions monitoring; and
    - satellite methane monitoring at a facility level and investigation of the flare performance via fleur cameras indicating operational performance were within design expectations.

4. Assessment of Compliance: Audit Table

The purpose of this section is to assess compliance with the Ministerial Statement 844 conditions. Table 1 details the audit terminology used and Table 2 provides the assessment of compliance.

Table 1: Audit Terminology

Compliance Status Terms	**Acronym**
Compliant C	C
Completed	CLD
Not required at this stage	NR
Non-compliant	NC

Table 2: Assessment of compliance with Ministerial Statement 844 conditions

Audit Code	Subject	Action (from Ministerial Statement 844)	How	Evidence	Satisfy	Advice	Phase	When	Status	Further Information
844:M1.1	Implementation	The proponent shall implement the proposal as documented and described in schedule 1 of this statement subject to the conditions and procedures of this statement.	Project implemented in accordance with these criteria	Compliance Assessment Report (CAR)	Min for Env		Overall		C	2024 CAR (this document)
844:M2.1	Proponent Nomination and Contact Details	The proponent for the time being nominated by the Minister under sections 38(6) or 38(7) of the Act is responsible for the implementation of the proposal.			Min for Env		Overall		C	Proponent is Woodside Energy Global Pty Ltd
844:M2.2	Proponent Nomination and Contact Details	The proponent shall notify the CEO of any change of the name and address of the proponent for the serving of notices or other correspondence within 30 days of such change.	Letter notifying CEO of any change in proponent details	Letter notifying CEO of any change in proponent details	CEO		Overall	Within 30 days of such change	C	No change during the reporting period
844:M3.1	Time Limit of Authorisation	The authorisation to implement the proposal provided for in this statement shall lapse and be void five years after the date of this statement if the proposal to which this statement relates is not substantially commenced.	Implement project		Min for Env		Overall	Commence implementation by 27 October 2015	CLD	Implementation commenced in 2011 OEPA Desktop Audit report 31.08.2012
844:M3.2	Time Limit of Authorisation	The proponent shall provide the CEO with written evidence which demonstrates that the proposal has substantially commenced on or before the expiration of five years from the date of this statement.	Letter notifying CEO that proposal has substantially commenced	Letter to the CEO demonstrating that the proposal has substantially commenced	CEO		Overall	Within one month of commencement	CLD	Letter sent to CEO dated 16.01.2012 OEPA Desktop Audit report 31.08.2012
844:M4.1	Compliance Reporting	The proponent shall prepare and maintain a compliance assessment plan (CAP) to the satisfaction of the CEO.	CAP will be developed prior to implementation and maintained	CAP	CEO		Overall	Prior to implementation and ongoing	C	OEPA accepted 18.03.2011 (CAP latest version 13 dated 27.01.2023, submitted to OEPA on 28.01.2023)
844:M4.2	Compliance Reporting	The proponent shall submit to the CEO the CAP required by condition 4-1 at least six months prior to the first compliance report required by condition 4-6, or prior to implementation, whichever is sooner. The CAP shall indicate: 1. the frequency of compliance reporting; 2. the approach and timing of compliance assessments; 3. the retention of compliance assessments; 4. the method of reporting of potential non-compliances and corrective actions taken; 5. the table of contents of compliance assessment reports; and 6. public availability of compliance assessment reports.	CAP will be developed prior to implementation and submitted to CEO	CAP	CEO		Pre-construction	At least six months prior to the first CAR required by Condition 4-6, or prior to implementation, whichever is sooner	CLD	OEPA accepted 18.03.2011
844:M4.3	Compliance Reporting	The proponent shall assess compliance with conditions in accordance with the CAP required by condition 4-1.	Prepare Compliance Assessment Report (CAR)	CAR	Min for Env		Overall	When requested by the CEO	C	2011 CAR, 2012 CAR, 2013 CAR, 2014 CAR, 2015 CAR, 2016 CAR, 2017 CAR; 2018 CAR, 2019 CAR, 2020 CAR, 2021 CAR, 2022 CAR, 2023 CAR 2024 CAR (this document)
844:M4.4	Compliance Reporting	The proponent shall retain reports of all compliance assessments described in the CAP required by condition 4-1 and shall make those reports available when requested by the CEO.	CAR to include compliance assessments (audit table), retain CAR for the life of the project in electronic and hard copy format	CAR	CEO		Overall	Annual	C	2011 CAR, 2012 CAR, 2013 CAR, 2014 CAR, 2015 CAR, 2016 CAR, 2017 CAR, 2018 CAR, 2019 CAR, 2020 CAR, 2021 CAR, 2022 CAR, 2023 CAR 2024 CAR (this document)
844:M4.5	Compliance Reporting	The proponent shall advise the CEO of any potential non-compliance within seven days of that non-compliance being known.	Advise CEO of potential non-compliance in writing	Log of phone call, email or letter	CEO		Overall	Within seven days of that non-compliance being known	C	Non-compliance email provided to DWER on 23.1.25x date within 7 days of receiving Macedon Monitoring Report related to condition 8

Audit Code	Subject	Action (from Ministerial Statement 844)	How	Evidence	Satisfy	Advice	Phase	When	Status	Further Information
844:M4.6	Compliance Reporting	The proponent shall submit to the CEO the first CAR fifteen months from the date of issue of this Statement addressing the twelve month period from the date of issue of this Statement and then annually from the date of submission of the first CAR. The CAR shall: 1. be endorsed by the proponent's Managing Director or a person delegated to sign on the Managing Director's behalf; 2. include a statement as to whether the proponent has complied with the conditions; 3. identify all potential non-compliances and describe corrective and preventative actions taken; 4. be made publicly available in accordance with the approved CAP; and 5. indicate any proposed changes to the CAP required by condition 4-1.	CAR will be issued Make CAR publicly available in accordance with 'Proposal Implementation Monitoring Branch – Draft Fact Sheet 1 – Making Documents Publicly Available – April 2010'	CAR	CEO		Overall	Annually by 28 January each year with the first CAR due 28 January 2012	C	2011 CAR, 2012 CAR, 2013 CAR, 2014 CAR, 2015 CAR, 2016 CAR, 2017 CAR; 2018 CAR, 2019 CAR, 2020 CAR, 2021 CAR, 2022 CAR, 2023 CAR. Documents are publicly available via https://www.woodside.com/what-we-do/operations/macedon 2024 CAR (this document).
844:M5.1	Non-Indigenous Marine Species	Prior to mobilisation of vessels and submersible equipment for the construction of the Macedon Gas Project marine pipeline and umbilical, the proponent shall update the Introduced Marine Pest Management Procedure contained in Appendix Q of the Final EPS to be consistent with the Commonwealth and State guidelines approved and published at that time, to the satisfaction of the CEO on advice from the Department of Fisheries.	Revise and obtain approval of Introduced Marine Pest Management Procedure (IMP MP)	IMP MP	CEO	DPIRD	Pre-construction	Prior to mobilisation of vessels and submersible equipment for the construction of the Macedon Gas Project marine pipeline and umbilical	CLD	Letter of Approval from CEO of EPA received 28.11.2011
844:M5.2	Non-Indigenous Marine Species	The proponent shall implement the updated Introduced Marine Pest Management Procedure for the construction and maintenance of the Macedon Gas Project marine pipeline and umbilical.	Offshore pipelay and maintenance implemented in compliance with IMP MP	Inspection of IMP MP vessel risk assessments, certificates of vessel cleanliness	Min for Env		Overall	For the construction and maintenance of the Macedon Gas Project marine pipeline and umbilical	C	IMP MP implemented during construction phase. Pipeline maintenance survey completed in accordance with IMP MP No maintenance campaigns occurred during the reporting period.
844:M6.1	Marine Fauna	The proponent shall not cause physical damage to turtles, disrupt turtle nesting behaviour or cause a change to hatchling orientation in waters and/or beaches adjacent to the pipeline shore crossing during construction.	Implement Marine Turtle Impacts Management Protocol (MTI MP)	Implementation of MTI MP, Marine Fauna Observer logs	Min for Env		Construction	During construction	CLD	Shore crossing complete, no impacts to marine turtles recorded
844:M6.2	Marine Fauna	If the pipeline shore crossing is to take place between 1 November and 30 April the proponent shall prepare a MTI MP to the satisfaction of the CEO on advice from the DEC prior to undertaking the shore crossing. The protocol shall include: 1. employment of a suitably qualified marine fauna observer; 2. indicators for determining if and when there is potential for impacts on turtle nesting or hatchling emergence; 3. management responses to evidence of turtle activity; and 4. triggers for stopping construction activities pending further consultation with the DEC; and 5. when resumption of activities can take place, on advice of the DEC.	Prepare MTI MP	Approval of MTI MP	CEO	DWER	Construction	Prior to undertaking the shore crossing, if the pipeline shore crossing is to take place between 1 November and 30 April	CLD	Letter of Approval from CEO of EPA received 31.10.2011
844:M6.3	Marine Fauna	The proponent shall implement the MTI MP if undertaking the pipeline shore crossing between 1 November and 30 April.	Implement MTI MP	Marine Fauna Observer logs	Min for Env		Construction	If undertaking the pipeline shore crossing location between 1 November and 30 April	CLD	Pipeline shore crossing complete. MTI MP implemented for shore crossing
844:M6.1A	Pipeline Route – State waters	Subject to complying with the separation distances in condition 7-1, the pipeline within State waters shall be laid/constructed within the corridor delineated by the coordinates specified in Schedule 2.	Install pipeline in corridor delineated in Schedule 2	Pipelay vessel logs, as-built survey of route	Min for Env		Construction	During offshore pipeline construction	CLD	Pipeline installed within corridor

Audit Code	Subject	Action (from Ministerial Statement 844)	How	Evidence	Satisfy	Advice	Phase	When	Status	Further Information
844:M7.1	Benthic Primary Producer Habitat	The proponent shall undertake all works in a manner that ensures that the loss of Benthic Primary Producer Habitat (BPPH) within the Local Assessment Area, as defined in Figure 3, does not exceed 1% for any habitat type and is minimised by maintaining the following separation distances during construction of the marine pipeline and umbilical: (1) pipeline to primary feature – 700 metres; (2) pipeline to secondary feature – 600 metres; (3) vessel movement/anchor to primary feature – 200 metres; and (4) vessel movement/anchor to secondary feature – 100 metres. Note: “loss” is loss that does not recover within 5 years, “primary feature” and “secondary feature” are as defined in Figure 18 of the Final EPS and not a feature for which proposed impacts are described in section 8.4.4.5 of the Final EPS.	Maintain separation distance during offshore pipelay as per Condition 7-1	Pipelay vessel logs, as-built survey of route, BPPH survey and loss calculations	Min for Env		Construction	During offshore pipeline construction	CLD	Letter of Approval from CEO of EPA received 23.09.2013
844:M7.2	Benthic Primary Producer Habitat	The proponent shall survey the direct loss of BPPH against the criteria in condition 7-1 starting within one month of completion of the marine pipeline and umbilical.	Survey and calculate loss of BPPH	Post construction as built survey of route, BPPH survey and loss calculations	Min for Env		Overall	Commencing within one month of completion of the marine pipeline and umbilical	CLD	Letter of Approval from CEO of EPA received 23.09.2013
844:M7.3	Benthic Primary Producer Habitat	Notwithstanding condition 7-1, if monitoring detects that construction activities have contributed to a loss of greater than 1% in any habitat type within the management unit, as defined in Figure 3, the proponent shall notify the CEO of the strategies to be implemented to enhance recovery and rehabilitate the impacted BPPH.	Develop strategies for recovery and rehabilitation of BPPH	Post construction as-built survey, strategies	CEO		Overall	If monitoring detects that construction activities have contributed to a loss greater than 1% in any habitat type within the management unit, as defined in Figure 3	CLD	No exceedance of loss >1% in any habitat type
844:M8.1	Terrestrial Vegetation	Within two months following completion of construction of the gas plant and associated pipelines, the proponent shall commence rehabilitation of the temporarily cleared areas of the site that are no longer being utilised to achieve re-establishment of vegetation, such that the following criteria are met across the distribution of the disturbance footprint within three years of commencement of rehabilitation: (1) Species diversity is not less than 60 percent of the known original species diversity; (2) Weed coverage is equal to or less than that of pre-cleared levels. Note: The original species diversity and weed coverage must be determined prior to clearing or from analogue sites approved by the CEO on advice from the DEC.	Undertake rehabilitation of temporarily cleared areas (gas plant and pipelines) as per Condition 8-1	Rehabilitation monitoring reports, rehabilitation completion criteria: Species diversity greater than 60% of pre-disturbance Weed coverage less than pre-disturbance levels	CEO	DWER	Overall	Commence rehabilitation within two months following completion of construction of the gas plant and associated pipelines and meet criteria within three years of commencement of rehabilitation	NC	Results from the recent rehabilitation survey undertaken in July 2024 indicated the criterion for condition 8-1(1) in MS844 was met during the reporting period, however condition 8-1(2) was not (but is expected to be met longer term). All 17 monitored transects met the criterion of condition 8-1(1). Five of the 17 monitored transects did not meet the criterion of condition 8-1(2). Refer to 2024 Macedon Gas Pipeline Rehabilitation Survey 2024 (Appendix A of this document)
844:M8.2	Terrestrial Vegetation	In liaison with the DEC, the proponent shall monitor progressively the performance of rehabilitation for a range of sites against the criteria in condition 8-1 based on appropriately timed surveys after rain, until the completion criteria are met. The surveys shall be conducted annually unless otherwise agreed by the CEO.	Monitor rehabilitation success against rehabilitation completion criteria, conduct surveys in accordance with Condition 8-2	Rehabilitation monitoring report, rehabilitation completion criteria: Species diversity greater than 60% of pre-disturbance Weed coverage equal to or less than pre-disturbance levels Correspondence with DPAW	CEO	DWER	Overall	Appropriately timed after rain on an annual basis unless otherwise agreed by the CEO until the completion criteria are met	C	2024 Macedon Gas Pipeline Rehabilitation Survey 2024 (Appendix A of this document)
844:M8.3	Terrestrial Vegetation	The proponent shall include a rehabilitation monitoring report in the CAR referred to in condition 4-6 commencing from the	Submit rehabilitation monitoring report	Rehabilitation monitoring report, rehabilitation completion criteria:	Min for Env		Overall	Commencing from the date rehabilitation was	C	2024 Macedon Gas Pipeline Rehabilitation Survey 2024 (Appendix A of this document)

Audit Code	Subject	Action (from Ministerial Statement 844)	How	Evidence	Satisfy	Advice	Phase	When	Status	Further Information
		date rehabilitation was commenced. The report shall address in the report the following: 1. The progress made towards meeting the criteria required by condition 8-1; and 2. Contingency management measures in the event that the criteria required by condition 8-1 are unlikely to be met.		Species diversity greater than 60%of pre-disturbance Weed coverage equal to or less than pre-disturbance levels				commenced and on an annual basis		
844:M9.1	Terrestrial Fauna	The proponent shall prevent the death of fauna that becomes entrapped in the onshore pipeline trenches by employing a fauna clearing person or persons to remove trapped fauna from any open pipeline trench.	Fauna clearing person(s) to remove fauna from open pipeline trench	Employment of fauna clearing person(s), daily logs	Min for Env		Construction	Until all trenching is completed and no open pipeline trenches remain	CLD	Trenching complete
844:M9.2	Terrestrial Fauna	The length of open trenches shall not exceed a length capable of being inspected and cleared by a fauna clearing person within the time frame specified in condition 9-4.	Clear open trench within identified timeframes specified in Condition 9-4	Employment of fauna clearing person(s), daily logs	Min for Env		Construction	Until all trenching is completed and no open pipeline trenches remain	CLD	Trenching complete
844:M9.3	Terrestrial Fauna	Fauna refuges providing suitable shelter from the sun and predators for trapped fauna shall be placed in the trench at intervals not exceeding 50 metres.	Fauna refuges installed in open trench at intervals < 50m	Daily logs	Min for Env		Construction	Until all trenching is completed and no open pipeline trenches remain	CLD	Trenching complete
844:M9.4	Terrestrial Fauna	Inspection and clearing of fauna from trenches by a fauna clearing person shall occur twice daily and not more than half an hour prior to the backfilling of trenches, with the first daily inspection and clearing to be undertaken no later than 3.5 hours after sunrise, and the second inspection and clearing to be undertaken daily between the hours of 3:00 pm and 6:00 pm.	Clear open trench within identified timeframes	Employment of fauna clearing person(s), daily logs	Min for Env		Construction	Twice daily and not more than half an hour prior to the backfilling of trenches, with the first daily inspection and clearing to be undertaken no later than 3.5 hours after sunrise, and the second inspection and clearing to be undertaken daily between the hours of 3:00 pm and 6:00 pm	CLD	Trenching complete
844:M9.5	Terrestrial Fauna	In the event of rainfall, the proponent shall, following the clearing of fauna from the trench, pump out significant pooled water in the open trench (with the exception of groundwater) and discharge it to adjacent vegetated areas in a manner that does not cause erosion.	Pump out significant pooled water in open trench	Daily logs	Min for Env		Construction	In the event of rainfall, following the clearing of fauna from the trench	CLD	Trenching complete. No loss of fauna during pipeline construction. Small losses due to groundwater flooding in trenches.
844:M10.1	Emissions to Air	The proponent shall install equipment and manage ongoing operations such that best practice for a petroleum gas/condensate facility in respect to volatile organic compounds and oxides of nitrogen emissions is achieved.	Install equipment as detailed in Air Emissions Best Practice Report (AEBPR) and manage ongoing operations	Approved AEBPR, CAR	Min for Env		Overall	Construction and ongoing operations	C	Equipment identified in AEBPR installed and operated. Emission testing demonstrates effective management of VOC and NOx
844:M10.2	Emissions to Air	The proponent shall provide reports showing the basis on which 'best practice' was determined, to the satisfaction of the CEO, as follows: 1. for plant and equipment – prior to applying for a Works Approval under Part V of the Act*;* and 2. for ongoing management of operations – prior to applying for a Licence under Part V of the Act.	Prepare AEBPR for selection of equipment and ongoing management of operations	Approved AEBPR, CAR	CEO		Overall	Prior to applying for a Works Approval (for plant and equipment) and prior to applying for a Part V licence (for ongoing management of operations)	CLD	Approval of AEBPR received from CEO of EPA in letter dated 07.07.2011
844:M11.1	Greenhouse Gas Abatement	For the life of the project, the proponent shall include in the CARs referred to in Condition 4-6 the following: 1. annual greenhouse gas (GHG) emissions and intensity resulting from the operation of the project in comparison to the annual emissions predicted in the Final EPS and reasons for any variance; 2. details of improvements in equipment, technology or procedures investigated by the proponent that would reduce greenhouse gas emissions; and 3. details of improvements in equipment, technology or procedures implemented by the proponent that will reduce greenhouse gas emissions.	CAR to include GHG emissions and intensity (including comparison to annual emissions predicted in the Final EPS and reasons for any variance) and proposed and implemented GHG reduction methods	CAR	Min for Env		Operation	For the life of the project	C	2018 CAR, 2019 CAR, 2020 CAR, 2021 CAR, 2022 CAR, 2023 CAR, 2024 CAR (this document, see **Section 3.3** on GHG)

Audit Code	Subject	Action (from Ministerial Statement 844)	How	Evidence	Satisfy	Advice	Phase	When	Status	Further Information
844:M12.1	Decommissioning	At least six months prior to the anticipated date of closure, the proponent shall submit a Final Decommissioning Plan designed to ensure that the site is suitable for future land uses, for approval of the CEO. The Final Decommissioning Plan shall set out procedures and measures for: 1. removal or, if appropriate, retention of plant and infrastructure; and 2. remediation or rehabilitation of all disturbed areas to a standard suitable for the agreed new land use(s).	Submit Final Decommissioning Plan	Approval of Final Decommissioning Plan	CEO		Operation	At least six months prior to the anticipated date of closure	NR	
844:M12.2	Decommissioning	The proponent shall implement the Final Decommissioning Plan required by condition 12-1 from the date of closure until such time as the Minister determines, on advice of the CEO, that the proponent's decommissioning responsibilities have been fulfilled.	Implement Final Decommissioning Plan	Decommissioning and rehabilitation monitoring reports	Min for Env	CEO	Decommissioning	From the date of closure until such time as the Minister determines, on advice of the CEO, the proponent's decommissioning responsibilities have been fulfilled	NR	
844:M12.3	Decommissioning	The proponent shall make the Final Decommissioning Plan required by condition 12-1 publicly available in a manner approved by the CEO.	Make Final Decommissioning Plan publicly available	Final Decommissioning Plan available as directed by CEO	CEO		Overall	Within two weeks of receiving approval for the final Decommissioning Plan	NR	

Note:

• Phases that apply in this table = Pre-construction, Construction, Operation, Decommissioning, Overall (several phases)

• This audit table is a summary and timetable of conditions and commitments applying to this project. Refer to the Minister's Statement for full detail/precise wording of individual elements

• Code prefixes: M = Minister's condition; P = Proponent's commitment; A= Audit specification; N= Procedure

• Any elements with status = "Audited by proponent only" are legally binding but are not required to be addressed specifically in compliance reports, if complied with

• Acronyms list:- Min for Env = Minister for the Environment; CEO = Chief Executive Officer of OEPA; OEPA = Office of the Environmental Protection Authority; EPA = Environmental Protection Authority; DWER = Department of Water and Environmental Regulation (formerly Department of Environment and Conservation (DEC)); DEMIRS = Department of Energy, Mines, Industry Regulation and Safety (formerly Department of Mines, Industry Regulation and Safety (DMIRS)); DoH = Department of Health; DPIRD = Department of Primary Industries and Regional Development (formerly Department of Fisheries (DoF))

5. Non-compliance and corrective/preventative actions

5.1 Non-compliance

During the reporting period, there was a non-compliance with condition 8-1(2). It's noted that Woodside has reported this non-compliance for several years.

Terrestrial Vegetation condition 8-1(2) During the reporting period, rehabilitation monitoring was conducted in accordance with condition 8-1. Following the results of this monitoring, it was concluded that five transects had not achieved weed coverage equal to or less than pre-cleared levels, with regards to the tussock grasses **Cenchrus ciliaris* (Buffel Grass) and **C. setiger* (Birdwood Grass). Therefore a non-compliance with condition 8-1(2) was identified. Details of the rehabilitation monitoring is presented in section 3.2 and Appendix A.

Condition 8-1(2) has been reported as non-compliant annually since the 2021 Compliance Assessment Report. As outlined in Section 3.2, the non-compliance is due to the large population of the introduced tussock grasses *Cenchrus ciliaris (Buffel Grass) and *C.setiger (Birdwood Grass), which are highly widespread through the region.

5.2 Corrective/preventative actions

Terrestrial Vegetation condition 8-1(2)

Rehabilitation monitoring is ongoing on a yearly basis, with no additional actions required to improve species diversity relating to Condition 8-1(1). Despite the external weed sources that have the potential to further increase weeds, annual weed spraying will continue to target areas identified in the 2024 monitoring report, post-wet season.

Since the 2023 monitoring survey and the most recent survey conducted in July 2024, weed spraying was undertaken in April 2023, August 2023 and April 2024. Additional spraying is planned for March 2025 in line with consultant recommendations for opportunistic spraying after rainfall.

Woodside is also reviewing improvement opportunities to the rehabilitation monitoring program management.

Woodside responded to a request for additional information relating to Condition 8 of MS844 from Department of Water and Environment Regulation (DWER) on 7 June 2024 and welcomes the opportunity to further discuss this matter and ongoing management with DWER.

6. Changes to the Compliance Assessment Plan

As an update to the key contacts outlined in the Compliance Assessment Plan in 2023, matters regarding the Macedon Gas Development can be directed to:

Allie Convery
Asset Manager Pyrenees and Macedon
Email: allie.convery@woodside.com

or

Chris Coffey
Australia Operations Environment and Sustainability Manager
Email: chris.coffey@woodside.com

All general phone enquiries can be made to the following number:
Corporate Affairs: 1800 442 977

References

Macedon Gas Project Compliance Assessment Plan (PMA-BHP-EN-EIA-0002)

Astron (2012) Pipeline Rehabilitation Monitoring and Evaluation Plan

APPENDIX A: Macedon Gas Pipeline Rehabilitation Survey 2024

Biota Environmental Sciences

Macedon Gas Pipeline Rehabilitation Survey 2024

Prepared for

Woodside Energy

January 2025

Biota Environmental Sciences

ABN 49 092 687 119
Level 4, 46 Colin Street
West Perth, Western Australia 6005
Ph: (08) 9328 1900

Job No.: 1846

Prepared by: T. Hounsham
S. Werner

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Macedon Gas Pipeline Rehabilitation Survey 2024

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1.0 Executive Summary

1.1 Background

On 1st June 2022, BHP Petroleum and Woodside merged, and on 11th July 2022, BHP Petroleum Pty Ltd changed its company name to Woodside Energy Global Pty Ltd (Woodside)*.

In 2012, Woodside commenced the rehabilitation of a 285 ha area that had been cleared along the Macedon Gas Pipeline, south of Onslow. As part of a condition of the environmental approval of the Macedon project (Condition 8 of Ministerial Statement 844 (MS844); Minister for Environment 2010), monitoring was required to demonstrate that the reinstated vegetation met the following criteria within three years of commencement of rehabilitation:

(1) Species diversity is not less than 60 per cent of the known original species diversity.

(2) Weed coverage is equal to or less than that of pre-cleared levels.

A monitoring program was developed by Astron Environmental Services (Astron 2012). Annual monitoring was subsequently undertaken by Astron in May 2013, July 2014, and September/October 2015 (collectively reported in Astron 2016), and then by Biota Environmental Sciences (Biota) in 2017, 2019, 2021, 2022, and 2023 (Biota 2017, 2019, 2021, 2022, and 2023 respectively).

In 2024, Biota was again commissioned to undertake the annual monitoring survey of the Macedon Gas Pipeline, which was completed between 18th and 20th July 2024.

1.2 Methodology

During the field survey 10 rehabilitation sites were assessed in historically disturbed areas, with seven of these also having an associated analogue site located in a nearby undisturbed area. Monitoring was completed according to the methodology established by Astron (2012). To summarise the development of vegetation along the rehabilitation transects, each transect was also ranked according to a predefined rehabilitation scale.

1.3 Results and Conclusions

A total of 75 native vascular flora species were recorded from the 17 transects resampled in 2024. Two weed species were recorded from the study area (**Cenchrus ciliaris* and **C. setiger*).

1.3.1 Satisfaction of Completion Criteria

With regards to the criteria for the rehabilitation areas listed for Condition 8 of MS844:

1) Species diversity is not less than 60 per cent of the known original species diversity.

This criterion has been met for species richness (native species count) in all the monitored transects. In the absence of threatening factors such as weed invasion, revegetation in the study area is 'Excellent' in the northwestern transects but ranging to 'Very Poor' in the southeastern transects. It would be expected to continue to develop towards a floristic community and composition more aligned with pre-clearing levels in the longer term.

*for ease of reference, this report refers to Woodside, noting that prior to 1st June 2022 BHP was operator of the Macedon Gas Project

(2) Weed coverage is equal to or less than that of pre-cleared levels.

The criterion for Condition 8 in MS844 has again not been met for rehabilitation transects **BHPPD-23**, **BHPPD-28**, **BHPPD-29**, **BHPPD-30** and **BHPPD-31** in 2024 with regard to the introduced tussock grasses **Cenchrus ciliaris* (Buffel Grass) and **C. setiger* (Birdwood Grass).

When comparing the 2024 results to those of 2023, **Cenchrus ciliaris* and **C. setiger* have decreased in abundance (as measured by their percent cover along the line transect) at **BHPPD-23** and **BHPPD-29**, increased significantly at **BHPPD-28** and slightly at **BHPPD-30** and **BHPPD-31**, and effectively remained the same at **BHPPD-31**. Provided that continued spraying of these species within the rehabilitated areas is undertaken at the appropriate times and intensity of effort over the course of the next several seasons, it would be expected that the cover of **Cenchrus* spp. should decrease and begin to trend towards pre-clearing levels.

1.3.2 Rehabilitation within the Mt Minnie Conservation Area

While most of the rehabilitation transects sampled in the Mt Minnie conservation area show Good to Excellent vegetation development, with few or no weeds, three transects remain in Poor to Very Poor condition, with a fourth considered to be Fair:

- Transect **BHPPD-28** is considered Fair, with cover of **Cenchrus ciliaris* tussock grasses doubling from 7.50% in 2023 to 14.65% in 2024. There is still no development of spinifex or perennial shrubs over the course of monitoring. Cattle tracks were observed for the first time in 2024 throughout the area surrounding the transect.
- Transect **BHPPD-29** is considered Poor, with a high cover of **Cenchrus ciliaris* tussock grasses (32.55%) and no development of spinifex or perennial shrubs over the course of monitoring. Notably, **Cenchrus* cover decreased by 16% since the last phase.
- Transect **BHPPD-30** is considered Very Poor. It shows a reasonable development of both spinifex and perennial shrub cover, but the cover of **Cenchrus* has remained high since 2017, increasing to a total of 46.9% in 2024. Cattle tracks were observed for the first time in the area in 2024.
- Transect **BHPPD-31** is considered Poor in 2024: spinifex and perennial herb cover has decreased slightly and remains at less than pre-clearing levels, with **Cenchrus* cover remaining steady (increasing by 1.2%). Cattle tracks were observed for the first time in the area in 2024.

In addition, transect **BHPPD-23** was considered Good, with only three **Cenchrus setiger* individuals recorded in 2024. This was a significant decrease from 22.6% in 2023 but was due to a fire prior to the survey. Development of spinifex and perennial shrubs had also been interrupted, however some shrubs, young hummock grasses and annual herbs were present.

1.3.3 Likely Progression of Vegetation along Rehabilitation Transects

Prior to the 2019 survey, DBCA requested discussion of the likely progression of revegetation in the rehabilitation areas situated within the Mt Minnie conservation area in the short term (2-5 years), medium term (5-10 years) and long term (10-20 years). Based on the data recorded from the monitoring transects in these areas to date, vegetation development is clearly variable in different areas, and would be expected to progress differently over time.

Consistent with previous years, transects ranked as 'Excellent' in 2024 comprised **BHPPD-22** and **BHPPD-24** (both of which had been burnt prior to the current survey), **BHPPD-25**,

BHPPD-26 and **BHPPD-27**. Vegetation at these transects was essentially comparable to that which existed prior to clearing, with a similar or sometimes greater amount of vegetation cover and no weeds. This vegetation would be expected to continue to develop in the short term, with additional species recruiting from the soil seed bank and adjacent areas. In the medium and long term, vegetation at the rehabilitation transects would be expected to remain stable over time, with major changes arising only due to disturbance events such as fire, or long-term shifts in the amount of rainfall received.

Transect **BHPPD-23** was ranked as 'Good' in 2024. This transect was burnt prior to the current survey and spinifex cover had therefore decreased dramatically, but would be expected to return towards pre-clearing levels in the long term. Perennial shrubs (*Acacia* and *Senna*) had increased slightly since the last phase and opportunistic annual herbs (colonising species) were recorded following the fire. The cover of **Cenchrus* had declined from 22.6% in 2023 to 0% in 2024, with only a few individuals recorded within the strip transect, however this was likely due to the fire preceding the survey rather than a permanent reduction. The population of **Cenchrus* spp. in the surrounding vegetation will likely need to be controlled in the medium to long term to ensure continued development of the native vegetation.

Transect **BHPPD-28** was ranked as 'Fair' in 2024. The cover of native perennial vegetation along this transect was generally approaching the percentage recorded prior to clearing in 2010, although the proportions of shrubs and spinifex were often dissimilar (typically more shrubs and less spinifex). There was a notable increase in the cover of **Cenchrus* at this transect, from 7.50% in 2023 to 14.65% in 2024. It would be expected that the native vegetation cover would increase to reach the pre-clearing levels within 5 years and would then remain stable over time, provided that **Cenchrus* is controlled.

Two transects were ranked as 'Poor' in 2024, **BHPPD-29** and **BHPPD-31**, which was consistent with their ranking in 2023:

- There continued to be a lack of development of perennial vegetation at **BHPPD-29** (no hummock grassland of *Triodia glabra* and no shrubland of *Acacia synchronicia* and *A. xiphophylla* that existed prior to clearing). The cover of **Cenchrus* spp. at this transect (32.55%) had decreased from the 48.50% recorded in 2023, and it is expected that in the short to medium term, with continued spraying, the level of **Cenchrus* spp. should continue to decline. The perennial *Acacia* shrubs and *Triodia* hummocks are only likely to establish in the long term given favourable conditions and the absence of competition from **Cenchrus* spp., both within and surrounding the transect.
- At **BHPPD-31**, it is unlikely that the cover of *Acacia xiphophylla* will return to the pre-clearing levels of 72%, with colonisation of *A. bivenosa* shrubs along this transect only likely in the very long-term. Spinifex cover has remained steady since 2021 but was still 25% less than pre-clearing levels. The cover of **Cenchrus* has increased slightly since 2023 but remains significantly lower than in 2022 (73.65% in 2022, 35.15% in 2023 and 36.35% in 2024). The greater area surrounding **BHPPD-31** continues to support large, permanent populations of *A. xiphophylla*, and as a whole presents as a stable, healthy vegetation unit.

Transect **BHPPD-30** was ranked as 'Very Poor' in 2024, declining from "Poor (verging on Very Poor" in 2023. Hummock grass cover remains at half of the pre-clearing level, whilst perennial woody shrubs are at 15.75% (8% less than the 23.5% recorded in 2010). The cover of **Cenchrus* has ranged between 27-47% over the last six phases, with the highest value recorded in 2024. As for **BHPPD-29,** it is expected that the native perennial vegetation will

only establish fully in the long term given favourable conditions and the absence of competition from **Cenchrus* spp.

For transects **BHPPD-28**, **BHPPD-29**, **BHPPD-30**, and **BHPPD-31**, the presence of substantial amounts of **Cenchrus* spp. is likely to influence the development of native vegetation through competition for resources and allelopathy. The presence of **Cenchrus* spp. is not the only factor influencing slow revegetation, however it is likely to be a significant factor over time, particularly for transects at which the cover of weeds is still moderate or high following herbicide spraying. Given the amount of **Cenchrus* spp. cover currently recorded at **BHPPD-28**, **BHPPD-29, BHPPD30** and **BHPPD-31**, these infestations would be expected to increase in the short to medium term unless continued herbicide spraying is undertaken, and would likely suppress the regeneration of native perennial vegetation. It is unlikely that native vegetation will be able to re-establish to a similar state as was present prior to clearing, without continued weed control efforts.

To ameliorate the current long-term trend of a relatively stable, or increasing, **Cenchrus* population (specifically in the south-eastern end of the study area), it is recommended that the **herbicide treatment plan is a bi-annual occurrence for at least seven years** to eradicate the species from the soil seedbank.

1.3.4 DBCA (2018) Recommendations

With regards to meeting the four recommendations outlined by the DBCA (2018):

- Recommendation 1 (continual rehabilitation activities and weed monitoring) has been met by continual activities (herbicide application, weed spraying occurring in April 2023, August 2023, and April 2024), and by both the 2024 survey and content of this rehabilitation monitoring report.
- Recommendations 2 (identification of contingency management measures to be implemented), 3 (contingency management measures to date), and 4 (recognition of the access track acting as a potential weed vector) have been addressed within this rehabilitation monitoring report.

2.0 Introduction

2.1 Project Background

Woodside Energy Pty Ltd (Woodside) operates the Macedon Gas Pipeline, which is associated with its Macedon Gas Development near Onslow. In 2010, prior to the commencement of vegetation clearing along the Macedon Gas Pipeline, Astron completed a baseline monitoring survey (Astron 2010). The purpose of this was to establish permanent monitoring sites, determine baseline levels of diversity and weed cover, and acquire vegetation data against which to assess completion criteria contained in Condition 8 of Ministerial Statement 844 (MS844) (Minister for Environment 2010).

In 2012, Woodside commenced the rehabilitation of a 285 ha area that was cleared along the Macedon Gas Pipeline. As part of a condition of the environmental approval of the Macedon project (Condition 8 of Ministerial Statement 844 (MS844); Minister for Environment 2010), monitoring was required to demonstrate that revegetation met the following criteria within three years of commencement of rehabilitation:

1. *Species diversity is not less than 60 per cent of the known original species diversity*.
2. *Weed coverage is equal to or less than that of pre-cleared levels*.

A monitoring program was developed by Astron (2012), and annual monitoring was subsequently undertaken by Astron in May 2013, July 2014, and September/October 2015 (collectively reported in Astron 2016), and then by Biota in 2017, 2019, 2021, 2022, and 2023 (Biota 2017, 2019, 2021, 2022, and 2023 respectively).

Following comment on the 2017 results and requests for further information received from the DBCA regarding the infestations of **Cenchrus* spp. within the ex-Mt Minnie pastoral exclusion, Woodside appointed a contractor to undertake weed spraying of **Cenchrus* spp. This started in Q3 of 2018 along the section of ROW within the Mt Minnie conservation area. Woodside then commissioned additional phases of rehabilitation monitoring (see Table 3.2), including the current 2024 survey, to assess both whether Condition 8 of MS844 had been met, and if the level of **Cenchrus* spp. within the Mt Minnie conservation area had decreased.

2.2 DBCA Review of 2017 Monitoring Phase

Prior to the 2019 survey, the DBCA reviewed the results of the 2017 monitoring report (Biota 2017), and provided the following four recommendations regarding the rehabilitation and ongoing monitoring of the project:

(1) "*That the proponent continues rehabilitation activities and weed monitoring along the section of the Macedon gas pipeline within the former Mount Minnie pastoral lease.*"

(2) "*That the rehabilitation monitoring report identifies contingency management measures to be implemented to meet the completion criteria, particularly given that some areas along the gas pipeline disturbance corridor within the former Mount Minnie pastoral lease do not appear to be meeting completion criteria required by Condition 8-3 under MS 844.*"

(3) "*That the rehabilitation monitoring report includes information on the rehabilitation and weed contingency management measures implemented to date.*"

(4) "*That the rehabilitation monitoring report recognises that the existing pipeline access track is likely to be providing a potential vector for weed introduction along the pipeline disturbance corridor, particularly in areas that are currently weed free or where vegetation has not become established"* (DBCA 2018).

2.3 Scope and Objectives

Biota was commissioned to undertake the 2024 monitoring survey of the Macedon Gas Pipeline, situated within the proposed Mt Minnie conservation area (hereafter referred to as the 'study area'; Figure 2.1). The principal aims of the study, as identified by Woodside, were to:

- conduct the annual rehabilitation monitoring in 2024 (timed appropriately after rainfall) to measure spatial and temporal changes of vegetation in both analogue and rehabilitated transects located within the Mt Minnie conservation area; and
- complete subsequent reporting and statistical analyses in accordance with Section 3.10 of the BHP guidance document (BHP Iron Ore 2016) and the BHP Macedon Gas Project Pipeline Rehabilitation Monitoring and Evaluation Plan (Astron 2012).

These aims were met by completing a desktop study of existing reports and supporting data sets (Astron 2009, 2013, 2014, 2016, and Biota 2017, 2019, 2021, 2022, 2023), together with information available for the locality (see Section 4.0). This was followed by a field survey in July 2024 to repeat the monitoring following appropriate rainfall conditions (see Section 3.0).

The approach and methodology used for the 2024 rehabilitation monitoring survey considered the following:

- the monitoring methodology as outlined in the *BHP Macedon Gas Project Pipeline Rehabilitation Monitoring and Evaluation Plan* (Astron 2012) (hereafter referred to as the 'current monitoring procedure');
- *Document Review Comments Sheet: Macedon Gas Pipeline Rehabilitation Survey – 2017* (DBCA 2018); and
- Environmental Protection Authority (EPA) "*Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*" (EPA 2016).

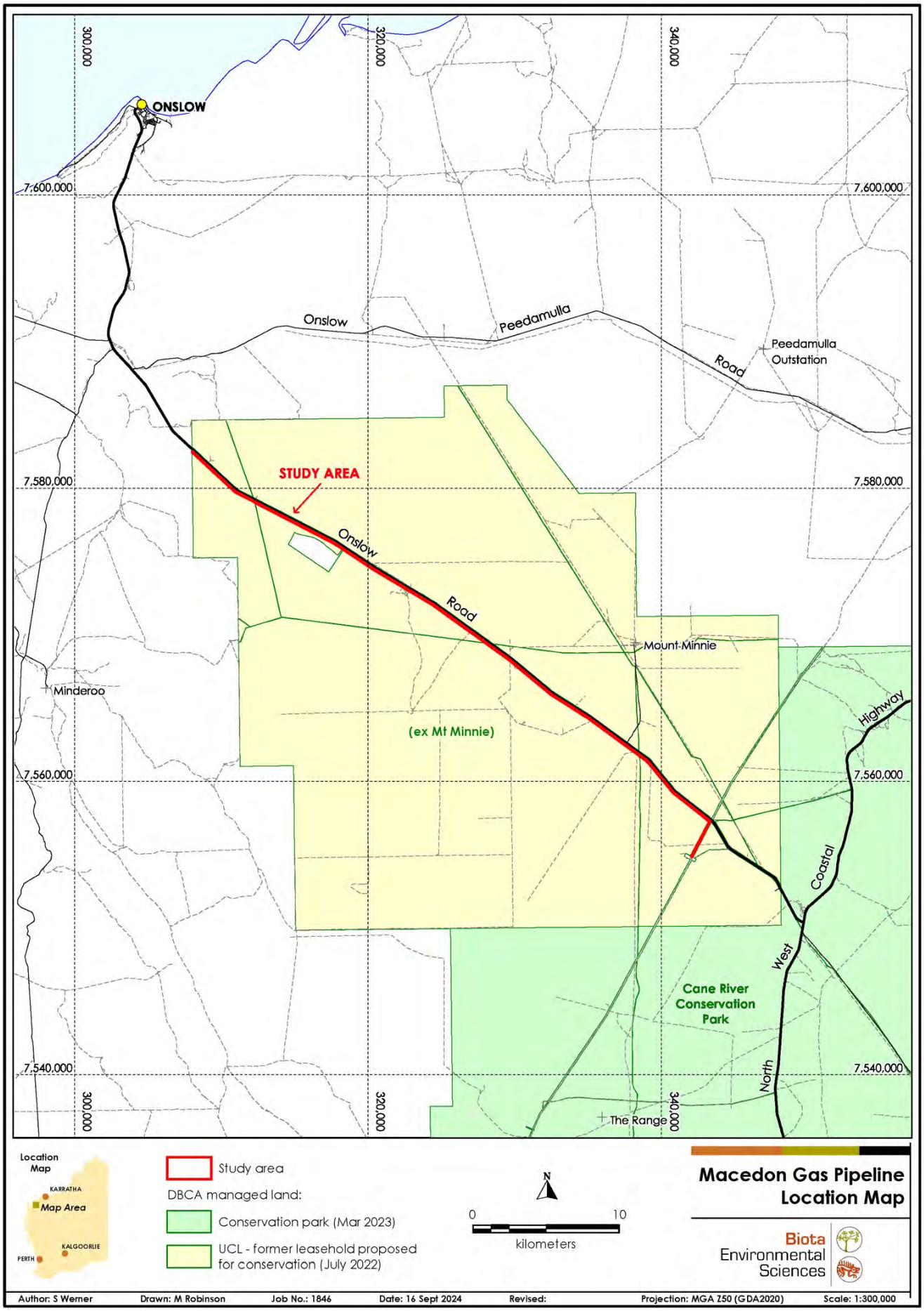


Figure 2.1: **Location of the Macedon Gas Pipeline study area in which the current rehabilitation monitoring survey was completed.**

3.0 Methods

3.1 Survey Team and Timing

The field survey was conducted by Scott Werner (Principal Biologist) and Jason Teuber (Botanist), both of whom have experience conducting biological surveys in the Pilbara region (Table 3.1).

Monitoring of the analogue and rehabilitation transects was conducted between 18th – 20 July 2024 and followed appropriate rainfall to ensure that adequate survey information was collected (see Section 3.1.1).

Table 3.1: Summary of Biota personnel involved in the 2024 Macedon Gas Pipeline rehabilitation monitoring.

Name	Position	Years of Experience	Flora Licence No.†
Scott Werner	Principal Biologist	14	FB62000038-2
Jason Teuber	Botanist	5	FB62000286-2

† Flora Taking (Biological Assessment) Licence under Regulation 62 of the *Biodiversity Conservation Regulations 2018* (previously *Wildlife Conservation Act 1950*) (required to collect flora specimens).

3.1.1 Climate

Seasonal timing, particularly the amount of rainfall received prior to a survey, can have a significant influence on the species abundance and diversity recorded during a field survey. Rainfall data for the locality were compiled and compared to long-term monthly data (Figure 3.1). Data from the Bureau of Meteorology weather recording station at Onslow Airport (#5017)[1] show that rainfall in the six months prior to the current monitoring survey (February 2024 to July 2024) totalled 81.4 mm, which was 13.4 mm less than the total of the long-term monthly medians[2] for the locality during those months (94.8 mm). The last substantial rainfall events prior to the 2024 rehabilitation monitoring survey were recorded on the 26th and 27th of June (30.2 mm), 21 days prior to the survey.

Since the commencement of monitoring in 2010, the amount of rainfall received prior to each phase has varied (Table 3.2). While the baseline survey in 2010 was completed during dry conditions, the first two post-rehabilitation surveys in 2013 and 2014 were undertaken following adequate rainfall. The 2015 survey was completed following three months of below average rainfall, which is typical for spring in the Pilbara region. The survey in 2017 was undertaken following the third wettest period experienced over the course of the program, and approximately three to six weeks after significant rainfall events. The survey in 2019 was undertaken four to five weeks following the first significant rainfall event received in the Onslow locality for the 2018/2019 “wet season”, with additional rainfall received leading up to the survey. The 2021 survey was undertaken following the second wettest period experienced over the course of monitoring. The survey in 2022 was undertaken following the wettest period experienced over the course of the program, with 191.4 mm of rainfall within a week of commencing the survey. The survey in 2023 commenced approximately 6-7 weeks following the first significant rainfall event received.

1 The Onslow Airport weather recording station is located approximately 23 km north-northwest of the closest transect, and 62 km northwest of the farthest transect.

2 From a meteorological perspective, the median is usually the preferred measure of 'typical' rainfall due to the high temporal variability of rainfall in most regions.

The current survey in 2024 commenced exactly three weeks following the first significant rainfall event received in the Onslow locality for the two months prior to the survey. The survey was therefore undertaken during a period that would be considered optimal for general collection of flora, and ideal timing for the determination of **Cenchrus* spp. in the field.

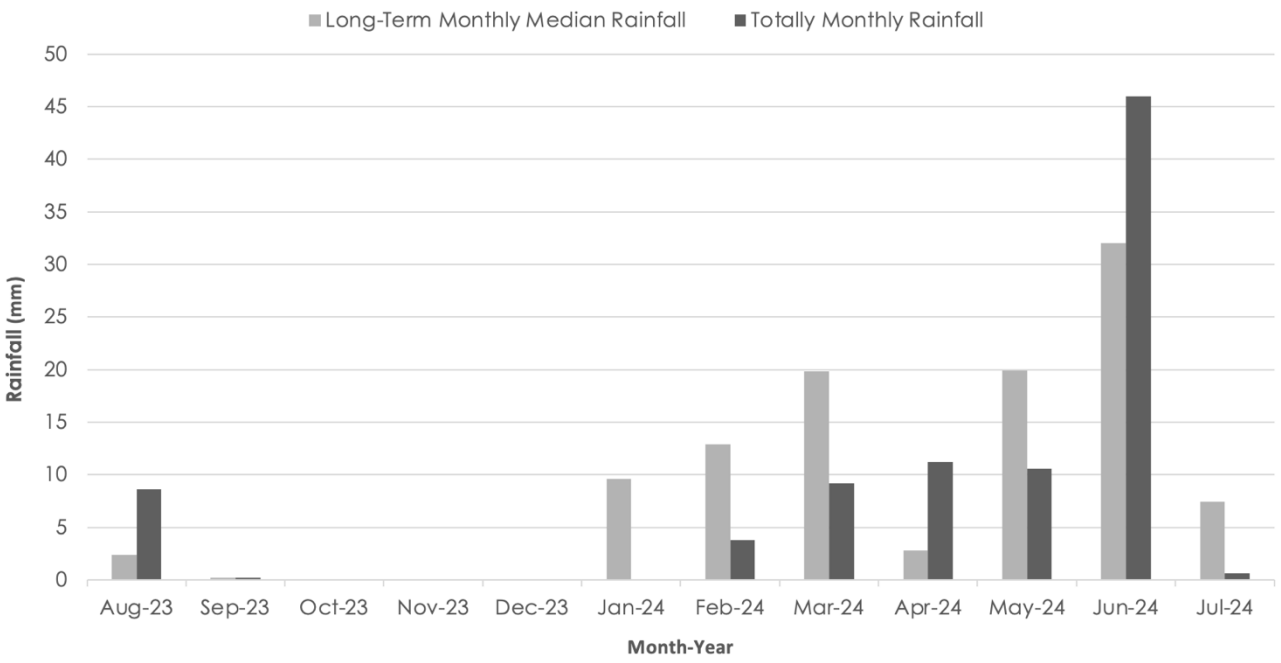


Figure 3.1: **Total monthly rainfall at Onslow Airport recording station (#5017) for the 12 months preceding the survey, compared to the long-term monthly median.**
Data supplied by the Bureau of Meteorology (http://www.bom.gov.au).

Table 3.2: **Summary of timing and seasonal conditions for the Macedon Gas Pipeline rehabilitation monitoring surveys completed to date.**

Survey Timing	Rainfall in the Six Months Preceding the Survey	Rainfall in the Three Months Preceding the Survey
Baseline Survey		
14 – 19 October 2010	28.0 mm (Apr – Sep 2010)	14.8 mm (Jul – Sep 2010)
Post–Rehabilitation Surveys		
3 – 8 May 2013	131.6 mm (Nov 2012 – Apr 2013)	72.2 mm (Feb – Apr 2013)
8 – 12 July 2014	97.6 mm (Jan – Jun 2014)	83.2 mm (Apr – June 2014)
30 September – 4 October 2015	89.2 mm (Apr – Sep 2015)	13.4 mm (Jul – Sep 2015)
13 – 17 March 2017	218.2 mm (Sep 2016 – Feb 2017)	215.2 mm (Dec 2016 – Feb 2017)
30 March – 2 April 2019	62.8 mm (Oct 2018 – Mar 2019)	40.8 mm (Jan 2018 – Mar 2019)
5 – 7 May 2021	251.6 mm (Nov 2020 – Apr 2021)	50.2 mm (Feb 2021 – Apr 2021)
18 – 20 May 2022	275.2 mm (Dec 2022 – May 2022)	265.0 mm (Mar 2022 – May 2022)
12 – 14 April 2023	97.6 mm (Nov 2022 – Apr 2023)	88.6 mm (Feb 2023 – Apr 2023)
18 – 20 July 2024	81.4 mm (Feb 2024 – Jul 2024)	57.2 mm (May 2024 – Jul 2024)

3.2 Monitoring Methodology

The survey methodology for the 2024 rehabilitation monitoring survey was consistent with that outlined in the current monitoring procedure (Astron 2012) and the most recent survey completed (Biota 2023).

3.2.1 Rehabilitation and Analogue Transects

In 2010, Astron established and assessed 56 line-intercept transects along the Macedon Gas Pipeline to provide baseline monitoring data, consisting of 31 rehabilitation transects established within the 30 m wide pipeline construction corridor and 25 analogue transects located outside the pipeline corridor. Each 20 m transect was installed perpendicular to the pipeline corridor and marked with a fence dropper at each end. The spatial distribution of transects was selected to sample eight geomorphic units spanning the length of the Macedon Gas Pipeline (Astron 2010).

In 2013, an additional 1 m x 20 m 'fixed-point strip transect' was monitored for each transect to ensure uncommon species were detected. This strip transect was positioned along the left side of each line intercept transect, and has been monitored during each subsequent monitoring survey. Monitoring sites consist of both an analogue and rehabilitation transect, with the exception of three sites that solely consist of rehabilitation transects without a paired analogue (see Table 3.3).

Ten of the monitoring sites in the southern section of the study area (sites 22 to 31) are located within the Mt Minnie pastoral lease. This lease was purchased by the State Government in 1996 for the purposes of conservation and is now managed by DBCA. It is proposed to be added to the Cane River Conservation Park in future (see Section 4.1). For the purposes of this report, we have referred to this area as the "Mt Minnie conservation area". Given its management interest in the area, DBCA is particularly interested in the progress of the rehabilitation in the 10 sites at the southern end of the study area.

The current survey comprised resampling of 17 transects along the Macedon Gas Pipeline corridor that are situated within the Mt Minnie conservation area (comprising 10 rehabilitation and seven analogue transects) (see Table 3.3). Sites situated outside of the Mt Minnie Pastoral Lease were not required to be monitored from 2021 onwards, following comments from the Department of Biodiversity, Conservation and Attractions in June 2018 recommending that "*that the proponent continues rehabilitation activities and weed monitoring along the section of the Macedon gas pipeline within the former Mount Minnie pastoral lease"* (DBCA 2018).

Table 3.3: Summary of monitoring sites assessed in 2024.

Monitoring Sites§	Line-Intercept Transects Reassessed in 2024 (Total Number of Transects)	
	Rehabilitation	Analogue
22, 23, 24, 26, 28, 29, 30	Yes (7)	Yes (7)
25, 27, 31	Yes (3)	No
Total	**10**	**7**

§ Monitoring site labels as per Appendix A of Astron (2016).

Locations of all transects monitored in 2024 are presented in Figure 3.2 to Figure 3.4, with transect coordinates listed in Appendix 1.

3.2.2 Assessment of Transects

Rehabilitation and vegetation assessments were conducted for each of the 17 line-intercept transects (10 rehabilitation and seven analogue). The following data were collected:

- all vascular plant species (including weeds) present along the transect, and also within the adjacent 1 m x 20 m fixed-point strip transect;
- the length of intercept for each flora species recorded along the transect; and
- two photographs (one from each end of the transect, oriented along the length of the transect).

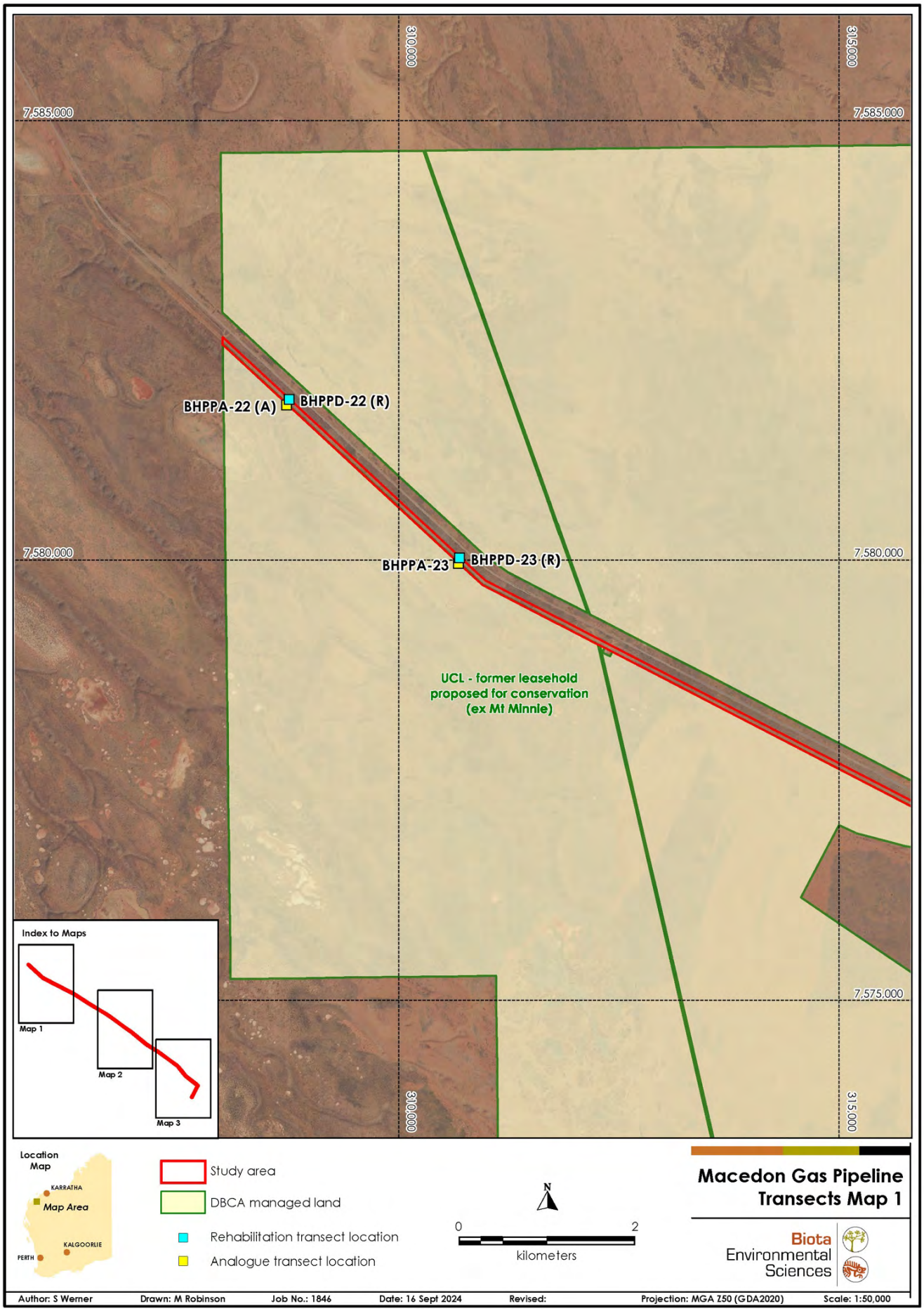


Figure 3.2: **Monitoring transect locations (map 1 of 3).**

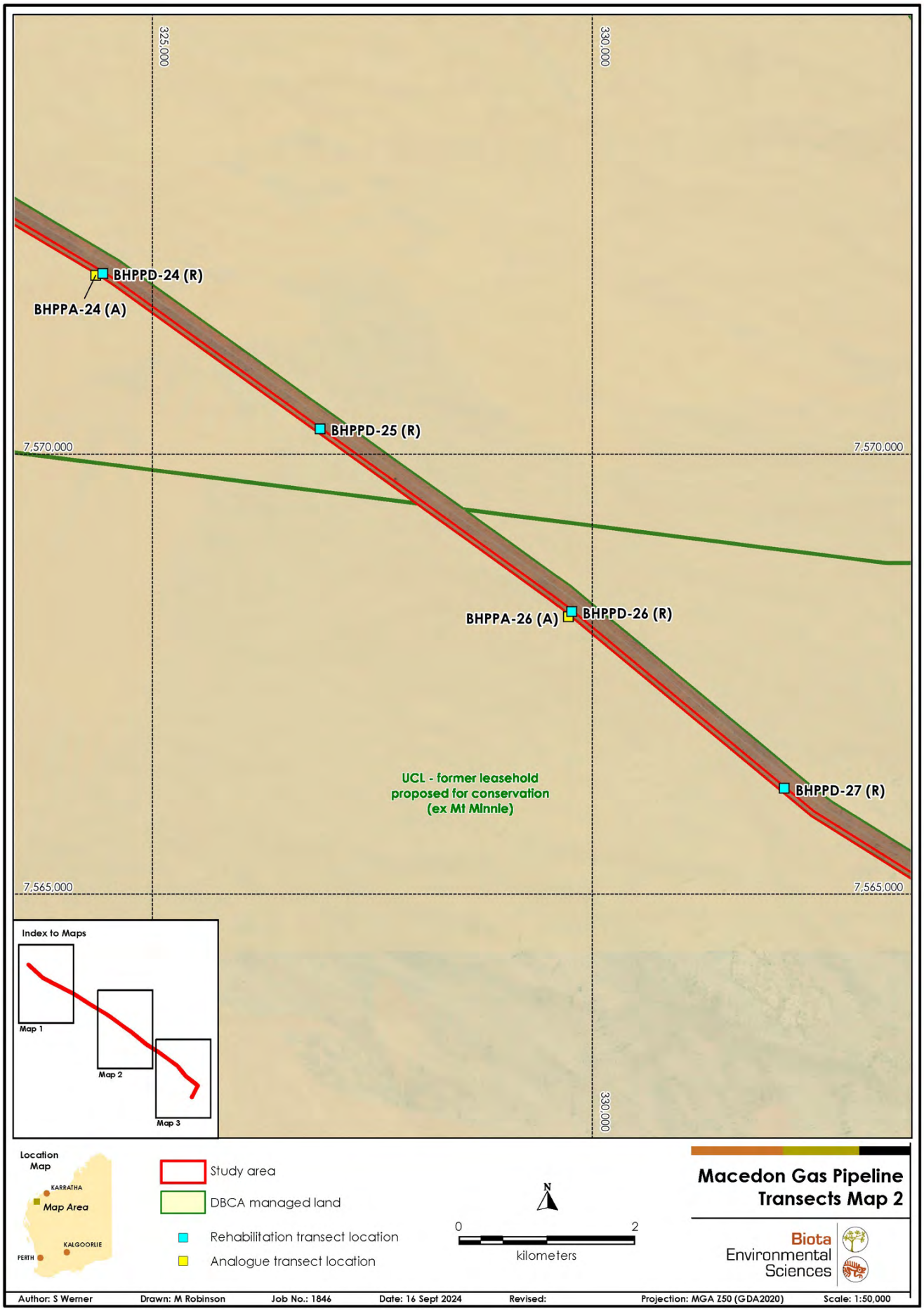


Figure 3.3: Monitoring transect locations (map 2 of 3).

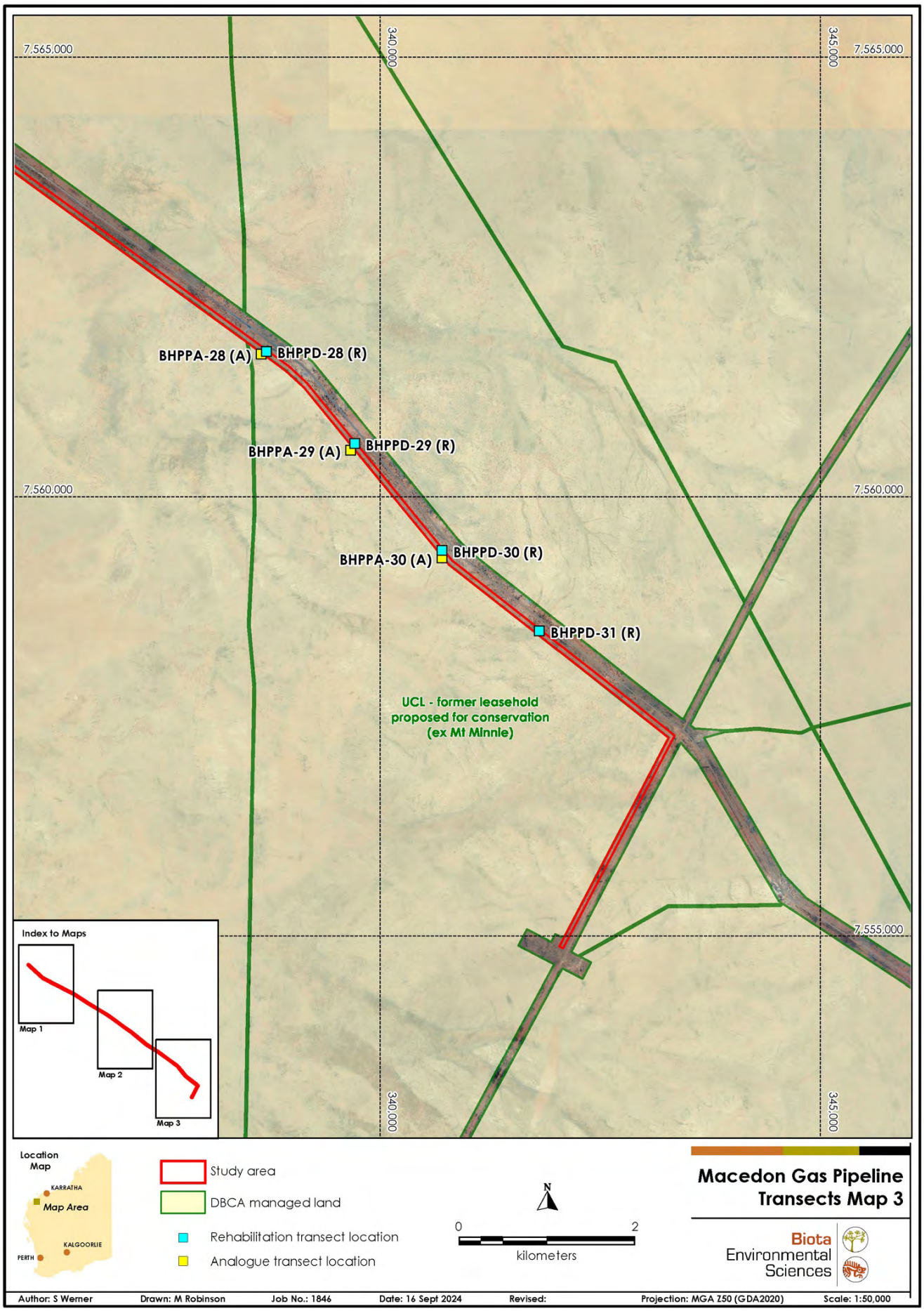


Figure 3.4: **Monitoring transect locations (map 3 of 3).**

3.2.3 Flora Specimen Identification, Nomenclature and Data Entry

Common taxa that were well known to the survey botanists were identified in the field, with voucher specimens of all other species collected. Plant specimens were identified in Perth using published and unpublished taxonomic keys and resources available at the WA Herbarium.

Nomenclature used in this report is consistent with the current listing of WA flora recognised by the WA Herbarium on Florabase[3] at the time of preparation of this report.

All flora data were entered into Excel spreadsheets, maintaining consistency with the data format from previous phases, and that established by Astron during the initial phase of monitoring (Astron 2010).

3.3 Data Analysis and Presentation

The *BHP Billiton Macedon Gas Project Pipeline Rehabilitation Monitoring and Evaluation Plan* (Astron 2012) specifies two statistical analyses to be undertaken:

1. The average percent covers for native species along the analogue and rehabilitation transects should be tested for significant differences using a non-parametric Multivariate Analysis of Variance (MANOVA); the same analysis should also be completed for the average percent cover of weeds along the analogue and rehabilitation transects.
2. Change in the vegetation community over time should be evaluated through a two-way Analysis of Similarity (ANOSIM) of the species percentage foliar cover (presumably comprising the line transect data), using transect type (rehabilitation / analogue) nested within the survey year.

Results in the Astron (2016) monitoring report were analysed in this way. Data were also tabulated and presented graphically, with transect data always separated by treatment (rehabilitation or analogue) but typically averaged across either the treatment or three broad habitat classes: clay pan/floodplain, open plain or sand dune.

The size of the error bars on some of these graphs indicated a large amount of variability in the data around the calculated means, suggesting that the transects were dissimilar for some values and may not have been developing equivalently. The significant "site" interaction values presented for some of the statistical analyses also suggested this. In addition, averaging of transect data prevented any close inspection of the results that applied specifically to the Mt Minnie conservation area. For this study we have therefore elected to present the data for individual transects separately wherever possible and for all sampling events, so as not to obscure any differences between transects. We also applied a more rigorous analysis of trends over time, including floristic clustering analyses, rather than the multivariate analysis of variance suggested by Astron (2016).

Clustering analyses were carried out in PRIMER v6 and used to examine the relationships between both the floristic composition of the individual transects in 2010 vs. 2024, and of each transect compared to its paired analogue. The following protocols were used:

- All native species (both perennial and annual) present at each site were included in the data set; weeds were removed.

[3] http://florabase.dbca.wa.gov.au

- The data were prepared as a matrix of the presence / absence of each species at each site in 2010 and 2024; this was based on the combined data from the line transect (for 2010 and 2024) and the strip transect (2024 only).
- The Bray-Curtis coefficient was used to produce a similarity matrix, and a cluster analysis was then performed using the group average method. The clusters were tested for significance using the similarity profile permutation test (SIMPROF). Similarity percentage (SIMPER) analysis was also used to assess which species were primarily responsible for the observed differences between groups.

Representative outputs from the clustering analyses are presented in Section 5.2.2 as both floristic dendrograms and non-metric, multi-dimensional scaling (NMDS) ordination plots.

To broadly summarise the current development of vegetation along the rehabilitation transects, each transect was also ranked according to the scale presented in Table 3.4 (see Section 5.5). Note that the criteria were developed with particular consideration of the requirements of the current study and the vegetation types being sampled, and would not necessarily be directly relevant to other areas (for example, vegetation types that have a naturally low level of cover provided by perennial species, or that are substantially invaded by other weed species).

Table 3.4: Ranking categories for overall development of vegetation along the rehabilitation transects.

Ranking	Criteria
Excellent	The cover of perennial vegetation along the transect is equivalent to the pre-clearing cover, floristic composition is similar to the original, AND the cover of **Cenchrus* is negligible (<0.5%).
Good	The cover of perennial vegetation along the transect is approaching the pre-clearing cover, AND floristic composition is similar to the original OR the cover of **Cenchrus* is negligible to low (<10%).
Fair	There is limited re-establishment of perennial vegetation along the transect (<20% cover) AND the cover of **Cenchrus* is negligible to very low (<5%).
Poor	A moderate amount of perennial vegetation has established on the transect (<45% cover), however the floristic composition is dissimilar to the original AND the cover of **Cenchrus* is low to high (10-45%) and increasing.
Very Poor	Minimal perennial vegetation has established on the transect (<5% cover), the floristic composition is dissimilar to the original AND the cover of **Cenchrus* is high to very high (>35%).

3.4 Study Limitations

The aim of the current monitoring survey was to provide a reliable post-rehabilitation comparison of the ecological attributes of the analogue and rehabilitation transects. There are potential constraints and limitations of this study that must be considered when reviewing and interpreting the results:

1. In 2024, and all previous monitoring phases from 2017-2023, some fence-droppers marking the start and end points of each transect were missing due to works conducted along the ROW track situated within the study area. These points were located as accurately as possible using supplied GPS coordinates, however the fence droppers were not re-established in this monitoring phase. Considering the accuracy of handheld GPS units, missing fence droppers at sites have implications for repeated sampling and subsequent analyses (repeatability).

2. Fire history varies for some transects. Most recently, analogue transects **BHPPA-22**, **BHPPA-23**, and **BHPPA-24**, and rehabilitation transects **BHPPD-22**, **BHPPD-23**, and **BHPPD-24** were severely burnt in August and November of 2023. **BHPPA-24** along with two other analogue transects (**BHPPA-26** and **BHPPA-28**), and two rehabilitation transects (**BHPPD-25** and **BHPPD-26**) have been burnt previously at some point since the monitoring programme began. The remaining transects have not been burnt since 2010 (see Section 5.2.1 and Appendix 2). The fire events have affected the flora data recorded, and this needs to be taken into consideration when interpreting the results.
3. Some combinations of landform setting, hydrological function, and vegetation within the rehabilitation corridor were not replicated within analogue areas. Assessment of change relies largely on comparing post-impact data to those of the baseline phases, or to paired analogue transects. Three of the rehabilitation transects surveyed in 2024 do not have a paired analogue, as was the case in 2017, 2019, 2021, 2022, and 2023.

4.0 Background to the Study Area

4.1 Conservation Reserves in the Locality

The main conservation reserve in the locality is the Cane River Conservation Park, situated approximately 100 km southeast of Onslow. This reserve includes several landforms and vegetation types of particular significance that are not found in other conservation reserves in the Pilbara.

The current extent of the Cane River Conservation Park is proposed to be increased through the addition of two areas: an exclusion including the Nanutarra pastoral lease to the south, and the Mt Minnie conservation area to the north (see Figure 2.1). This is part of a broader State-wide process of pastoral lease exclusions for public purposes, specifically conservation, which has the intention of providing a more comprehensive, adequate and representative reserve system (EPA 2014).

Approximately 48 km of the Macedon Gas Pipeline runs parallel to Onslow Road through a development corridor that traverses the proposed Mt Minnie conservation area (see Figure 2.1). The 10 rehabilitation transects in this section (**BHPPD-22** to **BHPPD-31**) are situated within the development corridor, while the seven paired analogue transects (**BHPPA-22** to **BHPPA-24**, **BHPPA-26**, and **BHPPA-28** to **BHPPA-30**) are located within the Mt Minnie conservation area (and thus within the proposed Cane River Conservation Park). DBCA is particularly interested in the presence of weeds through this section of the Macedon Gas Pipeline, given the potential for spread into the adjacent proposed reserve.

4.2 Surface Hydrology

The surface hydrology within the study area varies considerably, given that it intersects three separate land systems. The broader area is characterised by extensive sandy plains, longitudinal dunes, and numerous round and elongated claypans varying in extent from 20 m to 400 m situated between these dunes (Payne et al. 1988).

Broad, usually unchannelled, drainage floors occupy the majority of the sandy plains in the area, with these soils susceptible to water erosion. The deep loam and clay soils of the area are subject to irregular flooding, with the loams becoming very powdery when dry, resulting in susceptibility to erosion (Payne et al. 1988).

Drainage throughout the length of the study area is typically broad and diffuse across areas consisting mainly of colluvial sediments (Payne et al. 1988). The land systems in the study area generally exhibit the following drainage characteristics (from Payne et al. 1988, van Vreeswyk et al. 2004):

- Uaroo land system – mainly depositional surfaces with occasional stony rises and low hills; some through-drainage by broad unchannelled tracts receiving sheet flow.
- Giralia land system – broad non-saline plains with no organised drainage, however through-flow areas receive more concentrated sheet flow than the adjacent plains.
- Stuart land system – gently undulating plains with minor hills, and drainage tracts that experience through-flow.

4.3 Vegetation and Flora

Vegetation of the study area was described and mapped by Astron (2009) and largely reflects the array of vegetation types typically seen in the locality. Previous surveys completed in the Onslow area have identified a diverse suite of native flora, as well as a number of introduced flora species (Biota 2010, ENV 2011).

A total of 39 vegetation associations were identified by Astron (2009) within the Macedon Gas Pipeline corridor, 15 of which occur in the current study area. The 39 vegetation associations were grouped according to their occurrence on 11 landforms, and subsequently termed 'vegetation types'. The representation of transects surveyed during the current phase across each vegetation type is shown in Table 4.1.

Table 4.1: Distribution of transects resampled during current phase of monitoring based on vegetation types identified by Astron (2009).

Vegetation Type and No. of Vegetation Associations (Astron 2009)		Current Study	
		No. of Analogue Transects	No. of Rehabilitation Transects
Crests and upper slopes of inland sand dunes supporting *Grevillea eriostachya* or *Hakea stenophylla* shrubs, *Acacia* sp., *Crotalaria cunninghamii* over mixed low shrubs over *Triodia epactia* 'sens. lat.' or *T. glabra* hummock grasslands.	2 (13%)	1 (14%)	1 (10%)
Sandy/loamy plains supporting *Eucalyptus* and *Corymbia* low trees in patches over mixed shrubs over *Triodia glabra* hummock grasslands; some vegetation types characterised by an upper storey of *Hakea chordophylla* or *Grevillea wickhamii*.	9 (60%)	2 (29%)	3 (30%)
Lower, often stony plains supporting *A. xiphophylla* and other *Acacia* species shrublands over *Triodia* hummock grasslands, occasionally with a *Corymbia* isolated low trees overstorey.	3 (20%)	3 (43%)	5 (50%)
Internal, undirected drainages supporting **Prosopis* (now **Neltuma*), *Acacia* or *Eucalyptus victrix* shrubland/low woodland over mixed shrubs and mixed tussock grassland, occasionally *Triodia* hummock grassland.	1 (7%)	1 (14%)	1 (10%)
Total	**15**	**7**	**10**

NB. Percentages reflect proportion of the total for each column.

5.0 Results and Discussion

Summarised data for each transect across all phases of monitoring (2010 – 2024) are presented in Appendix 2. A list of vascular flora species recorded during each year of monitoring is presented in Appendix 3 and summarised in Table 5.1.

5.1 Overview of Flora Recorded in 2024

A total of 75 native vascular flora species were recorded from the 17 transects resampled in 2024. Two weed species were recorded from the study area in 2024 (**Cenchrus ciliaris* and **C. setiger*).

The mean species per transect (as a way of accounting for varying survey effort) is comparable across years given the rainfall received at the time of each monitoring phase (see Table 3.2). The low number of species recorded in 2010 reflects the lack of sampling along the strip transects, which were implemented in 2013, and may have also been affected by the dry conditions in that year. In 2024, only the section of gas pipeline situated within the Mt Minnie conservation area was surveyed (17 transects in total).

Table 5.1: Number of species recorded from the current study area in each year of monitoring (includes opportunistic records of weeds).

	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Number of Native Species	39	116	144	135	104	29	95	54	65	75
Number of Weed Species	3	3	3	4	4	2	2	2	2	2
Number of Transects	56	56	56	56	56	17	17	17	17	17
Mean Species/Transect	0.75	2.13	2.63	2.48	1.93	1.82	5.71	3.29	3.94	4.59

5.1.1 Species of Conservation Significance

No Threatened or Priority species were recorded from the study area during the current phase of monitoring.

5.2 Species Diversity

Results from the monitoring program are discussed below against the relevant criterion from Condition 8 of MS844:

(1) Species diversity is not less than 60% of the known original species diversity.

5.2.1 Species Richness

As in previous phases, one measure of diversity used to assess this criterion was species richness, with only native species considered. To compare the 2024 species richness against the baseline values, only those species recorded along the line transect were considered, as the extra sampling along the strip transect was not implemented until 2013. Two baseline species diversity values were considered: the 2010 species richness from the rehabilitation transect, and the 2010 species richness from the equivalent analogue. These values are shown in Table 5.2, Figure 5.1 and Figure 5.2.

When using the simple number of native species as the measure of diversity, all 17 rehabilitation transects and analogue transects met the criterion of "*not less than 60% of the known original species diversity*".

It should be noted that, depending on the nature of the habitat, high species richness is not necessarily indicative of the development of a satisfactory level of vegetation. Some intact vegetation types naturally have very low species richness (less than five species in a 50 m^2 area; e.g. some wetlands, spinifex plains, and samphire vegetation).

The relatively high number of mean species per transect observed between 2021 and 2024 compared to the previous phases can be attributed to factors including the smaller subset of transects sampled, a development of perennial vegetation in certain transects, and the amount of rainfall received in the six months preceding the surveys (see Table 3.2, Appendix 2). The conditions set out in MS844 rely on a simplified indicator of species diversity (number of species recorded), and as such should be viewed with a consideration of all floristic values associated with rehabilitation and analogue transects.

Table 5.2: **Native species richness of rehabilitation line transects in 2024 compared to 2010 for both the same transect and for the paired (or equivalent) analogue.**
Richness calculated for the line transect only, as the strip transect was not sampled in 2010.

		Rehabilitation Transect Compared to Itself		Rehabilitation Transect Compared to Paired (or Equivalent †) Analogue		
Rehabilitation Transect	**2024 Species Richness**	**2010 Species Richness**	**Criterion Met? (2024 Species Richness as % of Original)**	**Analogue Transect**	**2010 Species Richness**	**Criterion Met? (2024 Species Richness as % of 2010 Analogue)**
BHPPD-22 ß	4	6	Yes (67%)	BHPPA-22 ß	3	Yes (133%)
BHPPD-23 ß	10	6	Yes (167%)	BHPPA-23 ß	4	Yes (250%)
BHPPD-24 ß	3	4	Yes (75%)	BHPPA-24 ß, ρ	3	Yes (100%)
BHPPD-25 ρ	4	5	Yes (80%)	BHPPA-26 †, ρ	3	Yes (133%)
BHPPD-26 ρ	2	3	Yes (67%)	BHPPA-26 ρ	3	Yes (67%)
BHPPD-27	5	3	Yes (167%)	BHPPA-26 †, ρ	3	Yes (167%)
BHPPD-28	9	3	Yes (300%)	BHPPA-28 ρ	3	Yes (300%)
BHPPD-29	2	3	Yes (67%)	BHPPA-29	3	Yes (67%)
BHPPD-30	7	2	Yes (350%)	BHPPA-30	2	Yes (350%)
BHPPD-31	9	4	Yes (225%)	BHPPA-30 †	3	Yes (300%)

† Selected as the closest analogue transect in a similar topographic position and vegetation type.

ß Transect was burnt <1 year prior to the 2024 survey.

ρ Transect was burnt approximately <10 years prior to 2024 survey.

Long undisturbed spinifex hummock grasslands are frequently species poor and, particularly where spinifex cover is high, species numbers may not vary substantially in different seasons. However, following ground clearing or after fire, species richness typically increases dramatically with the establishment of "pioneer" colonising species, such as members of the Malvaceae and Fabaceae families; annual herbs and grasses are also typically more abundant in the early stages of regeneration. Species richness then typically declines as the vegetation matures, with the senescence of the early seral species, and annuals becoming crowded out as the spinifex hummocks occupy more of the available ground. These trends are apparent in the analogue sites **BHPPA-26** and **BHPPA-28** following fire (Figure 5.1 and Figure 5.2).

The fact that all transects exceeded 60% of the original species richness is expected given the age of the rehabilitation areas.

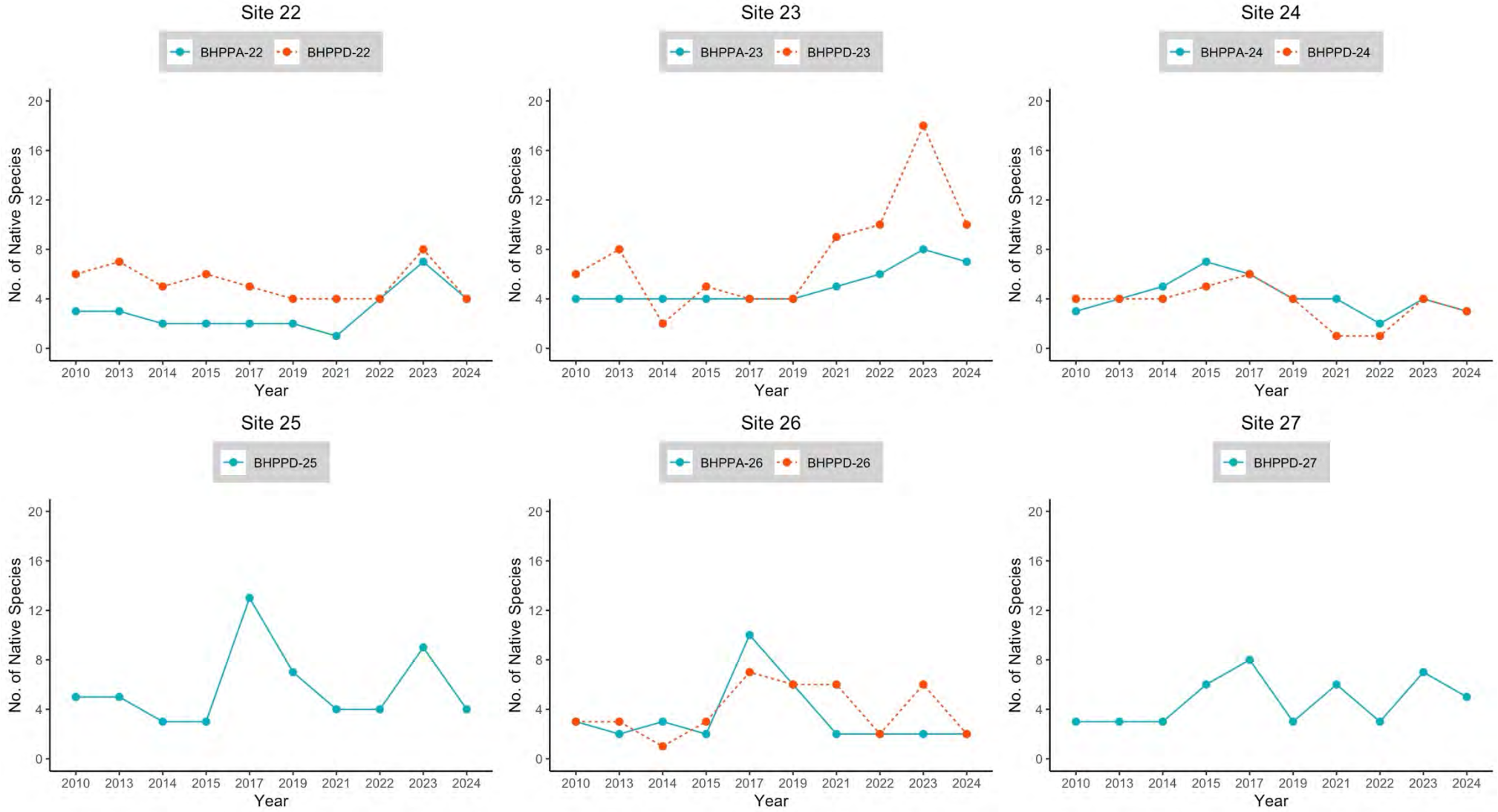


Figure 5.1: **Native species richness (count data) from line transects at analogue (A) and rehabilitation (D) sites (1of 2).**

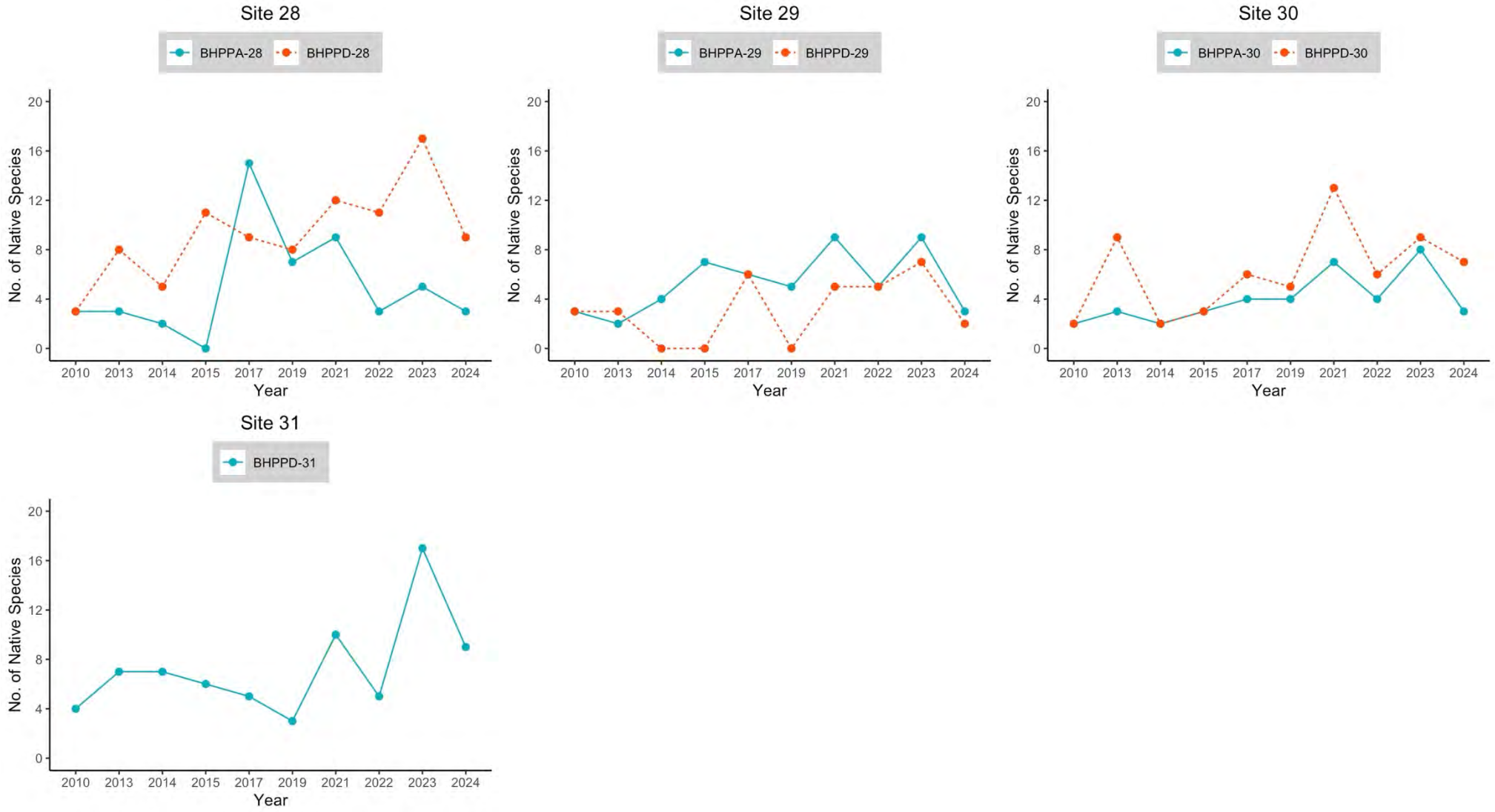


Figure 5.2: **Native species richness (count data) from line-transects at analogue (A) and rehabilitation (D) sites (2 of 2).**

5.2.2 Similarity of Species Composition

Another measure that should be considered within the broad context of the original "diversity" is the similarity of the species present in the rehabilitation areas in relation to those present in the pre-clearing vegetation and also those in the relevant analogue site. Floristic clustering analyses were run using PRIMER to investigate this aspect. The first analysis used the presence/absence data for native species in 2010 and 2024 and was run separately for the analogue transects (Figure 5.3) and rehabilitation transects (Figure 5.4).

The **analogue transects** clustered into seven different floristic groups (*FGa* to *FGg*; Figure 5.3). Four of the groups contained single transects only and therefore did not have indicator species identified through the SIMPER analysis; the individual transect data were examined to attempt to identify the species causing these to separate. The seven groups were as follows:

- *FGa* comprised **BHPPA-22** from both 2010 and 2024, despite the transect being recently burnt prior to the 2024 survey and having considerably more species (13 compared to three). **BHPPA-22** differed from the other analogue transects in the presence of *Dicrastylis cordifolia* and *Triodia schinzii,* which together explained 100% of the cumulative similarity; the lack of *Triodia glabra* was likely also a factor.
- *FGb* comprised **BHPPA-23** from 2024. This transect had similarly been recently burnt prior to the 2024 survey and had the equal highest number of species from this year (13). These included seven species not present at any other transect in the data set, most of which were typical early coloniser species (*Abutilon otocarpum, Corchorus sidoides* subsp. *sidoides, Gossypium australe, Heliotropium crispatum, Hibiscus sturtii* var. *platychlamys, Indigofera colutea* and *Sida arsiniata*). The only species present at this transect in both 2010 and 2024 were *Triodia epactia* and *T. glabra* (see *FGe* below).
- *FGc* comprised **BHPPA-24** from 2024. This transect had again been recently burnt prior to the 2024 survey and included three species that were not present at any other transect in the data set (*Grevillea striata, Paspalidium clementii* and *Tephrosia uniovulata*). *Corymbia hamersleyana* and *Triodia glabra* were the only species present at this transect in both 2010 and 2024 (see *FGg* below).
- *FGd* comprised **BHPPA-29** and **BHPPA-30** from both 2010 and 2024. These two transects were floristically similar across the two phases, and distinct from the other transects in the data set. The three indicator species identified by SIMPER comprised *Acacia xiphophylla, Triodia glabra* and *Salsola australis*, which together explained 94.97% of the similarity between transects in this group.
- *FGe* comprised **BHPPA-23** from 2010. Only four species were recorded in total from this transect, including one that was not present at any other transect in the data set (*Acacia synchronicia*).
- *FGf* comprised **BHPPA-28** from 2024. This transect included three species that were not present at any other transect in the data set (*Codonocarpus cotinifolius, Dysphania rhadinostachya* and *Sporobolus australasicus*).
- *FGg* comprised **BHPPA-24** and **BHPPA-28** from 2010 only, and **BHPPA-26** from both 2010 and 2024. Only two to three species were recorded from each transect in this group. The two indicator species identified by SIMPER comprised *Acacia ancistrocarpa* and *Triodia glabra*, which together explained 92.96% of the similarity between transects in *FGg*.

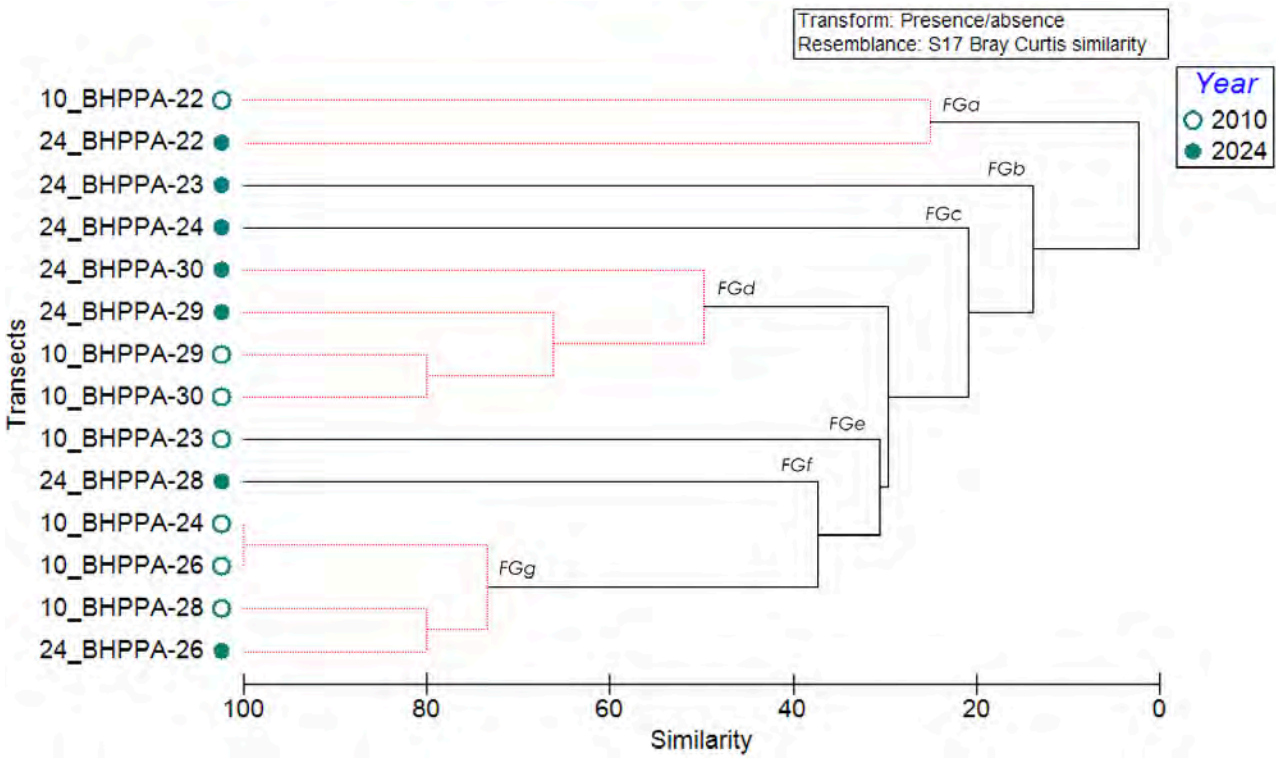


Figure 5.3: **Clustering of the analogue transects based on the species recorded in 2010 and 2024.**
Red lines indicate that sites are not significantly different (p>0.05) from each other (SIMPROF test).

The **rehabilitation transects** clustered into four different groups, three of which contained sites from 2024 only (Figure 5.4). Two of the groups contained only single transects and therefore did not have indicator species identified through the SIMPER analysis. The four groups were as follows:

- *FGa* contained **BHPPD-23** from 2024. This site was burnt prior to the 2024 survey, and had the greatest number of species of any of the transects sampled this year (23). This included 14 species that were not recorded from any other rehabilitation transect, many of which were typical of early seral stage vegetation (e.g. *Abutilon otocarpum, Cullen martinii* and *Sida echinocarpa*). The only species present at **BHPPD-23** in both 2010 and 2024 were *Acacia ancistrocarpa* and *Triodia epactia* (see *FGd* below).
- *FGb* contained transects **BHPPD-28**, **BHPPD-29**, **BHPPD-30**, and **BHPPD-31** from the 2024 phase only. The SIMPER analysis identified the top four species contributing to this grouping as *Salsola australis, Ptilotus exaltatus, Senna notabilis* and *Sporobolus australasicus*, together contributing 63.99% of the cumulative similarity between the transects in this group. Other species that were only recorded from the transects in *FGb* were *Abutilon lepidum, Dactyloctenium radulans, Iseilema dolichotrichum,* and *Solanum lasiophyllum*.
- *FGc* contained **BHPPD-22** from 2024. This transect was burnt prior to the 2024 survey, and contained six species that were not recorded at any of the other rehabilitation transects (*Bulbostylis barbata, Cassytha capillaris, Corchorus* sp., *Petalostylis cassioides, Swainsona kingii* and *Triodia schinzii*). The only species present at **BHPPD-22** in both 2010 and 2024 were *Acacia stellaticeps, Dicrastylis cordifolia,* and *Triodia glabra*.
- *FGd* contained all transects from 2010, along with the remaining transects from 2024 (including the recently burnt transect **BHPPD-24**). Four species contributed to this similarity according to the SIMPER analysis: *Triodia glabra, T. epactia, Acacia ancistrocarpa*, and *A. bivenosa*, together accounting for 92.92% of the cumulative similarity between the transects in *FGd*.

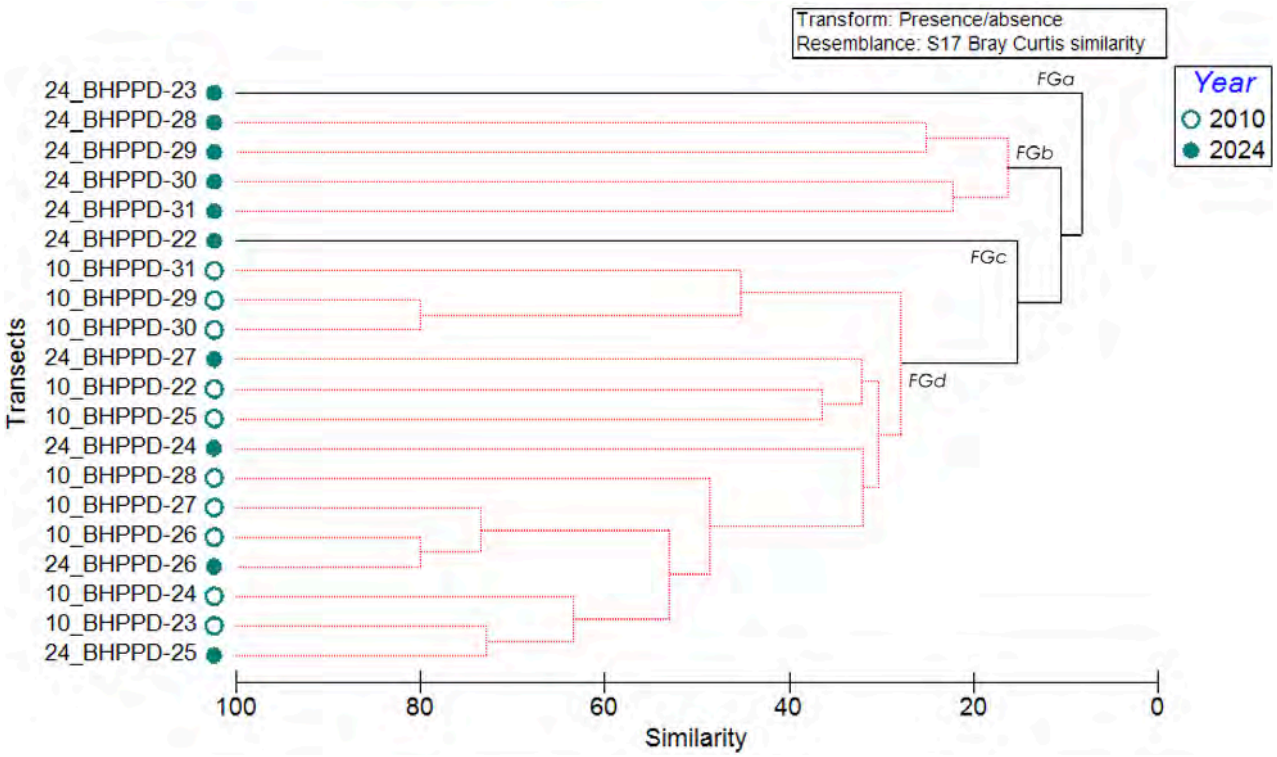


Figure 5.4: **Clustering of the rehabilitation transects based on the species recorded in 2010 and 2024.** Red lines indicate that sites are not significantly different (p>0.05) from each other (SIMPROF test).

The second clustering analysis used presence/absence data for native species from 2024 only, but for all transects sampled (both the rehabilitation transects and the analogues). This identified eight significantly different floristic groups (see Figure 5.5).

In general, the rehabilitation transects clustered with their paired (or nominated) analogue transect:

- *FGa* comprised **BHPPD-22** and **BHPPA-22**. Eight species contributed to the similarity of these transects (*Aristida holathera* var. *holathera, Bonamia alatisemina, Corchorus* sp., *Dicrastylis cordifolia, Goodenia microptera, Petalostylis cassioides, Ptilotus polystachyus* and *Triodia schinzii*).
- *FGb* comprised **BHPPD-23** and **BHPPA-23**. Nine species contributed to the similarity of these transects (*Abutilon otocarpum, Bonamia alatisemina, Corchorus sidoides* subsp. *sidoides, Heliotropium crispatum, Hibiscus sturtii* var. *platychlamys, Indigofera boviperda* subsp. *boviperda, I. colutea, Panicum australiense* var. *australiense* and *Triodia epactia*).
- *FGc* comprised two rehabilitation transects only, **BHPPD-30** and **BHPPD-31**. Four species contributed to the similarity of these transects (*Acacia synchronicia, Dactyloctenium radulans, Solanum lasiophyllum* and *Triodia epactia*). The associated analogue transect for both, **BHPPA-30**, clustered in *FGh* (see below); this was due to the absence of the above species and the presence of *Acacia xiphophylla*.
- *FGd* comprised **BHPPD-24** and **BHPPA-24**. Four species contributed to the similarity of these transects (*Aristida holathera* var. *holathera, Bonamia erecta, Tephrosia uniovulata* and *Triodia glabra*).
- *FGe* comprised a single rehabilitation transect, **BHPPD-27**. The nominated analogue transect for this, **BHPPA-26**, clustered in the neighbouring group *FGf* (see below). The key species contributing to this separation comprised the lack of *Acacia ancistrocarpa* at **BHPPD-27** and the presence of *Acacia inaequilatera, Aristida contorta, A. holathera* var.

holathera and *Ptilotus polystachyus*; these five species cumulatively contributed 74.32% to the dissimilarity between *FGe* and *FGf*.

- *FGf* comprised **BHPPD-25** and **BHPPD-26** along with the nominated analogue transect for both, **BHPPA-26**. Two species contributed to the similarity of these transects (*Acacia ancistrocarpa* and *Triodia glabra*).
- *FGg* comprised **BHPPD-28** and **BHPPA-28**. Five species contributed to the similarity of these transects (*Acacia ancistrocarpa, Ptilotus polystachyus, Salsola australis, Sporobolus australasicus* and *Triodia glabra*).
- *FGh* comprised **BHPPD-29** and **BHPPA-29**, along with the analogue transect **BHPPA-30**. Five species contributed to the similarity of these transects (*Ptilotus exaltatus, Salsola australis, Acacia xiphophylla, Triodia glabra* and *T. wiseana*).

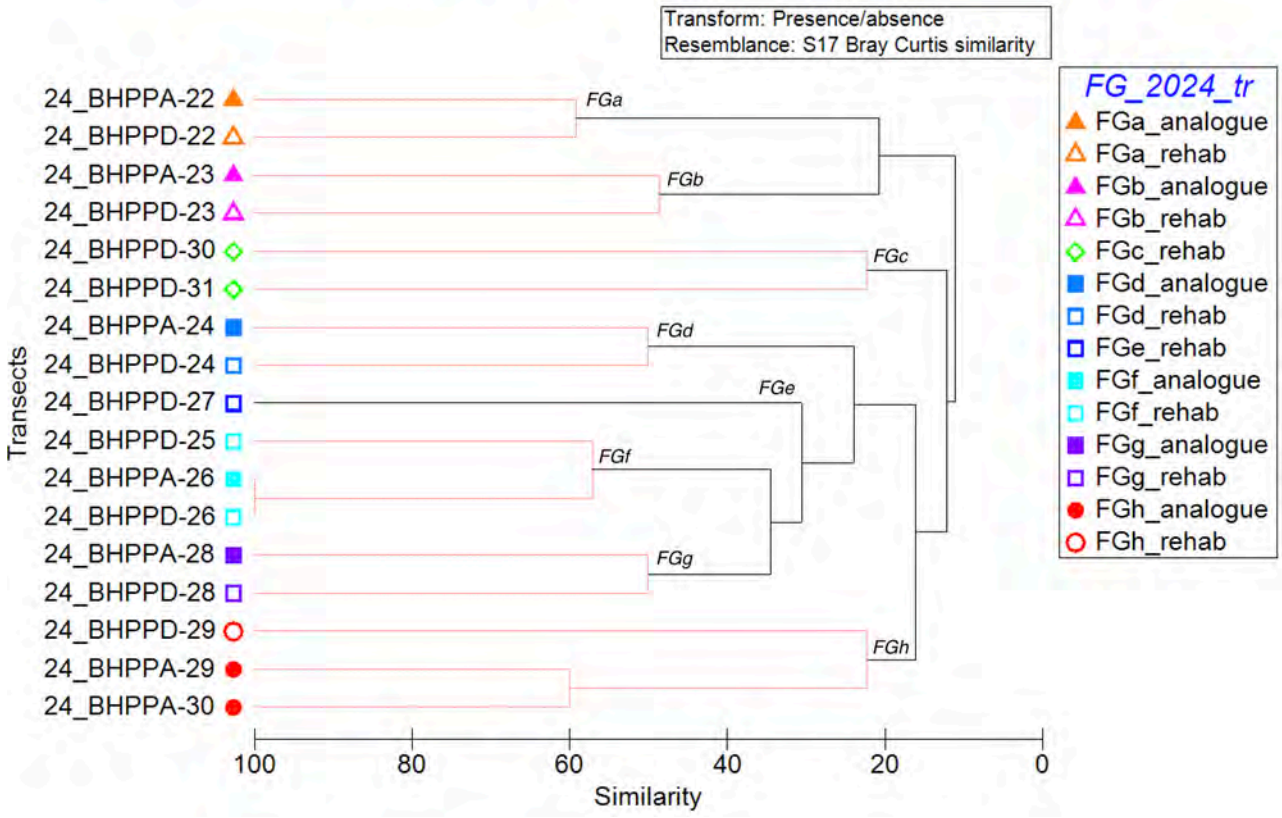


Figure 5.5: **Results of the floristic clustering analysis carried out on the 2024 data for the monitoring transects (presence/absence of native species only).**

The site groupings can be further summarised through the four broad groups identified at the 20% similarity level, as shown in Figure 5.6. These are briefly described below:

1. *FG1* comprised the transects from site 22 and 23. A variety of species contributed to the similarity between transects in this group, with the top five comprising *Bonamia alatisemina, Goodenia microptera, Panicum australiense* var. *australiense, Ptilotus polystachyus* and *Aristida holathera* var. *holathera*.
2. *FG2* comprised the rehabilitation transects from sites 30 and 31. Four species characterised these transects: *Acacia synchronicia, Dactyloctenium radulans, Solanum lasiophyllum* and *Triodia epactia*.
3. *FG3* comprised the transects from site 29 and the analogue transect from site 30. These transects were characterised by five species: *Triodia glabra, Acacia ancistrocarpa,*

Aristida holathera var. *holathera, Ptilotus polystachyus* and *Dysphania rhadinostachya* subsp. *rhadinostachya*.

4. *FG4* comprised the transects from sites 24, 25, 26, 27 and 28. These transects were characterised by five species: *Ptilotus exaltatus, Salsola australis, Acacia xiphophylla, Triodia glabra* and *T. wiseana*.

Overall, these results indicate significant similarity in terms of floristic composition between the rehabilitation transects and the appropriate analogue transects in 2024 (taking into account the recent fire history at multiple sites), but variable similarity compared to the original floristic composition recorded in the pre-clearing vegetation.

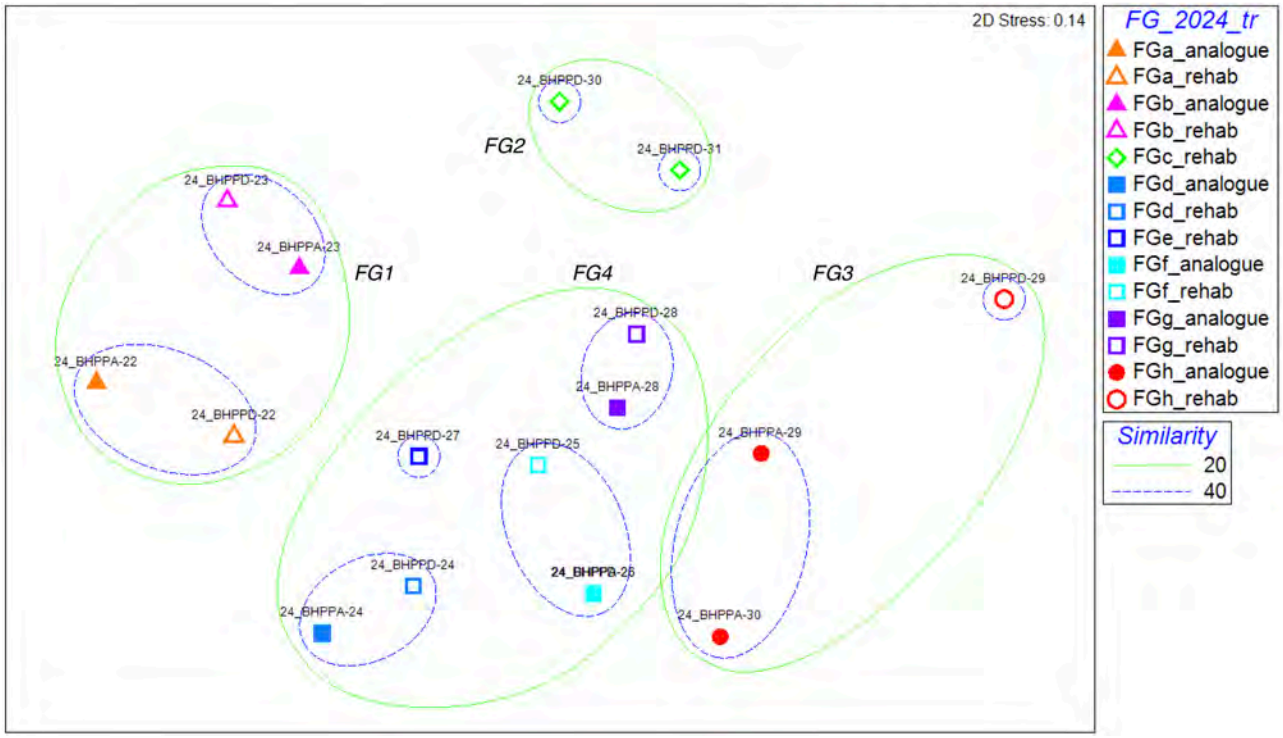


Figure 5.6: **NMDS plot of 2024 data for the monitoring transects (presence-absence of native species only).**

5.3 Introduced Flora (Weeds)

Two perennial weed species were recorded from the study area in 2024, neither of which were new for the monitoring program:

- Live individuals of **Cenchrus ciliaris* and/or **C. setiger* were recorded from five of the rehabilitation transects (along four of the line intercept transects and within one strip transect; see Table 5.3). In contrast, **Cenchrus* spp. were only recorded from one analogue site (along the line intercept transect at **BHPPA-30**).

The data for **Cenchrus* spp. are discussed further below in relation to the relevant criterion from Condition 8-1 of MS844, with the pre-cleared levels being those of 2010:

(2) Weed coverage is equal to or less than that of pre-cleared levels.

5.3.1 **Cenchrus* spp.

While **Cenchrus* spp. are not listed as either declared pests or Weeds of National Significance (WONS), they are significant environmental weeds. They are aggressive and effective competitors for resources and space, have the potential to increase the fuel load (leading to more frequent and/or hotter fires), and regenerate quickly following fire and cessation of drought. In addition, **Cenchrus ciliaris* has been demonstrated to produce allelopathic chemicals, which act as biochemical inhibitors of other plant species (see Cheam 1984a, 1984b).

The DBCA *Weed Prioritisation Process* (WPP; see Department of Parks and Wildlife 2013) assigned rankings to weed species based on their invasive characteristics and potential for impact specific to each management region in WA. The current version for the Pilbara region (DBCA 2023) ranks **Cenchrus* species as highly invasive and with the potential for serious environmental impact, but notes that the species are widespread through the region and therefore have a low feasibility for control. However, the process does identify **Cenchrus* spp. as being a priority for management when there is potential for impact to the conservation estate (e.g. at Barrow Island Nature Reserve).

Records of **Cenchrus* spp. at the monitoring sites over the course of the program are presented in Table 5.3, Figure 5.7 and Figure 5.8.

Table 5.3: Cover and presence of *Cenchrus spp. at monitoring transects within the Mt Minnie conservation area from 2010 to 2024.

Transect	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	Change in Percent Cover	
											2023 to 2024	2010 to 2024
Analogue												
BHPPA-23 ß	-	-	-	-	+	-	-	-	+	-	-	-
BHPPA-29	-	+	+	1.90	2.50	9.70	-	-	-	-	-	-
BHPPA-30	-	-	-	-	-	+	0.35	+	1.05	3.10	2.05	3.10
Rehabilitation												
BHPPD-22 ß	-	-	-	-	-	-	-	+	-	-	-	-
BHPPD-23 ß	-	1.00	3.00	4.00	+	-	0.45	5.00	22.60	+	-22.60	+
BHPPD-28	-	-	-	-	0.40	+	+	0.20	7.50	14.65	7.15	14.65
BHPPD-29	-	7.00	15.00	3.3	70.15	21.55	24.20	8.15	48.50	32.55	-15.95	32.55

Transect	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	Change in Percent Cover	
											2023 to 2024	2010 to 2024
BHPPD-30	-	2.50	10.00	1.05	27.95	27.00	45.05	36.30	41.80	46.90	5.10	46.90
BHPPD-31	-	5.25	19.25	12.35	27.35	1.90	31.20	73.65	35.15	36.35	1.20	36.35

Values are the percentage of the 20 m line transect occupied by each species at each site.

+ indicates presence only in the 1 m wide strip transect, which was utilised from 2013 onwards.

ß Transect was burnt <1 year prior to the 2024 survey.

Further discussion is provided below for each phase.

2013

Cenchrus* spp. were not recorded from the transects in the Mt Minnie conservation area in 2010, although it should be noted that the baseline survey was conducted under dry conditions. In 2013, **Cenchrus* was recorded at four rehabilitation transects in the Mt Minnie conservation area (BHPPD-23**, **BHPPD-29**, **BHPPD-30** and **BHPD-31**, with a maximum cover of 7.0% at **BHPPD-29**). With the additional strip transect monitoring technique implemented in 2013 for the first time, **Cenchrus* was also recorded as a presence at analogue transect **BHPPA-29**. It is possible that this record of **Cenchrus* from **BHPPA-29** did not truly represent a "new" record for this transect, as the species may have already been present in 2010, but not recorded due to the differing methodology. The apparent increase in records between 2010 and 2013 likely reflected the better seasonal conditions under which the latter survey was conducted.

2014 and 2015

In 2014, **Cenchrus ciliaris* was again recorded from the strip transect at analogue **BHPPA-29**. The cover of **Cenchrus* spp. increased from 2013 to 2014 at the same four rehabilitation transects in the Mt Minnie conservation area, with **C. setiger* co-occurring at **BHPPD-23** and **BHPPD-31** (Table 5.3 and Figure 5.8). In some cases, this increase was substantial (e.g. at **BHPPD-31**).

In 2015, **Cenchrus ciliaris* was recorded at 1.9% cover from the line transect at analogue **BHPPA-29**. **Cenchrus ciliaris* was also recorded from the same four rehabilitation transects in the Mt Minnie conservation area, but showed no consistent pattern compared to 2014, decreasing at three sites and increasing at one.

2017

In 2017, **Cenchrus ciliaris* was recorded at slightly higher cover at analogue **BHPPA-29**; it was also recorded in the strip transect only at analogue **BHPPA-23**, together with **Cenchrus setiger*. In terms of the rehabilitation transects, **Cenchrus* was recorded from all transects from which it had previously been recorded, although it was only present in the strip transect at **BHPPD-23**; a small amount was also recorded from a new rehabilitation transect (**BHPPD-28**). **Cenchrus setiger* co-occurred with **C. ciliaris* along the line transect at **BHPPD-31**.

2019

In 2019, **Cenchrus ciliaris* was again recorded from analogue site **BHPPA-29**, showing an increase in cover of 7.2% compared to 2017. It was also recorded in the strip transect only at **BHPPA-30** for the first time, but was not recorded in the strip transect at **BHPPA-23**.

In terms of the rehabilitation transects, **Cenchrus* spp. were recorded from four of the five transects from which they had previously been recorded, being absent from **BHPPD-23**. **Cenchrus setiger* co-occurred with **C. ciliaris* along the line transect at **BHPPD-31**.

From 2017 to 2019, the cover of **Cenchrus* spp. decreased noticeably at four of the rehabilitation sites. At **BHPPA-23**, **C. ciliaris* and **C. setiger* were no longer recorded in the strip transect. At **BHPPD-28**, **Cenchrus* was no longer recorded along the line transect but only in the strip transect. Substantial decreases in cover were also observed at **BHPPD-29** and **BHPPD-31** following herbicide treatment (see Plate 5.2 and Plate 5.4). There was essentially no change in **Cenchrus* cover at the remaining site, **BHPPD-30** (Plate 5.3). The cover of **Cenchrus* species along the rehabilitation line transects in the Mt Minnie conservation area was greater than the pre-cleared levels.

2021

In 2021, **Cenchrus ciliaris* was not recorded from analogue site **BHPPA-29**: cover had decreased from 9.7% in 2019 to 0% in 2021. At **BHPPA-30**, this species was recorded at 0.35% cover along the line transect for the first time, having previously only been recorded as a presence within the strip transect.

In terms of the rehabilitation transects, **Cenchrus* spp. were recorded from all of the transects where they had been previously recorded, including the reoccurrence of **Cenchrus* spp. at **BHPPD-23** after an absence in 2019. **Cenchrus setiger* co-occurred with **C. ciliaris* at **BHPPD-30** and **BHPPD-23**.

From 2019 to 2021, the cover of **Cenchrus* spp. increased at four of the rehabilitation sites (**BHPPD-23**, **BHPPD-29**, **BHPPD-30** and **BHPPD-31**), with the remaining site (**BHPPD-28**) only recording **Cenchrus* spp. within the strip transect. Substantial increases in cover were observed at **BHPPD-30** (18.05%; Plate 5.3) and **BHPPD-31**(29.30%; Plate 5.4). Site **BHPPD-23** saw the reoccurrence of **Cenchrus* spp. at 0.45% cover, after it was not recorded in either the strip or line transect during the 2019 monitoring. The cover of **Cenchrus* spp. was greater than the pre-cleared levels within five rehabilitation sites in the Mt Minnie conservation area (**BHPPD-23**, and **BHPPD-28** to **BHPPD-31**) (Table 5.3).

2022

In 2022, **Cenchrus* was again recorded at analogue site **BHPPA-30**, this time only as a presence in the strip transect, down from 0.35% along the line transect in 2021 (Table 5.3).

A decrease in the cover of **Cenchrus* was observed in 2022 at rehabilitation transects **BHPPD-29** (-16.05%; Plate 5.2) and **BHPPD-30** (-8.75%) (Table 5.3, Figure 5.8). However, a significant increase in the cover of **Cenchrus* (42.45%) was recorded at **BHPPD-31**, which had the highest cover of **Cenchrus* of any transect in 2022.

Importantly, it was clear from the data that with regards to **Cenchrus* spp., the level of weed coverage at some of the rehabilitation transects in the Mt Minnie conservation area was not equal or less than the pre-cleared levels but was considerably higher. The rehabilitation in these areas therefore did not meet Condition 8-1 of MS844.

2023

In 2023, **Cenchrus* was again recorded at analogue site **BHPPA-30**, this time as a cover of 1.05% along the line transect, increasing from only a presence along the strip transect in 2022. Additionally, for the second time since monitoring began, **Cenchrus* was recorded as a presence within the strip transect at analogue site **BHPPA-23** (Table 5.3).

A significant decrease in the cover of **Cenchrus* was observed at rehabilitation transect **BHPPD-31** in 2023 (-38.5%; Plate 5.4, Table 5.3, Figure 5.8). However, a significant increase in the cover of **Cenchrus* was recorded at **BHPPD-29** (40.35%). Cover also increased at **BHPPD-23** (17.60%) and **BHPPD-28** (7.30%), with these two transects recording their highest level of infestation over the course of the programme.

It was again clear that some of the rehabilitation transects in the Mt Minnie conservation area had considerably higher levels of weed coverage than those present in 2010, prior to clearing (Table 5.3, Figure 5.7 and Figure 5.8), and the rehabilitation in these areas therefore did not meet Condition 8-1 of MS844.

2024

In 2024, **Cenchrus* was again recorded at analogue site **BHPPA-30**, increasing in cover to 3.1% from 1.05% in 2023. **Cenchrus* was not recorded at any other analogue sites in 2024, noting however that **BHPPA-23** was recently burnt.

A significant decrease in the cover of **Cenchrus* was observed at rehabilitation transect **BHPPD-23** (-22.6%; Plate 5.1), which had been recently burnt, but also at the unburnt **BHPPD-29** (-15.95%) in 2024 (Table 5.3, Figure 5.8). In contrast, sites **BHPPD-28** and **BHPPD-30** continued their trend of increasing **Cenchrus* cover, resulting in the highest levels of infestation recorded at these two sites for the course of the monitoring program (14.65% and 46.9% respectively). **Cenchrus* cover also increased marginally (by 1.2%) at site **BHPPD-31** to 36.35%.

Importantly, there are currently four rehabilitation transects with high **Cenchrus* spp. cover (**BHPPD-28**, **BHPPD-29**, **BHPPD-30**, and **BHPPD-31**) in the southern end of the Mt Minnie conservation area (Table 5.3). It is clear from the data that with regards to **Cenchrus* spp., the level of weed coverage at these transects is not equal or less than the pre-cleared levels but is considerably higher. It is also likely that the cover of **Cenchrus* will increase again at **BHPPD-23** following the fire. The rehabilitation in these areas therefore does not meet Condition 8-1 of MS844. Notwithstanding the potential that the monitoring conducted during the dry year in 2010 substantially underestimated both the number of sites at which **Cenchrus* spp. was present and the amount of cover of **Cenchrus* spp. at those sites, there has been an increase at a number of the sites over subsequent years, with decreases or plateaus following appropriate herbicide application (Table 5.3, Figure 5.7 and Figure 5.8).

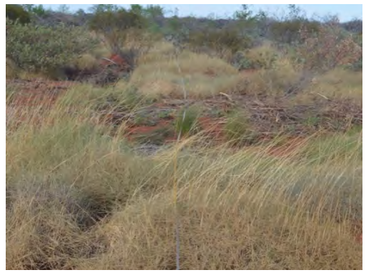
A  B  C  D  E  F 

Plate 5.1: *Cenchrus at site BHPPD-28 in 2017 (A), 2019 (B), 2021 (C), 2022 (D), 2023 (E), and 2024 (F).

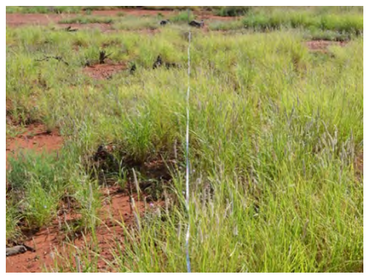
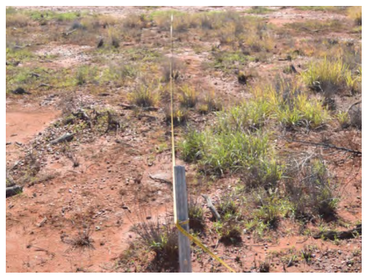
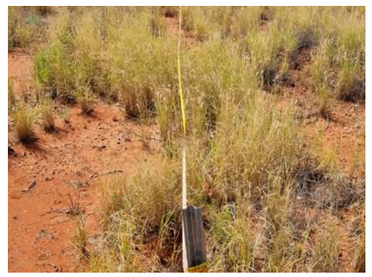
G  H  I  J  K  L 

Plate 5.2: *Cenchrus at site BHPPD-29 in 2017 (G), 2019 (H), 2021 (I), 2022 (J), 2023 (K), and 2024 (L).

M  N  O  P  Q  R 

Plate 5.3: *Cenchrus at site BHPPD-30 in 2017 (M), 2019 (N), 2021 (O), 2022 (P), 2023 (Q), and 2024 (R).

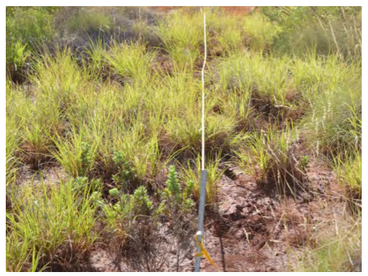
S  T  U  V  W  X 

Plate 5.4: *Cenchrus at site BHPPD-31 in 2017 (S), 2019 (T), 2021 (U), 2022 (V), 2023 (W), and 2024 (X).

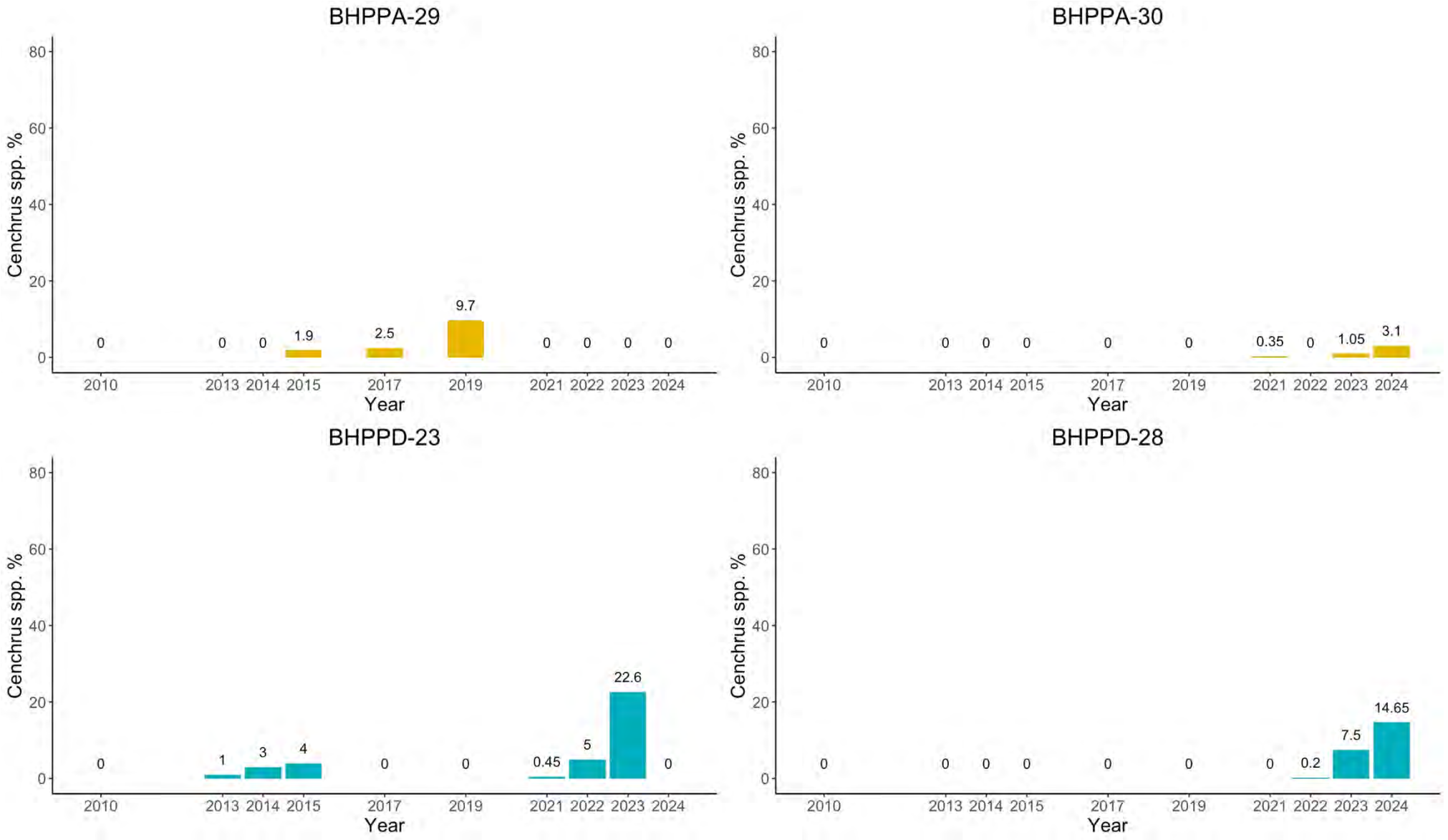


Figure 5.7: **Cover of **Cenchrus* spp. recorded along line-transects across all monitoring phases (1 of 2).**

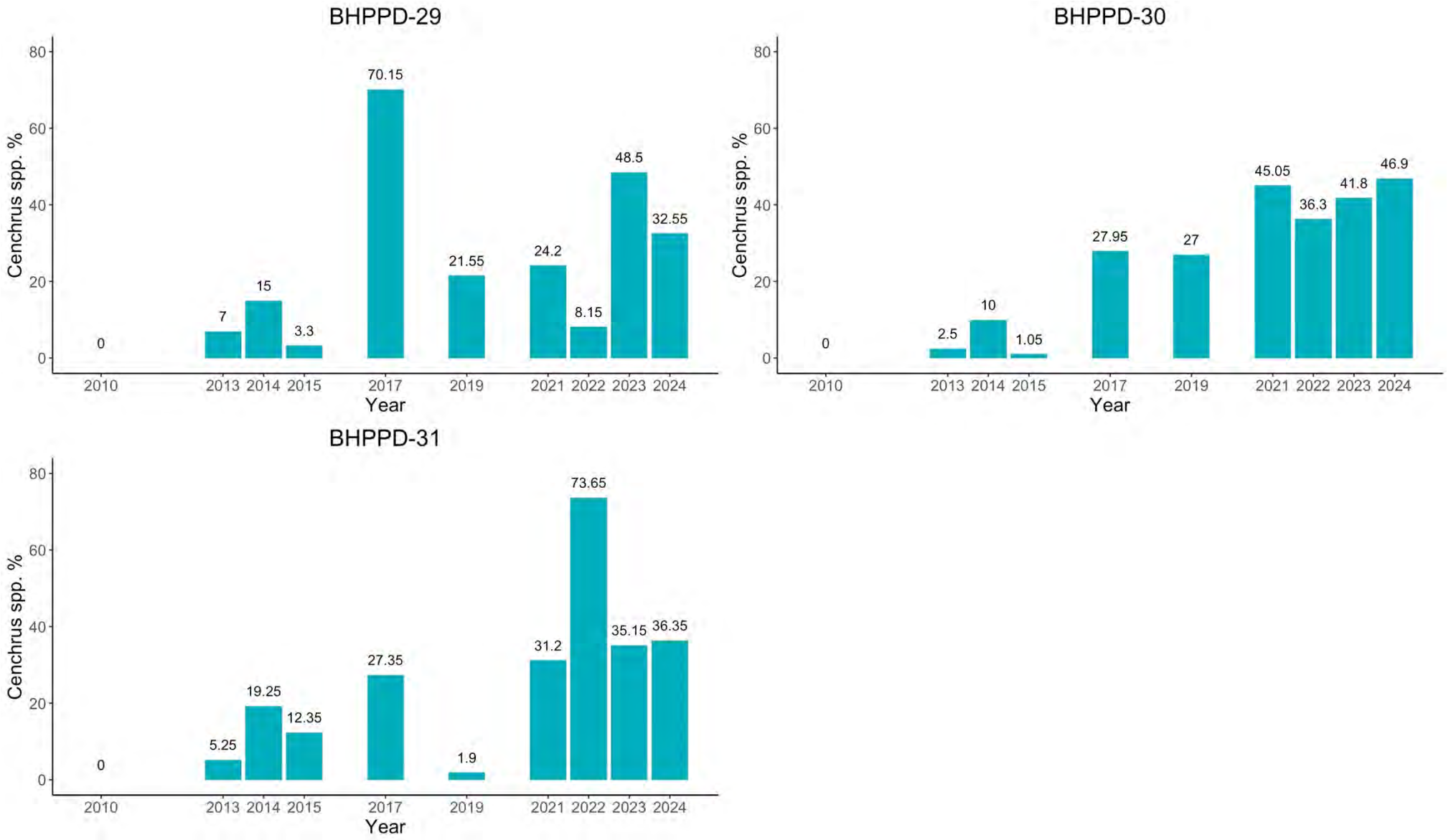


Figure 5.8: **Cover of **Cenchrus* spp. recorded along line-transects across all monitoring phases (2 of 2).**

5.4 Development of Vegetation Cover

In addition to species diversity and weed coverage, a third parameter warrants investigation: the degree of development of vegetation in the rehabilitation areas. The amount of cover provided by native plants at each transect was calculated for the different growth form and longevity classes (i.e. hummock grasses, perennial tussock grasses, shrubs and trees, and annual grasses and annual herbs). This is presented along with the cover of **Cenchrus* spp. in Appendix 2.

Some of the rehabilitation transects have clearly developed a substantially higher cover of vegetation post-clearing than others, and the proportion of the different life form classes has often changed over the nine monitoring phases since the areas were cleared. This information has been incorporated into the qualitative assessment in Section 5.5.

5.5 Summary Overview of Transect Condition

The data recorded during the survey were summarised to provide a broad qualitative assessment of the transects monitored in 2024. Transects were assigned to one of five categories (Excellent, Good, Fair, Poor or Very Poor) depending on the degree of perennial native vegetation cover, its similarity to original vegetation composition, and the level of invasion by weeds (principally **Cenchrus* spp.; see Table 3.4). The effect of fire was excluded from this process as far as possible.

Most of the analogue transects monitored in 2024 (six of the seven) were in Excellent condition, with the exception of **BHPPA-30** in the Mt Minnie conservation area; transect **BHPPA-30** was ranked as Very Good to take into account the presence of juvenile **Cenchrus ciliaris* individuals either within the strip-transect or intersecting the transect line.

Half of the rehabilitation transects were ranked as being in Excellent condition (see Table 5.4). The remaining five transects were ranked as Good (**BHPPD-23**), Fair (**BHPPD-28**), Poor (**BHPPD-29** and **BHPPD-31**) and Very Poor (**BHPPD-30**), reflecting the lack of development of native vegetation and/or substantial development of weeds (**Cenchrus* spp.).

Rehabilitation transect **BHPPD-23** has improved in qualitative assessment of vegetation development since 2023; whereas **BHPPD-28**, **BHPPD-29**, **BHPPD-30**, **and BHPPD-31** have declined in overall development of native vegetation, mainly due to the increase in cover of **Cenchrus* recorded in 2024. The remaining transects exhibited a similar level of vegetation development in 2024 to that observed in 2023.

Table 5.4: Qualitative assessment of the development of vegetation on the rehabilitation transects in 2024.

Transect	2017	2019	2021	2022	2023	2024 - Overall Ranking and Comments
BHPPD-22	Excellent	Excellent	Excellent	Excellent	Excellent Perennial *Acacia* mature and flowering, increasing in 2023 to above pre-clearing levels; spinifex is above pre-clearing levels and has been steady over the last five phases. Perennial herbs maintained level of cover since 2022.	Excellent Site has been recently burnt, but small *Triodia* are still present, along with low cover of native shrubs. No **Cenchrus* present at site.
BHPPD-23	Good	Good	Good (towards Excellent)	Good (towards Excellent)	Fair Spinifex cover steady from 2022, however still 30% less than pre-clearing levels; *Acacia ancistrocarpa* has decreased in cover to only a presence (0.1%). *Acacia bivenosa, A. stellaticeps*, and *A. trachycarpa* yet to approach pre-clearing levels. **Cenchrus* spp. increased from 5% to 22.6% in 2023.	Good Site has been recently burnt, but retains some shrubs, small hummock grasses and annual herbs. Only three **Cenchrus* individuals present in strip transect, but this is likely due to the fire rather than a genuine, permanent reduction.
BHPPD-24	Excellent	Excellent	Excellent	Excellent	Excellent Steady cover of mature spinifex since 2017 which is still 15% greater than the pre-clearing levels; the cover of spinifex appear to be at a level that is representative of the surrounding vegetation; *Acacia* spp. appear to be dead and absent in the 2022 monitoring again; no weeds recorded within the sites and surrounding vegetation.	Excellent Transect has been recently burnt but lies on the edge of the fire scar. Current foliar cover is <1% but nearby unburnt area contains healthy hummocks and *Acacia* shrubs. No **Cenchrus* present in vicinity.
BHPPD-25	Good	Good	Excellent	Excellent	Excellent Spinifex has regenerated to the levels prior to the 2017 fire and increased from 2022 levels by 10% - spinifex cover is now only 4% less than that observed pre-clearing. Mature *Acacia* spp. present; spinifex and *Acacia* spp. appear to be at a level that is representative of the greater area; as expected with trees post-clearing, scattered *Corymbia hamersleyana* and *Eucalyptus xerothermica* are still absent; no weeds recorded within the sites and surrounding vegetation.	Excellent Hummocks are healthy and approaching pre-clearance levels. *Acacia* shrubs appear healthy but still absent within clearing footprint. No **Cenchrus* present at site.
BHPPD-26	Good	Good	Excellent	Excellent	Excellent Almost identical to analogue site (strata and species composition): spinifex and *Acacia* spp. cover has exceeded pre-clearing levels with the continued absence of *Corymbia hamersleyana* (as expected with trees post-clearing); annual grasses and herbs have mostly disappeared since 2021; no weeds have been recorded within the sites or in the surrounding vegetation; the rehabilitation and analogue sites are very similar in terms of strata and percentage cover.	Excellent Again, almost identical to analogue site (strata and species composition): spinifex and *Acacia* spp. cover has exceeded pre-clearing levels with the continued absence of *Corymbia hamersleyana* (as expected with trees post-clearing); no weeds have been recorded within the sites or in the surrounding vegetation; the rehabilitation and analogue sites are very similar in terms of strata and percentage cover.
BHPPD-27	Fair	Excellent	Good	Good (verging on Excellent)	Excellent Spinifex cover has continually increased since 2013 to half of pre-clearing levels in 2022; cover of *Acacia ancistrocarpa* and *A. inaequilatera* has remained steady since 2022; overall there is positive indication that vegetation structure is tending towards its natural state; decrease in annual grasses *Aristida contorta* and *Paspalidium clementii*; no weeds were recorded within the sites or in the surrounding vegetation.	Excellent Several *Acacia inaequilatera* shrubs are establishing within clearing footprint, along with small *Triodia hummocks* and *Aristida* tussocks, though some open patches are still present. No **Cenchrus* present in area.

Transect	2017	2019	2021	2022	2023	2024 - Overall Ranking and Comments
BHPPD-28	Excellent	Excellent	Excellent	Excellent	Good (trending to Fair) Spinifex cover has again decreased slightly since 2022 and is now 10% less than pre-clearing levels; cover of *Acacia* spp. shrubs is still very low compared to pre-clearing with mature *Acacia ancistrocarpa* and *A. bivenosa* in the surrounding non-cleared vegetation; less mature *Acacia* appear to be present over the clearing footprint; in 2022 the cover of **Cenchrus* was recorded as 0.2% along the line-intercept and the cover in the surrounding rehabilitated area was minimal, but **Cenchrus* spp. increased to 7.5% cover in 2023.	Fair (trending to Poor) **Cenchrus* has increased to 14.65% cover in the clearing footprint, with a reduced cover of spinifex and scattered *Acacia inaequilatera* shrubs in the vicinity. Strong recruitment of native herbs and tussock grasses. Large amounts of cattle tracks.
BHPPD-29	Very Poor	Poor	Poor	Fair	Poor No spinifex or *Acacia* have established along the transect (or in the surrounding cleared footprint) following clearing; cover of **Cenchrus* has increased to its highest level since 2017. **Cenchrus* spp. increased by 40% in 2023. Overall, the rehabilitation site does not represent the pre-clearing vegetation cover levels.	Poor Transect is completely devoid of perennial native species, and has <1% cover of native annual species. Less than 10 *Triodia* seedlings were observed within 20 metres. Patches of healthy **Cenchrus* juveniles and many **Cenchrus* seedlings present. Large swathes of **Cenchrus* have died off from previous spraying.
BHPPD-30	Poor	Poor	Very Poor	Poor	Poor (verging on Very Poor) Spinifex has re-established on the transect and is continuing the trend towards pre-clearing levels, remaining at a steady 33-38% since 2017 which is somewhat a promising indicator; perennial shrubs (*Acacia* and *Senna*) have remained steady since the last phase and annual grasses are absent all together; the cover of **Cenchrus* remains high despite a decrease of 9% since 2021. **Cenchrus* spp. increased by 5.5% to 41.8% in 2023.	Very Poor **Cenchrus* contributed 46.9% cover and has begun to dominate the grass layer; the cover of hummock grasses has reduced. Spraying has killed older **Cenchrus* individuals (as well as some small *Triodia* hummocks), but widespread swathes have established in the area. Cattle tracks are also present at site.
BHPPD-31	Poor	Good	Poor	Very Poor	Poor Spinifex cover remains steady since 2021 but is still 22% less than pre-clearing levels; the cover of *Acacia* species is non-existent, however *Acacia* shrubs in the broader area (not cleared) are in healthy condition and flowering; there was a slight increase in annual grasses. **Cenchrus* spp. decreased significantly from 73.65% in 2022 to 35.15% in 2023. Overall, the Rehabilitation site does not represent pre-clearing vegetation cover levels.	Poor Spinifex cover and perennial herb cover have decreased slightly. Recruitment of an *Acacia bivenosa* shrub has occurred, however **Cenchrus* cover is persistent and makes up the majority of foliar cover at 36.35%, with many new seedlings following rain. Numerous cattle tracks and scats are also present.

6.0 Conclusions

6.1 Satisfaction of Completion Criteria

When assessing rehabilitation progress against the completion criteria, consideration needs to be given to the existing pipeline access track, and its potential to act as a vector for weed introduction along the pipeline disturbance corridor, particularly in areas that are currently weed free or where vegetation has not become adequately established.

With regards to the criteria for the rehabilitation areas listed for Condition 8 of MS844:

(1) Species diversity is not less than 60 per cent of the known original species diversity.

This criterion has been met for species richness (native species count) in all the monitored transects. In the absence of threatening factors such as weed invasion, revegetation in the study area is 'Excellent' in the northwestern transects but 'Very Poor' in the southeastern transects. It is expected to continue to develop towards a floristic community and composition more aligned with pre-clearing levels in the longer term.

(2) Weed coverage is equal to or less than that of pre-cleared levels.

The criterion for Condition 8 in MS844 has again not been met for rehabilitation transects **BHPPD-23**, **BHPPD-28**, **BHPPD-29**, **BHPPD-30** and **BHPPD-31** in 2024 with regard to the cover of the introduced tussock grasses **Cenchrus ciliaris* (Buffel Grass) and **C. setiger* (Birdwood Grass).

When comparing the 2024 results to those of 2023, **Cenchrus ciliaris* and **C. setiger* had decreased in abundance (as measured by their percent cover along the line transect) at **BHPPD-23** (which had been recently burnt) and at **BHPPD-29** (which was unburnt); had increased significantly at **BHPPD-28** and slightly at **BHPPD-30** and **BHPPD-31**; and effectively remained the same at **BHPPD-31**. Provided that continued spraying of these species is undertaken within the rehabilitated areas at the appropriate times and intensity of effort over the course of the next several seasons, it would be expected that the cover of **Cenchrus* spp. should decrease and begin to trend towards pre-clearing levels.

6.2 Rehabilitation within the Mt Minnie Conservation Area

While most of the rehabilitation transects sampled in the Mt Minnie conservation area showed Good to Excellent vegetation development, with few or no weeds, three transects remained in Poor to Very Poor condition in 2024, with a fourth considered to be Fair:

- Transect **BHPPD-28** was considered Fair, with cover of **Cenchrus ciliaris* tussock grasses doubling from 7.50% in 2023 to 14.65% in 2024. There was still no development of spinifex or perennial shrubs over the course of monitoring. Cattle tracks were observed for the first time in 2024 throughout the area surrounding the transect.
- Transect **BHPPD-29** was considered Poor, with a high cover of **Cenchrus ciliaris* tussock grasses (32.55%) and no development of spinifex or perennial shrubs over the course of monitoring. Notably, **Cenchrus* cover had decreased by 16% since the last phase.

- Transect **BHPPD-30** was considered Very Poor. It shows a reasonable development of both spinifex and perennial shrub cover, but the cover of **Cenchrus* has remained high since 2017 with an increase to a total of 46.9% since the last monitoring phase. Cattle tracks were observed for the first time in the area in 2024.
- Transect **BHPPD-31** was considered Poor. Spinifex and perennial herb cover had decreased slightly and remained at less than pre-clearing levels, with **Cenchrus* cover remaining relatively steady (increasing by 1.2%). Cattle tracks were observed for the first time in the area in 2024.

In addition, transect **BHPPD-23** was ranked as Good in 2024 due to only three **Cenchrus ciliaris* individuals being recorded. This was a significant decrease from 22.6% in 2023, when the condition of this transect was ranked as Fair. However, the ranking in 2024 is considered an artefact of the site having been recently burnt, and it is likely that **Cenchrus* will re-establish in the area post-fire.

6.3 Likely Progression of Rehabilitation Transect Vegetation

Prior to the 2019 survey, DBCA requested discussion of the likely progression of revegetation in the rehabilitation areas situated within the Mt Minnie conservation area in the short term (2-5 years), medium term (5-10 years) and long term (10-20 years). Based on the data recorded from the monitoring transects to date, vegetation development is clearly variable in different areas, and would be expected to progress differently over time.

Transects ranked as 'Excellent' comprised **BHPPD-22, BHPPD-24, BHPPD-25, BHPPD-26** and **BHPPD-27** (see Table 5.4). Vegetation at these transects is relatively comparable to that which existed prior to clearing, with a similar or sometimes greater amount of vegetation cover and no weeds. This vegetation would be expected to continue to develop in the short term, with additional species recruiting from the soil seed bank and adjacent areas. In the medium and long term, vegetation at the rehabilitation transects would be expected to remain stable over time, with major changes arising only due to disturbance events such as fire, or long-term shifts in the amount of rainfall received. **BHPPD-22** was recently burnt prior to the current survey, but is still considered to be in 'Excellent' condition.

Transect **BHPPD-23** was ranked as 'Good' (Table 5.4). This transect had been burnt prior to the current survey and the cover of **Cenchrus* along the line transect had reduced from 22.6% in 2023 to 0% in 2024, with only a few individuals recorded within the strip transect. The cover of spinifex had also decreased dramatically but would be expected to return towards pre-clearing levels in the long term. Perennial shrubs (*Acacia* and *Senna*) had increased slightly since the last phase and opportunistic annual herbs were recorded in 2024 following the fire. It is likely that the native vegetation cover, particularly the perennial woody shrubs and spinifex, will only re-establish at higher levels if the population of **Cenchrus* spp. in the surrounding vegetation is controlled in the medium to long term.

Transect **BHPPD-28** was ranked as 'Fair' (Table 5.4). The cover of native perennial vegetation along this transect was approaching the percentage recorded in 2010 prior to clearing, although the proportions of shrubs and spinifex were often dissimilar (typically more shrubs and less spinifex). A notable increase in **Cenchrus* was recorded, almost doubling from 7.50% cover in 2023 to 14.65% cover in 2024. In the absence of substantial weeds, the native vegetation cover would be expected increase to reach the pre-clearing levels within 5 years and then remain relatively stable over time. Unless spot spraying is undertaken at **BHPPD-28**,

however, it is expected that **Cenchrus* spp. levels would continue to increase over the short to medium term.

Transects ranked as 'Poor' comprised **BHPPD-29 and BHPPD-31** (Table 5.4):

- Although there was a lack of development of perennial vegetation at **BHPPD-29** (no hummock grassland of *Triodia glabra* and no shrubland of *Acacia synchronicia* and *A. xiphophylla* that existed prior to clearing), the current cover of **Cenchrus* spp. at this transect (32.55%) had decreased from the 48.50% recorded in 2023; the level of **Cenchrus* spp. would be expected to decline in the short to medium term with continued spraying. The perennial *Acacia* shrubs and *Triodia* hummocks would only be expected to establish fully in the long term given favourable conditions and the absence of competition from **Cenchrus* spp., both within and surrounding the transect.
- At **BHPPD-31**, it is unlikely that the cover of *Acacia xiphophylla* will return to pre-clearing levels of 72%, with colonisation of *A. bivenosa* shrubs along this transect only likely in the very long term. Spinifex cover has remained steady since 2021 but was still 25% less than pre-clearing levels. The cover of **Cenchrus* had decreased significantly from 73.65% in 2022 to 36.35% in 2024. The greater area surrounding **BHPPD-31** continues to support large, permanent populations of *A. xiphophylla*, and as a whole presents as a stable, healthy vegetation unit.

Transect **BHPPD-30** was ranked as 'Very Poor' (Table 5.4). Hummock grasses were at half of the pre-clearing levels, whilst perennial woody shrubs provided 15.75% cover (8% less than the 23.5% recorded in 2010). The cover of **Cenchrus* has ranged between 27-47% over the last six phases, with the highest value recorded in 2024. As at **BHPPD-29,** it would only be expected that the perennial *Acacia* shrubs would become established in the long term given favourable conditions and the absence of competition from **Cenchrus* spp.

For transects **BHPPD-28**, **BHPPD-29**, **BHPPD-30**, and **BHPPD-31**, the presence of substantial amounts of **Cenchrus* spp. is likely to influence the development of native vegetation, through competition for resources and allelopathy. The presence of **Cenchrus* spp. is not the only factor influencing slow revegetation, however it is likely to be a significant factor over time, particularly for transects at which the cover of weeds is still moderate or high following herbicide spraying. In the short to medium term, it is expected that the cover of native vegetation may still increase, however it is also likely that the cover of **Cenchrus* spp. will continue to increase unless continued herbicide spraying is undertaken. It is therefore unlikely that native vegetation will be able to re-establish to a similar state as was present prior to clearing, without continued weed control efforts.

To ameliorate the current long-term trend of a stable to increasing **Cenchrus* population (specifically in the southeastern part of the study area), it is recommended that the **herbicide treatment plan is a bi-annual occurrence for at least seven years** to eradicate the species from the soil seedbank.

6.4 Recommendations of DBCA Review

With regards to meeting the four recommendations outlined by the DBCA in 2018 (see Section 2.2):

Recommendation 1

Woodside completed a weed survey of the ROW in July 2018, and appointed a contractor to complete herbicide spraying of **Cenchrus* spp. infestations and individuals along the section

situated within the proposed Mt Minnie conservation area in Q3 of the same year, July of 2019, October 2020, November 2021, May 2022, April 2023, August 2023, and April 2024.

Additionally, Woodside commissioned Biota to undertake additional phases of rehabilitation and weed monitoring in March/April 2019, May 2021, May 2022, April 2023, and July 2024 following appropriate rainfall.

Recommendation 2

In order to address completion criteria required by Condition 8-3 under MS844, it is again recommended that the following contingency management measures are implemented:

a) for the pipeline disturbance corridor, especially the section within the Mt Minnie conservation area, it is recommended that as a minimum standard, ongoing herbicide spraying of **Cenchrus* spp. is undertaken when conditions are appropriate. Additionally, opportunistic (reactive) spraying of populations should be undertaken following appropriate rainfall events (multiple rainfall events over consecutive days totalling 6.5-20 mm) to ensure both mature individuals and germinating seedlings are targeted.

b) that vehicles and machinery utilising the ROW within the pipeline gas corridor adhere to the current Woodside weed hygiene management practices.

Recommendation 3

To date, Woodside has completed herbicide spraying of **Cenchrus* spp. populations in Q3 of 2018, July of 2019, October 2020, November 2021, May 2022, April 2023, August 2023, and April 2024. Additionally, weed hygiene protocols have been implemented and utilised for all vehicles and machinery traversing the ROW within the Mt Minnie conservation area.

Recommendation 4

Woodside, along with the results and conclusions of this report, recognises that the existing pipeline access track is likely to be acting as a vector for weed introduction along the pipeline disturbance corridor. In 2024 cattle tracks were recorded at multiple sites within the Mt Minnie conservation area, representing an additional vector for weed introduction and spread. Current weed hygiene protocols are in place to prevent the spread of weeds along the pipeline access track. Appropriately timed, herbicide application to **Cenchrus* spp. populations, will need to be adopted as a continual, ongoing effort for several years in order to control and prevent the spread of weeds into the surrounding vegetation.

7.0 References

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Appendix 1 2024 Monitoring Transect Coordinates

ANALOGUE TRANSECTS

Transect ID	Peg Location – 0 m (start)		Peg Location – 20 m (end)	
	Easting	Northing	Easting	Northing
BHPPA-22	308722	7581767	308707	7581757
BHPPA-23	310680	7579965	310663	7579949
BHPPA-24	324359	7572037	324352	7572018
BHPPA-26	329727	7568156	329716	7568139
BHPPA-28	338649	7561624	338638	7561607
BHPPA-29	339668	7560530	339663	7560510
BHPPA-30	340703	7559306	340696	7559287

REHABILITATION TRANSECTS

Transect ID	Peg Location – 0 m (start)		Peg Location – 20 m (end)	
	Easting	Northing	Easting	Northing
BHPPD-22	308753	7581829	308743	7581814
BHPPD-23	310693	7580026	310681	7580010
BHPPD-24	324437	7572060	324428	7572043
BHPPD-25	326911	7570292	326903	7570273
BHPPD-26	329764	7568214	329760	7568195
BHPPD-27	332180	7566205	332173	7566188
BHPPD-28	338709	7561652	338704	7561632
BHPPD-29	339711	7560604	339703	7560590
BHPPD-30	340706	7559391	340699	7559379
BHPPD-31	341811	7558474	341800	7558458

Appendix 2 Transect Photographs and Summarised Data (2010-2024)

Photographs of transects over the course of the monitoring program, together with summarised data from the monitoring transects.

Cover of each lifeform category along the line transect.

Values in table are the percentage of the 20 m line transect occupied by each native lifeform category at each site, along with the percentage occupied by weeds. (Note that **Cenchrus* tussock grasses were the only weeds recorded on the line transects, although other weeds were sometimes present in the broader sites.)

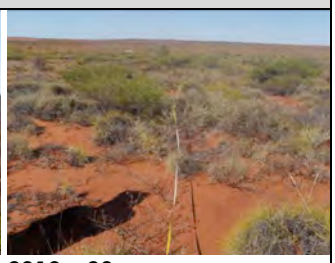
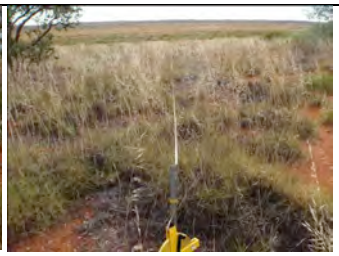
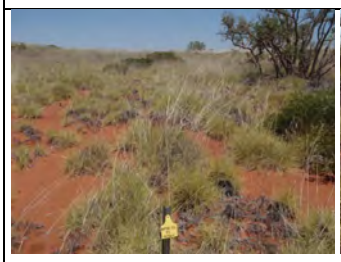
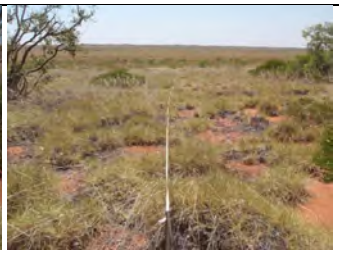
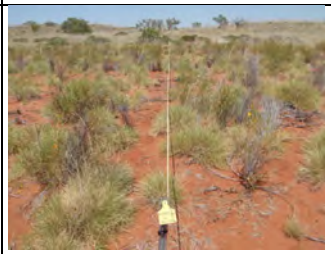
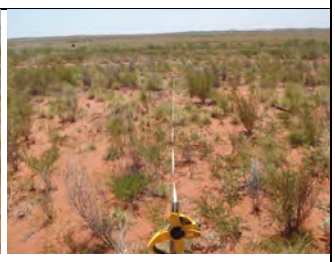
Covers and presence of individual species.

Values in table are the percentage of the 20 m line transect occupied by each species at each site.

+ indicates additional species present in 1 m wide strip transect (note that the strip transect was only utilised from 2013 onwards).

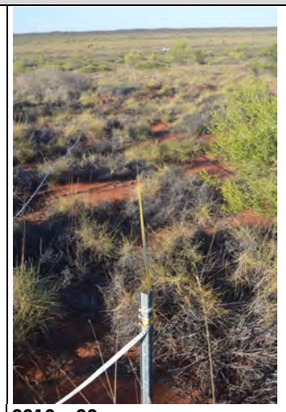
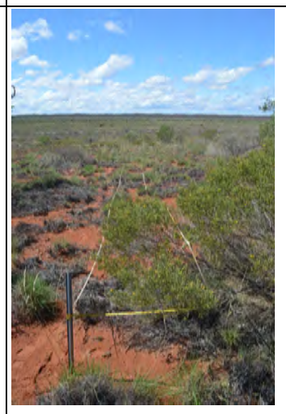
Site 22 (Mt Minnie conservation area)

Note: Burnt in August and/or November 2023.

Analogue Transect BHPPA-22		Rehabilitation Transect BHPPD-22	
			
2010 – 0 m	**2010 – 20 m**	**2010 – 0 m**	**2010 – 20 m**
			
2013 – 0 m	**2013 – 20 m**	**2013 – 0 m**	**2013 – 20 m**
			
2014 – 0 m	**2014 – 20 m**	**2014 – 0 m**	**2014 – 20 m**
			
2015 – 0 m	**2015 – 20 m**	**2015 – 0 m**	**2015 – 20 m**
			
2017 – 0 m	**2017 – 20 m**	**2017 – 0 m**	**2017 – 20 m**

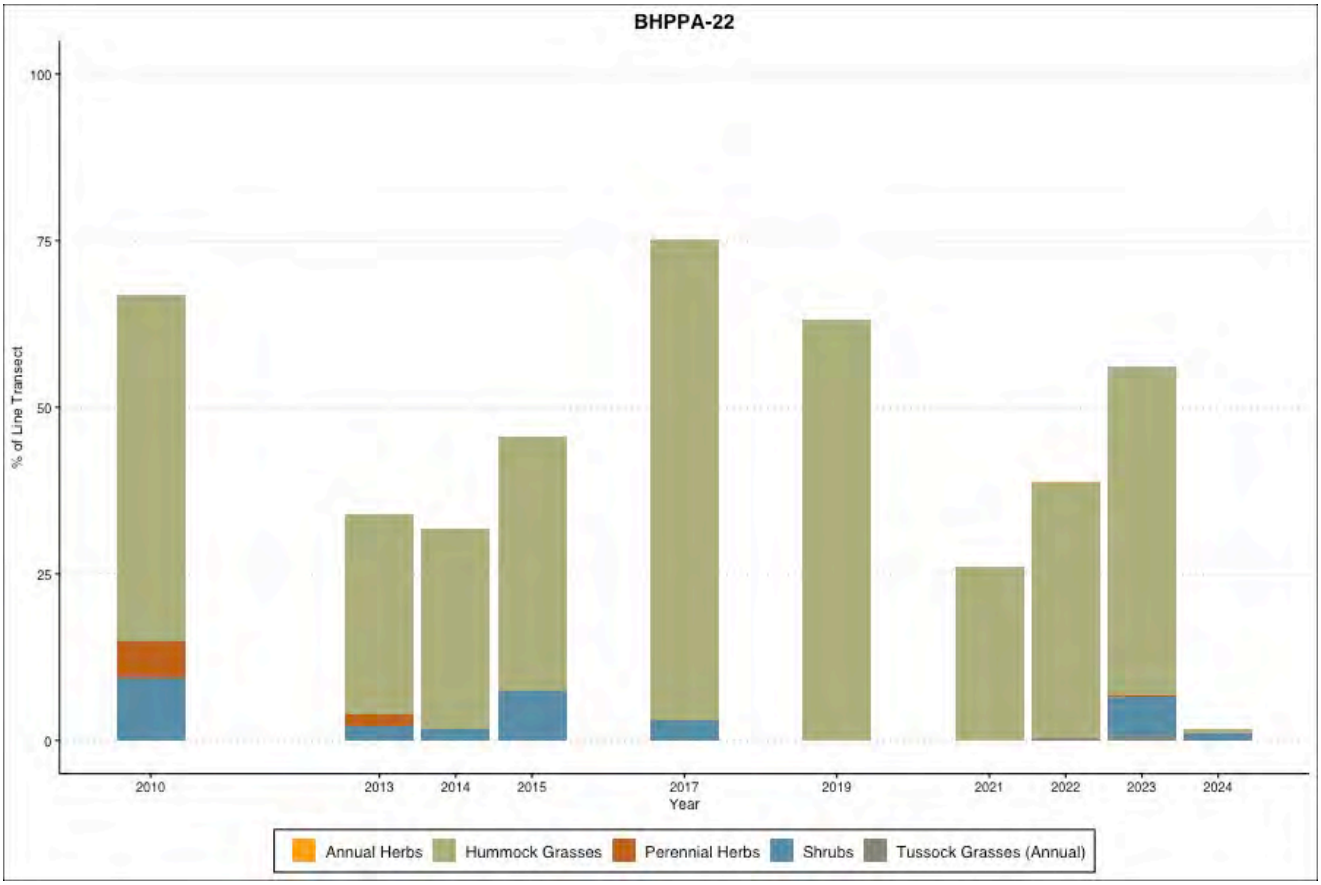
Site 22 (Mt Minnie conservation area)

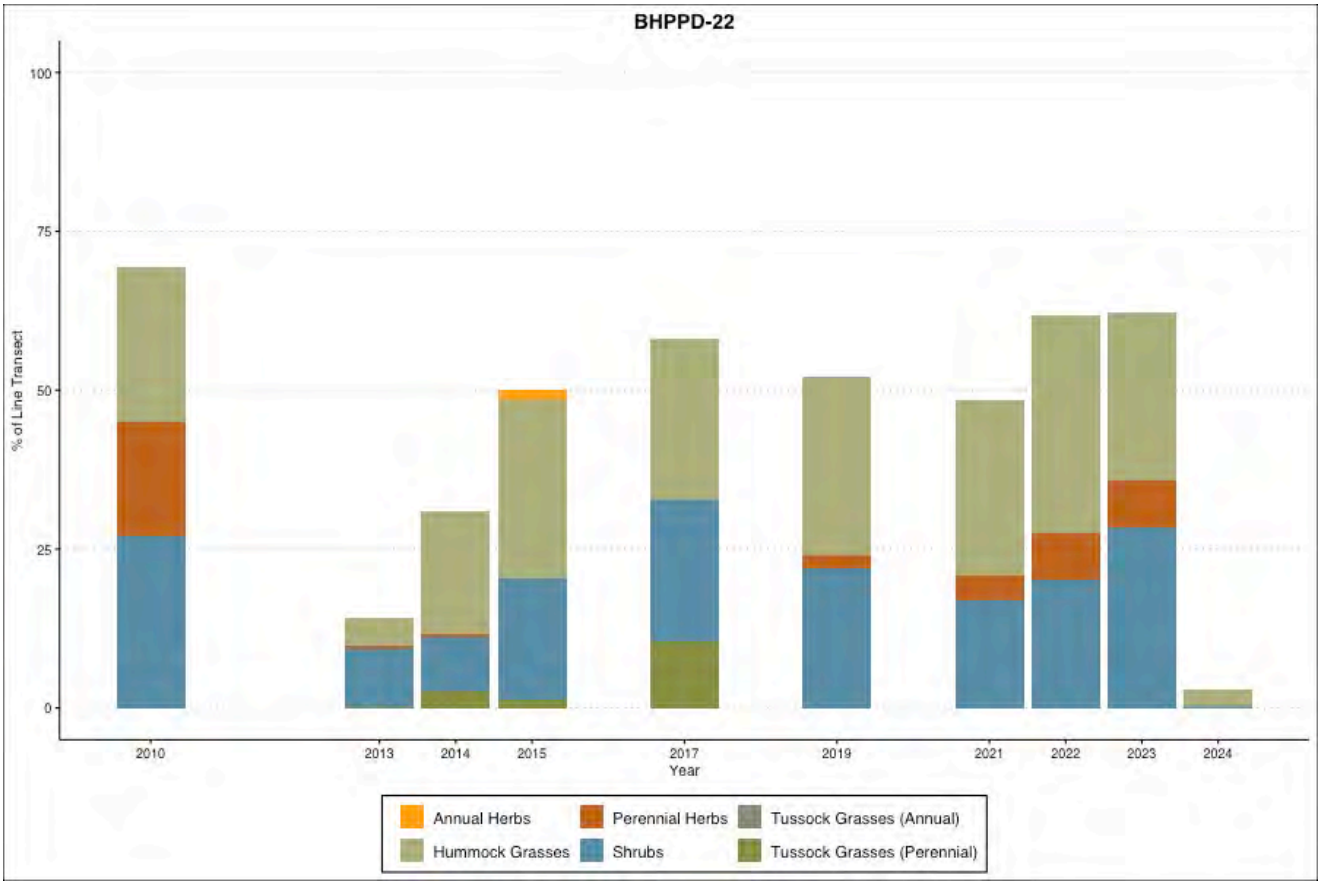
Note: Burnt in August and/or November 2023.

Analogue Transect BHPPA-22		Rehabilitation Transect BHPPD-22		Analogue Transect BHPPA-22		Rehabilitation Transect BHPPD-22	
							
2019 – 0 m	2019 – 20 m	2019 – 0 m	2019 – 20 m	2023 – 0 m	2023 – 20 m	2023 – 0 m	2023 – 20 m
							
2021 – 0 m	2021 – 20 m	2021 – 0 m	2021 – 20 m	2024 – 0 m	2024 – 20 m	2024 – 0 m	2024 – 20 m
							
2022 – 0 m	2022 – 20 m	2022 – 0 m	2022 – 20 m				

Cover of each lifeform category along the line transect.

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Analogue BHPPA-22	2010	5.55	52.05	9.30					
	2013	1.75	30.00	2.25					
	2014		30.00	1.75					
	2015		38.00	7.50					
	2017		72.25	3.05					
	2019		63.20						
	2021		26.15						
	2022	0.10	38.40	0.10				0.25	
	2023	0.40	49.20	5.90			0.55		
	2024		0.75	1.05					
Rehab BHPPD-22	2010	17.80	24.40	27.15					
	2013	0.35	4.40	9.10		0.25			
	2014	0.40	19.20	8.70		2.60			
	2015		28.20	19.10		1.25		1.45	
	2017		25.35	22.30		10.55			
	2019	2.05	28.05	22.05					
	2021	4.05	27.60	16.90					
	2022	7.40	34.40	20.05					
	2023	7.35	26.45	28.40					
	2024		2.65	0.20					


BHPPA-22
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Hummock Grasses
Perennial Herbs
Shrubs
Tussock Grasses (Annual)


BHPPD-22
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Hummock Grasses
Perennial Herbs
Shrubs
Tussock Grasses (Annual)
Tussock Grasses (Perennial)

Site 22 (Mt Minnie conservation area)

Note: Burnt in August and/or November 2023.

Cover and presence of individual species.

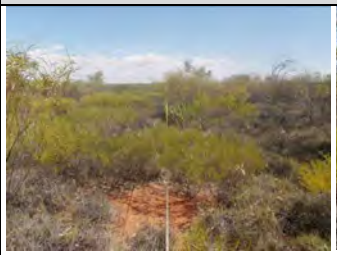
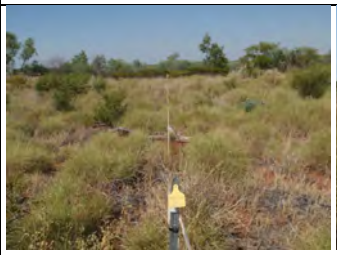
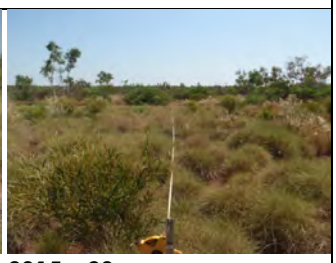
Family / Species	BHPPA-22										BHPPD-22									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Amaranthaceae																				
Ptilotus polystachyus								0.25		+								+		+
Convolvulaceae																				
Bonamia alatisemina								0.10	0.40	+			0.40		+			+	1.40	+
Bonamia erecta			+	+	+		+	+	+	0.40										
Polymeria lanata												0.35								
Cyperaceae																				
Bulbostylis barbata																				+
Fabaceae																				
Acacia stellaticeps							+	0.10	5.90		12.30	0.10	+	6.40	12.10	22.05	16.90	20.05	28.4	+
Petalostylis cassioides										+		8.75	8.70	12.70	10.20			+		+
Senna notabilis																				0.10
Swainsona ? kingii														1.45						+
Euphorbiaceae																				
Euphorbia sp.										+									+	
Goodeniaceae																				
Goodenia microptera				+					+	+									+	+
Scaevola parvifolia													+	+	+					
Lamiaceae																				
Dicrastylis cordifolia	9.30	2.25	1.75	7.50	3.05	+				0.10	7.85	0.25	+	+	+					0.10
Quoya paniculata											7.00									
Lauraceae																				
Cassytha capillaris					+				+						+	+	4.05	7.40	5.95	+
Cassytha sp.	5.55	1.75									17.8									
Malvaceae																				
Abutilon sp.										+										
Corchorus sp.								+		+										+
Sida echinocarpa										0.55										
Poaceae																				
Aristida holathera var. *holathera*									0.55	+		+		+					+	+
**Cenchrus ciliaris*																		+		
Eragrostis eriopoda												0.25	2.60	1.25	10.55					
Panicum australiense var. *australiense*										+										
Triodia epactia											22.45	4.15	18.45						1.25	
Triodia schinzii	52.05	30.00	30.00	38.00	72.25	63.20	26.15	38.40	49.2	0.75			+	25.80	21.85	28.05	22.15	25.55	20.90	0.25
Triodia glabra											1.95	0.25	0.75	2.40	3.50	+	5.45	9.85	4.30	2.40
Proteaceae																				
Grevillea stenobotrya														+	+					
Total no. of native species	**3**	**3**	**3**	**4**	**4**	**2**	**3**	**6**	**7**	**13**	**6**	**8**	**9**	**10**	**10**	**4**	**4**	**7**	**9**	**14**
Total no. of weed species	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**

Comments regarding site:

Rehabilitation was in 'Excellent' condition during 2024 monitoring. Both transects were severely burnt in late 2023 but the perennial shrub *Acacia stellaticeps* and spinifex (*Triodia schinzii* and *T.* glabra) were both present post-fire (representative of the surrounding vegetation), and it is expected that these will return to pre-fire covers over time. **Cenchrus ciliaris* was recorded for the first time in 2022 in the rehabilitation site but has not been recorded since. There is potential for **Cenchrus* spp. to colonise the site post -fire opportunistically.

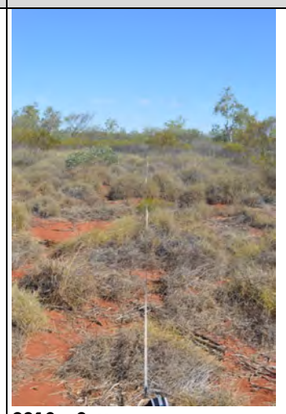
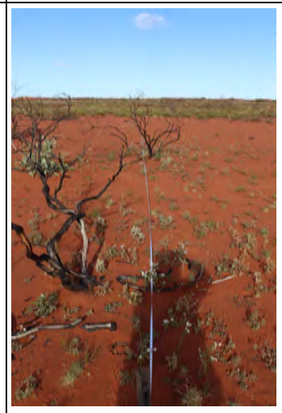
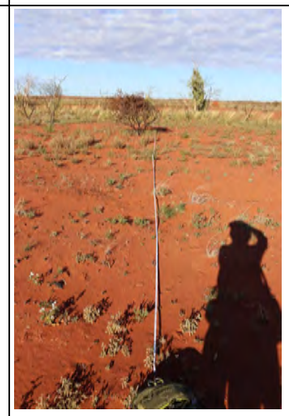
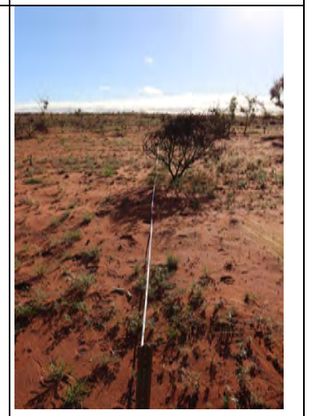
Site 23 (Mt Minnie conservation area)

Note: Burnt in August and/or November 2023.

Analogue Transect BHPPA-23		Rehabilitation Transect BHPPD-23	
			
2010 – 0 m	**2010 – 20 m**	**2010 – 0 m**	**2010 – 20 m**
			
2013 – 0 m	**2013 – 20 m**	**2013 – 0 m**	**2013 – 20 m**
			
2014 – 0 m	**2014 – 20 m**	**2014 – 0 m**	**2014 – 20 m**
			
2015 – 0 m	**2015 – 20 m**	**2015 – 0 m**	**2015 – 20 m**
			
2017 – 0 m	**2017 – 20 m**	**2017 – 0 m**	**2017 – 20 m**

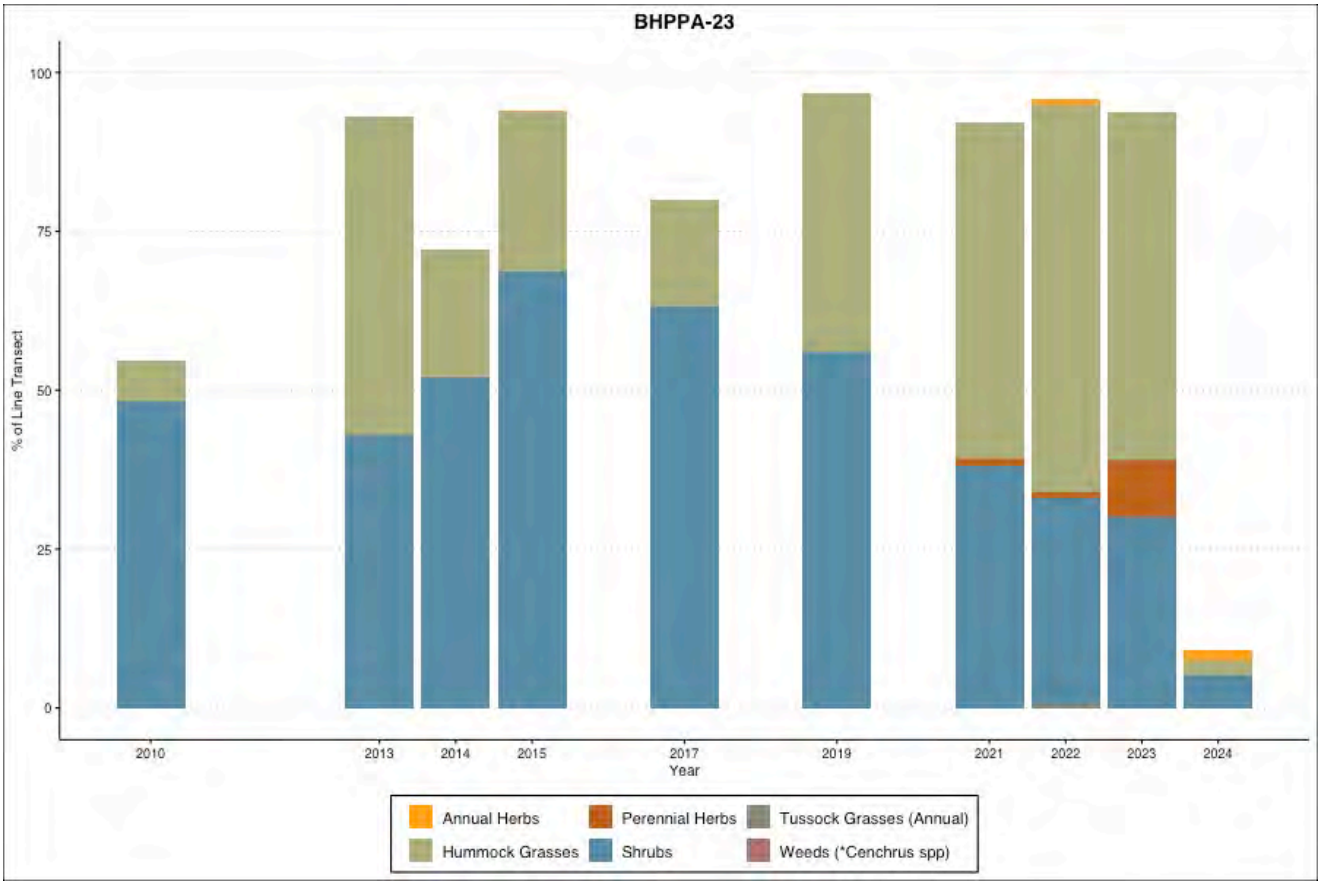
Site 23 (Mt Minnie conservation area)

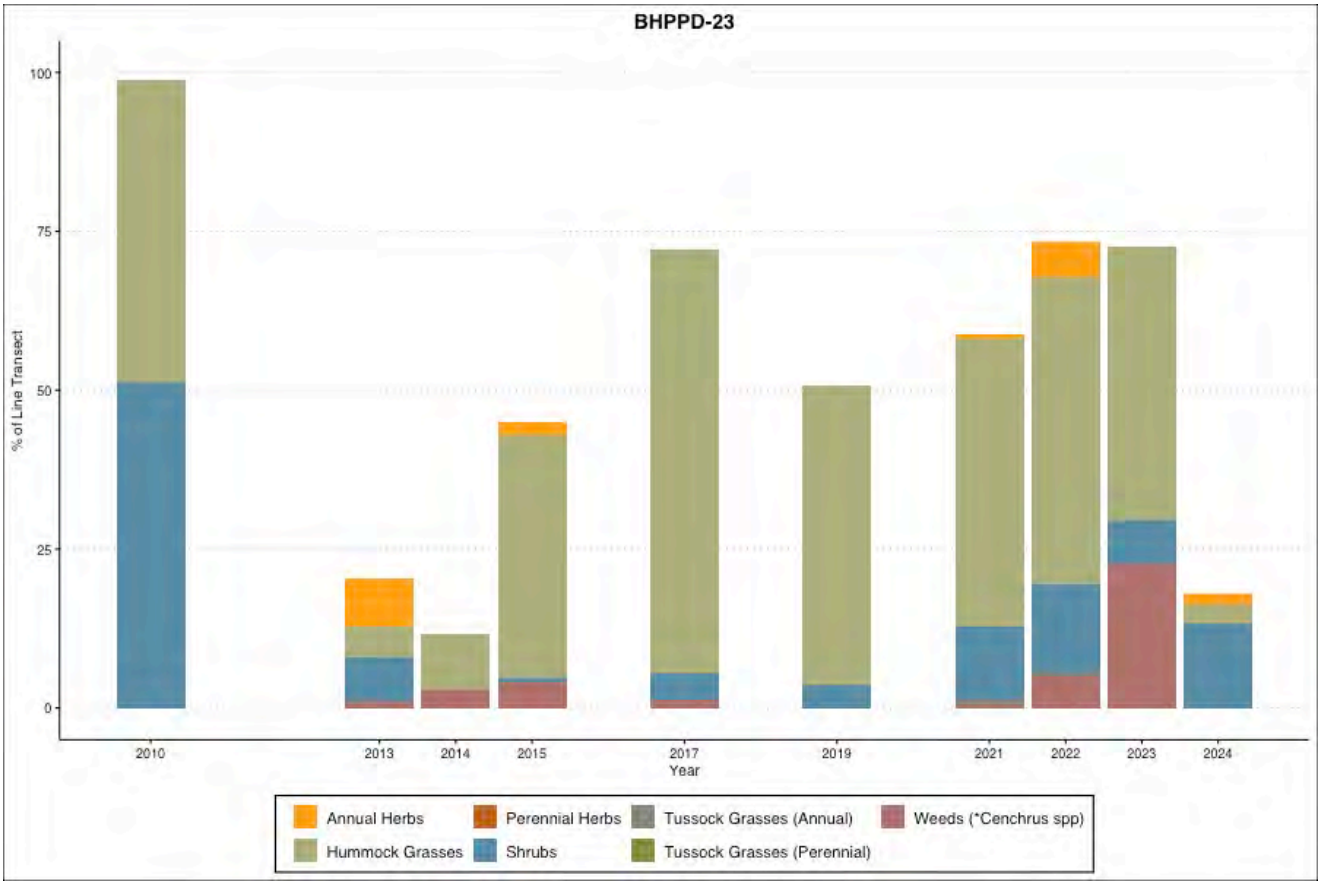
Note: Burnt in August and/or November 2023.

Analogue Transect BHPPA-23		Rehabilitation Transect BHPPD-23		Analogue Transect BHPPA-23		Rehabilitation Transect BHPPD-23	
							
2019 – 0 m	2019 – 20 m	2019 – 0 m	2019 – 20 m	2023 – 0 m	2023 – 20 m	2023 – 0 m	2023 – 20 m
							
2021 – 0 m	2021 – 20 m	2021 – 0 m	2021 – 20 m	2024 – 0 m	2024 – 20 m	2024 – 0 m	2024 – 20 m
							
2022 – 0 m	2022 – 20 m	2022 – 0 m	2022 – 20 m				

Cover of each lifeform category along the line transect.

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Analogue BHPPA-23	2010		93.70	48.25					
	2013		50.00	43.00					
	2014		20.00	52.10					
	2015		25.00	68.70				0.25	
	2017		76.55	63.15					
	2019		74.30	55.95					
	2021	1.00	53.00	38.15					
	2022	0.75	73.50	32.50			0.65	0.95	
	2023	8.80	80.40	30.15					
	2024		2.30	5.25				1.50	
Rehab BHPPD-23	2010		72.70	51.25					
	2013		4.75	7.00				7.75	1.00
	2014		8.75						3.00
	2015		38.05	0.85				2.00	4.00
	2017		66.75	4.15					
	2019		47.20	3.65					
	2021		45.30	11.45			0.90	0.65	0.45
	2022		44.35	13.85			0.65	5.60	5.00
	2023		42.85	7.05					22.60
	2024		3.10	13.20				1.65	


BHPPA-23
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Perennial Herbs
Tussock Grasses (Annual)
Hummock Grasses
Shrubs
Weeds (*Cenchrus spp)


BHPPD-23
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Perennial Herbs
Tussock Grasses (Annual)
Weeds (*Cenchrus spp)
Hummock Grasses
Shrubs
Tussock Grasses (Perennial)

Site 23 (Mt Minnie conservation area)

Note: Burnt in August and/or November 2023.

Cover and presence of individual species.

Family / Species	BHPPA-23										BHPPD-23									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Amaranthaceae																				
Ptilotus axillaris												1.00					+			0.15
Ptilotus polystachyus												4.75		0.10			+	5.50		1.25
Araliaceae																				
Trachymene oleracea								+												
Asteraceae																				
Pluchea dentex																		+		
Pluchea dunlopii				+																
Streptoglossa decurrens				+													+		+	
Boraginaceae																				
Heliotropium crispatum							+	0.95		1.50		2.00					+			+
Chenopodiaceae																				
Dysphania rhadinostachya subsp. rhadinostachya																	+			+
Cleomaceae																				
Arivela viscosa																	+	0.10		
Convolvulaceae																				
Bonamia alatisemina										+										+
Bonamia erecta												+	+	+						1.00
Evolvulus alsinoides var. *villosicalyx*					+													+	+	+
Cyperaceae																				
Bulbostylis barbata													+				0.65	+		
Euphorbiaceae																				
Euphorbia tannensis																	+			
Euphorbia tannensis subsp. *eremophila*								+												
Euphorbia boophthona																		+	+	+
Fabaceae																				
Acacia ancistrocarpa											8.55		+	0.85	2.75	3.65	3.50	9.90	+	+
Acacia bivenosa	40.50	37.50	43.50	56.05	55.25	55.95	37.40	32.50	28.00		4.05		+	+			+		+	
Acacia stellaticeps											30.90			+	1.40	+	5.20	3.45	2.60	
Acacia synchronicia	7.75	5.50	8.60	12.65	7.90	+	0.75	+	+											
Acacia trachycarpa											7.75									
Cullen martinii																				+
Indigofera boviperda subsp. *boviperda*								+		2.95				+			2.30	0.30	+	3.30
Indigofera colutea								+		+		+		1.90			+	+	+	0.25
Petalostylis cassioides														+						
Tephrosia sp. B Kimberley Flora (C.A. Gardner 7300)					+							+	+					+	+	3.05
Goodeniaceae																				
Goodenia microptera				0.25					+	+		+								
Lauraceae																				
Cassytha capillaris							1.00	0.75	8.80											
Malvaceae																				
Abutilon lepidum												1.00					0.45	+	3.40	
Abutilon otocarpum										+		3.00						0.20	1.05	+
Abutilon ? sp. Onslow (F. Smith s.n. 10/9/61)							+	+	0.30											
Abutilon sp.				+																
Corchorus sidoides subsp. *sidoides*										1.80							+		+	0.80
Gossypium australe										0.10										
Hibiscus sturtii														+						
Hibiscus sturtii var. *campylochlamys*					+															
Hibiscus sturtii var. *platychlamys*										+			+						+	+
Sida arsiniata									1.85	0.40				+						
Sida cardiophylla							+													
Sida echinocarpa																				0.35
Sida fibulifera								+				3.00					+	+	+	4.70
Sida sp.				+								+	+							
Montiaceae																				
Calandrinia sp.																		+		
Phyllanthaceae																				
Dendrophyllanthus erwinii																	+	+		
Nellica maderaspatensis				+																
Poaceae																				
**Cenchrus ciliaris*					+							1.00	2.00	2.00	+		+	1.15	+	

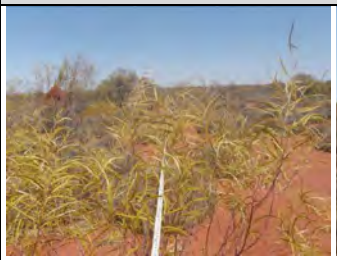
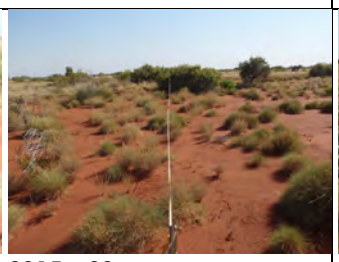
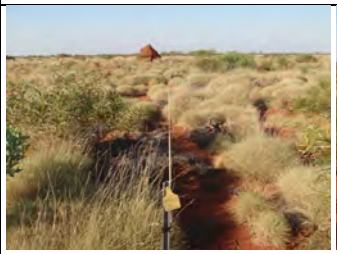
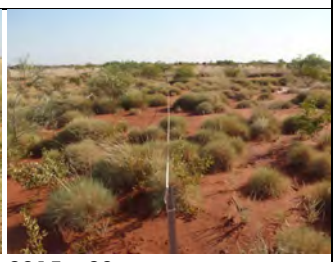
Family / Species	BHPPA-23										BHPPD-23									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
**Cenchrus setiger*					+				+				1.00	2.00			0.45	3.85	22.60	+
Chrysopogon fallax																			+	+
Eriachne aristidea																		0.35	+	+
Panicum australiense var. *australiense*										+							+			+
Paspalidium clementii								0.65									0.90	0.30		
Sporobolus australasicus								+												
Triodia epactia	92.45	30.00	15.00	25.00	70.65	61.00	27.45	45.75	54.85	1.90	66.55	4.50	7.50	30.00	62.00	47.20	36.65	28.45	35.45	3.10
Triodia glabra	1.25	20.00	5.00		5.90	13.30	25.55	27.75	25.55	0.40	6.15	0.25	1.25	8.05	4.75	+	8.65	15.90	7.40	
Portulacaceae																				
Portulaca oleracea												+								
Total no. of native species	**4**	**4**	**4**	**9**	**9**	**4**	**8**	**14**	**8**	**13**	**6**	**14**	**9**	**12**	**4**	**4**	**21**	**20**	**18**	**23**
Total no. of weed species	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**2**	**2**	**1**	**0**	**2**	**2**	**2**	**1**

Comments regarding site:

Rehabilitation was in 'Good' condition during 2024 monitoring, with both transects severely burnt in late 2023. Overall, spinifex and perennial shrubs are almost non-existent due to the fire, with 3% *Triodia epactia* currently in the rehabilitation transect. A relatively high percentage of **Cenchrus* spp. was recorded in the transect and the surrounding vegetation during the 2023 monitoring, however in 2024 only three individuals were recorded within the rehabilitation strip transect; note that their absence is likely due to the recent fire disturbance. There is a high likelihood that **Cenchrus* spp. will recolonise the site post-fire.

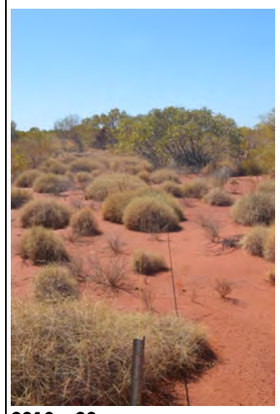
Site 24 (Mt Minnie conservation area)

Note: Burnt in August and/or November 2023.

Analogue Transect BHPPA-24		Rehabilitation Transect BHPPD-24	
			
2010 – 0 m	**2010 – 20 m**	**2010 – 0 m**	**2010 – 20 m**
			
2013 – 0 m (burnt)	**2013 – 20 m (burnt)**	**2013 – 0 m**	**2013 – 20 m**
			
2014 – 0 m	**2014 – 20 m**	**2014 – 0 m**	**2014 – 20 m**
			
2015 – 0 m	**2015 – 20 m**	**2015 – 0 m**	**2015 – 20 m**
			
2017 – 0 m	**2017 – 20 m**	**2017 – 0 m**	**2017 – 20 m**

Site 24 (Mt Minnie conservation area)

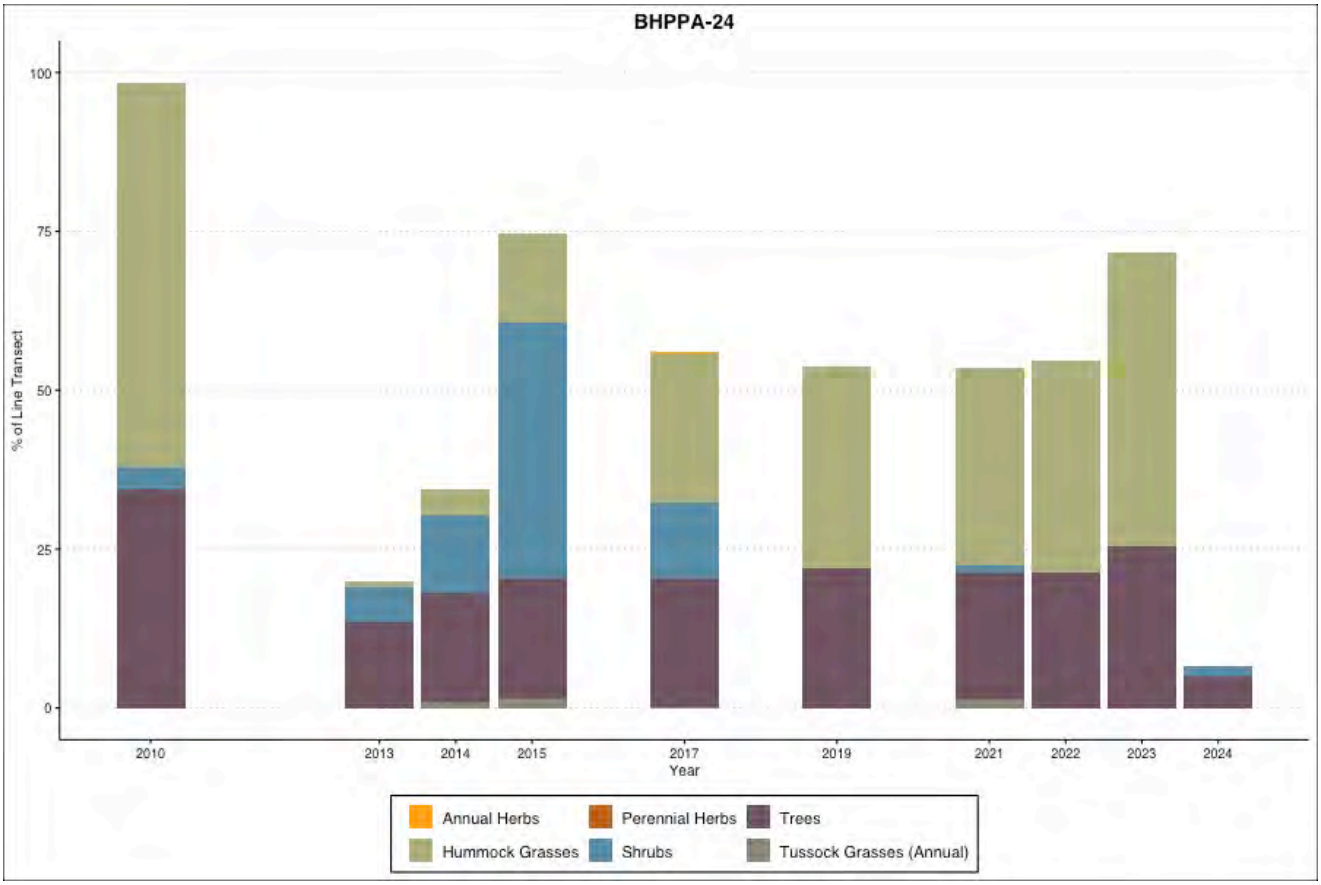
Note: Burnt in August and/or November 2023.

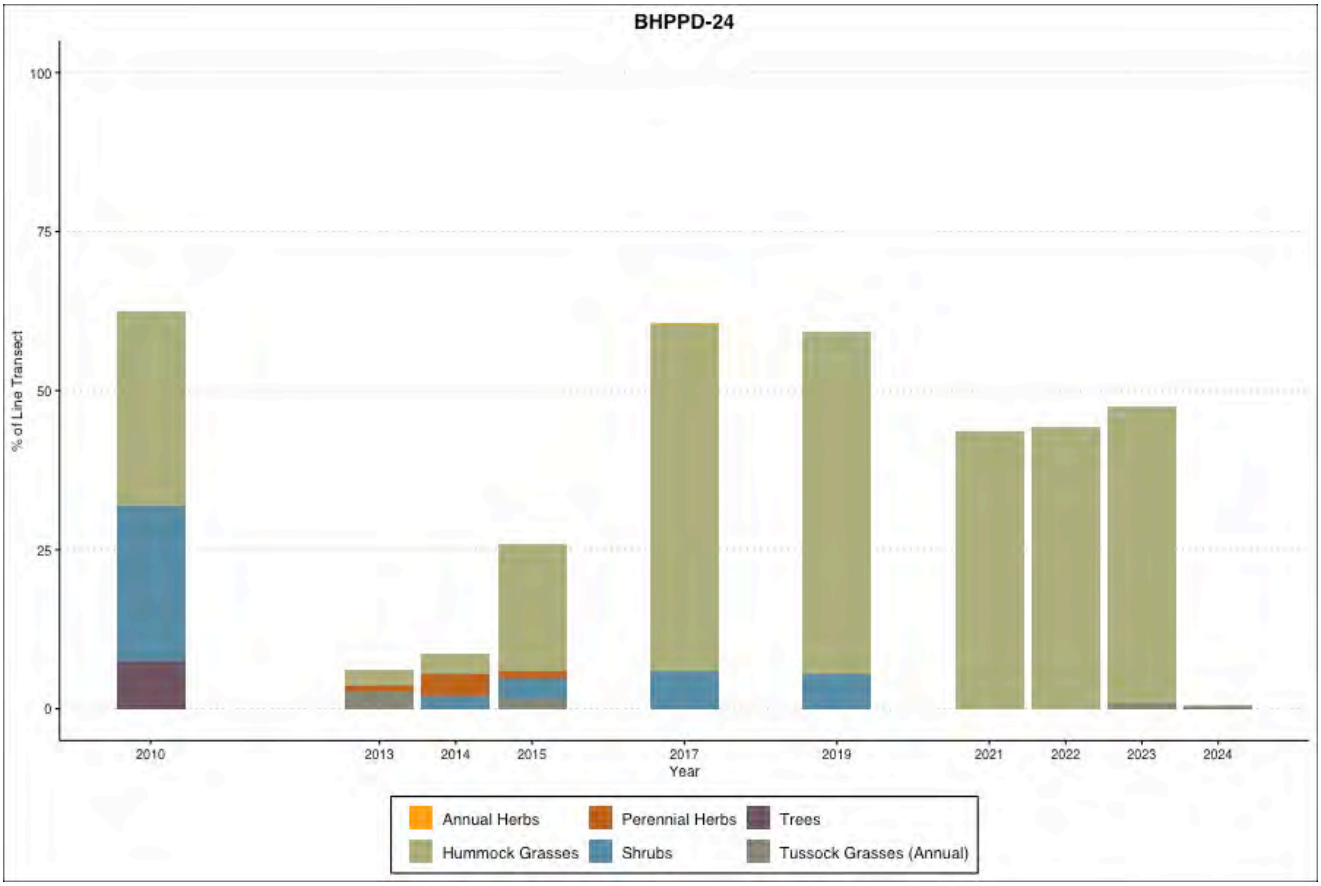
Analogue Transect BHPPA-24		Rehabilitation Transect BHPPD-24		Analogue Transect BHPPA-24		Rehabilitation Transect BHPPD-24	
							
2019 – 0 m	2019 – 20 m	2019 – 0 m	2019 – 20 m	2023 – 0 m	2023 – 20 m	2023 – 0 m	2023 – 20 m
							
2021 – 0 m	2021 – 20 m	2021 – 0 m	2021 – 20 m	2024 – 0 m	2024 – 20 m	2024 – 0 m	2024 – 20 m
							
2022 – 0 m	2022 – 20 m	2022 – 0 m	2022 – 20 m				

Cover of each lifeform category along the line transect.

Note: BHPPA-24 was burnt prior to the 2013 survey.

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Analogue BHPPA-24	2010		60.50	3.30	34.50				
	2013		0.75	5.60	13.50				
	2014		4.15	12.20	17.40		0.75		
	2015		13.90	40.25	19.05		1.45		
	2017		23.25	12.05	20.15		0.25	0.40	
	2019		31.85		21.95				
	2021		31.05	1.20	20.00		1.25		
	2022		33.40		21.30				
	2023		46.15		25.50				
	2024			1.50	5.05				
Rehab BHPPD-24	2010		30.50	24.40	7.50				
	2013	1.00	2.50				2.65		
	2014	3.60	3.00	1.95					
	2015	1.20	20.00	3.25			1.55		
	2017		54.60	5.85				0.25	
	2019		53.80	5.90					
	2021		43.55						
	2022		44.30						
	2023		46.65				0.80		
	2024		0.25	0.15			0.10		


BHPPA-24
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Perennial Herbs
Trees
Hummock Grasses
Shrubs
Tussock Grasses (Annual)


BHPPD-24
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Perennial Herbs
Trees
Hummock Grasses
Shrubs
Tussock Grasses (Annual)

Site 24 (Mt Minnie conservation area)

Note: Burnt in August and/or November 2023.

Cover and presence of individual species.

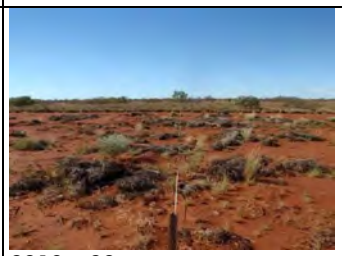
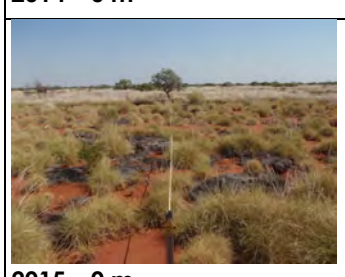
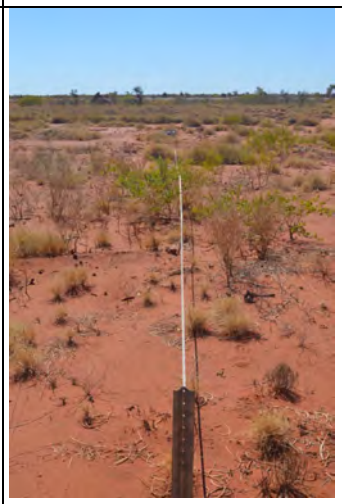
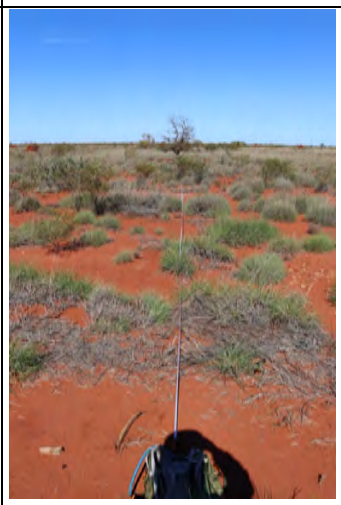
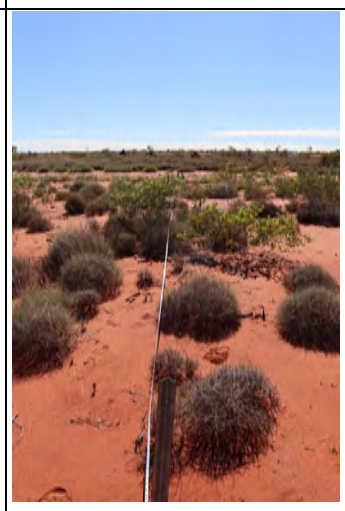
Family / Species	BHPPA-24										BHPPD-24									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Amaranthaceae																				
Ptilotus axillaris													+				+			
Ptilotus fusiformis													+							
Asteraceae																				
Pluchea dunlopii																				+
Cleomaceae																				
Arivela uncifera				+																
Convolvulaceae																				
Bonamia alatisemina					+								3.60							
Bonamia erecta		5.35	10.75	17.90	8.55		1.20	+	+	1.30		+	+	1.65	2.30		+	+	+	+
Evolvulus alsinoides														1.20						
Evolvulus alsinoides var. *villosicalyx*				+																
Polymeria lanata												1.00								
Cyperaceae																				
Bulbostylis barbata					0.40										0.25					
Fabaceae																				
Acacia ancistrocarpa	3.30			+		+					21.25		+	+	2.50	4.75				0.15
Acacia bivenosa											3.15		+	+	0.75	0.65				
Indigofera boviperda subsp. *boviperda*			+	+						+		+	+							
Indigofera sp.				+																
Isotropis atropurpurea			+	18.05	3.50								+	+						
Tephrosia uniovulata										0.20			+							+
Goodeniaceae																				
Goodenia microptera				+																
Scaevola spinescens												+	0.35	+	0.30	+	+	+	+	
Malvaceae																				
Corchorus sidoides		0.25	1.45	4.30																
Hibiscus sturtii var. platychlamys																				+
Sida cardiophylla													1.60	1.60						
Sida sp. Pilbara (A.A. Mitchell PRP 1543)		+	+									+								
Myrtaceae																				
Corymbia hamersleyana	34.50	13.50	17.40	19.05	20.15	21.95	20.00	21.30	25.5	5.05										
Eucalyptus xerothermica											7.50									
Poaceae																				
Aristida contorta		+																		
Aristida holathera var. *holathera*			0.75	1.15		+	1.25		+	+		2.00	+	+			+		0.80	0.10
Eriachne aristidea		+		0.30								+		1.55						
Eriachne pulchella var. *pulchella*					0.25															
Iseilema vaginiflorum												+								
Paspalidium clementii				+	+					+										
Paspalidium sp.												0.65								
Triodia glabra	60.50	0.75	4.15	13.90	23.25	13.30	31.05	33.40	46.15	+	30.50	2.50	3.00	20.00	54.60	+	43.55	44.30	46.65	0.25
Proteaceae																				
Grevillea striata							+			+										
Total no. of native species	**3**	**7**	**8**	**14**	**8**	**4**	**5**	**3**	**4**	**8**	**4**	**10**	**13**	**10**	**6**	**4**	**5**	**3**	**4**	**7**
Total no. of weed species	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Comments regarding site:

Rehabilitation was in 'Excellent' condition during 2024 monitoring, with both transects patchily burnt in late 2023 and situated on the edge of the fire scar. Current perennial shrub and spinifex cover is <1% in both transects, with the surrounding unburnt area still maintaining a healthy cover of mature hummock and *Acacia* shrubs. No weeds were recorded within the transects or surrounding vegetation.

Site 25 (Mt Minnie conservation area)

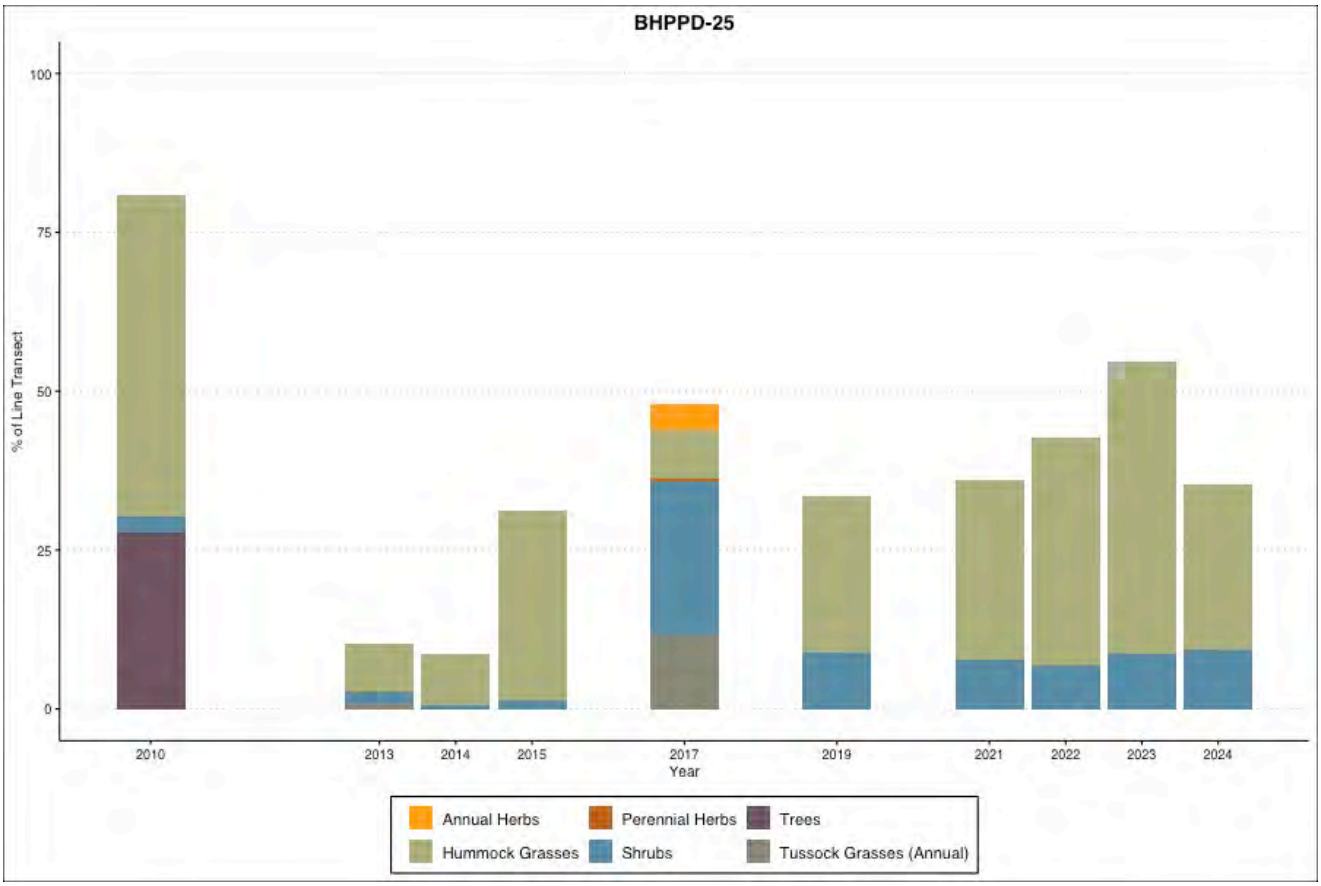
Note: no analogue transect.

Rehabilitation Transect BHPPD-25			
 2010 – 0 m	 2010 – 20 m	 2021 – 0 m	 2021 – 20 m
 2013 – 0 m	 2013 – 20 m		
 2014 – 0 m	 2014 – 20 m	 2022 – 0 m	 2022 – 20 m
 2015 – 0 m	 2015 – 20 m		
 2017 – 0 m (patchily burnt)	 2017 – 20 m (patchily burnt)	 2023 – 0 m	 2023 – 20 m
 2019 – 0 m	 2019 – 20 m	 2024 – 0 m	 2024 – 20 m

Cover of each lifeform category along the line transect.

Note: Patchily burnt prior to 2017 survey.

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus*)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Rehab BHPPD-25	2010		50.70	2.50	27.75				
	2013		7.50	2.00			0.75		
	2014		8.00	0.55					
	2015		30.00	1.25					
	2017	0.55	7.45	24.05			11.75	4.15	
	2019		24.75	8.80					
	2021		28.45	7.65					
	2022		35.80	6.90					
	2023		46.00	8.70					
	2024		25.95	9.40					



Site 25 (Mt Minnie conservation area)

Note: Patchily burnt prior to 2017 survey.

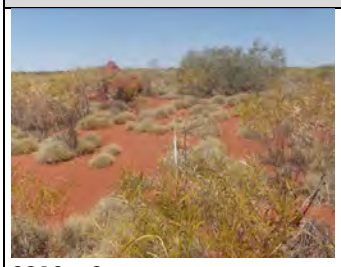
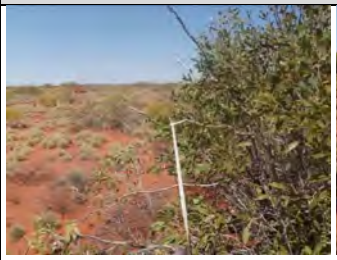
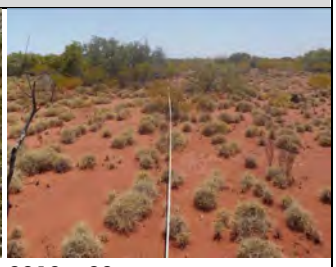
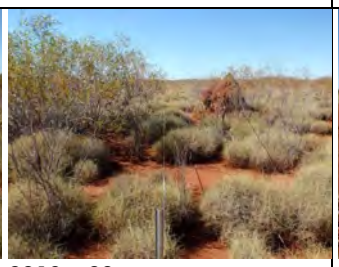
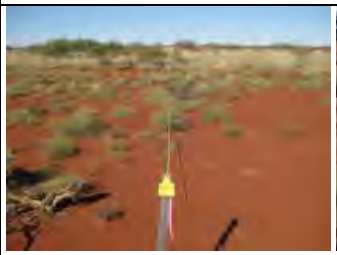
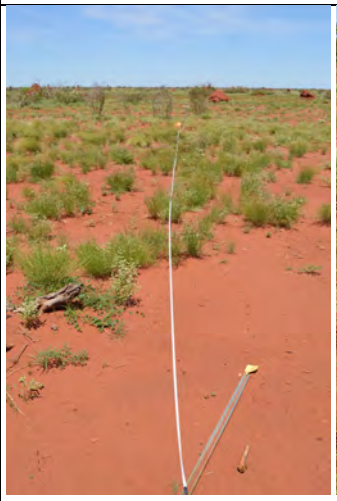
Cover and presence of individual species.

Family / Species	BHPPD-25									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Asteraceae										
Streptoglossa decurrens									+	
Amaranthaceae										
Ptilotus axillaris					2.75					
Ptilotus fusiformis					+					
Boraginaceae										
Euploca inexplicita					+					
Heliotropium crispatum					+					
Chenopodiaceae										
Dysphania rhadinostachya subsp. rhadinostachya					+					+
Convolvulaceae										
Bonamia alatisemina			+		0.55					
Polycarpaea corymbosa var. *corymbosa*					+					
Cyperaceae										
Bulbostylis barbata			+		0.35					
Euphorbiaceae										
Euphorbia vaccaria var. *vaccaria*					+					
Fabaceae										
Acacia ancistrocarpa					1.90	3.20	3.30	5.45	5.75	4.45
Acacia bivenosa					+	+	4.35	1.45	2.95	4.95
Acacia coriacea	2.50									
Indigofera boviperda subsp. *boviperda*					2.10	+			+	
Senna notabilis		+			2.65				+	
Tephrosia uniovulata					13.30	1.85	+			
Goodeniaceae										
Goodenia microptera					1.05					
Malvaceae										
Corchorus sidoides subsp. *vermicularis*					3.15					
Sida sp. Pilbara (A.A. Mitchell PRP 1543)						+				
Molluginaceae										
Trigastrotheca molluginea					+					
Myrtaceae										
Corymbia hamersleyana	10.50									
Eucalyptus xerothermica	17.25									
Poaceae										
Aristida contorta		+							+	
Aristida holathera var. *holathera*		+			10.85		+			
Eriachne aristidea		0.50			0.90				+	
Eriachne pulchella var. *pulchella*		+			+					
Paspalidium sp.		0.25								
Triodia epactia	35.95	4.10	3.00	15.00	7.45	14.80	16.00	11.85	19.45	13.00
Triodia glabra	14.75	3.40	5.00	15.00	+	+	12.45	23.95	26.55	12.95
Solanaceae										
Solanum lasiophyllum		2.00	0.55	1.25	0.95					
Total no. of native species	**5**	**9**	**5**	**3**	**23**	**7**	**6**	**4**	**9**	**5**
Total no. of weed species	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

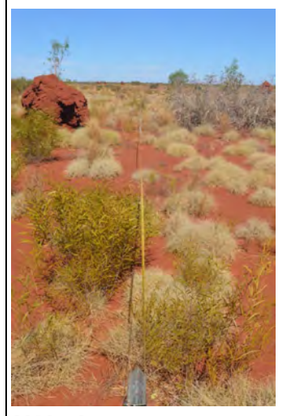
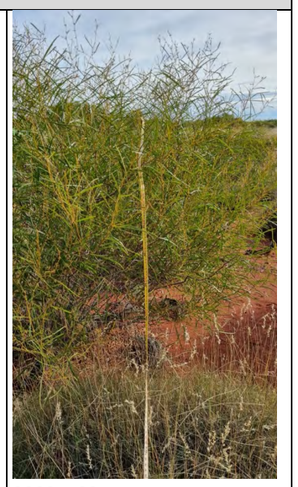
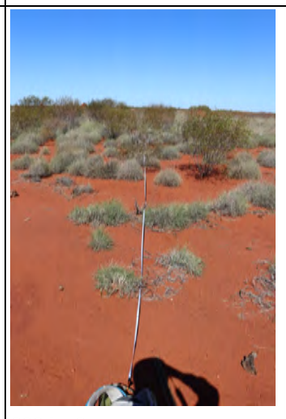
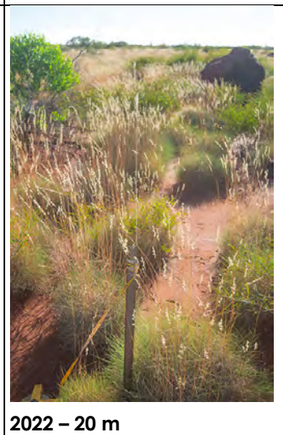
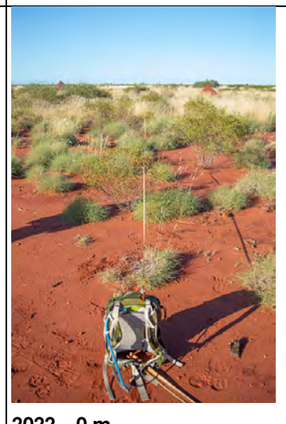
Comments regarding site:

Rehabilitation has remained in 'Excellent' condition during 2024 monitoring. Patch burns (post 2023 monitoring) were evident across the transects. Hummocks (*Triodia epactia* and *T. glabra*) appear healthy and are approaching covers similar to that observed prior to the burn that proceeded the 2017 monitoring phase. It is expected that the native species cover will continue to increase toward pre-clearing 2010 levels with time. *Acacia* species are present in the rehabilitation and appear healthy but are still absent within the clearing footprint. *Corymbia hamersleyana* and *Eucalyptus xerothermica* are still absent within the clearing footprint, despite being scattered in the broader landscape. No weeds were recorded in the transect during 2024 monitoring.

Site 26 (Mt Minnie conservation area)

Analogue Transect BHPPA-26		Rehabilitation Transect BHPPD-26	
			
2010 – 0 m	2010 – 20 m	2010 – 0 m	2010 – 20 m
			
2013 – 0 m	2013 – 20 m	2013 – 0 m	2013 – 20 m
			
2014 – 0 m	2014 – 20 m	2014 – 0 m	2014 – 20 m
			
2015 – 0 m	2015 – 20 m	2015 – 0 m	2015 – 20 m
			
2017 – 0 m (burnt)	2017 – 20 m (burnt)	2017 – 0 m (burnt)	2017 – 20 m (burnt)

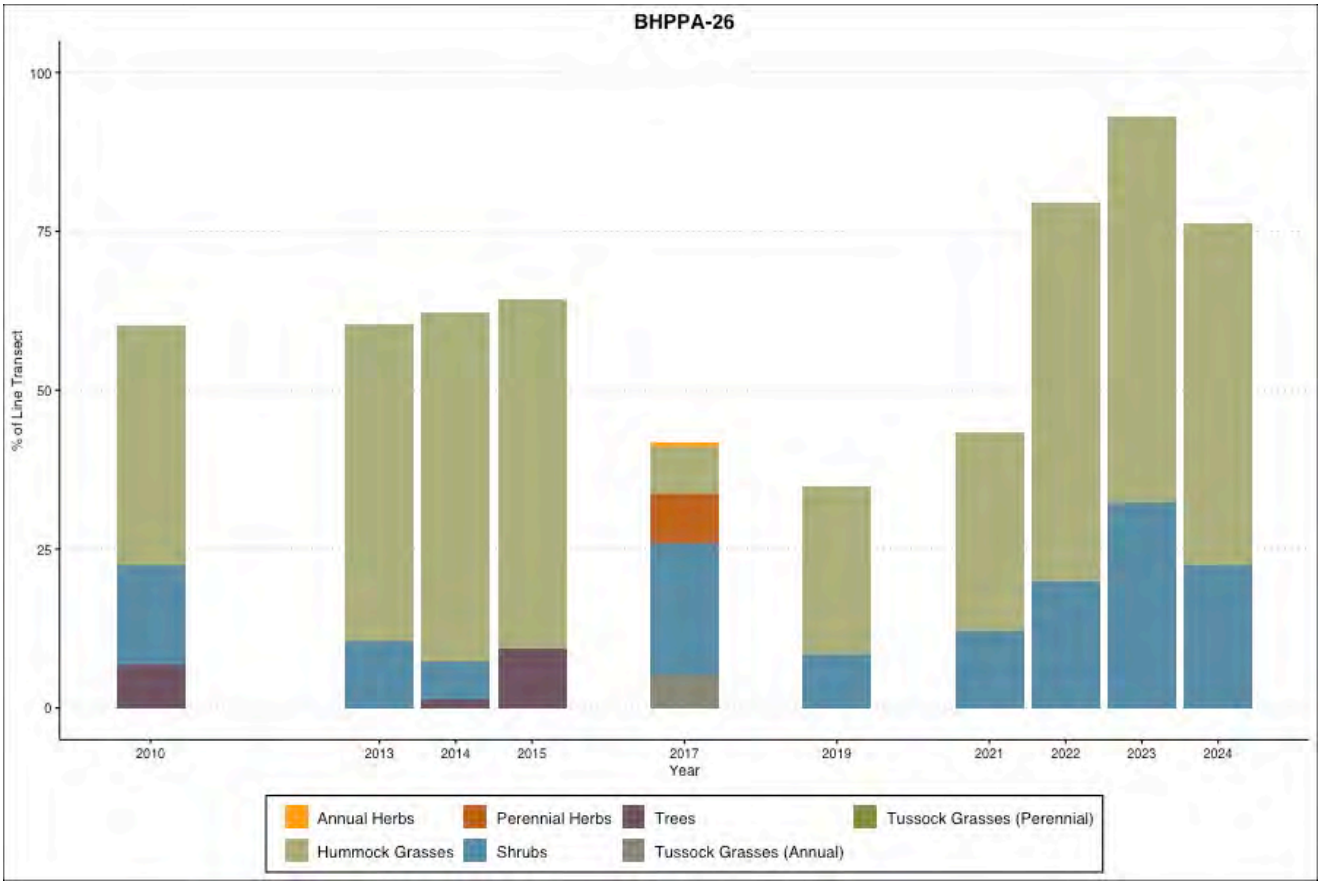
Site 26 (Mt Minnie conservation area)

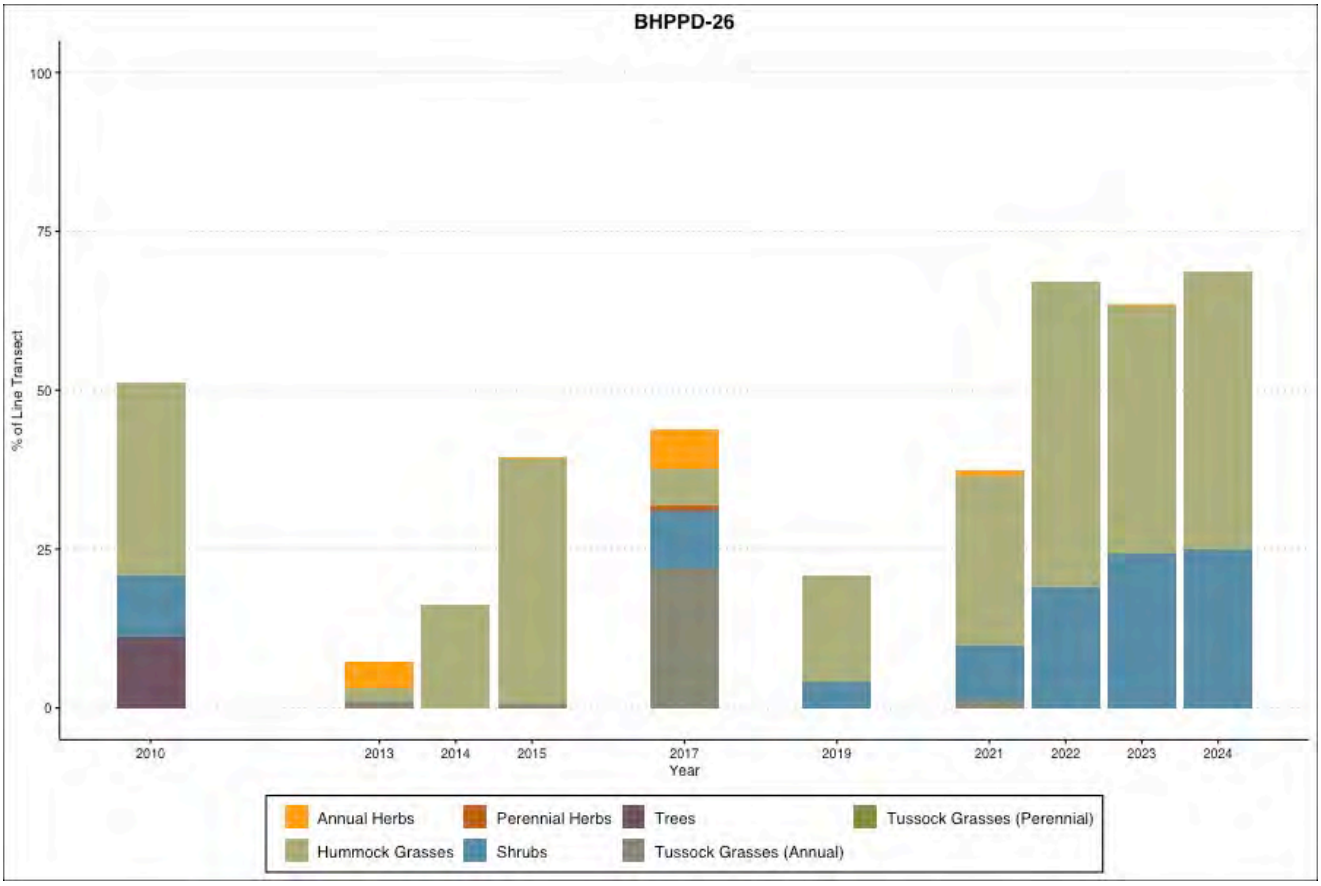
Analogue Transect BHPPA-26		Rehabilitation Transect BHPPD-26		Analogue Transect BHPPA-26		Rehabilitation Transect BHPPD-26	
							
2019 – 0 m	2019 – 20 m	2019 – 0 m	2019 – 20 m	2023 – 0 m	2023 – 20 m	2023 – 0 m	2023 – 20 m
							
2021 – 0 m	2021 – 20 m	2021 – 0 m	2021 – 20 m	2024 – 0 m	2024 – 20 m	2024 – 0 m	2024 – 20 m
							
2022 – 0 m	2022 – 20 m	2022 – 0 m	2022 – 20 m				

Cover of each lifeform category along the line transect.

Note: Both transects were burnt prior to the 2017 survey.

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Analogue BHPPA-26	2010		37.85	15.60	6.75				
	2013		50.00	10.50					
	2014		55.00	5.95	1.25				
	2015		55.00		9.25				
	2017	7.70	7.50	20.85			5.15	0.50	
	2019		26.50	8.40					
	2021		31.35	12.05					
	2022		59.60	19.90					
	2023		60.70	32.35					
	2024		53.70	22.55					
Rehab BHPPD-26	2010		30.30	9.65	11.25				
	2013		2.25				1.00	4.00	
	2014		16.15						
	2015		38.45				0.70	0.35	
	2017	1.00	5.80	9.05			21.90	6.20	
	2019		16.95	4.00					
	2021		26.60	8.60			1.25	0.90	
	2022		48.25	18.90					
	2023		38.95	24.30				0.20	
	2024		43.80	24.90					


BHPPA-26
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Perennial Herbs
Trees
Tussock Grasses (Perennial)
Hummock Grasses
Shrubs
Tussock Grasses (Annual)


BHPPD-26
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Perennial Herbs
Trees
Tussock Grasses (Perennial)
Hummock Grasses
Shrubs
Tussock Grasses (Annual)

Site 26 (Mt Minnie conservation area)

Note: Both the analogue and rehabilitation sites were burnt prior to the 2017 survey.

Cover and presence of individual species.

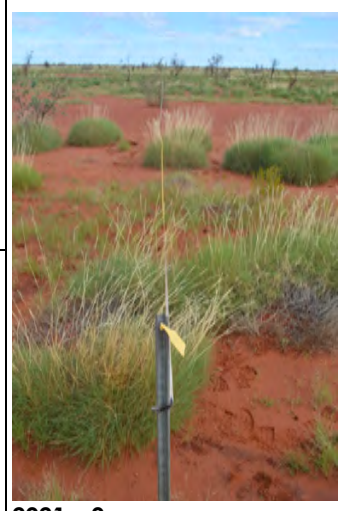
Family / Species	BHPPA-26										BHPPD-26									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Amaranthaceae																				
Ptilotus axillaris							+								+		+	+		
Ptilotus fusiformis					+							4.00	+	0.35	6.20		+			
Chenopodiaceae																				
Dysphania sp.					+										+		+			
Convolvulaceae																				
Bonamia alatisemina					7.70										1.00					
Bonamia erecta					+										+		+	+	+	
Bonamia pilbarensis																	0.50			
Evolvulus alsinoides var. *villosicalyx*														+						
Cyperaceae																				
Bulbostylis barbata					0.50		+						+		+		0.90	+	0.20	
Fabaceae																				
Acacia ancistrocarpa	15.60	10.50	5.95		0.75	8.40	12.05	19.90	32.35	22.55	9.65	+	+	+	+	1.1	7.75	18.90	24.30	24.90
Indigofera boviperda subsp. *boviperda*					7.70		+	+							1.05		0.35			
Indigofera colutea																		+	+	
Isotropis atropurpurea					7.95	+									8.00	+				
Senna notabilis					1.95										+					
Malvaceae																				
Abutilon otocarpum															+					
Corchorus sidoides subsp. *vermicularis*					2.50	+									+	+				
Hannafordia quadrivalvis subsp. *recurva*																2.90				
Sida sp. Pilbara (A.A. Mitchell PRP 1543)														+						
Triumfetta ramosa															+					
Molluginaceae																				
Trigastrotheca molluginea					+										+					
Myrtaceae																				
Corymbia hamersleyana	6.75	+	1.25	9.25		+					11.25									
Poaceae																				
Aristida contorta							+								+					
Aristida holathera var. *holathera*					3.65	+								0.70	8.50	+	+			
Aristida sp.																	1.25			
Eragrostis eriopoda												+	+							
Eragrostis tenellula					+										+					
Eriachne aristidea					1.50							+	+		13.40				+	
Eriachne pulchella subsp. *pulchella*																	+			
Paspalidium sp.												1.00	+							
Sporobolus australasicus																		+		
Triodia glabra	37.85	50.00	55.00	55.00	7.50	26.50	31.35	59.60	60.70	53.70	30.30	2.25	16.15	38.45	5.80	16.95	26.60	48.25	38.95	43.80
Total no. of native species	**3**	**3**	**3**	**2**	**15**	**6**	**6**	**3**	**2**	**2**	**3**	**6**	**7**	**6**	**19**	**6**	**12**	**7**	**6**	**2**
Total no. of weed species	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Comments regarding site:

Rehabilitation is in 'Excellent' condition, based on 2024 monitoring. The vegetation is almost identical to the analogue site (native species strata and composition), with the exception of the continued absence of *Corymbia hamersleyana* in the rehabilitation. *Triodia glabra* and *Acacia ancistrocarpa* cover have exceeded pre-clearing levels. Annual grasses and herbs have continued to remain absent from the site, similar to 2023 observations. No weeds have been recorded within the sites or in the surrounding vegetation.

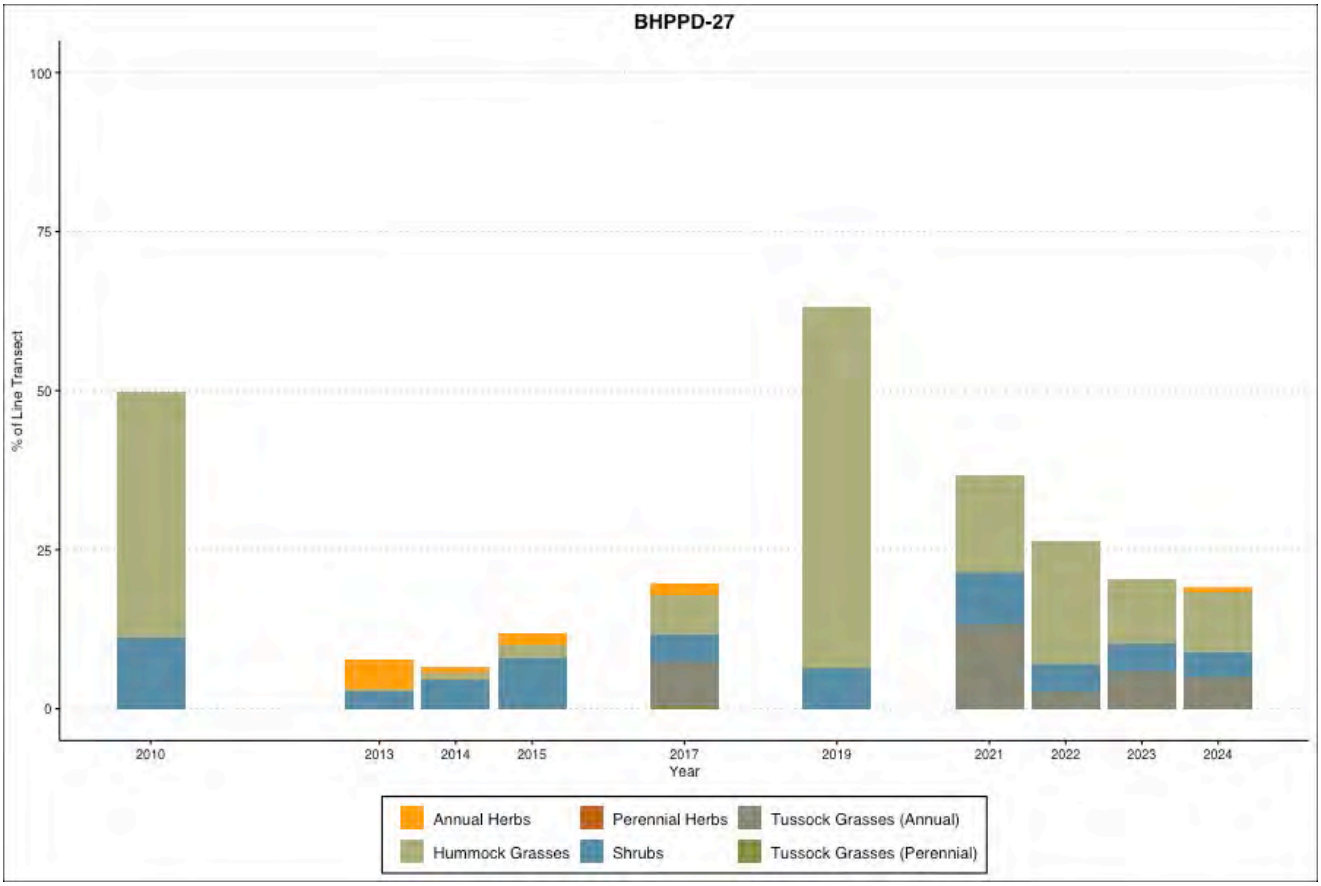
Site 27 (Mt Minnie conservation area)

Note: no analogue transect.

Rehabilitation Transect BHPPD-27			
 2010 – 0 m	 2010 – 20 m	 2021 – 0 m	 2021 – 20 m
 2013 – 0 m	 2013 – 20 m		
 2014 – 0 m	 2014 – 20 m	 2022 – 0 m	 2022 – 20 m
 2015 – 0 m	 2015 – 20 m		
 2017 – 0 m	 2017 – 20 m	 2023 – 0 m	 2023 – 20 m
 2019 – 0 m	 2019 – 20 m	 2024 – 0 m	 2024 – 20 m

Cover of each lifeform category along the line transect.

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Rehab BHPPD-27	2010		38.70	11.20					
	2013		0.50	2.75				4.50	
	2014		1.25	4.50				0.85	
	2015		2.00	7.80			0.25	1.75	
	2017		6.30	4.30		0.30	7.05	1.85	
	2019		10.00	6.40					
	2021		15.45	8.05			13.30		
	2022		19.20	4.40			2.75		
	2023		10.15	4.55			5.80		
	2024		9.45	3.75			5.05	0.85	



Site 27 (Mt Minnie conservation area)

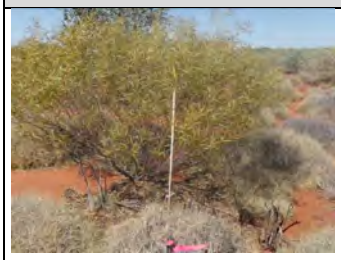
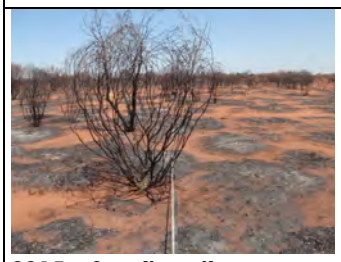
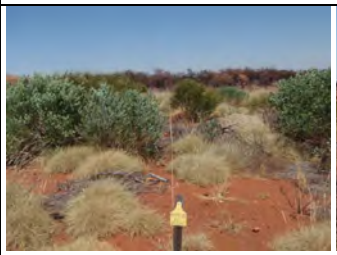
Cover and presence of individual species.

Family / Species	BHPPD-27									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Amaranthaceae										
Ptilotus astrolasius							0.10			
Ptilotus axillaris		4.50	+	1.00	1.70			+	+	
Ptilotus exaltatus							+	+		
Ptilotus fusiformis		+	0.85		+					
Ptilotus polystachyus							+	+		0.85
Boraginaceae										
Euploca inexplicita				0.75						
Chenopodiaceae										
Dysphania rhadinostachya			+							+
Dysphania sp.					+					
Cleomaceae										
Arivela uncifera							+			
Cyperaceae										
Bulbostylis barbata			+		+		+			
Euphorbiaceae										
Euphorbia australis				+						
Euphorbia vaccaria var. *vaccaria*					+					
Fabaceae										
Acacia ancistrocarpa	2.05					+	0.55			
Acacia inaequilatera	9.15	2.75	4.50	6.80	2.60	6.40	7.40	4.40	4.55	3.75
Acacia pyrifolia var. *pyrifolia*									+	
Indigofera boviperda subsp. *boviperda*			+	+	1.70		+			
Senna notabilis				1.00						
Goodeniaceae										
Goodenia microptera					+					
Molluginaceae										
Trigastrotheca molluginea		+		+	+			+		
Nyctaginaceae										
Boerhavia coccinea					0.15					
Poaceae										
Aristida contorta			+		6.90		12.65	2.75	5.80	5.05
Aristida holathera var. *holathera*				0.25						+
Dichanthium sericeum subsp. *humilius*							+			
Eriachne aristidea							+	+		
Eriachne pulchella var. *pulchella*		+	+		+		+	+	+	
Panicum australiense var. *australiense*		+		+						
Panicum sp.					0.30					
Paspalidium clementii							0.65	+		
Sporobolus australasicus					0.15			+		
Triodia epactia										2.00
Triodia glabra	38.70	0.50	1.25	2.00	6.30	10.00	15.45	19.20	10.15	7.45
Portulacaceae										
Portulaca oleracea							+		+	
Portulaca sp.								+		
Zygophyllaceae										
Tribulus hirsutus							+			
Tribulus macrocarpus							+			
Total no. of native species	**3**	**7**	**9**	**10**	**15**	**3**	**17**	**12**	**7**	**7**
Total no. of weed species	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

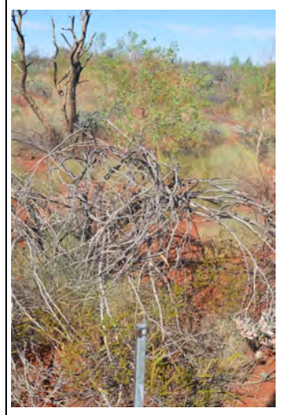
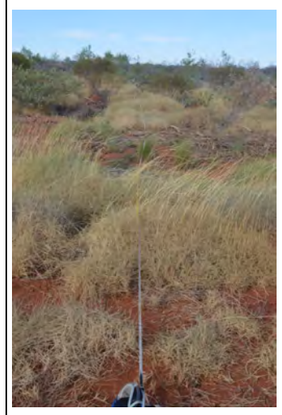
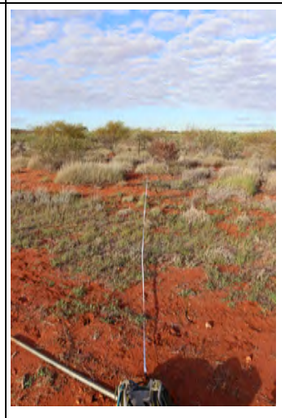
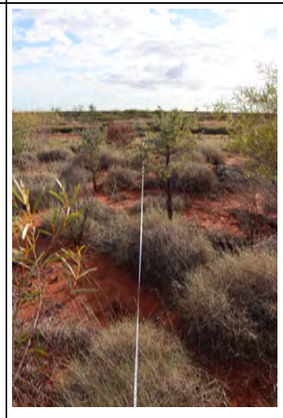
Comments regarding site:

Rehabilitation is in 'Excellent' condition, based on 2024 monitoring. Several *Acacia inaequilatera* shrubs are establishing within the clearing footprint, along with small *Triodia* hummockgs and *Aristida* tussocks, though some open patches are still present. No **Cenchrus* spp. were recorded in the transect or surrounding vegetation. Overall, it appears that vegetation structure is recovering toward an analogue structure.

Site 28 (Mt Minnie conservation area)

Analogue Transect BHPPA-28		Rehabilitation Transect BHPPD-28	
			
2010 – 0 m	2010 – 20 m	2010 – 0 m	2010 – 20 m
			
2013 – 0 m	2013 – 20 m	2013 – 0 m	2013 – 20 m
			
2014 – 0 m	2014 – 20 m	2014 – 0 m	2014 – 20 m
			
2015 – 0 m (burnt)	2015 – 20 m (burnt)	2015 – 0 m	2015 – 20 m
			
2017 – 0 m	2017 – 20 m	2017 – 0 m	2017 – 20 m

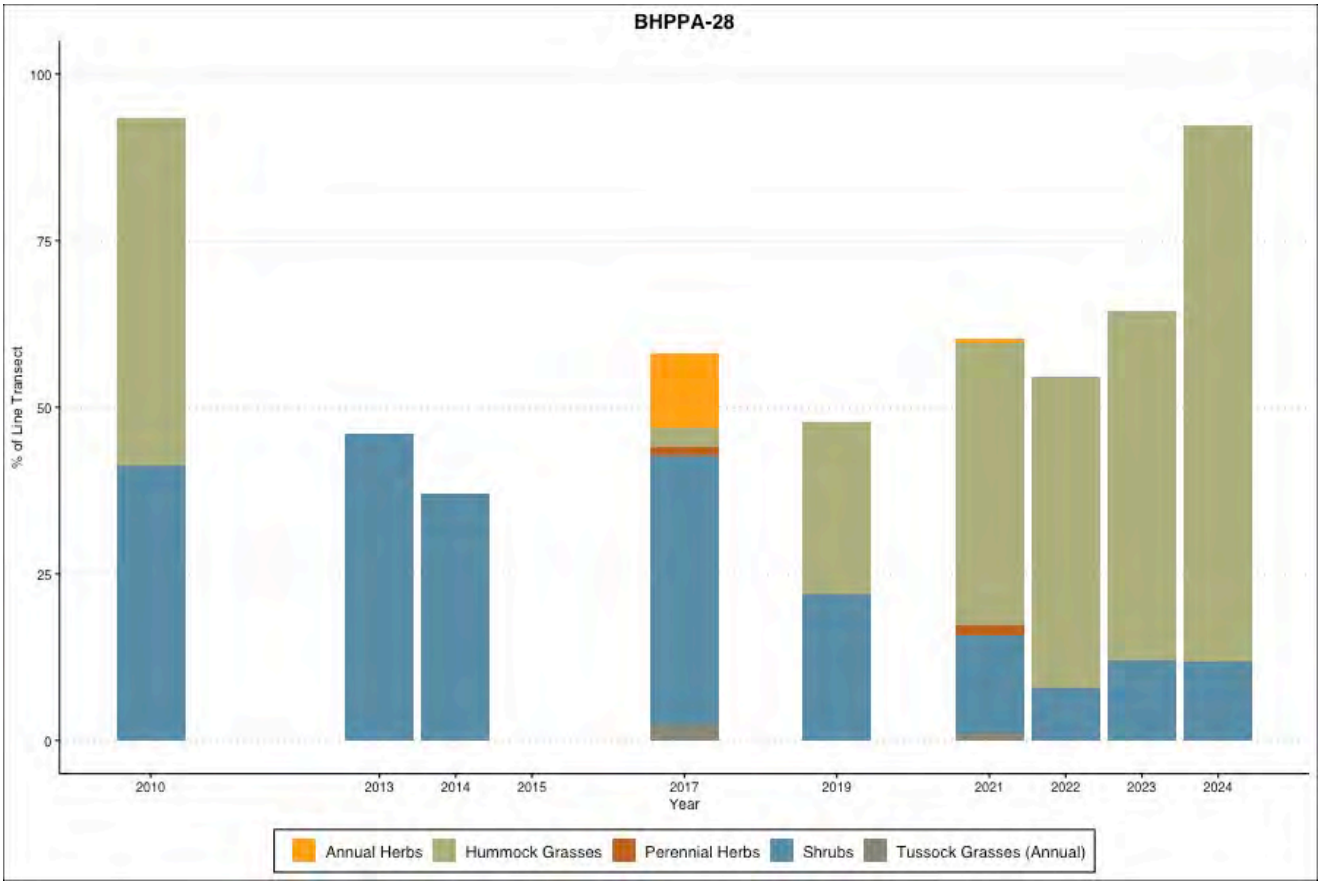
Site 28 (Mt Minnie conservation area)

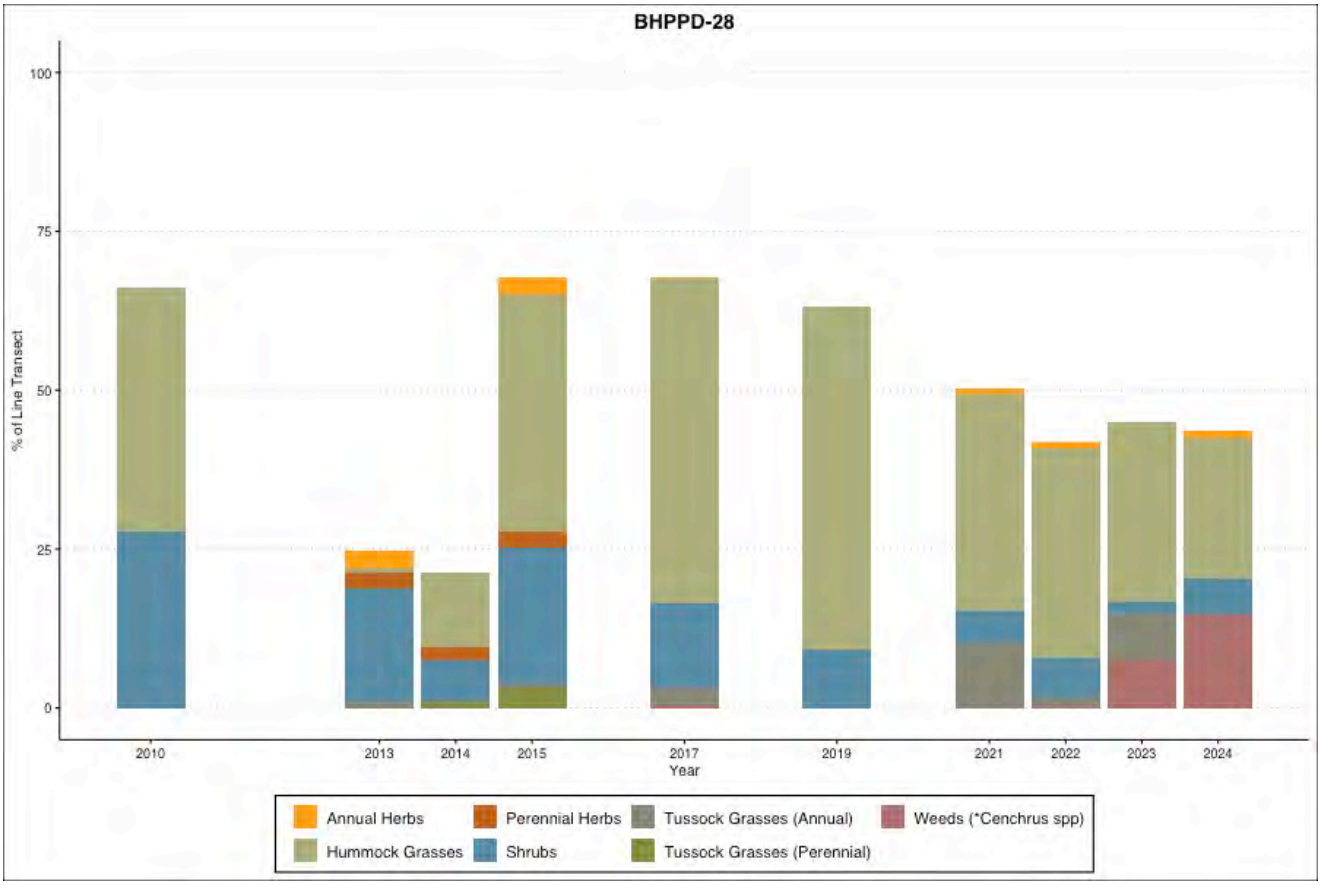
Analogue Transect BHPPA-28		Rehabilitation Transect BHPPD-28		Analogue Transect BHPPA-28		Rehabilitation Transect BHPPD-28	
							
2019 – 0 m	2019 – 20 m	2019 – 0 m	2019 – 20 m	2023 – 0 m	2023 – 20 m	2023 – 0 m	2023 – 20 m
							
2021 – 0 m	2021 – 20 m	2021 – 0 m	2021 – 20 m	2024 – 0 m	2024 – 20 m	2024 – 0 m	2024 – 20 m
							
2022 – 0 m	2022 – 20 m	2022 – 0 m	2022 – 20 m				

Cover of each lifeform category along the line transect

Note: BHPPA-28 was burnt immediately prior to 2015 survey.

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Analogue BHPPA-28	2010		52.10	41.30					
	2013		65.00	46.00					
	2014		65.00	37.00					
	2015		Burnt	Burnt					
	2017	1.45	2.70	40.25			2.45	11.20	
	2019		25.95	21.85					
	2021	1.50	42.35	14.75			1.00	0.65	
	2022		46.70	7.85					
	2023		52.40	12.10					
	2024		80.65	11.75					
Rehab BHPPD-28	2010		38.35	27.70					
	2013	2.50	0.75	17.75			1.00	2.75	
	2014	1.95	11.90	6.40		1.15			
	2015	2.55	39.85	18.90		3.25	0.50	2.75	
	2017		51.20	13.30			2.75	0.15	0.40
	2019		52.35	9.05			1.75		
	2021		34.25	4.85			10.30	0.85	
	2022		33.10	6.10			1.55	0.75	0.20
	2023		28.35	1.95			7.30		7.50
	2024		22.00	5.55			0.25	1.15	


BHPPA-28
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Hummock Grasses
Perennial Herbs
Shrubs
Tussock Grasses (Annual)


BHPPD-28
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Hummock Grasses
Perennial Herbs
Shrubs
Tussock Grasses (Annual)
Tussock Grasses (Perennial)
Weeds (*Cenchrus spp)

Site 28 (Mt Minnie conservation area)

Note: Analogue transect BHPPA-28 was burnt immediately prior to the 2015 survey.

Cover and presence of individual species.

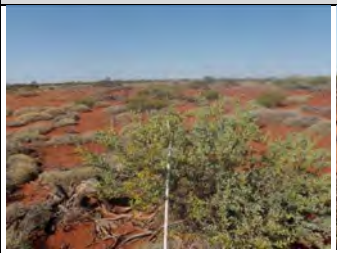
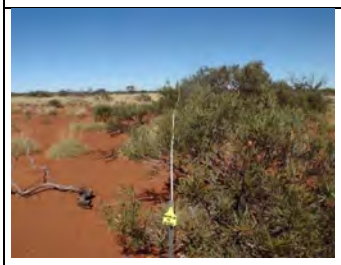
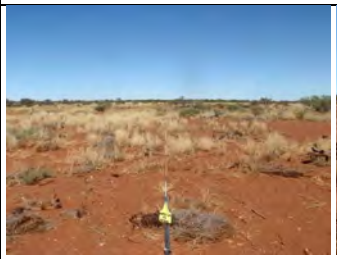
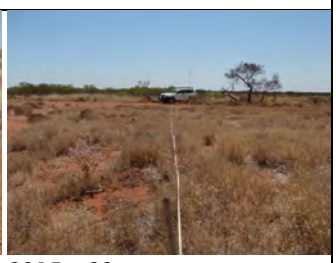
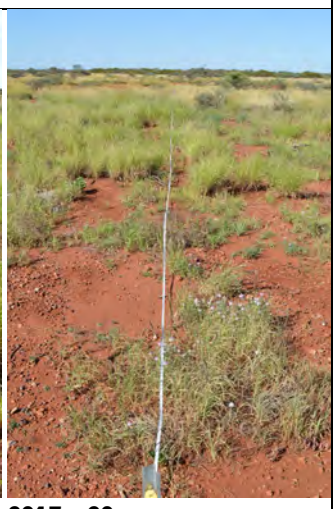
Family / Species	BHPPA-28										BHPPD-28									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Aizoaceae																				
Trianthema triquetrum																	0.10	+		
Amaranthaceae																				
Gomphrena canescens													+						+	
Gomphrena cunninghamii																		0.10	+	0.45
Ptilotus astrolasius					+	3.80	2.55										0.15	3.70		
Ptilotus axillaris					+		+					1.50		2.75			0.75	0.10		
Ptilotus exaltatus													+					+		0.55
Ptilotus polystachyus							+			+							+	+		+
Asteraceae																				
Streptoglossa decurrens					+		+							+						
Caryophyllaceae																				
Polycarpaea corymbosa var. *corymbosa*													+				+			
Chenopodiaceae																				
Dysphania kalpari							0.30													
Dysphania rhadinostachya							+			+		+	+				+			
Dysphania sp.																		+		
Salsola australis					1.30			+	+	+		+	+				+	0.65	+	0.15
Convolvulaceae																				
Bonamia alatisemina					0.95								+							
Evolvulus alsinoides var. *villosicalyx*														0.75			+			
Polymeria lanata												+								
Cucurbitaceae																				
Cucumis variabilis												+								
Cyperaceae																				
Bulbostylis barbata			+				+	+							0.15		+			
Cyperaceae sp.												2.50								
Euphorbiaceae																				
Euphorbia vaccaria var. *vaccaria*					+		+													
Fabaceae																				
Acacia ancistrocarpa	24.55	31.25	37.00			6.35	+	0.10	+	0.35			+	3.75		+	+	0.40	1.95	2.20
Acacia bivenosa					0.30	+	+	+	1.75	+	20.75	+	+	2.50		+				
Acacia inaequilatera	16.75	14.75			+	+					6.95	+	+	0.75	0.15	1.60	+	0.50	+	2.30
Acacia stellaticeps							0.70													
Acacia synchronicia															11.60					
Acacia trachycarpa							1.65													
Cullen leucanthum					1.30															
Cullen martinii					3.75															
Indigofera boviperda subsp. *boviperda*					17.45	4.25						0.75	4.90	10.65	0.75	4.80				
Senna notabilis					0.90							15.25		+	+	1.95	0.90	0.25	+	0.65
Goodeniaceae																				
Goodenia microptera					4.00		0.35					1.25					+			
Gyrostemonaceae																				
Codonocarpus cotinifolius					6.75	7.45	9.85	7.75	10.35	11.40										
Malvaceae																				
Abutilon fraseri subsp. *fraseri*					3.45															
Abutilon lepidum							+					+	+	+	0.60	0.70	3.35	1.25	+	0.40
Abutilon sp. Pilbara (W.R.Barker 2025)																	+			
Corchorus laniflorus														1.25						
Corchorus sidoides												+	+	+						
Corchorus sidoides subsp. *vermicularis*					+		+										+			
Hannafordia quadrivalvis subsp. *recurva*																	0.45			
Triumfetta ramosa												1.75	1.50	+						
Molluginaceae																				
Trigastrotheca molluginea					0.50		1.50					+	1.95	1.80			+			
Nyctaginaceae																				
Boerhavia coccinea					5.90														+	
Poaceae																				
**Cenchrus ciliaris*															0.40	+	+	0.20	7.50	14.65
Aristida contorta							+										2.40		+	
Aristida holathera var. *holathera*					2.45										2.65	1.75			5.35	
Enneapogon caerulescens																	+	+	1.95	0.25

Family / Species	BHPPA-28										BHPPD-28									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Eragrostis eriopoda													1.15	3.25						
Eragrostis pergracilis												+					2.10			
Eragrostis tenellula																	3.25	+	+	
Eriachne aristidea							1.00					+	+	0.50			0.80		+	
Eriachne pulchella subsp. *pulchella*																	+			
Iseilema dolichotrichum															+					+
Iseilema vaginiflorum												+					+	0.10		
Panicum australiense var. *australiense*																			+	
Paspalidium clementii							+					1.00					1.75			
Paspalidium rarum																	+			
Sporobolus australasicus										+			+		0.10		+	1.45	+	+
Triodia epactia																			4.00	
Triodia glabra	52.10	65.00	65.00		2.70	25.95	42.35	46.70	52.40	80.65	38.35	0.75	11.90	39.85	51.20	52.35	34.25	33.10	24.35	22.00
Portulacaceae																				
Portulaca oleracea							+						+				+	+		
Solanaceae																				
Solanum diversiflorum					+															
Surianaceae																				
Stylobasium spathulatum															0.20					
Zygophyllaceae																				
Tribulus hirsutus																	+			
Total no. of native species	**3**	**3**	**3**	**0**	**21**	**7**	**22**	**6**	**5**	**8**	**3**	**20**	**19**	**16**	**11**	**8**	**31**	**18**	**17**	**12**
Total no. of weed species	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**1**

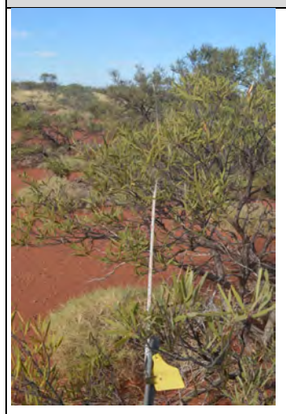
Comments regarding site:

The rehabilitation has been assigned a 'Fair, trending to Poor' condition during the 2024 monitoring. The area has become increasingly disturbed since the last 'Excellent' condition rating during the 2022 monitoring period. **Cenchrus ciliaris* has increased in the clearing footprint, while spinifex cover has declined slightly, and there are only scattered *Acacia inaequilatera* shrubs in the vicinity. Strong recruitment of native herbs and tussock grasses is occurring in the rehabilitation. Considerable disturbance from cattle is evident within the rehabilitation.

Site 29 (Mt Minnie conservation area)

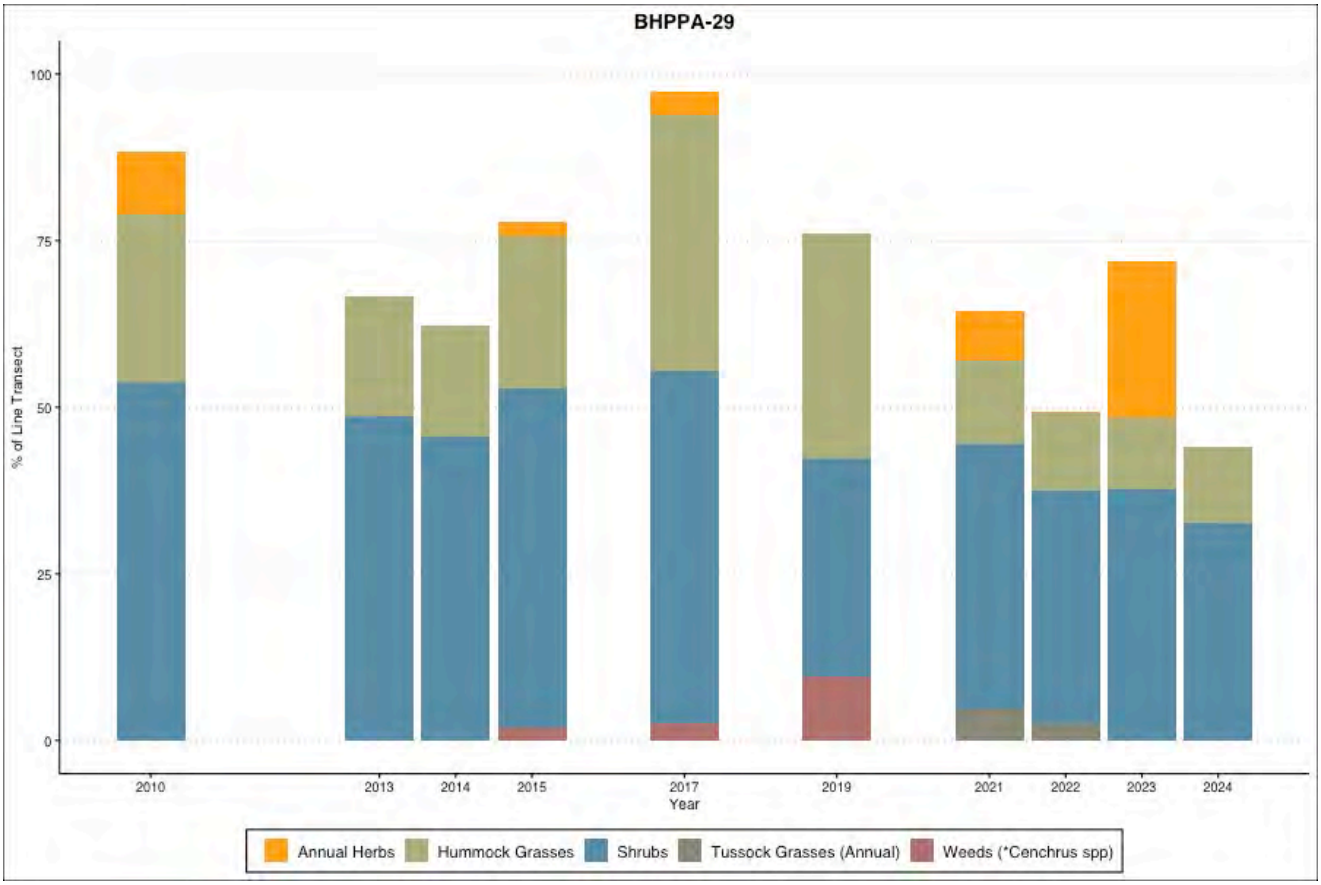
Analogue Transect BHPPA-29		Rehabilitation Transect BHPPD-29	
			
2010 – 0 m	2010 – 20 m	2010 – 0 m	2010 – 20 m
			
2013 – 0 m	2013 – 20 m	2013 – 0 m	2013 – 20 m
			
2014 – 0 m	2014 – 20 m	2014 – 0 m	2014 – 20 m
			
2015 – 0 m	2015 – 20 m	2015 – 0 m	2015 – 20 m
			
2017 – 0 m	2017 – 20 m	2017 – 0 m	2017 – 20 m

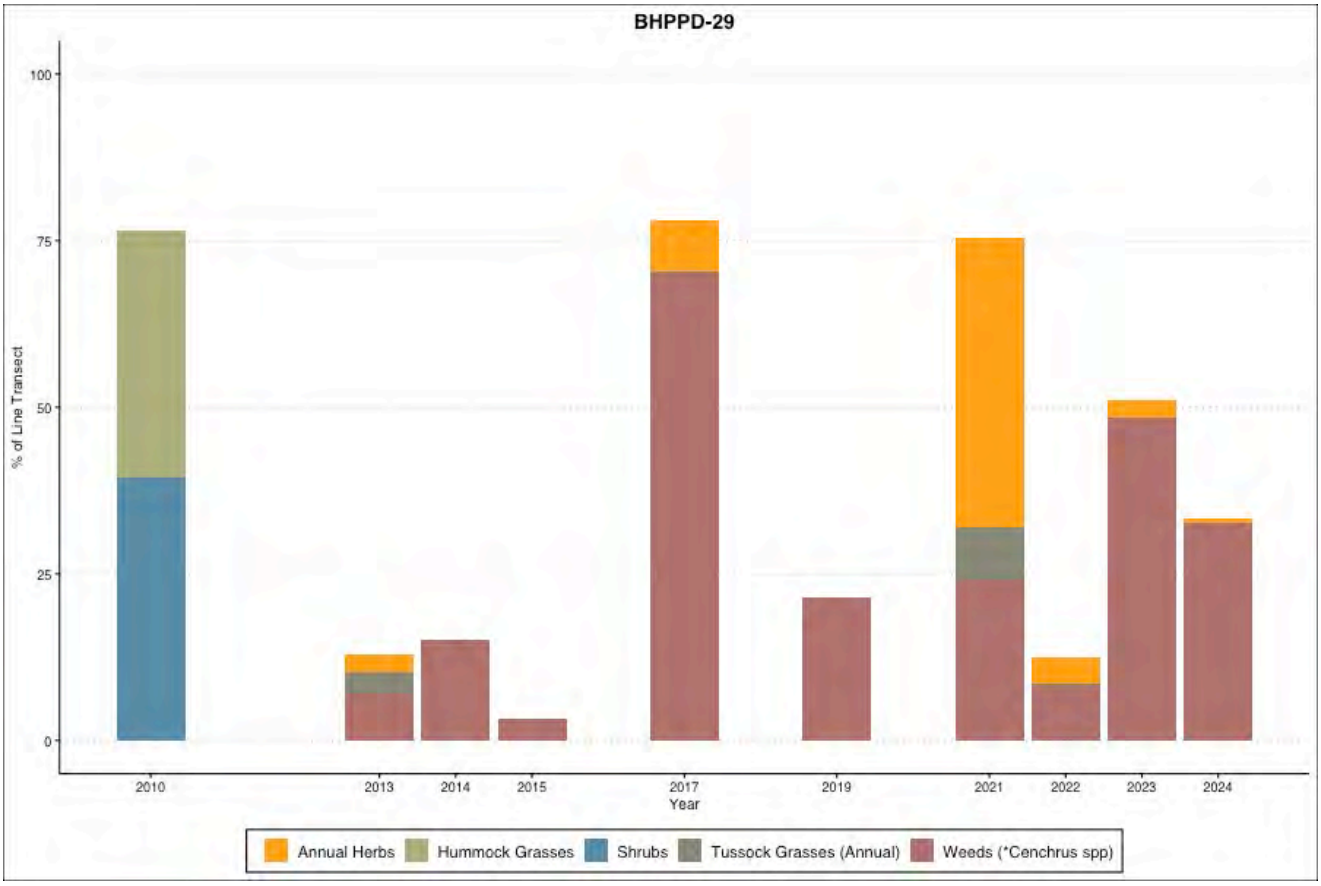
Site 29 (Mt Minnie conservation area)

Analogue Transect BHPPA-29		Rehabilitation Transect BHPPD-29		Analogue Transect BHPPA-29		Rehabilitation Transect BHPPD-29	
							
2019 – 0 m	2019 – 20 m	2019 – 0 m	2019 – 20 m	2023 – 0 m	2023 – 20 m	2023 – 0 m	2023 – 20 m
							
2021 – 0 m	2021 – 20 m	2021 – 0 m	2021 – 20 m	2024 – 0 m	2024 – 20 m	2024 – 0 m	2024 – 20 m
							
2022 – 0 m	2022 – 20 m	2022 – 0 m	2022 – 20 m				

Cover of each lifeform category along the line transect.

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Analogue BHPPA-29	2010		25.15	53.70				9.60	
	2013		18.00	48.75					
	2014		16.75	45.50					
	2015		22.70	51.00				2.15	1.90
	2017		38.30	53.00				6.60	2.50
	2019		33.70	32.60					9.70
	2021		12.55	39.75			4.70	7.45	
	2022		11.65	34.90		2.40		0.25	
	2023		10.80	37.70				23.35	
	2024		11.35	32.60					
Rehab BHPPD-29	2010		37.10	39.50					
	2013						3.25	2.75	7.00
	2014								15.00
	2015								3.30
	2017						0.25	7.65	70.15
	2019								21.55
	2021						7.85	43.30	24.20
	2022						0.10	3.95	8.15
	2023							2.50	48.50
	2024							0.80	32.55


BHPPA-29
100
75
50
25
0
% of Line Transect
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Hummock Grasses
Shrubs
Tussock Grasses (Annual)
Weeds (*Cenchrus spp)


BHPPD-29
100
75
50
25
0
% of Line Transect
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Hummock Grasses
Shrubs
Tussock Grasses (Annual)
Weeds (*Cenchrus spp)

Site 29 (Mt Minnie conservation area)

Cover and presence of individual species.

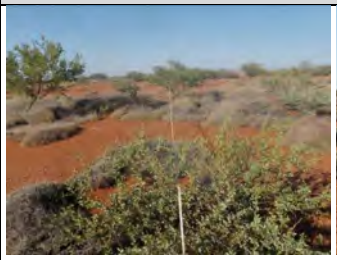
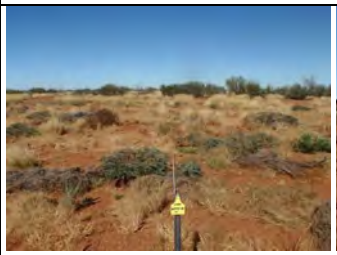
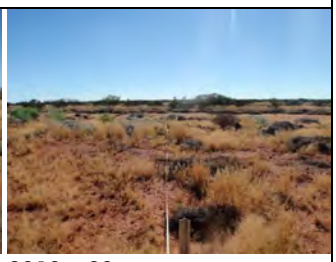
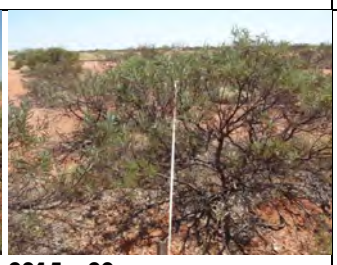
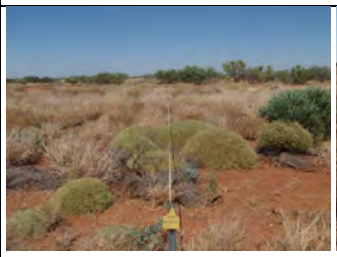
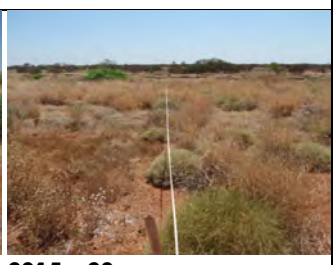
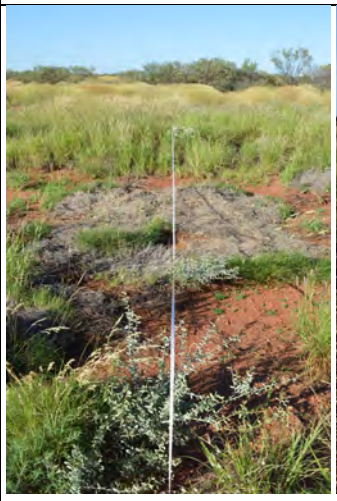
Family / Species	BHPPA-29										BHPPD-29									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Aizoaceae																				
Trianthema triquetrum		+	+				3.95	0.25					+		0.50		24.60	3.70	+	+
Amaranthaceae																				
Amaranthus cuspidifolius							0.25										+			
Amaranthus ? interruptus					+															
Amaranthus undulatus		+		1.30								+	+							
Amaranthus sp.								+												
Gomphrena affinis subsp. *pilbarensis*					+										6.15		+			
Gomphrena canescens		+		+								+	+					+	+	+
Ptilotus astrolasius																	+			
Ptilotus axillaris																		0.15		
Ptilotus exaltatus													+	+	0.30		+			+
Asteraceae																				
Streptoglossa decurrens																	+			
Chenopodiaceae																				
Dysphania rhadinostachya																	+			
Enchylaena tomentosa																		+	+	
Maireana villosa															+					
Salsola australis	9.60			0.85	6.50			+	23.35				+	+	+			+	2.50	0.55
Fabaceae																				
Acacia ancistrocarpa												+	+							
Acacia synchronicia											25.00									
Acacia xiphophylla	53.70	48.75	45.50	50.25	52.00	32.60	39.75	34.90	37.70		14.50									
Malvaceae																				
Abutilon fraseri subsp. *fraseri*					1.00	+		+	+											
Abutilon lepidum				0.75																
Abutilon ? sp. Pilbara (W.R.Barker 2025)							+													
Corchorus laniflorus																	+			
Hibiscus sturtii var. *grandiflorus*																	+		+	
Sida fibulifera													+							
Nyctaginaceae																				
Boerhavia coccinea					+				+			1.50	+		0.50		+			
Poaceae																				
Aristida contorta							0.30		+											
Aristida sp.								+												
**Cenchrus ciliaris*		+	+	1.90	2.50	9.70						7.00	15.00	3.30	70.15	21.55	24.20	8.15	48.50	32.55
**Cenchrus setiger*																		+		
Cynodon prostratus		+	+		+		4.00	2.40	+											
Dactyloctenium radulans							+	0.15	+									0.30	+	
Enneapogon caerulescens												+	+				+			
Eragrostis tenellula							+													
Paspalidium clementii							0.40										1.00			
Sporobolus australasicus		+			+							3.25	+		0.25		6.85	0.10	+	
Sporobolus actinocladus																		+		
Triodia epactia			7.50	5.50	2.00	12.80														
Triodia glabra	25.15		1.75	9.10	+	+	4.75	11.65	3.20	3.30	37.10									
Triodia wiseana		18.00	7.50	8.10	36.30	20.90	7.80		7.60	8.05										
Portulacaceae																				
Portulaca oleracea		+	+		0.10		3.25					1.25			0.20		18.70			
Portulaca sp. *oleracea/intraterranea*								+										0.10		
Zygophyllaceae																				
Tribulus astrocarpus							+													
Total no. of native species	**3**	**8**	**7**	**8**	**12**	**5**	**13**	**10**	**9**	**2**	**3**	**7**	**10**	**2**	**8**	**0**	**14**	**10**	**8**	**4**
Total no. of weed species	**0**	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**0**	**1**

Comments regarding site:

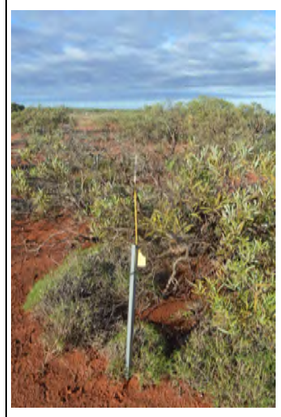
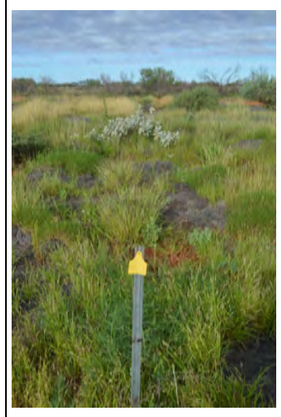
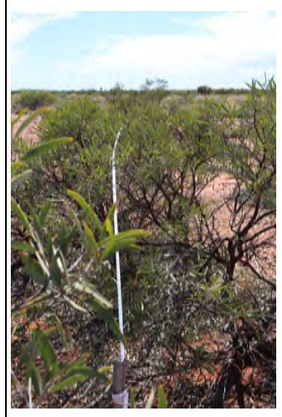
The rehabilitation has been assigned a 'Poor' condition during the 2024 monitoring. The condition of the rehabilitation has not improved since 2023, and the site has not reached above a 'Fair' condition since 2022 (prior to which it was also in 'Poor' to 'Very Poor' condition). The transect is completely devoid of perennial native species, with <1% cover of native annual species. Less than 10 *Triodia* spp. seedlings were observed within 20 m of the transects. Patches of healthy **Cenchrus* juveniles and many **Cenchrus* seedlings were present in the rehabilitation and surrounding vegetation areas. Large amounts of dead *Cenchrus spp. were observed, likely from spraying, reducing the cover from 48.5% in 2023 to 32.55% in 2024. Following the application of herbicide in 2018, **Cenchrus* cover was reduced from 70% to 21% in 2019, reducing competition and allowing for the establishment of native annual grasses and herbs seen in 2021. Overall, the rehabilitation site does not represent pre-clearing vegetation cover levels.

The analogue site saw slight increases of spinifex cover (composition of spinifex species same as that of the 2023 monitoring). Analogue sites had no weed records.

Site 30 (Mt Minnie conservation area)

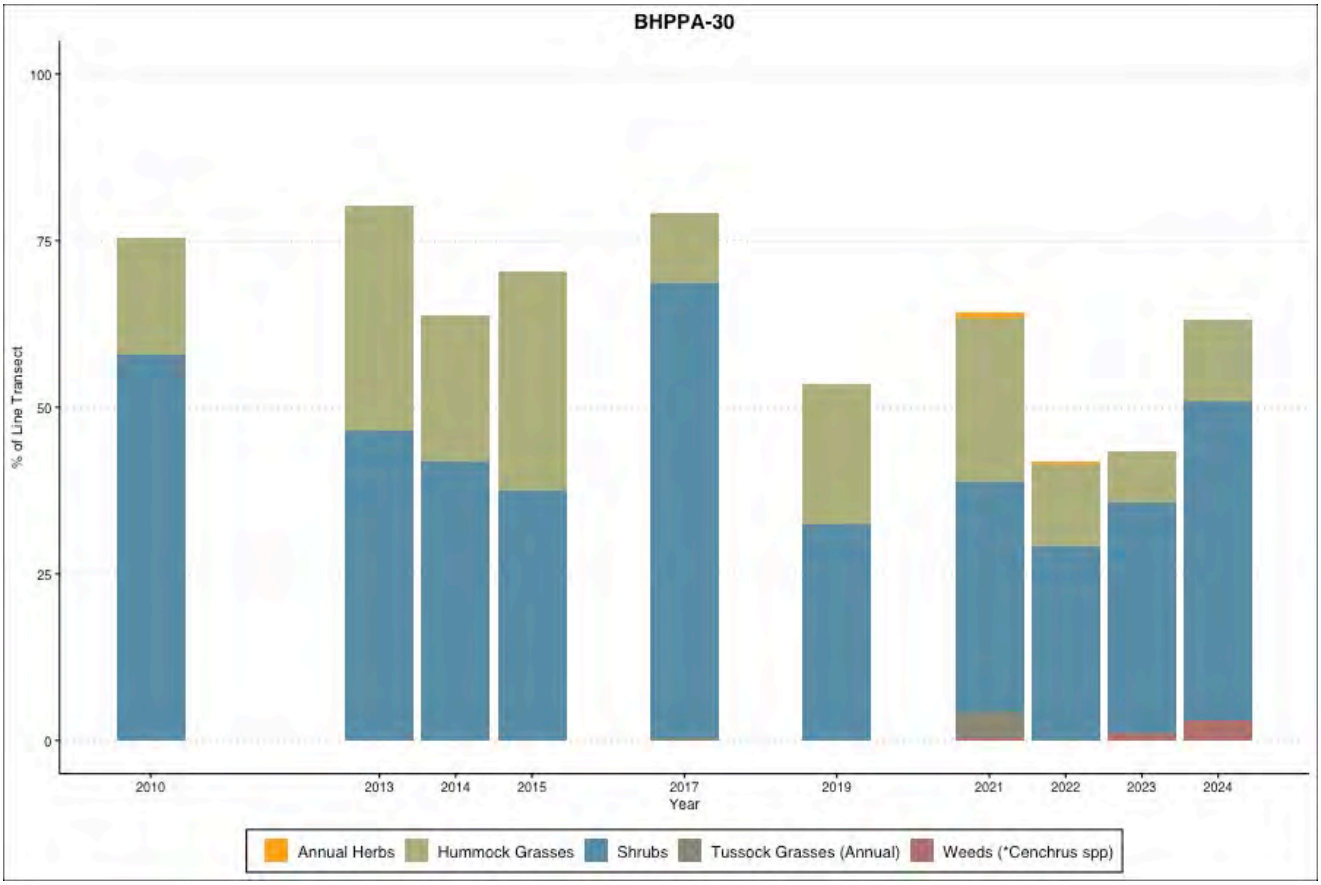
Analogue Transect BHPPA-30		Rehabilitation Transect BHPPD-30	
			
2010 – 0 m	2010 – 20 m	2010 – 0 m	2010 – 20 m
			
2013 – 0 m	2013 – 20 m	2013 – 0 m	2013 – 20 m
			
2014 – 0 m	2014 – 20 m	2014 – 0 m	2014 – 20 m
			
2015 – 0 m	2015 – 20 m	2015 – 0 m	2015 – 20 m
			
2017 – 0 m	2017 – 20 m	2017 – 0 m	2017 – 20 m

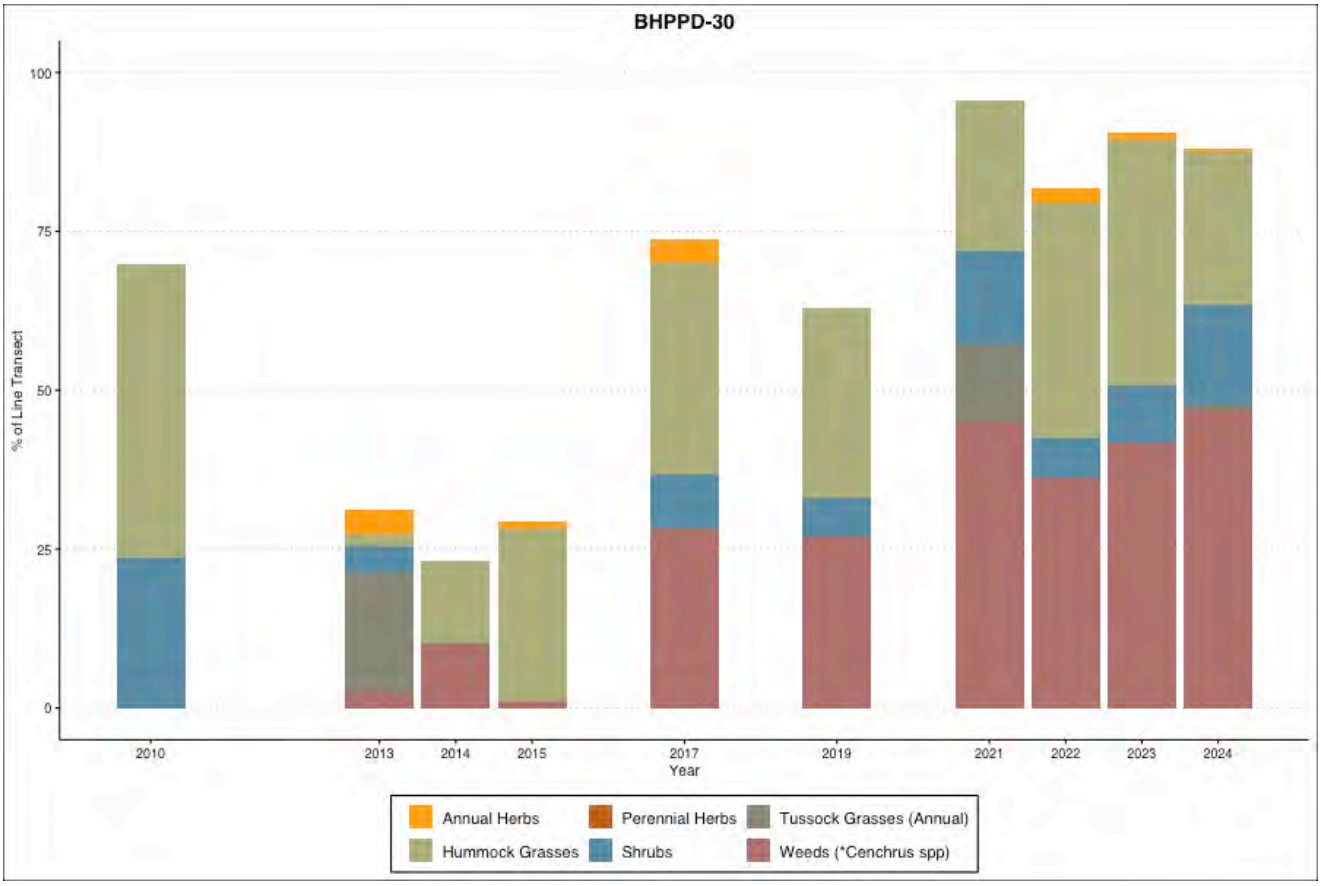
Site 30 (Mt Minnie conservation area)

Analogue Transect BHPPA-30		Rehabilitation Transect BHPPD-30		Analogue Transect BHPPA-30		Rehabilitation Transect BHPPD-30	
							
2019 – 0 m	2019 – 20 m	2019 – 0 m	2019 – 20 m	2023 – 0 m	2023 – 20 m	2023 – 0 m	2023 – 20 m
							
2021 – 0 m	2021 – 20 m	2021 – 0 m	2021 – 20 m	2024 – 0 m	2024 – 20 m	2024 – 0 m	2024 – 20 m
							
2022 – 0 m	2022 – 20 m	2022 – 0 m	2022 – 20 m				

Cover of each lifeform category along the line transect.

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Analogue BHPPA-30	2010		17.50	57.90					
	2013		33.85	46.50					
	2014		22.00	41.90					
	2015		32.95	37.40					
	2017		10.55	68.25			0.45		
	2019		21.05	32.50					
	2021		24.70	34.50			3.90	0.85	0.35
	2022	0.95	12.25	28.20				0.40	
	2023		7.80	34.60					1.05
	2024		12.25	47.75					3.10
Rehab BHPPD-30	2010		46.25	23.50					
	2013		1.75	4.25			18.75	3.95	2.50
	2014		12.70				0.35		10.00
	2015		27.10					1.20	1.05
	2017		33.35	8.20			0.50	3.80	27.95
	2019		29.95	5.95					27.00
	2021		35.55	14.65			12.20	3.70	45.05
	2022		37.05	6.10				2.30	36.30
	2023		38.75	8.95				1.10	41.80
	2024		24.15	15.75			0.8	0.30	46.90


BHPPA-30
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Hummock Grasses
Shrubs
Tussock Grasses (Annual)
Weeds (*Cenchrus spp)


BHPPD-30
% of Line Transect
100
75
50
25
0
2010
2013
2014
2015
2017
2019
2021
2022
2023
2024
Year
Annual Herbs
Perennial Herbs
Tussock Grasses (Annual)
Hummock Grasses
Shrubs
Weeds (*Cenchrus spp)

Site 30 (Mt Minnie conservation area)

Cover and presence of individual species.

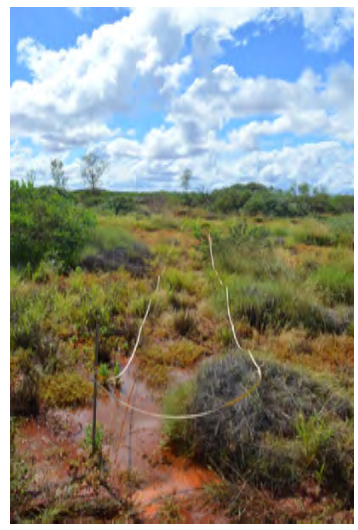
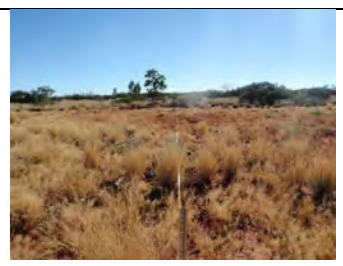
Family / Species	BHPPA-30										BHPPD-30									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Aizoaceae																				
Trianthema triquetrum							+										1.05			
Amaranthaceae																				
Amaranthus cuspidifolius							+										+			
Gomphrena affinis subsp. *pilbarensis*															0.45		+			
Gomphrena canescens													+					0.25	+	
Ptilotus astrolasius												+	+					+		
Ptilotus axillaris							+										+			
Ptilotus exaltatus (was *nobilis*)					+		0.85	+									+	+	+	
Asteraceae																				
Pterocaulon sphaeranthoides													+							+
Streptoglossa bubakii												+	+				+			+
Brassicaceae																				
Lepidium phlebopetalum																	+			
Chenopodiaceae																				
Dysphania rhadinostachya							+													
Enchylaena tomentosa var tomentosa										14.55										
Maireana planifolia			+	0.40	1.20	1.25	0.80	0.95	5.30	+										
Salsola australis					+		+	0.40	+			2.25	+	1.20	3.35		2.65	2.05	1.10	+
Cyperaceae																				
Bulbostylis barbata												0.20					+			
Fabaceae																				
Acacia synchronicia											23.50		+		6.15	2.35	4.55	1.50	+	9.45
Acacia xiphophylla	57.90	46.50	41.90	37.00	67.05	31.25	33.70	28.20	29.30	33.20										
Indigofera boviperda subsp. *boviperda*																				+
Senna notabilis							+					4.25	+		+		1.45		+	1.75
Goodeniaceae																				
Goodenia microptera																	+			0.30
Nyctaginaceae																				
Boerhavia coccinea												1.50	+				+	+		
Malvaceae																				
Corchorus laniflorus							+													
Corchorus sidoides var. *vermicularis*						+										+				
Hibiscus sturtii																				+
Sida sp. spiciform panicles (E. Leyland s.n. 14/08/90)									+											
Poaceae																				
**Cenchrus ciliaris*						+	0.35	+	1.05	3.10		2.50	10.00	1.05	27.95	27.00	45.05	36.30	41.80	46.90
Cynodon prostratus												4.00	+				+			
Dactyloctenium radulans													+		0.50		3.05	+		+
Dichanthium sericeum												1.75	0.35				+			0.80
Enneapogon caerulescens							+													
Eragrostis pergracilis												1.00								
Eragrostis tenellula							+										+			
Eriachne pulchella subsp. *pulchella*							0.25		+											
Iseilema dolichotrichum							+													
Iseilema vaginiflorum												+					0.95			
Paspalidium clementii					0.45		3.65	+	+								2.35			
Paspalidium sp.												+								
Sporobolus australasicus												12.00					5.85	+	+	+
Triodia epactia														4.70		8.95	9.50	37.05	38.75	8.50
Triodia glabra	17.50	15.25						12.25	+	+	46.25							+		
Triodia wiseana		18.60	22.00	32.95	10.55	21.05	24.70		7.80	12.25		1.75	12.70	22.40	33.35	21.00	26.05			15.65
Portulacaceae																				
Portulaca oleracea							+										+			+
Portulaca sp. *oleracea/intraterranea*								+												
Solanaceae																				
Solanum horridum													+			+	4.10	+	+	
Solanum lasiophyllum															2.05	3.60	4.55	4.60	8.95	4.55
Total no. of native species	**2**	**3**	**3**	**3**	**6**	**4**	**17**	**7**	**8**	**5**	**2**	**13**	**13**	**3**	**7**	**6**	**25**	**12**	**9**	**15**
Total no. of weed species	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

Comments regarding site:

The rehabilitation has remained in a 'Very Poor' condition in 2024. **Cenchrus ciliaris* has begun to dominate the grass layer and the cover of hummock grasses has reduced. Spraying has killed older **Cenchrus* spp. individuals (as well as some small *Triodia* hummocks), but widespread swathes have established in the area. *Triodia* spp. have historically re-established on the transect during previous monitoring periods and are continuing towards pre-clearing levels (remaining at a steady 30-38% since 2019). This 2024 monitoring period showed a drastic reduction in *Triodia* spp., likely due to the dominance of **Cenchrus ciliaris*. The application of herbicide in 2018 is evident in some patches of **Cenchrus*, but it appears to have had minimal impact upon the substantial populations, with the establishment of **Cenchrus* still found within the analogue site (recorded over the last five phases, inclusive of 2024). The presence of cattle has likely contributed to the Very Poor condition of the site.

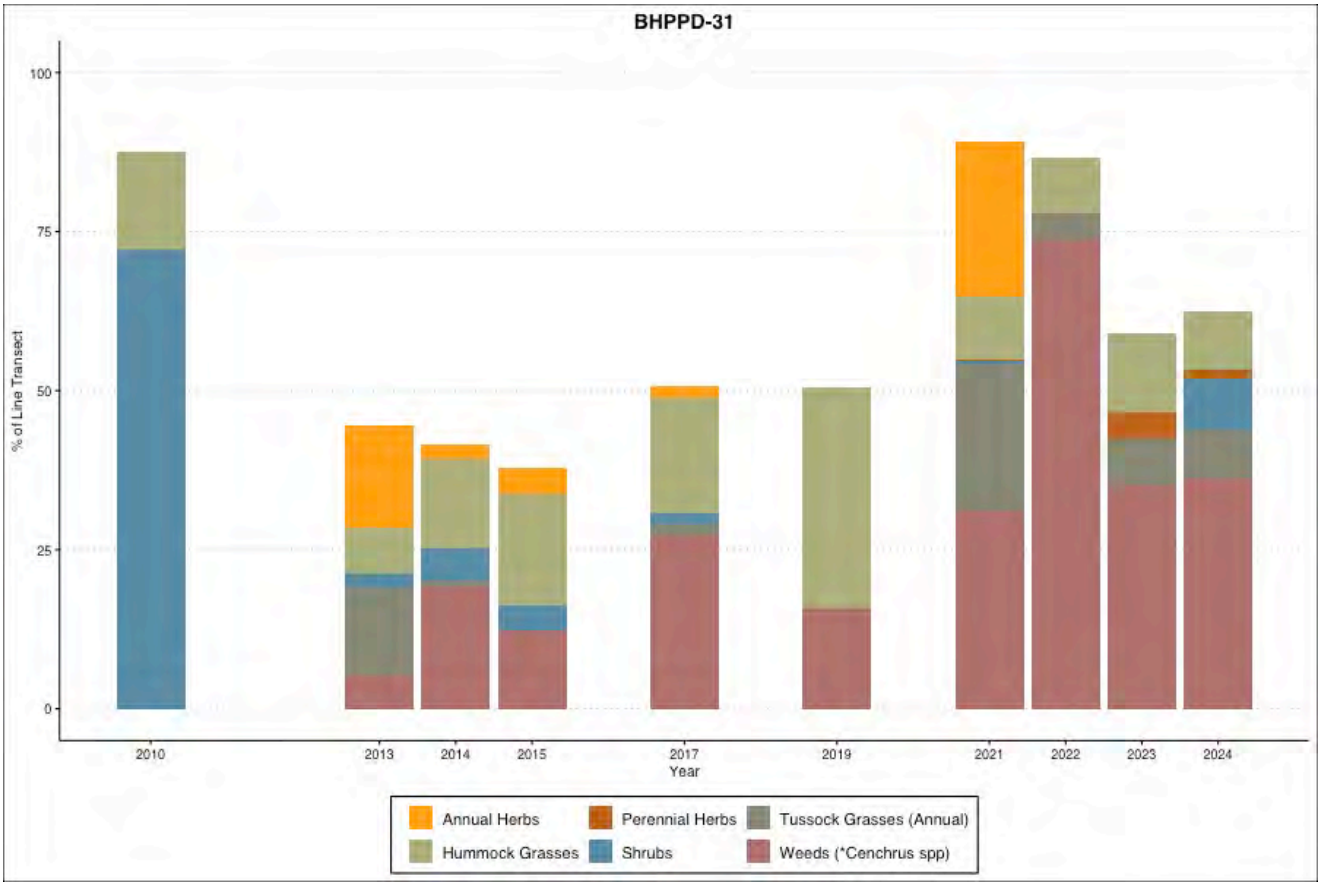
Site 31 (Mt Minnie conservation area)

Note: no analogue transect.

Rehabilitation Transect BHPPD-31			
 2010 – 0 m	 2010 – 20 m	 2021 – 0 m	 2021 – 20 m
 2013 – 0 m	 2013 – 20 m		
 2014 – 0 m	 2014 – 20 m	 2022 – 0 m	 2022 – 20 m
 2015 – 0 m	 2015 – 20 m		
 2017 – 0 m	 2017 – 20 m	 2023 – 0 m	 2023 – 20 m
 2019 – 0 m	 2019 – 20 m	 2024 – 0 m	 2024 – 20 m

Cover of each lifeform category along the line transect:

Transect	Year	Perennials					Annuals		Weeds (*Cenchrus)
		Herbs	Hummock Grasses	Shrubs	Trees	Tussock Grasses	Grasses	Herbs	
Rehab BHPPD-31	2010		34.05	72.05					
	2013		7.25	2.25			13.75	16.00	5.25
	2014		14.00	4.95			1.00	2.35	19.25
	2015		17.50	3.90				4.20	12.35
	2017		18.20	1.80			1.55	1.75	27.35
	2019		34.65						1.90
	2021	0.40	9.75	0.40			23.00	24.50	31.20
	2022		8.60				4.10		73.65
	2023	4.10	12.50				7.25		35.15
	2024	1.35	9.35	7.95			7.55		36.35



Site 31 (Mt Minnie conservation area)

Cover and presence of individual species.

Family / Species	BHPPD-31									
	2010	2013	2014	2015	2017	2019	2021	2022	2023	2024
Aizoaceae										
Trianthema triquetrum		15.00					23.15	+		
Amaranthaceae										
Gomphrena affinis subsp. *pilbarensis*									+	+
Ptilotus axillaris								+		
Ptilotus exaltatus							0.75			+
Asteraceae										
Pluchea dentex									+	
Pterocaulon sphacelatum									2.15	0.30
Stemodia grossa									1.95	
Streptoglossa decurrens							+		+	+
Chenopodiaceae										
Dysphania rhadinostachya							+			+
Dysphania sp.		+								
Maireana planifolia		2.25	2.50						+	+
Salsola australis		+	2.35	4.20	1.75			+	+	
Cleomaceae										
Arivela viscosa								+		
Cyperaceae										
Bulbostylis barbata							0.35			
Euphorbiaceae										
Euphorbia boophthona							+			
Fabaceae										
Acacia bivenosa		+	0.25	2.50	1.80	+		+	+	4.10
Acacia synchronicia							+	+	+	+
Acacia xiphophylla	68.15									
Crotalaria medicaginea var. *neglecta*							+			
Rhynchosia minima							+	+	+	1.05
Senna artemisioides subsp. *oligophylla* 'thinly sericeous'	3.90									
Senna notabilis							0.30			
Malvaceae										
Abutilon lepidum										0.45
Hibiscus sturtii			+	0.15						
Iseilema eremaeum								+		
Sida echinocarpa							0.10			
Sida fibulifera			2.20	1.25	+			+	+	2.90
Sida sp.		+								
Nyctaginaceae										
Boerhavia coccinea										+
Plantaginaceae										
Stemodia grossa		+	+					+		+
Poaceae										
**Cenchrus ciliaris*		5.25	7.55	4.75	13.15	1.00	31.20	+	33.80	34.55
**Cenchrus setiger*			11.70	7.60	14.20	0.90	+	73.65	1.35	1.80
Dactyloctenium radulans		1.00	1.00		1.55		6.95	+	7.25	6.00
Eragrostis cumingii					+					
Eragrostis dielsii		0.75								
Eragrostis tenellula							+			
Iseilema dolichotrichum							+	3.45	+	1.55
Iseilema vaginiflorum								0.35		
Sporobolus australasicus		12.00	+	+			16.05	0.30	+	
Triodia epactia			8.50	12.50	17.20	16.10	+		12.50	9.35
Triodia glabra	28.10	7.25	5.50	5.00	1.00	18.55	9.75	8.60	+	+
Triodia ? schinzii	5.95									
Portulacaceae										
Portulaca oleracea		1.00	+		+		0.25		+	
Solanaceae										
Solanum diversiflorum							+			
Solanum horridum										0.50
Solanum lasiophyllum										+
Total no. of native species	**4**	**12**	**11**	**7**	**8**	**3**	**19**	**15**	**17**	**19**
Total no. of weed species	**0**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**

Comments regarding site:

The rehabilitation increased from 'Very Poor' to 'Poor' condition during the 2023 monitoring and remained in this condition in 2024. Spinifex cover and perennial herb cover decreased slightly since 2023. Recruitment of *Acacia bivenosa* has occurred, however **Cenchrus* spp. cover is persistent and makes up the majority of foliar cover, with many new seedlings following rain. Numerous cattle tracks and scats are also present.

Appendix 3 Vascular Flora Species List (2010-2024)

N.B. The low total number of species recorded in 2019, 2021, 2022, 2023, and 2024 relative to years prior to 2019 is due to the fact that only the section of sales gas pipeline situated within the Mt Minnie conservation area was surveyed during these phases (17 transects in total, compared to 56 in previous phases).

		Astron				Biota					
Family	**Species**	**2010**	**2013**	**2014**	**2015**	**2017**	**2019**	**2021**	**2022**	**2023**	**2024**
Aizoaceae	*Trianthema pilosum*		+	+	+						
	Trianthema triquetrum		+	+		+		+	+	+	+
	Trianthema turgidifolium	+	+	+	+	+					
Amaranthaceae	*Amaranthus cuspidifolius*							+			
	Amaranthus ? interruptus					+					
	Amaranthus undulatus		+	+	+						+
	Gomphrena affinis subsp. *pilbarensis*					+		+		+	+
	Gomphrena canescens		+	+	+				+	+	+
	Gomphrena cunninghamii								+	+	+
	Ptilotus appendiculatus				+						
	Ptilotus arthrolasius					+					
	Ptilotus astrolasius		+	+		+	+	+	+		
	Ptilotus axillaris		+	+	+	+		+	+	+	+
	Ptilotus exaltatus (formerly *Ptilotus nobilis* subsp. *nobilis*)		+	+	+	+		+	+	+	+
	Ptilotus fusiformis		+	+	+	+		+			
	Ptilotus gomphrenoides		+								
	Ptilotus latifolius		+	+	+						
	Ptilotus murrayi			+							
	Ptilotus polystachyus		+	+	+			+	+		+
	Ptilotus villosiflorus				+						
	Ptilotus xerophilus			+	+						
Araliaceae	*Trachymene pilbarensis*			+							
Asteraceae	*Calotis porphyroglossa*				+						
	Pluchea dentex								+	+	
	Pluchea dunlopii				+						+
	Pluchea rubelliflora				+						
	Pterocaulon sphaeranthoides			+							+

		Astron				Biota					
Family	**Species**	**2010**	**2013**	**2014**	**2015**	**2017**	**2019**	**2021**	**2022**	**2023**	**2024**
Asteraceae (cont.)	*Pterocaulon sphacelatum*										+
	Streptoglossa bubakii		+	+	+	+		+			+
	Streptoglossa decurrens			+	+	+		+		+	+
	Streptoglossa odora				+						
Boraginaceae	*Euploca glandulifera* (formerly *Heliotropium glanduliferum*)		+	+	+						
	Euploca inexplicita (formerly *Heliotropium inexplicitum*)				+	+					
	Heliotropium crispatum		+	+	+	+		+			+
	Heliotropium curassavicum				+						
	Trichodesma zeylanicum (var. not specified)			+	+						
	Trichodesma zeylanicum var. *grandiflorum*					+					
Brassicaceae	*Lepidium phlebopetalum*							+			
Caryophyllaceae	*Polycarpaea corymbosa* var. *corymbosa*			+		+		+			
Chenopodiaceae	*Atriplex codonocarpa*				+						
	Atriplex semilunaris					+					
	Atriplex sp. (inadequate material)			+							
	Dysphania kalpari			+				+			
	Dysphania rhadinostachya		+	+				+			+
	Dysphania sp. (inadequate material)		+			+		+	+		
	Enchylaena tomentosa								+	+	+
	Maireana planifolia			+	+	+	+	+		+	+
	Maireana villosa					+					
	Maireana sp. (inadequate material)		+	+						+	
	Neobassia astrocarpa			+	+						
	Salsola australis	+	+	+	+	+		+	+	+	+
	Sclerolaena burbidgeae				+						
	Sclerolaena costata				+						
	Sclerolaena recurvicuspis					+					
	Tecticornia auriculata				+						
	Tecticornia halocnemoides (subsp. not determined)	+	+	+							

		Astron				Biota					
Family	**Species**	**2010**	**2013**	**2014**	**2015**	**2017**	**2019**	**2021**	**2022**	**2023**	**2024**
Chenopodiaceae	*Tecticornia halocnemoides* subsp. *tenuis*				+						
(cont.)	*Tecticornia indica*	+	+	+	+						
Cleomaceae	*Arivela uncifera*				+			+			
	Arivela viscosa							+	+		
Convolvulaceae	*Bonamia alatisemina*			+	+	+			+	+	+
	Bonamia erecta		+	+	+	+		+	+	+	+
	Bonamia pilbarensis							+			
	Cressa australis			+	+						
	Evolvulus alsinoides (sterile; var. not determined)				+			+			
	Evolvulus alsinoides var. *villosicalyx*		+	+	+	+		+	+	+	+
	Ipomoea coptica				+	+					
	Ipomoea muelleri		+	+	+	+					
	Ipomoea polymorpha				+	+					
	Ipomoea sp. (inadequate material)			+							
	Operculina aequisepala				+						
	Polymeria ambigua		+	+							
	Polymeria lanata		+								
Cucurbitaceae	*Cucumis variabilis*		+								
Cyperaceae	*Bulbostylis barbata*		+	+	+	+		+	+	+	+
	Cyperus bulbosus			+	+						
	Cyperaceae sp. (inadequate material)		+								
Euphorbiaceae	*Adriana tomentosa* var. *tomentosa*	+	+	+	+						
	Euphorbia australis (var. not determined)				+						
	Euphorbia boophthona			+				+	+	+	+
	Euphorbia coghlanii		+	+							
	Euphorbia myrtoides			+	+	+					
	Euphorbia tannensis subsp. *eremophila*			+				+			
	Euphorbia vaccaria var. *vaccaria*					+		+			
Euphorbiaceae (cont.)	*Euphorbia* sp. (inadequate material)		+	+							+

		Astron				Biota					
Family	**Species**	**2010**	**2013**	**2014**	**2015**	**2017**	**2019**	**2021**	**2022**	**2023**	**2024**
Fabaceae	*Acacia ancistrocarpa*	+	+	+	+	+	+	+	+	+	+
	Acacia bivenosa	+	+	+	+	+	+	+	+	+	+
	Acacia coriacea	+	+	+	+						
	Acacia gregorii	+									
	Acacia inaequilatera	+	+	+	+	+	+	+	+	+	+
	Acacia sclerosperma subsp. *sclerosperma*				+						
	Acacia stellaticeps	+	+	+	+	+	+	+	+	+	+
	Acacia synchronicia	+	+	+	+	+	+	+		+	+
	Acacia tetragonophylla	+	+	+	+			+			
	Acacia trachycarpa	+						+			
	Acacia xiphophylla	+	+	+	+	+	+	+	+	+	+
	Aenictophyton reconditum		+	+							
	Crotalaria cunninghamii subsp. *sturtii*		+	+	+	+					
	Crotalaria medicaginea var. *neglecta*		+	+	+	+		+			
	Crotalaria ramosissima			+	+	+					
	Cullen cinereum		+	+	+						
	Cullen leucanthum		+		+	+					
	Cullen martinii		+	+	+	+		+			+
	Grona filiformis (formerly *Desmodium filiforme*)			+		+		+			
	Indigofera boviperda subsp. *boviperda*		+	+	+	+	+	+	+	+	+
	Indigofera colutea		+	+	+	+		+	+	+	+
	Indigofera linifolia		+	+	+	+		+			
	Indigofera linnaei				+						
	Indigofera sp. (inadequate material)				+						
	Isotropis atropurpurea			+	+	+	+				
	Lotus cruentus			+							
	**Neltuma* sp. (inadequate material) (formerly **Prosopis* sp.)				+	+					
	Petalostylis cassioides		+	+	+	+			+		+
Fabaceae (cont.)	*Rhynchosia minima*		+	+	+			+	+	+	+

		Astron				Biota					
Family	**Species**	**2010**	**2013**	**2014**	**2015**	**2017**	**2019**	**2021**	**2022**	**2023**	**2024**
	Senna artemisioides subsp. *oligophylla* '(thinly sericeous form)'	+									
	Senna notabilis		+	+	+	+	+	+	+	+	+
	Sesbania cannabina				+	+					
	Swainsona kingii			+	+			+			+
	Swainsona pterostylis		+	+	+						
	Tephrosia clementii							+			
	Tephrosia uniovulata		+	+		+	+	+			+
	Tephrosia sp. B Kimberley Flora (C.A. Gardner 7300)		+	+	+	+		+	+	+	+
	Tephrosia sp. (inadequate material)				+						
	**Vachellia farnesiana*	+	+	+	+	+					
Frankeniaceae	*Frankenia pauciflora*	+	+	+	+						
Gentianaceae	*Schenkia clementii*				+						
Geraniaceae	*Erodium cygnorum*			+							
Goodeniaceae	*Goodenia forrestii*		+	+	+	+					
	Goodenia microptera		+	+	+	+		+		+	+
	Goodenia tenuiloba		+	+	+						
	Scaevola parvifolia			+	+	+					
	Scaevola sericophylla	+	+	+	+	+					
	Scaevola spinescens		+	+	+	+	+	+	+	+	
Gyrostemonaceae	*Codonocarpus cotinifolius*					+	+	+		+	+
Haloragaceae	*Haloragis gossei*		+	+							
Lamiaceae	*Dicrastylis cordifolia*	+	+	+	+	+	+				+
	Quoya loxocarpa					+					
	Quoya paniculata	+	+	+	+						
Lauraceae	*Cassytha capillaris*	+			+	+	+	+	+	+	+
	Cassytha sp. (inadequate material)	+	+	+	+						
Malvaceae	*Abutilon fraseri* subsp. *fraseri*					+	+			+	
	Abutilon lepidum		+	+	+	+	+	+	+	+	+
Malvaceae (cont.)	*Abutilon otocarpum*		+			+			+	+	+

		Astron				Biota					
Family	**Species**	**2010**	**2013**	**2014**	**2015**	**2017**	**2019**	**2021**	**2022**	**2023**	**2024**
	Abutilon sp. Pilbara (W.R.Barker 2025)							+			
	Abutilon sp. Onslow (F. Smith s.n. 10/9/61) – **Priority 1**							+		+	
	Abutilon sp. (inadequate material)		+	+	+						+
	Alyogyne pinoniana var. *pinoniana*	+			+	+					
	Corchorus laniflorus				+			+			
	Corchorus sidoides (inadequate material)		+	+	+						
	Corchorus sidoides subsp. *sidoides*							+		+	+
	Corchorus sidoides subsp. *vermicularis*					+	+	+			
	Gossypium australe										+
	Hannafordia quadrivalvis subsp. *recurva*			+	+		+	+			
	Hibiscus brachychlaenus				+	+					
	Hibiscus sturtii (inadequate material)		+	+	+						
	Hibiscus sturtii var. *campylochlamys*					+					
	Hibiscus sturtii var. *grandiflorus*							+		+	
	Hibiscus sturtii var. *platychlamys*			+	+					+	+
	Hibiscus sp. (inadequate material)		+	+							+
	Lawrencia viridigrisea			+	+						
	Melhania oblongifolia			+		+					
	Sida arsiniata				+			+		+	+
	Sida cardiophylla			+	+			+			
	Sida echinocarpa										+
	Sida fibulifera		+	+	+	+		+	+	+	+
	Sida ? intricata		+								
	Sida rohlenae subsp. *rohlenae*		+	+	+						
	Sida sp. Pilbara (A.A. Mitchell PRP 1543)		+	+	+		+				
	Sida sp. (inadequate material)		+	+	+	+				+	
	Triumfetta ramosa		+	+	+	+					
	? *Triumfetta* sp. (inadequate material)		+								
Marsileaceae	*Marsilea hirsuta*				+	+					

		Astron				Biota					
Family	**Species**	**2010**	**2013**	**2014**	**2015**	**2017**	**2019**	**2021**	**2022**	**2023**	**2024**
Molluginaceae	*Trigastrotheca molluginea*		+	+	+	+		+			
Montiaceae	*Calandrinia* sp. (inadequate material)			+					+		
Myrtaceae	*Corymbia hamersleyana*	+	+	+	+	+	+	+		+	+
	Eucalyptus victrix	+	+	+	+						
	Eucalyptus ? victrix (inadequate material)	+									
	Eucalyptus xerothermica	+									
Nyctaginaceae	*Boerhavia coccinea*		+	+		+		+	+	+	+
	Boerhavia sp. (inadequate material)			+							
Phyllanthaceae	*Dendrophyllanthus erwinii* (formerly *Phyllanthus erwinii*)							+	+		
	Nellica maderaspatensis (formerly *Phyllanthus maderaspatensis*)			+	+						
Plantaginaceae	*Stemodia grossa*		+	+					+	+	+
Poaceae	*Aristida contorta*		+	+		+		+	+	+	+
	Aristida holathera var. *holathera*		+	+	+	+	+	+		+	+
	**Cenchrus ciliaris*	+	+	+	+	+	+	+	+	+	+
	**Cenchrus setiger*		+	+	+	+	+	+	+	+	+
	**Cenchrus* sp. (inadequate material)					+			+		
	Chloris pumilio		+	+	+	+					
	Chrysopogon fallax			+						+	+
	Cynodon prostratus		+	+		+		+		+	
	Dactyloctenium radulans		+	+		+		+	+	+	+
	Dichanthium sericeum subsp. *humilius*		+	+				+			+
	Enneapogon caerulescens		+	+				+	+	+	+
	Eragrostis cumingii					+					
	Eragrostis dielsii		+								
	Eragrostis eriopoda		+	+	+	+					
	Eragrostis pergracilis		+	+	+	+		+			
	Eragrostis tenellula					+		+	+		
	Eragrostis sp. (inadequate material)	+									
Poaceae (cont.)	*Eriachne aristidea*		+	+	+	+		+	+	+	+

		Astron				Biota					
Family	**Species**	**2010**	**2013**	**2014**	**2015**	**2017**	**2019**	**2021**	**2022**	**2023**	**2024**
	Eriachne benthamii	+	+	+	+						
	Eriachne obtusa			+	+						
	Eriachne pulchella var. *pulchella*		+	+		+		+	+	+	
	Eriachne sp. (inadequate material)	+									
	Eulalia aurea	+	+	+	+	+					
	Iseilema dolichotrichum					+		+	+	+	+
	Iseilema eremaeum										
	Iseilema vaginiflorum		+	+	+			+	+		
	Panicum australiense var. *australiense* (formerly *Yakirra australiensis* var. *australiensis*)		+		+	+		+		+	+
	Panicum decompositum				+						
	Panicum sp. (inadequate material)					+					
	Paractaenum refractum		+	+						+	
	Paspalidium clementii		+		+	+		+	+		+
	Paspalidium rarum							+			
	Paspalidium sp. (inadequate material)		+	+							
	Setaria dielsii				+						
	Sorghum plumosum		+	+	+						
	Sporobolus actinocladus								+		
	Sporobolus australasicus		+	+	+	+		+	+	+	+
	Sporobolus mitchellii		+	+	+	+					
	Triodia epactia	+	+	+	+	+	+	+	+	+	+
	Triodia glabra	+	+	+	+	+	+	+	+	+	+
	Triodia schinzii	+	+	+	+	+	+	+	+	+	+
	Triodia ? schinzii (inadequate material)	+									
	Triodia wiseana		+	+	+	+	+	+		+	+
	Urochloa holosericea subsp. *velutina*					+					
	Poaceae sp. (inadequate material)	+									
Polygalaceae	*Polygala isingii*			+							

Macedon Gas Development MS844 2024 Compliance Assessment Report

Head Office

Mia Yellagonga
11 Mount Street
Perth WA

T: +61 8 9348 4000
www.woodside.com