# BHP Pilbara Expansion Strategic Proposal Derived Proposal Rehabilitation Report

22 July 2025

**Authorisation**

| Version | Description | Position | Date |
|---|---|---|---|
| Rev 1 (Final) | Final version for referral to EPA | Manager Environment, Approvals and Biodiversity, WA Iron Ore | July 2025 |

# Glossary

| Term | Meaning |
|---|---|
| Allelopathic species | Plant species which chemically inhibit another plant due to the release into the environment of substances acting as germination or growth inhibitors |
| Baseline data | Regional or local data (from reference sites) from a point in time used to compare data at rehabilitation sites |
| Completed rehabilitation | Rehabilitation areas where the revegetation phase of rehabilitation is at a stage where it can be assessed for completion (rehabilitation generally greater than 15 to 20 years old) |
| Completion criteria | Agreed standards or levels of performance that indicate the success of completed rehabilitation (DMIRS 2020) |
| Disturbed land | Total land area that is physically impacted by the activities of the business (including cleared areas) |
| Domain | A group of landform(s) or infrastructure that has similar rehabilitation and closure requirements and outcomes (DMIRS 2020) |
| Future rehabilitation activities | Rehabilitation areas where rehabilitation activities have not yet commenced, i.e. areas that have been cleared or areas planned and proposed to be cleared |
| Post-mining land use | The outcome environment that is established for disturbed land after mining ceases (from Syrinx 2020) |
| Progressive criteria | Criteria developed for this report to measure how rehabilitation underway is progressing and whether it is likely to be successful (at completion) |
| Reference site | Location that has not been subject to mine-related disturbance that is monitored (landform and vegetation) as part of BHP's rehabilitation monitoring program |
| Rehabilitation | A process, which improves a degraded environment toward an agreed goal (Syrinx 2020) |
| Rehabilitation area | Area where rehabilitation activities have been undertaken and revegetation phase has begun |
| Rehabilitation site | Location within area under rehabilitation that is monitored as part of BHP's rehabilitation monitoring program |
| Rehabilitation underway | Rehabilitation areas where all rehabilitation activities have been undertaken but the rehabilitation is not at a stage where it can be assessed for completion (rehabilitation generally less than 15 years old) |
| Revegetation | Phase of rehabilitation, including any or all of the following activities - final trim, topsoil, ameliorant, contour ripping / scarification and seeding, to achieve rehabilitation |
| Young criteria | Criteria developed to measure how rehabilitation underway (less than 5 years since revegetation activity commenced) is progressing and whether it is likely to be successful (at completion) |

# Abbreviations

| Term | Meaning |
|---|---|
| AER | Annual Environmental Report |
| AWT | Above water table |
| BWT | Below water table |
| DMIRS | Department of Mines, Industry Regulation and Safety |
| DWER | Department of Water and Environment Regulation |
| EPA | Environmental Protection Authority |
| EP Act | *Environmental Protection Act 1986* (WA) |
| FY | Financial Year |
| Ha | Hectare |
| IRR | Impact Reconciliation Reports |
| MCPs | Mine Closure Plans |
| MRF | Mining Rehabilitation Fund |
| MS | Ministerial Statement |
| MS1105 | Ministerial Statement 1105 |
| NA | Not applicable |
| NVCP | Native Vegetation Clearing Permit |
| OB | Orebody |
| OB32 BWT | Orebody 32 Below Water Table Proposal |
| OSA | Overburden Storage Area |
| Strategic Proposal | BHP Pilbara Expansion Strategic Proposal |
| TBA | To be advised |
| WA | Western Australia |
| WABSI | Western Australian Biodiversity Science Institute |
| WAIO | Western Australian Iron Ore |
| Western Ridge | Western Ridge Proposal |
| Yrs | Years |

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# Summary

## Purpose, approach and scope

The purpose of this report is to comply with Ministerial Statement 1105 (MS1105) – Pilbara Expansion Strategic Proposal, which requires that a report on rehabilitation is to be included with a request to declare a referred proposal to be a derived proposal (see: 1(c) of the *Guidelines for submitting a derived proposal* (MS1105 Guidelines). BHP has prepared this report to support the derived proposal requests for the following proposals:

- Ministers North
- Orebody 32 Creek Discharge.

BHP has developed scientifically based criteria and quantitative targets to systematically, consistently and transparently assess rehabilitation progress and success across its Western Australian Iron Ore (WAIO) operations.

## Guidelines 1(c)(i): Types of ecosystems and total area required to be rehabilitated

The types of ecosystems that require rehabilitation have been defined across BHP WAIO's iron ore tenure, based on the major vegetation types of Beard *et al*. (2013). These major vegetation types were applied as they are representative of the dominant ecosystems present within BHP's tenure, reflect the scale of rehabilitation required, and reflect the likely post-mining ecosystem.

The estimated total area of disturbance that BHP will be required to rehabilitate to the revegetation phase across the WAIO tenure is 68,803 ha. This number is derived from the total approved disturbance limit with the inclusion of the Ministers North Proposal, and the exclusion of areas which will not be revegetated (i.e. open pits remaining as voids). BHP's actual disturbance totals 38,177 ha, with 28,450 ha of this total to be rehabilitated (revegetated), which equates to 74% of BHP WAIO's total volume of disturbed land.

## Guidelines 1(c)(ii): Analysis of rehabilitation history and success

BHP has undertaken an analysis of the history of rehabilitation practices in the Pilbara. The key rehabilitation practices and outcomes include the following:

- **1980s**: Rehabilitation began at Mount Whaleback (Newman hub) – rehabilitation was 'ad hoc' with poor Triodia recruitment, limited species diversity and high erosion observed
- **1990s:** Rehabilitation was initiated across all WAIO Pilbara operations, which included trials with alternative rehabilitation landforms, slope modification and the implementation of contour ripping. Erosion outcomes and Triodia recruitment were observed to increase compared to the previous decade, and rehabilitation trials and monitoring practices were improved
- **From early 2000s:** Improvements were made to landforms including the integration of overburden storage areas (OSAs) into the landscape, and alteration of slopes to minimise erosion. Improvements were made to the establishment of native vegetation with the concept of growth media introduced. A resulting decreased in erosion was observed at BHP WAIO rehabilitation sites
- **From 2015:** Revegetation technologies were progressed, including: the understanding of seed biology, improved seed collection methods, and dormancy breaking and seeding methodologies employed to improve revegetation outcomes. These technologies resulted in an improvement in recruitment across BHP WAIO rehabilitation / revegetation efforts
- **From 2021:** BHP developed completion criteria to measure rehabilitation success and progressive criteria to predict future rehabilitation success. The analysis completed in 2021 identified that historical rehabilitation was variable across the hubs and was partially successful at a minimum. The majority of rehabilitation sites met most criteria. The most common criteria not met was Hummock Grasses (*Triodia*) Cover. Triodia Cover was identified as a key indicator for success, and as such, has been a key focus in BHP's continued improvement in rehabilitation methodology and research.

The success of BHP's rehabilitation efforts up to and including the 2024 financial year (FY2024) are presented within this report. Below listed are the key findings of the FY2024 analysis of rehabilitation success:

- As of the FY2024, rehabilitation sites at BHP numbered 1,238 comprising 3,466.72 ha. Of this total, young stage rehabilitation equated to 536.3 ha, Progressive stage rehabilitation accounted for 1,967.07 ha and completion stage rehabilitation totalled 963.22 ha.
- **Future Rehabilitation**: the performance of future rehabilitation monitoring data against BHP's robust suite of progressive criteria enables BHP to assess the likelihood of future rehabilitation success. Where performance of a site is not achieving the criteria, remedial measures can be undertaken to ensure that the rehabilitation site progresses along the appropriate trajectory. Monitoring results from the FY2024 indicated variable performance against criteria across hubs and landforms (crest, flat and slope). Criteria with high achievement across most sites including *Native Vegetation Cover*, *Total Weed Cover*, and *Weed: Hummock Ratio*.
- **Historical Rehabilitation**: the performance of historical rehabilitation monitoring data against BHP's robust suite of completion criteria enables BHP to assess the success of historical/completed rehabilitation. Where performance of a site is not achieving the criteria, remedial measures can be undertaken to ensure that the rehabilitation performance can be improved and the revegetation sustained. Monitoring results from the FY2024 indicated variable performance against completion criteria across hubs and landforms (crest, flat and slope). Criteria with high achievement across most sites included Total Weed Cover, Cenchrus (buffel) cover, Herb Cover, Shrub Cover and Other Grasses Cover.

## Schedule 1, Table 2, 2.c and Guidelines 1(c)(iii): Future rehabilitation success

BHP has developed progressive criteria to estimate future rehabilitation success, which are comprised of major criterion and supporting criterion. These criteria are applied as the monitoring targets for rehabilitation areas which have undergone revegetation efforts and are not at a level of maturity (15 years or more) that can be measured for rehabilitation success (completion). Rehabilitation that is progressing (0 – 15 years) is considered likely to be successful if BHP can demonstrate that rehabilitation is progressing according to the appropriate trajectory.

In the 2021 financial year (FY2021) progressing rehabilitation was variably successful across all WAIO mining hubs. Supporting criterion were met for most hubs whilst most hubs did not meet the major criterion considered to support a trajectory for success (*Hummock Cover: Total Native Cover ratio*), with the exception of the Mining Area C and Jimblebar hubs.

In FY2024 BHP WAIO's progressive rehabilitation sites were observed to be improving against the major and supporting criterion. At all WAIO hubs an average of 87% of progressive rehabilitation sites were achieving the *Native Vegetation Cover* targets, and an average of 53% of progressive rehabilitation sites were achieving the *Hummock Grass: Total Native Cover* ratio target. BHP continues to adopt the principle of adaptive management and progress Triodia seeding technologies to improve the performance of future rehabilitation across all WAIO hubs.

# 1. Introduction

## 1.1 Purpose of this report

BHP has prepared this Rehabilitation Report (report) for the 2023-2024 Financial Year (FY), to support the request that the Proposal to which this Rehabilitation Report is attached be declared a Derived Proposal of BHP's Pilbara Expansion Strategic Proposal (Strategic Proposal) (BHP 2016) (Figure 1), as required by Ministerial Statement 1105 (MS1105).

The purpose of this report is to meet the requirement under the Pilbara Expansion Strategic Proposal (Strategic Proposal) (BHP 2016) Ministerial Statement 1105 (MS1105) to include a report on rehabilitation with a request to declare a referred proposal to be a derived proposal (see 1(c) of the *Guidelines for submitting a derived proposal* (MS1105 Guidelines)). Table 1 outlines which sections in this report address the specific requirements of MS1105. Columns 1 and 2 refer to the requirements as stated in the MS1105 Guidelines, and Column 3 refers to the section within this Rehabilitation Report which demonstrates compliance to the requirements.

**Table 1: Derived proposal request requirements – Rehabilitation Report**

| Column 1: MS1105 Reference | Column 2: Rehabilitation requirement | Column 3: Section addressed within this report |
|---|---|---|
| Guideline 1(c)(i) | The types of ecosystems and total area of rehabilitation that the proponent will be required to rehabilitate across their iron ore tenure including the derived proposal. | Section 2 - BHP areas requiring rehabilitation |
| Guideline 1(c)(ii) | An analysis of the history of rehabilitation that the proponent has undertaken in the Pilbara and the demonstrated success of this rehabilitation. | Section 4 – Rehabilitation success<br><br>Section 4.8 – Summary of rehabilitation success |
| Guideline 1(c)(iii) | The likely success of future rehabilitation activities in establishing self-sustaining areas of rehabilitation, taking into account:<br>• relevant contemporary scientific evidence<br>• the types of area to be rehabilitated<br>• the scale of rehabilitation activities. | Section 3 - Methodology for measuring rehabilitation success<br><br>Section 4.9 – Summary of future rehabilitation success |
| Schedule 1, Table 2, Column 3 | 1 Planned, designed and managed (demonstrated in the referral of future proposal and draft management plans submitted at the time of referral of future proposals) to ensure:<br>c. Scientifically verifiable estimates of the likely success of future rehabilitation have been made. | Section 3 - Methodology for measuring rehabilitation success<br><br>Section 4 – Rehabilitation success<br><br>Section 5 – Continuous improvement and future work |

## 1.2 Approach for this report

In the Environmental Protection Authority's (EPA) Report 1619 on the Strategic Proposal (EPA 2018), the EPA considered that it is important that a full understanding of the status of rehabilitation in the Pilbara is achieved and included guidance on the information related to rehabilitation that it expects to see in any request to declare a proposal a derived proposal (see MS1105 Guidelines, 1(c)). This report documents the status of rehabilitation at BHP's Western Australia Iron Ore (WAIO) operations.

This report builds upon BHP's FY2021 Rehabilitation Report for a derived proposal submitted in 2022 (BHP 2022). The scientifically based criteria and quantitative targets presented in the FY2021 Rehabilitation Report (BHP 2022) have continued to be applied to systematically, consistently and transparently to assess rehabilitation progress and success across BHP's WAIO operations. These criteria and targets for rehabilitation are also reported on for other internal and regulatory requirements, including at the approval level as part of the Annual Environmental Report (AER).

BHP considers that the approach for this report will enable consistency with previous and future versions of this report to demonstrate success and progression of broadscale rehabilitation over time, whilst providing flexibility to continue to improve the standard of rehabilitation across BHP WAIO sites. The rehabilitation success methodology of the previous report has remained consistent, however improvements to the methodology are in development by BHP WAIO Rehabilitation. BHP will continue to use a scientifically verifiable approach for measuring rehabilitation success, however the rehabilitation success methodology will be updated for future reports.

## 1.3 Scope of this report

The scope of this Rehabilitation Report is to report the success of rehabilitation of the disturbed areas which meet the following criteria:

- Legislative scope: areas which have been disturbed and require rehabilitation pursuant to State Agreements and/or Part IV and Part V of the *Environment Protection Act 1986* (EP Act)
- Spatial scope: areas of disturbance which are located within BHP's Western Australia Iron Ore tenure
- Data collected by BHP within the above legislative and spatial extents, up to and including the 2024 financial year (FY2024).

This Rehabilitation Report is supplementary to the requests for a proposal to be a derived proposal and the following subsections (Section 1.3.1, Section 1.3.2 and Section 1.3.2) define the limits of the scope of this Rehabilitation Report.

### 1.3.1 Data

Unless otherwise specified, BHP will use disturbance (clearing) and rehabilitation data from the previous financial year to prepare rehabilitation reports. This report uses BHP data from approved projects up to the end of FY2024 (i.e. 30 June 2024). This enables the information presented in this report to be aligned with other regulatory reporting relating to disturbance/clearing and rehabilitation, e.g. Annual Environmental Reports (AERs), Mining Rehabilitation Fund (MRF) reports and Impact Reconciliation Reports (IRR).

As required by MS1105 Guideline 1(c)(i) and (iii), this report also includes relevant data and information (Section 2) relating to the proposals to which this report is attached.

### 1.3.2 Rehabilitation phase – revegetation

This Rehabilitation Report refers to the revegetation phase of rehabilitation, where all other earthwork activities are complete and, if specified, topsoil, ameliorant, contour ripping/scarification and/or seeding have been undertaken. In EPA Report 1619, the EPA states that a consideration for environmental impact assessment (in the EPA's *Environmental Factor Guideline – Flora and Vegetation*) is whether the proposal area will be revegetated in a manner that promotes biological diversity and ecological integrity (EPA 2018). Other rehabilitation phases such as landform profiling, contouring and armouring are addressed in Mine Closure Plans (MCPs) and other Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) requirements.

### 1.3.3 Types of disturbance

This Rehabilitation Report presents the performance of rehabilitation (revegetation) of mining-related disturbance including clearing related to overburden storage areas (OSAs), associated infrastructure and rail. The analysis of rehabilitation success in this report does not include:

- mine pits that will remain as open pit voids at closure (i.e. are not backfilled, including where pit lakes will form), as these landforms will not undergo revegetation

- the portions of the Chichester rail line that are not located within a mine hub
- exploration disturbance (this type of disturbance will be rehabilitated under EP Act Part V Native Vegetation Clearing Permits (NVCP), or included as mine disturbance in the future if the orebody is approved for mining)
- BHP operations at Port Hedland.

## 1.4 Other rehabilitation reporting

This Rehabilitation Report complements other documents relating to disturbance and rehabilitation that BHP is required to prepare including Mine Closure Plans (MCP), Annual Environmental Reports (AER), Impact Reconciliation Reports (IRRs) and Mining Rehabilitation Fund (MRF) reports.

## 1.5 Updates since FY2021

Changes to BHP WAIO's rehabilitation monitoring methodology, assessment criteria and approach since the FY2021 Rehabilitation Report are documented in Table 2 below.

**Table 2: Changes to methodology and approach from previous report (FY2021)**

| Item | FY2021 | FY2024 | Justification for change |
|---|---|---|---|
| Methodology for monitoring rehabilitation | Monitoring and analysis of data conducted by Spectrum Ecology and Spatial. | Outsourced: aerial imagery capture, remote sensing analysis, on-ground botanical monitoring<br><br>BHP: qualitative on-ground monitoring, reporting against completion criteria via purpose-built ESRI database | Greater control of scope and increase in flexibility of timing and to adopt 'adaptive management' amendments to monitoring regime |
| | | Permanent on-ground rehabilitation monitoring plots covering ~1% of BHP's rehabilitation areas | Increased statistical power |
| | Sites monitored once every three years at a minimum | Two-year monitoring rotation for mining hubs with increased rigour/intensity | More rigorous and cost-effective approach |

# 2. BHP areas requiring rehabilitation

This section addresses Guideline 1(c)(i) of MS1105 (Table 1 and provides definition of the areas to be rehabilitated within the scope of this Rehabilitation Report (Section 1.3), and describes the type of ecosystems requiring and undergoing rehabilitation.

## 2.1 Mine operations to be rehabilitated

WAIO tenure extends across the Pilbara region (Figure 1) and includes existing operations and future operations as identified in the Strategic Proposal. For the purposes of this Rehabilitation Report, BHP's WAIO operations have been grouped into functional hubs to facilitate meaningful analysis of BHP's rehabilitation performance. The hub boundaries are defined for calculation and mapping purposes only (Figure 2).

All of the mine hubs described in this Rehabilitation Report are located within the Strategic Proposal boundary (Figure 1) and are consistent with the existing mining operations as identified in MS1105, with the exception of Goldsworthy and Yarrie. The hub boundaries are arbitrary only for the purposes of grouping operations to assess rehabilitation success. As future operations are proposed (including future proposals identified in the Strategic Proposal), BHP may amend the hubs or add new hubs.

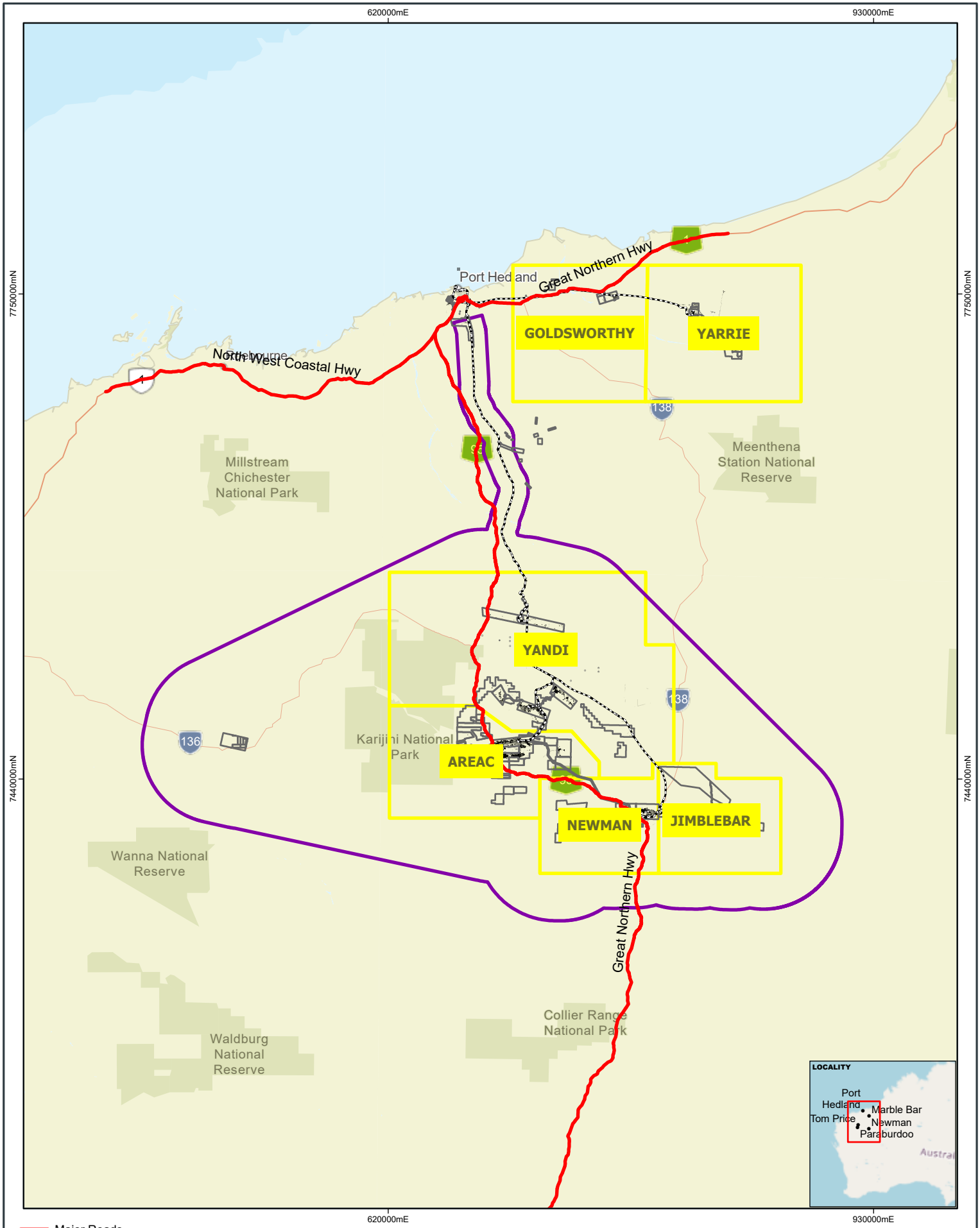
Disturbance limits and areas requiring rehabilitation within BHP's WAIO mining operations and approved by Part IV of the EP Act (Ministerial Statements) are presented in Table 3 below. The table also details legacy mining operations which predate the EP Act (Whaleback and Goldsworthy), proposals currently under assessment, and the proposals subject of this Rehabilitation Report: Ministers North and Orebody 32 Creek Discharge.

**Table 3: Mine operations requiring rehabilitation**

| Mining hub | Mine | Part IV approval status | Year of (original) Part IV approval | Current Ministerial Statement | Approved disturbance (ha) | Operational phase | Estimated mining[1] completion year |
|---|---|---|---|---|---|---|---|
| Jimblebar | Jimblebar | Approved | 2011 | MS1126 | 6,902 | Operations | 2060 |
| | Orebody 31 | Approved | 2015 | MS1021 | 2,500 | Operations | 2069 |
| | Orebody 17, 18 | Approved | 1997 | MS439 (and MS1012) | 793 | Operations | 2069 |
| | Jimblebar Hub Significant Amendment | Under Assessment | N/A | N/A | N/A | Planning | - |
| Newman | Whaleback | Approved | N/A pre–EP Act (1964)[2] | N/A | N/A | Operations | 2040 |
| | Orebody 29/30/35 Below Water Table | Approved | 2014 | MS963 | 1 | Operations | 2069 |
| | Western Ridge | Approved | 2023 | MS1105 (DP) | 4,281 | Operations | 2054 |
| | Eastern Ridge (Orebodies 24, 25, 25W and 32[3]) | Approved | 2006 | MS1037 | 3,820 | Operations | 2068 |

| Mining hub | Mine | Part IV approval status | Year of (original) Part IV approval | Current Ministerial Statement | Approved disturbance (ha) | Operational phase | Estimated mining[1] completion year |
|---|---|---|---|---|---|---|---|
| | Orebody 32 Below Water Table | Approved | 2023 | MS1105-s45b-OB32 | 224 | Operations | 2068 |
| | Orebody 32 Homestead Creek Discharge | Proposed | N/A | N/A | N/A | Planning | - |
| | Orebody 23[4] | Approved | 1998 | MS478 | 137 | Mining ceased | - |
| | Orebody 29/30/35 Significant Amendment | Under Assessment | N/A | N/A | N/A | Planning | - |
| Yandi | Marillana Creek (Yandi) | Approved | 2005 | (MS679 and MS1039) | 4,558 | Operations | 2028 |
| Mining Area C | Mining Area C (North and South Flanks) | Approved | 1998 | MS1072 | 21,824 | Operations | 2049 |
| | Ministers North | Proposed | N/A | N/A | N/A | Planning | - |
| Goldsworthy | Goldsworthy | Approved | N/A Pre-EP Act (1964) | N/A | | Mining ceased | - |
| Yarrie | Yarrie (Y2, Y3) | Approved | 1993 | MS303 | 0 | Suspended operations | To be advised |
| | Nimingarra (Nim 1)<br>Yarrie (Y4A, Y7W and Y10)<br>Cattle Gorge | Approved | 2005 | MS682 | 270 | Mining ceased<br>Suspended operations<br>Mining ceased | |
| | Cundaline<br>Callawa | Approved | 2009 | MS814 | 624 | Suspended operations<br>Mining not started | |

1. Latest mining completion date according to current MCPs. Decommissioning and demolition of infrastructure will occur decades later at some hubs (e.g. Newman and Mining Area C), where the infrastructure is used to service other operations.
2. Date State Agreement approval.
3. Above water table mining at Orebody 32 is approved.
4. BHP also includes Orebody 23 as part of the Eastern Ridge operations; however, it was not included in the Eastern Ridge Revised Proposal approved under MS1037.




- Major Roads
- BHP Rail
- BHP Tenements
- Strategic Proposal MS1105 Project Boundary
- Operations
- Hubs

N

0 20 40 60 80

KILOMETRES

GDA 1994 MGA ZONE 50

BHP

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# REHABILITATION REPORT FY2024

## BHP TENURE MS 1105 BOUNDARY

**WAIO- PLANNING, TECHNICAL & ENVIRONMENT**

| | | | | | |
|---|---|---|---|---|---|
| SCALE @ A4: | 1:3,100,000 | REQUESTOR: | J. Irvin | FIGURE: | |
| DATE: | 23/10/2024 | PREPARED: | J. Irvin | NO: | |
| | | REVIEWED: | A. Blackburn | | |

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## 2.2 Types of ecosystems to be rehabilitated

MS1105 Guidelines (1(c)(i) requires information on '*the types of ecosystems that the proponent will be required to rehabilitate across their iron ore tenure including the derived proposal*'.

The term ecosystem is applied at various scales, and in WA has been used at the scale of a specific community (e.g. wetland communities associated with Weeli Wolli spring) as well as at the broader vegetation scale (e.g. spinifex grasslands) or geomorphic scale (e.g. claypan) (Syrinx 2020).

BHP has defined the types of ecosystems requiring rehabilitation across their iron ore tenure based on the Beard 1:3,000,000 scale major vegetation types (Beard *et al* 2013). These major vegetation types were selected by analysis undertaken by Syrinx (2020), as they represent the dominant ecosystems present on BHP iron ore tenure and reflect the scale of rehabilitation required.

The frame of reference applied (Beard *et al* 2013 scale) is a broad classification of the major vegetation types within the BHP Pilbara Expansion Strategic Proposal, as this provides fluidity of absolute vegetation composition for each reference site and provides flexibility for natural variability in species compositions and climate cycles. Completion criteria for each ecosystem type are derived from detailed reference plots which have been surveyed in accordance with NVIS Level 5 (Association).

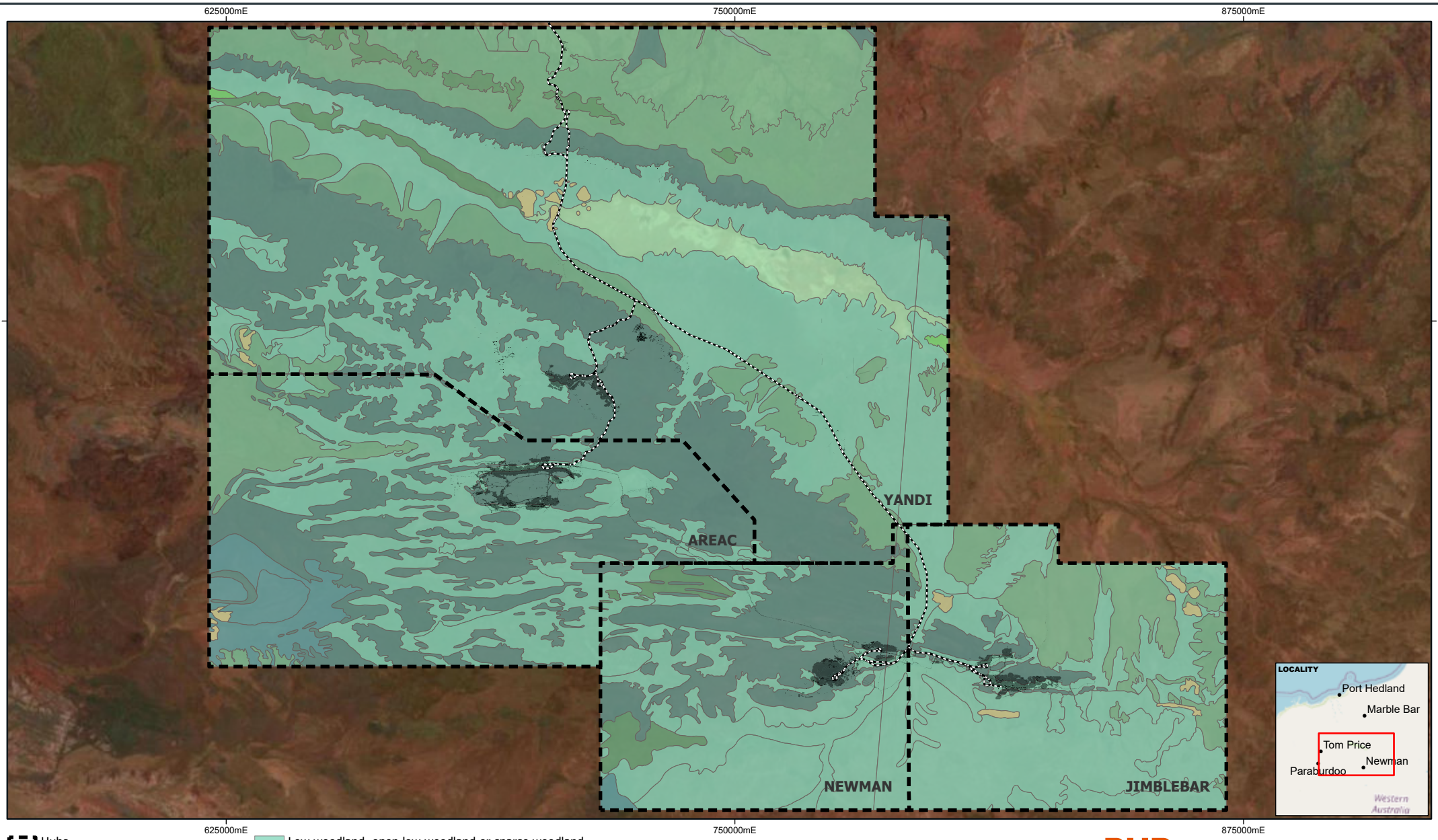
The survey data comprised fine scale plot data in the following categories: vegetation cover, species richness, and dominant species, which was aggregated into the broader Beard vegetation classes used for assessments. The major vegetation types also represent the likely post-mining ecosystem as the pre-mining environment is generally significantly altered following mining. For the purposes of this Rehabilitation Report, the major WAIO mining hubs have been classified into vegetation classes (Table 4 below) which have been derived from the detailed survey data. This data undergoes continual refinement within BHP's geospatial databases as biodiversity surveys are completed.

**Table 4: BHP WAIO vegetation classes**

| Ecosystem types | |
|---|---|
| Beard vegetation types | |
| Spinifex grassland | 35 Low tree-steppe |
| | 38 Shrub-steppe |
| | 40 Grass-steppe |
| Low forest and woodlands | 8 Low woodland, open low woodland or sparse woodland |
| Bunch grassland | 32 Riverine sedgeland/grassland with trees |

The classification of ecosystem types within BHP's WAIO tenure into the broad vegetation categories as defined by Beard *et al* (2013), facilitates rehabilitation to be completed at a site-specific scale, with meaningful reference to natural patterns observed at a landscape and regional level. The major vegetation classification types defined within BHP's WAIO tenure are shown on Figure 2 and Figure 3 below.

The major vegetation types facilitate the analysis of rehabilitation (revegetation) at a holistic/cumulative scale, and the attributes used to benchmark rehabilitation success are common across major landscape classifications to ecosystems at a finer resolution. The attributes represent the likely post-mining ecosystems as the pre-mining environment is generally significantly altered following mining activities.




- Hubs
- BHP Rail
- Operations

**Vegetation Structure Description**

- Grass-steppe
- Grasslands, short bunch-grass savanna
- Low tree-steppe
- Low woodland, open low woodland or sparse woodland
- Riverine sedgeland/grassland with trees
- Samphire
- Scrub, open scrub or sparse scrub
- Shrub-steppe
- Woodland other

N

0 10 20 30 40

KILOMETRES

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# REHABILITATION REPORT FY2024

## BEARDS PILBARA VEGETATION CLASSIFICATION FOR CENTRAL AND EASTERN PILBARA

WAIO- PLANNING, TECHNICAL & ENVIRONMENT

| | | | | | |
|---|---|---|---|---|---|
| SCALE @ A4: | 1:1,250,000 | REQUESTOR: | J. Irvin | FIGURE: | |
| DATE: | 23/10/2024 | PREPARED: | J. Irvin | NO: | |
| | | REVIEWED: | A. Blackburn | | |

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- Hubs
- BHP Rail
- Operations

**Vegetation Structure Description**

- Grass-steppe
- Grasslands, short bunch-grass savanna
- Low tree-steppe
- Pindan with low trees
- Riverine sedgeland/grassland with trees
- Salt lake, lagoon, clay pan
- Short bunch-grass savanna / Grass-steppe
- Shrub-steppe
- Sparse low tree-steppe / Sparse shrub-steppe
- Tidal mud flat
- Woodland other

N

0 10 20 30 40

KILOMETRES

GDA 1994 MGA ZONE 50

BHP

PUBLIC

# REHABILITATION REPORT FY2024

## BEARDS PILBARA VEGETATION CLASSIFICATION FOR NORTHERN PILBARA

**WAIO- PLANNING, TECHNICAL & ENVIRONMENT**

| | | | | | |
|---|---|---|---|---|---|
| SCALE @ A4: | 1:1,250,000 | REQUESTOR: | J. Irvin | FIGURE: | |
| DATE: | 23/10/2024 | PREPARED: | J. Irvin | NO: | |
| | | REVIEWED: | A. Blackburn | | |

Document Path: A:\Environment_Site\Rehabilitation\JI - Working Folder\GIS-TCE\ArcPro\DerivedProposal_Maps_Hub_VegStructure.aprx\A4_Standard_Landscape_VegStructure_NorthernHubs

## 2.3 Types of areas to be rehabilitated

MS1105 Guideline 1 (c)(iii) requires BHP to provide information relating to '*the likely success of future rehabilitation activities in establishing self-sustaining areas of rehabilitation, taking into account … the types of areas to be rehabilitated …'.*

The success of rehabilitation will depend to a degree on the type of landforms and/or infrastructure constructed as part of a mining operation. Consistent with DMIRS *Statutory Guidelines for mine closure plans* (DMIRS 2020), BHP considers domains, which are a group of landform(s) or infrastructure that have similar rehabilitation and closure requirements and outcomes. Rehabilitation is likely to be more successful and/or take less time to be successful in areas where there is a lower impact on the land (e.g. infrastructure areas), compared to areas where there is a higher impact (e.g. overburden storage areas (OSAs)).

BHP also reports disturbance to DMIRS for the MRF (as part of BHP's AER process) for infrastructure and land features within domains. The main domains are OSAs, infrastructure, mine voids and rail.

As discussed in Section 1.3, the analysis of rehabilitation (revegetation) success in this report does not include mine pits that will remain as open pit voids at closure (i.e. are not backfilled, including where pit lakes will form), as these landforms will not be revegetated. This report does include all other types of areas associated with mining operations in the mine hubs that will be rehabilitated, i.e. OSAs, infrastructure and rail.

## 2.4 Total area of disturbance to be rehabilitated

MS1105 Guidelines 1(c)(i) requires BHP to provide information on '*the total area of rehabilitation that the proponent will be required to rehabilitate across their iron ore tenure including the derived proposal'.*

Disturbance (clearing) data for approved operations under Part IV and Part V of the EP Act and State Agreements for each hub as at the end of FY2024 is presented in Table 5 below. Proposals that have been referred for assessment under Part IV of the EP Act, or have been approved since 1 July 2024 are also identified in Table 3. The total area of disturbance that BHP will be required to rehabilitate across its iron ore tenure (including proposals Ministers North) is 68,803 ha based upon approved and proposed disturbance limits. The assumptions underpinning this calculation include:

- All approved and proposed disturbance requires rehabilitation
- 26% of the total actual disturbance is attributed to mine pits that will remain as open pit voids at closure (i.e. are not backfilled to pit crest, including where pit lakes will form)

Therefore, the current total area of disturbance that BHP will be required to rehabilitate (to revegetation phase) across its WAIO tenure (including derived proposals) is estimated to be 50,914.41 ha (74% of the 68,803 ha total approved disturbance limit). The actual area will depend on the final pit backfill strategy selected for each mine.

**Table 5: Mine disturbance requiring rehabilitation**

| Mine hub | Type of Approval | Approved disturbance limit (ha) | Actual disturbance at FY2024 | Actual disturbance at FY2024 excluding pits | Disturbance excluding pits as % of actual disturbance |
|---|---|---|---|---|---|
| Goldsworthy | MS | - | - | - | - |
| | Other (NVCP) | 1,303 | 1,303 | 1,239 | 95% |
| | ***Subtotal*** | ***1,303*** | ***1,303*** | ***1,239*** | ***95%*** |
| Jimblebar | MS | 10,195 | 6,315.17 | 4,103.81 | 65% |
| | Other (NVCP, State Agreement etc.) | 3,856.33 | 1,071.97 | 1,071.88 | 99.99% |
| | ***Subtotal*** | ***14,051.33*** | ***7,387.14*** | ***5,175.70*** | ***70%*** |
| Mining Area C | MS | 21,824 | 9,814.04 | 6,686.74 | 68% |

| Mine hub | Type of Approval | Approved disturbance limit (ha) | Actual disturbance at FY2024 | Actual disturbance at FY2024 excluding pits | Disturbance excluding pits as % of actual disturbance |
|---|---|---|---|---|---|
| | Other (NVCP) | 4,232 | 376.65 | 376.65 | 100% |
| | ***Subtotal*** | ***26,056*** | ***10,190.68*** | ***7,063.38*** | ***6%*** |
| Ministers North | Proposed | 1,819 | - | - | - |
| Newman | MS | 3,957 | 2,087.35 | 1,153.28 | 55% |
| | Other (NVCP) | 8,851.93 | 5,482.88 | 4,405.93 | 80% |
| | ***Subtotal*** | ***12,808.93*** | ***7,570.23*** | ***5,713.49*** | ***75%*** |
| Yandi | MS | 4,958 | 4,744.33 | 2,996.27 | 63% |
| | Other (NVCP) | 3,149 | 3,017. | 2,841.85 | 94% |
| | ***Subtotal*** | ***8,107*** | ***7,586.17*** | ***5,823.07*** | ***77%*** |
| Yarrie | MS | 1,362 | 926.54 | 656.20 | 71% |
| | Other (NVCP) | 3,296 | 3,213.02 | 2,779.32 | 86% |
| | ***Subtotal*** | ***4,658*** | ***4,139.56*** | ***3,435.52*** | ***83%*** |
| Total | | ***68,803*** | ***38,177*** | ***28,450*** | ***74%*** |

1. The figures for each mine hub are approximate only, as some approvals overlap more than one mine hub (especially for linear infrastructure). Where an approval overlaps more than one hub the areas have been apportioned to each hub (e.g. small proportion of MS1072 for Mining Area C extends into Yandi hub).
2. Includes disturbance (clearing) authorised through Ministerial Statements, NVCPs and State Agreements and assumes the derived proposals are approved. Excludes disturbance authorised for exploration. 'Other' also includes historical clearing other than State Agreements (including clearing from current and previous *Mining Act 1978* (WA) tenure, previous clearing from NVCPs, clearing exempt from approval, e.g. firebreaks). For historical clearing without an approved disturbance limit, it was assumed that the approved disturbance limit is the actual disturbance (see 3. below).
3. Actual disturbance is from BHP land disturbance data as at 30 June 2024. This differs from the total in the 2022 AER (BHP 2022), as the AER reports on data from Ministerial Statements and active NVCPs only, not inactive approvals or disturbance authorised only through State Agreements, e.g. Whaleback. Historical calculations exclude clearing attributed to current MS and NVCPs. Note there may be overlap where historical clearing and/or previous approval (e.g. NVCP) has been superseded by a more recent approval (e.g. MS).
4. Pit area data derived from disturbed areas classified under MRF landuse category as a pit.

# 3. Methodology for measuring rehabilitation success

## 3.1 Background

Following the publishing of EPA Report 1619 on the Strategic Proposal in July 2018, which included the guidelines for a rehabilitation report as part of the EPA's recommended conditions, BHP initiated work to develop a methodology for measuring rehabilitation success across BHP's iron ore tenure (WAIO operations). To meet the requirements of the rehabilitation report under MS1105 Guidelines 1(c) and Schedule 1, Table 2, Column 3 (see Table 1), BHP commissioned Syrinx Environmental (Syrinx) to develop rehabilitation success criteria and a methodology for measuring rehabilitation success.

The *BHP Pilbara Strategic Proposal: Inputs to Rehabilitation Report* (Syrinx 2020) is a supporting document to this report. It provides the scientific detail to support the preliminary approach to measure rehabilitation success in this report, including the following:

- relevant contemporary scientific evidence in the Pilbara, including factors that influence rehabilitation success (e.g. rainfall, vegetation cover, diversity of species and growth media)
- development of scientifically verifiable success measures based on revegetation objectives, considering; post-mining land use (Pastoral or Natural System), appropriate floristic (vegetation) attributes, appropriate spatial and time scales
- development of criteria and targets using quantitative BHP reference site and baseline data compared and verified with published data specific to the Pilbara
- methodology for measuring rehabilitation success and initial testing of the methodology using BHP rehabilitation data up to FY2018.

The rehabilitation success methodology has been adopted by BHP since 2019 and is undergoing continual assessment to ensure that it is fit for purpose (including the rehabilitation monitoring approach and rehabilitation criteria).

## 3.2 Rehabilitation standards and guidance

The Western Australian Biodiversity Science Institute (WABSI) concluded that the most relevant and detailed sources of publicly available guidance for establishing completion criteria in WA were those from the EPA, Department of Water and Environmental Regulation (DWER), DMIRS, and the Australian Government Department of Industry Innovation and Science (Syrinx 2020). BHP also follows internal rehabilitation standards, which align with current guidance from these departments.

**Society for Ecological Restoration Australasia (SERA) National Standards**

BHP's completion criteria were developed prior to the development of the SERA framework (SERA 2021), and was developed to the WABSI framework which was current at the time of development. BHP aligns with the WABSI definition of 'rehabilitation' which is:

*"The return of disturbed land to a safe, stable, non-polluting/ non-contaminating landform in an ecologically sustainable manner that is productive and/or self-sustaining, and is consistent with the agreed post-mining land use."*

The SERA framework provides guidance to achieving ecological restoration; however, BHP's closure aim is to rehabilitate the land to a standard that is suitable for the identified Post Mining Land Use (PMLU), and to maintain naturalness, resilience, and habitat connectivity. Restoration is considered an unrealistic target for mining areas due to substantial change in landforms and soils post mining, however, BHP's rehabilitation targets are consistent with a two or three star rating across each of the six attributes within the SERA Framework.

BHP has not completed an analysis of the alignment between BHP's completion criteria and Rehabilitation Targets with the SERA framework, and as such BHP's completion criteria and rehabilitation Targets are provisionally considered to align to each of the six SERA attributes accordingly:

1 **Absence of Threats** – 3 Star
Number of direct degradation drivers low but some may remain intermediate in degree.

2 **Physical Conditions** – 2 Star
Physical and chemical properties of substrates and hydrology, remain at low similarity levels relative to reference ecosystem but capable of supporting some biota of reference ecosystem.

3 **Species Composition** – 3 Star
A subset of key native species present.

4 **Structural Diversity** – 3 Star
Most strata of the reference present and intermediate similarity of spatial patterning and trophic complexity relative to reference ecosystem.

5 **Ecosystem Function** – 3 Star
Intermediate numbers and levels of physical and biological processes and functions, relative to the reference ecosystem (including reproduction and dispersal) are present.

6 **External Exchanges** – 2 - 3 Star
Positive exchanges between site and surrounding environment in place for intermediate levels of characteristic species and processes.

## 3.3 Rehabilitation assessment criteria

BHP has developed criteria that are indicators of rehabilitation success at different points in time:

- Young rehabilitation: rehabilitation activities have been completed however revegetation is incomplete (seedlings are still emerging and therefore too young to monitor accurately)
- Progressive criteria: the criteria that measure whether progress for rehabilitation underway is likely to be on a trajectory to achieve rehabilitation success in the future.
- Completion criteria: the end point criteria that measure rehabilitation success when rehabilitation is considered to be complete.

The following Sections 3.3.1, 3.3.2 and 3.3.3 detail the scientifically derived (Syrinx 2020) criteria to assess the success of historical rehabilitation (completion stage) and to measure the likely success of future rehabilitation (young and progressive stage). The outcomes of the assessment of rehabilitation sites against the Rehabilitation Assessment Criteria inform the methodology of rehabilitation and monitoring (Section 3.5 and 4.1) and the improvement of the Rehabilitation Assessment Criteria. These sections are considered to align with the requirements of Guideline 1(c)(iii):

*'The likely success of future rehabilitation activities in establishing self-sustaining areas of rehabilitation, taking into account: relevant contemporary scientific evidence, the types of area to be rehabilitated, the scale of rehabilitation activities.'*

BHP WAIO has developed criteria to measure and predict rehabilitation success at different stages in the maturation of rehabilitation sites.

BHP WAIO implemented a set of ecological completion criteria in FY2024, subject to further refinements in accordance with the principle of adaptive management. The ecological criteria are based on broad Pilbara target vegetation types (Shrub Steppe, Grass Steppe, Low Woodland) as defined by Beard *et al* (2013), and have been derived from high resolution survey data. Baseline flora surveys were used to determine an interquartile range (Q1 – Q3) for each vegetation type and associated stratum (tree, shrub, herb, grass). Targets for each major vegetation type and the two dominant PMLU (Natural and Pastoral) were then set.

The major vegetation types (Figure 1, Figure 2 and Figure 3) allow for the analysis of rehabilitation (revegetation), based on vegetation attributes including indicator species, vegetation cover and species richness. The major

vegetation types also represent the likely post-mining ecosystem as the pre-mining environment is significantly altered following mining. Therefore, the broad vegetation types are sufficient to separate areas, based on vegetation structure, dominant species, vegetation cover and species richness. As such, these provide a meaningful basis for deriving target vegetation types (ecosystem) and in the setting of completion targets.

Time is a critical factor in determining rehabilitation success. Fifteen years has been selected as a reasonable period to measure sites against completion criteria for final assessment, while younger sites are measured against different sets of interim criteria to track their progress towards achieving completion. Therefore, the ecological criteria are grouped into three broad age groups: young (<5 years), progressive (5 – 15 years) and completion (>15 years). Rehabilitation phases and their associated criteria for measuring rehabilitation success are presented in the following sections (Sections 3.3.1 , and 3.3.3).

These age ranges are a guide only and BHP will assess the progress of rehabilitation at sites against progressive criteria to ensure they are at a level ready to transition into the next phase of rehabilitation (young, progressive, completion). BHP will still monitor the progress of rehabilitation sites at a frequency of two years as part of the rehabilitation monitoring program (Section 3.5 and 4.1) to allow continuous improvement (e.g. to confirm that seed is germinating, the appropriate species are germinating and rehabilitation areas have not washed away etc.).

### 3.3.1 Young rehabilitation (<5 years)

Sites are categorized as young for the period from completion of initial rehabilitation to five years. At this early stage, revegetation is not in a state of progression that enables accurate monitoring and assessment of success. This is due to high dormancy rates and dependence of seasonal climatic variation in the early years of rehabilitation.

BHP continues to monitor sites which are in the early stages of revegetation to ensure that young stage rehabilitation is progressing along the right trajectory. An assessment on young rehabilitation has not been provided for this Rehabilitation Report due to a lack of meaningful benchmarks with which to measure success. The criteria that BHP WAIO is monitoring young stage rehabilitation against is presented in Table 6 below.

### 3.3.2 Progressive criteria (5 – 15 years)

MS1105 Schedule 1, Table 2, Column 3 2.c. requires that ‘Scientifically verifiable estimates of the likely success of future rehabilitation have been made’.

To address the requirements of MS1105 Schedule 1, Table 2, Column 3, 2.c., BHP considers that ‘future rehabilitation’ is rehabilitation where all rehabilitation activities have been undertaken but the rehabilitation is not at a stage where it can be assessed for completion (rehabilitation generally less than 15 years old). BHP has used the assessment of rehabilitation at each hub against progressive criteria as the basis for analysing the likely success of future rehabilitation because:

- the progressive criteria and targets are based on the same scientifically verifiable data and approach as the completion criteria and targets
- rehabilitation is likely to be successful (at completion) if BHP can demonstrate that rehabilitation is progressing according to an appropriate trajectory.

BHP has assessed the performance of ‘future rehabilitation’ using the progressive criteria to understand whether rehabilitation underway that is young or progressive is likely to be successful in the future (i.e. when considered to be completed).

The key principle in deriving progressive criteria is that they should be consistent with the completion criteria, PMLU and the closure revegetation objectives. The progressive criteria were developed by Syrinx (Syrinx 2020; referenced in BHP 2022) to provide confidence that a site is progressing along the appropriate trajectory. The criteria will be continually improved to align with the principal of adaptive management. Sites that have undergone rehabilitation activities 5 – 15 years prior to the current reporting period (FY2024) are assessed against progressive criteria to track likely future success against completion criteria.

The analysis indicates that *Triodia* cover, shrub cover, and weed cover are the key progressive and young criteria that indicate whether rehabilitation at these stages (progressive and young) are developing along the desired trajectory. The analysis further indicated that relative abundance is important and differs at different points in time. Ratios represent the dynamics of developing sites and are informative in terms of identifying where intervention may be required.

Table 6 below presents the young and progressive criteria with which BHP WAIO is measuring progress of rehabilitation in the progressive category.

**Table 6: Young and Progressive stage rehabilitation assessment criteria**

| Young and progressive rehabilitation assessment criteria | | |
|---|---|---|
| **Major / supporting criteria** | **Criteria** | **Target** |
| Major criteria | Hummock cover / Shrub cover ratio | > 0.50 |
| | Hummock grass / Total native cover ratio | > 0.20 – 0.30 |
| Supporting criteria | Minimum total native cover (%) | > 25 - 30% |
| | Weed cover / Hummock cover ratio | < 1 |
| | Shrub cover / Total native cover ratio | > 0.50 |
| | Bare ground cover (%) | < 50% |
| | Total weed cover (%) | < 10% |
| | Weed cover / Hummock cover ratio | < 1 |

### 3.3.3 Completion rehabilitation (>15 years)

Completion criteria are used to determine whether the closure revegetation objectives (naturalness, resilience, habitat connectivity etc.) for the post-mining land uses have been met and whether rehabilitation is successful. The criteria need to achieve the goal of establishing self-sustaining areas of rehabilitation that support the PMLU. The degree to which completion criteria are met provides a measure of historical rehabilitation success.

The development of the completion criteria considered:

- relevant contemporary scientific evidence - including a scientific literature review and recent BHP data (Syrinx 2020)
- the types of ecosystems to be rehabilitated (Section 2.2) and the types of areas to be rehabilitated (Section 2.3).

To assess appropriate timeframes for measuring rehabilitation success, Syrinx (2020) analysed *Triodia* data based on the age of rehabilitation. *Triodia* was selected, as it is the major component of most of the target ecosystem (vegetation) types and has typically been considered as the most important plant genera in terms of naturalness. The likely timeframe to be able to measure rehabilitation success (i.e. when rehabilitation is considered to be completed) is 15 to 20 years, based on the strong correlation between time when rehabilitation started and *Triodia* cover (Syrinx 2020). The criteria and metrics developed to assess rehabilitation sites are presented below in Table 7 and Table 8.

Three categories of completion criteria have been developed for rehabilitation (revegetation) within the completion stage. The three categories align with landform and age of mine (current and future operations, and legacy operations), and are further subdivided by ecosystem classification.

It should be noted that all rehabilitation attributed to operational and future mining operations will be assessed to the current criteria, and operations pre-dating contemporary mine closure understanding (Goldsworthy and Yarrie) will be assessed against the specifically derived criteria for Legacy operations (Table 8). Further information is provided in (Syrinx 2020 report).

**Table 7: Completion criteria for assessment of rehabilitation success for standard (non-legacy) rehabilitation**

| | | Target Vegetation Types | Grass Steppe | Shrub Steppe | Low Tree Steppe | Low Woodland | Riparian Woodland |
|---|---|---|---|---|---|---|---|
| PMLU | Metric / Targets | | Ecological targets / Completion Criteria | | | | |
| Natural Environments | Bare Ground (%) | Crests, slopes, flats | ≤ 50 | | | | |
| | | Drainage Lines/Floodplains | ≤ 20 | | | | |
| | Indicator species | Proportion (%) common to the Target Vegetation Type | >70% of species present in the rehabilitation areas are common to the Target Vegetation Type | | | | |
| | | Presence of dominant species – grasses, shrubs, trees | At least one dominant species from each strata from the major Target Vegetation Type | | | | |
| | Native plant cover - % cover for each strata and each vegetation type to be within the Q1-Q3 range | Trees | 0 -1 | 1 - 10 | 1 - 10 | 2 – 10 | 10 - 70 |
| | | Shrubs | 0.2 - 7 | 3 - 7 | 2 - 10 | 2.6 – 6.8 | 2 - 10 |
| | | Hummock Grasses | 15 - 34 | 19 - 33 | 20 - 30 | 17 - 33 | 2 - 10 |
| | | Other Grasses | 0.01 – 0.4 | 0.02 – 0.16 | 0.04 – 0.62 | 0.2 – 1 | 2 - 10 |
| | | Herbs | 0.1 – 0.2 | 0.1 - 1 | 0.05 -0.4 | 0.06 -0.27 | 2 - 10 |
| | Species richness – perennial native species richness to be within Q1 – Q3 range | No. of perennial species recorded in aggregated 50 x 50 m plots | 8 - 16.5 | 15 - 19 | 16 - 29 | 28 - 30 | 14 - 30 |
| | Weed invasiveness % total weed cover | Drainage lines, floodplains | < 15 | | | | |
| | | Crests, slopes, flats | < 5 | | | | |
| | Weed invasiveness % buffel grass (*Cenchrus*) within acceptable thresholds | Drainage lines, floodplains | <10 | | | | |
| | | Crests, slopes, flats | < 5 | | | | |
| Pastoral Environments | Bare Ground (%) | Crests, slopes, flats | ≤ 50 | | | | |
| | | Drainage Lines/Floodplains | ≤ 20 | | | | |
| | Indicator species | Proportion (%) common to the Target Vegetation Type | > 50% of species present in the rehabilitation areas are common to the Target Vegetation Type | | | | |
| | | Presence of dominant species – grasses, shrubs, trees | At least one dominant species from each strata from the major Target Vegetation Type | | | | |
| | Native plant cover - % cover for each strata and each vegetation type to be within the Q1-Q3 range | Trees | > 0 | > 1 | > 1 | > 2 | > 10 |
| | | Shrubs | > 0.2 | > 3 | > 2 | > 2.6 | > 2 |
| | | Hummock Grasses | > 15 | > 19 | > 20 | > 17 | > 2 |
| | | Other Grasses | > 0.01 | > 0.02 | > 0.04 | > 0.2 | > 2 |
| | | Herbs | > 0.1 | > 0.1 | > 0.05 | >0.06 | > 2 |
| | Species richness – perennial native species richness to be within Q1 – Q3 range | No. of perennial species in 50 x 50 m plots | > 8 | > 15 | > 16 | > 28 | > 14 |
| | Weed invasiveness % total weed cover | Drainage lines, floodplains | < 20 | | | | |
| | | Crests, slopes, flats | < 10 | | | | |
| | Weed invasiveness % buffel grass (*Cenchrus*) within acceptable thresholds | Drainage lines, floodplains | < 10 | | | | |
| | | Crests, slopes, flats | < 10 | | | | |

**Table 8: Completion criteria for assessment of rehabilitation for legacy hubs (Goldsworthy and Yarrie)**

| | | Rehabilitation Landform | Standard Landforms | Legacy Landforms |
|---|---|---|---|---|
| | | Target Vegetation Types | Grass Steppe or Shrub Steppe | Non-specific |
| PMLU | Metric | | Ecological targets | |
| Pastoral Environments | % bare ground | Crests, slopes, flats | ≤ 50 | N/A |
| | | Drainage lines / floodplains | ≤ 20 | N/A |
| | | Moonscapes | N/A | ≤ 20 |
| | Indicator species | Proportion (%) common species to the Target Vegetation Type | All native species present in rehabilitation areas are common to the Pilbara | |
| | | Presence of dominant species | Hummock grasses, and other native grasses | N/A |
| | Native Plant Cover<br>- % cover for each strata | Presence of hummock grasses | Hummock grasses present in each 50 x 50 m plot | N/A |
| | | Total native species | > 15 | > 15 |
| | | Trees | > 0 | N/A |
| | | Shrubs | > 0.2 | N/A |
| | | All grasses | > 5 | N/A |
| | Weed invasiveness - % total weed cover | Crests, slopes, flats | < 20 | < 20 |
| | | Drainage lines / floodplains | < 10 | < 10 |
| | Weed invasiveness % buffel grass (Cenchrus) within acceptable thresholds | Crests, slopes, flats | < 10 | < 10 |
| | | Drainage lines / floodplains | < 10 | < 10 |

## 3.4 Quantity of rehabilitation

BHP notes the EPA's discussion in EPA Report 1619 regarding the limited evidence of large-scale rehabilitation in the Pilbara (EPA 2018). BHP measures and reports on the amount (quantity) of rehabilitation against each relevant active approval (MS, NVCP, State Agreement etc.) in its Annual Environment Reports (AER). This report quantifies and reports on the cumulative amount of rehabilitation across its WAIO operations at the hub scale.

During operations, only a portion of the land disturbed is available to be rehabilitated, as many areas of the mine site are still active (e.g. mine pits, active overburden storage areas). Figure 4 shows conceptual disturbance and rehabilitation over time for a typical iron ore mine, highlighting that most of the area to be rehabilitated is only available towards the end of the mine life. Therefore, the quantity of rehabilitation relative to the area of disturbed land will be greater for older mine sites that are closer to the end of the mine life.

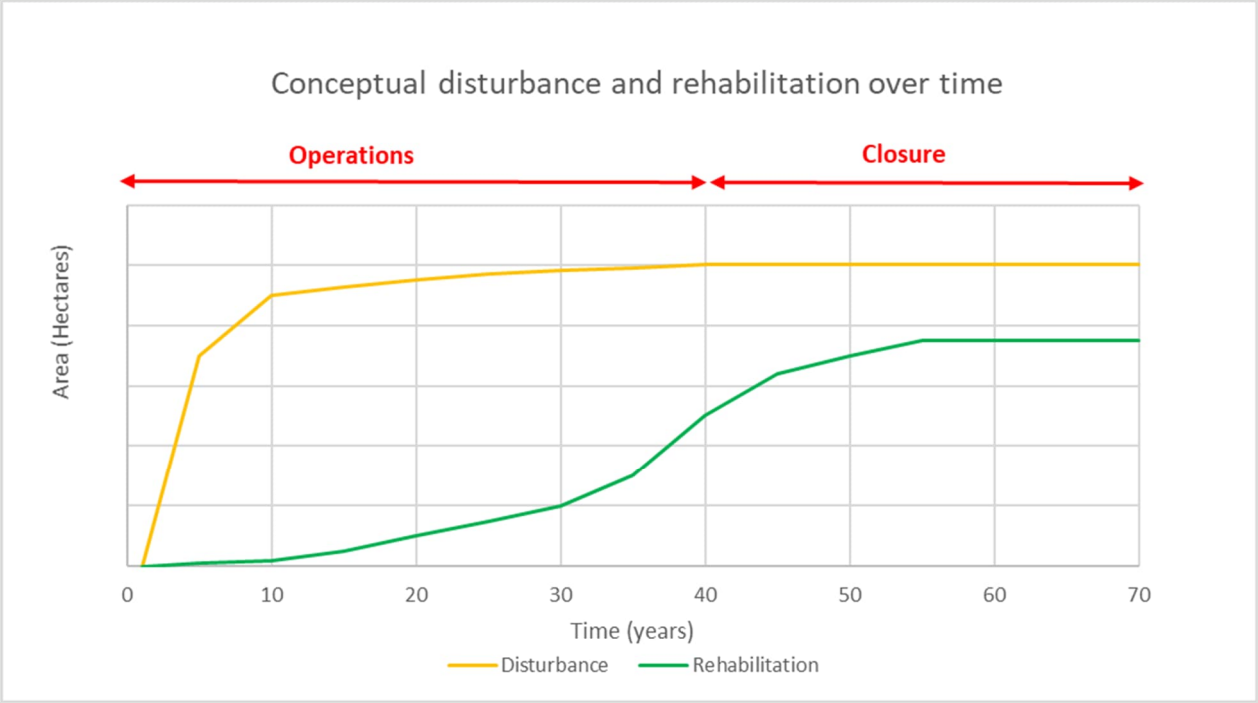



**Figure 4 Conceptual disturbance and rehabilitation over time**

*Note: Area rehabilitated is less than the area disturbed, as pits that remain as voids will not be rehabilitated (revegetated)*

## 3.5 Monitoring approach

A new rehabilitation monitoring program was finalised by BHP WAIO in FY2024, combining both remote sensing assessment and on-ground surveys. The new approach aims to:

- Use a combination of both remote sensing and on-ground surveys to assess rehabilitation performance against the 'new' progressive criteria and completion criteria.
- Establish an on-ground monitoring program that supports remote sensing and assess rehabilitation performance on ground at the species level.
- Aim to achieve >1% on-ground survey coverage for greater statistical confidence, using a grid based stratified random permanent plots (50 m x 50 m) approach, across all age groups (young, progressive and completion).

### 3.5.1 Remote sensing

Since 2020, BHP WAIO has used remote sensing technology to assess and track rehabilitation performance. The assessment uses a machine learning model known as *TytonAI* (formally known as *VegSense* developed by Spectrum Ecology) to autonomously classify signatures from 10 cm aerial imagery; across three landform domains (crest, slope

and flat). The accuracy of the *TytonAI* classification was assessed by calculating F1 scores, produced by comparing the classifications to known sample points. The classification achieved an overall accuracy between 81.5% to 87%, across all sites assessed in the FY2024 period.

The main categories identified are:

- four native vegetation lifeforms (tree, shrub, herb, grass (*Triodia spp.* and tussock))
- three introduced species (*Calotropis procera, Cenchrus spp., Aerva javanica*)
- bare ground cover.

### 3.5.2 Monitoring schedule

All rehabilitation sites are assessed every two years, on a two-year rotation. Rotation 1 includes Mining Area C, Whaleback, Eastern Ridge and Jimblebar hubs. Rotation 2 includes hubs Goldsworthy, Yarrie and Yandi hubs (Table 9).

In the FY2024 period, on-ground flora survey and remote sensing was undertaken at rehabilitation sites at Mining Area C, Eastern Ridge, Whaleback and Jimblebar. Remote sensing was captured at a resolution of 10 cm. The complete FY2024 rehabilitation monitoring assessment is detailed in Section 4.

**Table 9: Rehabilitation monitoring schedule for BHP WAIO rehabilitation sites**

| | | WAIO Mining Hubs | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Rotation** | **Year** | **Rail** | **Goldsworthy** | **Yarrie** | **Yandi** | **Mining Area C** | **Newman (Whaleback& Eastern Ridge)** | **Jimblebar** |
| 1 | 2024 | - | - | - | - | RS + OG | RS + OG | RS + OG |
| 2 | 2025 | RS + OG | RS + OG | RS + OG | RS + OG | - | - | - |

**Note**
RS = Remote sensing survey
OG = On-ground survey

## 3.6 Communicating rehabilitation success

The assessment of rehabilitation success across BHP's iron ore tenure involves the analysis of numerous rehabilitation and reference sites. This level of detail is necessary to make scientifically verifiable estimates of the success of historical rehabilitation and the likely success of future rehabilitation. However, as the scale of BHP's WAIO mine operations is hundreds of kilometers, BHP has assessed overall rehabilitation success at the hub level.

BHP has developed a spatial traffic light approach to report the status of rehabilitation at each hub using the following categories:

- **Operations:** Disturbed land that is still required for operations and is not yet available to be rehabilitated (i.e. not assessable).
- **Progressive rehabilitation**:
  - *Young rehabilitation (<5 years)*: Areas of rehabilitation where rehabilitation activities have been undertaken within the last 5 years.
  - *Progressing rehabilitation (5 - 15 years) - on track:* Areas of rehabilitation that have progressed enough to assess rehabilitation progress and rehabilitation is on track to achieve success (all progressive criteria met).

  - *Progressing rehabilitation (5-15 years) - maintenance required:* Areas of rehabilitation that have progressed enough to assess rehabilitation progress and rehabilitation requires maintenance (one or more progressive criteria has not been met).
  - *Status unknown*: Areas where data is not suitable to assess against progressive criteria.

- **Completion rehabilitation:**
  - *Completion rehabilitation (>15 years) – completion criteria met*: Areas of rehabilitation that have progressed enough to assess whether rehabilitation is successful and have met all completion criteria.
  - *Completion rehabilitation (>15 years) – completion criteria not met*: Areas of rehabilitation that have progressed enough to assess whether rehabilitation is successful and one or more completion criteria has not been met that will be reviewed to determine the appropriate intervention.

BHP has used the traffic light approach for the rehabilitation summary of each hub (Figure 5, Figure 11, Figure 17, Figure 23, Figure 28 and Figure 31) in Section 4.2 and Section 4.3. Performance data for progressive and completion age rehabilitation is provided in Section 4.2 and Section 4.3 below.

# 4. Rehabilitation summary

The following section presents WAIO's rehabilitation monitoring results by mining hub and summarises the assessment of rehabilitation performance as at the end of FY2024 for existing areas under rehabilitation. Historical rehabilitation success has been summarised in Section 4.8 and refers to the performance of completion age rehabilitation sites against the completion criteria. Future rehabilitation success has been summarised in Section 4.9 and refers to the performance of progressive stage rehabilitation against progressive criteria.

## 4.1 Rehabilitation Monitoring

### 4.1.1 Completion criteria

BHP WAIO implemented a set of ecological completion criteria in FY2024, subject to further refinements. The completion criteria are based on broad Pilbara target vegetation types (Shrub Steppe, Grass Steppe, Low Woodland) as defined by Beard et al 2013. Baseline flora surveys were used to determine an interquartile range (Q1 – Q3) for each vegetation type and associated stratum (tree, shrub, herb, grass). Targets for each major vegetation type and the two dominant PMLU (Natural and Pastoral) were then set. The dominant vegetation types and PMLU defined for each of BHP's WAIO mining hubs are identified in Table 10.

**Table 10: Dominant vegetation types and PMLU for BHP WAIO hubs**

| Hub | Dominant Vegetation Type | PMLU |
|---|---|---|
| Goldsworthy | Grass Steppe | Pastoral |
| Yarrie | Shrub Steppe | Pastoral |
| Yandi | Low Tree Steppe | Pastoral |
| Area C | Low Tree Steppe | Natural |
| Newman | Low Tree Steppe | Pastoral |
| Jimblebar | Low Tree Steppe | Pastoral |

Time is a critical factor in determining rehabilitation success. Fifteen years has been selected as a reasonable period to measure sites against completion criteria for final assessment, while younger sites are measured against progressive criteria to track their progress towards achieving completion. As detailed in Section 3.3; specific rehabilitation criteria have been applied to rehabilitation across three age categories:

- **<5 years (young)** – rehabilitation activities have been completed however revegetation is incomplete (seedlings are still emerging and therefore too young to monitor accurately)
- **5-15 years (progressive)** – ecological succession processes are establishing, however not sufficient to support all species or adequate cover targets. The progressive criteria aims to measure whether rehabilitation is on a positive trajectory to achieve rehabilitation success in the future.
- **>15 years (completion)** – of sufficient age to be assessed against the completion criteria.

As young sites are too undeveloped to monitor accurately only results for progressive and completion aged rehabilitation is presented below.

### 4.1.2 Monitoring Approach

A new rehabilitation monitoring program was finalised by BHP WAIO in FY2024, combining both remote sensing assessment and on-ground surveys. The new approach aimed to:

- Use a combination of both remote sensing and on-ground surveys to assess rehabilitation performance against the 'new' progressive and completion criteria.

- Establish an on-ground monitoring program that supports remote sensing, and assess rehabilitation performance on ground at the species level.
- Aim to achieve >1% on-ground survey coverage for greater statistical confidence, using a grid based stratified random permanent plots (50 m x 50 m) approach, across all age groups (young, progressive and completion).

### 4.1.3 Remote Sensing

Since 2020, BHP WAIO has used remote sensing technology to assess and track rehabilitation performance. The assessment uses a Machine Learning model known as *TytonAI* (formally known as *VegSense* developed by Spectrum Ecology) to autonomously classify signatures from 10 cm aerial imagery; across three landform domains (crest, slope, flat). The accuracy of the *TytonAI* classification was assessed by calculating F1 scores, produced by comparing the classifications to known sample points. The classification achieved an overall accuracy between 81.5% to 87%, across all sites assessed in the FY2024 period.

The main categories identified are:

- four native vegetation lifeforms (tree, shrub, herb, grass (*Triodia spp.* and tussock))
- three introduced species (*Calotropis procera*, *Cenchrus* spp., *Aerva javanica*
- bare ground cover.

### 4.1.4 Monitoring Schedule

All rehabilitation sites are assessed every two years, on a two-year rotation. Rotation 1 includes hubs Mining Area C, Whaleback, Eastern Ridge and Jimblebar. On alternating years, Rotation 2 includes hubs Goldsworth, Yarrie and Yandi (Chichester Deviation). Refer to Table 9. Aerial data only was captured for Rotation 2, as on-ground surveys were out of cycle (see Table 2).

For Rotation 1, in the FY2024 period, both on-ground surveys, and remote sensing assessment was undertaken at:

- Mining Area C
- Newman
- Jimblebar

For remote sensing, aerial imagery was captured at 10 cm resolution in May 2024.

For Rotation 2, in the FY2023 period, remote sensing assessment was undertaken at:

- Goldsworthy
- Yarrie
- Yandi
- Chichester Deviation

For remote sensing, aerial imagery was captured at 10 cm resolution in May 2023. On-ground flora surveys will commence in FY2025 for hubs in Rotation 2.

## 4.2 Mining Area C Hub

### 4.2.1 Remote Sensing Assessment

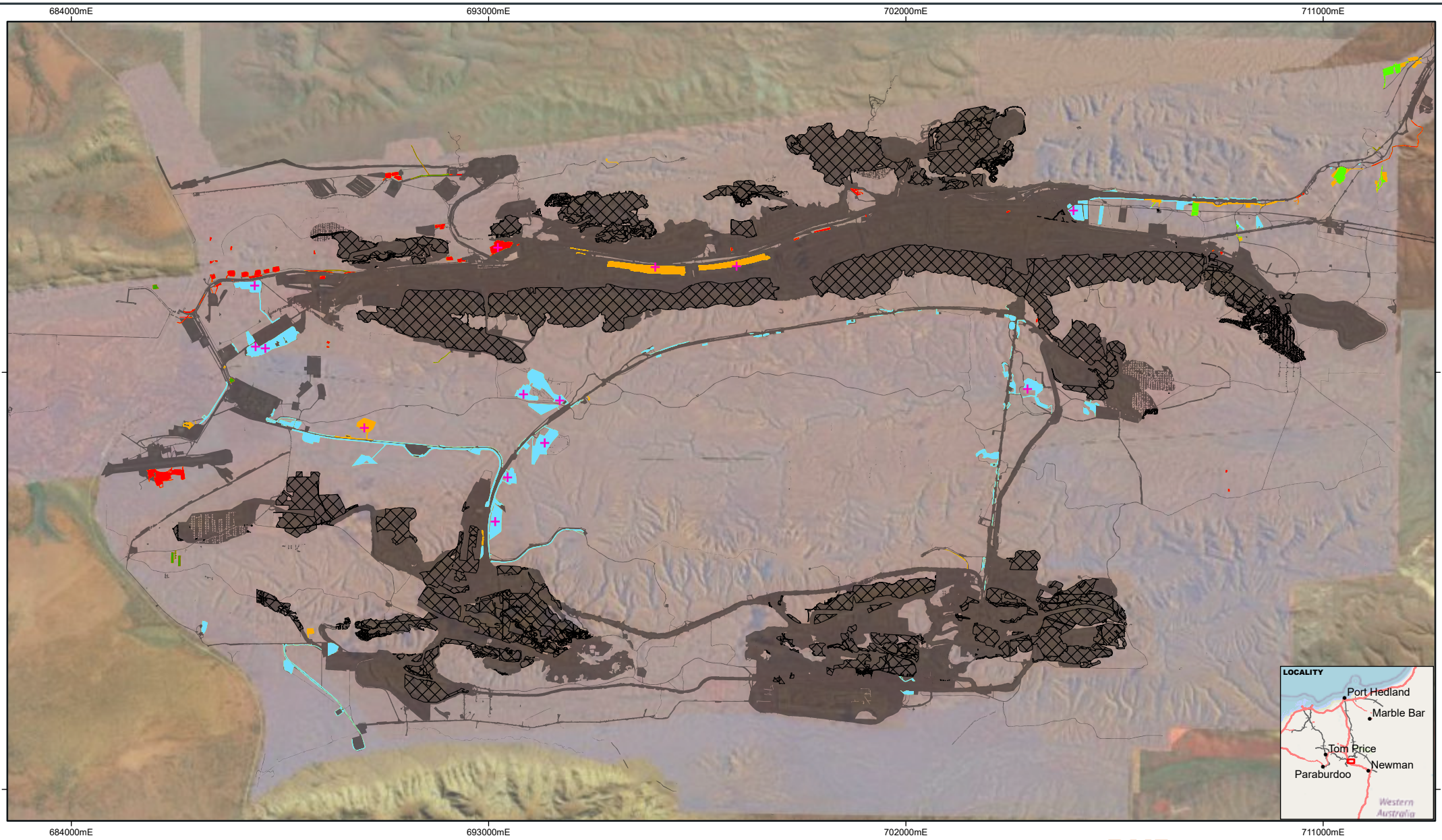
A total of 413.88 ha of rehabilitated land at Mining Area C was classified across 134 sites, which was comprised of 115 flat (356.53 ha) and 19 slope (57.34 ha) landforms. Rehabilitated sites less than 0.25 ha have been excluded from all results below in Table 11.

**Table 11: Rehabilitated area within Mining Area C hub**

| Age | Landform | Area (ha) | Number of sites (2024) |
|---|---|---|---|
| Completion (> 15 yrs) | Crest | - | - |
| | Flat | 38.47 | 23 |
| | Slope | 6.70 | 8 |
| Progressive (5 – 15 yrs) | Crest | - | - |
| | Flat | 40.07 | 22 |
| | Slope | 50.64 | 11 |
| Young (< 5 yrs) | Crest | - | - |
| | Flat | 278.00 | 70 |
| | Slope | - | - |
| Total | | **413.88** | **134** |
| **Note:** Sites that do not currently have accurate date information have been assessed at completion age | | | |

### 4.2.2 Rehabilitation Summary

The FY2024 summary of completion and progressive rehabilitation at BHP's Mining Area C hub is presented on Figure 5 below.




+ Onground Assessment Plots (2024 - Onwards) Survey Data Locations

## Remote Sensing Assessment (2024)

**Completion Rehabilitation (>15 years)**

- Completion Rehabilitation (>15 years) - Criteria Met
- Completion Rehabilitation (>15 years) - Criteria Not Met

**Progressing Rehabilitation (5 - 15 years)**

- Progressing Rehabilitation (5 - 15 years) - On Track
- Progressing Rehabilitation (5 - 15 years) - Maintenance Required
- Young Rehabilitation (<5 years)
- Rehabilitation - Not Assessed
- Pit Voids
- BHP Operations

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# REHABILITATION REPORT FY2024
## MINING AREA C HUB

**WAIO- PLANNING, TECHNICAL & ENVIRONMENT**

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| SCALE @ A4: | 1:110,000 | REQUESTOR: | J. Irvin | FIGURE: | |
| DATE: | 28/10/2024 | PREPARED: | J. Irvin | NO: | |
| | | REVIEWED: | A. Blackburn | | |

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### 4.2.3 Progressive Sites (greater than 5 years, less than 15 years)

The average native cover across progressive sites at Mining Area C was 46.11% and ranged between 2.74% and 84.12%. Rehabilitated flats and slopes had an average native cover of 48.07% and 42.21% (Figure 6). On average, native vegetation cover at Mining Area C consisted of 0.93% other grass (tussock), 16.21% hummock grass (*Triodia spp.*), 23.14% shrub, 0.03% herb and 4.81% tree cover. Mean hummock grass cover was lowest at slope sites (8.61%), relative to flat (20.02%) landforms (Figure 6). Introduced plant species (weeds) covered 0.82% of Mining Area C rehabilitation on average and mean weed cover varied between flat (0.05%), and slope (2.36%) landforms (Figure 7). Bare ground on average covered 52.60% of a site; and ranged between 15.54% and 97.08%. Bare ground percentage was highest on slope (54.24%), then flat (51.78%) landforms.

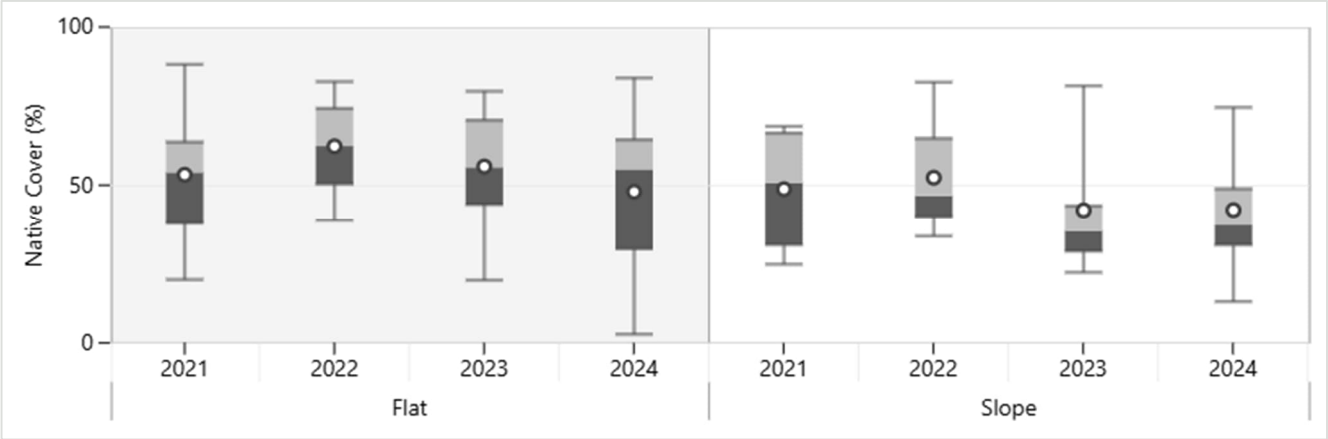


**Figure 6: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites at Mining Area C *(sites older than 5 years but less than 15 years)***

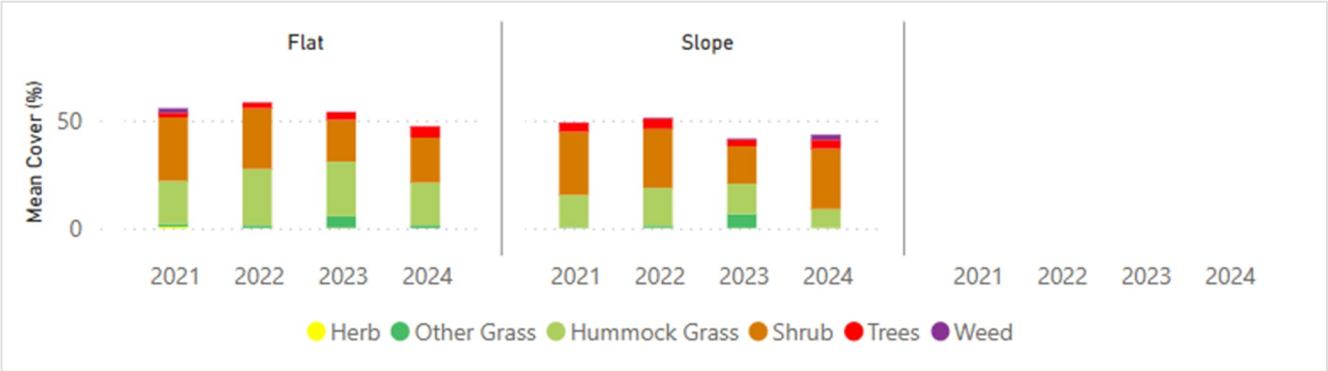


**Figure 7: Mean % cover of lifeforms at Mining Area C for each landform *(sites older than 5 years but less than 15 years).***

A total of 20.77% (18.84 ha of 90.71 ha) rehabilitated land between 5 and 15 years old is currently meeting the progressive criteria targets (Table-12).

**Table-12: Percentage of rehabilitation areas at Mining Area C meeting progressive criteria (> 5 Years, < 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated area (>5 Years, < 15 Years) meeting progressive criteria | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Native Veg Cover | Hummock Grass: Total Native Ratio | Hummock Grass: Shrub Ratio | Shrub: Total Native Ratio | Bare Ground Cover | Total Weed Cover | Weed: Hummock Ratio |
| **Landform** | **Year** | **Area (ha)** | | **>25 – 30 %** | **>0.20 – 0.30** | **>0.50** | **>0.50** | **<50 %** | **<10 %** | **<1** |
| **Crest** | 2024 | - | - | - | - | - | - | - | - | - |
| **Flat** | 2024 | 40.07 | 43.4 | 91.7 | 58.2 | 55.2 | 53.8 | 59.5 | 100 | 100 |
| **Slope** | 2024 | 50.64 | 2.7 | 79.7 | 3.4 | 5.82 | 3.4 | 6.04 | 50 | 15.5 |

### 4.2.4 On-ground Assessment

The on-ground assessment for Mining Area C was conducted between 23 and 25 March 2024. A total of 14 quadrats (12 flat and 2 slope) were surveyed for Species Richness. Quadrats surveyed represented all age groups; young (9), progressive (3) and completion (2). A total of 144 perennial species and 32 annual species were identified at Mining Area C. The mean number of perennial species per quadrat, across all age groups was 38 species. Completion and progressive plots had the greatest average perennial species richness of 39, while young was 36, respectively (Figure 8).

A total of 4 weed species were identified (*Cenchrus ciliaris, Cenchrus setiger, Malvastrum americanum* and *Setaria verticillata*).

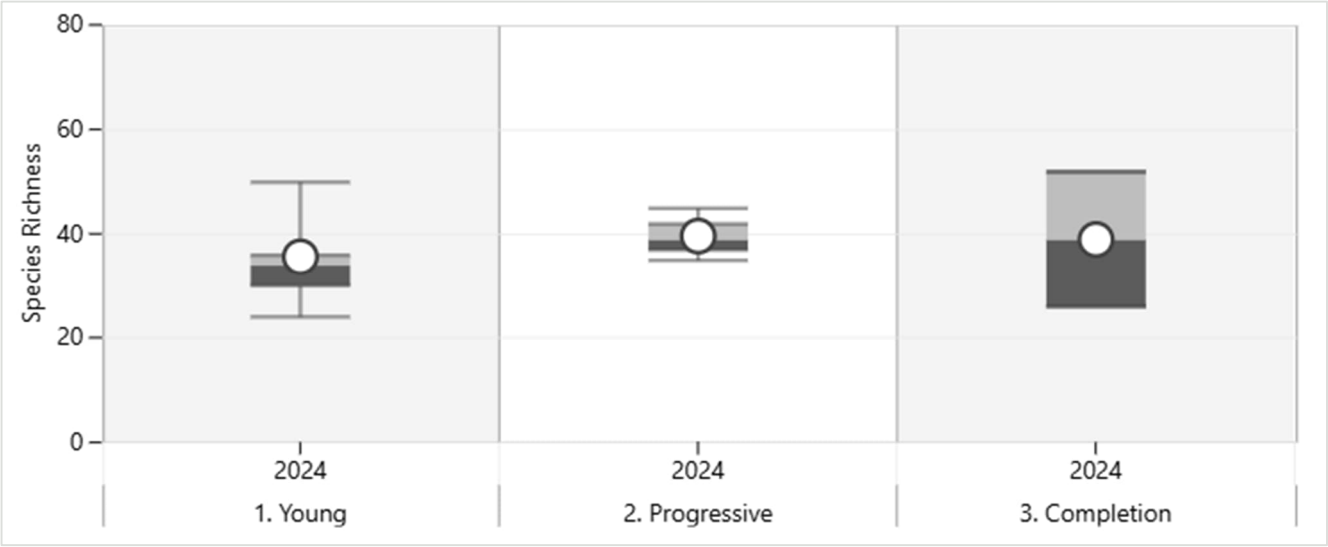


**Figure 8: Species Richness (Perennials) across Age Groups**

### 4.2.5 Completion Age (greater than 15 years)

The average native cover across rehabilitation sites at completion age (or with no accurate date information) at Mining Area C was 62.88%; and ranged between 10.95% and 97.09%. Rehabilitated flats and slopes had an average native cover of 59.69% and 72.05% (Figure 9). On average, native vegetation cover at Mining Area C consisted of 1.21% other grass (tussock), 25.01% hummock grass (*Triodia spp.*), 22.42% shrub, 0.01% herb and 6.07% tree cover. Mean hummock grass cover was lowest at flat sites (21.05%), relative to slope (36.40%) landforms (Figure 9). Introduced plant species (weeds) covered 0.09% of Mining Area C rehabilitation on average and mean weed cover varied between flat (0.10%), and slope (0.04%) landforms (Figure 10). Bare ground on average covered 36.93% of a site; and ranged between 2.90% and 8.89%. Bare ground percentage was highest on fat (40.10%), then slope (27.84%) landforms.

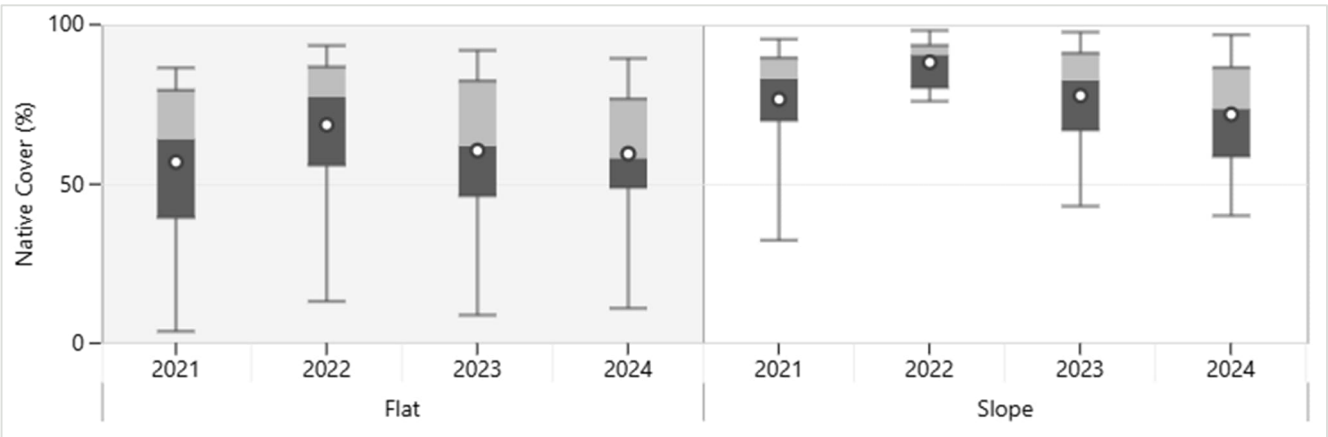


**Figure 9: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites at Mining Area C *(older than 15 years)***

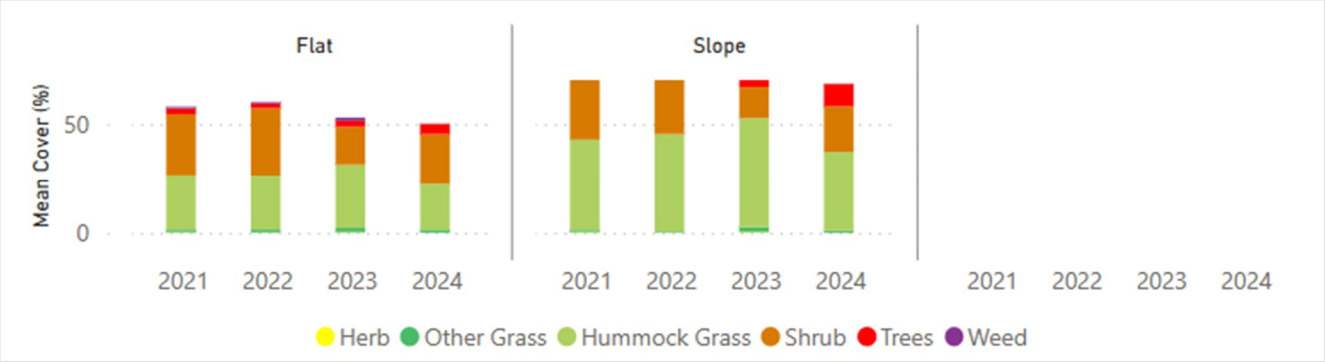


**Figure 10: Mean % cover of lifeforms at Mining Area C for each landform *(sites older than 15 years)***

Rehabilitated sites greater than 15 years old accounted for 45.17 ha of the total rehabilitation at Mining Area C, of which 0.62% (0.28 ha) is currently meeting all completion criteria targets for “Low Tree Steppe” (Table -13).

**Table -13: Percentage of rehabilitation areas at Mining Area C meeting completion criteria (> 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated areas (> 15 Years) meeting completion criteria | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Hummock Grass Cover | Other Grass Cover | Shrub Cover | Herb Cover | Tree Cover | Bare Ground Cover | Total Weed Cover | Cenchrus (Weed) Cover |
| **Landform** | **Year** | **Area (ha)** | | **20 - 30%** | **0.04 – 0.62%** | **2 – 10%** | **0.05 – 0.4%** | **1 – 10%** | **≤50%** | **<5%** | **<5%** |
| **Crest** | 2024 | - | - | - | - | - | - | - | - | - | - |
| **Flat** | 2024 | 38.19 | 0.72 | 56.8 | 55.6 | 35.4 | 0.72 | 49.5 | 57.7 | 100 | 100 |
| **Slope** | 2024 | 6.70 | 0 | 54.6 | 45.3 | 10.94 | 0 | 26.91 | 89.1 | 100 | 100 |

## 4.3 Newman Hub

### 4.3.1 Remote Sensing Assessment

A total of 667.73 ha of rehabilitated land at Newman was classified across 243 sites, which was comprised of 31 crest (55.28 ha), 149 flat (351 ha), and 63 slope (261.45 ha) landforms. Rehabilitated sites less than 0.25 ha have been excluded from all results in Table -14 below.

**Table -14: Rehabilitated area within the Newman hub**

| Age | Landform | Area (ha) | Number of sites (2024) |
|---|---|---|---|
| Completion (> 15 yrs) | Crest | 5.55 | 5 |
| | Flat | 103.05 | 93 |
| | Slope | 51.77 | 19 |
| Progressive (5 – 15 yrs) | Crest | 49.73 | 26 |
| | Flat | 229.64 | 55 |
| | Slope | 209.69 | 44 |
| Young (< 5 yrs) | Crest | - | - |
| | Flat | - | - |
| | Slope | - | - |
| **Total** | | **649.43** | **242** |
| Sites that do not currently have accurate date information have been assessed at Completion age | | | |

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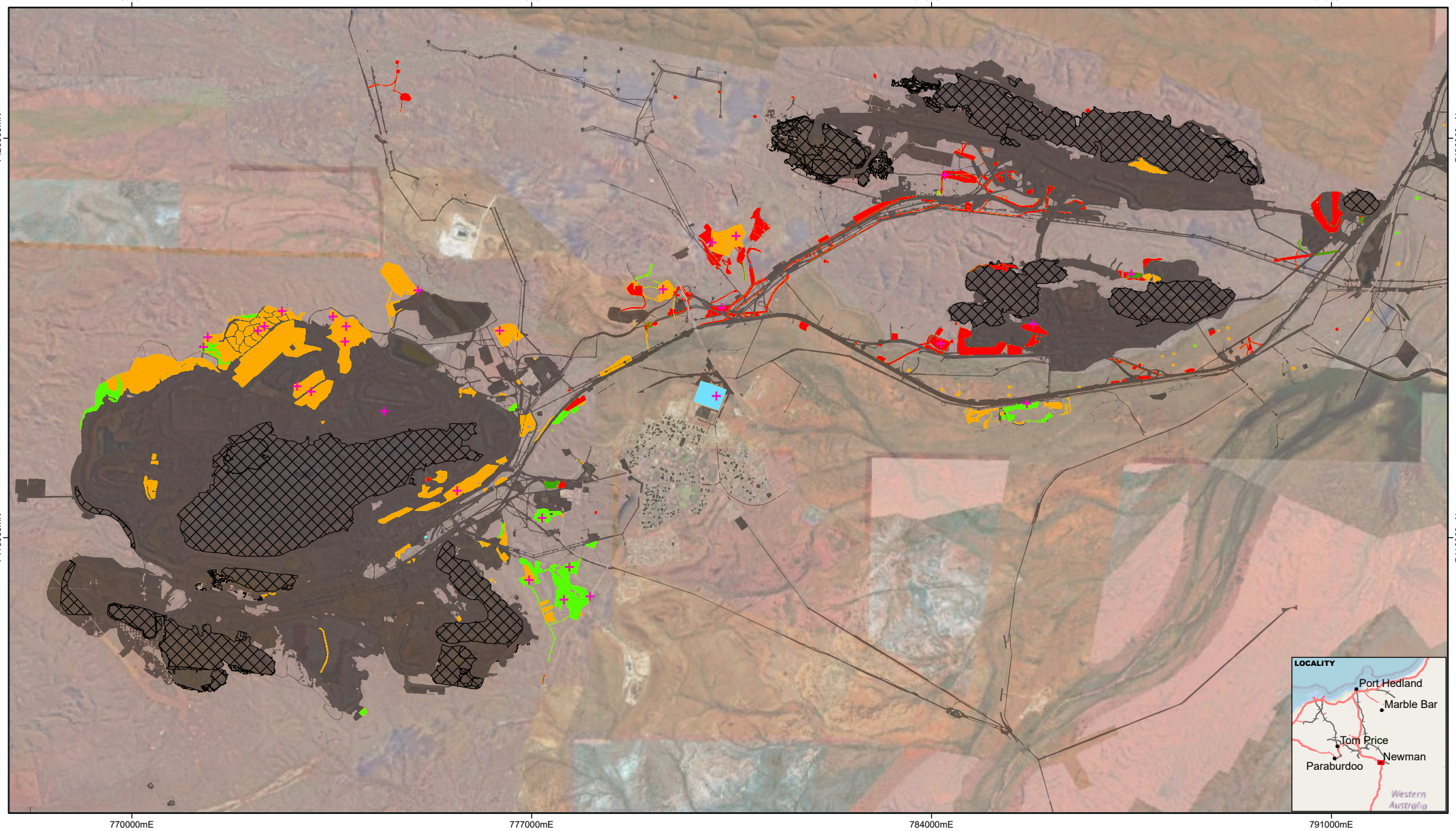
### 4.3.2 Rehabilitation Summary

The FY2024 summary of completion and progressive rehabilitation at BHP's Mining Area C hub is presented on Figure 11 below.




+ Onground Assessment Plots (2024 - Onwards) Survey Data Locations

## Remote Sensing Assessment (2024)

**Completion Rehabilitation (>15 years)**

- Completion Rehabilitation (>15 years) - Criteria Met
- Completion Rehabilitation (>15 years) - Criteria Not Met

**Progressing Rehabilitation (5 - 15 years)**

- Progressing Rehabilitation (5 - 15 years) - On Track
- Progressing Rehabilitation (5 - 15 years) - Maintenance Required
- Young Rehabilitation (<5 years)
- Rehabilitation - Not Assessed
- Pit Voids
- BHP Operations

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# REHABILITATION REPORT FY2024
## NEWMAN HUB

**WAIO- PLANNING, TECHNICAL & ENVIRONMENT**

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| SCALE @ A4: | 1:90,000 | REQUESTOR: | J. Irvin | FIGURE: | |
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| | | REVIEWED: | A. Blackburn | | |

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### 4.3.3 Progressive Sites (greater than 5 years, less than 15 years)

The average native cover across progressive sites at Newman was 37.99% and ranged from no cover to 95.55% cover. Rehabilitated crests, flats, and slopes had an average native cover of 32.01%, 39.31%, and 39.89% (Figure 12). On average, native vegetation cover at Newman consisted of 0.69% other grass (tussock), 18.46% hummock grass (*Triodia spp.*), 12.86% shrub, 0.91% herb and 0.67% tree cover. Mean hummock grass cover was lowest at crest sites (16.36%), relative to flat (17.75%), and slope (20.57%) landforms (Figure 13). Introduced plant species (weeds) covered 17.35% of Newman rehabilitation on average and mean weed cover varied between crest (14.98%), flat (22.65%), and slope (12.12%) landforms (Figure 13). Bare ground on average covered 44.47% of a site; and ranged between 1.27% and 99.91%. Bare ground percentage was highest on crest (52.97%), then slope (47.78%), then flat (37.81%) landforms.

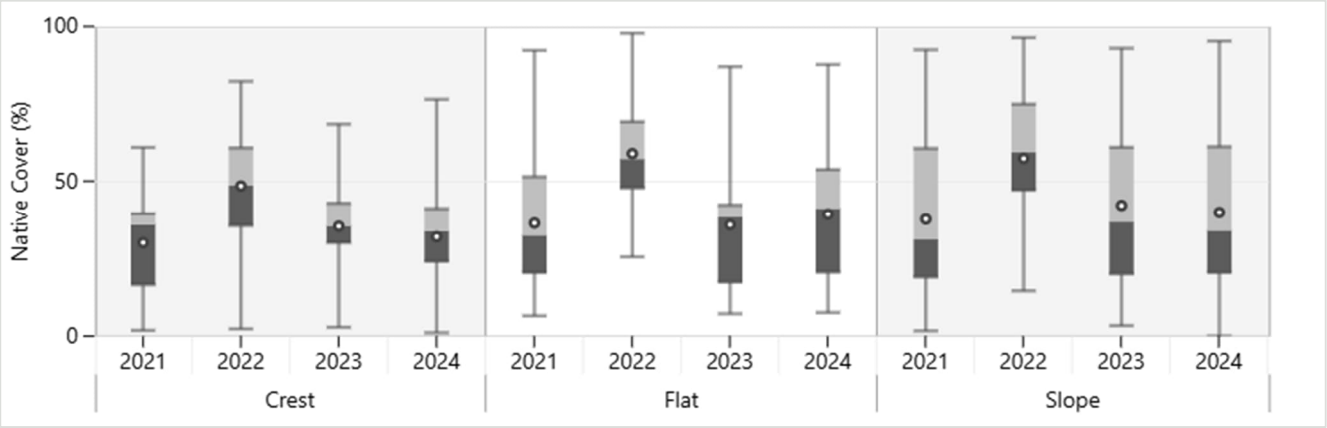



**Figure 12: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites at Newman *(sites older than 5 years but less than 15 years)***


**Figure 13: Mean % cover of lifeforms at Newman for each landform *(sites older than 5 years but less than 15 years).***

A total of 18.04% (88.24 ha of 489.06 ha) rehabilitated land between 5 and 15 years old is currently meeting the progressive criteria targets (Table -15).

**Table -15: Percentage of rehabilitation areas at Newman meeting progressive criteria (> 5 Years, < 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated area (>5 Years, < 15 Years) meeting progressive criteria | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Native Veg Cover | Hummock Grass: Total Native Ratio | Hummock Grass: Shrub Ratio | Shrub: Total Native Ratio | Bare Ground Cover | Total Weed Cover | Weed: Hummock Ratio |
| Landform | Year | Area (ha) | | >25 – 30 % | >0.20 – 0.30 | >0.50 | >0.50 | <50 % | <10 % | <1 |
| **Crest** | 2024 | 49.73 | 4.2 | 85.5 | 66.4 | 40.6 | 41.6 | 59.2 | 34.2 | 34.2 |
| **Flat** | 2024 | 229.64 | 27.3 | 70.4 | 45.2 | 51.7 | 71.4 | 64.9 | 54 | 48.4 |
| **Slope** | 2024 | 209.69 | 11.2 | 62.4 | 44.0 | 68.7 | 72.7 | 22.3 | 77.2 | 43.6 |

### 4.3.4 On-ground Assessment

The on-ground assessment for the Newman areas was conducted between 23 and 25 March 2024. A total of 29 quadrats (3 crest, 18 flat and 8 slope) were surveyed for Species Richness. Quadrats surveyed represented all age groups; young (1), progressive (22) and completion (6). A total of 211 perennial species and 66 annual species were identified across Newman. The mean number of perennial species per quadrat was 36 (Figure 14).

A total of 10 weed species were identified (*Aerva Javanica, Bidens bipinnata, Cenchrus ciliaris, Cenchrus setiger Chloris virgata, Indigofera oblongifolia, Malvastrum americanum, Rumex vesicarius, Tribulus terrestris and Vachellia farnesiana*).

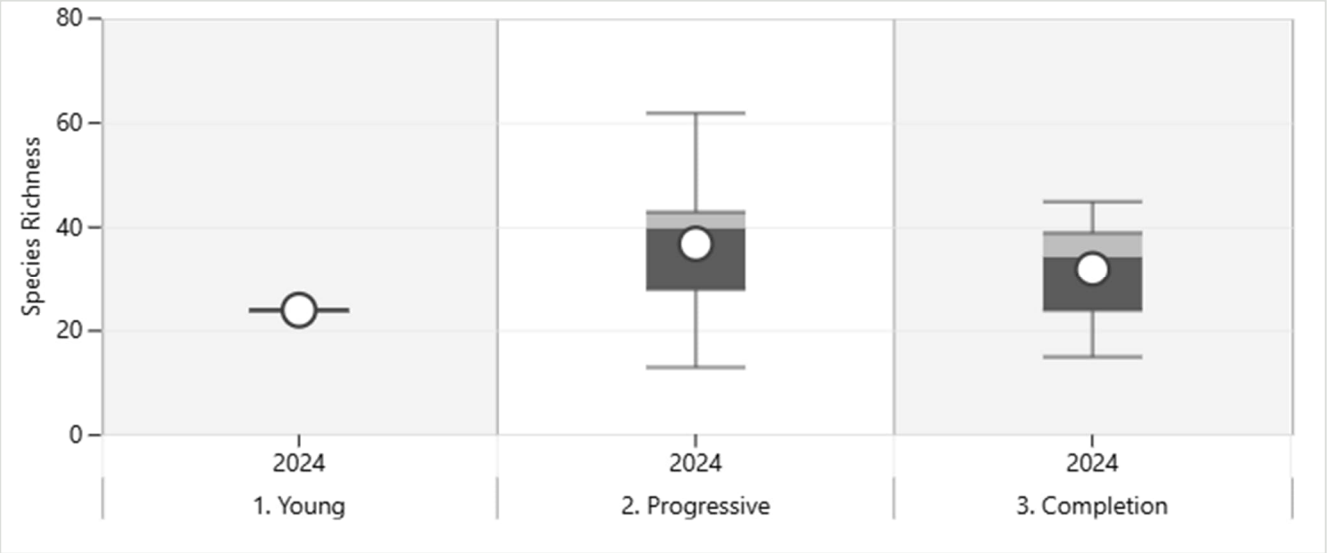



**Figure 14: Species Richness (Perennials) across Age Groups.**

### 4.3.5 Completion Age (greater than 15 years)

The average native cover across rehabilitation sites at completion age (or with no accurate date information) at Newman was 43.97%; and ranged between 7.21% and 91.80%. Rehabilitated crests, flats, and slopes had an average native cover of 47.41%, 44.48%, and 40.60% (Figure 15). On average, native vegetation cover at Newman consisted of 1.28% other grass (tussock), 13.72% hummock grass (*Triodia spp.*), 21.77% shrub, 0.36% herb and 1.04% tree cover. Mean hummock grass cover was lowest at crest sites (10.69%), relative to flat (13.68%), and slope (14.71%) landforms (Figure 15). Introduced plant species (weeds) covered 15.44% of Newman rehabilitation on average and mean weed cover varied between crest (6.15%), flat (15.68%), and slope (16.74%) landforms (Figure 16). Bare ground on average covered 40.42% of a site; and ranged between 0.62% and 88.38%. Bare ground percentage was highest on crest (46.24%), then slope (42.52%), then flat (39.68%) landforms.

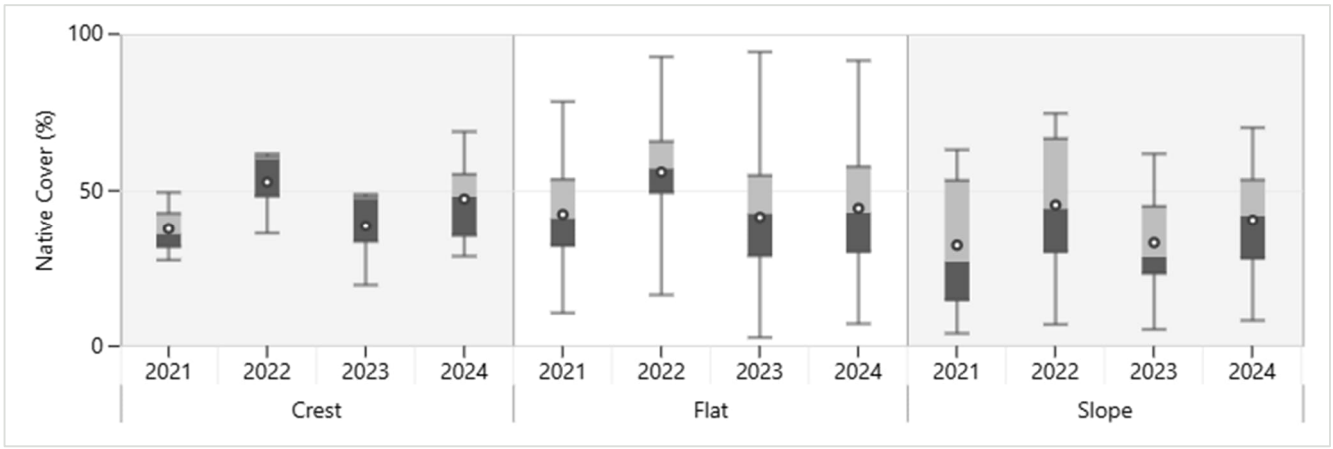



**Figure 15: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites at Newman *(older than 15 years)***

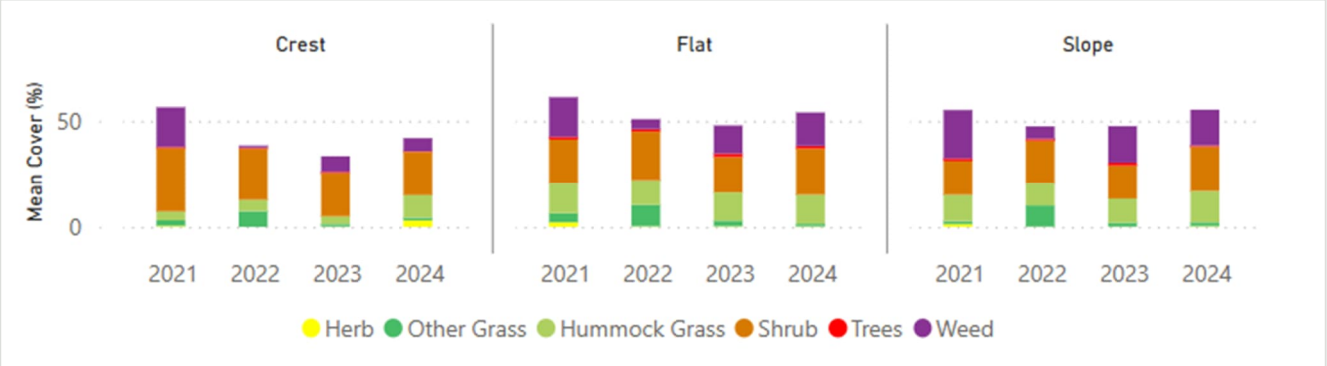



**Figure 16: Mean % cover of lifeforms Newman for each landform *(sites older than 15 years)***

Rehabilitated sites greater than 15 years old accounted for 160.37 ha of the total rehabilitation at Newman, of which 3.13% (5.02 ha) is currently meeting all completion criteria targets for Low Tree Steppe (Table -16).

**Table -16: Percentage of rehabilitation areas at Newman meeting completion criteria (> 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated areas (> 15 Years) meeting completion criteria | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Hummock Grass Cover | Other Grass Cover | Shrub Cover | Herb Cover | Tree Cover | Bare Ground Cover | Total Weed Cover | Cenchrus (Weed) Cover |
| Landform | Year | Area (ha) | | 20 - 30% | 0.04 – 0.62% | 2 – 10% | 0.05 – 0.4% | 1 – 10% | ≤50% | <10% | <10% |
| **Crest** | 2024 | 5.63 | 0 | 8.8 | 84 | 100 | 92.7 | 0 | 81.3 | 60.6 | 60.6 |
| **Flat** | 2024 | 82.76 | 2.8 | 30.1 | 91.3 | 100 | 77.2 | 36.3 | 65.6 | 51.0 | 51.0 |
| **Slope** | 2024 | 58.12 | 4.17 | 19.9 | 87.8 | 100 | 83.6 | 6.8 | 58.9 | 9.4 | 9.38 |

## 4.4 Jimblebar Hub

### 4.4.1 Remote Sensing Assessment

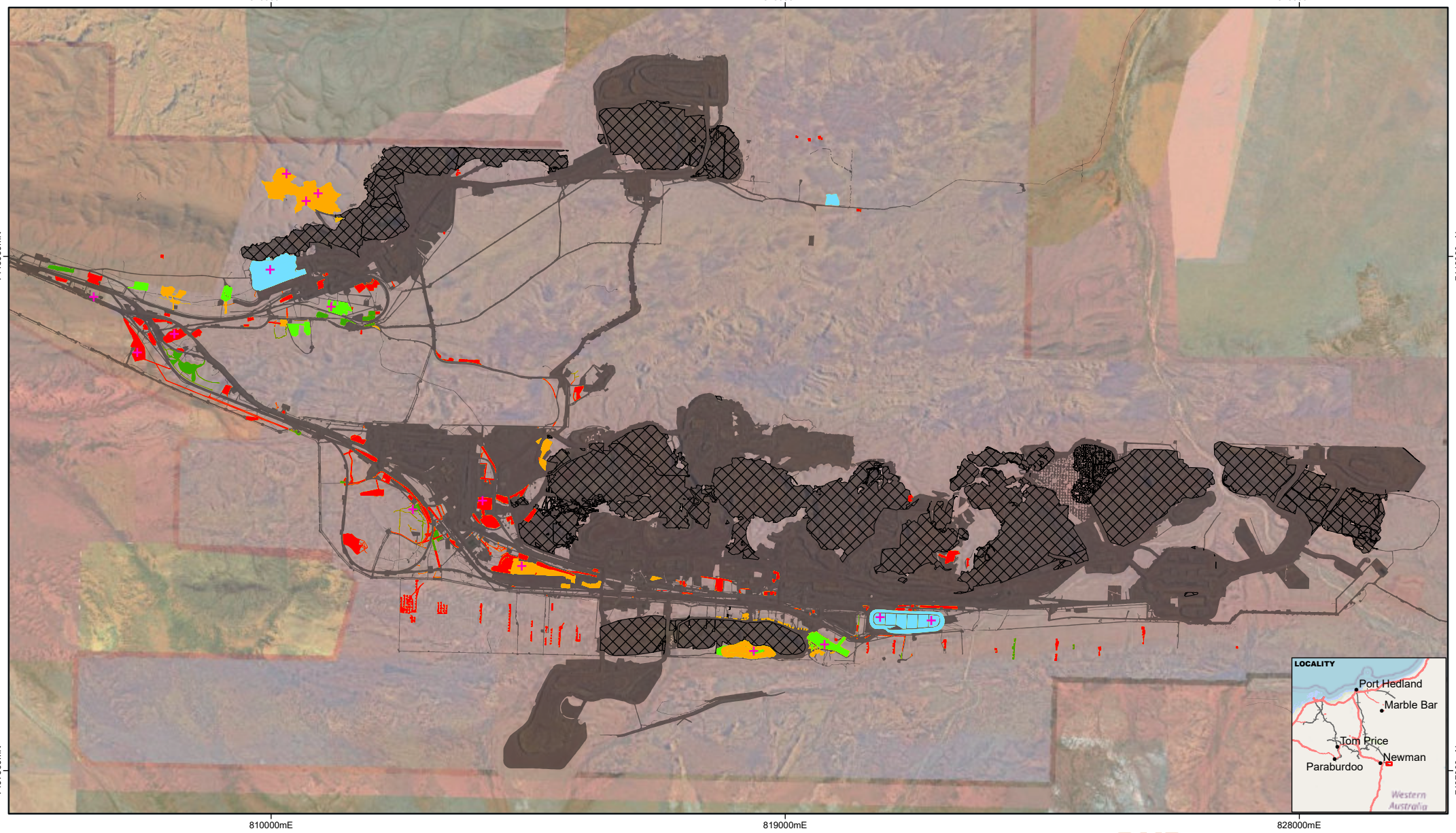
A total of 424.34 ha of rehabilitated land was classified across 202 sites at Jimblebar, which was comprised of 19 crest (78.74 ha), 148 flat (226.05 ha), and 35 slope (119.55 ha) landforms. Rehabilitated sites less than 0.25 ha have been excluded from all results below.

**Table -17: Rehabilitated area at the Jimblebar hub**

| Age | Landform | Area (ha) | Number of sites (2024) |
|---|---|---|---|
| Completion (> 15 yrs) | Crest | 3.74 | 2 |
| | Flat | 183.45 | 127 |
| | Slope | 14.44 | 17 |
| Progressive (5 – 15 yrs) | Crest | 14.80 | 7 |
| | Flat | 33.73 | 18 |
| | Slope | 66.40 | 16 |
| Young (< 5 yrs) | Crest | 33.20 | 10 |
| | Flat | 8.87 | 3 |
| | Slope | 38.71 | 2 |
| Total | | **397.34** | **202** |
| Sites that do not currently have accurate date information have been assessed at Completion age. | | | |

### 4.4.2 Rehabilitation Summary

The FY2024 summary of completion and progressive rehabilitation at BHP's Jimblebar hub is presented on Figure 17 below.




+ Onground Assessment Plots (2024 - Onwards) Survey Data Locations

## Remote Sensing Assessment (2024)

**Completion Rehabilitation (>15 years)**

- Completion Rehabilitation (>15 years) - Criteria Met
- Completion Rehabilitation (>15 years) - Criteria Not Met

**Progressing Rehabilitation (5 - 15 years)**

- Progressing Rehabilitation (5 - 15 years) - On Track
- Progressing Rehabilitation (5 - 15 years) - Maintenance Required
- Young Rehabilitation (<5 years)
- Rehabilitation - Not Assessed
- Pit Voids
- BHP Operations

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# REHABILITATION REPORT FY2024
## JIMBLEBAR HUB

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### 4.4.3 Progressive Sites (greater than 5 years, less than 15 years)

The average native cover across progressive sites at Jimblebar was 39.59% and ranged between 2.05% and 83.45%. Rehabilitated crests, flats, and slopes had an average native cover of 35.75%, 44.10%, and 36.19% (Figure 18). On average, native vegetation cover at Jimblebar consisted of 4.36% other grass (tussock), 15.74% hummock grass (*Triodia spp.*), 18.17% shrub, 0.27% herb and 0.77% tree cover. Mean hummock grass cover was lowest at crest sites (9.98%), relative to slope (10.72%), and flat (22.45%) landforms (Figure 19). Introduced plant species (weeds) covered 2.00% of Jimblebar rehabilitation on average and mean weed cover varied between crest (0.30%), flat (3.74%), and slope (0.77%) landforms (Figure 19). Bare ground on average covered 58.31% of a site; and ranged between 16.52% and 97.96%. Bare ground percentage was highest on crest (63.89%), then slope (62.80%), then flat (52.16%) landforms.

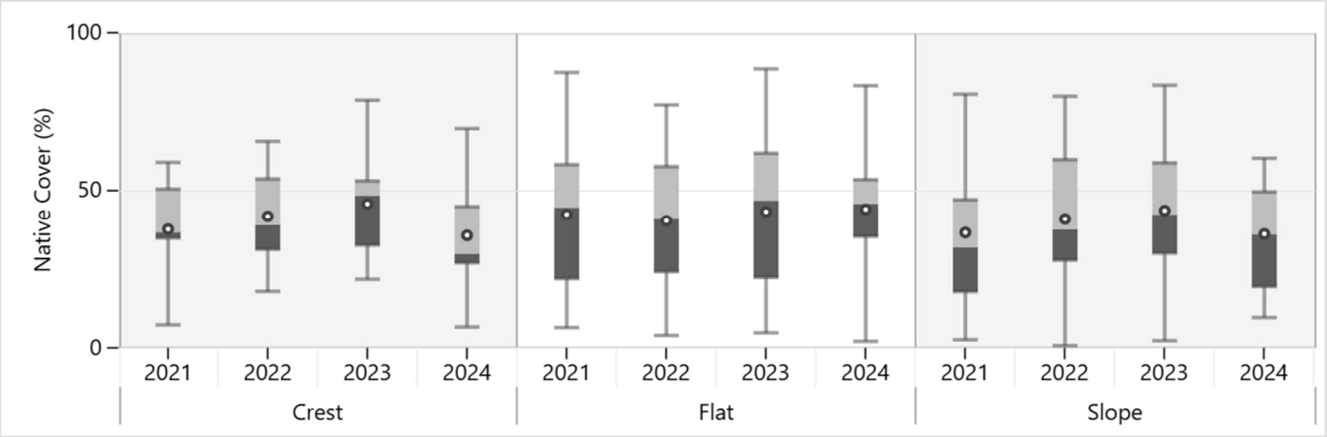



**Figure 18: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites at Jimblebar *(sites older than 5 years but less than 15 years)***

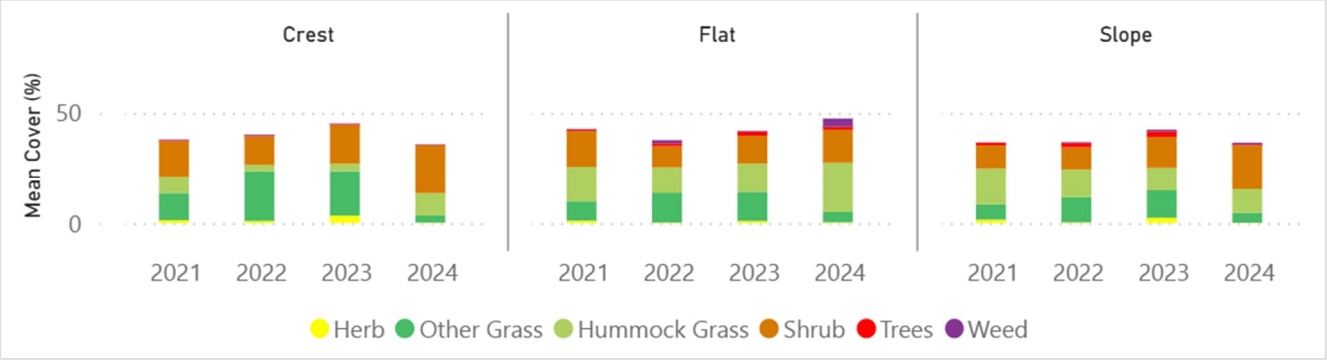



**Figure 19: Mean % cover of lifeforms at Jimblebar for each landform *(sites older than 5 years but less than 15 years).***

A total of 23.9% (34 ha of 141.93 ha) rehabilitated land between 5 and 15 years old is currently meeting all progressive criteria targets (Table -18).

**Table -18: Percentage of rehabilitation areas at Jimblebar meeting progressive criteria (> 5 Years, < 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated area (>5 Years, < 15 Years) meeting progressive criteria | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Native Veg Cover | Hummock Grass: Total Native Ratio | Hummock Grass: Shrub Ratio | Shrub: Total Native Ratio | Bare Ground Cover | Total Weed Cover | Weed: Hummock Ratio |
| Landform | Year | Area (ha) | | >25 – 30 % | >0.20 – 0.30 | >0.50 | >0.50 | <50 % | <10 % | <1 |
| **Crest** | 2024 | 41.8 | 2.8 | 92.7 | 55.6 | 12.5 | 12.5 | 2.81 | 100 | 93.6 |
| **Flat** | 2024 | 33.73 | 56.0 | 94.1 | 82.5 | 78.0 | 64.4 | 66.1 | 97.3 | 92.2 |
| **Slope** | 2024 | 66.40 | 21.0 | 78.2 | 43.2 | 41.6 | 41.8 | 32.4 | 100 | 99.0 |

### 4.4.4 On-ground Assessment

The on-ground assessment for Jimblebar was conducted between 19 and 22 March 2024. A total of 15 quadrats (5 crest, 4 flat and 6 slope) were surveyed for Species Richness. Quadrats surveyed represented all age groups; young (2), progressive (4) and completion (8). A total of 157 perennial species and 29 annual species were identified at Jimblebar. The mean number of perennial species per quadrat, across all age groups was 38. Young plots had the greatest average perennial species richness of 47, while completion and progressive were 33 and 43, respectively (Figure 20).

A total of 3 weed species were identified (*Cenchrus ciliaris, Cenchrus setiger and Malvastrum americanum*).

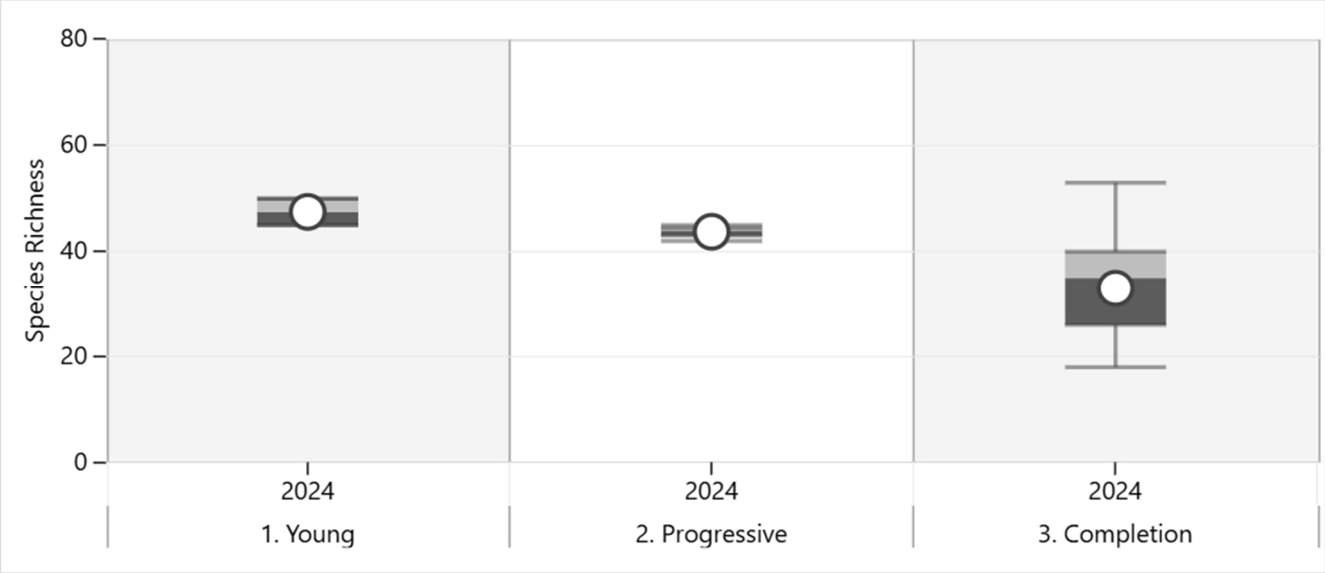



**Figure 20: Species Richness (Perennials) across age groups**

### 4.4.5 Completion Age (greater than 15 years)

The average native cover across rehabilitation sites at completion age (or with no accurate date information) at Jimblebar was 36.24%; and ranged between 1.75% and 87.73%. Rehabilitated crests, flats, and slopes had an average native cover of 23.74%, 36.04%, and 39.27% (Figure 21). On average, native vegetation cover at Jimblebar consisted of 4.33% other grass (tussock), 13.89% hummock grass (*Triodia spp.*), 12.77% shrub, 0.32% herb and 0.72% tree cover. Mean hummock grass cover was lowest at crests sites (0.48%), relative to slope (12.43%), and flat (14.30%) landforms (Figure 22). Introduced plant species (weeds) covered 2.69% of Jimblebar rehabilitation on average and mean weed cover varied between crest (1.12%), flat (3.06%), and slope (0.09%) landforms (Figure 22). Bare ground on average covered 61.04% of a site; and ranged between 9.98% and 98.25%. Bare ground percentage was highest on crest (75.14%), then flat (60.87%), then slope (60.63%) landforms.

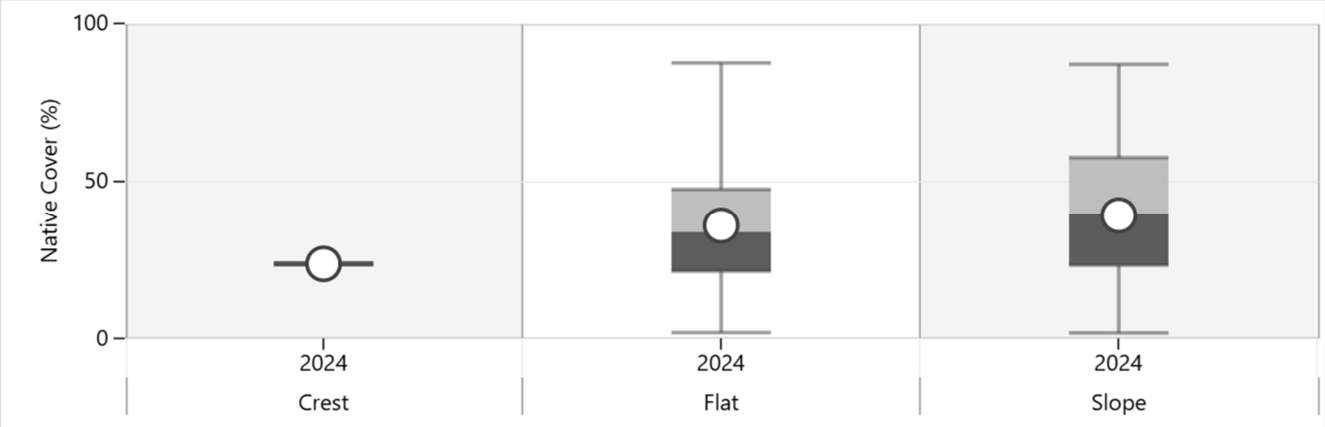



**Figure 21: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites Jimblebar *(older than 15 years)***

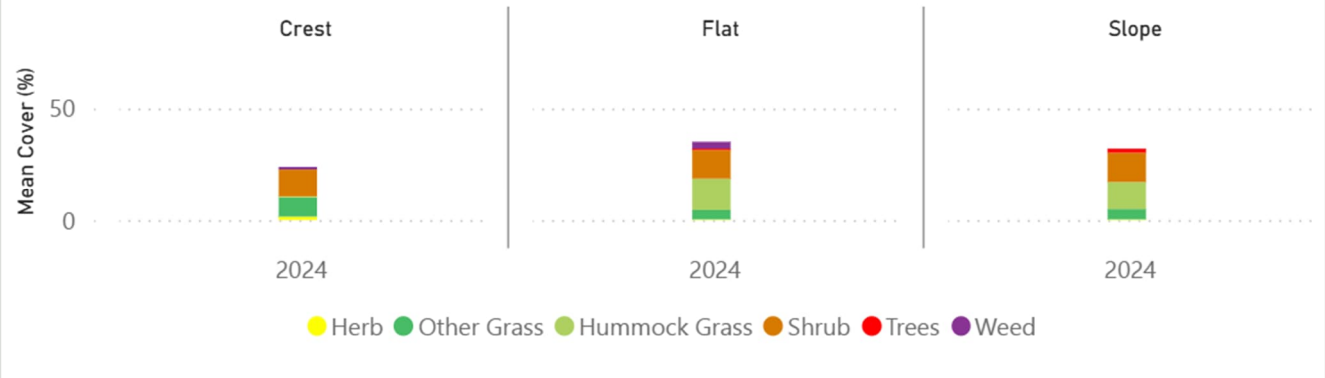



**Figure 22: Mean % cover of lifeforms at Jimblebar for each landform *(sites older than 15 years)***

Rehabilitated sites greater than 15 years old accounted for 201.62 ha of the total rehabilitation at Jimblebar, of which 6.88% (13.88 ha) is currently meeting all completion criteria targets for Low Tree Steppe (Table -19Table -19: Percentage of rehabilitation areas at Jimblebar meeting completion criteria (> 15 Years) assessed with remote sensing)

**Table -19: Percentage of rehabilitation areas at Jimblebar meeting completion criteria (> 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated areas (> 15 Years) meeting completion criteria | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Hummock Grass Cover | Other Grass Cover | Shrub Cover | Herb Cover | Tree Cover | Bare Ground Cover | Total Weed Cover | Cenchrus (Weed) Cover |
| Landform | Year | Area (ha) | | 20 - 30% | 0.04 – 0.62% | 2 – 10% | 0.05 – 0.4% | 1 – 10% | ≤50% | <10% | <10% |
| **Crest** | 2024 | 3.74 | 0 | 0 | 100 | 100 | 100 | 0 | 0 | 100 | 100 |
| **Flat** | 2024 | 183.45 | 7.3 | 43.6 | 98.6 | 95.2 | 54.4 | 18.9 | 27.1 | 95.2 | 95.6 |
| **Slope** | 2024 | 14.44 | 3.7 | 10.7 | 96.5 | 73.3 | 79.3 | 35.2 | 23.8 | 100 | 100 |

## 4.5 Goldsworthy Hub

### 4.5.1 Remote Sensing Assessment

A total of 464.97 ha of rehabilitated land was classified across 93 sites at Goldsworthy, which was comprised of 22 crest (127.95 ha), 40 flat (233.05 ha), and 31 slope (103.97 ha) landforms. Rehabilitated sites less than 0.25 ha have been excluded from all results below.

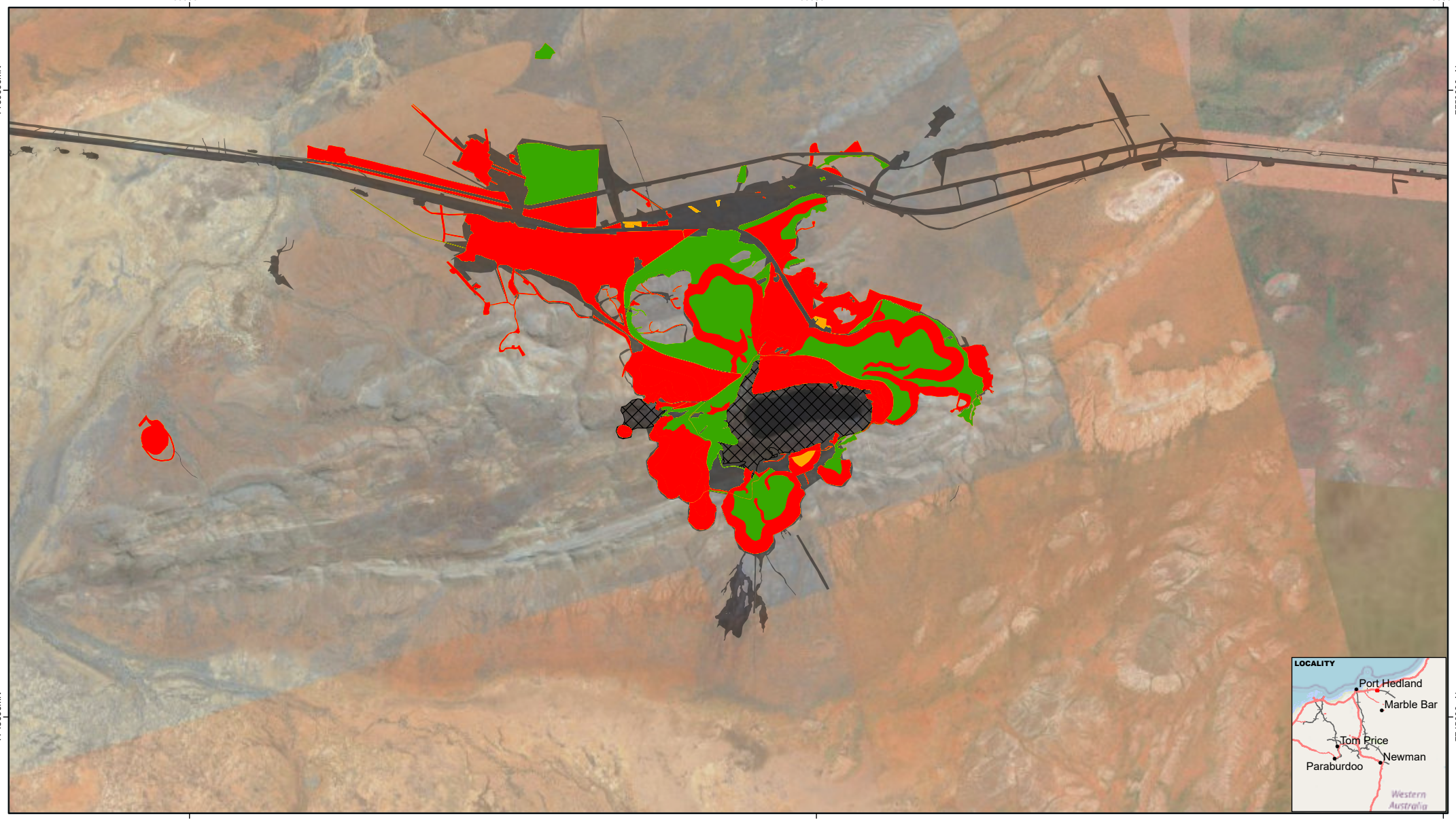
**Table -20: Rehabilitated area at Goldsworthy hub**

| Age | Landform | Area (ha) | Number of sites (2023) |
|---|---|---|---|
| Completion (> 15 yrs) | Crest | 126.76 | 21 |
| | Flat | 232.39 | 39 |
| | Slope | 103.97 | 31 |
| Progressive (5 – 15 yrs) | Crest | 1.19 | 1 |
| | Flat | 0.65 | 1 |
| | Slope | - | - |
| Young (< 5 yrs) | Crest | - | - |
| | Flat | - | - |
| | Slope | - | - |
| **Total** | | **464.96** | **93** |

* Sites that do not currently have accurate date information have been assessed at completion age

### 4.5.2 Rehabilitation Summary

The FY2024 summary of completion and progressive rehabilitation at BHP's Goldsworthy hub is presented in Figure 23 below.




## Remote Sensing Assessment (2023)

**Completion Rehabilitation (>15 years)**

- Completion Rehabilitation (>15 years) - Criteria Met
- Completion Rehabilitation (>15 years) - Criteria Not Met

**Progressing Rehabilitation (5 - 15 years)**

- Progressing Rehabilitation (5 - 15 years) - Maintenance Required
- Rehabilitation - Not Assessed
- Pit Voids
- BHP Operations

N

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KILOMETRES

GDA 1994 MGA ZONE 50

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# REHABILITATION REPORT FY2024
## GOLDSWORTHY HUB

**WAIO- PLANNING, TECHNICAL & ENVIRONMENT**

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| SCALE @ A4: | 1:41,000 | REQUESTOR: | J. Irvin | FIGURE: | |
| DATE: | 28/10/2024 | PREPARED: | J. Irvin | NO: | |
| | | REVIEWED: | A. Blackburn | | |

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### 4.5.3 Progressive Sites (greater than 5 years, less than 15 years)

The average native cover across progressive sites at Goldsworthy was 51.16% and ranged between 40.76% and 61.56%. Rehabilitated crests and flats had an average native cover of 40.76% and 61.56% (Figure 24). On average, native vegetation cover at Goldsworthy consisted of 5.17% other grass (tussock), 12.05% hummock grass (*Triodia spp.*), 32.27% shrub, 0.44% herb and 1.23% tree cover. Mean hummock grass cover was lowest at flat sites (7.48%), relative to crest (16.62%) landforms (Figure 25). Introduced plant species (weeds) covered 15.35% of Goldsworthy rehabilitation on average and mean weed cover varied between crest (19.75%), and flat (10.94%) landforms (Figure 25). Bare ground on average covered 33.49% of a site; and ranged between 27.50% and 39.49%. Bare ground percentage was highest on crest (39.49%), then flat (27.50%) landforms.

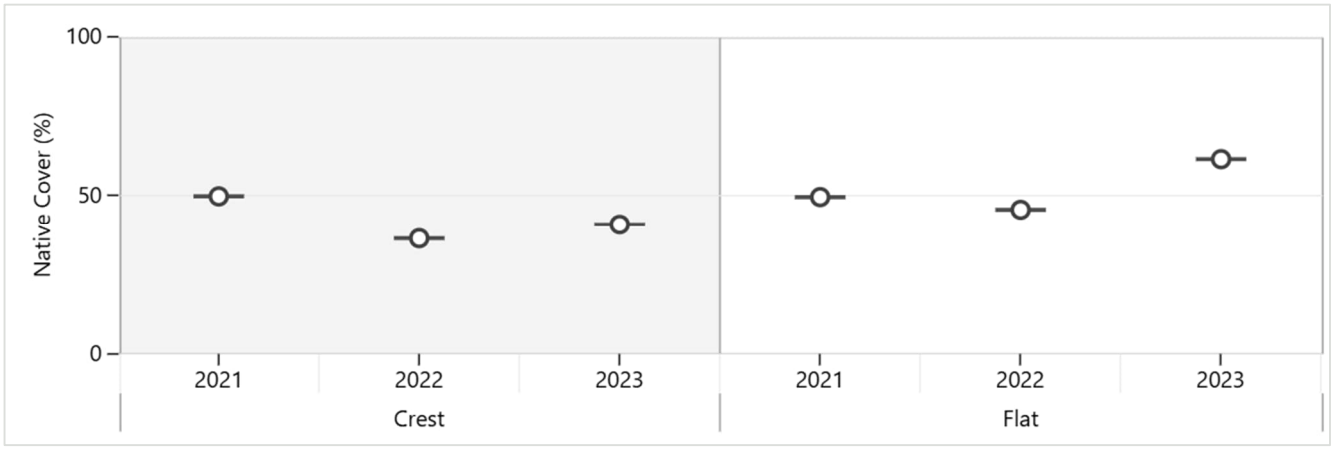



**Figure 24: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites at Goldsworthy *(sites older than 5 years but less than 15 years)***

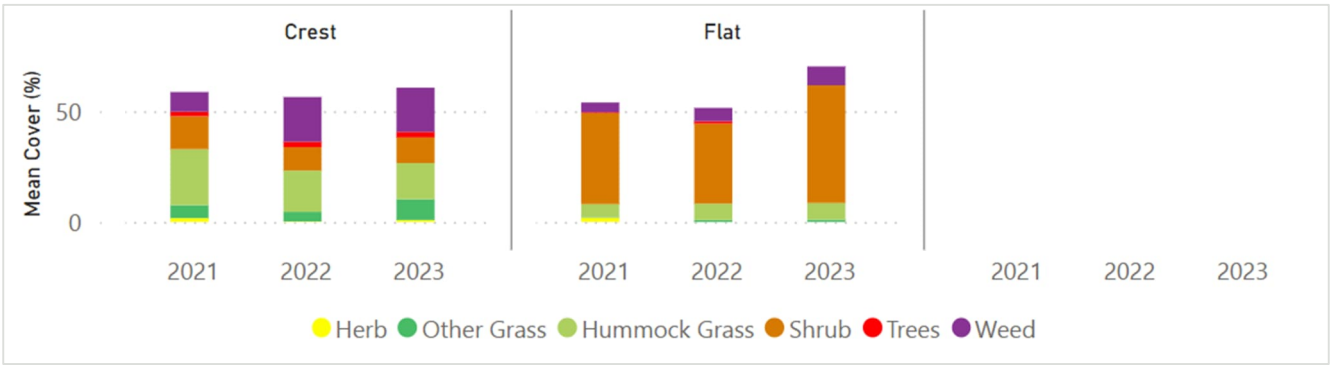



**Figure 25: Mean % cover of lifeforms at Goldsworthy for each landform *(sites older than 5 years but less than 15 years).***

No rehabilitated land between 5 and 15 years old (1.85 ha) is currently meeting all progressive criteria targets (Table -21).

**Table -21: Percentage of rehabilitation areas at Goldsworthy meeting progressive criteria (> 5 Years, < 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated area (>5 Years, < 15 Years) meeting progressive criteria | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Native Veg Cover | Hummock Grass: Total Native Ratio | Hummock Grass: Shrub Ratio | Shrub: Total Native Ratio | Bare Ground Cover | Total Weed Cover | Weed: Hummock Ratio |
| Landform | Year | Area (ha) | | >30 – 30 % | >0.20 – 0.30 | >0.50 | >0.50 | <50 % | <10 % | <1 |
| **Crest** | 2023 | 1.19 | 0 | 100 | 100 | 100 | 100 | 100 | 0 | 0 |
| **Flat** | 2023 | 0.65 | 0 | 100 | 0 | 0 | 0 | 100 | 0 | 0 |
| **Slope** | 2023 | - | - | - | - | - | - | - | - | - |

### 4.5.4 Completion Age (greater than 15 years)

The average native cover across rehabilitation sites at completion age (or with no accurate date information) at Goldsworthy was 46.56%; and ranged between 2.36% and 87.94%. Rehabilitated crests, flats, and slopes had an average native cover of 45.78%, 42.92%, and 54.38% (Figure 26). On average, native vegetation cover at Goldsworthy consisted of 3.35% other grass (tussock), 17.38% hummock grass (*Triodia spp.*), 23.87% shrub, 0.43% herb and 1.51% tree cover. Mean hummock grass cover was lowest at slope sites (14.13%), relative to crest (22.37%), and flat (17.27%) landforms (Figure 27). Introduced plant species (weeds) covered 8.86% of Goldsworthy rehabilitation on average and mean weed cover varied between crest (8.89%), flat (10.76%), and slope (6.46%) landforms (Figure 27). Bare ground on average covered 44.60% of a site; and ranged between 6.43% and 97.37%. Bare ground percentage was highest on slope (47.76%), then flat (46.32%), then crest (36.72%) landforms.

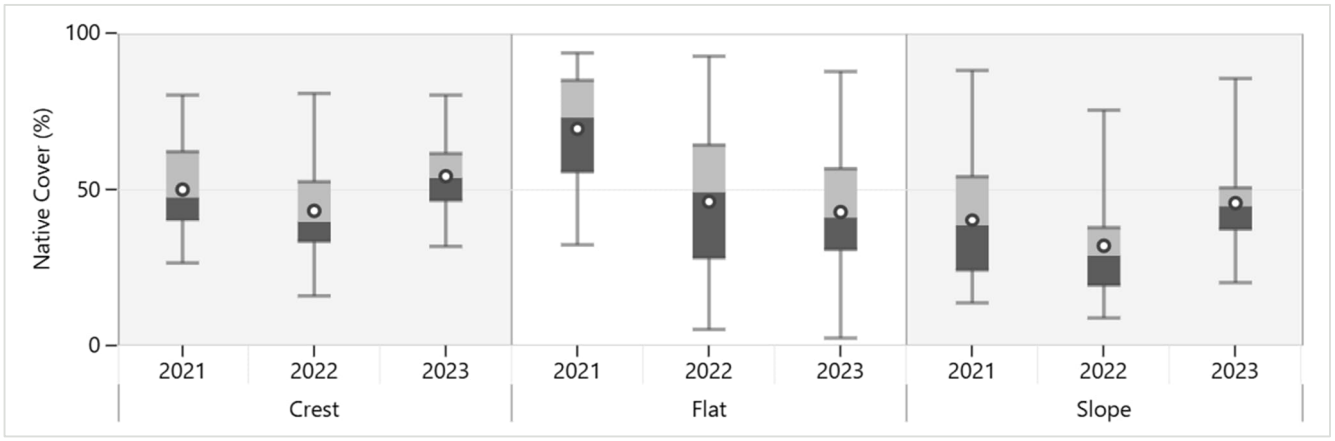



**Figure 26: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites Goldsworthy *(older than 15 years)***

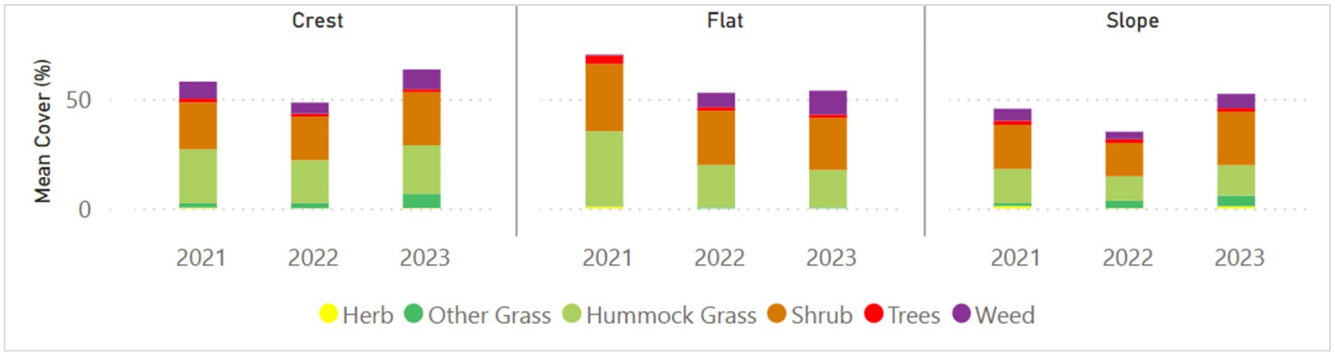



**Figure 27: Mean % cover of lifeforms at Goldsworthy for each landform *(sites older than 15 years***

Rehabilitated sites greater than 15 years old accounted for 463.12 ha of the total rehabilitation at Goldsworthy, of which 35.56% (164.7 ha) is currently meeting all completion criteria targets for Grass Steppe (Table -22).

**Table -22: Percentage of rehabilitation areas at Goldsworthy meeting completion criteria (> 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated areas (> 15 Years) meeting completion criteria | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Total Native Species | All Grasses | Shrub Cover | Tree Cover | Bare Ground Cover | Total Weed Cover | Cenchrus (Weed) Cover |
| Landform | Year | Area (ha) | | >15% | >5% | >0.2% | >0% | <50% | <20-10% | <10% |
| Crest | 2023 | 126.76 | 64.2 | 100 | 100 | 100 | 98.2 | 96.7 | 84.6 | 67.8 |
| Flat | 2023 | 232.39 | 33.0 | 98.5 | 97.4 | 99.8 | 99.6 | 82.1 | 69.0 | 51.1 |
| Slope | 2023 | 18.01 | 35.9 | 100 | 98.3 | 100 | 97.0 | 63.0 | 80.9 | 75.8 |
| Slope – Moonscaping | 2023 | 85.95 | 0 | 100 | | | | 0.43 | 0 | 0 |

## 4.6 Yarrie Hub

### 4.6.1 Remote Sensing Assessment

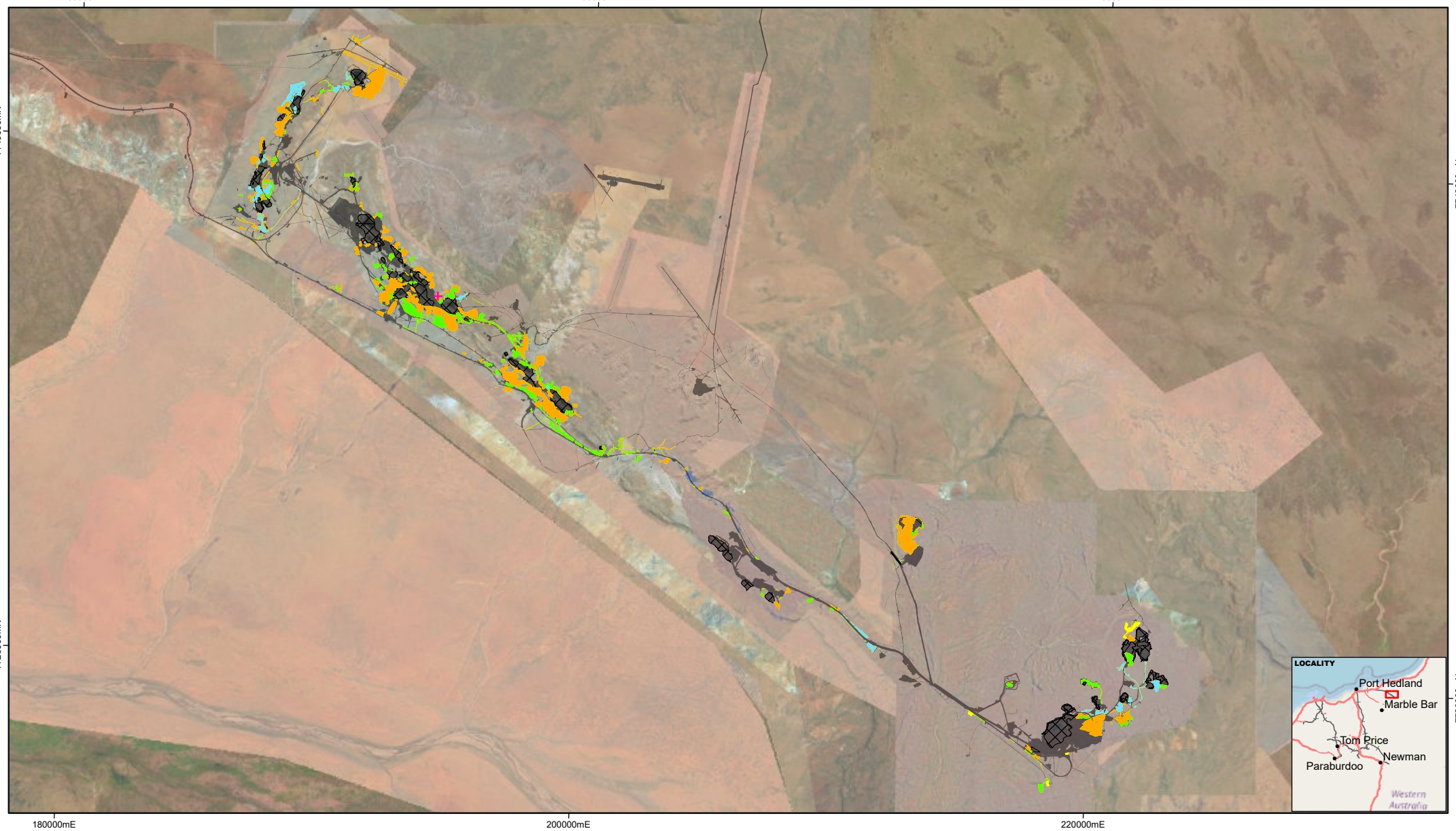
A total of 1,177.38 ha of rehabilitated land was classified across 403 sites across the Yarrie hub, which was comprised of 177 crest (578.01 ha), 100 flat (230.57 ha), and 126 slope (368.81 ha) landforms. Rehabilitated sites less than 0.25 ha have been excluded from all results below.

**Table -23: Rehabilitated area at Yarrie hub**

| Age | Landform | Area (ha) | Number of sites (2023) |
|---|---|---|---|
| Completion (> 15 yrs) | Crest | - | - |
| | Flat | - | - |
| | Slope | - | - |
| Progressive (5 – 15 yrs) | Crest | 458.56 | 124 |
| | Flat | 210.76 | 90 |
| | Slope | 340.87 | 116 |
| Young (< 5 yrs) | Crest | 119.45 | 53 |
| | Flat | 19.80 | 10 |
| | Slope | 27.94 | 10 |
| **Total** | | **1177.38** | **403** |
| Sites that do not currently have accurate date information have been assessed at completion age | | | |

### 4.6.2 Rehabilitation Summary

The FY2024 summary of completion and progressive rehabilitation at BHP's Yarrie hub is presented in Figure 28 below.




+ Onground Assessment Plots (2024 - Onwards) Survey Data Locations

## Remote Sensing Assessment (2023)

**Progressing Rehabilitation (5 - 15 years)**

- Progressing Rehabilitation (5 - 15 years) - On Track
- Progressing Rehabilitation (5 - 15 years) - Maintenance Required
- Young Rehabilitation (<5 years)
- Rehabilitation - Not Assessed
- Pit Voids
- BHP Operations

N

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KILOMETRES

GDA 1994 MGA ZONE 50

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# REHABILITATION REPORT FY2024
## YARRIE HUB

**WAIO- PLANNING, TECHNICAL & ENVIRONMENT**

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| SCALE @ A4: | 1:200,000 | REQUESTOR: | J. Irvin | FIGURE: | |
| DATE: | 28/10/2024 | PREPARED: | J. Irvin | NO: | A0000-000 Rev0 |
| | | REVIEWED: | A. Blackburn | | |

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### 4.6.3 Progressive Sites (greater than 5 years, less than 15 years)

The average native cover across progressive sites at Yarrie was 59.97% and ranged between 6.72% and 98.40%. Rehabilitated crests, flats, and slopes had an average native cover of 65.27%, 61.04%, and 53.47% (Figure 29). On average, native vegetation cover at Yarrie consisted of 9.06% other grass (tussock), 26.97% hummock grass (*Triodia spp.*), 17.37% shrub, 0.43% herb and 6.14% tree cover. Mean hummock grass cover was lowest at slope sites (12.83%), relative to crest (28.63%), and flat (42.91%) landforms (Figure 30). Introduced plant species (weeds) covered 2.16% of Yarrie rehabilitation on average and mean weed cover varied between crest (1.31%), flat (4.85%), and slope (1.00%) landforms (Figure 30). Bare ground on average covered 37.81% of a site; and ranged between 0.18% and 93.24%. Bare ground percentage was highest on slope (45.49%), then flat (33.94%), then crest (33.42%) landforms.

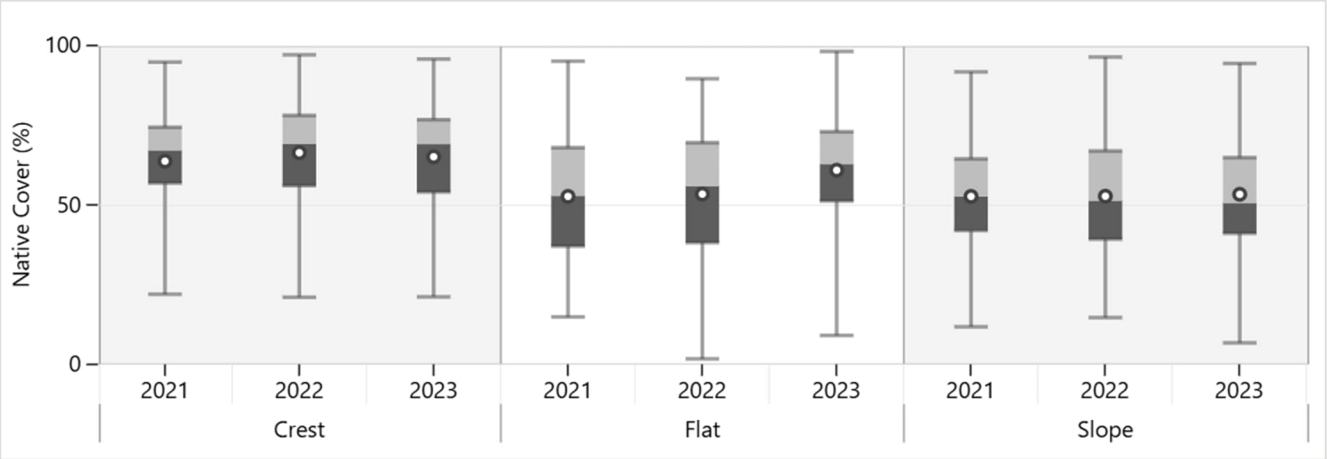



**Figure 29: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites at Yarrie *(sites older than 5 years but less than 15 years)***


**Figure 30: Mean % cover of lifeforms at Yarrie for each landform *(sites older than 5 years but less than 15 years).***

**Table -24: Percentage of rehabilitation areas at Yarrie meeting progressive criteria (> 5 Years, < 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated area (>5 Years, < 15 Years) meeting progressive criteria | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Native Veg Cover | Hummock Grass: Total Native Ratio | Hummock Grass: Shrub Ratio | Shrub: Total Native Ratio | Bare Ground Cover | Total Weed Cover | Weed: Hummock Ratio |
| Landform | Year | Area (ha) | | >25 – 30 % | >0.20 – 0.30 | >0.50 | >0.50 | <50 % | <10 % | <1 |
| **Crest** | 2023 | 458.56 | 10.1 | 88.1 | 44.0 | 57.5 | 68.7 | 82.3 | 83.6 | 88.8 |
| **Flat** | 2023 | 210.76 | 60.9 | 97.0 | 85.7 | 83.4 | 73.4 | 85.5 | 94.7 | 97.4 |
| **Slope** | 2023 | 340.87 | 28.4 | 97.4 | 52.7 | 75.44 | 77.7 | 67.5 | 100 | 95.3 |

### 4.6.4 Completion Age (greater than 15 years)

No rehabilitation greater than 15 years assessed.

## 4.7 Yandi Hub – Rotation 2

### 4.7.1 Remote Sensing Assessment

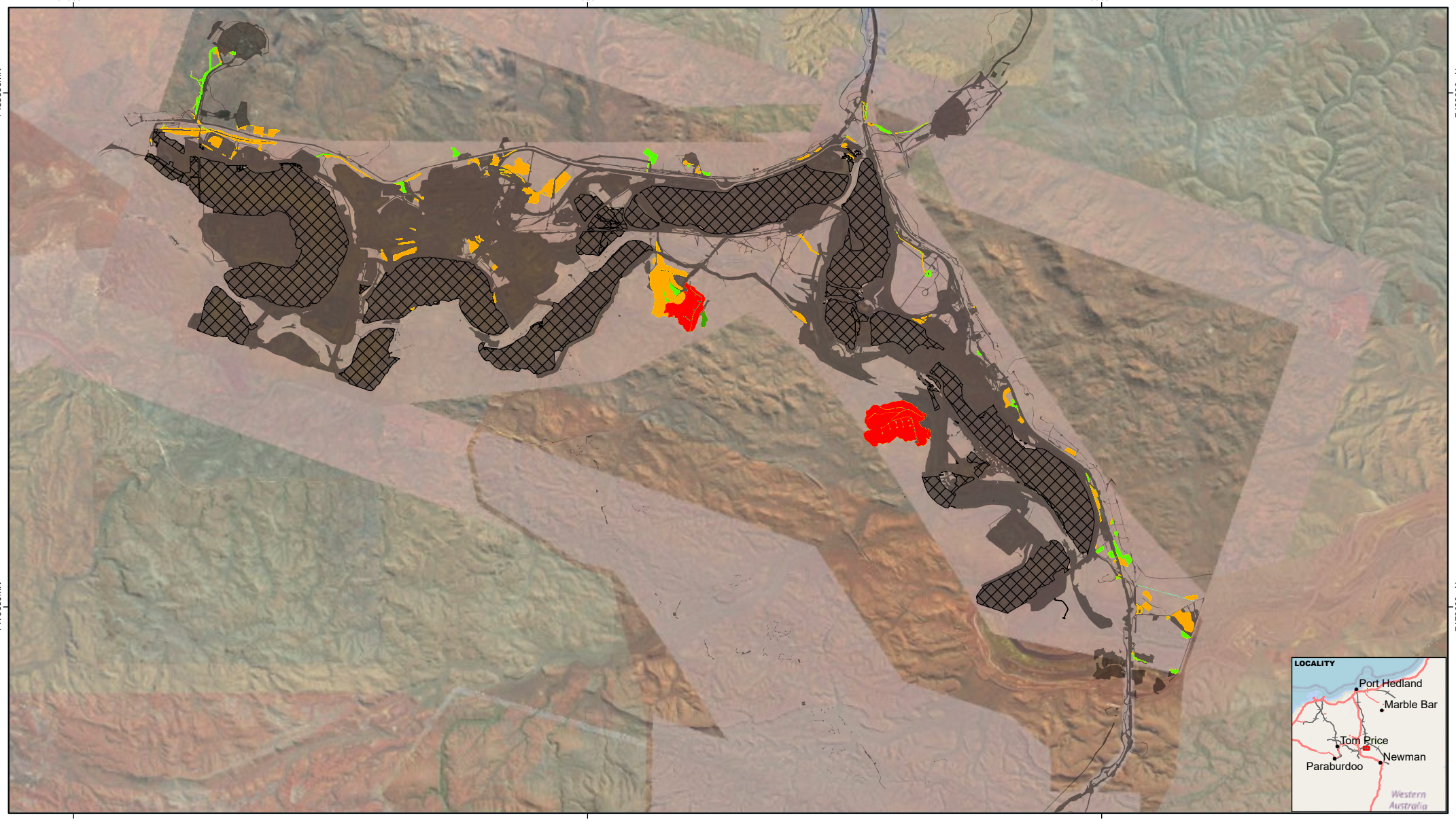
A total of 336.73 ha of rehabilitated land was classified across 167 sites across the Yandi hub, which was comprised of 21 crest (68.90 ha), 78 flat (106.01 ha), and 68 slope (161.82 ha) landforms. Rehabilitated sites less than 0.25 ha have been excluded from all results below.

**Table -25: Rehabilitated area at the Yandi hub**

| Age | Landform | Area (ha) | Number of sites (2023) |
|---|---|---|---|
| Completion (> 15 yrs) | Crest | 59.83 | 11 |
| | Flat | - | - |
| | Slope | 33.10 | 7 |
| Progressive (5 – 15 yrs) | Crest | 9.07 | 7 |
| | Flat | 97.21 | 76 |
| | Slope | 127.06 | 60 |
| Young (< 5 yrs) | Crest | - | - |
| | Flat | 8.80 | 2 |
| | Slope | 1.66 | 1 |
| **Total** | | **336.73** | **164** |
| Sites that do not currently have accurate date information have been assessed at Completion age. | | | |

### 4.7.2 Rehabilitation Summary

The FY2024 summary of completion and progressive rehabilitation at BHP's Mining Area C hub is presented on Figure 31 below.




## Remote Sensing Assessment (2023)

**Completion Rehabilitation (>15 years)**

- Completion Rehabilitation (>15 years) - Criteria Met
- Completion Rehabilitation (>15 years) - Criteria Not Met

**Progressing Rehabilitation (5 - 15 years)**

- Progressing Rehabilitation (5 - 15 years) - On Track
- Progressing Rehabilitation (5 - 15 years) - Maintenance Required
- Young Rehabilitation (<5 years)
- Rehabilitation - Not Assessed
- Pit Voids
- BHP Operations

N

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# REHABILITATION REPORT FY2024
## YANDI HUB

**WAIO- PLANNING, TECHNICAL & ENVIRONMENT**

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| SCALE @ A4: | 1:90,000 | REQUESTOR: | J. Irvin | FIGURE: | |
| DATE: | 28/10/2024 | PREPARED: | J. Irvin | NO: | |
| | | REVIEWED: | A. Blackburn | | |

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### 4.7.3 Progressive Sites (greater than 5 years, less than 15 years)

The average native cover across progressive sites and greater than 0.25 ha at Yandi was 63.64% and ranged between 11.32% and 98.77%. Rehabilitated crests, flats, and slopes had an average native cover of 69.37%, 61.71%, and 65.13% (Figure 32). On average, native vegetation cover at Yandi consisted of 10.25% other grass (tussock), 23.45% hummock grass (*Triodia spp.*), 24.99% shrub, 0.73% herb and 2.16% tree cover. Mean hummock grass cover was lowest at flat sites (20.90%), relative to slope (24.94%), and crest (33.82%) landforms (Figure 33). Introduced plant species (weeds) covered 7.42% of Yandi rehabilitation on average and mean weed cover varied between crest (6.27%), flat (8.43%), and slope (6.32%) landforms (Figure 33). Bare ground on average covered 28.94 % of a site; and ranged between 0.01% and 70.79%. Bare ground percentage was highest on flat (29.86%), then slope (28.55%), then crest (24.36%) landforms.

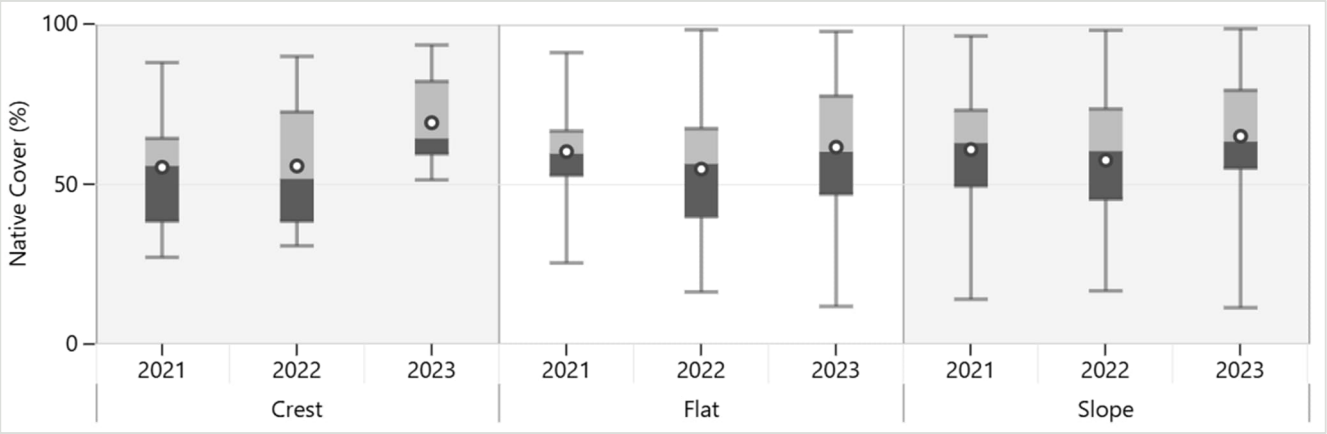


**Figure 32: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites at Yandi *(sites older than 5 years but less than 15 years)***


**Figure 33: Mean % cover of lifeforms at Yandi for each landform *(sites older than 5 years but less than 15 years).***

**Table -26: Percentage of rehabilitation areas at Yandi meeting progressive criteria (> 5 Years, < 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated area (>5 Years, < 15 Years) meeting progressive criteria | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Native Veg Cover | Hummock Grass: Total Native Ratio | Hummock Grass: Shrub Ratio | Shrub: Total Native Ratio | Bare Ground Cover | Total Weed Cover | Weed: Hummock Ratio |
| Landform | Year | Area (ha) | | >25 – 30 % | >0.20 – 0.30 | >0.50 | >0.50 | <50 % | <10 % | <1 |
| **Crest** | 2023 | 9.07 | 59.9 | 100 | 59.9 | 83.3 | 100 | 100 | 79.9 | 74.7 |
| **Flat** | 2023 | 97.21 | 12.3 | 94.6 | 43.0 | 52.2 | 54.2 | 85.9 | 67.0 | 65.4 |
| **Slope** | 2023 | 127.06 | 24.3 | 99.4 | 48.6 | 48.8 | 56.5 | 96.1 | 92.1 | 96.8 |

### 4.7.4 Completion Age (greater than 15 years)

The average native cover across rehabilitation sites at completion age (or with no accurate date information) at Yandi was 73.73%; and ranged between 45.31% and 96.64%. Rehabilitated crests and slopes had an average native cover of 70.42%, and 78.94% (Figure 34). On average, native vegetation cover at Yandi consisted of 48.66% other grass (tussock), 8.17% hummock grass (*Triodia spp.*), 10.33% shrub, 3.70% herb and 1.97% tree cover. Mean hummock grass cover was lowest at crests sites (5.16%) relative to slope (12.90%) landforms (Figure 35). Introduced plant species (weeds) covered 9.73% of Yandi rehabilitation on average and mean weed cover varied between crest (9.68%) and slope (9.80%) landforms (Figure 35). Bare ground on average covered 16.53% of a site; and ranged between 2.43% and 44.44%. Bare ground percentage was highest on crest (19.87%), then slope (11.25%) landforms.

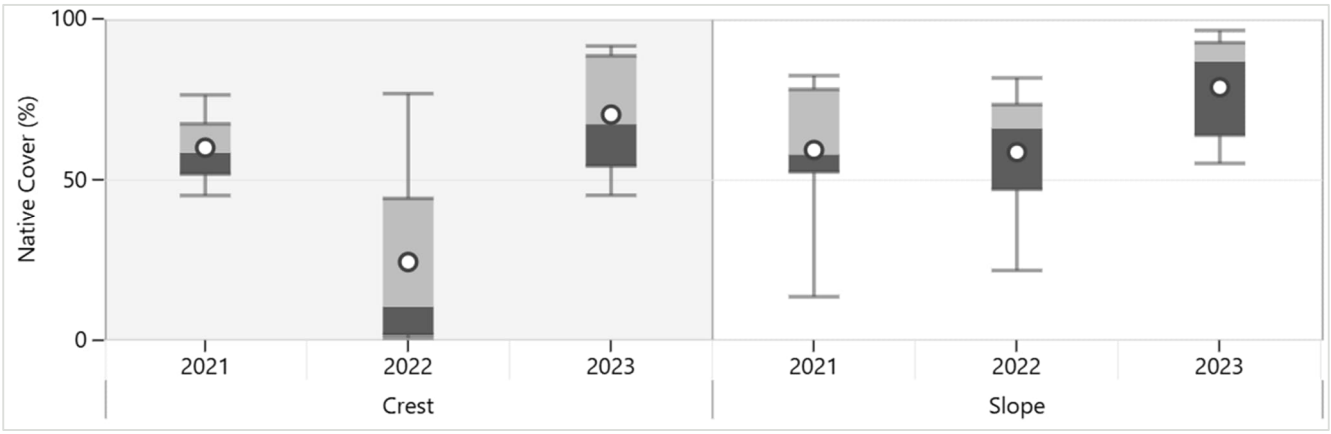


**Figure 34: Boxplots summarising the total native vegetation cover recorded at rehabilitated sites Yandi *(older than 15 years)***

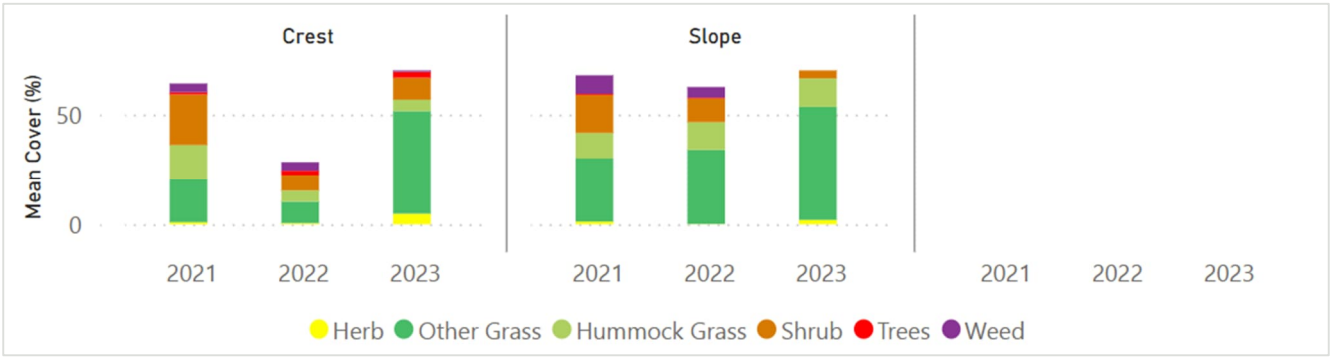


**Figure 35: Mean % cover of lifeforms at Yandi for each landform *(sites older than 15 years)***

Rehabilitated sites greater than 15 years old accounted for 92.93 ha of the total rehabilitation at Yandi, of which none is currently meeting all completion criteria targets for Low Tree Steppe (Table -27).

**Table -27: Percentage of rehabilitation areas at Yandi meeting completion criteria (> 15 Years) assessed with remote sensing**

| Site Details | | | Percentage of rehabilitated areas (> 15 Years) meeting completion criteria | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All Criteria | Hummock Grass Cover | Other Grass Cover | Shrub Cover | Herb Cover | Tree Cover | Bare Ground Cover | Total Weed Cover | Cenchrus (Weed) Cover |
| Landform | Year | Area (ha) | | 20 - 30% | 0.04 – 0.62% | 2 – 10% | 0.05 – 0.4% | 1 – 10% | ≤50% | <10% | <10% |
| **Crest** | 2023 | 59.83 | 0 | 55.6 | 100 | 81.6 | 99.2 | 13.06 | 100 | 91.9 | 91.9 |
| **Flat** | 2023 | - | - | - | - | - | - | - | - | - | - |
| **Slope** | 2023 | 33.10 | 0 | 23.7 | 100 | 100 | 72.6 | 51.6 | 100 | 73.3 | 73.3 |

## 4.8 Summary of historical rehabilitation success

MS1105 Guidelines 1(c)(ii) requires '*an analysis of the history of rehabilitation that BHP has undertaken in the Pilbara and the demonstrated success of this rehabilitation*'.

As discussed in Section 3, assessment of rehabilitation success can be measured when the revegetation phase of rehabilitation is at completion age (>15 years since revegetation activity commenced). To assess the success of historical rehabilitation for this report (as required by Guidelines 1(c)(ii); BHP has defined 'historical rehabilitation' as rehabilitation that is ready to be assessed against the completion criteria discussed in Section 3.3.3.

### 4.8.1 Analysis of historical rehabilitation success

An analysis of the history of BHP's rehabilitation practices in the Pilbara was undertaken by BHP. The key rehabilitation practices and outcomes are presented in Table 28.

**Table 28: Historical rehabilitation success**

| Time period | Summary |
|---|---|
| 1980s | Rehabilitation began at Mount Whaleback (Newman hub) – rehabilitation was 'ad hoc' with poor Triodia recruitment, limited species diversity and high erosion observed |
| 1990s | Rehabilitation was initiated across all WAIO Pilbara operations, which included trials with alternative rehabilitation landforms, slope modification and the implementation of contour ripping. Erosion outcomes were observed to increase compared to the previous decade, and rehabilitation trials and monitoring practices were improved |
| From early 2000s | Improvements were made to landforms including the integration of overburden storage areas (OSAs) into the landscape, and alteration of slopes to minimise erosion. A resulting decreased in erosion was observed at BHP WAIO rehabilitation sites. Improvements were made to the establishment of native vegetation with the concept of growth media introduced. |
| From 2015 | Revegetation technologies were progressed, including: the understanding of seed biology, improved seed collection methods, and dormancy breaking and seeding methodologies employed to improve revegetation outcomes. These technologies resulted in an improvement in recruitment across BHP WAIO rehabilitation / revegetation efforts |
| From 2021 | BHP developed completion criteria to measure rehabilitation success and progressive criteria to predict future rehabilitation success. The analysis completed in 2021 identified that historical rehabilitation was variable across the hubs and was partially successful at a minimum. Few rehabilitation sites did not meet most criteria. The most common criteria not met was Hummock Grasses (Triodia) Cover. Triodia Cover was identified as a key indicator for success, and as such, has been a key focus in BHP's continued improvement in rehabilitation methodology and research. |

### 4.8.2 Historical rehabilitation assessment

The FY2024 results for rehabilitation sites analysed are provided in the completion criteria output tables (Table -13, Table -16, Table -19, Table -22, and Table -27) and rehabilitation results by hub (Section 4). The tables provide summaries of the overall performance of the hub against the vegetation attributes comprising the completion criteria. A vegetation attribute is considered to be met at the hub level if the median number of individual sites meet the completion criteria target. For the FY2024 analysis, all hubs had rehabilitation sites that underwent monitoring and were at completion age, with the exception of the Yarrie hub.

Table 29 presents the summary of the performance of historical (completion) rehabilitation against completion criteria for completion age rehabilitation sites by hub. Rehabilitation at the hub level was variable across all hubs, with partial success achieved at each hub. Most rehabilitation sites met most of the assessment criteria, which suggests that older sites are likely to achieve rehabilitation success, but potentially over a longer timeframe.

Reasons that completion criteria weren't met across the hubs include the following:

- Poor rainfall years when rehabilitation areas are seeded. Spinifex (*Triodia*) germination is reliant on rainfall, hence many sites are not meeting Hummock Grasses (*Triodia*) Cover criteria.
- Older seeding techniques used in the past at some sites have not been conducive to *Triodia* germination or encouraging species richness (i.e. limited species seed mix). Some native species may have been used in the past which are allelopathic (i.e. plant species that produce substances that inhibit the germination or growth, survival, of other species), which may have affected hummock grasses.
- Weed infestation causing pronounced weed cover levels at some sites and in some cases restricting the growth and establishment of native species (e.g. where there are infestations of Buffel Grass (*Cenchrus cilliaris*), an allelopathic species).
- Lack of topsoil available or topsoil which cannot be used due to high weed seed loads (e.g. Whaleback in the Newman hub).
- Erosion of landform(e.g. Eastern Ridge in the Newman hub). The application of competent rock armour material to the surface of the post-mining landform has been adopted as standard practice within BHP WAIO.
- The past use of 'moonscaping' (from 1990 to early 2000s until it was replaced with other landforming methods) where the landform was scalloped to increase the water harvesting potential (e.g. Goldsworthy).

The quantity of rehabilitation at completion stage in FY2024 equated to 963.22 ha, an increase from the quantity reported in the FY2021 Rehabilitation Report of 422 ha. The rehabilitation summary maps (Figure 5, Figure 11, Figure 17, Figure 23, Figure 28, and Figure 31) show that a higher proportion of completion stage rehabilitation sites are present at BHP's older operations (Goldsworthy, Jimblebar and Newman). Since the FY2021 Rehabilitation Report, there has been an increase in confirmation of the status of rehabilitation across WAIO sites, with an overall reduction in the proportion of sites where rehabilitation is 'unknown'. This change reflects the efficacy of BHP's improved monitoring program and the effect of multiple rounds of monitoring aligning with the recent updates to methodology (detailed in Section 3.5).

Where completion criteria have not been met, BHP will review whether this is attributable to inappropriate criteria or whether intervention is required for certain rehabilitation areas (e.g. to address *Triodia* cover and Annual Species Richness). Non-achievement of completion criteria at WAIO's older operations (Whaleback in the Newman hub, Goldsworthy and Yarrie) may be attributable to the older land-forming and revegetation techniques which were historically acceptable yet no longer in line with current best-practice.

**Table 29 Summary of historical rehabilitation success at FY2024**

| Mining hub / target vegetation classification | No. sites assessed / total area ha | Completion assessment | Summary |
|---|---|---|---|
| Mining Area C<br><br>Low Tree Steppe | No. sites: 31<br><br>Total area: 45.17 ha | • All progressive criteria were achieved by a total area of 0.28 ha (0.62%) of completion aged rehabilitation (> 15 years) at Mining Area C in the FY2024 period.<br>• Completion Criteria for *Total Weed Cover* and *Cenchrus (Weed) Cover* were achieved by all completion rehabilitation sites<br>• Completion criteria were achieved by the median (or higher) number of sites for *Hummock Grass Cover* and *Bare Ground Cover*. Above the median number of sites at flat landforms achieved the criteria *Other Grass Cover*.<br>• Results were variable for *Shrub Cover, Herb Cover* and *Tree Cover*, with a higher level of achievement for these criteria observed for Flat landforms compared to slope landforms<br>• Below the median number of completion rehabilitation sites achieved the criteria for *Shrub Cover, Herb Cover* and *Tree Cover* at Mining Area C in FY2024. Below the median number of slope landform sites achieved the criteria *Other Grass Cover*. | **Partially successful**<br>• A total of 0.62% the completion aged rehabilitation were meeting all criteria at Mining Area C in FY2024<br>• Five out of eight completion criteria were met by the median number of rehabilitation sites, with higher achievement observed for flat landforms<br>• Key indicator of success *Hummock Grass Cover* was achieved by 56% of completion aged rehabilitation<br>• Supporting indicator *Total Weed Cover* was achieved by all completion aged rehabilitation at Mining Area C in FY2024 |
| Newman<br><br>Low Tree Steppe | No. sites: 117<br><br>Total area: 160.37 | • All progressive criteria were achieved by a total area of 2.05 ha (3.13%) of completion aged rehabilitation (> 15 years) at Newman in the FY2024 period.<br>• The criteria *Shrub Cover* was met by all completion aged rehabilitation at the Newman hub<br>• Completion criteria were achieved by the median (or higher) number of sites for *Other Grass Cover, Herb Cover*, and *Bare Ground Cover*. Achievement of the criteria *Total Weed Cover* and *Cenchrus (Weed) Cover* was variable between landforms, with greater than median achievement at crest and flat landforms | **Partially successful**<br>• A total of 3.13% completion aged rehabilitation were meeting all criteria at Newman in FY2024<br>• Four out of eight completion criteria were met by the median number of rehabilitation sites, with areas of improvement variable by landform type<br>• Key indicator of success *Hummock Grass Cover* was achieved by 23% of completion aged rehabilitation |

| Mining hub / target vegetation classification | No. sites assessed / total area ha | Completion assessment | Summary |
|---|---|---|---|
| | | • Completion criteria were achieved by below the median number of completion sites for criteria *Hummock Grass Cover* and *Tree Cover* at all landforms in the Newman hub. Below the median number of slope sites achieved the *Total Weed* and *Cenchrus (Weed) Cover* criteria in the FY2024 period at Newman. | • Supporting indicator *Total Weed Cover* was achieved by 32% completion aged rehabilitation at the Newman hub |
| Jimblebar<br><br>Low Tree Steppe | No. sites: 146<br><br>Total area: 201.63 | • All progressive criteria were achieved by a total area of 13.88 ha (6.88%) of completion aged rehabilitation (>15 years) at the Jimblebar hub in the FY2024 period.<br>• Completion criteria were achieved by the median (or greater) number of sites for *Other Grass Cover*, *Shrub Cover*, *Total Weed Cover* and *Cenchrus (Weed) Cover*.<br>• Below the median number of sites achieved the completion criteria for *Hummock Grass Cover*, *Tree Cover* and *Bare Ground Cover* at rehabilitation age sites at Jimblebar.<br>• No crest landform completion sites (1.8% of Jimblebar completion sites) achieved the criteria for *Hummock Grass Cover, Tree Cover* and *Bare Ground Cover* at Jimblebar | **Partially successful**<br>• Five out of eight completion criteria were met by the median number of rehabilitation sites.<br>• A total of 6.88% completion aged rehabilitation were meeting all criteria at the Jimblebar hub in FY2024<br>• Greater than median achievement of criteria for *Other Grass Cover, Shrub Cover, Total Weed Cover* and *Cenchrus (Weed) Cover*<br>• Key indicator of success *Hummock Grass Cover* was achieved by 40% of completion aged rehabilitation<br>• Supporting indicator *Total Weed Cover* was achieved by 96% completion aged rehabilitation at Jimblebar |
| Goldsworthy<br><br>Grasse Steppe | No. sites: 91<br><br>Total area: 463.12 | • All completion criteria were achieved by a total area of 164.7 ha (35.6%) of completion aged rehabilitation (>15 years) at Goldsworthy in the FY2023 period.<br>• Completion criteria were achieved by the above the median number of flat, slope and crest rehabilitation sites at Goldsworthy in FY2023. All moonscaped sites achieved the completion criteria for *Total Native Species* in FY2023.<br>• Legacy rehabilitation sites, classified as 'moonscaped' had below median achievement or non-achievement of the completion criteria | **Partially Successful**<br>• A total of 35.6% completion aged rehabilitation were meeting all criteria at Goldsworthy in FY2023<br>• Greater than median achievement for all completion criteria at flat, slope and crest completion aged rehabilitation at Goldsworthy n FY2023<br>• Variable results for legacy 'moonscaped' completion aged rehabilitation sites<br>• Key indicator of success *Total Native Species* was achieved by 99% of completion aged rehabilitation |

| Mining hub / target vegetation classification | No. sites assessed / total area ha | Completion assessment | Summary |
|---|---|---|---|
| | | for Bare Ground Cover, Total Weed Cover and Cenchrus (Weed) Cover. | • Supporting indicator *Total Weed Cover* was achieved by 61% completion aged rehabilitation at Goldsworthy |
| Yarrie<br><br>Shrub Steppe | - | No rehabilitation greater than 15 years assessed. | No rehabilitation greater than 15 years assessed. |
| Yandi<br><br>Low Tree Steppe | No. sites: 18<br><br>Total area: 92.93 | • No completion aged rehabilitation sites at Yandi achieved all of the eight completion criteria categories in FY2023<br>• Completion criteria were achieved by greater than the median number of sites for *Other Grass Cover, Shrub Cover, Herb Cover, Bare Ground Cover, Total Weed Cover*, and *Cenchrus (Weed) Cover* at Yandi in FY2023. *Hummock Grass Cover* was achieved by greater than the median number of sites at crest landforms. The criteria for *Tree Cover* was achieved by greater than the median number of slope landform sites at Yandi.<br>• *Hummock Grass Cover* and *Tree Cover* were achieved variably at Yandi in FY2023. Below the median number of slope sites achieved the criteria for T*ree Cover*, and below the median number of sites achieved the criteria for *Hummock Grass Cover* in FY2023 at Yandi | **Partially successful**<br>• No completion aged rehabilitation sites at Yandi were meeting all completion criteria in the FY2023 period<br>• Six of the eight completion criteria categories were achieved by greater than the median number of sites at the Yandi hub in the FY2023 period<br>• Key indicator of success *Hummock Grass Cover* was achieved by 44% of completion aged rehabilitation<br>• Supporting indicator *Total Weed Cover* was achieved by 85% completion aged rehabilitation at Yandi |

## 4.9 Summary of future rehabilitation success

### 4.9.1 Rehabilitation underway

MS1105 Schedule 1, Table 2, Column 3.2.c requires that *'Scientifically verifiable estimates of the likely success of future rehabilitation have been made'.*

BHP has derived scientifically verifiable and site-specific criteria to measure the likely success of future rehabilitation underway for sites where revegetation activities have been completed but the rehabilitation is not yet at a stage that can be assessed for completion (rehabilitation generally less than 15 years old). BHP has categorised rehabilitation underway into two age categories to appropriately assess the likelihood of future success; young (<5 years since revegetation activities were complete) and progressive (5 – 15 years since revegetation activities were complete). The young and progressive categories, and criteria are discussed in detail in Section 3.3 Rehabilitation assessment criteria.

BHP has monitored the progressive aged rehabilitation at each hub and measured the results against the progressive criteria (Section 4) to assess the likelihood of success of future rehabilitation because:

- the progressive criteria and targets are derived from the same verifiable scientific data and approach as the completion criteria, which BHP has used to monitor historical rehabilitation success (Section 3.3.3)
- Rehabilitation is likely to be successful (at completion ages) if BHP can demonstrate that rehabilitation is progressing according to an appropriate trajectory

BHP has assessed the performance of 'future rehabilitation' by comparing progressive age rehabilitation against progressive criteria to understand the likelihood that rehabilitation progressing will be successful in the future. The FY2024 results of the future rehabilitation assessment are shown in Section 4. The results for young rehabilitation are not presented as at this early stage, revegetation is not in a state of progression that enables accurate monitoring and assessment of success (Section 3.3.1).

- The quantity of young and progressive sites for each hub during the FY2024 period has increased from BHP's FY2021 Rehabilitation Report (BHP 2022). The rehabilitation status maps (Figure 5, Figure 11, Figure 17, Figure 23, Figure 28, and Figure 31) show that the quantity of young and progressive rehabilitation sites is variable between hubs, and a greater proportion has been mapped with certainty when compared to the previous Rehabilitation Report (FY2021).

During the FY2024 period Goldsworthy had two progressive age rehabilitation sites and no young rehabilitation sites, and Newman had no young rehabilitation sites. The lower quantity of young and progressive age sites at these hubs is reflective of the stage of the mine, e.g. hubs with older operations / mines that have ceased mining in some/all areas have less new rehabilitation.

Table 30 below presents the summary of the progressive rehabilitation assessment for the likely future rehabilitation success. The data shows that progressive rehabilitation is variable across hubs, however, was at least partially successful for all hubs with progressive age rehabilitation sites. Whilst the supporting criteria were met for most hubs, the major criterion (*Hummock Grass: Total Native Cover Ratio*) was met variably across hubs and between landforms. The Newman hub and the Goldsworthy hub also did not meet the supporting Weed Cover/*Triodia* Cover ratio. As discussed in Section 3.3, *Triodia* Cover (Hummock Grass) is a key indicator for rehabilitation success, and improving *Triodia* will be a focus of improvement activities (Section 5). The reasons that completion criteria weren't met are also applicable to why the progressing criteria weren't met

**Table 30 Summary of future rehabilitation success at FY2024**

| Mining hub / target vegetation classification | No. of sites / Total Area | Progressive rehabilitation assessment | Summary |
|---|---|---|---|
| Goldsworthy (FY2023)<br><br>Target vegetation type: Grasse Steppe | No. sites: 2<br><br>Total Area: 1.84 ha | • No rehabilitation underway (progressive rehabilitation) sites achieved all progressive criteria in the FY2023 period.<br>• Progressive criteria achieved by the median (or more) number of sites for *Native Veg Cover, Hummock Grass: Total Native Ratio, Hummock Grass: Shrub Ratio, Shrub to Total Native Ratio* and *Bare Ground Cover* at all crest landform sites (1.19 ha). The criteria were achieved for *Native Veg Cover* and *Bare Ground Cover* at all flat landform sites (0.65 ha).<br>• Progressive criteria *Total Weed Cover* and *Weed: Hummock Ratio* were not achieved by either of the Goldsworthy progressive aged sites in FY2023. The progressive aged site classified as slope did not achieve the *Hummock Grass: Native Ratio*, *Hummock Grass: Shrub Ratio* and *Shrub: Total Native Ratio* in FY2023 | **Partially successful**<br>• Two of the progressive criteria categories were achieved by both Goldsworthy sites, with variable achievement across the remaining five progressive criteria categories.<br>• Goldsworthy had only two sites at the progressive rehabilitation stage, which limits the assessment of rehabilitation performance at the hub scale. |
| Jimblebar (FY2024)<br><br>Target vegetation type: Low Tree Steppe | No. sites: 41<br><br>Total Area: 114.93 ha | • All progressive criteria were achieved by a total area of 79.8 ha (69.4%) of rehabilitation underway (5 – 15 years) in the FY2024 period.<br>• Above the median number of sites achieved all of the progressive criteria at rehabilitation sites classified as flat at Jimblebar in FY2024. Greater than the median number of sites in each landform category achieved the progressive criteria for *Native Veg Cover, Total Weed Cover* and *Weed: Hummock Ratio*. In both the crest and the flat landform categories, *Hummock Grass: Total Native Ratio* was achieved by greater than the median number of sites.<br>• progressive criteria were achieved by less than the median number of slope landform sites for *Hummock Grass: Total Native Ratio, Hummock Grass: Shrub Ratio, Shrub: Total Native Ratio* and *Bare Ground Cover*. Progressive criteria were achieved by less than the median number of | **Partially successful**<br>• A total of 69.4% progressive rehabilitation were meeting all criteria at Jimblebar in FY2024<br>• Greater than median achievement for all categories in the flat landform category, and greater than median achievement by all landform categories for three criteria categories<br>• Key indicator of success *Hummock Grass: Total Native Ratio* was achieved by 69% of progressive aged rehabilitation<br>• Supporting indicator *Weed: Hummock Ratio* was achieved by 96% progressive aged rehabilitation at Jimblebar |

| Mining hub / target vegetation classification | No. of sites / Total Area | Progressive rehabilitation assessment | Summary |
|---|---|---|---|
| | | crest landform sites for *Hummock Grass: Shrub Ratio, Shrub: Total Native Ratio* and *Bare Ground Cover.* | |
| Mining Area C<br><br>Target vegetation type: Low Tree Steppe | No. sites: 33<br><br>Total Area: 90.71 ha | • All progressive criteria were achieved by total area of 46.1 ha (50.8%) of rehabilitation underway (5 – 15 years) in the FY2024 period<br>• Above the median number of sites achieved all of the progressive criteria at rehabilitation sites classified as flat. Achievement of the progressive criteria was variable for sites classified as Slope with above median achievement for *Total Native Veg Cover* and *Total Weed cover*<br>• The progressive criteria were achieved by below the median number of sites at slope landforms for categories *Hummock Grass: Total Native Ratio, Hummock Grass: Shrub Ratio, Shrub: Total Native Ratio, Bare Ground Cover*, and *Weed: Hummock Ratio* | **Partially Successful**<br>• A total of 50.8% progressive rehabilitation were meeting all criteria at Mining Area C in FY2024<br>• Greater than median achievement of progressive criteria for flat landform sites with partial achievement for slope landform sites<br>• Key indicator of success *Hummock Grass: Total Native Ratio* was achieved by 47% of progressive aged rehabilitation<br>• Supporting indicator *Weed: Hummock Ratio* was achieved by 45% progressive aged rehabilitation at Mining Area C |
| Newman<br><br>Target vegetation type: Low Tree Steppe | No. sites: 125<br><br>Total Area: 489.06 ha | • All progressive criteria were achieved by a total area of 88.24 ha (18%) of rehabilitation underway (5 – 15 years) in the FY2024 period.<br>• Progressive criteria were achieved variably across criteria categories and landforms in the FY2024 period. Greater than the median number of sites achieved *Native Veg Cover* criteria across all landform categories (crest, flat, slope). Greater than the median number of flat sites achieved criteria for *Hummock Grass: Shrub Cover Ratio, Shrub: Toal Native Ratio, Bare Ground Cover* and *Total Weed Cover.* The criteria were achieved by greater than the median number of crest sites for *Hummock Grass: Total Native Ratio and Bare Ground Cover.* The criteria were achieved by greater than the median number of slope sites for *Hummock Grass: Shrub Ratio, Shub: Total Native Ratio and Total Weed Cover*.<br>• Progressive criteria were achieved by less than the median number of rehabilitation underway sites for *Hummock Grass: Total Native Ratio* (flat and slope landforms) and *Weed: Hummock Ratio* (all landforms). Criteria were achieved by less than the median number of sites at crest | **Partially Successful**<br>• A total of 18% progressive rehabilitation were meeting all criteria at Newman in FY2024<br>• The seven progressive criteria were achieved variably across landforms and progressive sites at Newman in FY2024<br>• Key indicator of success *Hummock Grass: Total Native Ratio* was achieved by 47% of progressive aged rehabilitation<br>• Supporting indicator *Weed: Hummock Ratio* was achieved by 32% progressive aged rehabilitation at Newman |

| Mining hub / target vegetation classification | No. of sites / Total Area | Progressive rehabilitation assessment | Summary |
|---|---|---|---|
| | | landforms for *Hummock Grass: Shrub Ratio, Shrub: Total Native Ratio* and Total Weed Cover. Below the median number of slope sites achieved the *Bare Ground Cover* criteria. | |
| Yandi<br><br>Target vegetation type: Low Tree Steppe | No. sites: 143<br><br>Total Area: 233.34 ha | • All progressive criteria were achieved by a total area of 48.22 ha (20.7%) of rehabilitation underway (5 – 15 years) in the FY2023 period.<br>• Progressive criteria were achieved by the median (or higher) number of sites for *Native Veg Cover, Shrub: Total Native ratio, Bare Ground Cover, Total Weed Cover and Weed: Hummock Ratio*. Achievement of the criteria *Hummock Grass: Total Native Ratio* was variable, with above median achievement by crest landforms only. *Hummock Grass: Shrub Ratio* criteria achievement was variable and was achieved by above the median number of sites classified as crest and flat.<br>• Progressive criteria were achieved by below median number of sites for *Hummock Grass: Native Ratio* at sites classified as flat or slope landforms. *Hummock Grass: Shrub Ratio* was not achieved by the median number of sites at slope landforms. | **Partially successful**<br>• A total of 20.7% progressive rehabilitation were meeting all criteria at Yandi in FY2023<br>• Five out of seven progressive criteria categories were met by greater than the median number of sites<br>• Key indicator of success *Hummock Grass: Total Native Ratio* was achieved by 47% of progressive aged rehabilitation<br>• Supporting indicator *Weed: Hummock Ratio* was achieved by 83% progressive aged rehabilitation at Yandi |
| Yarrie<br><br>Target vegetation type: Shrub Steppe | No. sites: 330<br><br>Total Area: 1,010.19 ha | • All progressive criteria were achieved by a total area of 293.32 ha (29%) of rehabilitation underway (5 – 15 years) in the FY2023 period<br>• Progressive criteria were achieved by above the median number of sites for all categories with the exception of *Hummock Grass: Total Native Ratio*, which was achieved by above the median number of flat and slope sites only<br>• Progressive criteria were achieved by below the median number of sites for crest landforms for categories *Hummock Grass: Total Native Ratio.* | **Partially successful**<br>• A total of 29% of progressive rehabilitation is meeting all criteria at Yarrie<br>• six out of seven progressive criteria categories are being met by greater than the median number of sites<br>• Key indicator of success *Hummock Grass: Total Native Ratio* achieved by 58% of progressive aged rehabilitation<br>• Supporting indicator *Weed: Hummock Ratio* achieved by 93% progressive aged rehabilitation |

### 4.9.2 Future rehabilitation underway

MS1105 Guidelines 1(c)(iii) requires information on '*the likely success of future rehabilitation activities in establishing self-sustaining areas of rehabilitation, taking into account: relevant contemporary scientific evidence; the types of area to be rehabilitated; and the scale of rehabilitation activities*.'

BHP considers that the establishment of successful self-sustaining areas of rehabilitation is dependent on the following elements:

- the types of areas to be rehabilitated (Section 2) – rehabilitation is likely to be more successful and take less time to become established in areas of low impact disturbance (e.g. infrastructure areas), compared to areas of high impact disturbance (e.g. OSAs)
- smaller areas of disturbance (e.g. borrow pits or laydown areas) and linear disturbance (e.g. pipelines and roads) will be easier to rehabilitate than larger areas and landforms (e.g. OSAs)
- availability of growth media, and the type of waste when rehabilitating OSAs
- criteria and targets developed to measure success which are realistic and scientifically-based (Section 3.3)
- BHP's adaptation in response to rehabilitation learnings from the success of existing rehabilitation and adoption of relevant contemporary scientific evidence, e.g., to:
  - Adjust the rehabilitation monitoring program if required
  - Revise criteria and targets where scientifically appropriate
  - Undertake maintenance and/or corrective action where rehabilitation is not tracking to the appropriate trajectory

Whilst the scale of rehabilitation required is not a direct consideration for rehabilitation success, larger mines will operate for longer, and larger areas requiring rehabilitation will take longer to rehabilitate. Therefore, there is likely to be a longer time period from when rehabilitation activities start at a mine to when rehabilitation is complete.

BHP considers that future rehabilitation activities will be successful if the relevant criteria (progressive and completion) are met. Therefore, BHP intends to apply a similar approach for future rehabilitation activities as existing areas under rehabilitation (underway and completed), adapting the current approach (rehabilitation practices, monitoring and success criteria), where relevant, based upon contemporary scientific evidence (BHP data and information and broader (including Pilbara) information). The relevant scientific evidence BHP has taken into account for the current rehabilitation approach is detailed in Syrinx 2020 (Section 3). A full list of the scientific reports is provided in Syrinx 2020.

BHP considers that future rehabilitation activities are likely to be successful because BHP plans early for rehabilitation as part of the closure planning process, implements the latest rehabilitation techniques and incorporates learnings from the performance of existing rehabilitation. The assessment of historical rehabilitation (Section 4.8) and future rehabilitation (where rehabilitation is underway) (Section 4.9) demonstrates that rehabilitation is at least partially successful and at least partially progressing along the appropriate trajectory for success at completion, particularly for native species cover.

# 5. Continuous improvement and future work

## 5.1 Methodology for assessing rehabilitation success

To support the approach for assessing rehabilitation success used in this report, as part of the Rehabilitation Improvement Program, BHP will review and improve a number of standards and procedures/processes currently being used by WAIO and where necessary, address identified gaps. This includes the following:

***Review of rehabilitation criteria***

BHP will continue to review completion criteria developed to assess rehabilitation success for completed rehabilitation. BHP will continue the review of the appropriateness of the criteria for use at older mines (i.e. Whaleback in the Newman Hub, Goldsworthy and Yarrie) and may modify the criteria where appropriate, to recognise historical rehabilitation practices. Once the completion criteria are reviewed and updated and agreed within BHP, MCPs will be updated to reflect the revised completion criteria, where relevant. BHP has started discussions with DMIRS regarding revising the completion criteria and is currently exploring options to enable the completion criteria to be approved.

BHP has also started reviewing the progressive criteria and is developing interim milestones to enable BHP to assess whether rehabilitation underway is progressing on the right trajectory towards rehabilitation success.

***Review of monitoring methodology***

BHP has started to review the current rehabilitation monitoring methodology, to identify gaps in the monitoring and to better align the monitoring to the revised completion criteria. This will include reviewing the locations, frequency and method of monitoring (i.e on-ground and remote-sensing). Once the review of completion criteria is complete, BHP will revise the monitoring program to ensure appropriate data is collected to measure rehabilitation success at key development points on the rehabilitation trajectory (interim milestones) and at completion. The aim of the revised monitoring program is also to provide clear data on whether rehabilitation intervention / maintenance is required, for continuous improvement.

***Review of rehabilitation status and success reporting***

Once the completion criteria and monitoring program reviews are complete, BHP will review the traffic light approach for spatially presenting the status and success of rehabilitation, aligning it to any new monitoring methodology.

## 5.2 Rehabilitation activities

In parallel with the review of the methodology for assessing rehabilitation success, BHP will continue to ground-truth the analysis contained in this report to confirm the assessment of rehabilitation progress and success (including Status Unknown areas). This will include reviewing rehabilitation sites that are not performing against targets, or where there is variability across sites in the same hub, and decide if maintenance / intervention is required. For example, in response to poor performance against rehabilitation targets, the Buffel Grass (*Cenchrus cilliaris*) management techniques at the Newman hub are under review and a *Triodia* seeding program is commencing at areas near Yandi's putrescible landfill which has not met progressive criteria targets.

BHP will also continue to undertake progressive rehabilitation. BHP aims to complete landforming and stabilisation works within 3 years of disturbed areas becoming available for rehabilitation and complete topsoil and/or growth media spreading and revegetation works within 5 years. BHP will also align the timing of rehabilitation activities to the optimal time of year as far as practicable.

## 5.3 Investigation and research

BHP will identify work based on the outcomes of this report (e.g. where criteria have not been met - mostly Hummock Grasses (*Triodia*) criteria). Relevant investigations and research include the following:

- WAIO wide: Ongoing research is underway to investigate seed priming, seed pelleting and enhancements, seed placement and large-scale seed delivery mechanisms to enhance seedling recruitment.
- Yandi hub: A trial is underway to investigate *Triodia* seed production to increase access to quality seed resources.
- Yandi hub: A trial is underway to provide evidence for climate-adapted seed sourcing strategies for revegetation success.
- Newman and Yandi hubs: ongoing research into alternative growth media is underway to improve the success of rehabilitation with limited topsoil availability.
- Newman hub: a trial into the remediation and management of Buffel Grass-impacted rehabilitation is due to commence.

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