



UCMPL Annual Flora Monitoring Report 2023

Ulan Coal Mines Pty Ltd

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Template 2.8.1

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Abbreviations

BAM	Biodiversity Assessment Method
BMP	Biodiversity Management Plan
BSA	Biodiversity Stewardship Agreement
CA	Conservation Agreement
CEEC	Critically Endangered Ecological Community
CTRSWMP	Central Tablelands Regional Strategic Weed Management Plan
DBH	Diameter at breast height
DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FBS	Floristic based subsidence
GCAA	Glencore Coal Assets Australia
GPS	Global positioning system
HBT	Hollow-bearing Tree
HTE	High Threat Exotic
IBRA	Interim Biogeographic Regionalisation for Australia
IEM	Initial Establishment Monitoring
LLS	Local Land Services
LTM	Long-term Monitoring
LW	Longwall
MOP	Mining Operations Plan
MZ	Management Zone
NSW	New South Wales
OC	Open Cut
PCT	Plant Community Type
PFC	Projected foliage cover
RMP	Rehabilitation Management Plan
RPA	Residual Project Area
RRC	Rehabilitation Report Card
SOA	Salinity Offset Area
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee

BAM	Biodiversity Assessment Method
UCMPL	Ulan Coal Mines Pty. Ltd.
UG	Ulan Underground
UHNF	Upper Hunter Native Forest
UMC	Ulan Mine Complex
USO	Ulan Surface Operations
UW	Ulan West
VCA	Voluntary Conservation Agreement
VOA	Vegetation Offset Area
BAM	Biodiversity Assessment Method

1. Introduction

Eco Logical Australia (ELA) was engaged by Ulan Coal Mines Pty Ltd (UCMPL) to undertake floristic monitoring during autumn and spring 2023 at the Ulan Mine Complex (UMC). Monitoring was undertaken in accordance with the requirements of the Biodiversity Management Plan (BMP) (UCMPL 2022a) and the Rehabilitation Management Plan (RMP) (UCMPL 2022b).

1.1. Project background

UCMPL is wholly owned and managed by Glencore Coal Assets Australia Pty Limited (GCAA). The UMC is located within the Mid-Western Regional Council Local Government Area, approximately 1.5 kilometres from the village of Ulan and 38 kilometres northeast of Mudgee. UCMPL's landholdings straddle the Great Dividing Range and are located at the headwaters of the Goulburn and Talbragar River catchments.

UCMPL operations consist of Ulan Surface Operations (USO), Ulan Underground (UG) and Ulan West Underground (UW) mines. Five (5) Conservation Agreements (CA) and one (1) Biodiversity Stewardship Agreement (BSA) have been established between UCMPL and the NSW Department of Planning, Industry and Environment (DPIE) (now the NSW Department of Climate Change, Energy, the Environment and Water; DCCEEW) to satisfy commitments to secure biodiversity offsets relating to NSW Project Approval (PA) 08_0184 and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval EPBC 2009/5252. Annual floristic monitoring and reporting is undertaken in accordance with each Offset Area (Table 1).

Table 1: Offset Areas and associated reporting 2023

Area	Report
Bobadeen Vegetation Offset Area (VOA)	Eco Logical Australia 2023a. <i>UCMPL Bobadeen Vegetation Offset Area Monitoring Report 2022</i> . Prepared for Ulan Coal Mines Pty Ltd.
Spring Gully Conservation Area.	Eco Logical Australia 2023b. <i>UCMPL Spring Gully Cliffline Management Area Monitoring Report 2022</i> . Prepared for Ulan Coal Mines Pty Ltd.
Brokenback Area 1 Conservation Area	Eco Logical Australia 2023c. <i>UCMPL Brokenback Conservation Area – Area 1 Monitoring Report 2022</i> . Prepared for Ulan Coal Mines Pty Ltd.
Brokenback Area 3 Conservation Area	Eco Logical Australia 2023d. <i>UCMPL Brokenback Conservation Area – Area 3 Monitoring Report 2022</i> . Prepared for Ulan Coal Mines Pty Ltd.
Highett Road Conservation Area	Eco Logical Australia 2023e. <i>UCMPL Highett Road Acacia <i>ausfeldii</i> Management Area Monitoring Report 2022</i> . Prepared for Ulan Coal Mines Pty Ltd.
Bobadeen West Offset Area	No reporting completed during 2023.

1.2. Performance indicators and completion criteria

Performance indicators and completion criteria for the UMC are presented in two management plans: the RMP and the BMP.

Each management plan stratifies the UMC into areas with similar management requirements.

However, Domain nomenclature is not aligned between the RMP and the BMP and the documents have different purposes when it comes to the management of lands within the UMC. The relationship between the domains in each document and the source document that is used to provide management objectives and completion criteria is shown in Table 2.

Table 2: Relationship between the Domains listed in the RMP and the BMP Domains

RMP final land use domains	BMP domains	Source of completion criteria
Domain A: Native ecosystem	Domain B – Rehabilitation area – Woodland / open forest. Domain C – Goulburn River Diversion. Domain D – Rehabilitation area – Specific endemic vegetation community. Domain E – Rehabilitation area – tree screen.	Open cut rehabilitation areas at the UMC are assessed against the RMP Domain A completion criteria.
Domain D: Rehabilitation Biodiversity Offset Area.	Domain F – Biodiversity Offset Areas including: <ul style="list-style-type: none"> • Bobadeen Conservation Area • Brokenback Conservation Area – 1 • Brokenback Conservation Area – 3 • Spring Gully Cliffline Management Area • Highett Road Conservation Area • Bobadeen West Offset Area 	Biodiversity Offset Areas at the UMC are assessed against the BMP Domain F completion criteria.

1.2.1. Rehabilitation Management Plan

The RMP (UCMPL 2022b) defines the following Final Land Use Domains present at the UMC:

- Domain A: Native Ecosystem
- Domain D: Rehabilitation Biodiversity Offset Area
- Domain F: Water Management Areas
- Domain G: Water Storage (excluding final void)
- Domain I: Infrastructure
- Domain K: Other – Subsidence Management Area

Rehabilitation completion criteria for Domain A are provided in Table 3. As per the RMP, criteria relating to offset areas (RMP Domain D) are outlined in the BMP and are provided in Section 2.2.

Table 3: Rehabilitation completion criteria as extracted from the RMP (UCMPL 2022b)

Post Mining Land Use (Final Land Use Domain)	Mining Domain	Rehabilitation objectives	Completion criteria	Performance indices	Example of justification / validation methods
Domain A – Native Ecosystem (Non CEEC / EEC criteria)	Domain 1 – Infrastructure Area Domain 2 Tailings Storage Area Domain 3 – Water Management Area Domain 4 – Overburden Emplacement Area Domain 5 Active Mining Area (Open Cut Void)	Vegetation Composition as per criteria	Rehabilitation areas contain flora species assemblages characteristic of each Growth Form for the target native vegetation communities.	Native plant species richness assessed for each Growth Form	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Tree density as per completion criteria.	Indicative final minimum total tree/shrub densities for seeded areas to be 400 stems/ha.	Tree and shrub densities monitored for establishment and survival	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		The rehabilitation is self-sustainable	Evidence of flowering and seeds or second-generation juveniles for trees and shrubs or likely to be, based on comparable older rehabilitation sites.	Trees and shrubs are monitored for evidence of second-generation juveniles and evidence of flowers and seeds	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Habitat features incorporated	Habitat features (e.g. logs, rocks and nest boxes), including structures suitable for target species are incorporated into rehabilitation areas at required densities, as required by Approvals. Native rehabilitation areas provide a range of structural features (e.g. trees, shrubs, ground cover, developing litter layer etc.).	Habitat and structural features recorded	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Connectivity established	Habitat corridors are established and consistent with target vegetation community compositions, as required by Approvals.	Habitat corridors recorded	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Target fauna assemblages and habitat in rehabilitation areas	Monitoring confirms target native fauna species are recorded utilising rehabilitation areas or habitat suitable for target species is present, as required by Approvals.	Monitoring for the presence and abundance of target fauna species and habitat	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).

1.2.2. Biodiversity Management Plan

The BMP (UCMPL 2022a) was developed by UCMPL to guide management of the UMC subject to the requirements of Condition 44, Schedule 3 of PA 08_0184 and the requirements of the EPBC 2009/5252. Completion / success criteria have been developed for the following UMC Domains:

- Domain A: Water management area.
- Domain B: Rehabilitation area – Woodland / open forest.
- Domain C: Goulburn River Diversion.
- Domain D: Rehabilitation area – Specific endemic vegetation community.
- Domain E: Rehabilitation area – tree screen.
- Domain F¹: Bobadeen VOA.
- Domain G²:– Salinity Offset Area (SOA) and Residual Project Area (RPA).
- Domain H: Agricultural leasehold and private property.

Domain F and the SOA within Domain G has been split into MZs as shown in Table 4. Assessment against specific completion / success criteria for BMP Domain F (Table 5) and BMP Domain G (Table 6), as detailed in the BMP is provided in this report. Assessment against ‘all domain’ completion / success criteria detailed in the BMP have also been undertaken in this report for these domains.

Underground mining related subsidence performance measures are provided in Table 7 below.

¹ Domain F does not include the Spring Gully, Brokenback Area 1, Brokenback Area 3, and Hihett Road Conservation Areas, and Bobadeen West Offset Area.

Table 4: Domain F and SOA management zones

Domain	MZ	Vegetation type	Description
Domain F	MZ1	Benchmark vegetation	Includes remnant woodland areas which are of benchmark condition and exhibit high native species richness and vegetation structure. Large areas of MZ1 have undergone some form of historical disturbance, mostly in the form of logging.
	MZ2	Natural regeneration	Includes previously cleared areas containing components of benchmark vegetation and often directly adjacent to remnant woodland (i.e. sources of natural recruitment). These areas are managed to avoid adverse disturbances and to maximise natural regeneration success.
	MZ3	Assisted revegetation	Includes disturbed areas within biodiversity offset areas which require intervention to revegetate the structure and dominant species composition of disturbed vegetation to a condition similar to that of the corresponding benchmark community.
SOA within Domain G	MZ4a	Regeneration / revegetation	Includes disturbed areas within the SOA which is managed to encourage natural regeneration of cleared areas in combination with continued grazing.
	MZ4b	Benchmark vegetation	Includes remnant woodland areas of benchmark condition within SOAs which are managed to maintain or increase biodiversity values (as per MZ1).

Table 5: BMP Domain F completion criteria as extracted from the BMP (UCMPL 2022a).

Domain objective	Performance indicator	Completion criteria	Target	Method
Growth Medium Development Phase				
Facilitate the natural regeneration of Management Zone 2 areas.	Natural Regeneration	Monitor natural regeneration occurring within Biodiversity Offset Areas and update mapping with changes identified	-	Transect Monitoring Driving/Drone flight Fringe vegetation to monitor spread of natural regeneration
Re-establish native woodlands / open forest within Management Zone 3 areas	Revegetation	Plantings established and self-sustaining (flowering, fruiting or second-generation juvenile) and sufficient stem density for Woodland >40 stems/ha, Open Forest >60 stems/ha	-	BAM Method amended for tree count within 50x20m plot
Ecosystem and Land Use Establishment Phase				
Facilitate the natural regeneration of Management Zone 2 areas	Natural Regeneration	Monitoring to indicate native species diversity approaching or consistent with MZ1 or other appropriate analogue sites. Stem density >40 stems/ha for woodland, >60 stems/ha for Open Forest vegetation community	-	BAM Method
Re-establish native woodlands / open forest within Management Zone 3 areas	Revegetation	Monitoring to indicate native species diversity approaching or consistent with MZ1 or other appropriate analogue sites. Stem density >40 stems/ha for woodland, >60 stems/ha for Open Forest vegetation community	-	BAM Method
Weeds and feral animal species do not present a risk to regeneration / revegetation	Weed presence	Ensure priority weeds (as per LLS Central Tablelands Regional Strategic Weed Management Plan 2017-2022; CTRSWMP) do not exceed 10% of plant cover Records indicate that listed weeds are controlled in accordance with legislation	Reduce exotic cover in herb layer -	BAM Method Flora monitoring program. Opportunistic listed weed observations
	Pest animals	Records indicate pest animals are controlled in accordance with legislation, and Pest animal presence does not pose a risk to the establishment of rehabilitation areas	-	Annual feral pest monitoring. Opportunistic pest observations
Management measures will be implemented to minimise bushfire risks in offset areas	Bushfire risk management	Bushfire management measures (e.g. access tracks, fire breaks) are in place to protect establishing rehabilitation areas	-	-
Erosion does not present a safety hazard or compromise the post mining land capability	Erosion and Sediment Control	Visual monitoring indicates that there is no erosion present that compromises land capability or the intended final land use	-	-
Fauna habitat available	Presence of a range of fauna habitats	A range of fauna habitat is available suitable for native bird and microbat species, from multiple families. Fauna monitoring program implemented	-	General Fauna monitoring

Domain objective	Performance indicator	Completion criteria	Target	Method
Ecosystem and Land Use Sustainability Phase				
Facilitate the natural regeneration of Management Zone 2 areas	Natural Regeneration	Monitoring to indicate native species diversity approaching or consistent with MZ1 or other appropriate analogue sites. Stem density established at >40 stems/ha for woodland, >60 stems/ha for Open Forest vegetation community	-	-
Re-establish native woodlands / open forest within Management Zone 3 areas	Revegetation	Monitoring to indicate native species diversity approaching or consistent with MZ1 or other appropriate analogue sites. Stem density established at >40 stems/ha for woodland, >60 stems/ha for Open Forest vegetation community	-	-
Control Weeds	Listed Weed Presence	Records indicate that listed weeds are controlled in accordance with legislation	-	Flora monitoring program
Control Pest animals	Pest animals	Records indicate pest animals are controlled in accordance with legislation, and	-	-
Pest animal presence does not pose a risk to the establishment of rehabilitation areas		Annual feral pest monitoring	-	-
Management measures will be implemented to Minimise bushfire risks in rehabilitation areas	Fuel Loads	Fuel loads are assessed and managed	-	-
Land Relinquishment				
Re-establishment of Box Gum Grassy Woodland Critically Endangered Ecological Communities (CEEC)	Re-establishment of CEEC	CEEC re-vegetation meets the DoE minimum requirements for classification as CEEC	-	BAM Method and rapid EEC assessment plots where required as part of VCA monitoring
Security in Perpetuity	Conservation Agreements	All conservation agreements are secured in perpetuity and registered on the land title	-	-

Table 6: BMP Domain G completion criteria as extracted from BMP (UCML 2022a)

Domain objective	Performance indicator	Completion criteria	Target	Method
Protection and improvement of flora and fauna habitat from ongoing impacts	Impacts to habitat absent or managed	Flora and fauna habitat values protected and enhanced and not subject to ongoing impacts	Progressive improvement and long-term protection of flora and fauna habitat	Flora and fauna monitoring programs, UCMPL inspections and opportunistic observations
Control weeds	Occurrences of listed weeds reported and management undertaken in response	Control listed weeds	Minimise ongoing presence of listed weed species	Flora monitoring program, UCMPL inspections and opportunistic observations
		Ensure priority weeds (as per CTRSWMP) do not exceed 10% of plant cover	Natural regeneration able to progress uninhibited by exotic perennial plant cover	-
Control pest animals	Pest animals reported and managed	Records indicate pest animals are controlled in accordance with legislation, and Pest animal presence does not pose a risk to the establishment of rehabilitation areas	Minimise ongoing presence of pest animals	Fauna monitoring program, UCMPL inspections and opportunistic observations
Natural regeneration occurring and resulting in the improvement of flora and fauna habitat	Monitoring determines the effectiveness of natural regeneration and identifies areas of where targeted plantings or seeding may be required	Natural regeneration is progressing throughout the Residual Project Area (RPA) and SOA	Improvement of flora and fauna habitat	Flora monitoring program
Native groundcover is stable and of high diversity	Floristic monitoring indicates stable groundcover and increasing native flora diversity	Stable to increasing groundcover (including plant cover, litter and cryptogam) with a stable to increasing native flora diversity, comparable with remnant condition sites (e.g. MZ1, MZ4b) or other appropriate analogue sites	Stable groundcover of high native flora diversity	Flora monitoring program

Table 7: Subsidence monitoring performance measures (UCMPL 2022a).

PA_08_0184 Performance measures	Monitoring of environmental consequence			Data analysis to assess against performance indicator	Performance indicators	Assessment of performance indicator	Assessment of performance measure
	Site	Parameter	Frequency				
Threatened species, populations, habitat or ecological communities – Negligible impact	Subsidence Floristic Plots within Project Area	Monitoring to identify any deterioration of the vegetation health of communities above mining areas.	In accordance with the Subsidence Monitoring Program (Section 7.21.4). Spring & Autumn Before longwall mining of each panel in Autumn and after longwall mining during the same period for another 2 years	Analysis of vegetative characteristics from each subsidence floristic plot in accordance with the methodology in Section 8.4.1.3.	The vegetation communities located above longwall panels in the subsidence zone are not expected to experience changes in condition different to changes in the corresponding sites located in the transition zone.	An indicator will be considered to have been triggered if: <ul style="list-style-type: none"> Analysis of subsidence-based flora data indicates a >10% (percentage points) decrease in canopy foliage cover of a site within the subsidence zone inconsistent with canopy foliage cover in the transition zone; and Analysis of subsidence-based flora data indicates >10% (percentage points) decrease in canopy foliage cover in the selected vegetation community located above mining areas, not seen in non-mined areas of the vegetation community. If data analysis indicates the performance indicators have been exceeded, an assessment will be made against the performance measure to determine if the impact is a result of mining and whether any Box Gum Woodland CEEC present above the longwall has exceeded performance measure.	The performance measure is exceeded if investigation shows subsidence has resulted in greater than negligible impacts to the Box Gum Woodland CEEC within mined areas.
	Subsidence Fauna Monitoring Terrestrial sites and Aquatic	Monitoring to identify any deterioration of potential threatened species or associated habitat.	In accordance with the Subsidence Monitoring Program Spring & Autumn	Analysis of threatened species occurrence in accordance with the methodology in Section 8.4.4 & 8.4.6 of the BMP.	No changes in known threatened fauna species occurrence, apart from seasonal variations.	This indicator will be considered to have been exceeded if: <ul style="list-style-type: none"> Masked Owl: reduction in abundance and/or condition of HBTs at Floristic Based Subsidence (FBS) monitoring sites; and Regent Honeyeater and Swift Parrot: >10% (percentage points) decrease in canopy foliage cover of key feed species at FBS monitoring sites. 	The performance measure is exceeded if subsidence fauna monitoring indicates the secondary extraction has resulted in greater than negligible impacts has occurred to threatened fauna

PA_08_0184 Performance measures	Monitoring of environmental consequence			Data analysis to assess against performance indicator	Performance indicators	Assessment of performance indicator	Assessment of performance measure
	Site	Parameter	Frequency				
						<p>If data analysis indicates the performance indicators have been exceeded, an assessment will be made against the performance measure to determine if the impact is a result of mining.</p>	<p>species and associated habitat.</p>
Cliff lines over mined areas (Targeted Cliff Line Monitoring for micro-bats)		Monitoring to identify decreasing trends in threatened micro-bat species activity levels. Section 8.4.6.6 of the BMP	<p>In accordance with the Subsidence Monitoring Program (Section 8.4.4.6)</p> <p>Before longwall mining of each panel between October to February and after longwall mining during the same period.</p>	Analysis of micro-bat surveys results of potential micro-bat roosting/breeding cave habitats before and after longwall mining.	No change to endangered micro-bat activity levels pre and post mining.	<p>An indicator will be considered to have been triggered if:</p> <ul style="list-style-type: none"> Analysis of micro-bat monitoring data identifies decreasing activity levels (>10% decline) of endangered micro-bats species during cliff line monitoring within mined areas over two or more monitoring periods outside of seasonal variations. <p>If data analysis indicates the performance indicators have been exceeded, an assessment will be made against the performance measure to determine if the impact is a result of mining.</p>	<p>The performance measure is exceeded if mining is shown to have caused greater than negligible impacts to potential micro-bat cave roosting habitat, based on bat activity levels pre and post mining, confirmed by UCMPL's specialist micro-bat ecologist.</p>

1.2.3. Ulan West EPBC 2015/7511 Area

Development of a monitoring program for and subsequent baseline monitoring of Box Gum Woodland condition and extent throughout the Ulan West Underground EPBC Referral Area was undertaken during 2022 (ELA 2023g) as required by Condition 3 of EPBC Referral 2015/7511. The monitoring program and baseline monitoring also seeks to track progress against Condition 2 of EPBC Referral 2015/7511. Performance measures outlined in the monitoring program (ELA 2023g) are presented in Table 8. This monitoring program is not yet included in the BMP.

Following the completion of undermining, patches surveyed as part of the baseline assessment will be re-surveyed to provide a comparison of pre-mining and post-mining condition and extent of Box Gum Woodland (ELA 2023g).

Table 8: Ulan West EPBC 2015/7511 performance measures

Performance Measure	Performance Indicator	Assessment of performance indicator/measure
Negligible impact on Box Gum Woodland.	Box Gum Woodland located above longwall panels in the subsidence zone are not expected to experience changes in condition different to changes in the corresponding sites located in the transition zone.	An indicator will be considered to have been triggered if: <ul style="list-style-type: none"> • Analysis of FBS data indicates a >10% (percentage points) decrease in canopy foliage cover of a site within the subsidence zone inconsistent with canopy foliage cover in the transition zone; and • Analysis of FBS data indicates >10% (percentage points) decrease in canopy foliage cover in the selected vegetation community located above mining areas, not seen in non-mined reference sites. The performance measure is exceeded if investigation shows subsidence has resulted in greater than negligible impacts to the Box Gum Woodland within mined areas.
	At the completion of undermining, Box Gum Woodland patches continue to meet the condition thresholds described in the Policy Statement (DEH 2006).	An indicator will be considered to have been triggered if assessment against the condition thresholds within the Policy Statement (DEH 2006) are no longer met, with no negative impacts and/or decline in condition also recorded in Box Gum Woodland reference.

2. Methodology

2.1. RMP Domain A: Native ecosystem rehabilitation

2.1.1. Floristic monitoring

During 2023, 41 sites were monitored across six (6) open cut rehabilitation areas (polygons) (Table 9). Monitoring was undertaken by ELA ecologists between 1 to 13 September 2023.

Monitoring during 2023 was the third round of monitoring for each polygon at the current site density. Monitoring has previously been undertaken sporadically since 2016 for sites with names beginning with 'OC' (Table 9). As the complete dataset (i.e., all sites for each polygon) is only available for the last four years (2020-2023) trend analysis has not been undertaken within this report.

There are two phases of monitoring methodologies implemented at the UMC:

- Initial Establishment Monitoring (IEM) involving rapid assessment of young (0–3-year-old) rehabilitated areas completed at 2 years and 3 years to determine germination success and landform stability, undertaken during the same season.
- Long-term Monitoring (LTM) involving detailed floristic and remote sensing assessment comparison of established rehabilitation areas (>4-year-old).

Table 9: Rehabilitation polygons and sites monitored during 2023

Polygon	Vegetation community	Year of rehabilitation	Age [^]	Phase	Sites
Polygon 1	White Box Woodland Community	2017	6	LTM	1a, 1b, 1c, 1d
Polygon 2	Native Woodland	2008	15	LTM	2b, 2c, OC4A
Polygon 3	Native Woodland	2018	5	LTM	3a, 3b, OC11A
Polygon 4	Native Woodland	2012	11	LTM	4a, 4d, 4e
Polygon 5	Ironbark Open Forest Complex on Sandstone	2017	6	LTM	5c, 5d
Polygon 6	Grey Box Woodland	2017	6	LTM	6c, 6d, 6e
Polygon 9	Grey Box Woodland	Unknown	-	LTM	9a, 9b, 9c, OC8A, OC8C
Polygon 10	Native Woodland	2008	15	LTM	OC4C, 10b, 10a,
Polygon 11	Native Woodland	2014	9	LTM	OC4b, 11d, 11b, 11c
Polygon 14	Native Woodland	2000	23	LTM	14a, 14b, 14c, 14d
Polygon 16	Native Woodland	1997	26	LTM	OC2B, 16a, 16b, 16c
Polygon 17	Native Woodland	1980's-2018	5	LTM	17a, 17b, 17c, 17d
East Pit Relinquished Rehabilitation	Native Woodland	1989-1997	26	LTM	OC3A, OC3C, OC3D

[^] age as of September 2023

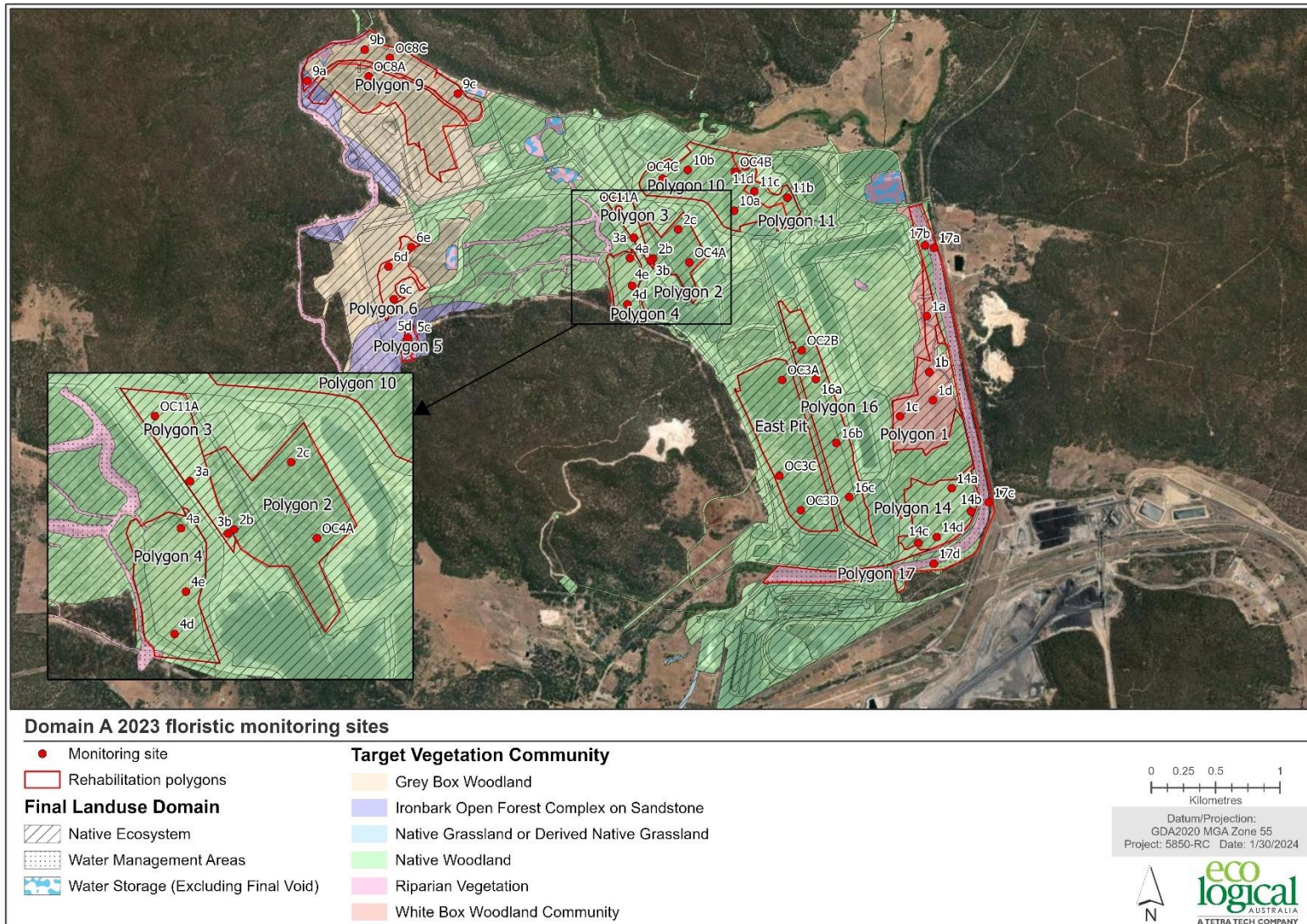


Figure 1: Domain A 2023 floristic monitoring sites

2.1.1.1. Field survey methodology

Each floristic plot consists of a 20 x 50 m quadrat with a nest 20 x 20 m quadrat. Within the 20 x 20 m quadrat, projected foliage cover (from 1-5% and then to nearest 5%) and estimated abundance (1-10, 20, 50, 100, 500, 1000 or specified greater number of individuals) for every species present was recorded. The following data was collected within the 20 x 50 m quadrat:

- Photographs - a photograph will be taken along the transect from the start location with the end location positioned in the centre of the photograph; along with a photograph taken from the end location with the start location positioned in the centre of the photograph.
- Litter cover assessed within five (5) 1 x 1 m quadrats.
- Presence of trees in the following stem size classes (5-9 cm, 10-19 cm, 20-29 cm, 30-39 cm, 40 - 49 cm, >50 cm diameter at breast height (DBH)).
- Point-intersects at every 1 m along the 50 m transect for the following categories: litter, bare soil, rock, cryptogram, native grass, native shrub (<1 m in height), native other (herb, forb, climber, sedge, etc) and exotic species.
- Assessment of projected foliage cover of shrub (>1 m in height) and canopy cover at five (5) m intervals along the 50 m transect.
- Number of hollow bearing trees.
- Length of large woody debris >10 cm diameter.
- Presence of naturally regenerating canopy and midstorey species.
- Estimated stem density of canopy species within the 20 x 50 m quadrat.
- Erosion - including the type, width, depth and position (distance from start, m) along the transect. Erosion identified will be rated using the following:
 - 1 – no erosion.
 - 2 – sheet erosion.
 - 3 – rill erosion < 0.3 m deep.
 - 4 – gully erosion > 0.3 m, < 1 m deep.
 - 5 – gully.

General site notes were also recorded at each monitoring site, including:

- Vegetation condition.
- Opportunistic fauna observations or micro-habitats (i.e. nests), including habitat present for threatened species.

2.1.1.2. GCAA Rehabilitation Report Card

Monitoring and assessment against the Rehabilitation Report Card (RRC) was undertaken in accordance with the following documents:

- BMP (UCMPL 2022).
- Development of the Annual Rehabilitation Report Card (NSW) Procedure (Draft version, GCAA 2021a).
- Scientific Background Report NSW Rehabilitation Report Card (Draft version, GCAA 2021b).
- NSW Rehabilitation Data Workbook Template Version 2 Final issued 4 August 2021 (GCAA 2021c).
- NSW Rehabilitation Calculator Version 12 Final issued 4 August 2021 (GCAA 2021d).

The RRC requires a list of ‘diagnostic species’ for targeted vegetation types within the open cut rehabilitation being Grey Box Woodland and Ironbark Open Forest Complex on Sandstone communities. A list of diagnostic species has been built for each community using data from remnant condition MZ1 monitoring sites at the UMC (Table 10). Species associated with the target vegetation types for relevant PCTs listed in the NSW BioNet Vegetation Classification, have also been included in the diagnostic species list. The target vegetation types correspond to the following PCTs listed in Table 10.

Targeted vegetation types also require calculation of structure and function scores using the Biodiversity Assessment Method (BAM) Calculator (DPE 2020), which uses benchmark data derived from plot data within the same vegetation formation and class.

The RRC does not split rehabilitation into the target vegetation types per the RMP, with the only vegetation type available in the RRC being Upper Hunter Native Forest (UHNF). However, reference sites (and PCTs) used to generate the reference structure, function and regeneration attributes required by the RRC are presented in Table 10.

Following updates to the Final Landform and Rehabilitation Plans

Table 10: Nominated reference sites monitored during 2023 and associated PCTs used in the BAM-C

Target vegetation (RRC)	Target vegetation per Final Landuse	Polygon/s	Reference sites (used to derive spp list)	PCT used in BAM-C for benchmarks
UHNF	Ironbark Open Forest Complex on Sandstone	Polygon 5	UCML_CA_Site16, UCML_CA_Site17, UCML_CA_Site18	PCT 3753: Dunedoo Sandstone Ironbark Forest
	Grey Box Woodland	Polygon 6, Polygon 9	RPA16, RPA17, RPA7	PCT 3532: Western Hunter Ironbark-Box Forest
	White Box Woodland Community	Polygon 1	BOB11B, BOB4B, BOBC1, BOBC9, BOBE2	PCT 483: Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley

2.1.1.3. Assessment against RMP Completion Criteria

The completion criteria provided in the RMP differ from target ranges for monitoring attributes provided in the RRC. As such, assessment against the RMP completion criteria is reported on separately within this report.

Flora species assemblages for the target native vegetation communities as per the ‘*Rehabilitation areas contain flora species assemblages characteristic of each Growth Form for the target native vegetation communities*’ completion criteria has been developed based on species lists built from remnant Ironbark Open Forest Complex, Grey Box Woodland, and White Box Woodland Community sites, at the UMC listed in Table 10 above (i.e. the same as the diagnostic species used in the RRC).

2.1.2. Rehabilitation walkover

Rehabilitation walkovers were undertaken across the polygons listed in Table 9 above. While covering the area on foot, opportunistic assessments and identification of the following were recorded:

- Erosion features and processes – including an assessment of severity using the following criteria:
 - Sheet erosion or rills <100 mm.
 - Rills 100mm - <300 mm.
 - Gullies 300mm - <500 mm.
 - Gullies 500mm - <1 m.
 - Gullies >1m in depth or severe tunnel erosion.
- Stability and functioning of erosion and sediment control and water management structures (including potential drainage issues).
- Continuous areas of recalcitrant bare ground >400 m² in size, and collection of soil samples (where required).
- Presence of Priority Weed species listed under the Local Land Services *Central Tablelands Regional Strategic Weed Management Plan 2022 – 2027* (CTRSWMP; LLS 2022), other problematic weed species and severity of infestations.
- Evidence of vegetation health issues (e.g., diseases, predation, poor growth rates, etc.).
- Evidence of spontaneous combustion processes and associated impacts.
- Presence of vertebrate pests and evidence/severity of associated impacts.
- Presence, type, and location of constructed artificial habitat features.

2.2. BMP Domain F: Biodiversity Vegetation Offset Areas / Domain G: Salinity Offset Area

2.2.1. Floristic monitoring

Floristic monitoring was undertaken by ELA ecologists on 29 and 31 May, 1, 5-7, 15 and 19 June, 24 and 29 August, and 1 September 2023 across sites listed in Table 11.

Table 11: BMP Domain F sites monitored during 2023

Season	Location	MZ	Site	Method
Autumn	Bobadeen VOA	MZ1	BOB4B, BOBC1, BOBC3, UCML_CA_Site10, UCML_CA_Site11, UCML_CA_Site13, UCML_CA_Site53, UCML_CA_Site6, UCML_CA_Site7, UCML_CA_Site9, BOBE3,	As specified by the <i>Bobadeen Vegetation Offset Area Conservation Agreement</i> (UCMPL 2019b).
		MZ2	BOB13B*, BOBC4*, BOBE5, BOB20*, BOB22*	
		MZ3	BOB15B*, BOB21*, BOB23*, BOBE6, BOB10B*, BOB12*	
	Highett Road <i>Acacia ausfeldii</i> Management Area	NA	ACQ1, ACQ2, UCML_CA_Site51, UCML_CA_Site52	As specified by the <i>Highett Road Acacia ausfeldii Management Area Conservation Agreement</i> (UCMPL 2019c).
Brokenback Conservation Area – Area 1	NA	UCML_CA_Site24, UCML_CA_Site25, UCML_CA_Site28, UCML_CA_Site29, UCML_CA_Site30	As specified by the <i>Brokenback Conservation Area – Area 1</i>	

Season	Location	MZ	Site	Method
				<i>Conservation Agreement</i> (UCMPL 2019d).
	Brokenback Conservation Area – Area 2	NA	UCML_CA_Site1, UCML_CA_Site2, UCML_CA_Site3, UCML_CA_Site3, UCML_CA_Site5, UCML_CA_Site23, BB1	As specified by the <i>Brokenback Conservation Area – Area 2 Conservation Agreement</i> (UCMPL 2019e).
Spring	Bobadeen West Offset Area	NA	P1, P3, P7 (photo point monitoring)	As specified by the BMP (UCMPL 2022a) and the BAM (DPIE 2020).
	Spring Gully Cliffline Management Area	NA	UCML_CA_Site14, UCML_CA_Site15, UCML_CA_Site16, UCML_CA_Site17, UCML_CA_Site18, UCML_CA_Site19, UCML_CA_Site20, SG1	As specified by the <i>Spring Gully Cliffline Management Area Conservation Agreement</i> (UCMPL 2019f).
* Sites also conform to MZ4a (i.e. assisted / natural regeneration within the Salinity Offset Area (SOA)).				

No MZ2 Grassy Woodland sites were monitored during 2023 due to schedule amendments to allow for better data analysis in the future. All MZ2 Grassy Woodland sites will be monitored during Autumn 2024, with a detailed and current assessment against completion criteria provided in the 2024 annual monitoring report.

Grassy Woodland areas throughout UCMPL are associated with the Threatened Ecological Community (TEC) White Box – Yellow Box – Blakely’s Red Gum grassy woodlands and derived native grasslands (hereafter referred to as Box Gum Woodland) which is listed under the *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act. Dry Sclerophyll Forest areas at UMC are not associated with any Threatened Ecological Communities (TECs).

Assessment against the following publications was undertaken for Grassy Woodland sites at UMC:

- Department of the Environment and Heritage (DEH) *EPBC Act Policy Statements – White Box – Yellow Box – Blakely’s Red Gum grassy woodlands and derived native grasslands* (2006).
- *Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee on Amendments to the List of Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999* (Threatened Species Scientific Committee [TSSC] 2006).
- *Notice and reason for the Final Determination for White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland in the Sydney Basin* (Threatened Species Scientific committee (TSSC) 2020).

In accordance with the respective Conservation Agreements, monitoring results for the Bobadeen VOA, Hihett Road *Acacia ausfeldii* Management Area, Brokenback Conservation Area – Area 1, Brokenback Conservation Area – Area 2 and Spring Gully Cliffline Management Area are provided in the reports listed in Table 1 above.

2.2.2. Natural regeneration

Natural regeneration transects are monitored once every five (5) years in accordance with the BMP (UCMPL 2022a). No natural regeneration monitoring was undertaken in 2023 and is next scheduled to occur during 2025.

2.3. Floristic based subsidence monitoring

Floristic based subsidence (FBS) monitoring was undertaken along seven (7) longwall panels during 2023 (Table 12). Baseline data was collected at two (2) longwall panels during 2023, Ulan West Underground LW 8 and Ulan Underground LW 31.

Monitoring commences 1 year (2 seasons) prior to underground mining and continues for at least two years after mining is completed above each longwall (LW) (UCMPL 2022a). Sites are paired, with one site set up within the 'transition zone' and one site located within the 'maximum subsidence zone':

- Transition zone – maximum change in slope. Occurs from the centre of the longwall pillar to approximately 75 m into the panel (ELA 2015).
- Longwall zone – maximum predicted subsidence. Located within the centre of the longwall panel and varies in width, depending on the width of the panel (ELA 2015).

Table 12: FBS sites monitored during 2023.

Mine	LW	Mining commenced	Monitoring commenced	Estimated mining completion date [^]	Estimated monitoring completion [^]	Sites	Season
Ulan West Underground	LW 6	August 2020	Autumn 2019	June 2022	Spring 2024	UWLW6 L1-L10	Autumn and spring
	LW 7	July 2022	Autumn 2021	March 2024	Autumn 2026	UWLW7 L1-L10	Autumn and spring
	LW 8	May 2024	Autumn 2023	November 2025	Spring 2027	UWLW8 L1-L10	Autumn and spring
Ulan Underground	LW West 6	March 2020	Autumn 2019	March 2021	Spring 2023	UGLWW6 L1-L10	Autumn and spring
	LW West 7	May 2021	Autumn 2021	2022	Spring 2024	UGLWW7 L1-L10	Autumn and spring
	LW 30	2022	Autumn 2021	October 2023	Autumn 2026	UGLW30 L1-L10	Autumn and spring
	LW 31	October 2023	Autumn 2023	May 2025	Spring 2027	UGLW31 L1-L10	Autumn and spring

[^] based on period progress plots dated 31 December 2023 (UW) and 20 October 2023 (UG).
TBC: to be confirmed.

Eight (8) sites located over UW LW7 (L9 and L10) and UW LW8 (L1, L2, L3, L4, L5 and L6) are also part of the Ulan West EPBC 2015/7511 Area biodiversity monitoring program.

The following data was collected from each site:

- Projected foliage cover (in 5% increments) of upper canopy.

- Canopy health and defoliation (all in 5% increments):
 - Percentage of epicormic foliage in relation to total tree foliage.
 - Proportion of primary branches within canopy that have died back.
 - Percentage of current canopy foliage as a proportion of the estimated canopy foliage volume/potential canopy.
 - Percentage of canopy foliage discoloured.
- Photograph of the canopy (camera placed on top of the star picket, facing up); photograph facing due north, south, east and west from the north-west star picket.

Any evidence of subsidence opportunistically observed was also recorded with a handheld GPS.

2.4. Ulan West EPBC 2015/7511 Area monitoring

An additional six (6) FBS monitoring sites were established within the EPBC 2015/7511 Area within autumn 2023, meaning a total of ten (10) monitoring sites are now established (UW LW L1, L2, L3, L4, L5, L6 and UW LW7 L7, L8, L9, L10). Sites will be established over LW9, LW11 and LW12 once mining progresses to these longwalls.

3. Results and discussion

3.1. RMP Domain A: Native ecosystem rehabilitation

3.1.1. Vegetation composition

POLYGON 1 – WHITE BOX WOODLAND

A total of 24 native species and 36 exotic species were recorded throughout Polygon 1 (Table 13). Overall, 25% of all species and 50% of native species recorded within Polygon 1 are characteristic of White Box Woodland. Non-characteristic native species included five (5) species which could not be identified to a species level due to lack of fertile material at time of survey, one of which being a juvenile *Eucalyptus* spp. While the tree species *Angophora floribunda* (Rough-barked Apple) is not 'characteristic' of White Box Woodland (per the methodology outlined in Section 2.1.1), it is commonly present in, and characteristic of grassy woodlands in the greater Ulan region.

No species in the native 'fern' or 'other' (twiners, climbers etc) growth forms were recorded within Polygon 1. Many of these species are recalcitrant to move into rehabilitated areas or have specific microhabitats which may be absent from the rehabilitation area.

Table 13: Polygon 1 vegetation composition

Growth form group	1a		1b		1c		1d		Overall			
	√*	X*	√	X	√	X	√	X	√	X	√%	X%
Tree	3	1	3	1	1	0	1	1	3	3	50%	50%
Shrub	1	0	0	1	1	0	0	0	0	2	50%	50%
Grass & Grasslike	3	0	3	0	1	1	1	1	4	1	80%	20%
Forb	2	4	2	1	4	3	3	3	5	6	45%	55%
Fern	0	0	0	0	0	0	0	0	0	0	0%	0%
Other	0	0	0	0	0	0	0	0	0	0	0%	0%
Exotic	0	16	0	8	0	9	0	13	0	24	0%	0%
Total (including exotic)	8	22	8	11	6	14	5	18	12	36	27%	73%
Total (native spp only)	8	6	8	3	6	4	5	5	12	12	50%	50%

* √ = Characteristic of target vegetation community X = Not characteristic of target vegetation community

POLYGON 2 - NATIVE WOODLAND

A total of 62 native species and 22 exotic species were recorded throughout Polygon 2 (Table 14). All native species recorded within Polygon 2 are endemic to Native Woodlands throughout the Kerrabee Interim Biogeographic Regionalisation for Australia (IBRA) Subregion.

Table 14: Polygon 2 vegetation composition

Growth Form	2b	2c	OC4A	Overall
Tree	5	5	7	10
Shrub	7	5	12	16
Grass & Grasslike	4	8	8	13
Forb	8	11	11	19
Fern	1	1	2	2
Other	2	2	2	2
Native endemic species richness	27	32	42	62
Exotic species richness	9	18	8	22
Total	36	50	50	84

POLYGON 3 - NATIVE WOODLAND

A total of 34 native species and 28 exotic species were recorded throughout Polygon 3 (Table 15). All native species recorded within Polygon 3 are endemic to Native Woodlands throughout the Kerrabee IBRA Subregion.

Table 15: Polygon 3 vegetation composition

Growth Form	3a	3b	OC11A	Overall
Tree	6	1	4	7
Shrub	5	6	10	12
Grass & Grasslike	2	2	2	4
Forb	7	5	4	10
Fern	0	0	0	0
Other	1	1	1	1
Native endemic species richness	21	24	21	34
Exotic species richness	10	13	16	28
Total	31	27	37	62

POLYGON 4 - NATIVE WOODLAND

A total of 40 native species and 31 exotic species were recorded throughout Polygon 4 (Table 16). All native species recorded within Polygon 4 are endemic to Native Woodlands throughout the Kerrabee IBRA Subregion.

Table 16: Polygon 4 vegetation composition

Growth Form	4a	4d	4e	Overall
Tree	4	2	4	7
Shrub	3	6	4	8
Grass & Grasslike	5	8	6	10
Forb	9	6	7	11
Fern	1	0	0	1
Other	3	1	1	3
Native endemic species richness	25	23	22	40
Exotic species richness	19	17	17	31
Total	44	40	39	71

POLYGON 5 – IRONBARK OPEN FOREST COMPLEX ON SANDSTONE

A total of 43 native species and 18 exotic species were recorded throughout Polygon 5 (Table 17). Overall, 59% of all species and 84% of native species recorded within Polygon 5 are characteristic of Ironbark Open Forest Complex on Sandstone. The seven (7) non-characteristic native species include *Juncus bufonius* (Toad Rush), *Chloris truncata* (Windmill Grass), *Amyema quandang* and *Vittadinia muelleri*, along with three (3) species which could not be identified to species level, and if they are characteristic, due to lack of fertile material including *Rytidosperma* sp., *Juncus* sp., and *Acacia* sp.

Polygon 5 recorded species characteristic of Ironbark Open Forest on Sandstone across all growth forms.

Table 17: Polygon 5 vegetation composition

Growth form group	5c		5d		Overall			
	√*	X*	√	X	√	X	√ (%)	X (%)
Tree	5	0	2	0	5	0	100%	0%
Shrub	6	1	3	0	6	1	86%	14%
Grass & Grasslike	4	4	7	3	7	4	64%	36%
Forb	11	0	10	1	14	1	93%	7%
Fern	1	0	1	0	1	0	100%	0%
Other	2	0	2	1	3	1	75%	25%
Exotic	0	13	0	16	0	18	0%	100%
Total (including exotic)	25	21	25	21	36	25	59%	41%
Total (native spp only)	25	5	25	5	36	7	84%	16%

* √ = Characteristic of target vegetation community X = Not characteristic of target vegetation community

POLYGON 6 – GREY BOX WOODLAND

A total of 51 native species and 36 exotic species were recorded throughout Polygon 6 (Table 18). Overall, 28% of all species and 47% of native species recorded within Polygon 6 are characteristic of Grey Box Woodland. Polygon 6 recorded species characteristic of Grey Box Woodland across all growth forms.

Table 18: Polygon 6 vegetation composition

Growth group	form	6c		6d		6e		Overall			
		✓	X	✓	X	✓	X	✓	X	✓ (%)	X (%)
Tree		0	1	2	2	2	2	2	3	40%	60%
Shrub		1	0	1	0	2	1	2	1	67%	33%
Grass & Grasslike		2	3	3	6	4	6	4	7	36%	64%
Forb		4	6	8	10	5	10	13	12	52%	48%
Fern		0	0	1	0	1	0	1	1	50%	50%
Other		0	0	1	2	0	2	2	2	50%	50%
Exotic		0	22	0	23	24	23	0	36	0%	100%
Total (inc. exotic)		6	33	15	44	38	44	24	63	28%	72%
Total (native spp only)		6	11	15	21	38	21	24	27	47%	53%

* ✓ = Characteristic of target vegetation community X = Not characteristic of target vegetation community

POLYGON 9 – GREY BOX WOODLAND

A total of 64 native species and 25 exotic species were recorded throughout Polygon 9 (Table 19). Overall, 31% of all species and 44% of native species recorded within Polygon 9 are characteristic of Grey Box Woodland. Polygon 9 recorded species characteristic of Grey Box Woodland across all growth forms.

Table 19: Polygon 9 vegetation composition

Growth group	form	9a		9b		9c		OC8A		OC8C		Overall			
		✓*	X*	✓	X	✓	X	✓	X	✓	X	✓	X	✓%	X%
Tree		2	4	3	2	2	2	3	0	4	2	5	7	42%	58%
Shrub		0	0	0	7	0	6	0	2	4	7	4	11	27%	73%
Grass & Grasslike		1	3	5	0	2	0	2	1	6	1	6	5	55%	45%
Forb		2	5	5	5	5	2	7	4	6	3	8	12	40%	60%
Fern		0	0	0	0	1	0	0	0	1	0	1	0	100%	0%
Other		1	0	2	0	2	0	3	0	3	1	4	1	80%	20%
Exotic		0	19	0	10	0	10	0	7	0	4	0	25	0%	100%

Growth group	form	9a		9b		9c		OC8A		OC8C		Overall			
		√*	X*	√	X	√	X	√	X	√	X	√	X	√%	X%
Total (inc. exotic)		6	31	15	24	12	20	15	14	24	18	28	61	31%	69%
Total (native spp only)		6	12	15	14	12	10	15	7	24	14	28	36	44%	56%

* √ = Characteristic of target vegetation community X = Not characteristic of target vegetation community

POLYGON 10 - NATIVE WOODLAND

A total of 51 native species and 27 exotic species were recorded throughout Polygon 10 (Table 20). All native species recorded within Polygon 10 are characteristic of Native Woodlands throughout the Kerrabee IBRA Subregion.

Table 20: Polygon 10 vegetation composition

Growth Form	10a	10b	OC4B	OC4C	Overall
Tree	2	4	2	2	5
Shrub	3	5	2	7	8
Grass & Grasslike	5	7	5	7	13
Forb	6	3	10	10	21
Fern	0	1	1	3	2
Other	1	1	1	1	2
Native endemic species richness	17	21	21	30	51
Native non-endemic species richness	0	0	0	0	0
Exotic species richness	17	13	14	15	27
Total	34	34	35	45	78

POLYGON 11 - NATIVE WOODLAND

A total of 38 native species and 19 exotic species were recorded throughout Polygon 11 (Table 21). All native species recorded within Polygon 11 are characteristic of Native Woodlands throughout the Kerrabee IBRA Subregion.

Table 21: Polygon 11 vegetation composition

Growth Form	11b	11c	11d	Overall
Tree	2	3	3	5
Shrub	5	9	3	11
Grass & Grasslike	5	7	6	9
Forb	6	5	7	10
Fern	1	1	1	1

Growth Form	11b	11c	11d	Overall
Other	1	1	2	2
Native non-endemic species	0	0	0	0
Native endemic species richness	20	21	22	38
Exotic species richness	11	11	10	19
Total	31	32	32	57

POLYGON 14 - NATIVE WOODLAND

A total of 48 native species and 27 exotic species were recorded throughout Polygon 14 (Table 22). All native species recorded within Polygon 14 are characteristic of Native Woodlands throughout the Kerrabee IBRA Subregion.

Table 22: Polygon 14 vegetation composition

Growth Form	14a	14b	14c	14d	Overall
Tree	1	6	7	4	11
Shrub	3	2	4	5	11
Grass & Grasslike	3	2	6	4	10
Forb	7	6	12	8	15
Fern	1	0	1	0	1
Other	0	0	0	0	0
Native endemic species richness	15	16	30	21	48
Exotic species richness	15	19	14	18	27
Total	30	35	44	39	75

POLYGON 16 - NATIVE WOODLAND

A total of 53 native species and 26 exotic species were recorded throughout Polygon 16 (Table 23). All native species recorded within Polygon 16 are endemic to Native Woodlands throughout the Kerrabee IBRA Subregion, except *Acacia baileyana* (Cootamundra Wattle) which was recorded at 16a. This species is endemic to the Temora-Cootamundra district in the Riverina (NSW Flora Online 2023).

Table 23: Polygon 16 vegetation composition

Growth Form	16a	16b	16c	OC2B	Overall
Tree	3	0	1	2	5
Shrub	7	6	2	9	15

Growth Form	16a	16b	16c	OC2B	Overall
Grass & Grasslike	7	9	6	10	13
Forb	9	8	4	7	14
Fern	0	1	0	1	1
Other	3	1	1	3	5
Native endemic species richness	28	25	14	32	52
Native non-endemic species richness	1	0	0	0	1
Exotic species richness	15	14	13	11	26
Total	44	39	27	42	79

3.1.2. Tree stem density

All polygons monitored during 2023 recorded average tree/shrub stem density greater than the performance indicator (Table 3) requirement of 400 stems/ha (Table 24).

Table 24: Tree stem density

Polygon	Site	Tree/shrub density per ha
Polygon 1	1a	600
	1b	425
	1c	350
	1d	575
	Average	488
Polygon 2	2b	2300
	2c	1550
	OC4A	33750
	Average	12533
Polygon 3	3a	2575
	3b	1225
	OC11A	2500
	Average	2100
Polygon 4	4a	300
	4d	1050
	4e	225
	Average	525
Polygon 5	5c	950
	5d	850
	Average	900
Polygon 6	6c	75

Polygon	Site	Tree/shrub density per ha
	6d	450
	6e	975
	Average	500
Polygon 9	9a	475
	9b	1450
	9c	1100
	OC8A	575
	OC8C	2000
	Average	1120
Polygon 11	11b	50900
	11c	15050
	11d	14425
	Average	26792
Polygon 14	14a	250
	14b	600
	14c	1625
	14d	650
	Average	781
Polygon 16	16a	13275
	16b	1725
	16c	900
	OC2B	3125
	Average	4756
Polygon 17	17a	600
	17b	2550
	17c	2375
	17d	1150
	Average	1669
East Pit	OC3A	600
	OC3C	5050
	OC3D	13225
	Average	6292

3.1.3. Evidence of reproduction

Second generation tree seedlings were recorded throughout all polygons monitored in 2023, except for Polygon 3 and Polygon 5 (Table 25). The lack of second-generation tree seedlings at these polygons is likely due to the young age of rehabilitation at these polygons, being 6 and 5 years' old, respectively. However, buds were recorded on several shrub species and one tree species at both polygons.

Table 25: Evidence of reproduction

Polygon	Site	Trees			Shrubs		
		Second generation seedlings	Fruit	Buds	Second generation seedlings	Fruit	Buds
Polygon 1	1a	-	<i>Eucalyptus punctata</i> (Grey Gum)	-	-	-	-
	1b	<i>Eucalyptus albens</i> (White Box), <i>Acacia linearifolia</i> (Narrow-leaved Wattle)	<i>Acacia linearifolia</i>	-	<i>Acacia spectabilis</i> (Mudgee Wattle), <i>Acacia decora</i> (Western Silver Wattle), <i>Cassinia sifton</i> (Sifton Bush), <i>Acacia leucolobia</i>	-	<i>Acacia spectabilis</i> , <i>Cassinia sifton</i> , <i>Acacia leucolobia</i>
	1c	-	-	-	-	-	-
	1d	-	<i>Eucalyptus melliodora</i> (Yellow Box)	-	-	-	-
Polygon 2	2b	<i>Eucalyptus blakelyi</i> (Blakely's Red Gum), <i>Acacia linearifolia</i> ,	<i>Eucalyptus blakelyi</i>	-	<i>Dodonaea viscosa</i> (Hopbush), <i>Cassinia sifton</i>	<i>Dodonaea viscosa</i>	-
	2c	<i>Eucalyptus crebra</i> (Narrow-leaved Ironbark)	<i>Eucalyptus crebra</i>	<i>Acacia linearifolia</i>	-	<i>Kunzea ambigua</i> (Tick Bush)	<i>Acacia decora</i> , <i>Cassinia sifton</i> , <i>Acacia buxifolia</i> ,
	OC4A	<i>Callitris endlicheri</i> (Black Cypress Pine), <i>Eucalyptus crebra</i>	<i>Eucalyptus dwyeri</i> (Dwyer's Red Gum), <i>Eucalyptus punctata</i>	<i>Eucalyptus punctata</i> , <i>Eucalyptus dwyeri</i> , <i>Acacia linearifolia</i>	<i>Dodonaea boroniifolia</i> (Fern-leaf Hop-bush), <i>Cassinia sifton</i> , <i>Kunzea ambigua</i>	<i>Dodonaea boroniifolia</i>	<i>Acacia decora</i> , <i>Kunzea ambigua</i> , <i>Acacia brachystachya</i> (Umbrella Mulga), <i>Dodonaea boroniifolia</i>
Polygon 3	3a	-	-	-	-	-	-
	3b	-	-	<i>Acacia linearifolia</i>	-	<i>Acacia buxifolia</i> (Box-leaf Wattle)	<i>Acacia gladiiformis</i> (Sword Wattle)

Polygon	Site	Trees			Shrubs		
		Second generation seedlings	Fruit	Buds	Second generation seedlings	Fruit	Buds
	OC11A	-	-	<i>Acacia linearifolia</i>	-	<i>Acacia salicina</i> (Cooba), <i>Acacia buxifolia</i> , <i>Acacia gladiiformis</i> , <i>Acacia ixiophylla</i> (Sticky Leaved Wattle)	-
Polygon 4	4a	-	<i>Eucalyptus</i> sp.	<i>Eucalyptus blakelyi</i> , <i>Eucalyptus crebra</i>	<i>Acacia spectabilis</i> , <i>Cassinia sifton</i>	<i>Acacia decora</i>	<i>Acacia verniciflua</i> (Varnish Wattle), <i>Acacia ausfeldii</i> (Ausfeld's Wattle), <i>Acacia decora</i> , <i>Acacia spectabilis</i> , <i>Acacia dealbata</i> (Silver Wattle)
	4d	<i>Acacia linearifolia</i>	<i>Eucalyptus</i> sp.	<i>Eucalyptus moluccana</i>	<i>Acacia spectabilis</i> , <i>Acacia ausfeldii</i>	-	<i>Acacia buxifolia</i> , <i>Acacia ausfeldii</i> , <i>Cassinia sifton</i> , <i>Acacia spectabilis</i> , <i>Acacia verniciflua</i>
	4e	<i>Acacia linearifolia</i>	-	<i>Eucalyptus</i> sp.	-	-	<i>Acacia decora</i> , <i>Acacia spectabilis</i>
Polygon 5	5c	-	-	<i>Acacia linearifolia</i>	-	-	<i>Acacia buxifolia</i> , <i>Acacia decora</i> , <i>Dodonaea viscosa</i>
	5d	-	-	<i>Acacia linearifolia</i>	-	-	<i>Acacia buxifolia</i> , <i>Acacia spectabilis</i>
Polygon 6	6c	-	-		-	-	<i>Cassinia sifton</i>
	6d	<i>Acacia linearifolia</i>	-	<i>Acacia linearifolia</i>	-	-	<i>Cassinia sifton</i> , <i>Acacia verniciflua</i>
	6e	-	-	<i>Acacia linearifolia</i>	-	-	<i>Cassinia sifton</i> , <i>Acacia verniciflua</i> , <i>Acacia</i>

Polygon	Site	Trees			Shrubs		
		Second generation seedlings	Fruit	Buds	Second generation seedlings	Fruit	Buds
							<i>gladiiformis</i> , <i>Acacia ausfeldii</i>
Polygon 9	9a	<i>Eucalyptus melliodora</i>	<i>Eucalyptus moluccana</i>	<i>Eucalyptus moluccana</i> , <i>Eucalyptus melliodora</i> , <i>Acacia linearifolia</i>	<i>Acacia dealbata</i> (Blue Wattle)	<i>Acacia dealbata</i>	<i>Acacia dealbata</i>
	9b	<i>Acacia linearifolia</i>	<i>Acacia linearifolia</i>	-	-	<i>Acacia</i> sp.	<i>Acacia irrorata</i> (Green Wattle), <i>Acacia verniciflua</i> , <i>Acacia spectabilis</i> , <i>Acacia decora</i>
	9c	<i>Acacia linearifolia</i>	-	-	<i>Dodonaea viscosa</i>	<i>Dodonaea viscosa</i> , <i>Acacia irrorata</i> , <i>Acacia dealbata</i>	<i>Acacia spectabilis</i>
	OC8A	<i>Acacia linearifolia</i>	<i>Acacia linearifolia</i>	<i>Acacia linearifolia</i>	-	-	<i>Acacia ceasiella</i> (Tablelands Wattle), <i>Acacia brachystachya</i>
	OC8C	<i>Acacia linearifolia</i>	<i>Acacia linearifolia</i>	-	-	-	<i>Acacia spectabilis</i> , <i>Acacia dealbata</i> , <i>Acacia verniciflua</i> , <i>Acacia decora</i>
Polygon 11	11b	<i>Eucalyptus albens</i> , <i>Acacia linearifolia</i>	-	<i>Acacia linearifolia</i>	<i>Cassinia sifton</i> , <i>Acacia spectabilis</i> , <i>Acacia leucolobia</i>	-	<i>Acacia spectabilis</i> , <i>Acacia decora</i> , <i>Acacia leucolobia</i> , <i>Cassinia sifton</i>
	11c	<i>Eucalyptus blakelyi</i> , <i>Acacia linearifolia</i> , <i>Acacia doratoxylon</i> (Currawang)	-	<i>Eucalyptus blakelyi</i> , <i>Acacia linearifolia</i>	<i>Grevillea sericea</i> (Spider Grevillea), <i>Styphelia triflora</i> (Pink Five-corners), <i>Acacia decora</i> ,	-	<i>Grevillea sericea</i> , <i>Styphelia triflora</i> , <i>Acacia decora</i> , <i>Cassinia sifton</i> ,

Polygon	Site	Trees			Shrubs		
		Second generation seedlings	Fruit	Buds	Second generation seedlings	Fruit	Buds
					<i>Cassinia sifton</i> , <i>Kunzea parvifolia</i> (Violet Kunzea), <i>Acacia spectabilis</i>		<i>Kunzea parvifolia</i> , <i>Acacia spectabilis</i>
	11d	<i>Acacia linearifolia</i>	<i>Eucalyptus melliodora</i>	<i>Eucalyptus melliodora</i> , <i>Acacia linearifolia</i>	<i>Acacia spectabilis</i> , <i>Cassinia sifton</i> , <i>Acacia leucoloba</i>	-	<i>Acacia spectabilis</i> , <i>Cassinia sifton</i>
Polygon 14	14a	-	-	-	-	-	<i>Acacia spectabilis</i>
	14b	-	-	-	-	-	<i>Acacia deanii</i> (Deane's Wattle)
	14c	<i>Acacia implexa</i> (Hickory), <i>Eucalyptus blakelyi</i> , <i>Eucalyptus fibrosa</i> (Red Ironbark)	<i>Eucalyptus fibrosa</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus blakelyi</i>	<i>Eucalyptus fibrosa</i> , <i>Eucalyptus albens</i> , <i>Acacia linearifolia</i> , <i>Eucalyptus blakelyi</i>	<i>Cassinia sifton</i> , <i>Acacia spectabilis</i>	-	<i>Cassinia sifton</i> , <i>Acacia spectabilis</i>
	14d	-	-	<i>Acacia linearifolia</i>	-	-	<i>Dodonaea viscosa</i> , <i>Acacia decora</i> , <i>Cassinia sifton</i> , <i>Acacia spectabilis</i> , <i>Acacia gladiiformis</i> , <i>Acacia verniciflua</i>
Polygon 16	16a	<i>Eucalyptus blakelyi</i> , <i>Acacia linearifolia</i> , <i>Angophora floribunda</i> (Rough-barked Apple)	<i>Eucalyptus blakelyi</i> , <i>Acacia linearifolia</i> , <i>Angophora floribunda</i>	<i>Eucalyptus blakelyi</i>	<i>Kunzea parvifolia</i> , <i>Acacia spectabilis</i>	<i>Kunzea parvifolia</i> , <i>Acacia spectabilis</i>	<i>Kunzea parvifolia</i>
	16b	<i>Acacia implexa</i>	-	-	<i>Acacia baileyana</i> , <i>Cassinia sifton</i>	<i>Acacia baileyana</i> , <i>Acacia spectabilis</i>	-

Polygon	Site	Trees			Shrubs		
		Second generation seedlings	Fruit	Buds	Second generation seedlings	Fruit	Buds
	16c	-	<i>Acacia implexa</i>	-	<i>Acacia baileyana, Acacia spectabilis</i>	<i>Acacia baileyana, Acacia spectabilis</i>	-
	OC2B	<i>Acacia linearifolia</i>	<i>Acacia linearifolia, Callitris endlicheri</i>	<i>Acacia linearifolia</i>	<i>Cassinia sifton, Cassinia quinquefaria, Leucopogon muticus (Blunt Beard Heath)</i>	-	<i>Cassinia sifton, Cassinia quinquefaria, Leucopogon muticus</i>

3.1.4. Slopes, landform stability and erosion

No erosion was recorded within monitoring quadrats. However, landform settlement cracking was recorded in Polygon 5 (Plate 1), active gully erosion was recorded within Polygon 1, Polygon 6 (Plate 2) and a broken swale was recorded in Polygon 9 (Plate 3 and Plate 4). Locations of these features are shown in Figure 2, Figure 3 and Figure 4 below.



Plate 1: Landform settlement cracking in Polygon 5



Plate 2: Active gully erosion in Polygon 6



Plate 3: Broken swale resulting in tunnelling in Polygon 9



Plate 4: Broken swale resulting in tunnelling in Polygon 9

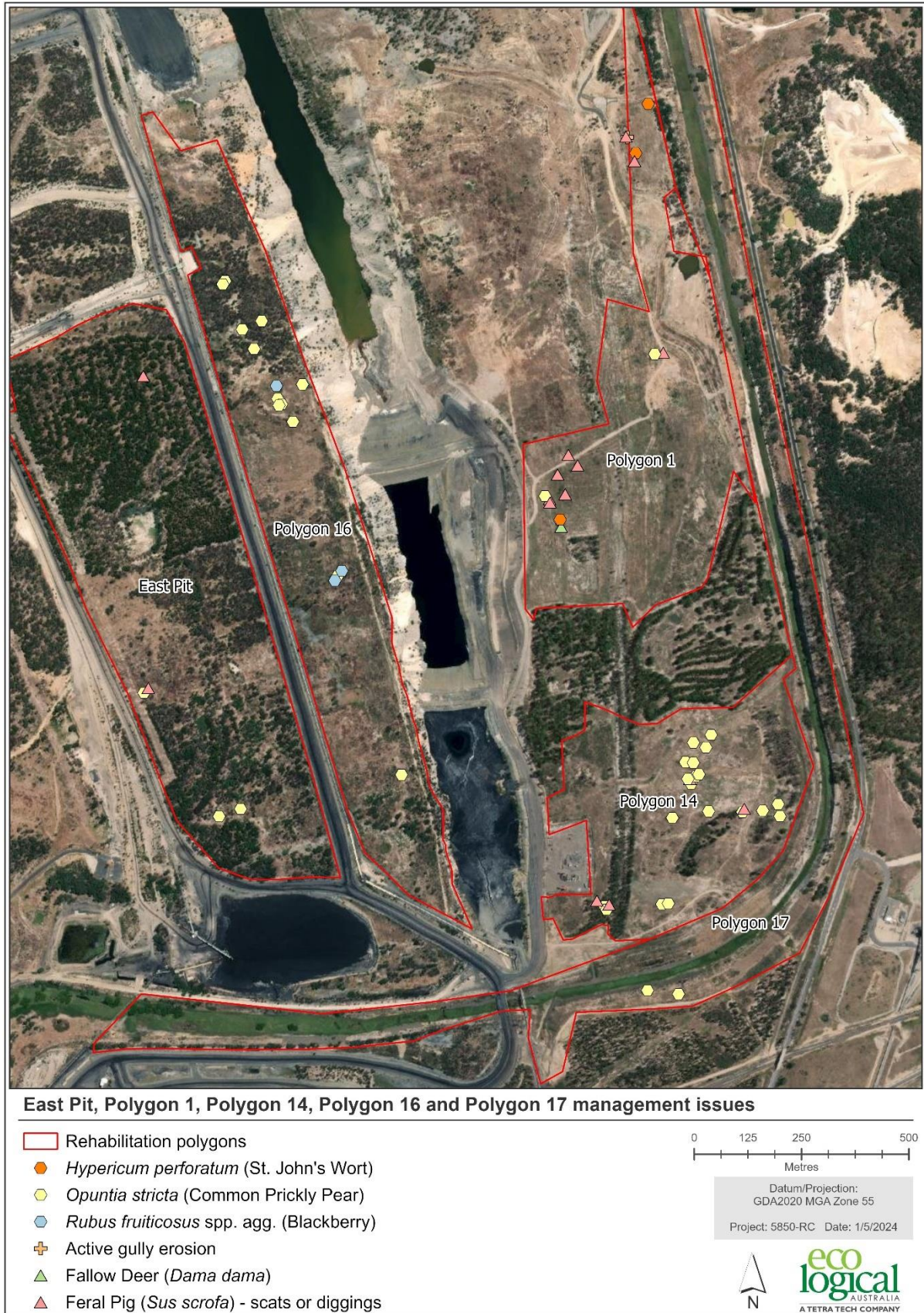


Figure 2: East Pit, Polygon 1, Polygon 14, Polygon 16 and Polygon 17 management issues



Figure 3: Polygon 2, Polygon 3, Polygon 4, Polygon 10 and Polygon 11 management issues

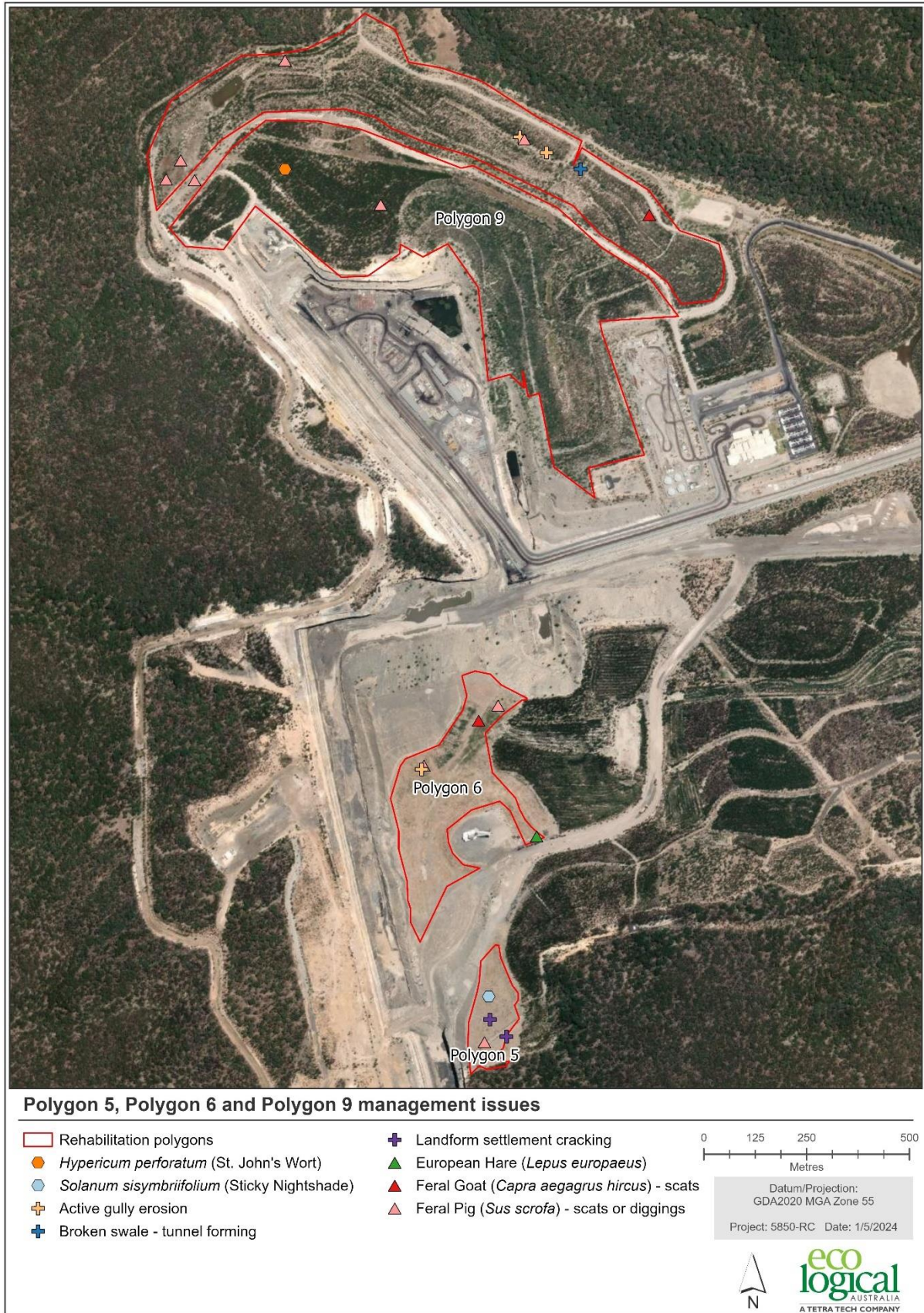


Figure 4: Polygon 5, Polygon 6 and Polygon 9 management issues

3.1.5. Weed presence

A total of three High Threat Exotics (HTEs) were recorded during monitoring in 2023:

- *Cathannus lanatus* (Saffron Thistle) – 1a, 14b and 14d.
- *Cyperus eragrostis* (Umbrella Sedge) – 4d, 5c, 5d, 6c, 6e and 9a.
- *Hypericum perforatum* (St. John’s Wort) – recorded at every site except 2b.

HTE cover was generally low, with all polygons recording less than 6% HTE PFC (Figure 5).

Hypericum perforatum, which is also listed as a Priority Weed under the *Central Tablelands Regional Strategic Weed Management Plan 2022-2027* (LLS 2022), contributed the highest amount to overall HTE PFC and Priority Weed PFC.

Three other Priority Weeds were recorded within the rehabilitation during walkovers (i.e. not within floristic plots) and include:

- *Opuntia stricta* (Common Prickly Pear) – occurrences throughout Polygon1, Polygon 2, Polygon 4, Polygon 10 and Polygon 14.
- *Rubus fruticosus* spp. aggr. (Blackberry) – occurrences throughout Polygon 10 and Polygon 16.
- *Solanum sisymbriifolium* (Sticky Nightshade) – Single occurrence in Polygon 5.

Locations of Priority Weeds are presented on Figure 2, Figure 3 and Figure 4 above. Given the wide extent of *Hypericum perforatum*, only dense infestations of this species are shown on these figures.

Figure 5: HTE and Priority Weed cover

Polygon	Site	Exotic PFC %	HTE PFC %	PW PFC %
Polygon 1	1a	24.4	5.1	5
	1b	15.7	5	5
	1c	24	1	1
	1d	24.7	5	5
	Average	22.2	4	4
Polygon 2	2b	3.8	0	0
	2c	14.4	2	2
	OC4A	2.8	2	2
	Average	7	1.3	1.3
Polygon 3	3a	6.8	0.1	0.1
	3b	1.8	0.1	0.1
	OC11A	1.8	0.1	0.1
	Average	3.5	0.1	0.1
Polygon 4	4a	35.6	5	5
	4d	4.5	0.2	0.3
	4e	32.5	10	10
	Average	24.2	6.8	5.1

Polygon	Site	Exotic PFC %	HTE PFC %	PW PFC %
Polygon 5	5c		0.3	0.2
	5d		0.3	0.2
	Average	9.6	0.3	0.2
Polygon 6	6c		6.2	0.2
	6d	35.1	0.1	0.1
	6e		0.3	0.2
	Average	22.7	2.2	0.2
Polygon 9	9a	33.8	0.4	0.2
	9b	2.3	0.2	0.2
	9c	3.9	0.4	0.4
	OC8A	4.3	1	1
	OC8C	11.3	0.2	0.2
	Average	11.2	0.4	0.4
Polygon 10	10a	62.3	30.1	30.1
	10b	7	1	0.5
	OC4B	16.2	10	10
	OC4C	9	0.2	0.2
	Average	23.6	10.4	10.2
Polygon 11	11b	2.5	0.5	0.5
	11c	3.8	0.5	0.5
	119	2.3	0.5	0.5
	Average	2.9	0.5	0.5
Polygon 14	14a	40.3	0.3	0.3
	14b	18	0.5	0.4
	14c	16.9	5	5
	14d	35.5	3.1	3
	Average	22.7	0.4	2.2
Polygon 16	16a	5.5	0.1	0.1
	16b	18.6	0.1	0.1
	16c	16	10	10
	OC2B	6.7	0.3	0.3
	Average	11.7	2.6	2.6

3.2. GCAA Rehabilitation Report Card

Results from the GCAA Rehabilitation Report Card are provided in Figure 6 below. All Polygons fall within the 'maintenance' performance category, except Polygon 9 and Polygon 5.

Polygon 9 falls within the 'rework' performance category due to significant gully erosion and drainage structure failures in a localised area (see Plate 3, Plate 4 and Figure 4 above).

According to the GCAA Rehabilitation Report Card Polygon 5 is the best performing Polygon, with only one category scoring 'maintenance' (function). Function scores could be increased by installing large woody debris within this Polygon; however, function scores also likely to increase as the vegetation matures and stem diameter increases.

Tree stem and canopy were the lowest performing categories, with all Polygons recording 'monitor' or 'maintenance' scores.

Polygons which scored 'maintenance' for tree stem density recorded stem density above the optimal range identified by the calculator (300-800 stems/ha), except for the East Pit rehabilitation which recorded lower stem density than the optimal range.

All polygons which scored 'maintenance' for canopy, recorded canopy covers lower than the optimal range identified by the calculator (15-50% PFC).

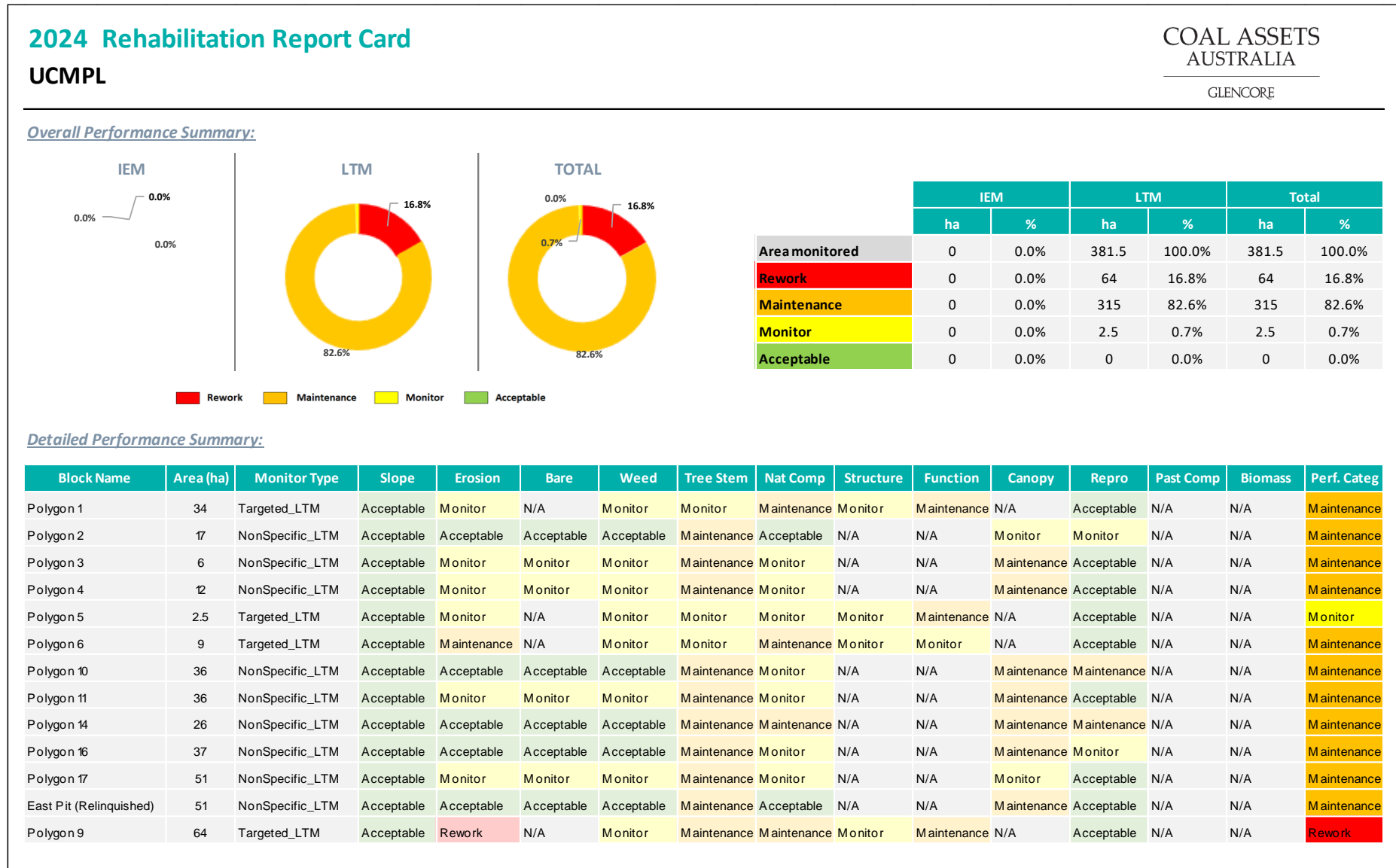


Figure 6: 2024 Rehabilitation Report Card

3.3. BMP Domain F: Biodiversity Vegetation Offset Areas

3.3.1. Reproduction in MZ3

Second-generation seedlings were recorded at four (4) out of the eight (8) MZ3 sites monitored during 2023 (Table 26). Despite the age of these MZ3 planted areas (8-9 years), most individuals have not yet reached reproductive age, particularly woodland areas planted with *Eucalyptus albens*.

Table 26: Reproduction in MZ3

Vegetation	Site	Year of revegetation	Reproduction
Forest	BOB15B	2015	Second-generation seedlings of <i>Acacia linearifolia</i> (Narrow-leaved Ironbark)
	BOB21	2015	Second-generation seedlings of <i>Eucalyptus crebra</i> , <i>Acacia linearifolia</i> , <i>Brachychiton populneus</i> (Kurrajong), <i>Eucalyptus sideroxylon</i> (Mugga Ironbark), <i>Eucalyptus macrocarpa</i> (Inland Grey Box)
	BOB23	2015	Second generation seedlings of <i>Angophora floribunda</i> (Rough-barked Apple) and <i>Eucalyptus crebra</i>
	BOBC7	2016	None
Woodland	BOB10B	2015	None
	BOBE6	2016	None
	BOB12	2015	None
	UCML_CA_Site9	2015	Second-generation seedlings of <i>Eucalyptus macrocarpa</i>

3.3.2. Stem density

Stem density for MZ2 and MZ3 sites monitored during 2023 is provided in Figure 7.

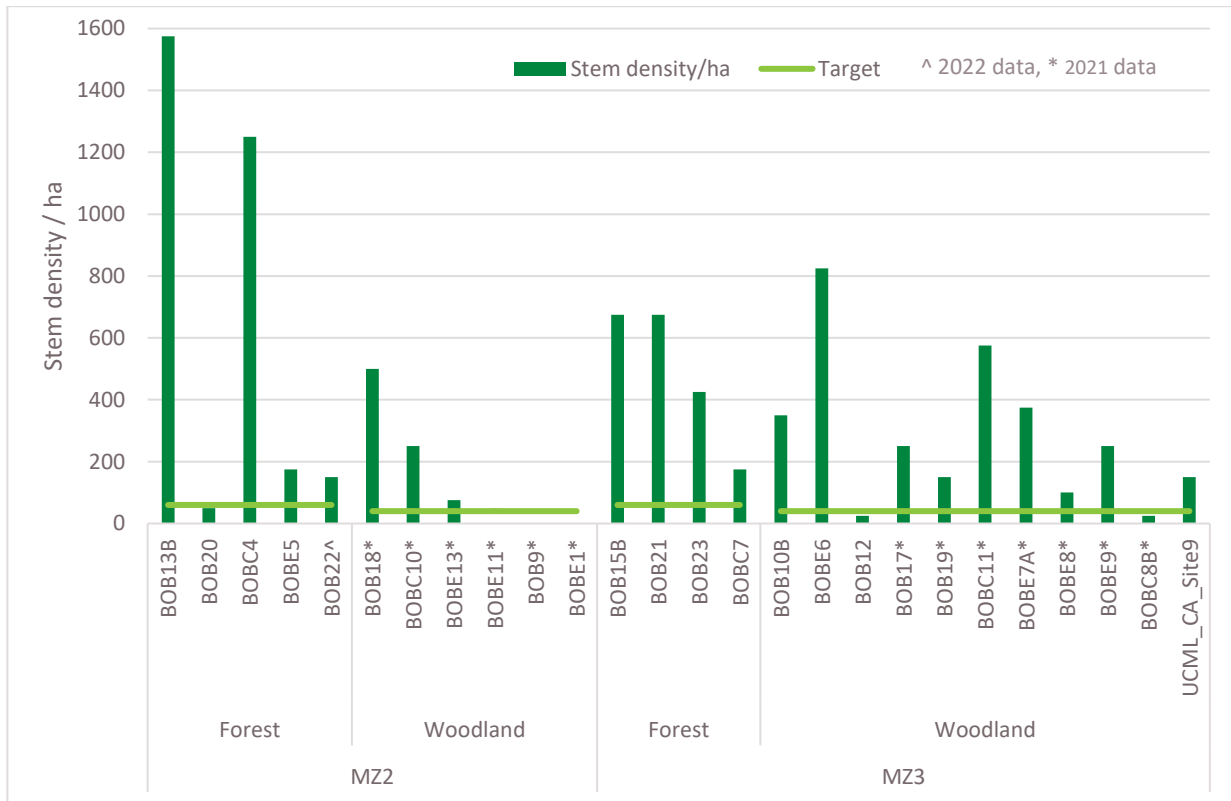


Figure 7: Stem density for MZ2 and MZ3 sites

3.3.2.1. MZ2

All MZ2 forest sites recorded stem density >60 stems/ha except BOB20. Tree species recruitment at BOB20 was recorded for the first time in 2022 since monitoring at this site commenced in 2016, with one *Eucalyptus crebra* (Narrow-leaved Ironbark) sapling recorded. An additional sapling (*Eucalyptus sideroxylon* (Mugga Ironbark)) was recorded during 2023, indicating that stem density at this site is increasing. Given the proximity to maturing *Eucalyptus sideroxylon* and *Eucalyptus crebra* trees, just outside the plot (Plate 5), but within the MZ2 area that this plot represents, it is likely that recruitment will increase as trees mature. Stem density (sapling density) is expected to increase over the next few years.

Half of the MZ2 woodland sites have recorded stem density >40 stems/ha (BOB18, BOBC10, BOBE13). BOBE11, BOB9 and BOBE1 recorded zero (0) tree species within the plot during monitoring in 2021 (when monitoring was last undertaken). These sites are all located within an area of very open *Eucalyptus albens* (White Box) woodland on fertile basalt derived soils, with very rocky, shallow soil areas occurring on hill tops. When assessed on a landform scale, tree density for those visible in aerial imagery is approximately 10 stems/ha (range 0-15 stems/ha); however, this may be an underestimation as immature individuals, or individuals growing close to another tree weren't detected in the imagery. It is possible that soil fertility is allowing for a dense perennial grass sward which may be inhibiting tree species germination. Review of aerial imagery indicates that woodland communities on basalt hills, like the sporadic occurrences within the Goulburn River National Park exhibit an approximate stem density

range between 20 – 40 stems/ha, which may be a result of soil fertility and shallow, rocky soils, so a lower stem density target may be more appropriate for these areas.



Plate 5: Maturing *Eucalyptus sideroxylon* and *Eucalyptus crebra* trees within MZ2 near BOB20



Plate 6: Site BOBE11 showing dense perennial grass sward and widely spaced remnant *Eucalyptus albens* trees

3.3.2.2. MZ3

All woodland and forest MZ3 sites recorded stem density >40 and >60 stems /ha, respectively (Figure 7), except the woodland sites BOB12 and BOBC8B.

As discussed in the UCMPL Annual Flora Monitoring Report 2023 (ELA 2023f), BOB12 is located within an area atypical of the surrounding vegetation condition which contains *Eucalyptus albens* at a density of approximately 250 stems/ha (Plate 7). This site was established prior to the planting activities, and it is possible that planting was never undertaken within the plot boundaries. Re-positioning of this monitoring site may allow for a more accurate assessment of stem density; however, BOB12 is also a monitoring site for the *Bobadeen Vegetation Offset Area Conservation Agreement* (UCML 2019) and adjusting this site is not permissible under the Conservation Agreement.

Despite recording a stem density of 20 stems/ha when last monitored, a planting survival assessment determined that the 'planting cell' BOBC8B is located within an area which recorded an approximate average stem density of 250 stems/ha (ELA 2022b). The low stem density/ha is likely due to plot positioning not being entirely reflective of the overall vegetation condition. Planted *Eucalyptus* spp. are visible outside of the plot at much higher densities (Plate 8).



Plate 7: Planted *Eucalyptus albens* showing good stem density outside of plot BOB12



Plate 8: Remnant *Eucalyptus moluccana* (Grey Box) and planted *Eucalyptus* sp. located outside of site BOBC8B

3.3.3. Native species richness

Native species richness recorded at each site within MZ1, MZ2 and MZ3 was within the range recorded during previous years (Figure 8, Figure 9 and Figure 10).

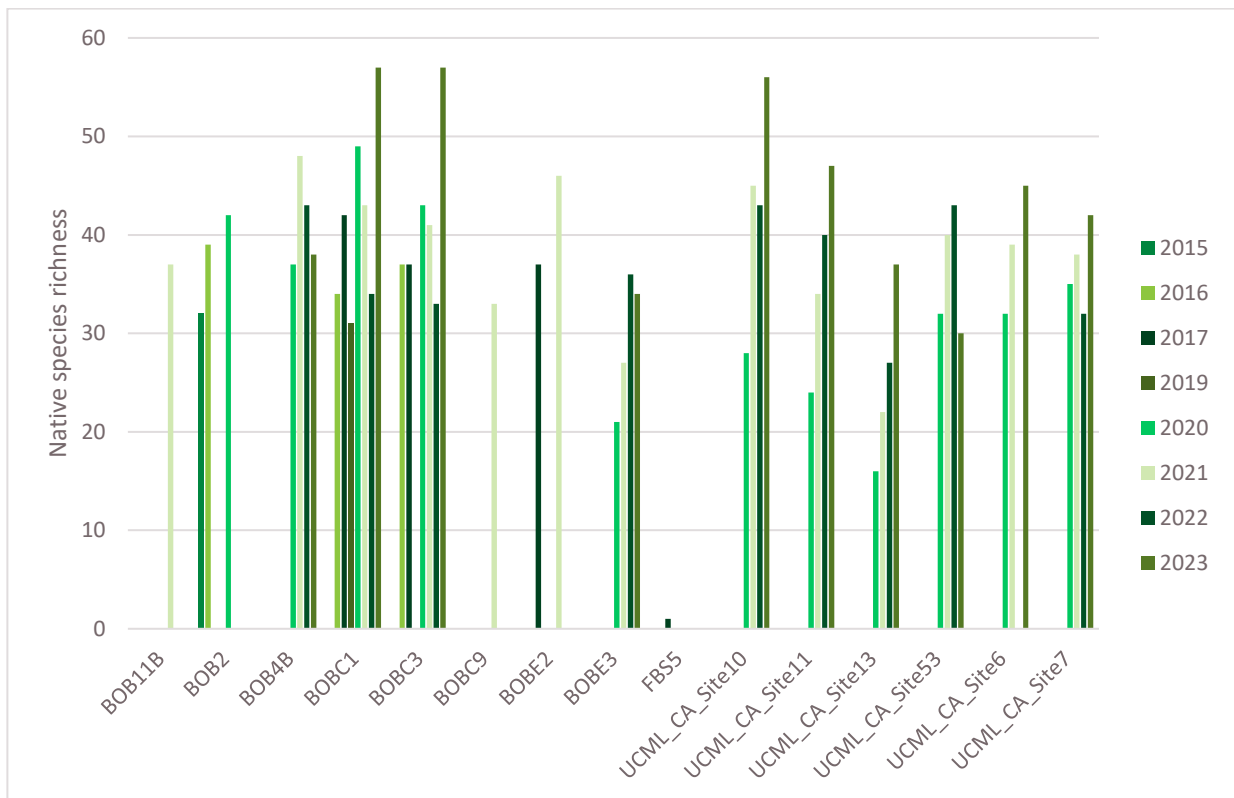


Figure 8: Native species richness at MZ1 sites, 2015-2023

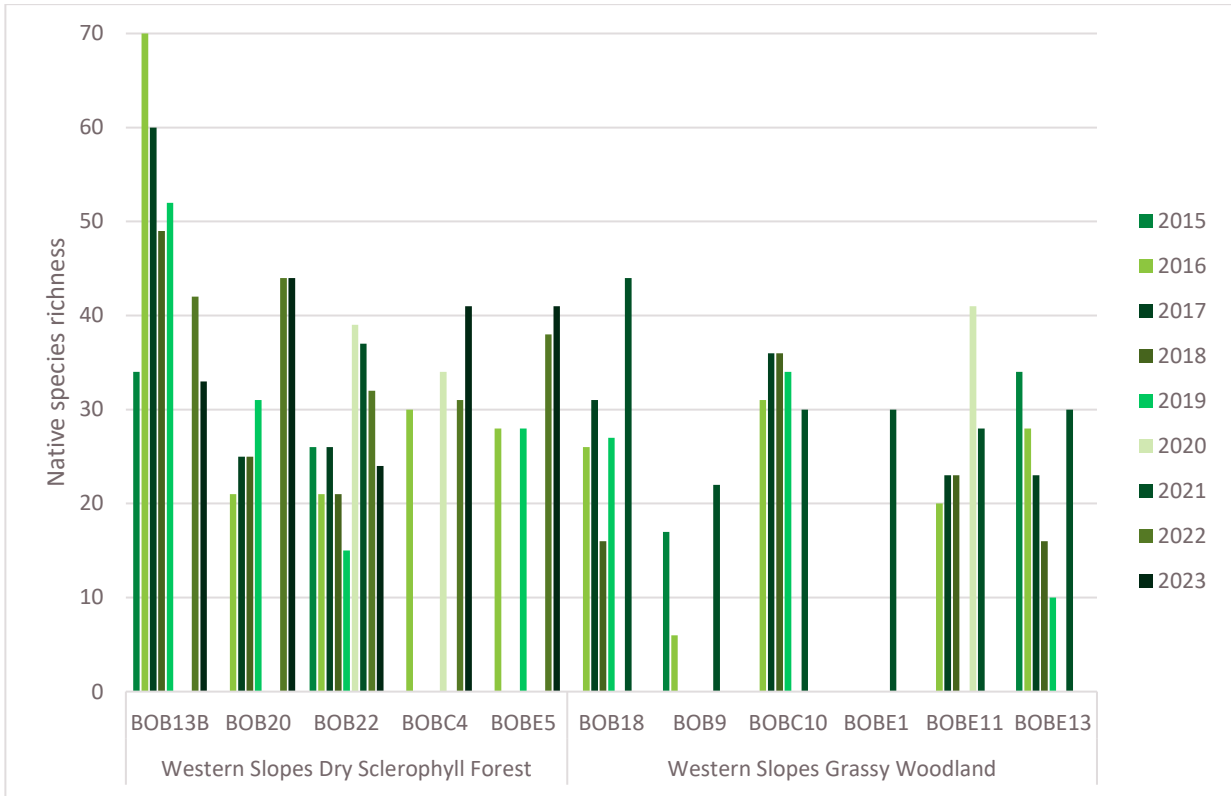


Figure 9: Native species richness at MZ2 sites, 2015-2023

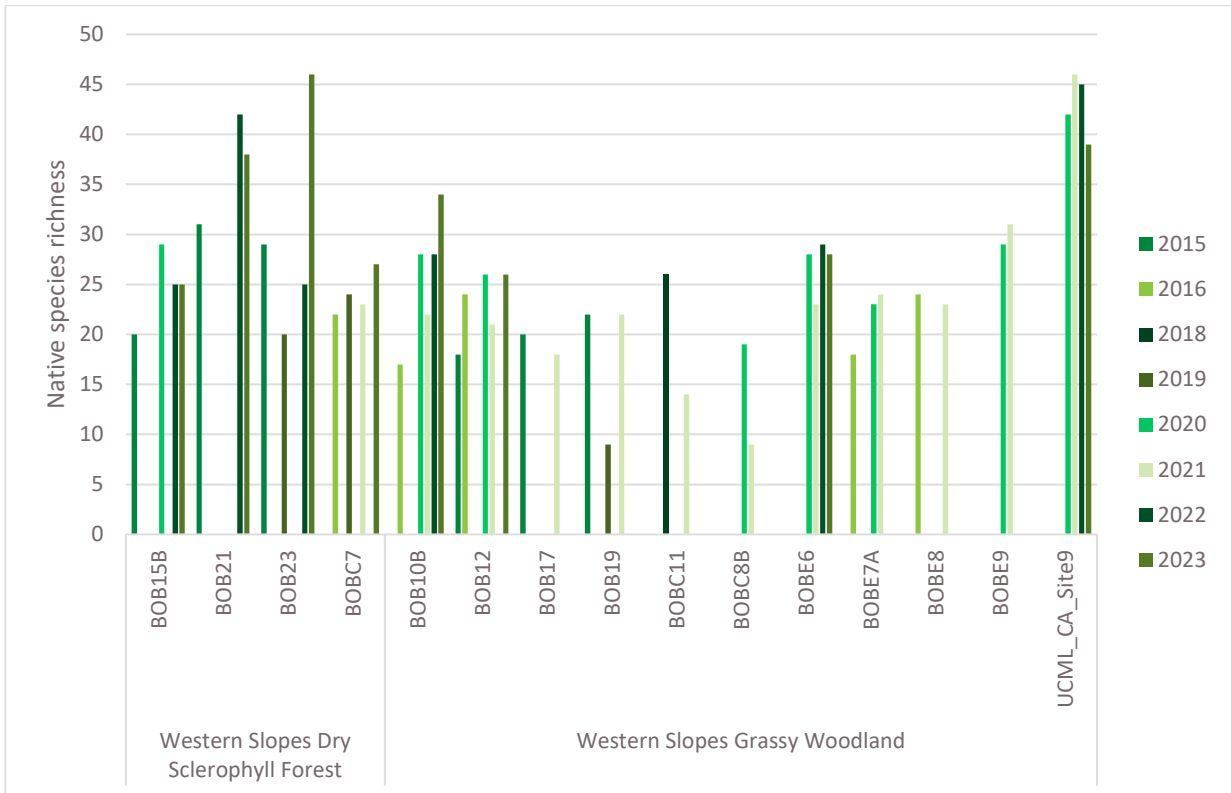


Figure 10: Native species richness at MZ3 sites, 2015-2023

Native species richness at woodland sites within MZ2 and within MZ3 have been within the range recorded at MZ1 sites, with the median for MZ2 and MZ3 sites consistently slightly lower than the median for MZ1 sites (Figure 11 and Figure 12). Since 2011, there has been a slight increase in median native species diversity for both MZ2 and MZ3 sites. Linear trend lines for MZ1 median and MZ2 median (Figure 11) indicates that MZ2 median is not trending towards the MZ1 median; however, the dataset is incomplete with a distinct increase in MZ3 median native species richness likely a result of the addition of several monitoring sites.

Converging linear trend lines for MZ1 and MZ3 median native species richness (Figure 12) indicates that MZ2 median native species richness is trending towards MZ1 median values.

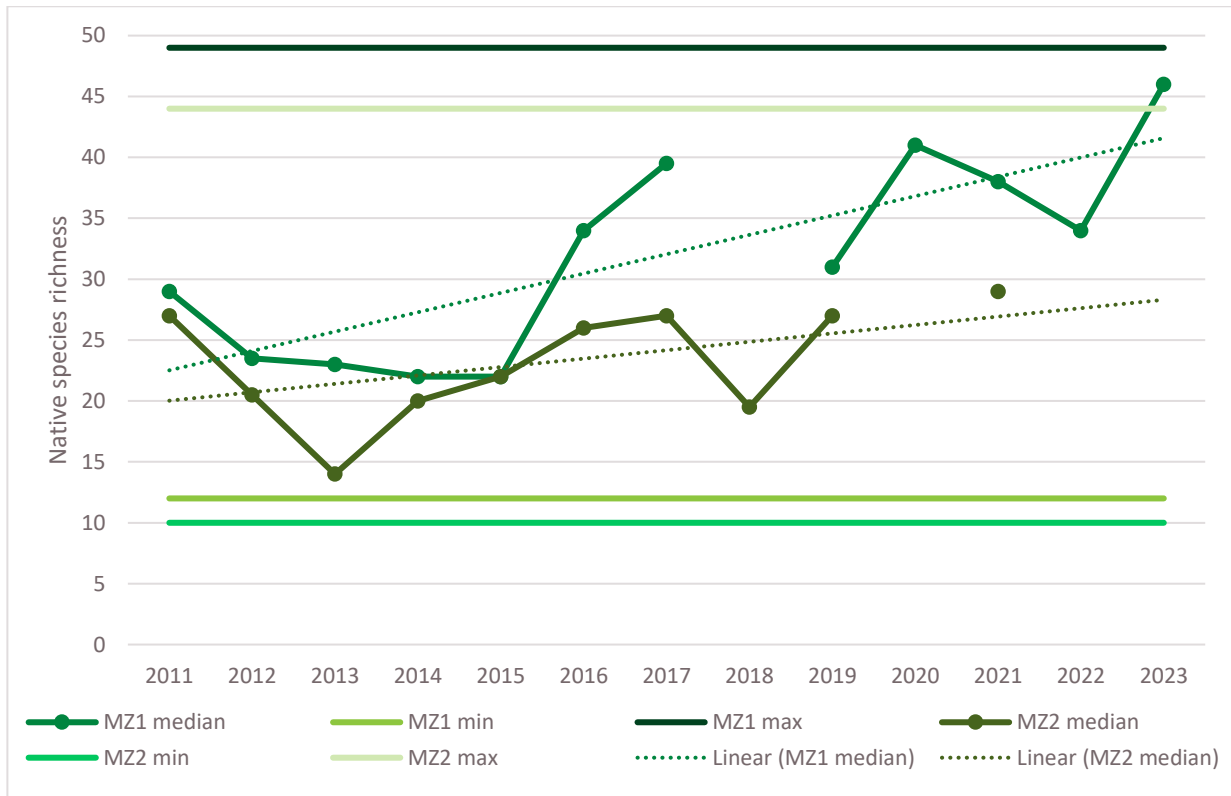


Figure 11: Grassy woodland native species richness trends – MZ1 compared to MZ2

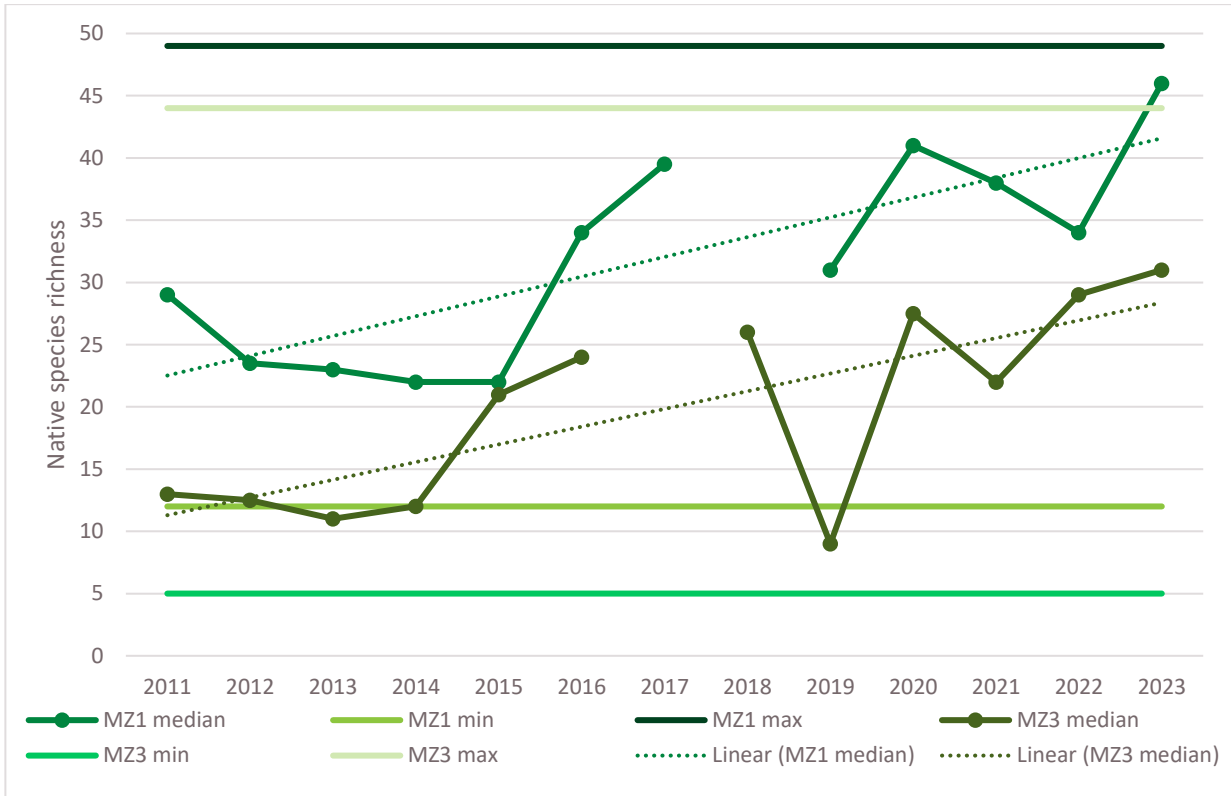


Figure 12: Grassy woodland native species richness trends – MZ1 compared to MZ3

Median native species richness values at MZ2 forest sites are comparable with MZ1 sites, with a slight convergence on linear trend lines for MZ1 median and MZ2 median native species richness (Figure 13). Similarly, median native species richness values at MZ3 forest sites are comparable with MZ1 sites, and also exhibits a slight convergence in linear trend lines for MZ1 median and MZ3 median native species richness (Figure 14).

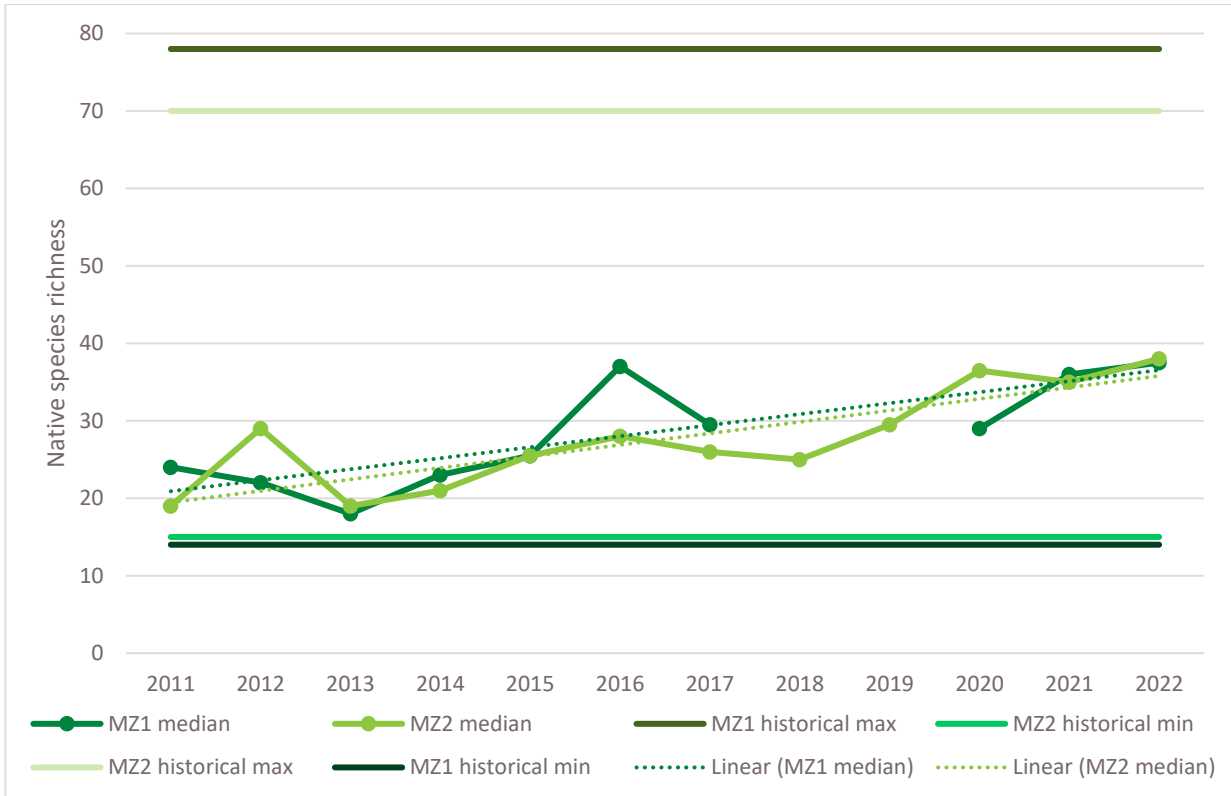


Figure 13: Forest native species richness trends – MZ1 compared to MZ2

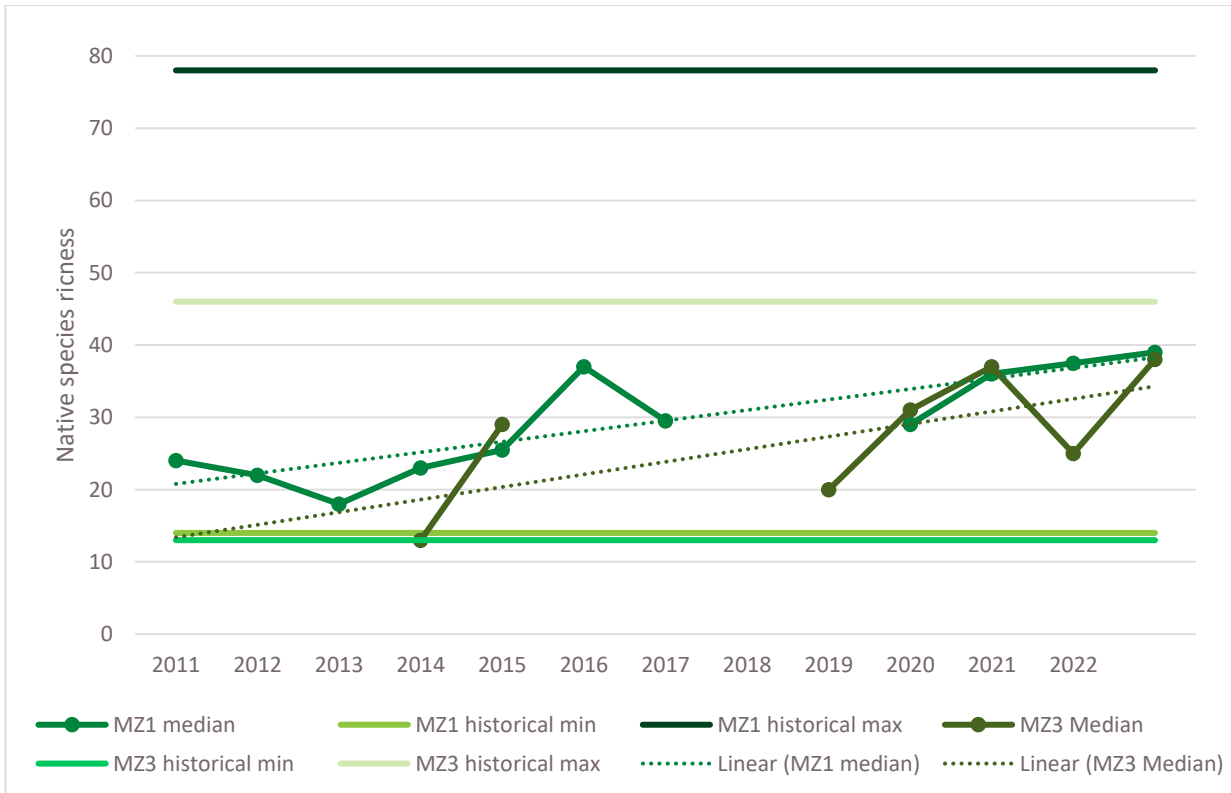


Figure 14: Forest native species richness trends – MZ1 compared to MZ3

3.3.4. Box Gum Woodland assessment

The EPBC Act Policy Statement for White Box – Yellow Box – Blakely’s Red Gum grassy woodlands and derived native grasslands identifies species which are important species for the purposes of this ecological community (DEH 2006). At least one important species must be present within patches of White Box – Yellow Box – Blakely’s Red Gum grassy woodlands and derived native grasslands to satisfy the EPBC Act listing criteria.

Figure 15 below, shows the average number of important species in MZ1, MZ2 and MZ3 from 2011 to 2023, as well as cumulative averages for each MZ. Whilst the average number of important species for MZ1 has fluctuated between 2011 to 2023, the cumulative average number of important species has remained relatively stable, which is reflective of benchmark vegetation. The MZ1, MZ2 and MZ3 cumulative averages indicate an increase in the number of important species recorded over the years.

The process of some species returning to White Box – Yellow Box – Blakely’s Red Gum grassy woodlands and derived native grasslands which have undergone planting or other restoration is slow. The recalcitrant species, such as *Hypericum gramineum* (Small St. John’s Wort), *Solenogyne dominii* and *Goodenia hederacea* (Forest Goodenia) may be very slow to return or may never return without intervention. Literature indicates that the trajectory of restoration of Box Gum Woodlands may be too slow to detect within 10 years of establishment (Wilkins, Keith and Adam 2003).

The most abundant important species throughout the MZ’s remain to be *Calotis lappulacea* (Yellow Burr Daisy), *Calotis cuneifolia* (Purple Burr Daisy), *Grona varians* (Slender Tick-trefoil) and *Glycine tabacina*. Their readily transportable seeds have resulted in its successful establishment through MZ2 and MZ3.

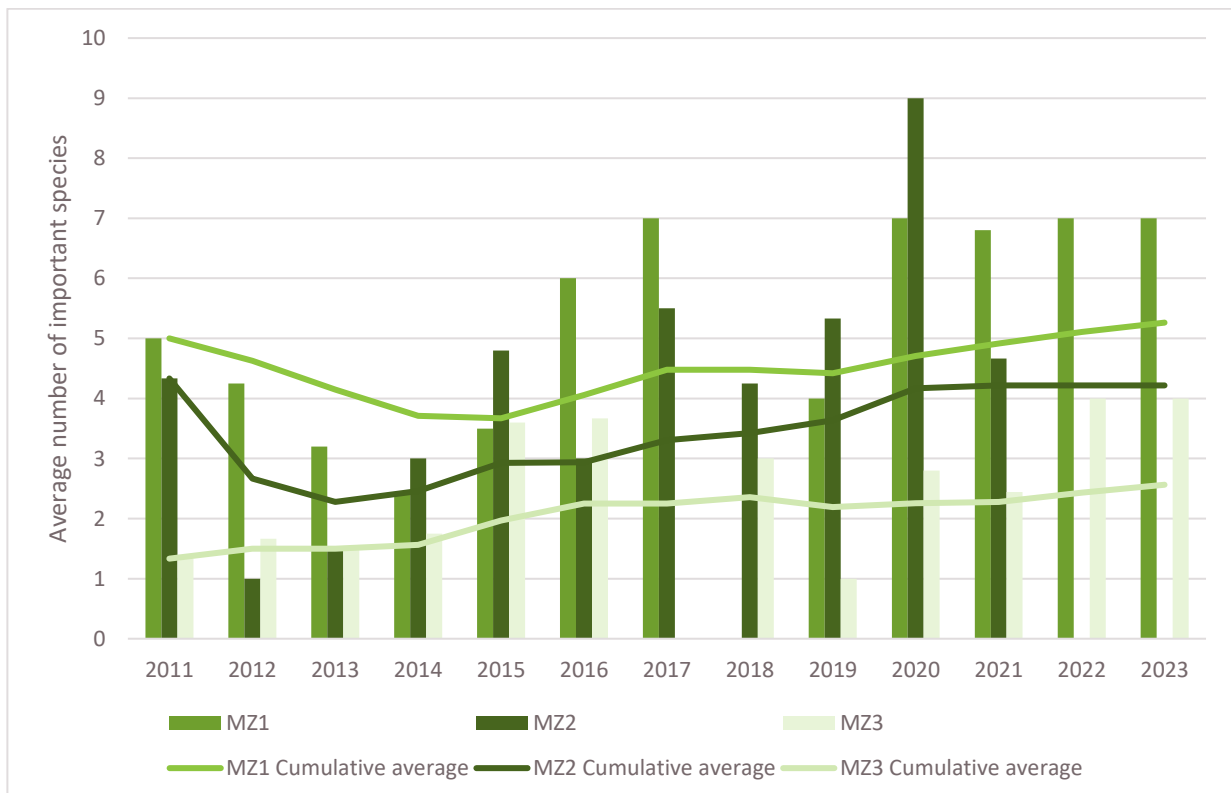


Figure 15: Average number of important species; 2011 to 2023

The condition thresholds defined by the Policy Statement (DEH 2006) are outlined below. MZ2 and MZ3 have been assessed as separate patches. MZ2 is currently conforms to the CEEC Box Gum Woodland (i.e. is consistent with the Policy Statement (DEH 2006)); however, areas within MZ3 where the ground cover is not dominated by perennial native species (i.e. the areas surrounding site BOB12) do not meet the listing criteria for Box Gum Woodland under the EPBC Act.

Table 27: EPBC Act Box Gum Woodland assessment – MZ2

Criteria	MZ2*
Policy Statement (DEH 2006)	
Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?	The most common overstorey species was White Box, which was recorded at sites BOBE13 and BOB18. Blakely's Red Gum was also recorded at BOBC10.
Does the patch have a predominately ¹ native understorey? A predominately native ground layer is one where at least 50% of the perennial vegetation cover in the ground layer is made up of native species (DEH 2006).	Overall, the sites within MZ2 exhibited a predominately native perennial understorey. The dominant groundcover includes the native perennial grasses <i>Sporobolus creber</i> (Rat's Tail Fescue), <i>Aristida ramosa</i> , <i>Aristida vagans</i> (Three-awn speargrass), <i>Microlaena stipoides</i> , <i>Austrostipa scabra</i> (Speargrass), and <i>Eragrostis leptostachya</i> . Generally, areas with lower canopy cover exhibited higher exotic annual species groundcover, including <i>Setaria pumila</i> , <i>Conyza bonariensis</i> , and <i>Carthamus lanatus</i> (Saffron Thistle). The perennial exotic species, <i>Hypericum perforatum</i> (St. John's Wort) was also present at all MZ2 sites, though had an overall low PFC. The presence of a predominately native ground layer indicates that the sites within MZ2 remain a contiguous patch, which is consistent with the Policy Statement (DEH 2006).
Is the patch 0.1 ha or greater?	The size of the patch is >0.1ha
There are 12 or more native understorey species present (excluding grasses). There must be at least one 'important species' as per the Species List for the Policy Statement (DEH 2006) If, not, is the patch 2 ha or greater in size? And, does the patch have an average of 20 or more mature trees per hectare, or is there natural regeneration of the dominant overstorey eucalypts?	At the time of survey in 2021* there were more than 12 non-grass native groundcover species within the ground layer of MZ2, including <i>Glycine tabacina</i> ., <i>Calotis lappulacea</i> (Yellow Burr Daisy), <i>Calotis cuneifolia</i> (Purple Burr Daisy), <i>Dichondra repens</i> (Kidney Weed), <i>Cynoglossum australe</i> , <i>Oxalis perennans</i> , <i>Geranium solanderi</i> (Native Geranium), <i>Haloragis heterophylla</i> (Rough Rasp wort), <i>Cheilanthes sieberi</i> , <i>Vittadinia muelleri</i> , <i>Geranium solanderi</i> , <i>Hydrocotyle laxiflora</i> and <i>Einadia nutans</i> (Climbing Saltbush). Several important species were recorded in 2021, including <i>Desmodium varians</i> , <i>Asperula conferta</i> , <i>Glycine tabacina</i> and <i>Glycine clandestina</i> , and <i>Sida corrugata</i> . Richness of non-grass groundcover species and important species is consistent with the Policy Statement (DEH 2006).
Listing Advice (TSSC 2006)	
'A remnant with a significant ground layer of tussock grasses, and where the distribution of shrubs is scattered or patchy, is part of the ecological community. In shrubby woodlands, the dominance of native tussock grasses in the ground layer of vegetation is lost. Therefore, a remnant with a continuous shrub layer, in which the shrub cover is greater than 30%, is considered to be a shrubby woodland	Shrub cover is sparse to absent (<1% PFC) throughout MZ2, but where present, it is comprised of <i>Cassinia sifton</i> (Sifton Bush) and <i>Acacia implexa</i> (Hickory Wattle).

Criteria	MZ2*
<i>and so is not part of the listed ecological community.'</i>	
<i>Tree cover is generally discontinuous and consists of widely spaced trees of medium height in which the canopies are clearly separated'</i>	Tree cover is discontinuous, with the canopy rarely touching.
<i>'This ecological community occurs in areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 metres to 1200 metres'</i>	Rainfall for the Ulan region is 655 mm per year (BoM 2024). MZ2 contains moderately fertile basalt derived clay loam soils. Altitude within MZ2 ranges from 560 to 570 m above sea level.
Outcome	MZ2 conforms to the EPBC Act listing criteria for Box Gum Woodland.
*No MZ2 grassy woodland sites were monitored during 2023. Data presented here is from 2021.	

Table 28: EPBC Act Box Gum Woodland assessment – MZ3

Criteria	MZ3
Policy Statement (DEH 2006)	
Is, or was previously, at least one of the most common overstorey species White Box, Yellow Box or Blakely's Red Gum?	The most common overstorey species was Blakely's Red Gum recorded at sites BOBE6 and BOB10B. Yellow Box was also recorded at BOBE6 and a solitary White Box at BOB12. <i>Eucalyptus moluccana</i> (Grey Box) was also present at BOB10B.
Does the patch have a predominately native understorey? A predominately native ground layer is one where at least 50% of the perennial vegetation cover in the ground layer is made up of native species (DEH 2006).	Overall, the sites within MZ3 exhibited a predominately native perennial understorey. The dominant groundcover includes the native perennial grasses <i>Sporobolus creber</i> (Rat's Tail Fescue), <i>Sporobolus elongatus</i> , <i>Aristida vagans</i> (Threeawn speargrass), <i>Austrostipa scabra</i> (Speargrass), and <i>Rytidosperma</i> spp. (wallaby grasses). Generally, areas with lower canopy cover exhibited higher exotic annual species groundcover, including <i>Paspalum dilatatum</i> , <i>Conyza bonariensis</i> , <i>Verbena bonariensis</i> (Purpletop), and <i>Carthamus lanatus</i> (Saffron Thistle). The perennial exotic species, <i>Hypericum perforatum</i> (St. John's Wort) was also present at the MZ3 sites, with one site, BOB12, recording a PFC of 40%. During 2023, the cover of the perennial weed species <i>Hypericum perforatum</i> was estimated to be 45%, a 5% increase since 2022. The presence of a high exotic cover at BOB12 indicates that the sites within MZ3 don't form a contiguous patch, and therefore does not comply with the Policy Statement (DEH 2006). Areas in which <i>Hypericum perforatum</i> forms the dominant groundcover (i.e. the ground cover is not predominately native) do not meet the listing criteria.
Is the patch 0.1 ha or greater?	The size of the patch is >0.1ha
There are 12 or more native understorey species present (excluding grasses). There must be at least one 'important species' as per the Species List for the Policy Statement (DEH 2006) If, not, is the patch 2 ha or greater in size?	At the time of the 2023 survey there were more than 12 non-grass native groundcover species within the ground layer of MZ3, including <i>Glycine tabacina.</i> , <i>Calotis lappulacea</i> (Yellow Burr Daisy), <i>Calotis cuneifolia</i> (Purple Burr Daisy), <i>Dichondra repens</i> (Kidney Weed), <i>Cynoglossum australe</i> , <i>Oxalis perennans</i> , <i>Geranium solanderi</i> (Native Geranium), <i>Haloragis heterophylla</i> (Rough Rasp wort), <i>Mentha saturoioides</i> ,

Criteria	MZ3
And, does the patch have an average of 20 or more mature trees per hectare, or is there natural regeneration of the dominant overstorey eucalypts?	<i>Vittadinia cuneata</i> <i>Wahlenbergia communis</i> , <i>Alternanthera nana</i> and <i>Einadia nutans</i> (Climbing Saltbush). Several important species were recorded in 2023, including <i>Desmodium varians</i> , <i>Dichelachne micrantha</i> , <i>Glycine clandestina</i> and <i>Glycine tabacina</i> , and <i>Sida corrugata</i> . Richness of non-grass groundcover species and important species is consistent with the Policy Statement (DEH 2006).
Listing Advice (TSSC 2006)	
'A remnant with a significant ground layer of tussock grasses, and where the distribution of shrubs is scattered or patchy, is part of the ecological community. In shrubby woodlands, the dominance of native tussock grasses in the ground layer of vegetation is lost. Therefore, a remnant with a continuous shrub layer, in which the shrub cover is greater than 30%, is considered to be a shrubby woodland and so is not part of the listed ecological community.'	Shrub cover is sparse to absent (1% PFC) throughout the MZ3, but where present, comprised of <i>Cassinia sifton</i> (Sifton Bush) and <i>Solanum cinereum</i> (Narrawa Burr).
'Tree cover is generally discontinuous and consists of widely spaced trees of medium height in which the canopies are clearly separated'	Tree cover is discontinuous, with the canopy rarely touching.
'This ecological community occurs in areas where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 metres to 1200 metres'	Rainfall for the Ulan region is 655 mm per year (BoM 2024). MZ3 contains moderately fertile basalt derived clay loam soils. Altitude within MZ3 ranges from 560 to 570 m above sea level.
Outcome	Areas throughout MZ3 where the ground cover is not dominated by perennial native species (i.e. the areas surrounding site BOB12) do not meet the listing criteria for Box Gum Woodland under the EPBC Act. Management of <i>Hypericum perforatum</i> is recommended to attain a predominately native understorey.

3.3.5. Weed presence

Six (6) priority weed species listed under the Central Tablelands Regional Strategic Weed Management Plan (CTRSWMP; LLS 2022) were identified throughout the Bobadeen Vegetation Offset Area during monitoring in 2023 (Table 29 and Figure 16):

- *Chrysanthemoides monilifera* (Boneseed) – BOB4B, UCML_CA_Site10
- *Heliotropium amplexicaule* (Blue Heliotrope) – recorded opportunistically
- *Hypericum perforatum* (St John's Wort) – BOB10B, BOB12, BOB4B, BOBE6, UCML_CA_Site9
- *Ligustrum lucidum* (Broad-leaf privet) – recorded opportunistically
- *Olea europaea* (Olive) – recorded opportunistically
- *Opuntia stricta* (Common Prickly Pear) – recorded opportunistically

All Bobadeen VOA monitoring sites recorded <1% priority weed PFC except MZ3 site BOB12, which recorded 45% PFC of *Hypericum perforatum*. Exotic species PFC was also generally low (except at site BOB12).

Table 29: Exotic species and priority weed PFC

MZ	Site	Exotic species PFC (%)	Priority weed PFC (%)
MZ1	BOB4B	0.8	0.2
	BOBC1	1.3	0
	BOBC3	0.4	0
	BOBE3	0.3	0
	UCML_CA_Site10	0.1	0.1
	UCML_CA_Site11	0.7	0
	UCML_CA_Site13	0.3	0
	UCML_CA_Site6	0.1	0
	Average	0.5	0.04
MZ2	BOB13B	0.6	0.1
	BOB20	0.8	0.2
	BOB22	5.5	0
	BOBC4	0.5	0
	BOBE5	0.8	0
	Average	1.6	0.1
MZ3	BOB10B	1.9	0.1
	BOB12	45.8	45
	BOB15B	0.7	0.1
	BOB21	0.4	0.1
	BOB23	0.8	0.1
	BOBC7	0.8	0.1

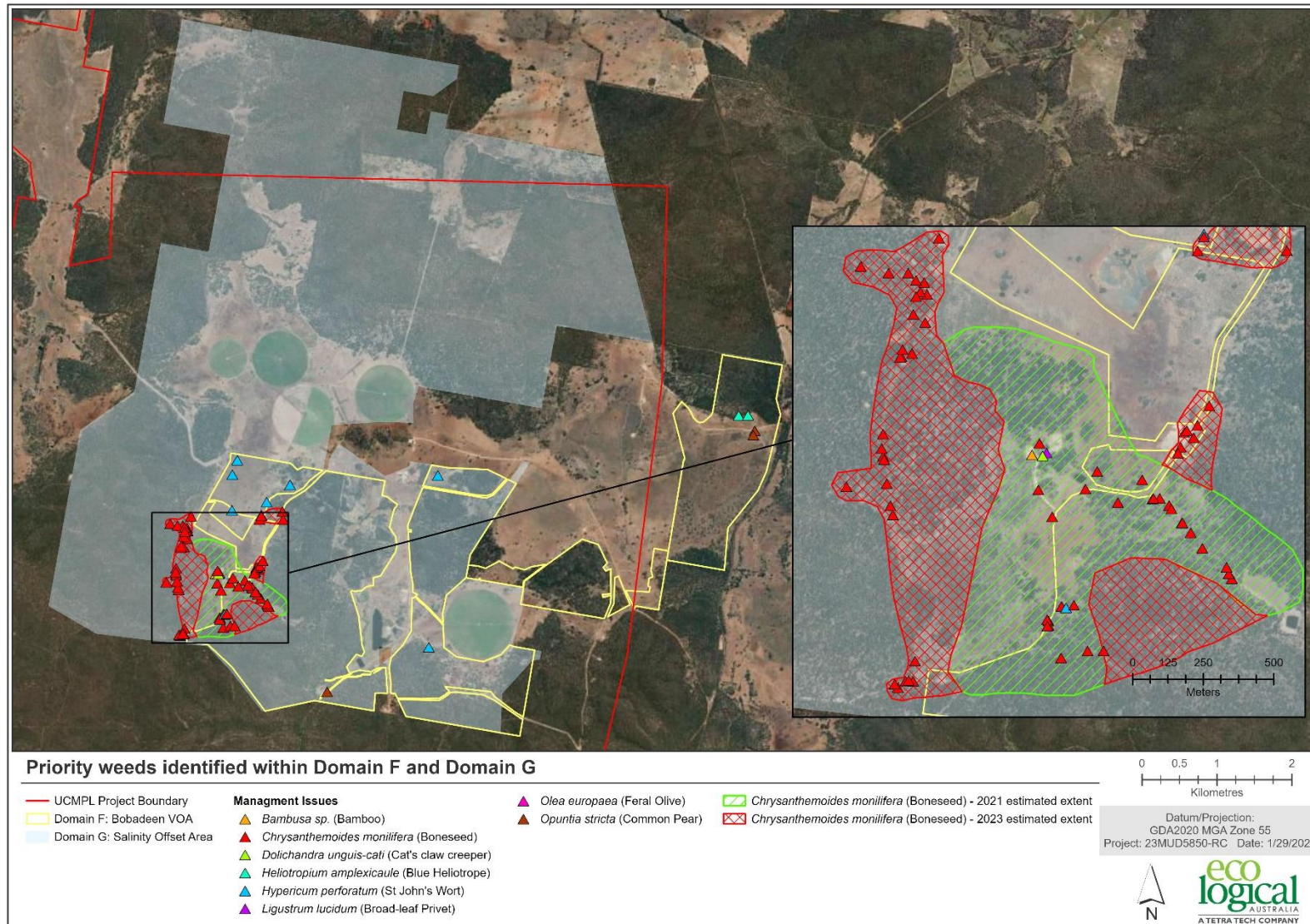


Figure 16: Priority weeds identified within Domain F and Domain G

3.3.6. Erosion and sediment control

No erosion was recorded throughout Domain F during 2023.

3.4. BMP Domain G: Salinity Offset Area

3.4.1. Weed presence

Seven (7) priority weeds were recorded opportunistically throughout the SOA during 2023 (Figure 16 above):

- *Bambusa* sp. (Bamboo)
- *Chrysanthemoides monilifera* subsp. *monilifera* (Boneseed)
- *Dolichandra unguis-cati* (Cat's claw Creeper)
- *Hypericum perforatum* (St John's Wort)
- *Ligustrum lucidum* (Broad-leaf privet)
- *Olea europaea* (Olive)
- *Opuntia stricta* (Common Prickly Pear)

Hypericum perforatum cover throughout areas of the SOA exceeds 10%, with areas of up to 45% PFC (BOB12). *Chrysanthemoides monilifera* subsp. *monilifera* is forming dense stands throughout the southwestern section of the SOA and has spread significantly since 2021 (Figure 16).

3.4.2. Natural regeneration

Natural regeneration monitoring, in accordance with Section 8.4.1.3 of the BMP, was not undertaken during 2023 within Domain F and Domain G. During 2020, sixteen (16) natural regeneration transects were monitored. A drive-over of MZ2 and MZ4a areas was undertaken during July 2020 to capture the baseline extent of natural regeneration throughout these areas. The next drive-over is to occur during 2025.

3.4.3. Native groundcover

Nine (9) sites within SOA MZ4a were monitored during 2023. Species richness and native species ground cover at these sites is consistent with previous years (Figure 17 and Figure 18). Average native species richness at MZ1 sites was only 8 species greater compared to MZ4a sites during 2023. Average native species ground cover at MZ4a sites was relatively consistent with MZ1 sites during 2023 (less than approximately 10% difference in PFC) and has been relatively consistent with MZ1 during previous years.

Figure 17: SOA MZ4a native species richness

Site	2015	2016	2017	2018	2019	2020	2021	2022	2023
BOB10B	-	27	-	-	-	27	24	33	34
BOB12	39	42	-	-	-	39	30	52	26
BOB13B	27	58	52	36	43	-	-	43	45
BOB15B	25	-	-	-	-	32	-	29	25
BOB20	-	21	26	25	33	-	-	44	45
BOB21	34	-	-	-	-	-	-	44	39
BOB22	32	22	27	20	11	45	35	33	24
BOB23	28	-	-	-	5	-	-	10	46
BOBC4	-	33	-	-	-	39	-	39	42
Average	30.8	33.8	35	27	23	36.4	29.7	36.9	36.2
MZ1 average	41	42.7	47	-	33	36.8	47.4	43.4	44.3

Figure 18: SOA MZ4a native species ground cover (PFC, %)

Site	2015	2016	2017	2018	2019	2020	2021	2022	2023
BOB10B	-	64	-	-	-	13.7	54.5	55.9	47.5
BOB12	63	84	-	-	-	48.2	86.4	65.7	36.2
BOB13B	37	45.5	42.4	13.6	15.6	-	-	59.3	43.2
BOB15B	28	-	-	-	-	21.2	-	28.1	58.4
BOB20	-	74	56.6	7.5	14.8	-	-	50.8	44.7
BOB21	61	-	-	-	-	-	-	55.5	81
BOB22	81	44.5	65.2	34.2	3	60.6	74.4	78.8	70.8
BOB23	62	-	-	-	9.2	-	-	1.5	57.1
BOBC4	-	54.5	-	-	-	59.9	-	57.6	76.2
Average	55.3	61.1	54.7	18.4	10.65	40.7	71.2	50.3	57.2
MZ1 average	45	61.2	49.2	-	17.7	40.2	71.9	61.4	64.9

3.5. Floristic based subsidence

Absolute change in PFC at all longwalls remains less than the subsidence Performance Indicator of a >10% (percentage points) decrease in canopy foliage cover. The absolute change in PFC since the beginning of monitoring for these sites is shown in Figure 19.

For sites with three or more years of data (UG LW30, UG LWW6, UG LWW7, UW LW6 and UW LW7), trends over time between maximum subsidence and transition sites have been compared. Fluctuations in PFC were recorded at each longwall for the duration of monitoring, with maximum subsidence and

transition sites following similar trajectories as shown in Figure 20 and Figure 21 below. The greatest decrease in average PFC for both maximum subsidence and transition sites occurred at UG LWW6 however, this is attributed to 5% decreases in PFC at only two transition sites (L1 and L3) and one maximum subsidence site (L8) out of 10 sites at UG LWW6 (Autumn 2019 compared to Spring 2023). All other sites recorded either no change or an increase in PFC. A 5% difference in PFC is within the natural fluctuations expected for remnant vegetation.

No subsidence cracks were observed during monitoring in 2023. The several subsidence cracks recorded over UG LWW7 and UW LW6 during 2022 are no longer present.

The BC Act listed vulnerable flora species, *Androcalva procumbens*, which was identified near UW LW6 L1 and L2 during 2021 and 2022 (ELA 2022a, ELA 2023), was not identified again during 2023. This is consistent with the species ecology as *Androcalva procumbens* favours areas which have undergone recent disturbance, such as bushfire or earthworks, and senesces and reverts to underground thickened rootstock in absence of recent disturbance (DPE 2023a). On-going monitoring of a population approximately 10 km east of UW LW6 L1 and L2, which was burnt in 2015-2016 (DPE 2023b), indicates that plant abundance decreased from 50 individuals recorded in 2017 to two (2) in 2023 (DPE 2023a). The potential habitat for this species near UW LW6 L1 and L2 remains unchanged or altered because of underground mining.

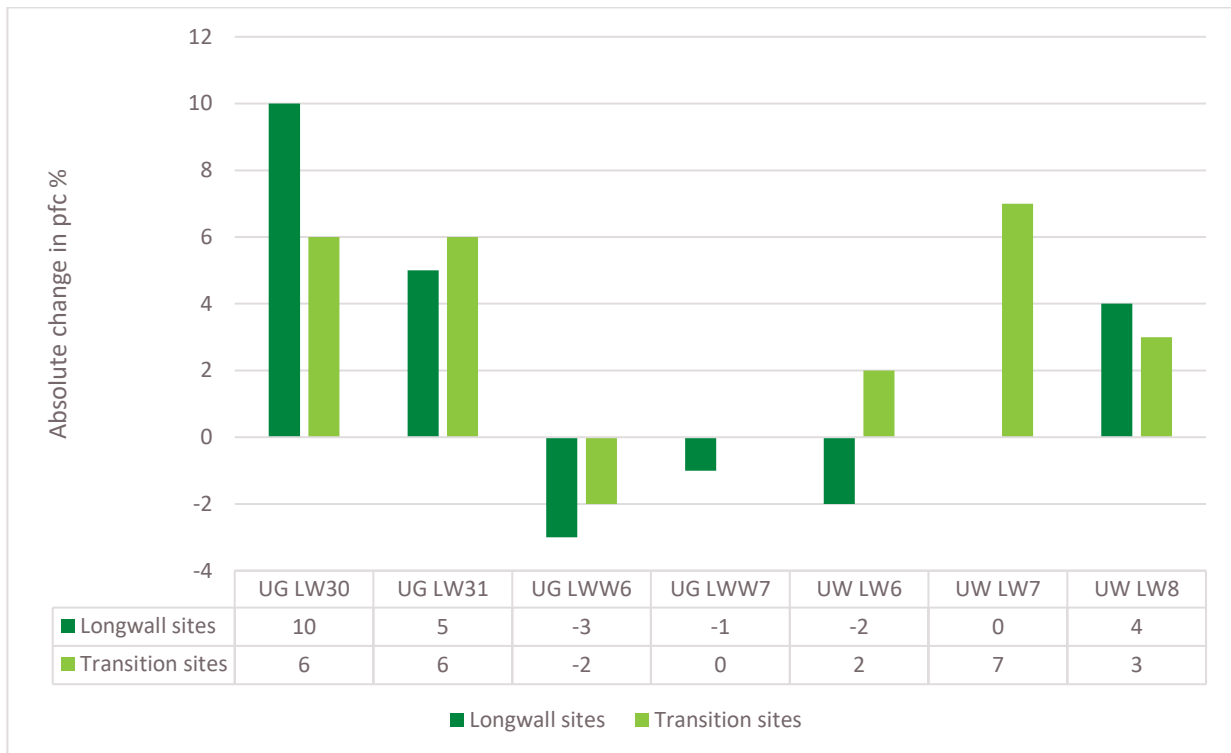


Figure 19: Absolute change in PFC since the beginning of monitoring

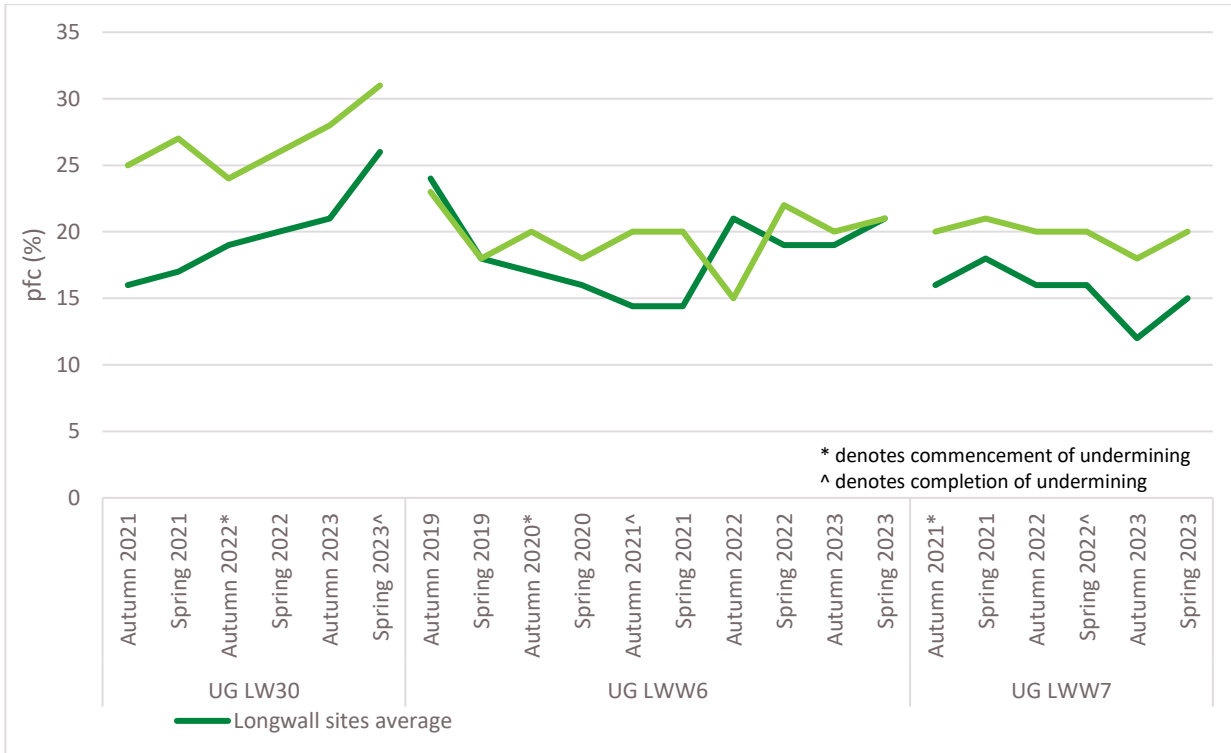


Figure 20: UG Longwalls – average PFC at longwall sites and transition sites over time

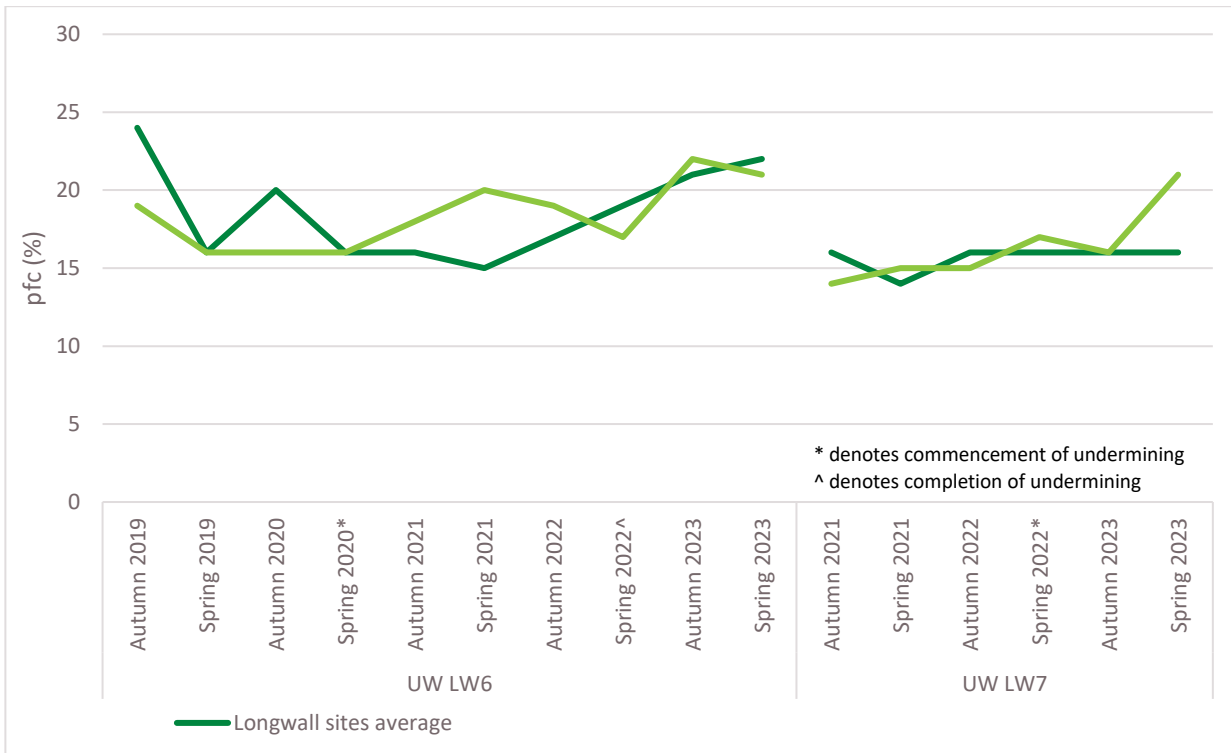


Figure 21: UW Longwalls – average PFC at longwall sites and transition sites over time

3.6. Ulan West EPBC 2015/7511 Area

Canopy PFC for Ulan West EPBC 2015/7511 Area monitoring sites is shown in Figure 22. No sites have recorded a >10% decrease in canopy cover between pre mining data and spring 2023 data, noting that undermining has not been completed for UW LW7 or UW LW8. There are no discernible differences in canopy PFC change between transition zone and longwall zone sites.

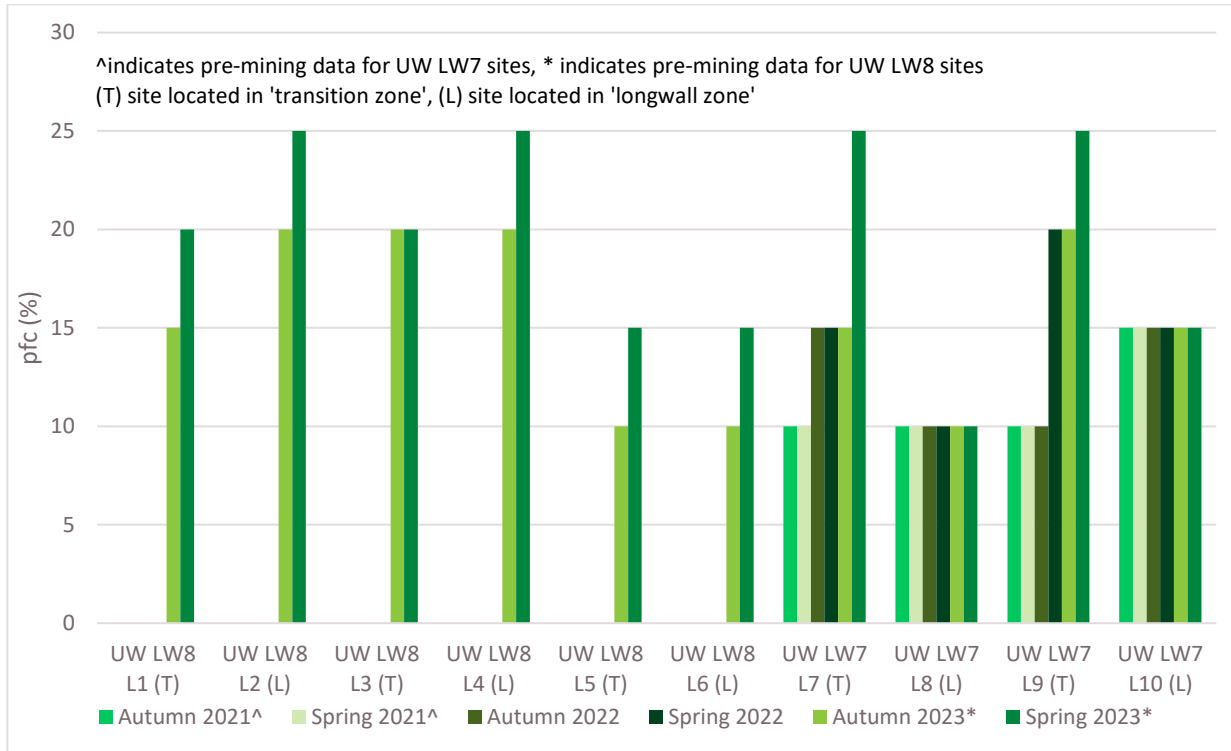


Figure 22: Canopy PFC for Ulan West EPBC 2015/7511 Area monitoring sites

4. Completion criteria and performance indicator summary

4.1. RMP completion criteria summary

A summary of assessment against the RMP completion criteria for Domain A is provided in Table 30.

Table 30: Domain A summary of assessment against RMP completion criteria

Rehabilitation objectives	Completion criteria	Performance indices	Completion criteria status
Vegetation Composition as per criteria	Rehabilitation areas contain flora species assemblage's characteristic of each Growth Form for the target native vegetation communities.	Native plant species richness assessed for each Growth Form	Not yet achieved – Polygon 1 (White Box Woodland) does not contain species characteristic of White Box Woodland within the 'other' growth form.
			Achieved – Polygon 5 (Ironbark Open Forest Complex), Polygon 6 and Polygon 9 (Grey Box Woodland) contain species characteristic of the target vegetation community in each growth form. All native species recorded within Polygons 2, 3, 4, 10, 11, 14, 16 and 17 (Native Woodland) are endemic to the Kerrabee IBRA Subregion.
Tree density as per completion criteria.	Indicative final minimum total tree/shrub densities for seeded areas to be 400 stems/ha.	Tree and shrub densities monitored for establishment and survival	Achieved All Polygons monitored during 2023 recorded a stem density greater than 400 stems / ha.
The rehabilitation is self-sustainable	Evidence of flowering and seeds or second-generation juveniles for trees and shrubs or likely to be, based on comparable older rehabilitation sites.	Trees and shrubs are monitored for evidence of second-generation juveniles and evidence of flowers and seeds	Achieved All areas monitored during 2023 recorded second-generation seedlings of canopy species, except Polygon 3 and Polygon 6. Reproductive features (buds) were recorded on several shrub and tree species within Polygon 3 and Polygon 6.

4.2. BMP completion criteria summary

Assessment against Domain F relevant BMP completion criteria is provided in Table 31.

Table 31: Domain F summary of assessment against BMP completion criteria

Phase	Domain Objective	Completion criteria	Completion criteria status
Growth Medium Development Phase	Facilitate the natural regeneration of Management Zone 2 areas	Monitor natural regeneration occurring within BOAs and update mapping with changes identified	Achieved as of 2020 – refer to <i>UCMPL Annual Flora Monitoring Report 2020 (ELA 2021)</i> .
	Re-establish native woodlands / open forest within Management Zone 3 areas	Plantings established and self-sustaining (flowering, fruiting or second-generation juvenile) and sufficient stem density for Woodland >40 stems/ha, Open Forest >60 stems/ha	Ongoing Second generation seedlings were recorded throughout Forest plantings in MZ3. Areas of Woodland plantings are yet to reach reproductive maturity; however, are in healthy condition.
	Facilitate the natural regeneration of Management Zone 2 areas	Monitoring to indicate native species diversity approaching or consistent with MZ1 or other appropriate analogue sites. Stem density >40 stems/ha for woodland, >60 stems/ha for Open Forest vegetation community	Ongoing Average stem density across MZ2 Forest sites monitored during 2023 was >60 stems/ha. MZ2 Woodland sites were not monitored in 2023; however, previous data indicates that three sites contain <40 stems / ha (BOBE11, BOB9 and BOBE1). Dense perennial native grass cover may be inhibiting eucalypt germination; however, the areas surrounding these sites are consistent with remnant stem density for basalt areas in Goulburn River National Park.
Ecosystem and Land Use Establishment Phase	Re-establish native woodlands / open forest within Management Zone 3 areas	Monitoring to indicate native species diversity approaching or consistent with MZ1 or other appropriate analogue sites. Stem density >40 stems/ha for woodland, >60 stems/ha for Open Forest vegetation community	Achieved Average stem density across MZ3 Woodland and Forest sites monitored during 2023 was >40 and >60 stems/ha respectively. One MZ3 Woodland site (BOB12) recorded 0 stems/ha; however, the area immediately surrounding this site has an approximate density of 250 stems/ha.
	Weeds and feral animal species do not present a risk to regeneration / revegetation	Ensure priority weeds (as per LLS Central Tablelands Strategic Weed Management Plan 2017-2022) do not exceed 10% of plant cover.	Not yet achieved Whilst priority weed species cover is generally low (<1% PFC); areas of the priority weed species <i>Hypericum perforatum</i> >10% PFC exist throughout Bobadeen VOA. Assessment against feral animals is provided in the <i>UCMPL Fauna Monitoring Report 2023 (ELA 2024)</i> .
		Records indicate that listed weeds are controlled in accordance with legislation.	Not yet achieved <i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i> is present throughout the Bobadeen VOA. In accordance with the <i>Biosecurity (Boneseed) Control Order 2007</i> , all individuals need to be removed from the land.

Phase	Domain Objective	Completion criteria	Completion criteria status
Ecosystem and Land Use Sustainability Phase	Facilitate the natural regeneration of Management Zone 2 areas	Monitoring to indicate native species diversity approaching or consistent with MZ1 or other appropriate analogue sites.	Ongoing Native species diversity at woodland and forest MZ2 sites is approaching that recorded at MZ1 sites.
Re-establishment of Box Gum Grassy Woodland Critically Endangered Ecological Communities (CEEC)	Re-establishment of EEC	CEEC re-vegetation meets the DoE minimum requirements for classification as CEEC	Achieved (MZ2) – MZ2 areas conform to Box Gum Woodland.
			Not yet achieved (MZ3) – some parts of MZ3 do not conform to Box Gum Woodland due to absence of a predominately native understorey due to high cover of <i>Hypericum perforatum</i> , particularly near BOB12.

4.3. Ulan West EPBC 2015/7511 Area performance indicators

Assessment against the Ulan West EPBC 2015/7511 Area performance measures is provided in Table 32.

Table 32: Assessment against Ulan West EPBC 2015/7511 Area performance measures

Performance Measure	Performance Indicator	Assessment of performance indicator/measure	Assessment
Negligible impact on Box Gum Woodland.	Box Gum Woodland located above longwall panels in the subsidence zone are not expected to experience changes in condition different to changes in the corresponding sites located in the transition zone.	<p>An indicator will be considered to have been triggered if:</p> <ul style="list-style-type: none"> Analysis of FBS data indicates a >10% (percentage points) decrease in canopy foliage cover of a site within the subsidence zone inconsistent with canopy foliage cover in the transition zone; and Analysis of FBS data indicates >10% (percentage points) decrease in canopy foliage cover in the selected vegetation community located above mining areas, not seen in non-mined reference sites. <p>The performance measure is exceeded if investigation shows subsidence has resulted in greater than negligible impacts to the Box Gum Woodland within mined areas.</p>	Ongoing – no sites recorded a >10% decrease in canopy PFC (% points), spring 2023 data compared to pre-mining data.
	At the completion of undermining, Box Gum Woodland patches continue to meet the condition thresholds described in the Policy Statement (DEH 2006).	An indicator will be considered to have been triggered if assessment against the condition thresholds within the Policy Statement (DEH 2006) are no longer met, with no negative impacts and/or decline in condition also recorded in Box Gum Woodland reference.	Ongoing – to be undertaken at completion of undermining (ELA 2023g).

5. Recommendations

The following items are recommended for consideration by UCMPL:

- On-going management of *Hypericum perforatum*, including spot spraying where feasible and translocation of Chrysolina beetles into severe infestations.
- Eradication of *Chrysanthemoides monilifera* subsp. *monilifera* is required in accordance with the *Biosecurity (Boneseed) Control Order 2007*. Information regarding control of this species can be found at [NSW WeedWise](#) (DPI 2024).
- Update the BMP to reflect the RMP completion criteria and domain nomenclature and incorporate the Ulan West EPBC 2015-7511 Area biodiversity monitoring program (ELA 2022g).
- Repairs to the active gully erosion recorded in Polygon 6 and the broken swale recorded in Polygon 9.
- A survey to identify the extent of *Androcalva procumbens* was recommended in the 2022 annual monitoring report (ELA 2023h); however, is no longer recommended. This species was not recorded during spring 2023 and doesn't persist without disturbance (DPE 2023a). The need for survey will be re-assessed if the species reappears in the coming years.
- A lower stem density target may be more appropriate for MZ2 areas of *Eucalyptus albens* located on rocky, basalt soils, consistent with similar areas located in Goulburn River National Park. Alternatively, disturbance trials (for example, planned burns or scalping of topsoil and seeding) may stimulate Eucalypt germination in areas of dense perennial grass swards.
- Now that plantings are maturing, several MZ3 monitoring sites are not reflective of vegetation condition, particularly stem density. Establishment of additional sites within these areas should be considered.

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