Appendix 5 – Biodiversity Offset Area Monitoring Report

Karuah East Quarry

Biodiversity Offset Area Monitoring Report

Karuah East Quarry Biodiversity Offset Area

Report prepared for:
Karuah East Quarry Pty Limited

Rev 1

Karuah East Quarry

Biodiversity Offset Area Monitoring Report

Karuah East Quarry Biodiversity Offset Area

Report Prepared for Karuah East Quarry Pty Limited

Version Control

Rev. No.	Revision Date	Author/s	Reviewer	Details
Rev 1	16 December 2024	Rachel Neal	Mark Dean	Draft
Rev 2	26 February 2025	Rachel Neal	Mark Dean	Final

Report Prepared by Wedgetail Project Consulting
Po Box 234
Cardiff NSW 2285

ABN: 93 640 388 683

Contents

Figures

Tables

1. INTRODUCTION

1.1 BACKGROUND

The Karuah East Quarry (KEQ) Project was subject to an assessment under part 3A of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act). The project was approved by the Planning Assessment Commission on 17 June 2014 subject to conditions set out in Schedules 2 to 5 of the Project Approval (09_0175). Subsequent modification was approved on 27 April 2018 (Modification 1) and 19 December 2018 (Modification 2) under Section 75J of the EP&A Act (Modification 1). A referral under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) for the project was also lodged with the Department of the Environment (DotE) (now known as Department of Agriculture, Water and the Environment - DAWE) on 29 July 2014 (EPBC 2014/7282). On 25 August 2014 the project was determined as a Controlled Action under the EPBC Act requiring further assessment subject to the controlling provision 'listed threatened species and communities'. The action was approved by DotE on 20 March 2015 subject to 17 conditions of approval.

Condition 33 of the NSW Project Approval and Condition 9 of the EPBC Act approval require the implementation of a Biodiversity Offset Area Management Plan (BOAMP) for the KEQ biodiversity offset area (BOA), which is a 138.22 ha consolidated land parcel (part Lot 13 DP1024564, Lot 14 DP1024564, Lot 5 DP838128) adjoining the western boundary of the project disturbance area (Figure 1). The BOAMP was prepared by Kleinfelder (2015) and subsequently approved by the NSW Department of Planning and Environment (DP&E) on 14 December 2015, and approved by the DotE on 16 March 2016. The BOAMP has since been updated in consideration of Modification 1 (February 2019) and Modification 2 (June 2021). Establishment of a Conservation Agreement or Stewardship Site Agreement for the BOA is currently in progress (with the Biodiversity Conservation Trust) as required under the project approval - Condition 29.

Baseline ecological surveys and monitoring were undertaken in October 2015 prior to commencement of clearing and construction as required under Section 3 of the BOAMP. The baseline monitoring surveys involved the establishment of 13 permanent monitoring sites within the Karuah East BOA in accordance with the BOAMP. An additional five permanent monitoring sites were also established on the adjoining Lot 12 DP 1024564 as per Sections 3.2 and 4.1 of the Statement of Commitments in accordance with Section 11.1.3 of the Landscape and Rehabilitation Management Plan (L&RMP) (SLR 2015). In addition to establishing the permanent monitoring sites, the surveys also involved baseline assessment of fencing, access tracks, erosion, weeds and vertebrate pests in accordance with Section 3 of the BOAMP. The baseline ecological surveys and monitoring report (Kleinfelder 2016) was submitted as an addendum to the BOAMP in January 2016 (available from https://hunterquarries.com.au/reporting/)

The first year of annual monitoring of the BOA and Lot 12 was undertaken in October 2016. This report provides the results of the ninth annual monitoring event undertaken in September/October 2024. Monitoring including analysis of monitoring data to date to evaluate changes in vegetation condition and threatened flora populations in the BOA.

This report also provides a summary of management actions completed within the BOA to date and recommendations for implementation of management actions in Year 9 of the BOAMP implementation to ensure compliance with relevant performance criteria.

Karuah East Quarry Approved Disturbance Area

Biodiversity Offset Area

National Parks & Reserves

Minor watercourse

Primary Road

Arterial Road

Sub-Arterial Road

Local Road

Figure 1: Karuah East Quarry & Biodiversity Offset Area

100 200 300 400 500 m

N

GDA94 / MGA zone 56
EPSG:28356

WEDGETAIL PROJECT CONSULTING

Map Produced: 05/12/2024
Produced By: Kane Blundell

Wedgetail Project Consulting\Hunter Quarries - Documents\KEQ - BOAMP Monitoring\@GIS\KEQBOAMP_ByTHEME.qgz

1.2 SCOPE

Section 3 of the BOAMP details the annual monitoring requirements for the Karuah East Quarry BOA. Additionally, Section 12.1 of the L&RMP details the ecological monitoring requirements for the Karuah East Quarry project area, adjoining vegetation within 50 m of the project area boundary on Lots 12 and 13, and along Yalimbah Creek (Lot 12). A summary of the Karuah East Quarry annual ecological monitoring requirements is provided in **Table 1.** It is noted that not all monitoring activities listed in **Table 1** are required for the 2024 monitoring (refer to the timing/frequency).

Table 1: Summary of annual monitoring requirements for Karuah East Quarry BOA and Lot 12

Monitoring Requirements	BOAMP / L&RMP Section(s)	Timing / Frequency	Completed in 2024
Vegetation and Threatened Flora Monitoring The 18 permanent monitoring sites established in the BOA and Lot 12 during the baseline are to be surveyed annually in accordance with Section 3.13 of the BOAMP and Section 12.1.3 of the L&RMP. Monitoring is to be undertaken during spring to coincide with the flowering times of threatened flora species in the BOA.	Section 3.13 of BOAMP Section 12.1.3 of L&RMP	Annually for the life of quarry (LOQ)	Completed
Fencing Inspections of boundary fencing will be undertaken as part of annual monitoring to identify maintenance requirements and record fencing activities undertaken in previous year. The effectiveness of fencing in excluding stock and unauthorised activities (e.g. rubbish dumping) will also be evaluated during annual monitoring and any additional controls will be identified if required.	Section 3.2 of BOAMP Section 12.1.2 of L&RMP	Annually for LOQ	Completed
Tracks Inspections of retained and redundant access tracks will be undertaken as part of annual monitoring to identify maintenance requirements and record maintenance activities undertaken in previous year.	Section 3.3 of BOAMP	Annually for LOQ	Completed
Erosion Inspections of erosion sites will be undertaken as part of annual monitoring to identify maintenance requirements and record maintenance activities undertaken in previous year. Erosion and sediment control structures installed within the project disturbance area to protect retained vegetation will be inspected as part of annual ecological monitoring.	Section 3.4 of BOAMP Section 12.1.2 of L&RMP	Annually for LOQ	Completed

Monitoring Requirements	BOAMP / L&RMP Section(s)	Timing / Frequency	Completed in 2024
Existing Dwellings Inspections of the dwellings, access tracks, and asset protection zones (APZs) will be undertaken as part of annual monitoring to identify maintenance requirements. These inspections will focus on fencing, weeds, and unauthorised access / disturbance.	Section 3.5 of BOAMP	Annually for LOQ	Completed
Habitat Augmentation and Nest Boxes Nest boxes will be inspected and maintained (or replaced) every two years following installation: Nest boxes 1 – 30 installed in April 2016 Nest boxes 31 – 125 installed in February 2018 Nest boxes 126 – 318 installed in July-August 2020 Nest boxes 319 – 375 installed in February 2023.	Section 3.8 of BOAMP	Boxes 1-375 monitoring required in 2024.	Monitoring completed for nest boxes 1-375 in 2024 and further monitoring will be required in 2026.
Weeds Target weed species will be mapped on an annual basis within the Project Disturbance Area and adjoining vegetation on Lots 12 and 13 (within 50 m of the project disturbance area boundary). Additionally, weed mapping along Yalimbah Creek will also be undertaken as part of the ecological monitoring program.	Section 12.1.1 of L&RMP	Annually (KEQ, 50 m buffer and Yalimbah Creek)	Completed (KEQ, 50 m buffer, Yalimbah Creek)
Weed mapping for the BOA will be undertaken every two years and compared to the previous mapping to assess changes in the extent and density of target weeds. Monitoring results will be used to develop a control strategy for the following two years, identifying target locations and timing for primary and follow-up control.	Section 3.10 of BOAMP	Every 2 years from baseline survey for LOQ (BOA)	Weed mapping for BOA updated in this report (2024).
Vertebrate Pest Assessment Monitoring of vertebrate pests will be undertaken using the same methods, locations and effort as the baseline assessment unless otherwise recommended in the annual monitoring reports. This will enable results to be accurately compared to the baseline assessment.	Section 3.11	Every 2 years from baseline survey for LOQ (BOA)	Pest management to be conducted.

Monitoring Requirements	BOAMP / L&RMP Section(s)	Timing / Frequency	Completed in 2024
Aerial Fauna Crossings A 12-month monitoring program of the two aerial fauna crossings will be undertaken using remote motion sensing cameras mounted on each pole (four cameras in total) once the crossings have been installed.	Section 12.1.4 of L&RMP	12 months from installation of the crossings	Aerial fauna crossings installed 2022. Monitoring program started awaiting results.
Threatened Flora Translocation – refer to *Tetratheca juncea* Translocation Management Plan (TjMP; Firebird 2015).	Refer to TjMP	Refer to TjMP	Completed – refer to Tj Translocation Monitoring Report (Firebird 2021)

1.3 KARUAH EAST QUARRY PROGRESS

The Karuah East Quarry (KEQ) Project commenced operations in May 2019 after the plant's construction in 2018. Vegetation clearing commenced in April 2016, and the majority of the KEQ project area was primarily cleared between April and June 2016, with some additional clearing also occurring in November 2016, May 2018, July 2018, October 2019, November 2019, September 2020, March 2021, June 2021, October 2021 and May 2022. Much of the disturbance area has been cleared to date. Major earthworks have also been completed, including the construction of the haul road, detention basins, and other infrastructure areas.

The current extent of clearing within the KEQ project area is shown in **Figure 2**.

Karuah East Quarry Approved Disturbance Area

National Parks & Reserves

Minor watercourse

Primary Road

Local Road

Figure 2:
Current Extent of Clearing within the Karuah East Quarry Project Area

N

GDA94 / MGA zone 56
EPSG:28356

50 100 150 200 250 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 05/12/2024
Produced By: Kane Blundell

Wedgetail Project Consulting\Hunter Quarries - Documents\KEQ - BOAMP Monitoring\@GIS\KEQBOAMP_ByTHEME.qgz

1.4 BIODIVERSITY VALUES

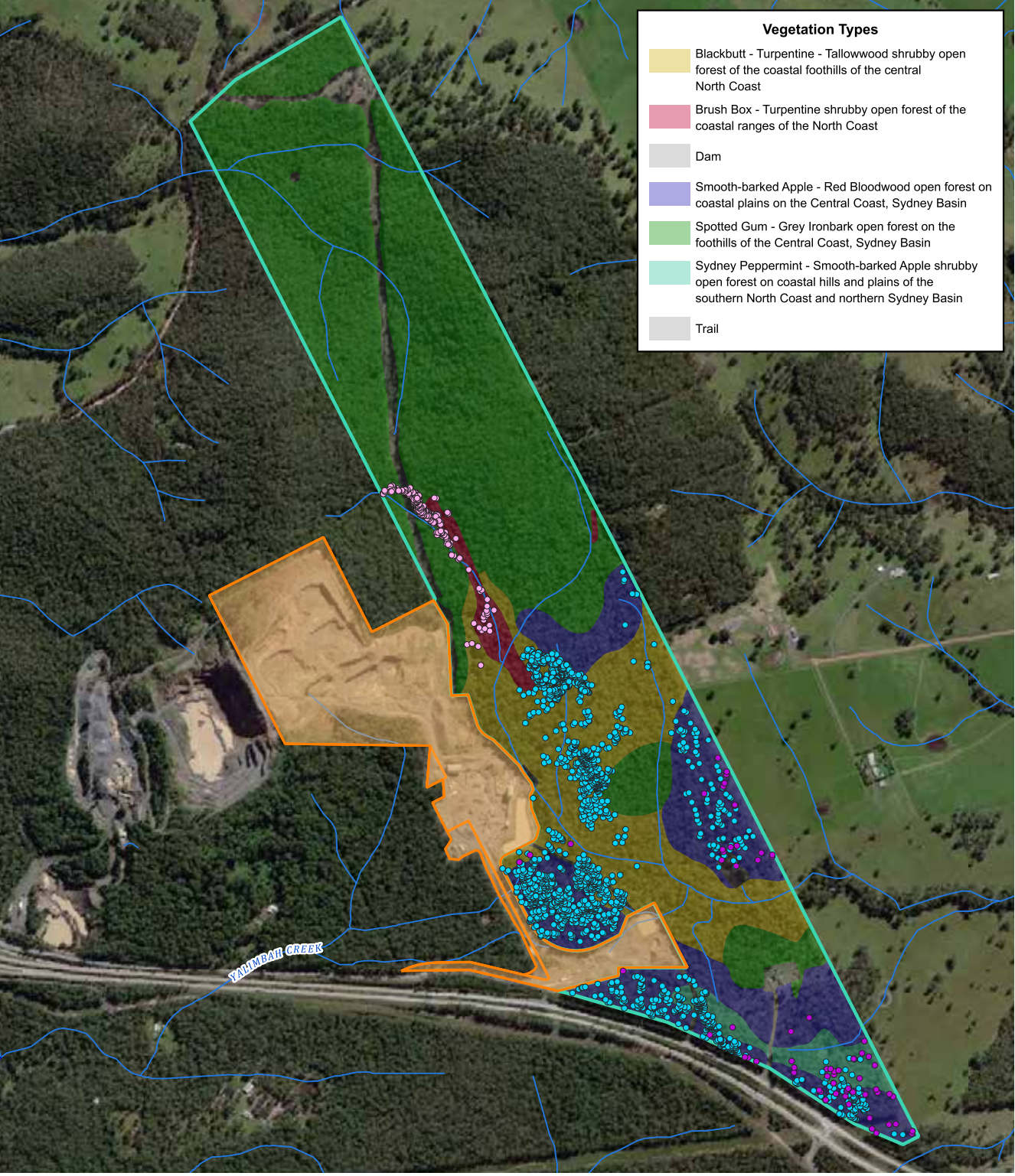
Section 2.3 of the BOAMP provides a detailed description of the biodiversity values identified in the Karuah East Quarry BOA during previous assessments (RPS Australia Pty Ltd 2013; Eco Logical Australia (ELA) 2013, 2014). Additional baseline ecological surveys were also undertaken within the BOA in October 2016 (Kleinfelder 2016). A summary of the key biodiversity values present (or previously recorded) within the site is provided in **Table 2** The locations of threatened flora species and the distribution of vegetation communities across the BOA are shown in **Figure 3**.

Table 2: Key Biodiversity Values Recorded within the Karuah East BOA

	Biodiversity Values	Area (ha) / No. of individuals
Vegetation Communities	Spotted Gum – Grey Ironbark open forest on the foothills of the Central Coast, Sydney Basin.	69.98
	Sydney Peppermint – Smooth barked Apple shrubby open forest on coastal hills and plains of the southern North Coast and northern Sydney Basin.	3.96
	Smooth-barked Apple - Red Bloodwood open forest on coastal plains on the Central Coast, Sydney Basin.	26.58
	Blackbutt - Turpentine - Tallowwood shrubby open forest of the coastal foothills of the central North Coast.	28.30
	Brush Box - Turpentine shrubby open forest of the coastal ranges of the North Coast.	2.62
Threatened Flora Species	*^*Tetratheca juncea* (Black-eyed Susan)	6,907
	*^*Grevillea parviflora subsp. parviflora* (Small-flower Grevillea)	100+
	*^*Asperula asthenes* (Trailing Woodruff)	399
Threatened and Migratory Fauna Species	* *Falsistrellus tasmaniensis* (Eastern Falsistrelle)	-
	* *Miniopterus australis* (Little Bent-winged Bat)	-
	* *Miniopterus orianae oceanensis* (Eastern Bent-winged Bat)	-
	* *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)	-
	* *Myotis macropus* (Southern Myotis)	-
	* *Vespadelus troughtoni* (Eastern Cave Bat)	-
	* *Calyptorhynchus lathami* (Glossy Black-Cockatoo)	-
	* *Daphoenositta chrysoptera* (Varied Sittella)	-

	Biodiversity Values	Area (ha) / No. of individuals
	* *Ninox strenua* (Powerful Owl)	-
	+ *Rhipidura rufifrons* (Rufous Fantail)	
	* *Petaurus norfolcensis* (Squirrel Glider)	

** = listed as Vulnerable under the BC Act 2016*
^ = listed as Vulnerable under the EPBC Act 1999
+ = listed as Migratory under the EPBC Act 1999



Karuah East Quarry Approved Disturbance Area

Biodiversity Offset Area

Major watercourse

Minor watercourse

Asperula asthenes

Grevillea parviflora subsp. *parviflora*

Tetratheca juncea

Figure 3: Vegetation Types and Threatened Flora Locations

N

GDA94 / MGA zone 56
EPSG:28356

100 200 300 400 500 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 05/12/2024
Produced By: Kane Blundell

Wedgetail Project Consulting\Hunter Quarries - Documents\KEQ - BOAMP Monitoring\@GIS\KEQBOAMP_ByTHEME.qgz

2. METHODS

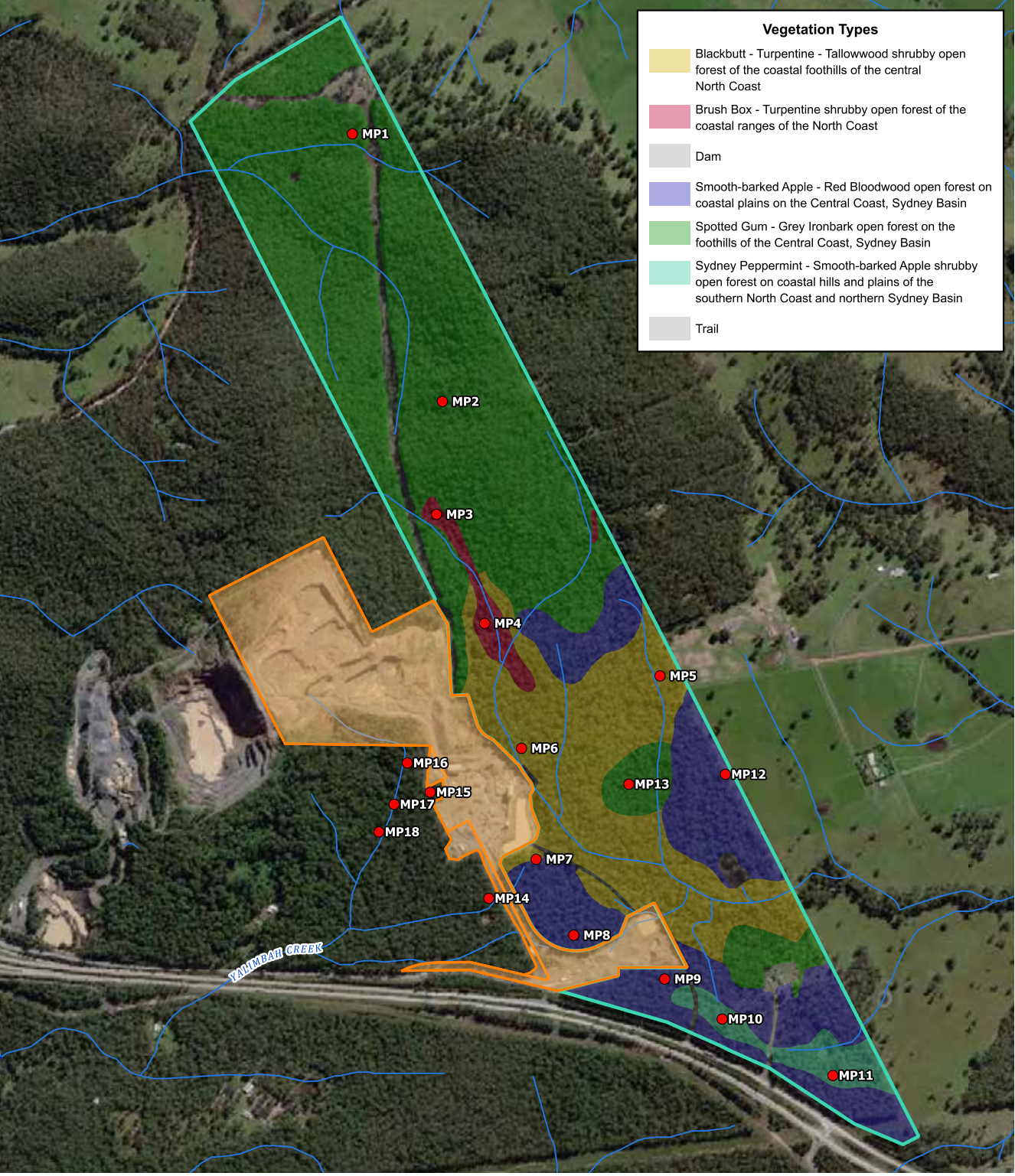
2.1 VEGETATION AND THREATENED FLORA MONITORING

A total of 18 monitoring sites were established in October 2015, including 13 sites within the Biodiversity Offset Area (BOA), and five sites on Lot 12 DP 1024564 within 50 m of the project disturbance area and along Yalimbah Creek. The location of each monitoring site was recorded with a handheld GPS (Terraflex) and permanently marked with a capped star picket (see **Figure 4**).

Baseline surveys were completed across the 18 monitoring sites in October 2015 and subsequently surveyed from 2016 to 2024 (24th and 25th September 2024). Vegetation condition monitoring was conducted across all 18 monitoring sites. Threatened flora monitoring was carried out at ten of the monitoring sites in 2024, including MP16 where *Asperula asthenes* was first identified in 2021 (**Table 3).**

Table 3: Summary of vegetation and threatened flora monitoring sites

Monitoring Site	Location	Vegetation Community	Threatened Flora Species Monitored
MP 1	BOA – Lot 5	Spotted Gum - Grey Ironbark open forest	-
MP 2	BOA – Lot 5	Spotted Gum - Grey Ironbark open forest	-
MP 3	BOA – Lot 5	Brush Box - Turpentine shrubby open forest	*Asperula asthenes*
MP 4	BOA – Lot 13	Brush Box - Turpentine shrubby open forest	*Asperula asthenes*
MP 5	BOA – Lot 14	Blackbutt - Turpentine - Tallowwood shrubby open forest	-
MP 6	BOA – Lot 13	Blackbutt - Turpentine - Tallowwood shrubby open forest	-
MP 7	BOA – Lot 13	Smooth-barked Apple - Red Bloodwood open forest	*Tetratheca juncea*
MP 8	BOA – Lot 13	Smooth-barked Apple - Red Bloodwood open forest	*Tetratheca juncea* and *Grevillea parviflora subsp. parviflora*
MP 9	BOA – Lot 13	Smooth-barked Apple - Red Bloodwood open forest	-
MP 10	BOA – Lot 14	Sydney Peppermint - Smooth-barked Apple shrubby open forest	-
MP 11	BOA – Lot 14	Sydney Peppermint - Smooth-barked Apple shrubby open forest	*Grevillea parviflora subsp. parviflora* and *Tetratheca juncea*
MP 12	BOA – Lot 14	Smooth-barked Apple – Red Bloodwood open forest	*Grevillea parviflora subsp. parviflora*
MP 13	BOA – Lot 14	Spotted Gum – Grey Ironbark open forest	-
MP 14	Lot 12	Smooth-barked Apple - Red Bloodwood open forest	-
MP 15	Lot 12	Blackbutt - Turpentine - Tallowwood shrubby open forest	*Tetratheca juncea*
MP 16	Lot 12	Spotted Gum – Grey Ironbark open forest	*Asperula asthenes*
MP 17	Lot 12	Brush Box - Turpentine shrubby open forest	*Asperula asthenes*
MP 18	Lot 12	Brush Box - Turpentine shrubby open forest	*Asperula asthenes*



Karuah East Quarry Approved Disturbance Area

Biodiversity Offset Area

Major watercourse

Minor watercourse

Monitoring Point

Wedgetail Project Consulting\Hunter Quarries - Documents\KEQ - BOAMP Monitoring\@GIS\KEQBOAMP_ByTHEME.qgz

Figure 4: Vegetation and Threatened Flora Monitoring Locations

N

GDA94 / MGA zone 56
EPSG:28356

100 200 300 400 500 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 05/12/2024
Produced By: Kane Blundell

2.1.1 Vegetation Condition Assessment

A qualitative assessment of vegetation condition and photo monitoring was undertaken at each of the 18 monitoring points, involving collection of the following data:

- Vegetation type and structure, including dominant species and estimated percentage foliage cover of each stratum (within 20 m radius of monitoring point);
- General health and condition of vegetation, including evidence of foliage die-off;
- Weed species and abundance; and
- Any management issues or indirect impacts from the project area or adjoining lands.
- One photograph (facing north) was taken at each of the monitoring points.

2.1.2 Threatened Flora Monitoring

Monitoring of threatened flora species was undertaken at the previously observed nine monitoring sites as per the BOAMP and L&RMP as well as MP16, where *Asperula asthenes* was identified in 2021. At these sites, all threatened flora individuals within 10 m of the monitoring point were recorded. The bearing and distance of each clump / individual from the star picket recorded during the baseline survey was used to accurately re-locate known individuals in the survey area. The bearing (degrees) for each clump was measured using a Suunto compass, and the distance was determined using a tape measure attached to the star picket. Additionally, each clump/individual was permanently marked with a steel peg (positioned 20 cm to the south of each clump/individual to avoid damaging plants); a metal tag was attached to each peg which provides a unique ID number. Note separate individual plants were delineated based on criteria described in **Table 4.**

Table 4: Criteria for delineation of "individual" plants

Species	Definition of “individual”
Asperula asthenes	Individual plants were delineated based on the methodology used by ELA (2014) during previous targeted surveys to ensure a consistent approach for population surveys and monitoring across the BOA. Based on this method, stems (or groups of stems) of Asperula asthenes occurring 40 cm or more apart are considered separate individuals.
Tetratheca juncea	Individuals or ‘clumps’ were delineated and counted in accordance with the standardised method described by Payne et al. (2002), in which individual clumps occurring 30 cm or more apart are considered separate, individual plants.
Grevillea parviflora subsp. *parviflora*	Stems occurring 30 cm or more apart were considered separate individuals.

For each individual identified in the survey area, the following information was recorded:

- Clump/individual ID number;
- Distance and bearing from centre star-picket to the clump;
- The size of the clump measured across the widest and narrowest points (cm) (for *A. asthenes* and *T. juncea*) or max height (for *G. parviflora* subsp. *parviflora*);
- Presence or absence of flowers (for *A. asthenes* and *G. parviflora* subsp. *parviflora*). The number of flowers and fruit on *T. juncea* plants were recorded to enable monitoring of reproductive output of this species; and
- Notes on general health of the plant, including any die-back or disease.

Following assessment of all previously recorded individuals, an additional survey of the area was performed at each site to identify any new individuals. For all new individuals identified within the survey area, the above listed information was collected.

2.2 SITE WALKOVER AND INSPECTION

Inspection of key management features was undertaken across the BOA and Lot 12 (within 50 m of the project area and along Yalimbah Creek) in September 2024 in accordance with Section 3 of the BOAMP. The following features were inspected and assessed:

- Internal and external fencing;
- Access tracks and gates;
- Areas of active erosion and sedimentation;
- Areas surrounding the two existing dwellings within the BOA;
- Redistribution of habitat resources salvaged during clearing for the KEQ Project;
- Extent and density of priority and environmental weeds within the project disturbance area, adjoining vegetation within 50 m of the disturbance area boundary on Lots 12 and 13, and along Yalimbah Creek.

2.2.1 Weed Mapping

Weeds for which detailed mapping was undertaken (i.e. target weed species) are those:

- Listed under the Biosecurity Act 2015 as priority weeds within the MidCoast Council control area;
- Identified as a Weed of National Significance (WoNS); and / or
- Environmental weeds which represent major infestations and / or have the potential to adversely affect ecological values within the BOA.

The most widespread and abundant weed species across the site is *Lantana camara* (Lantana). Four categories were used during field surveys to map areas of different Lantana density based on the percentage foliage cover:

- Nil: no Lantana observed;
- Scattered: ≤20% Lantana cover;
- Moderate: 21-60% Lantana cover; and
- High: >60% Lantana cover.

Other target weed species occurring outside moderate to high Lantana areas were mapped separately (i.e. weeds which may not be identified and treated as part of Lantana control).

3. RESULTS AND DISCUSSION

3.1 ENVIRONMENTAL CONDITIONS

Monitoring point field surveys were conducted on the 24th and 25th September 2024. Rainfall was variable with higher than average rainfall occurring from April to June inclusive (**Table 5** and **Plate 1**). Rainfall thus far is notably higher (1075ml) when compared to the dry conditions recorded throughout 2023 (855.9ml).

Table 5: Local Rainfall Data in mm (Clarence Town (Prince Street) Station – BOM Station 61010) (BOM 2024)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
2015	134.2	32.0	128.2	451.8	130.6	54.0	25.2	35.6	85.6	48.6	162.8	147.4	**1436.0**
2016	472.2	38.6	36.4	43.0	14.8	113.0	54.6	68.2	55.0	50.0	64.6	83.6	**1094.0**
2017	62.4	88.8	218.0	91.2	14.8	121.6	8.6	17.4	8.0	91.0	41.2	53.2	**816.2**
2018	16.2	79.2	149.2	83.4	15.4	153.6	1.0	28.4	49.8	143.2	90.2	87.0	**896.6**
2019	23.4	73.6	152.0	53.8	36.0	77.6	16.8	36.0	85.0	19.6	21.0	3.0	**597.8**
2020	78.0	274.0	110.0	26.8	82.4	56.6	141.8	44.0	34.6	169.2	48.2	163.2	**1228.8**
2021	200.4	141.4	363.8	31.0	61.2	72.2	35.0	60.6	62.0	72.0	236.4	92.6	**1428.6**
2022	85.0	94.6	307.0	104.6	82.0	19.2	282.8	54.0	121.0	89.6	54.4	28.4	**1322.6**
2023	158.4	38.3	123.7	65.2	37.7	7	42.9	60.7	11.2	97.2	81.4	132.2	**855.9**
2024	66.2	98.0	68.8	140.4	166.8	94.8	46.6	53.0	73.6	39.0	47.0	23.2	917.4
Mean	130	96	166	109	64	77	66	46	59	82	85	88	**1075**

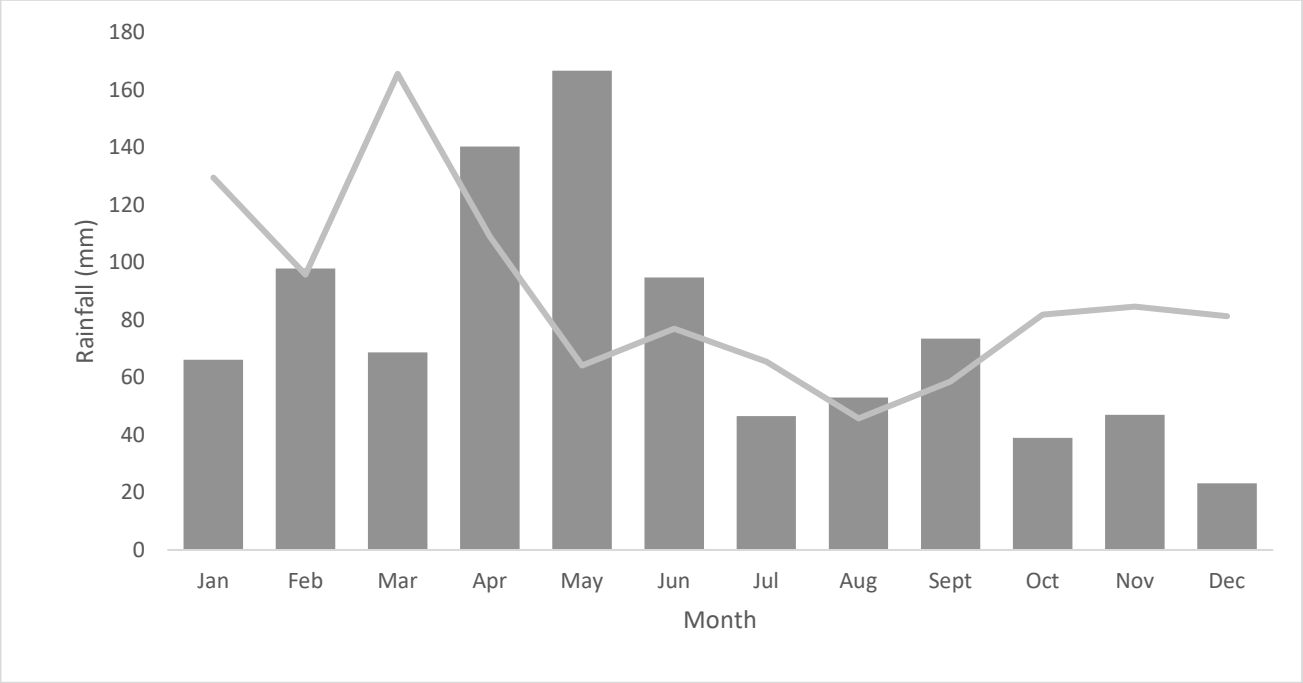


Plate 1: Local Rainfall Data (BOM Station 61010) (BOM 2024) – Columns (2024 rainfall data), Line (Long-term mean rainfall)

3.2 VEGETATION AND THREATENED SPECIES MONITORING

3.2.1 Vegetation Condition

The 2024 KEQ vegetation condition assessment was completed over two days (24th and 25th September) across all 18 monitoring sites and represents the Ninth annual inspection of vegetation condition within the KEQ BOA and Lot 12, with baseline data collected in 2015.

Vegetation condition, exotic species cover, and records of disturbance are summarised in the results below. Site-specific results and photo monitoring results are detailed further in **Appendix A** and **Appendix B.**

General health of vegetation

Vegetation condition across KEQ BOA and Lot 12 monitoring sites remain relatively stable since the previous monitoring event in 2024 with almost all monitoring sites recording signs of regeneration.

Canopy condition, measured as Projected Foliage Cover (PFC%), continues to slowly increase and is approaching pre-mine operations PFC (see **Plate 2**). Results from the current monitoring event indicate that canopy cover has largely stabilized, with small increases within the communities, recovering from the drought conditions on 2019/2020. Further monitoring events will identify any longer-term trends in canopy condition. Signs of dieback have decreased since monitoring in 2023. Trees also show signs of recovery, with new growth recorded in 2023 and having stabilized in 2024 possibly due to increase rainfall in 2024.

There has been little change in PFC across the midstory strata in recent years with some communities experiencing marginal decline at the current monitoring event (2024). A notable decline was seen in all vegetation communities from 2019 to 2020, presumably due to the drier conditions at that time. It appears that the midstory of these communities have recovered poorly since 2020, though PFC has stabilized (see **Plate 3**).

Shrub strata PFC has increased steadily since monitoring first began in 2015 with the largest improvements observed in *Brush Box – Turpentine shrubby open forest* (14% in 2015 and 23% in 2020). The remaining communities experienced similar trends which were observed to have stabilized in the previous monitoring event in 2023. Similarly, little variation was seen at the current monitoring event compared to 2023 (**Plate 4**). Most communities have exceeded pre-mine operations PFC targets though continued monitoring is needed for more accurate measures. The shrub strata across all vegetation communities has plateaued since 2022.

Grass cover across all communities has significantly decreased since monitoring began in 2015, and continues to decline, with the largest decline occurring over the 2018-2020 period. In recent years the PFC for this stratum has stabilized, though remains well below pre-mine operation values (**Plate 5**). This is unlikely to be the result of any direct or indirect impacts of quarry operations, instead is more likely from increasing competition from shrub/mid-story species as well as a small level of variability expected between surveyors. Additionally, non-grass groundcover, has recovered since a substantial decrease in 2020, likely due to surveyor variability, and is approaching pre-mine operation values (**Plate 6**).

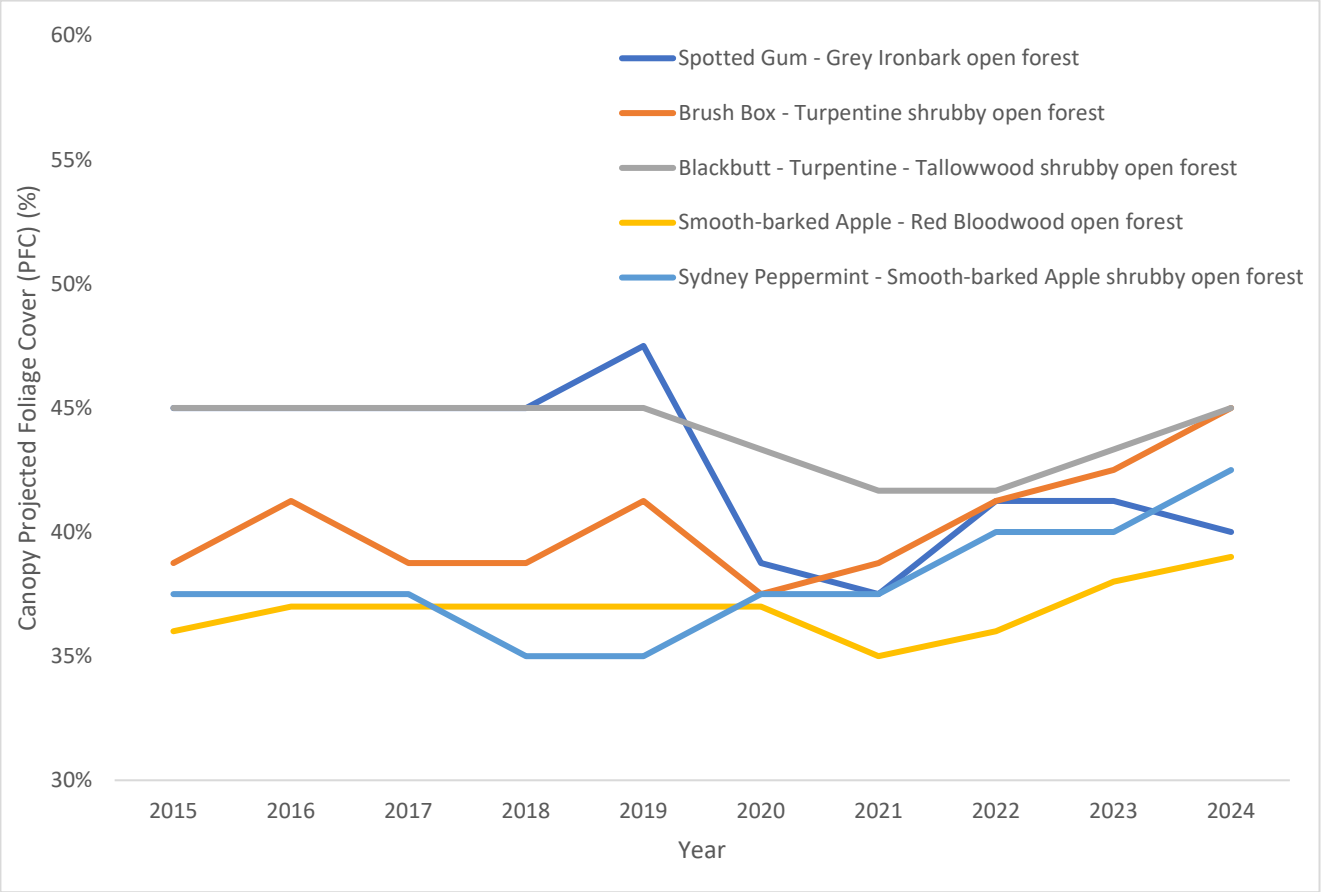


Plate 2: Mean Canopy Projected Foliage Cover (%) by vegetation community (2015-2024)

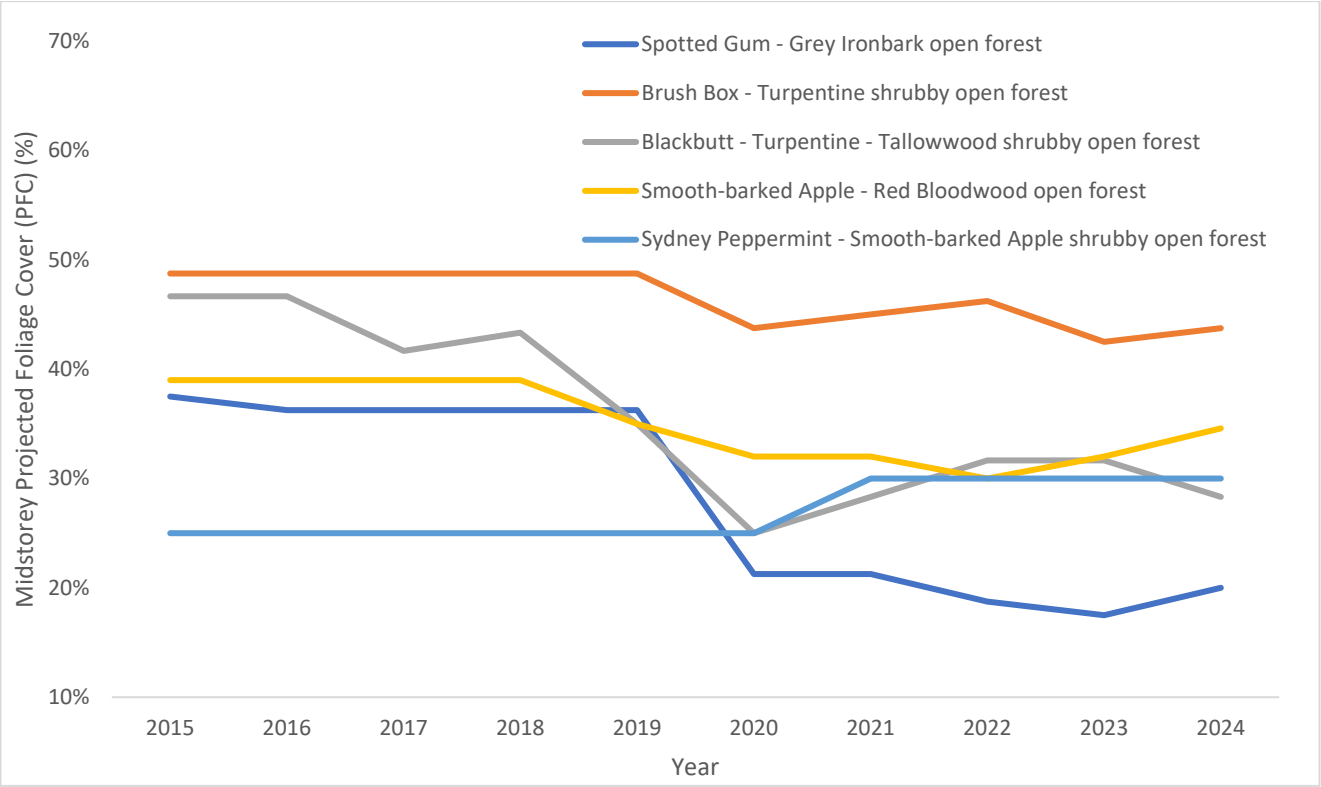


Plate 3: Mean Mid-storey Projected Foliage Cover (%) by vegetation community (2015-2024)

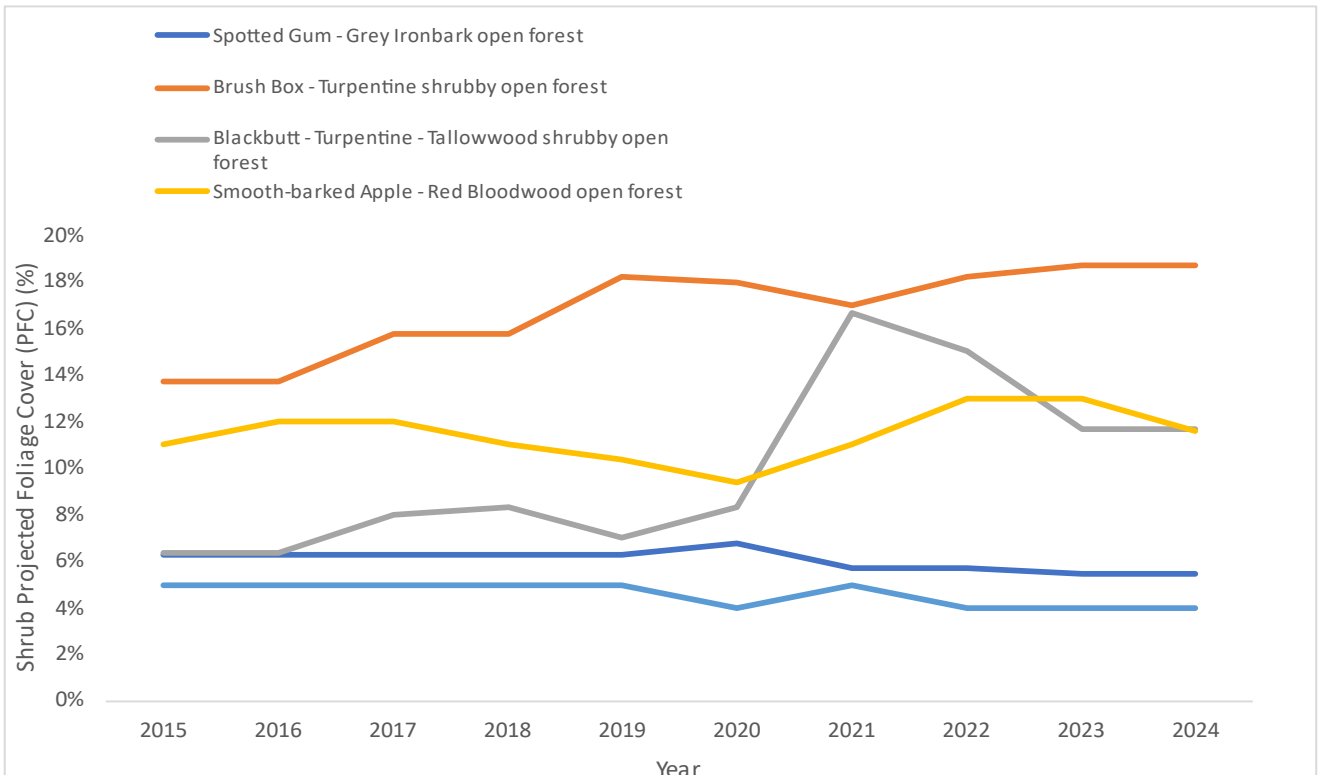


Plate 4: Mean Shrub Projected Foliage Cover (%) by vegetation community (2015-2024)

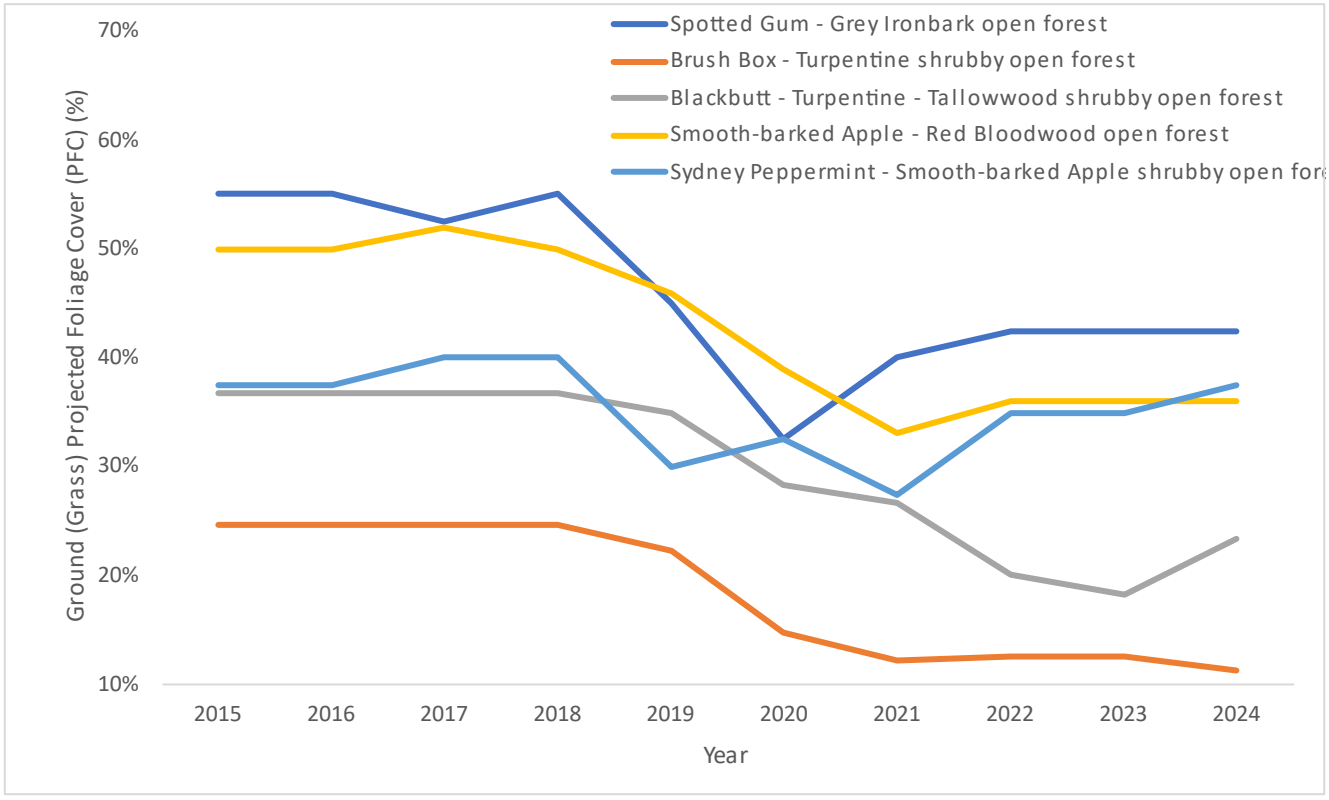


Plate 5: Mean Ground (Grass) Projected Foliage Cover (%) by vegetation community (2015-2024)

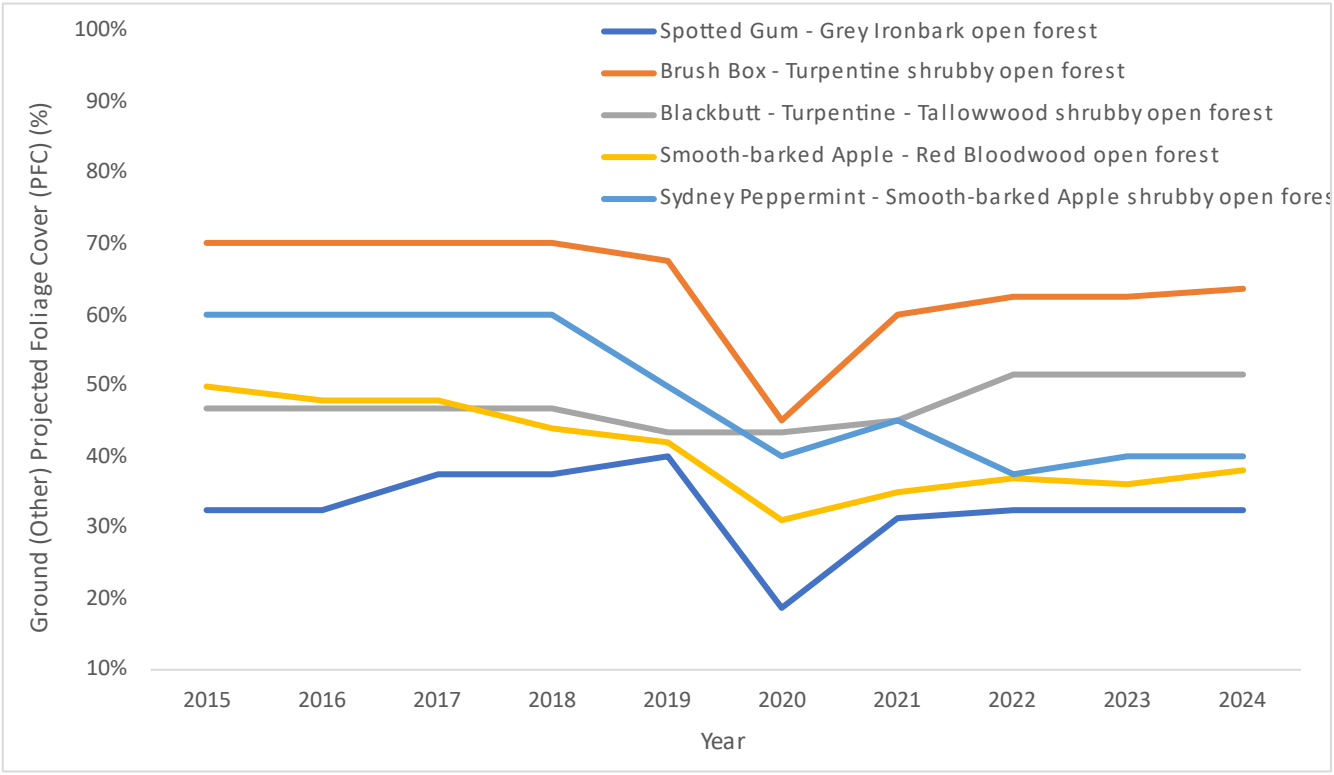


Plate 6: Mean Ground (Other) Projected Foliage Cover (%) by vegetation community (2015-2024)

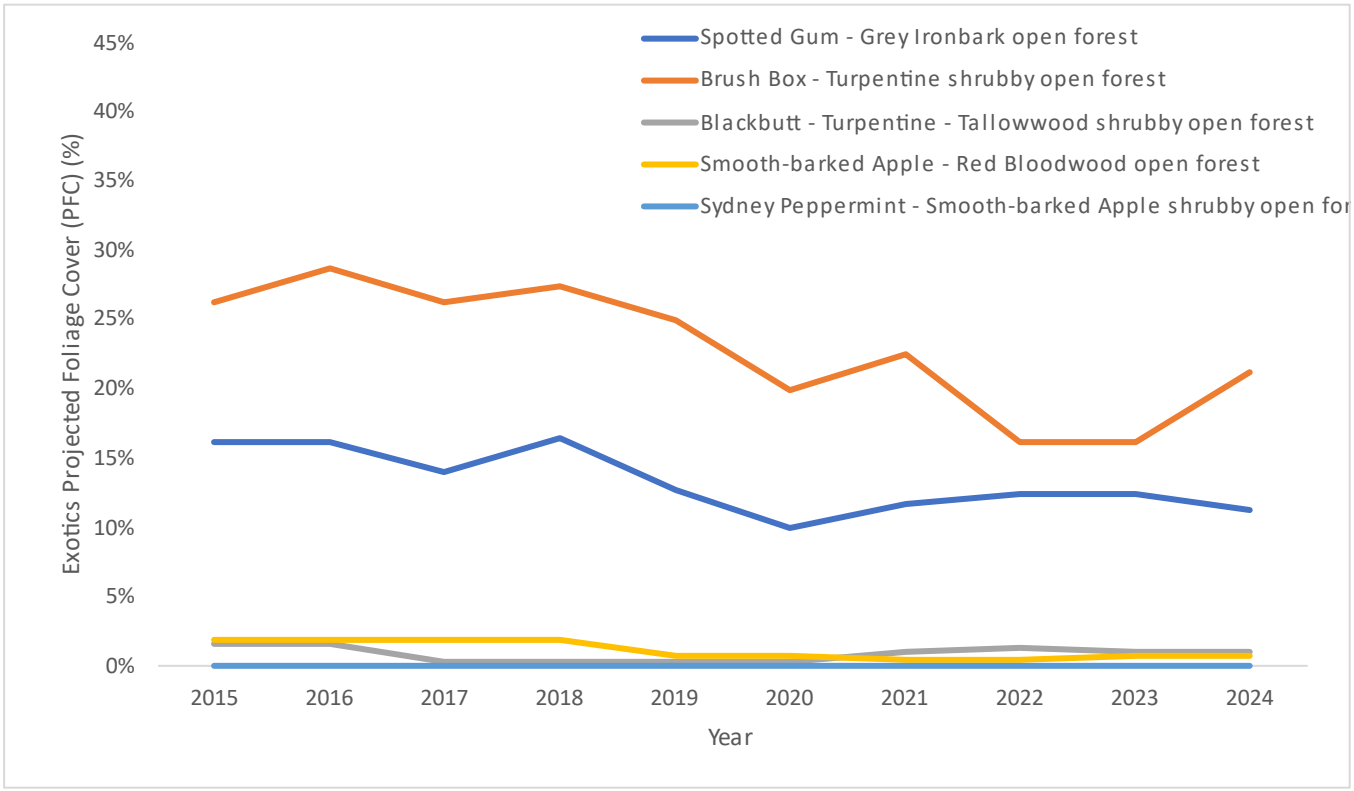


Plate 7: Mean Exotics Projected Foliage Cover (%) by vegetation community (2015-2024)

Exotics

PFC of exotic species has remained consistent with pre-mine operation values across most vegetation communities. A significant reduction in exotics were observed in the *Brush box – Turpentine shrubby open forest* community from 2015, though is increasing since previous monitoring events (**Plate 7**). There remains no recorded exotics in the *Sydney Peppermint – Smooth-barked apple shrubby open* forest community. The highest level of exotic species cover continues to occur within *Brush Box – Turpentine shrubby open forest* sites and includes large thickets of *Lantana camara* var. *camara*. Weed coverage is further discussed and mapped in **Figure 5.**

Disturbance

Minor disturbance was recorded at several monitoring sites. These are detailed in **Appendix A**, however, the following key observations are noted below:

- Heavy *Lantana camara* var. *camara* (Lantana) infestation remains in the vicinity of MP2 with small increases compared to 2023 monitoring.
- Heavy *Lantana camara* var. *camara* (Lantana) infestation occurs at MP3 and has increased substantially since previous monitoring events. This infestation was seen to impact the remaining *Asperula asthenes* at that location (**Appendix D**).
- Heavy rainfall occurring in 2022 at MP 4 had previously removed leaf litter and likely some *Asperula asthenes* individuals. Dense leaf litter has since returned to the monitoring point in 2023, and no further disturbance has occurred to the remaining *Asperula asthenes* in 2024.
- Past clearing at MP 12 is beginning to show signs of regeneration, despite continued maintenance of the accessway. The stockpiled timber of removed trees had impacted several *Grevillea parviflora* individuals that were not observed in 2023. This has not improved as even less individuals were recording at the current monitoring event in 2024.
- Sedimentation occurring in creek water from quarry operations likely initiated by rainfall runoff at MP6 and MP17.
- Similar to the 2023 monitoring, minor scouring of creek bank was recorded at MP18, MP17 within a gully to the west of the quarry. This is likely the result of high rainfall events during 2021. High rainfall occurring earlier in 2024 has exacerbated the scouring and likely contributed to the removal several of *Asperula asthenes* individuals growing along the creek banks.
- High levels of dust were observed on foliage (see **Photo 1)** and on the ground at several monitoring sites along the boundaries of quarry operations. Dust levels have increased compared to previous years and remnant vegetation is deteriorating. Monitoring of this disturbance should be continued to assess further impact on remnant vegetation.
- Evidence of sedimentation and erosion has been observed in a few locations including MP14, and around the extent of the quarry along the south eastern edge of the extraction area and along the western side of the haul road into the Karuah Quarries Conservation Area **(Photo 2, Photo 3** and **Photo 4).**

Photo 1: Dust Cover on Foliage recorded near MP6 in 2024

Photo 2: Sedimentation and Erosion into the Karuah Quarry Conservation Area into Dam (2024).

Photo 3: Erosion into the Karuah Quarry Conservation Area Dam and the area overgrown with *Setaria sphacelata* 2024.

Photo 4: Area overgrown with *Setaria sphacelata* 2024.

3.2.2 Threatened Flora

The 2024 threatened species monitoring identified a total of 51 individual *Asperula asthenes* plants, 25 clumps of *Tetratheca juncea*, and 17 *Grevillea parviflora* subsp. *parviflora* shrubs.

Species specific results are discussed below, for more detailed threatened flora results including site specific observations on abundance and condition see **Appendix C.**

Asperula asthenes

Monitoring for *A. asthenes* was completed at the four original monitoring sites; MP 3, MP 4, MP 17, and MP 18, as well as MP16, where the species was identified during the 2021 surveys. MP16 and MP 18 experienced small increases in *A. asthenes* abundance since 2023 with MP 6 identifying two new plants and MP18 identifying one new plant. However, MP 3 had lost two individuals. MP 4 and MP 17 were unchanged since 2023 (**Plate 8**). It is likely that many new individuals that germinated in 2020 (82 individual plants) in response to favourable conditions, have subsequently been outcompeted following the return of other groundcover species (51 individual plants in 2024). Additionally, several of the individuals residing on the banks of a creek may have been removed by heavy rainfall events especially seen within MP4 and MP17. Subsequent leaf litter that had washed away has since returned in the 2024 monitoring event for MP 4.

The decrease in abundance for the species across many of the monitoring sites continues a pattern of fluctuating abundance results for the species since 2015. There is no discernible pattern to suggest impacts from quarry operations in relation to *A. asthenes* abundance.

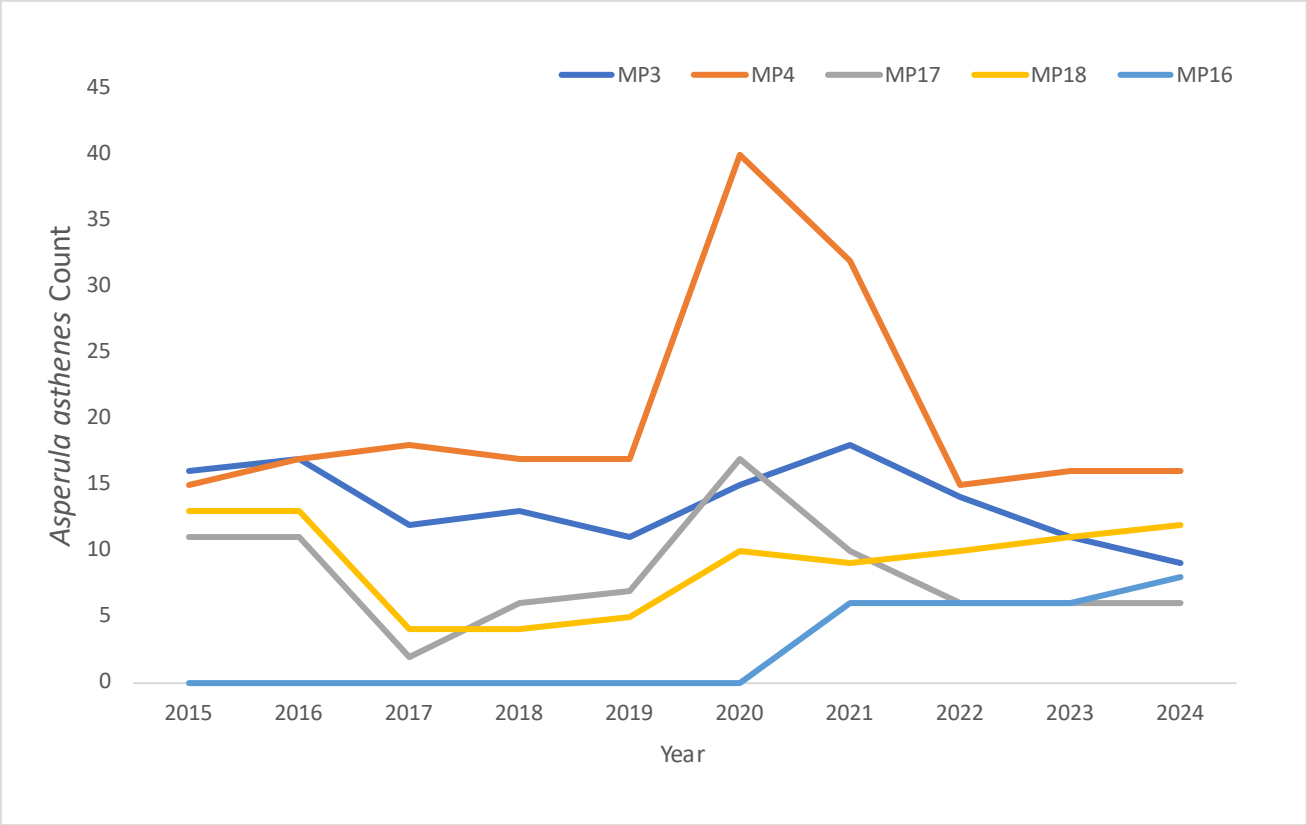


Plate 8: *Asperula asthenes* abundance at monitoring sites, including MP16 where it was first detected in 2021. (2015-2024)

Tetratheca juncea

Monitoring for *T. juncea* was completed at four monitoring sites; MP 7, MP 8, MP 11 and MP 15. The overall population remains consistent with the 2023 monitoring, though with a loss of two individuals. The population at MP 7 has decreased marginally (12 to 10 plants) with populations at MP 8 unchanged (9 plants) and one new plant recorded at MP 11, bringing the total to two since previous years. Monitoring point 15 continues to decline (5 to 4 plants). *Tetratheca juncea* abundance has generally remained stable across three of the monitoring sites (MP 7, MP 8, and MP 11) from 2015 to 2024. Though reductions have occurred, population numbers are similar to those recorded pre-mining operations.

Unfortunately, a major reduction in population numbers was observed at MP15, in which roughly 13% of the original plants remain. A thick layer of dust was observed on the foliage which has seemingly increased over the years. It is likely that the reduction in plant numbers could be linked to edge effects from quarry operations, i.e. increasing dust pollution. No other major disturbances were noted during monitoring (**Plate 9**).

Flowering was recorded for the species across all four monitoring plots (MP 7, MP 8, MP 11 and MP 15) during the 2023 monitoring event. Monitoring points 7, 8 and 11 were in particularly good condition, displaying an abundance of new shoots and plentiful flowers. A high density of fruits was observed at MP 8 and MP 11. Overall, with the exception of MP15, the results indicate *Tetratheca juncea* is in good reproductive condition (see **Appendix C**).

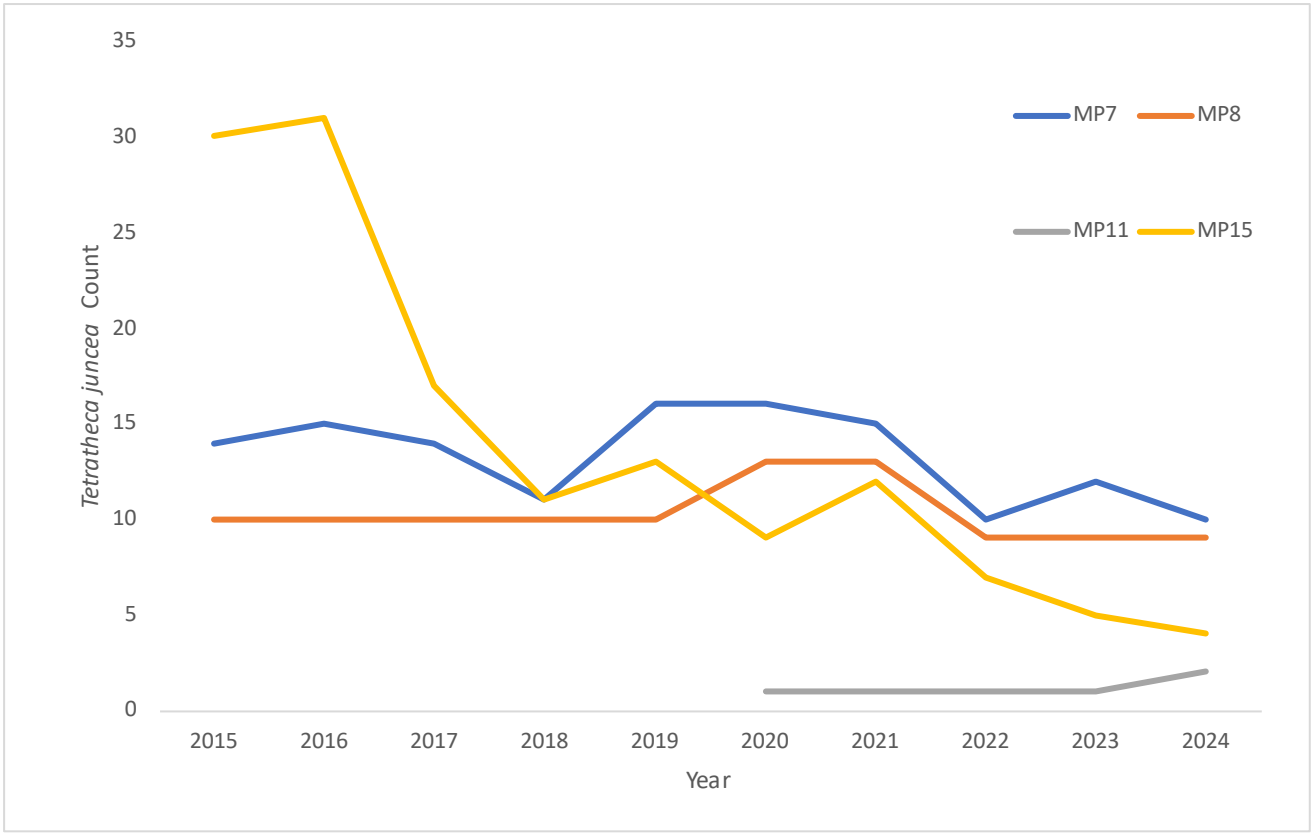


Plate 9:***Tetratheca juncea*** **abundance at monitoring sites (2015-2024)**

Grevillea parviflora subsp. parviflora

Monitoring for *G.parviflora* subsp. *parviflora* was completed at three monitoring sites; MP 8, MP 11 and MP 12. Since the previous monitoring event in 2023, MP11 recorded two more individuals, whereas MP12 lost two individuals . MP 11 and MP 12 displayed 5 and 4 flowering plants respectively (**Plate 10**). The total number of *G. parviflora* subsp. *parviflora* individuals across all monitoring sites is lower than that recorded in 2015, though remains stable since 2022.

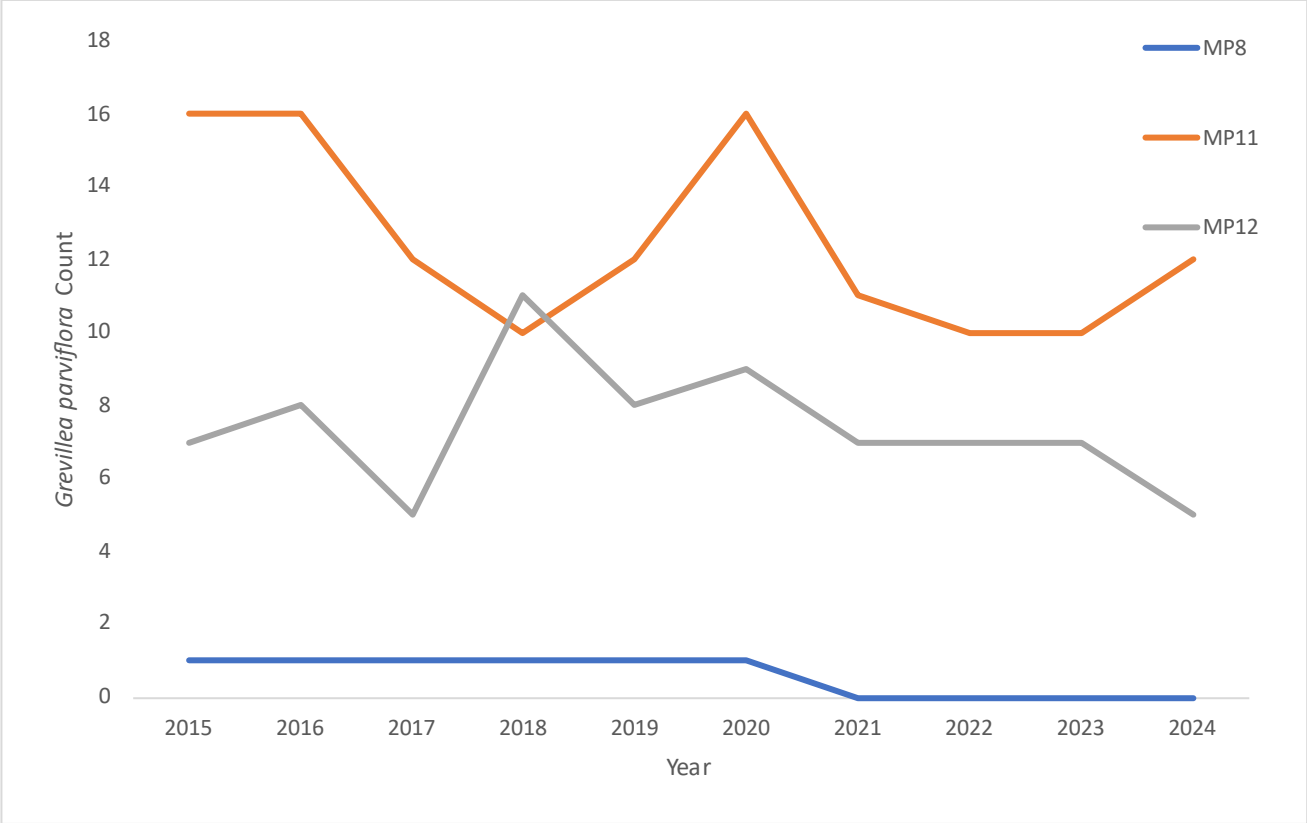


Plate 10: *Grevillea parviflora* subsp. *parviflora* abundance at monitoring sites (2015-2024)

3.2.2.1 Threatened Species abundance over time

The current monitoring event (2024) displayed a decrease in threatened flora abundance for all species, at the majority of monitoring locations. The table below (**Table 6**) illustrates the percent of decline in threatened flora since baseline surveys were conducted in 2015. It should be noted that *Asperula asthenes* at MP 16 was first identified in 2021 and calculations have been adjusted to reflect this new baseline. Similarly, *Tetratheca juncea* was first identified in MP 11 in 2020.

The monitoring points MP4, MP7, MP8, MP15, MP16 and MP17 are considered close to the impact area (as per BOAMP) and MP3, MP11, MP12 and MP18 are located further away from the impact area.

High levels of decline (<10%) were observed at locations both close and further away from the impact area, and thus this decline cannot be specifically attributed to disturbance from quarry operations. Rather, *Lantana camara* infestation may be contributing to the decline of *Asperula asthenes* individuals in particular, at MP3 and in Lot 12 (MP, 17, MP18).

Tetratheca juncea continues to steadily decline which may be a result of lower-than-average rainfall occurring in recent years (**Table 5**) and proximity to quarry operations, where substantial dust accumulation was observed on foliage (MP15 and MP7).

Substantial decline was observed for *Grevillea parviflora subsp. Parviflora,* though for MP 8 this is not an accurate reflection of overall population decline. One individual was originally recorded at this location and has not been detected since monitoring occurred in 2020. *Grevillea parviflora subsp. Parviflora* individuals at MP 12 however, have likely declined due to the flattening of clumps from timber waste that has been deposited there from track maintenance operations. Many individuals at this monitoring point cannot be located due to this obstruction, though it is possible that individuals persist underneath.

Table 6: Threatened Species percent change from baseline surveys (2015-2024)

Monitoring Point	Species	Change from baseline	Average Change
MP3 (Away from impact area)	*Asperula asthenes*	-43.75	11.38% Decline
MP4 (Close to impact area)		6.67	
MP16 (Close to impact area)		33.33 (since 2021)	
MP17 (Close to impact area)		-45.45	
MP18 (Away from impact area)		-7.69	
MP7 (Close to impact area)	*Tetratheca juncea*	-28.57	6.31% Decline
MP8 (Close to impact area)		-10.00	
MP11 (Away from impact area)		100.00 (since 2020)	
MP15 (Close to impact area)		-86.67	
MP8 (Close to impact area)	*Grevillea parviflora subsp. parviflora*	-100.00	51.19% Decline
MP11 (Away from impact area)		-25.00	
MP12 (Away from impact area)		-28.57	

3.3 SITE WALKOVER AND INSPECTION

3.3.1 Weed Infestations

Weed mapping was conducted across the BOA during field surveys on the 24th and 25th September 2024, within the project disturbance area, within 50 m of the project disturbance area, and along Yalimbah Creek on Lot 12. The resulting weed map (**Figure 5**) illustrates the cover of the most abundant weed species across the site, *Lantana camara* var. *camara* (Lantana) (Priority Weed within the MidCoast LGA). As with previous monitoring events, major infestations occur throughout the site, with most infestations occurring across the northern extent of the BOA (**Figure 5**). Lantana infestations were observed to spread to the southern extent of the BOA. The majority of the BOA including Lot 12 can be said to suffer moderate lantana densities.

One other Priority Weed species was identified in the BOA: *Senecio madagascariensis* (Fireweed). This species only occurs as small discrete patches in a few locations in the BOA.

Notable areas of exotic perennial grasses previously mapped along road and track sides, were recorded again in 2024 (**Figure 5**). The dominant exotic grass species in these areas include *Setaria sphacelata* (South African Pigeon Grass), *Andropogon virginicus* (Whisky Grass), and *Axonopus fissifolius* (Narrow-leafed Carpet Grass), as well as a variety of annual and perennial exotic herbs. The areas dominated by exotic grasses are primarily restricted to the power line easement, around existing dwellings, track edges, perimeter of quarry disturbance area, perimeter of the run-off dam in Lot 12, and previously cleared regrowth areas on the southern part of Lot 14.

While the dense areas of exotic grasses have been mapped, they are not considered target weed species at this stage. They represent a relatively low threat to the integrity of ecological values within the site. The exotic grasses occurring in the areas of native regrowth are also likely to be shaded out over time as the canopy, and midstorey cover continues to regenerate. However, the distribution of exotic grasses will continue to be monitored, and any increases will be evaluated to determine if management is required.

It is strongly recommended that weed control works for the next 12 months should focus on the Lantana infestations in Lot 5, northern section of Lot 12 and north-east part of Lot 13, especially within the vicinity of MP 3 and MP 4, to protect *Asperula asthenes* individuals. *Asperula asthenes* within MP3 is particularly suffering and requires immediate attention. Priority should also be given to controlling infestations alongside waterways where Lantana has become most abundant. These weed control activities must be undertaken in spring in accordance with the procedures detailed in Section 3.10 of the BOAMP due to the presence of threatened flora (*Asperula asthenes*) in these areas.

3.3.2 Fencing and Tracks

The layout of existing and required fencing, gates and tracks across the BOA is shown in **Figure 6**. Boundary fencing is required around the entire KEQ project area. Fencing of KEQ project area / BOA boundary has commenced (approximately 70% completed in 2017). A new fence was installed along the eastern boundary of the BOA adjoining Lot 10 in 2017. New fencing was installed along the haul road within Lot 13 in 2017 and this was extended in 2024 with the installation of a new gate and fencing around the KEQ entrance of the rock crushing area (**Photo 6)**. Fencing along the remaining 30% of project area / BOA boundary, and Lot 5 / Lot 14 boundary is required. Key fencing requirements within the site include:

- Internal fencing is also required around the existing dwellings on Lot 5 and Lot 14.
- The barbed-wire fence alongside the far northern boundary of Lot 5 requires repair throughout due to the fence having either fallen, lost tension or damage from fallen trees (**Figure 6**).
- Fencing alongside the north-eastern boundary of Lot 5 has been removed with the intention of replacing it.
- Fencing is absent along the western boundary of Lot 5 and will need installation
- Fencing along the western boundary of Lot 13 and haul road has been repaired from prior damage (see **Photo 5**).
- Fencing (Koala Fence) has been removed from the large dam to the south-east of the rock crushing area due to dam wall repairs. Repairs have now been completed and the fence was re-installed in 2024 **(Photo 6).**

- Many timber stockpiles were observed outside of the disturbance area along fence lines and at the end of the access track southeast of the rock quarry (**Photo 8)**.
- All fencing works are required to be undertaken in accordance with **Section 3.2** of the BOAMP.

Several redundant sections of tracks within the southern part of the BOA are being successfully rehabilitated following the placement of branches, hollow logs / sections and other organic debris salvaged from the KEQ disturbance area during vegetation clearing. Minor erosion damage along an access track towards the south of the stockpile area has been rectified since it was first observed in 2022.

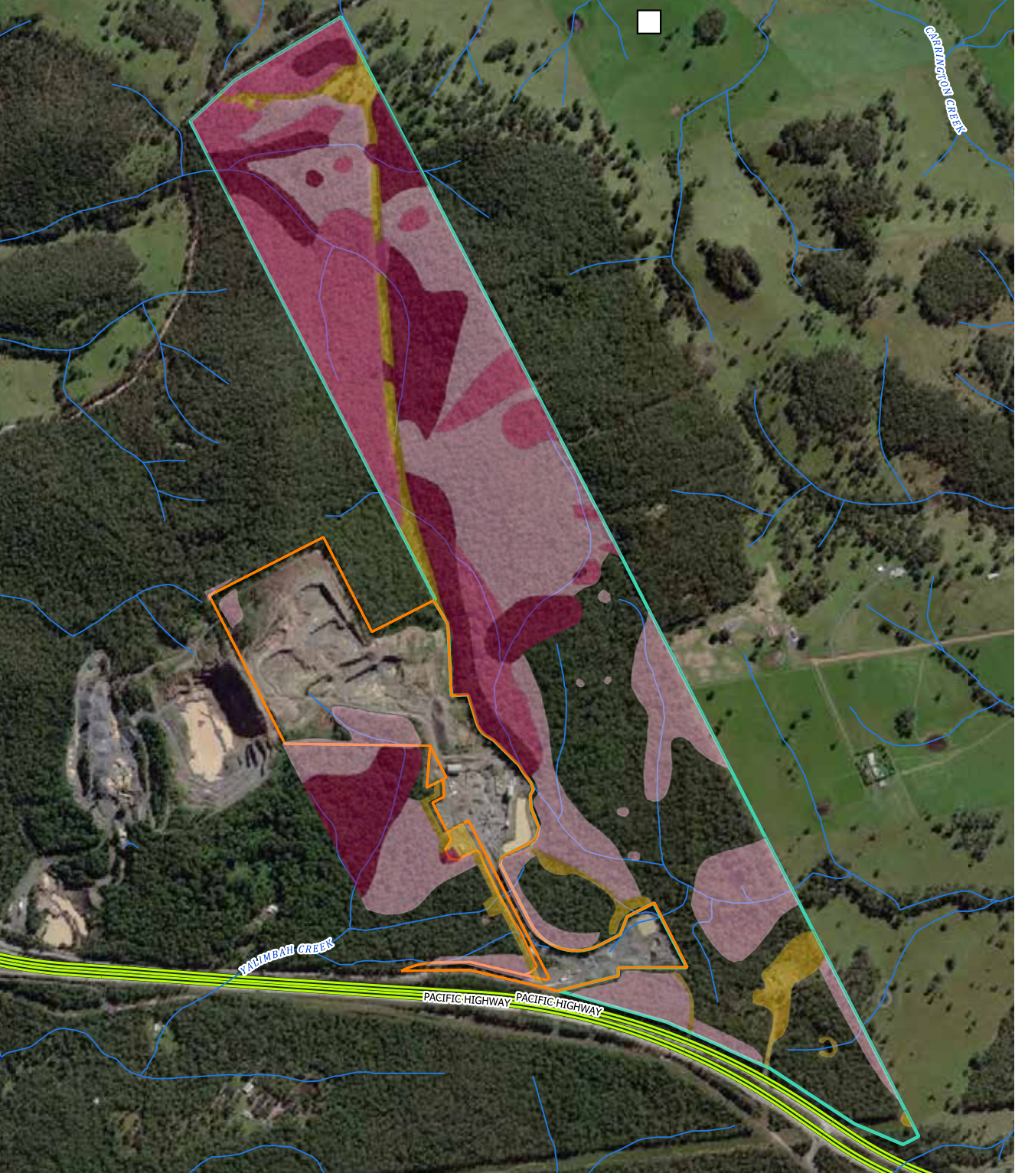
Additional maintenance is recommended at the access tracks along the north-western boundary of Lot 5, that have become overgrown and are no longer accessible by vehicle.

Photo 5: Fixed fence along western boundary of haul road

Photo 6: New gate and fencing installed in 2024 along a section of the eastern border of the quarry within Lot 13.

Photo 7: New gate and fencing installed in 2024 along the eastern border of the rock crushing area within Lot 13.

Photo 8: Large timber stockpile outside of the disturbance area towards the southeastern access track from the rock quarry.



Karuah East Quarry Approved Disturbance Area

Biodiversity Offset Area

Major watercourse

Minor watercourse

Primary Road

Weed Densities

Lantana - High

Lantana - Moderate

Lantana - Scattered

Exotic Grasses

Figure 5: Weed Mapping

N

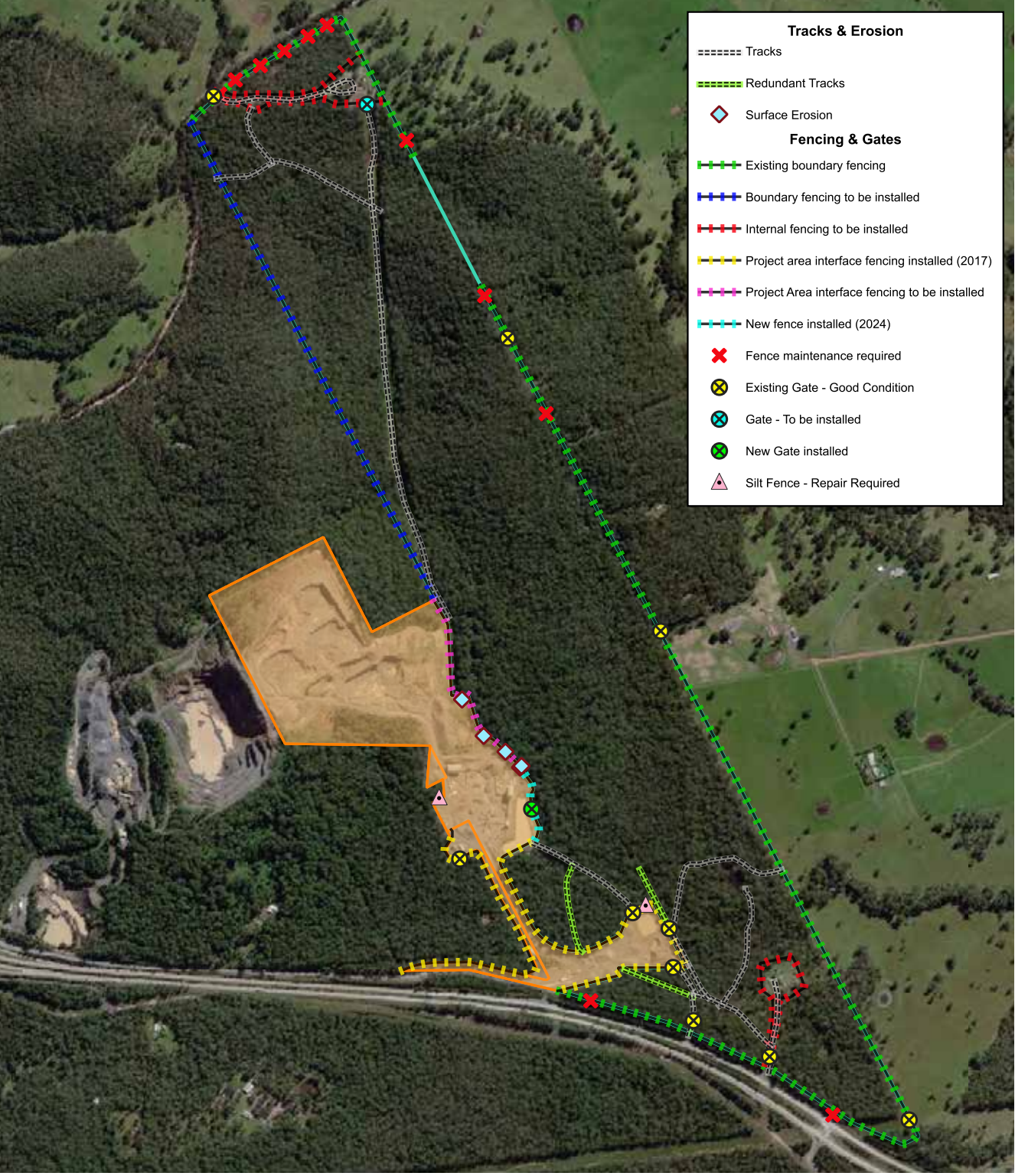
GDA94 / MGA zone 56
EPSG:28356

100 200 300 400 500 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 05/12/2024
Produced By: Kane Blundell

Wedgetail Project Consulting\Hunter Quarries - Documents\KEQ - BOAMP Monitoring\@GIS\KEQBOAMP_ByTHEME.qgz



Karuah East Quarry
Approved Disturbance Area

Biodiversity Offset Area

Figure 6:
Tracks, Erosion and Fencing

N

GDA94 / MGA zone 56
EPSG:28356

100 200 300 400 500 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 05/12/2024
Produced By: Kane Blundell

Wedgetail Project Consulting\Hunter Quarries - Documents\KEQ - BOAMP Monitoring\@GIS\KEQBOAMP_ByTHEME.qgz

3.3.3 Erosion

No areas of major active erosion were identified within the BOA during the 2024 monitoring. Areas of bare ground previously identified on the access tracks within the BOA predominantly appeared to be stable with no substantial active erosion or sedimentation observed. Minor scouring was still evident in several locations along the drainage lines within Lot 5 and within the vicinity of monitoring sites MP 17 and MP 18 in Lot 12, as recorded in the previous survey period. This scouring is considered to be natural stream bank erosion, as there was no evidence of unnatural disturbance in these areas, and overall the streams have relatively high ground vegetation cover and appear stable.

Certain areas of the BOA (primarily the steep slopes on Lot 5) have the potential to develop erosion following Lantana control works. The need for erosion or soil stabilisation measures following initial treatment of moderate and high density Lantana areas on steep slopes, will be assessed at each maintenance / monitoring event. No weed control had taken place within Lot 5 over the previous monitoring round, therefore no change of conditions was observed.

Sediment fencing and bund walls/diversion drains were in place in all areas downslope of disturbed areas except for the area north of Dam 1. However, the sediment fences installed along the eastern extent of the overburden stockpile and the area south east of Dam 1 had failed at the time of the 2018, 2019, 2020, 2021, 2022, 2023 and 2024 inspection. Active erosive processes are evident in several locations and can be observed along the wall of Dam 1 and the overburden stockpile wall. These processes are washing away sediments and rocks overtopping the sediment fence and spilling over the surrounding bushland. Many of these areas have begun to stabilise in some areas through the spread of exotic grass species over the disturbed areas, including roadsides and dam walls.

Key erosion and sedimentation issues were observed in multiple areas surrounding the quarry disturbance area:

- In three locations, the installed sediment fencing was overtopping (observed in 2018, 2019, 2020, 2021, 2022, 2023 and 2024) and, therefore, no longer provided active sediment control (**Figure 6**). It was observed in these locations that some sediment had been deposited within the surrounding environment. The overtopping sediment fencing along the western boundary of the quarry, within Lot 12, and adjacent to monitoring site MP 15 has fallen and is no longer adequately collecting sediment (**Photo 9**).
- It was noted during the 2017 monitoring event that the overflow for Dam 3 was depositing small amounts of sediment into the receiving environment with water being retained in the bushland east of the basin for a period. It was noted during the 2018 monitoring event that a small trough had been dug to allow the overflow from the dam to drain out of the area and into Bulga Creek. While some minor erosion and sedimentation was observed on the discharge side of the dam wall, it was still contained within the project disturbance area. This management action has remediated the waterlogging issue and no die-back or change in vegetation structure and composition was observed in 2018. No further changes have been noted since. Ongoing annual monitoring will be required to assess the effectiveness of the drainage and ensure no die-back or change in vegetation structure and composition occurs.
- It was observed in the 2021 monitoring event that excavated rock and sediment produced by the quarry operations has runoff the eastern boundary of the quarry into the BOA (**Photo 10).** This material forms a layer across this area where it is mixed in with organic material. It is recommended that silt fencing or bunding be installed to prevent the further introduction of this material into the BOA. Further excavated rock has been noted to the west of the haul road which has been deposited into the Karuah Quarry Conservation area into the dam (**Figure 6** and **Photo 2**).

- Moderate and high levels of dust were observed on foliage (see **Photo 1**) and on the ground at several monitoring sites along the boundaries of quarry operations. Dust levels are seemingly increased since the previous survey period. It is detrimentally impacting remnant vegetation and threatened species communities, particularly at MP15 and MP6.
- Erosion had formed a trough and sediment produced from the quarry had run off the eastern boundary into Lot 12 and into a dam. There is evidence of major sedimentation (**Photo 2 and Photo 3).**

Photo 9: Sediment fencing down and overtopping within Lot 12.

Photo 10: Excavated rock and sediment that has runoff from the eastern boundary of the quarry into the BOA.

3.3.4 Vertebrate Pests

No feral pests, or evidence thereof, were detected in the 2024 monitoring period. Feral pigs (*Sus scrofa*) were recorded during the 2020 site inspections along the powerline easement in Lot 5 and in proximity to monitoring site MP 4, supporting previous observations of suspected Feral Pig diggings recorded in the southern half of the BOA area during previous site inspections. Karuah East Quarry conducted Feral Pig trapping in Lot 14 in March 2019 and implemented a broader feral animal control baiting programme in the BOA during December 2020.

Additionally, the red fox (*Vulpes vulpes*) has been identified within the BOA and was also targeted in the December 2020 baiting programme. Further trapping is recommended on a scheduled basis to manage the population within the BOA.

3.3.5 Habitat Resources

Section 6.3.1 of the L&RMP and Section 3.8 of the BOAMP detail the protocol and requirements for salvaging habitat resources (i.e. logs, hollows and other large organic debris) during the KEQ project and redistributing into the rehabilitation or offset areas. Vegetation clearing undertaken in 2016 for the KEQ project has included the salvage of a large quantity of organic material (primarily large trees and logs). These resources were stockpiled on the boundaries of the KEQ project area (see **Figure 7**).

In addition to this, a total of 77 hollows and hollow log sections were previously salvaged and set aside for redistribution into the BOA. The location of the hollow logs to be redistributed throughout the BOA is shown on **Figure 7**. Inspections in 2020 indicated that most hollows are unsuitable for reinstallation due to cracks in hollow walls or the requirement to substantially modify the hollow for reinstallation. As such, in July/August 2020, 193 nest boxes were installed to compensated for the loss of 116 hollows and also compensate for the need to reinstall 77 salvaged hollows. It is recommended that the 77

salvaged hollows be redistributed terrestrially within the BOA to provide habitat for terrestrial fauna species.

Tree hollows removed as part of clearing works completed on site in November 2016, May and August 2018, and October and November 2019, have now been sufficiently replaced as per the requirements of the BOAMP.

Tree hollows removed as part of clearing works completed on site in September 2020, March, June, October and November 2021 and May 2022 (58 nest boxes) were replaced as per the requirements of the BOAMP in February 2023. Details on nest box installation are covered below.

Nest Boxes

Since 2016 a total of 375 nest boxes were installed in the Karuah East Quarry BOA. Monitoring of nest boxes is required every two years in which further monitoring is not required until 2026.

Details of nest box installation is outlined in **Table 7.**

Table 7: Nest box installation details across KEQ BOA (2016-2024)

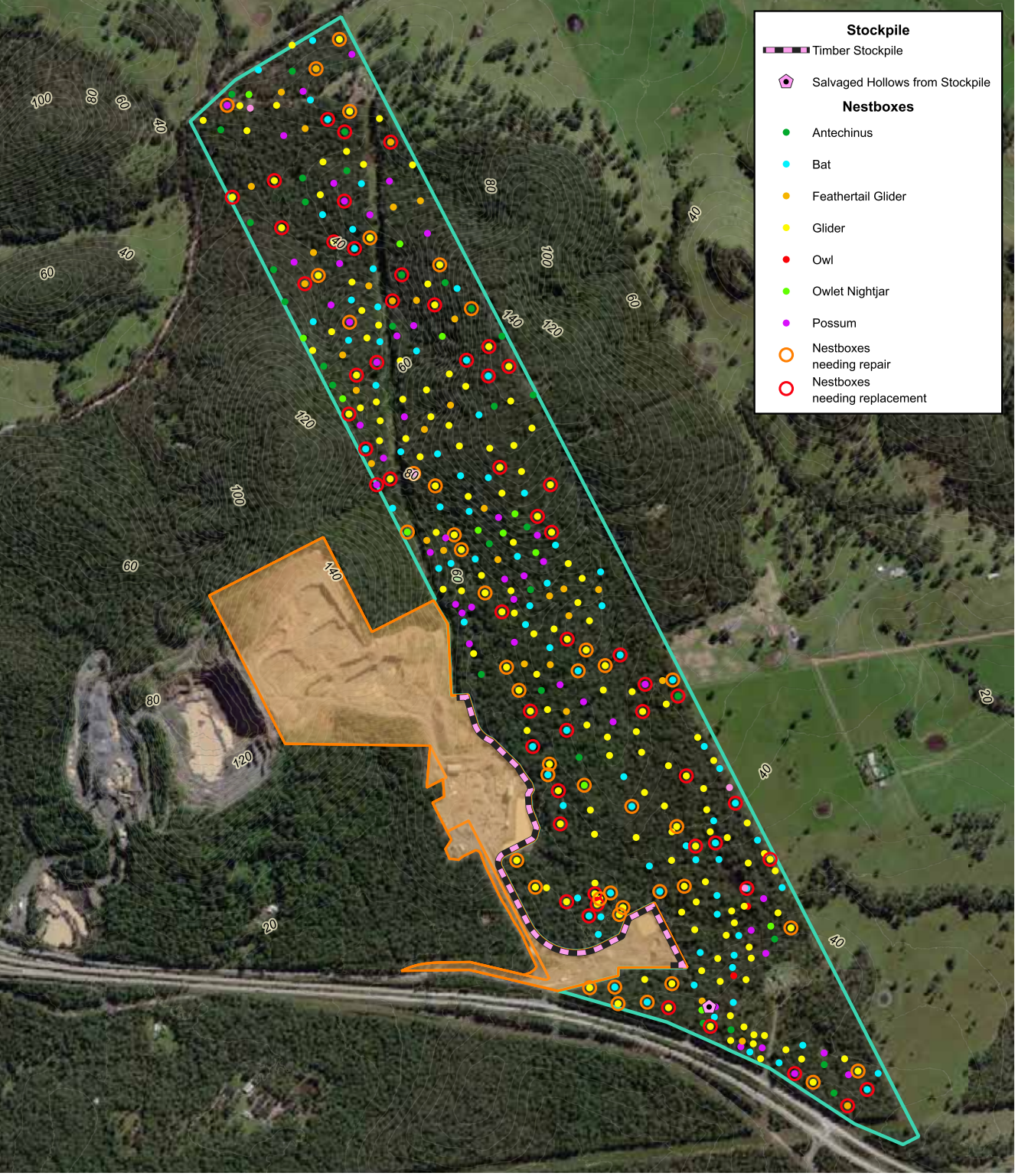
Installation Date	Installation Details	Box Type Installed
April 2016	30 nest boxes boxes were installed within the BOA in April 2016 as per Section 3.8 of the BOAMP.	• 20 Glider boxes • 10 Microchiropteran bat boxes
February 2018	93 nest boxes were installed between the 3rd and 6th of February 2018 and two large owl boxes were installed by quarry staff on 14 February 2018 (totaling 125) offsetting the original clearing works and loss of hollows at a 1:1 ratio assuming the 77 salvaged hollows are distributed throughout the BOA.	• 62 Glider boxes • 31 Microchiropteran bat boxes • Two owl nest boxes
July-August 2020	193 nest boxes were installed within the BOA to replace hollows removed during clearing undertaken on site in May and August 2018 at a ratio 1:1 as per the requirements of the L&RP and the BOAMP.	• 70 Glider boxes • 33 Possum boxes • 25 Antechinus boxes • 33 Microchiropteran bat boxes • 23 Feathertail Glider boxes • Nine Owlet Nightjar boxes
November-December 2022	Installation of 58 nest boxes were completed in February 2023 within the BOA to replace hollows removed during clearing undertaken on site, at a ratio 1:1 as per the requirements of the L&RP and the BOAMP.	• 14 Possum boxes • 10 Microbat boxes • 10 Feathertail boxes • 8 Sugar/squirrel Glider boxes • 7 Antechinus boxes • 5 Small Parrot boxes • 4 Owlet Nightjar boxes

Biennial nest box monitoring was completed by Kleinfelder in 2018, 2020 and Wedgetail in 2022 and 2024, results from these inspections are summarized below in **Table 8.**

Table 8: Nest box results across KEQ BOA (2016-2024)

Installation Date	Usage Rate	Details
2018 Inspection	**2016 Install of** 30 nest boxes (2yrs old) = 27% usage.	• 30 boxes were deemed to be available for use • No boxes recorded as damaged or unusable. • Eight Glider boxes showed signs of use including one being actively occupied by two Sugar Gliders (*Petaurus breviceps*). • None of the Microchiropteran bat exhibited signs of use during the survey.
2020 Inspection	**2016 Install of** 30 nest boxes (4yrs old) = 47% usage. **2018 Install of** 95 nest boxes (2yrs old) = 28% usage.	• 122 boxes were deemed to be available for use • Two boxes were found to be damaged and one unusable box (termite infested). • 40 Glider boxes showed signs of occupation, this included, three boxes occupied by Sugar Gliders (*Petaurus breviceps*) and 37 other boxes showing signs of use either from Sugar Gliders, Brown Antechinus (*Antechinus stuartii*) and Feathertail Gliders (*Acrobates pygmaeus*). • Almost half of all the glider nest boxes have either been utilised by or contain fauna species (usage rate of 49%). • None of the Microchiropteran bat boxes exhibited signs of use
2022 Inspection	**2016** Install of 30 nest boxes (6yrs old) = 40% usage. **2018** Install of 95 nest boxes (4yrs old) = 46% usage. **2020** Install of 193 nest boxes (2yrs old) = 46% nest boxes.	• 287 boxes were deemed to be available for use • Thirty-two boxes were found to be damaged and unusable boxes due to termite damage or European bee infestation. • 108 Glider boxes showed signs of occupation, this included, six boxes occupied by Sugar Gliders (*Petaurus breviceps*), one box occupied by a Squirrel Glider (*Petaurus norfolcensis*), one by Brown Antechinus (*Antechinus stuartii)* and 100 other boxes showing signs of use either from Sugar Gliders, Brown Antechinus (*Antechinus stuartii*) and Feathertail Gliders (*Acrobates pygmaeus*). • Almost three quarters of all the glider nest boxes have either been utilised by or contain fauna species (usage rate of 70%). • None of the Microchiropteran bat boxes exhibited signs of use
2024 Inspection	**2016** Install of 30 nest boxes (8yrs old) = 40% usage. **2018** Install of 95 nest boxes (6yrs old) = 46% usage. **2020** Install of 193 nest boxes (4yrs old) = 46% usage. **2022** Install of 58 nest boxes (2yrs old) = (70%) usage.	• 322 boxes were deemed to be available for use • Fifty-three boxes were found to be damaged and unusable boxes due to termite damage, European bee or wasp infestation. • 157 Glider boxes showed signs of occupation, this included, four boxes occupied by Sugar Gliders (*Petaurus breviceps*), one box occupied by a Squirrel Glider (*Petaurus norfolcensis*) and a further 152 boxes showing signs of use from Sugar Gliders (*Petaurus breviceps).* Squirrel Glider (*Petaurus norfolcensis*), Brown Antechinus (*Antechinus stuartii*), Feathertail Gliders (*Acrobates pygmaeus*) Brushtail Possum *(Trichosurus vulpecula)* and Ringtail possum *(Pseudocheirus peregrinus).*

		• Approximately half of the available boxes showed signs of occupancy (usage rate of 49%). • One of the Microchiropteran bat boxes exhibited signs of use, however the species was unable to be determined.



Karuah East Quarry Approved Disturbance Area

Biodiversity Offset Area

Figure 7: Habitat Resources and Nestbox Locations

N

GDA94 / MGA zone 56
EPSG:28356

100 200 300 400 500 m

WEDGETAIL PROJECT CONSULTING

Map Produced: 05/12/2024
Produced By: Kane Blundell

Wedgetail Project Consulting\Hunter Quarries - Documents\KEQ - BOAMP Monitoring\@GIS\KEQBOAMP_ByTHEME.qgz

4. PERFORMANCE CRITERIA EVALUATION

Performance Criteria Evaluation

BOAMP performance criteria and an evaluation of the current status, relevant management actions completed or further works required are detailed below in **Table 9.** It is noted that the BOAMP was endorsed by all consent authorities (i.e. Council, NSW DP&E and Commonwealth DotE) as of March 2016. As such, all Year 1 management actions were due to be completed before March 2017 to ensure compliance with the relevant performance criteria.

Table 9: Current status of BOAMP performance criteria

Action	Performance Criteria	Current Status (2024)
Fencing, Gates and Signage		
Fence mapping	Completed by end of year 1	Baseline fence mapping completed in October 2015.
Boundary fencing, gates and signage installation / repairs	Completed by end of year 1	Outstanding Ongoing installation of boundary fencing, gates and signage required. Mostly restricted due to access (e.g. around uncleared areas of the extraction area).
Redundant fencing removal	Completed by end of year 3	N/A – no redundant fencing identified during baseline fence mapping.
Fencing inspections	Completed annually	Annual inspection completed.
Fencing maintenance	Maintain boundary fencing as direct by annal inspection	Maintenance required following 2024 inspection. Repair of boundary fencing, gates and signage is to be undertaken as required.
Access Tracks		
Access track mapping and assessment	Completed by end of year 1	Baseline track mapping and assessment completed in October 2015.
Access track repairs	Completed by end of year 3 Track repair does not impact on ecological values and is restricted to defined limits	No major track repair requirements identified. Access tracks assessed as being in suitable condition for 4WD access during the 2024 monitoring.
Redundant access track rehabilitation	Completed by end of year 3	Rehabilitation of redundant tracks completed and natural regeneration occurring.
Access track inspections	Completed annually	Annual inspection completed.
Erosion, Sedimentation and Soil Management		
Erosion and sedimentation mapping	Completed by end of year 1	Baseline assessment completed in October 2015.
Erosion repair and management	Completed by end of year 3 Repair of erosion within BOA does not impact on ecological values	The 2023 survey identified areas requiring repair and/or management and these were not observed to be rectified in the 2024 inspection. These

Action	Performance Criteria	Current Status (2024)
		actions should be undertaking immediately. The effectiveness of erosion and sediment control measures within the Karuah East Quarry project area ,such as silt fencing and diversion drains, should be inspected and maintained regularly and after rain events.
Erosion inspections	Completed annually	Annual inspection completed in September 2024.
Existing Dwellings		
Exclusion of existing dwellings from Conservation Agreement	Completed by end of year 1	The survey plan excluded the two existing dwellings.
Fencing and signage installation	Completed by end of year 1	Outstanding - Installation of fencing, gates and signage required.
Inspections	Completed annually	Annual inspection completed in September 2024.
Maintenance and weed control	No noxious weeds present within excised areas. No unauthorised disturbance outside of excised areas in the BOA.	Historically heavy *Lantana camara* infestations have been observed throughout the BOA. During the current monitoring event this infestation has worsened and is now impacting a number of monitoring points; particularly MP3 were *Asperula asthenes* is monitored. Control is recommended to prevent the spread of this species and the potential decline of vegetation integrity of the BOA. No unauthorised disturbance observed outside of excised areas in the BOA during 2024 monitoring.
Revegetation and Regeneration*		
Confirm extent of revegetation areas	Completed by end of year 1	Completed. No revegetation works were assessed as being required within the BOA during the 2015 to the 2024 monitoring events. The requirement for revegetation works within the BOA will be reassessed each year.
Habitat Augmentation		
Salvage and redistribution of habitat resources	Redistribution of salvaged resources by end of Year 3 Redistribution of salvaged resources does not impact on ecological values of BOA, including threatened flora	The 77 salvaged hollows were determined to be unsuitable for reinstallation. The installation of 193 nest boxes in July/August 2020 compensates for the loss of these hollows and recent clearing works undertaken on site.
Nest box installation	30 nest boxes installed in BOA prior to commencement of clearing.	Completed. A total of 375 nest boxes have been installed within the BOA. This includes' Thirty nest boxes

Action	Performance Criteria	Current Status (2024)
	Remaining nest boxes installed within three months following completion of clearing.	installed in the southern part of the BOA in April 2015 prior to commencement of clearing, an additional 95 were installed in February 2018, the installation of 193 nest boxes in July-August 2020 and 58 during February 2023.
Nest box monitoring and maintenance	Nest boxes are inspected every two years. Repairs / maintenance implemented within 6 months of biennial inspection.	Monitoring of nest box 1-30 was carried in April 2018. Monitoring of boxes 1-125 was carried out in June 2020. Monitoring of all (1-375) boxes occurred during October 2024. Further monitoring is not required until 2026.
Threatened Flora Translocation		
Tetratheca juncea translocation	Translocation completed by end of year 1 Maintenance and monitoring undertaken in accordance with the TjMP	Refer to Tj Translocation Monitoring Report (Firebird 2018).
Weed Control		
Baseline weed mapping	Completed by end of year 1	Baseline assessment completed in October 2015 (Kleinfelder 2015).
Delineation of threatened flora prior to weed control works	No impacts on threatened flora populations within BOA from weed control activities.	N/A – no weed control works undertaken surrounding threatened species locations to date.
Weed control	20% reduction in extent or density (cover) of target weeds per year compared to baseline mapping by end of Year 3. Weed control activities do not impact on ecological values.	Outstanding Small areas of Lantana along the creek line in Lot 14 were sprayed in September 2018. Substantial amount of dieback in this area has occurred by February 2019. Additional weed control was undertaken in February 2019. Further dieback was recorded in November 2019, so that only scattered individuals now occur. Weed control has been undertaken along the boundary fence of Lot 12 in February 2019, and along the entire perimeter of Lot 12 in November 2019. Little action has been seen since the efforts described above. Weed density has significantly increased across the majority of the BOA since the 2018 monitoring round. Heavy infestations occur throughout Lot 5, spreading into Lot 13. Heavy infestation also occur in the northern section of Lot 12. Further weed control is recommended to prevent the establishment of Lantana (low density areas) or control established patches (medium/high density areas).

Action	Performance Criteria	Current Status (2024)
Weed monitoring	Completed biennially (every two years) (for BOA). Completed annually (KEQ, 50 m buffer and Yalimbah Creek).	Weed mapping revisited for KEQ project area, adjoining vegetation within 50 m of the project area boundary on Lots 12 and 13, along Yalimbah Creek (Lot 12) and BOA in September 2024.
Vertebrate Pest Management		
Baseline vertebrate pest assessment	Completed by end of year 1	Baseline assessment completed in October 2015 (Kleinfelder 2015).
Vertebrate pest control	No non-target species affected by control works. Reduction in abundance of target species across BOA compared to baseline assessment.	Feral animal control was undertaken in February 2019.
Monitoring	Completed biennially (every two years).	Outstanding 2017 biennially vertebrate pest monitoring required. 1080 baiting was undertaken within Lot 5 during December 2020. No action has been seen since.
Fire Management		
Fire management strategy	Completed by end of year 1	Outstanding A fire management strategy is to be prepared for the BOA.
Bushfire mitigation	Bushfire mitigation measures in the L&RMP adhered to at all times	Refer to KEQ Annual Environmental Report.
Aerial Fauna Crossing		
Installation of aerial fauna crossings	Installed upon completion of Haul Road. A 12-month monitoring program of the two aerial fauna crossings will be undertaken using remote motion sensing cameras mounted on each pole (four cameras in total) once the crossings have been installed.	Completed Aerial fauna crossings installed at Karuah Hardrock Quarry in 2019, and KEQ in 2020. Remote Camera monitoring programmes for both crossings are underway and cameras need to be assessed.
Ecological Monitoring		
Additional baseline surveys	Completed prior to clearing	Baseline surveys completed (refer to Kleinfelder 2016).
Vegetation and threatened flora monitoring	Baseline ecological monitoring undertaken prior to clearing in year 1. Less than 10% decline in Tetratheca juncea, Grevillea parviflora subsp. parviflora and Asperula asthenes population sizes (at monitoring sites) compared to baseline assessment. No major changes in vegetation health or condition across BOA.	Baseline ecological monitoring completed (refer to Kleinfelder 2016). No major changes in vegetation health or condition were observed in the BOA in 2024. A small decline in threatened flora species at monitoring sites was observed during 2023 survey and this remains stable for the current monitoring event (2024).

*Criteria relating to revegetation within the project area is outlined in the Landscape and Rehabilitation Management Plan (L&RMP).

5. CONCLUSION

Results from the 2024 KEQ BOA annual monitoring indicate that the vegetation and fauna habitats within the Karuah East Biodiversity Offset Area (BOA) and Lot 12 are in good condition and have remained relatively stable since the previous monitoring event in 2023.

The 2024 monitoring programme has identified several key management actions that are required to be completed, which have been highlighted in **Section 3.2.1** of this report. Key results from the 2024 monitoring programme include:

- *Asperula asthenes, Tetratheca juncea* and *Grevillea parviflora subsp. parviflora* populations are in good condition, though several populations have seen decreases in size since the previous monitoring event. This is possibly due to many factors including natural environmental variation, edge effect from quarry operations (MP 15, MP6) or *Lantana camara* infestations (MP3). Others have experienced a small increase but have overall remained relatively stable since the previous monitoring event.
- Key disturbances recorded within the KEQ BOA and Lot 12 include minor sedimentation due to overtopping of a small number of sediment fences, the occurrence of dust on foliage within close proximity to quarry operations, and the runoff of excavated rock into the BOA from the eastern boundary and western boundary along the haul road of the quarry operations.
- Weed coverage across the KEQ BOA and Lot 12 has significantly increased – management is required to reduce Lantana cover, especially within the northern portion of the site (Lot 5 and spreading down into Lot 13), adjacent to the powerline easement (particularly MP 2, MP3 and MP 4). Lantana infestations were also seen in the northern section of Lot 12.
- Maintenance required to repair and install fencing and sediment fencing.
- Minor erosion and sedimentation of a dam in Lot 12 due to runoff from the eastern boundary of the quarry.
- No feral pigs and foxes, or evidence thereof, were observed during the 2024 monitoring event, however this species was identified near the powerline easement in 2020. Despite not having been identified since, it is likely this species persists within the BOA and therefore continued control programmes be carried out.
- A total of 375 nest boxes have been installed to date across the KEQ BOA. Monitoring of nest boxes have been carried out in 2018, 2020 2022 and 2024. No further nest boxes need to be installed until further clearing of hollow bearing trees occurs. Monitoring will be required in 2026.

6. REFERENCES

Australian Bureau of Meteorology (BOM) (2021). Monthly Rainfall Clarence Town (Prince Street). Updated December 2020. Accessed 10 December 2020. http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=&p_c=&p_stn_num=061010

Eco Logical Australia (ELA) (2013). Karuah East Quarry Biodiversity Offset Strategy. Prepared for Karuah East Quarry Pty Ltd, July 2013.

Eco Logical Australia (ELA) (2014). EPBC Act Assessment Report: Karuah East Quarry – EPBC 2014/7282. Prepared for Karuah East Quarry Pty Ltd, October 2014.

Firebird ecoSultants Pty Ltd (2015). Tetratheca juncea Translocation Management Plan for the Karuah East Quarry Site. Prepared for Karuah East Quarry Pty Ltd, August 2015.

Firebird ecoSultants Pty Ltd (2016). Tetratheca juncea Translocation Monitoring Report. Prepared for Karuah East Quarry Pty Ltd.

Kleinfelder (2015). Biodiversity Offset Area Management Plan: Karuah East Quarry Project. Prepared for Karuah East Quarry Pty Ltd, January 2016.

Kleinfelder (2016). Baseline Ecological Surveys and Monitoring: Karuah East Quarry Biodiversity Offset Area and Lot 12. Prepared for Karuah East Quarry Pty Ltd, November 2015.

Payne, R.J., Stevenson, D., & Wellington, R. (2002). A standardised method for counting Black-eyed Susan populations. Unpublished Report.

RPS Australia Pty Ltd (2013). Terrestrial Ecology Survey and Assessment Report: Karuah East Quarry, Karuah NSW. Prepared for Karuah East Quarry Pty Ltd, July 2013.

SLR (2015). Landscape and Rehabilitation Management Plan, Karuah East Quarry. Prepared for Karuah East Quarry Pty Ltd, July 2015.

Wedgetail Project Consulting (2022) Biodiversity Offset Area Monitoring Report, Karuah East Quarry. Prepared for East Quarry Pty Ltd 2022

Wedgetail Project Consulting (2023) Biodiversity Offset Area Monitoring Report, Karuah East Quarry. Prepared for East Quarry Pty Ltd 2023

APPENDIX A. VEGETATION CONDITION ASSESSMENT RESULTS

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP1	Spotted Gum – Grey Ironbark open forest	• Observed increase in ground cover following drier conditions between 2019-2020. Ground cover is steadily increasing. • Midstorey regeneration present. • Low cover of fallen logs / timber. • Moderate to dense ground cover. • Low rock cover. • Dense litter cover. **Conclusion**: This years monitoring identified similar results in comparison to the previous survey (2023). Groundcover continues to increase in response to favorable weather conditions following drier conditions between 2019-2020.	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, rock / timber removal, or dust. • No signs of recent fire. • Some midstory die back. **Conclusion**: No new disturbance or changes in existing disturbance severity were observed since the previous survey (2023).	N/A

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP2	Spotted Gum – Grey Ironbark open forest	• Ground cover in both 'grass' and 'other' categories have not significantly changed in recent years though there has been a decrease in grass cover since previous monitoring events. • Moderate cover of fallen logs / timber. • Rocky areas present. • Hollow-bearing trees and one stag present within vicinity of monitoring site. • Dense leaf litter cover. • Canopy and midstory regeneration present. **Conclusion**: Some decrease in 'grass' groundcover suggesting that the site has recovered from drier conditions experienced on site during 2019-2020. No other significant changes in vegetation and habitat condition since the previous survey (2023).	• No evidence of erosion and sedimentation within the monitoring point, though minimal erosion occurs southwest of the monitoring point due along the steep slopes. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, rock / timber removal, or dust. • No signs of recent fire. • Weed cover is stable within the monitoring point though Heavy *Lantana* infestation in the gully southwest of MP2 remains. **Conclusion**: No new disturbance or changes in existing disturbance severity were observed since the previous survey (2023).	N/A

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP3	Brush Box – Turpentine shrubby open forest	• All vegetation strata within the monitoring site in healthy condition. • A small increase in canopy cover, though all other vegetation strata remain stable since previous monitoring events. • High structural complexity of vegetation. • High leaf litter. • Light-Moderate cover of fallen timber. • Weed cover (*Lantana* and Tradescantia) within the monitoring site has significantly increased, potentially in response to high rainfall in 2023. **Conclusion**: Excluding an increase in the abundance of exotic plants, no significant or notable changes in vegetation and habitat condition since the previous survey (2023).	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, or rock / timber removal. • No signs of recent fire. **Conclusion**: No new disturbance or changes in existing disturbance severity were observed since the previous survey (2023).	• There was a decrease in number of *Asperula asthenes* individuals within the monitoring site from 11 in 2023 to 9 in 2024. • Two *Asperula asthenes* plants were recorded flowering during monitoring. • All *Asperula asthenes* plants within the monitoring site were observed to be in healthy condition. • The population at MP 3 has declined significantly since 2021 (18 individuals recorded). **Conclusion:** Asperula asthenes continues to decrease since previous monitoring events despite appearing healthy. This may be due to being outcompeted by heavy exotic cover and smothering by high leaf litter.

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP4	Brush Box – Turpentine shrubby open forest	• Large increase in *Doodia aspera* abundance within the understory of the monitoring plot. • Shrub cover remains table despite a decrease in previous monitoring events. • Apart from the minor shrub dieback all vegetation strata within the monitoring site in healthy condition. • Canopy and midstory remain stable. • High structural complexity of vegetation. • Moderate fallen timber. • Weed cover (*Lantana* and *Tradescantia*) within the monitoring site has increased slightly. **Conclusion**: A notable increase in the abundance of ferns in the understorey, since previous monitoring events. There has been a slight increase weed abundance. No other significant or notable changes in vegetation and habitat condition since the previous survey (2023).	• No recent evidence of disturbance from grazing, pest animals, rubbish dumping, or rock / timber removal. • No recent evidence of disturbance from grazing, rubbish dumping, rock / timber removal. • Light dust cover observed on foliage. • No signs of recent fire. • Weed abundance slightly increased. • Flow of water from heavy rain has possibly some *Asperula asthenes* individuals. • High litter cover with no bare ground. **Conclusion**: No new disturbance or significant changes in existing disturbance severity were observed since the previous survey (2023).	• There was a decrease in number of *Asperula asthenes* individuals recorded in recent years from 32 in 2021 then to 16 in 2024. • Two *Asperula asthenes* plants were recorded flowering during monitoring. • All *Asperula asthenes* plants within the monitoring site were observed to be in healthy condition. • The population at MP 4 remains stable in recent monitoring events (16 individuals recorded) with a large decrease in population in 2021 likely the result of heavy rainfall and flow of water through the monitoring point removing some individuals. • Though some individuals were likely washed away, new growth and reshooting plants were observed in previous empty locations. **Conclusion:** Asperula asthenes abundance remain stable with small increased in exotic weed cover and light dust cover on surrounding foliage. Though plants appear healthy future monitoring may benefit to focus on minimizing dust and weed cover.

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP5	Blackbutt – Turpentine – Tallowwood shrubby open forest	• No evidence of foliage die-back was observed in the canopy or ground layer • Some midstory dieback though regeneration is present. • Small decrease in 'grass' groundcover. • Moderate fallen logs / timber. • Dense leaf litter cover. • Ligh cover of rocks. **Conclusion**: No significant changes in vegetation and habitat condition since the previous survey (2023).	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, rock / timber removal. • Light dust cover on surrounding foliage. • No signs of recent fire. **Conclusion**: No new disturbance or changes in existing disturbance severity were observed since the previous survey though future monitoring will benefit to focus on dust reduction (2023).	N/A
MP6	Blackbutt – Turpentine – Tallowwood shrubby open forest	• Some midstory dieback, particularly *Callistemon salignus* though regeneration is present. • Canopy remains in healthy condition. • Canopy and midstory regeneration present with an abundance of seedlings. • Low level of fallen logs / timber. • Ground cover is moderate. • Lantana remains in low abundance since previous survey. **Conclusion**: No significant changes in vegetation and habitat condition since the previous survey (2023).	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, or rock / timber removal was observed. • A very high dust cover observed on foliage. • Runoff observed within creek with sedimentation within water present. **Conclusion**: Very high dust cover on foliage has been observed within the monitoring site from 2020 to 2024. Future monitoring will benefit to focus on dust reduction.	N/A

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP7	Smooth-barked Apple - Red Bloodwood open forest	• Regeneration of foliage in canopy and midstory. • All vegetation strata in healthy condition. • Regrowth vegetation to the north and east that was previously cleared is now recovering satisfactorily. • Moderate litter cover within monitoring site, fallen timber present. • High leaf litter cover observed. • Canopy and midstory abundance have increase since previous monitoring. **Conclusion**: The monitoring point remains stable with signs of regeneration and increasing abundance in several stratum since the previous survey (2023).	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, or rock / timber removal. • High dust cover observed on foliage. • No signs of recent fire. **Conclusion**: High dust cover continues to occur on foliage and has been observed within the monitoring site from 2020 to 2024.	• There was a decrease in the number of *Tetratheca juncea* clumps recorded within the monitoring site, from 15 in 2021 to 12 in 2023 and 10 plants remain in 2024. • No new *Tetratheca juncea* clumps were recorded in 2023, though existing clumps were proliferating with many new shoots. • Eight *Tetratheca juncea* plants were recorded flowering during monitoring with two plants bearing fruit. • Most *Tetratheca juncea* plants within the monitoring site were observed to be in healthy condition. • Three *Tetratheca juncea* plants displayed new shoots. **Conclusion**: The *Tetratheca juncea* population at MP 7 has reduced since previous monitoring events though proliferation of remaining clumps suggests healthy plants.

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP8	Smooth-barked Apple - Red Bloodwood open forest	• Changes to groundcover composition, with a decrease in grass groundcover and an increase in 'other' with *Ptilotrix deusta* recorded higher than in previous years. • No exotic species identified within this plot. • No dieback of canopy stratum was observed. • Canopy and midstory regeneration present. • Low fallen timber • Dense ground cover and midstory **Conclusion**: Minor changes in vegetation and habitat condition since the previous survey with new growth observed in the canopy and midstory strata (2023).	• No evidence of erosion and sedimentation • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, rock / timber removal. • High dust cover due to nearby quarry operations. **Conclusion**: No new disturbance or changes in existing disturbance severity were observed since the previous survey (2023).	• The number of *Tetratheca juncea* clumps have remained stable since monitoring in 2022 with nine plants remaining in 2024. • No new *Tetratheca juncea* clumps was recorded in 2021. • Nine *Tetratheca juncea* plants were recorded flowering during monitoring. • Two *Tetratheca juncea* plants was recorded with fruits during monitoring. • Four plants were observed in healthy condition, displaying new growth and beginning to merge with neighboring plants. • One individual was observed to be yellowing. • The one *Grevillea parviflora* subsp. *parviflora* individual occurring within MP 8 in 2020 was absent during the 2024 monitoring surveys. **Conclusion:** *Tetratheca juncea* at MP8 has remain stable and healthy in recent years displaying new growth and an abundance of flowering plants.

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP9	Smooth-barked Apple - Red Bloodwood open forest	• Increased ground cover compared to previous monitoring events. • There was no sign of foliage die-back in the understory. • Minimal dead wood was observed throughout the canopy. • Moderate fallen timber. • High leaf litter cover present. **Conclusion**: Minor changes in vegetation and habitat condition since the previous survey (2023).	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rock / timber removal. • Low evidence of dust on foliage. • No signs of recent fire. • Old track to south. **Conclusion**: No new disturbance or changes in existing disturbance severity were observed since the previous survey (2023).	N/A
MP10	Sydney Peppermint - Smooth-barked Apple shrubby open forest	• Minor increase in canopy cover since previous monitoring. • All vegetation strata in healthy condition. • Canopy and midstory regeneration present. • Low-moderate fallen timber and high litter coverage. • Moderate to dense ground cover. **Conclusion**: No major changes in vegetation and habitat condition since the previous survey with some increases in canopy cover (2023).	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, rock / timber removal, or dust. • No signs of recent fire. • Three old dead stags present. **Conclusion**: No new disturbance or changes in existing disturbance severity were observed since the previous survey (2023).	N/A

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP11	Sydney Peppermint - Smooth-barked Apple shrubby open forest	• Previous evidence of foliage die-back, though this appears to have stabilized. • All present vegetation strata is in healthy condition. • Canopy and midstory regeneration present. • Groundcover has increased since previous monitoring events. • Low fallen timber. • Moderate ground cover. • High leaf litter coverage. **Conclusion**: No significant or notable changes in vegetation and habitat condition since the previous survey (2023).	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, rock / timber removal, or dust. **Conclusion**: No recent disturbance was observed since the previous survey (2023).	• There was an increase in the number of *Grevillea parviflora* subsp. *parviflora* plants recorded within the monitoring site, from 9 in 2022 to 10 in 2023 and 12 in 2024. • Two *Grevillea parviflora* subsp. *Parviflora* plants were relocated having been unrecorded in previous years. • All *Grevillea parviflora* subsp. *parviflora* plants within the monitoring site were observed to be in healthy condition. • Five *Grevillea parviflora* subsp. *Parviflora* were flowering. • The one *Tetratheca juncea* clump recorded at MP 11 in 2020 continues to be in a healthy condition with 165 flowers and 56 fruits. One new T*etratheca juncea* clump was recorded in 2024 with 55 flowers. **Conclusion**: The *Grevillea parviflora* subsp. *parviflora* population at MP 11 has declined since 2015 baseline (16 individuals recorded). To 12 plants recorded in 2024. One new *Tetratheca juncea* plant was recorded in 2024.

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP12	Smooth-barked Apple – Red Bloodwood open forest	• Midstorey reduced compared to surroundings due to vehicle tracks • Very high levels of fallen timber (from clearing). • High leaf litter coverage. • Moderate ground cover. • Evidence of regeneration in understory and midstory. **Conclusion**: Felled timber remains (from previous impact due to fence maintenance), however, no significant changes have occurred to vegetation and habitat condition since the previous survey (2023).	• No evidence of erosion and sedimentation. • Area has been previously subject to clearing due to fence line maintenance. • Clearing and log stockpiling in order to maintain an adjacent access track has impacted some of the vegetation including *Grevillea parviflora* individuals. **Conclusion**: Excluding the maintenance of an adjacent accessway, no evidence of new disturbance was observed since the previous survey (2023).	• There was a reduction of *Grevillea parviflora* subsp. *parviflora* plants recorded within the monitoring site, 2023 (7) to 2024 (5). • All *Grevillea parviflora* subsp. *parviflora* plants within the monitoring site were observed to be in healthy condition. • Four *Grevillea parviflora* subsp. *Parviflora* were observed flowering and one plant bore fruit. **Conclusion**: The *Grevillea parviflora* subsp. *parviflora* population at MP 11 has reduced by two plants since previous monitoring in 2023, possibly due to the continued impact of access track maintenance adjacent to the monitoring point.

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP13	Spotted Gum – Grey Ironbark open forest	• Minimal dieback in mature *Allocasuarina torulosa* individuals although healthy regeneration is observed within the canopy and midstory. • Low level of fallen logs / timber. • Dense ground cover. • Low rock cover. • Eucalypt and Midstory seedlings present. **Conclusion**: Regeneration is occurring within the monitoring point with minimal dieback of *Allocasuarina torulosa.*	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, rock / timber removal, or dust. • Significant dust settlement recorded here in 2023, though this appears to have reduced at the current monitoring event 2024 **Conclusion**: No evidence of new disturbance was observed since the previous survey (2023).	N/A

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP14	Smooth-barked Apple - Red Bloodwood open forest	• One individual *Setaria sphacelata.* • Most vegetation strata in healthy condition. • Canopy and midstory regeneration present. • Low fallen/ timber. • Dense ground and lead litter cover. **Conclusion**: No significant or notable changes in vegetation and habitat condition since the previous survey (2023).	• Evidence of sedimentation of quarry rock material adjacent to monitoring plot from haul road into the nearby dam. • High occurrence of *Setaria sphacelata* occurring south of the monitoring point. • Dust accumulation on foliage from Quarry. • Sediment runoff occurring south of the monitoring point contaminating the dam. • Moderate cover of exotic grasses around dam to south and along access track. **Conclusion**: Prevailing evidence of sedimentation was observed and high weed coverage still persist within the area since the previous survey (2023).	N/A

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP15	Blackbutt - Turpentine - Tallowwood shrubby open forest	• Marginal increase in Canopy cover since the 2023 survey. • All vegetation strata in moderately healthy condition. • Moderate fallen timber. • Dense ground cover and leaf litter. • Rocky areas in low abundance. • Large hollow present. **Conclusion**: No significant changes in vegetation and habitat condition since the previous survey (2023).	• No evidence of erosion and sedimentation. • There are some edge effects from adjacent clearing. • Thick dust coating on foliage. **Conclusion**: Dust cover on foliage was observed within the monitoring site in 2023 and again in 2024 seemingly becoming thicker.	• There was a decrease in the number of *Tetratheca juncea* clumps recorded within the monitoring site, from 5 in 2023, to 4 in 2024. • One new *Tetratheca juncea* that has not been detected in more recent years was observed reshooting. • All 4 *Tetratheca juncea* plants were recorded flowering during monitoring. • One *Tetratheca juncea* plant was observed fruiting. • All *Tetratheca juncea* plants within the monitoring site were observed to be in healthy condition. **Conclusion**: The *Tetratheca juncea* population at MP 15 has declined since 2015 baseline (30 individuals recorded). This decline in the *T. juncea* at MP 15 is most likely due to the lower than average rainfall during 2019, exacerbated by the location of the monitoring point; upper slopes of exposed hill side and thick dust cover.

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP16	Spotted Gum – Grey Ironbark open forest	• Increased 'grass' groundcover abundance that has stabilized since previous monitoring. • All vegetation strata in healthy condition. • Canopy and midstory regeneration present. • Moderate fallen timber. • Dense leaf litter and moderate ground cover. • Minor die back in the canopy • Decreased *Lantana camera* abundance since previous monitoring event. **Conclusion**: Minor changes, though not significant, in vegetation and habitat condition since the previous survey (2023).	• No evidence of erosion and sedimentation. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, rock / timber removal. • Very high dust cover from edge affects of quarry operations. **Conclusion**: Very high dust cover that has increased since previous monitoring (2023). No evidence of new disturbance was observed with some reduction in *Lantana camera.*	• *Asperula asthenes* detected within monitoring plot for first time (2021). • Six individual plants identified in 2022 and all remain in 2023. • An additional two plants were identified during the current monitoring event (2024). • Five *Asperula asthenes* plants were recorded flowering during monitoring. • All *Asperula asthenes* plants within the monitoring site were observed to be in healthy condition **Conclusion:** Despite increased edge effects from nearby quarry operations, *Asperula asthenes* is proliferating and healthy.

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP17	Brush Box - Turpentine shrubby open forest	• No evidence of foliage die-back, evidence of midstorey and canopy regeneration. • All vegetation strata in healthy condition. • Abundance of juvenile *Backhousia myrtifolia* in midstorey, subsequently increasing mid-storey cover. • Increased midstory has resulted in a decrease in ground cover. • *Lantana camara* abundance remains stable. • Moderate fallen timber. • Rocky areas along ephemeral creek. • Dense leaf litter. **Conclusion**: No significant changes in vegetation and habitat conditions since the previous survey (2023).	• Very minor scouring along creek bank. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, rock / timber removal. • Moderate dust cover on foliage. • Stable exotic plant community (*Lantana camara*). • Dirty water running within the creek. **Conclusion**: No evidence of new disturbance observed since the previous survey (2023). Creek water remains high in sedimentation.	• There was a decrease in number of *Asperula asthenes* individuals within the monitoring site from 10 in 2021 to 6 in 2023 and 6 plants remain in 2024 • Some individuals appear to have been removed along the creek bed due to heavy rainfall events, though other individuals were observed that haven't been recorded in recent years. • Four *Asperula asthenes* plants were recorded flowering during monitoring. • All *Asperula asthenes* plants within the monitoring site were observed to be in healthy condition with no yellowing. **Conclusion**: The population at MP 17 has decreased since 2015 baseline (11 individuals recorded) though it has remained stable in recent years, with new growth occurring.

Site	Vegetation Community	Vegetation and Habitat Condition	Evidence of Disturbance	Threatened Flora Monitoring
MP18	Brush Box - Turpentine shrubby open forest	• All vegetation strata in healthy condition • Canopy and midstorey regeneration present • Low fallen timber • High level of leaf litter present. • High leaf litter and ground cover • Rocky areas along ephemeral creek. **Conclusion**: No significant or notable changes in vegetation and habitat condition since the previous survey (2023).	• Very minor scouring along creek bank. • No recent evidence of disturbance from grazing, pest animals, rubbish dumping, or rock / timber removal. • reduced dust coverage on foliage when compared to previous years. **Conclusion**: No evidence of new disturbance was observed since the previous survey (2023).	• There was a small increase in number of *Asperula asthenes* individuals within the monitoring site from 11 in 2023 to 12 in 2024. • One new *Asperula asthenes* plants was recorded in 2024. • Five *Asperula asthenes* plant was recorded flowering during monitoring. • All *Asperula asthenes* plants within the monitoring site were observed to be in healthy condition. **Conclusion**: The population at MP 18 has remained stable since 2015 baseline (13 individuals recorded). Previous years of below average rainfall have likely impacted this population, however there are signs of plants reshooting and flowering, as well as plants sighted outside the monitoring point.

APPENDIX B. VEGETATION MONITORING DATA

Monitoring Site	Dominant Floristics		Projected Foliage Cover (%)									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
MP 1	Canopy	*Eucalyptus propinqua* (Small-fruited Grey Gum), *E. microcorys* (Tallowwood), *E. acmenoides* (White Mahogany) and *Corymbia maculata* (Spotted Gum)	50%	50%	50%	50%	50%	40%	40%	35%	35%	35%
	Midstorey	*Allocasuarina torulosa* (Forest Oak) and *Glochidion ferdinandi var. ferdinandi* (Cheese Tree)	40%	40%	40%	40%	40%	15%	20%	15%	15%	10%
	Shrub	*Leucopogon juniperinus* (Prickly Beard-heath), Hibbertia aspera (Rough Guinea Flower) and *Breynia oblongifolia* (Coffee Bush)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
	Ground (grass)	*Imperata cylindrica* (Blady Grass), *Oplismenus imbecillis* (Creeping Beard Grass), *Poa labillardierei* (Tussock) and *Themeda triandra* (Kangaroo Grass)	60%	60%	60%	60%	40%	20%	35%	35%	35%	40%
	Ground (other)	*Lomandra longifolia* (Spiny-headed Mat-rush), *Gonocarpus teucrioides* (Raspwort), *Carex longebrachiata* and *Adiantum aethiopicum* (Common Maidenhair)	50%	50%	50%	50%	50%	20%	30%	30%	25%	30%
	Exotic	*Lantana camara* (Lantana)	30%	30%	25%	25%	20%	10%	15%	15%	15%	15%
MP 2	Canopy	*Corymbia maculata* (Spotted Gum), *Eucalyptus microcorys* (Tallowwood), *E. canaliculata* (Grey Gum) *and E. paniculata subsp. paniculata* (Grey Ironbark)	40%	40%	40%	40%	40%	40%	35%	40%	40%	40%
	Midstorey	*Allocasuarina torulosa* (Forest Oak), *Bursaria spinosa (*Blackthorn) and *Exocarpos cupressiformis* (Cherry Ballart)	40%	35%	35%	35%	35%	30%	20%	20%	20%	20%
	Shrub	*Leucopogon juniperinus* (Prickly Beard-heath) and *Acacia ulicifolia* (Prickly Moses)	5%	5%	5%	5%	5%	10%	5%	5%	5%	5%
	Ground (grass)	*Themeda triandra* (Kangaroo Grass) and *Poa labillardierei* (Tussock)	50%	50%	50%	50%	40%	25%	40%	40%	40%	30%
	Ground (other)	*Lomandra longifolia* (Spiny-headed Mat-rush), *Gonocarpus tetragynus* and *Eustrephus latifolius* (Wombat Berry)	20%	20%	20%	20%	40%	5%	30%	35%	30%	30%

Monitoring Site	Dominant Floristics		Projected Foliage Cover (%)									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	Exotic	*Lantana camara* (Lantana)	5%	5%	1%	1%	1%	0%	2%	5%	5%	5%
MP 3	Canopy	*Lophostemon confertus* (Brush Box), *Syncarpia glomulifera* (Turpentine), *Eucalyptus propinqua* (Small-fruited Grey Gum) and *E. microcorys* (Tallowwood)	40%	40%	40%	40%	40%	35%	35%	45%	50%	55%
	Midstorey	*Melaleuca styphelioides* (Prickly-leaved Tea Tree), *Livistona australis* (Cabbage Palm), *Allocasuarina torulosa* (Forest Oak) and *Elaeocarpus obovatus* (Hard Quandong)	60%	60%	60%	60%	60%	40%	40%	40%	40%	40%
	Shrub	*Pittosporum multiflorum* (Orange Thorn), *Diospyros australis* (Black Plum) and *Bursaria spinosa* (Boxthorn)	40%	40%	50%	50%	60%	60%	55%	60%	60%	60%
	Ground (grass)	*Oplismenus aemulus* (Australian Basket Grass)	<5%	<5%	<5%	<5%	<5%	<5%	<5%	5%	5%	5%
	Ground (other)	*Doodia aspera* (Prickly Rasp Fern), *Carex longebrachiata*, *Adiantum hispidulum* (Rough Maidenhair Fern) and *Cissus antarctica* (Kangaroo Vine)	90%	90%	90%	90%	90%	65%	70%	70%	70%	70%
	Exotic	*Lantana camara* (Lantana) and *Ageratina riparia* (Mistflower)	50%	50%	50%	50%	40%	20%	30%	30%	35%	45%
MP 4	Canopy	*Lophostemon confertus* (Brush Box), *Syncarpia glomulifera* (Turpentine), and *Eucalyptus propinqua* (Small-fruited Grey Gum)	30%	30%	30%	30%	40%	25%	30%	30%	30%	40%
	Midstorey	*Glochidion ferdinandi var. ferdinandi* (Cheese Tree), *Livistona australis* (Cabbage-tree Palm), *Melaleuca styphelioides* (Prickly-leaved Tea Tree), *Acmena smithii* (Lilly Pilly) and *Elaeocarpus obovatus* (Hard Quandong)	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
	Shrub	*Pittosporum multiflorum* (Orange Thorn)	5%	5%	3%	3%	3%	20%	3%	3%	5%	5%
	Ground (grass)	*Oplismenus aemulus* (Australian Basket Grass)	5%	5%	5%	5%	5%	15%	5%	5%	5%	5%
	Ground (other)	*Doodia aspera* (Prickly Rasp Fern), *Morinda jasminoides* (Sweet Morinda) and *Carex longebrachiata*	90%	90%	90%	90%	90%	20%	70%	70%	70%	80%
	Exotic	*Lantana camara* (Lantana), *Asparagus aethiopicus* (Ground Asparagus) and *Tradescantia fluminensis* (Wandering Jew)	35%	35%	25%	30%	30%	30%	30%	20%	10%	15%

Monitoring Site	Dominant Floristics		Projected Foliage Cover (%)									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
MP 5	Canopy	*Eucalyptus pilularis* (Blackbutt), *E. microcorys* (Tallowwood), *Angophora costata* (Smooth-barked Apple) and *E. globoidea* (White Stringybark)	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
	Midstorey	*Allocasuarina torulosa (*Forest Oak), *Glochidion ferdinandi var. ferdinandi* (Cheese Tree), *Persoonia linearis* (Narrow-leaved Geebung) and *Melaleuca linariifolia* (Flax-leaved Paperbark)	60%	60%	60%	60%	60%	40%	40%	40%	40%	35%
	Shrub	*Leptospermum polygalifolium* (Tantoon), *Hibbertia aspera* (Rough Guinea Flower), *Breynia oblongifolia (*Coffee Bush) and *Phyllanthus hirtellus* (Thyme Spurge)	5%	5%	10%	10%	10%	10%	25%	15%	15%	15%
	Ground (grass)	*Entolasia stricta* (Wiry Panic) and *Oplismenus imbecillis* (Creeping Beard Grass)	60%	60%	60%	60%	60%	40%	35%	15%	15%	20%
	Ground (other)	*Doryanthes excelsa* (Gymea Lily), *Pteridium esculentum* (Common Bracken), *Ptilothrix deusta* and *Lomandra longifolia* (Spiny-headed Mat-rush)	50%	50%	50%	50%	50%	50%	50%	60%	60%	55%
	Exotic	*Lantana camara* (Lantana)	-	-	-	-	-	-	-	1%	-	-
MP 6	Canopy	*Eucalyptus microcorys* (Tallowwood), *E. propinqua* (Small-fruited Grey Gum), *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus pilularis* (Blackbutt)	50%	50%	50%	50%	50%	45%	45%	45%	45%	45%
	Midstorey	*Melaleuca styphelioides* (Prickly-leaved Tea Tree), *Allocasuarina torulosa* (Forest Oak), *Acmena smithii* (Lilly Pilly), *Callistemon salignus* (Willow Bottlebrush) and *Backhousia myrtifolia* (Grey Myrtle), *Acacia sp*.	60%	60%	50%	55%	30%	20%	35%	45%	45%	40%
	Shrub	*Hibbertia aspera* (Rough Guinea Flower), *Breynia oblongifolia* (Coffee Bush) and *Zieria smithii* (Sandfly Zieria)	<5%	<5%	<5%	5%	1%	5%	10%	15%	10%	10%
	Ground (grass)	*Imperata cylindrica* (Blady Grass), *Calochlaena dubia* (Rainbow Fern), *Oplismenus imbecillis* (Creeping Beard Grass) and *Poa labillardierei* (Tussock)	20%	20%	20%	20%	20%	20%	20%	20%	15%	20%

Monitoring Site	Dominant Floristics		Projected Foliage Cover (%)									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	Ground (other)	*Lomandra longifolia* (Spiny-headed Mat-rush), *Doryanthes excelsa* (Gymea Lily), *Adiantum aethiopicum* (Common Maidenhair) and *Morinda jasminoides* (Sweet Morinda)	30%	30%	30%	30%	30%	30%	30%	40%	40%	40%
	Exotic	*Lantana camara* (Lantana)	-	-	-	-	-	-	2%	2%	2%	2%
MP 7	Canopy	*Angophora costata* (Smooth-barked Apple), *Eucalyptus eugenioides* (Thin-leaved Stringybark) and *Corymbia gummifera* (Red Bloodwood)	35%	35%	35%	35%	35%	40%	40%	40%	40%	45%
	Midstorey	*Allocasuarina littoralis* (Black She-oak), *Leptospermum polygalifolium* (Tantoon) and *Allocasuarina torulosa* (Forest Oak)	40%	40%	40%	40%	40%	40%	40%	40%	40%	45%
	Shrub	*Pultenaea euchila* (Orange Pultenaea)	5%	5%	5%	5%	5%	5%	10%	10%	15%	10%
	Ground (grass)	*Themeda triandra* (Kangaroo Grass) and *Entolasia stricta* (Wiry Panic)	50%	50%	50%	50%	40%	25%	25%	35%	30%	25%
	Ground (other)	*Lomandra longifolia* (Spiny-headed Mat-rush), *Ptilothrix deusta* and *Gahnia radula*	70%	60%	60%	60%	60%	35%	40%	45%	50%	55%
	Exotic	*Setaria sphacelata* (South African Pigeon Grass)	5%	5%	5%	5%	2%	2%	1%	1%	2%	2%
MP 8	Canopy	*Angophora costata* (Smooth-barked Apple), *Eucalyptus eugenioides* (Thin-leaved Stringybark) and *Corymbia gummifera* (Red Bloodwood)	30%	30%	30%	30%	30%	30%	30%	30%	35%	35%
	Midstorey	*Allocasuarina littoralis* (Black She-oak), *Leptospermum polygalifolium* (Tantoon) and *Acacia longifolia* (Sydney Golden Wattle)	50%	50%	50%	50%	30%	40%	40%	40%	40%	43%
	Shrub	*Pultenaea paleacea* (Chaffy Bush-pea), *Pultenaea euchila* (Orange Pultenaea), *Phyllanthus hirtellus* (Thyme Spurge), *Hibbertia riparia* (Erect Guinea-flower) and *Hibbertia aspera* (Rough Guinea Flower)	20%	20%	20%	20%	15%	15%	15%	10%	10%	8%
	Ground (grass)	*Entolasia stricta* (Wiry Panic) and *Themeda triandra* (Kangaroo Grass)	50%	50%	50%	50%	40%	40%	15%	20%	25%	25%
	Ground (other)	*Lomandra longifolia* (Spiny-headed Mat-rush), *Ptilothrix deusta*, *Patersonia sericea* (Silky Purple-flag) and *Lomandra obliqua*	50%	50%	50%	50%	50%	40%	50%	55%	50%	55%
	Exotic	Nil	-	-	-	-	-	-	-	-	-	-

Monitoring Site	Dominant Floristics		Projected Foliage Cover (%)									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
MP 9	Canopy	*Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood), *Eucalyptus microcorys* (Tallowwood) and *E. eugenioides* (Thin-leaved Stringybark)	40%	40%	40%	40%	40%	40%	35%	40%	40%	40%
	Midstorey	*Allocasuarina* littoralis (Black She-oak), *Dodonaea triquetra* (Large-leaf Hop-bush) and *Persoonia linearis* (Narrow-leaved Geebung).	50%	50%	50%	50%	50%	40%	40%	40%	40%	40%
	Shrub	*Leptospermum polygalifolium* (Tantoon), *Pultenaea euchila* (Orange Pultenaea), *Logania albiflora* and *Polyscias sambucifolia* (Elderberry Panax)	10%	10%	10%	10%	7%	7%	10%	20%	15%	15%
	Ground (grass)	*Imperata cylindrica* (Blady Grass), *Rytidosperma pallidum* (Red-anther Wallaby Grass), *Entolasia stricta* (Wiry Panic) and *Themeda triandra* (Kangaroo Grass)	30%	30%	40%	40%	40%	30%	30%	30%	30%	35%
	Ground (other)	*Lomandra longifolia* (Spiny-headed Mat-rush), *Pteridium esculentum* (Common Bracken) and *Ptilothrix deusta*	60%	60%	60%	50%	40%	40%	40%	40%	35%	40%
	Exotic	Nil	-	-	-	-	-	-	-	-	-	-
MP 10	Canopy	*Eucalyptus piperita* (Sydney Peppermint), *Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus microcorys* (Tallowwood)	40%	40%	40%	35%	35%	40%	40%	40%	35%	40%
	Midstorey	*Allocasuarina littoralis* (Black She-oak), *Persoonia* linearis (Narrow-leaved Geebung) and *A. torulosa* (Forest Oak)	10%	10%	10%	10%	10%	10%	15%	15%	15%	15%
	Shrub	*Pultenaea euchila* (Orange Pultenaea), *Leptospermum polygalifolium* (Tantoon), *Pultenaea paleacea* (Chaffy Bush-pea) *Polyscias sambucifolia* (Elderberry Panax) and *Acacia ulicifolia* (Prickly Moses)	5%	5%	5%	5%	5%	3%	5%	3%	5%	5%
	Ground (grass)	*Entolasia stricta* (Wiry Panic), *Themeda triandra* (Kangaroo Grass) and *Imperata cylindrica* (Blady Grass)	40%	40%	40%	40%	30%	40%	30%	40%	40%	40%
	Ground (other)	*Gahnia radula*, *Doryanthes excelsa* (Gymea Lily), *Lomandra longifolia* (Spiny-headed Mat-rush) and *Ptilothrix deusta*	60%	60%	60%	60%	50%	40%	50%	50%	50%	50%
	Exotic	Nil	-	-	-	-	-	-	-	-	-	-

Monitoring Site	Dominant Floristics		Projected Foliage Cover (%)									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
MP 11	Canopy	*Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus capitellata* (Brown Stringybark)	35%	35%	35%	35%	35%	35%	35%	40%	45%	45%
	Midstorey	*Allocasuarina littoralis* (Black She-oak), *Glochidion ferdinandi var. ferdinandi* (Cheese Tree), *Leptospermum polygalifolium* (Tantoon) and *Banksia spinulosa* (Hairpin Banksia)	40%	40%	40%	40%	40%	40%	45%	45%	45%	45%
	Shrub	*Pultenaea euchila* (Orange Pultenaea) and *Boronia pinnata*	5%	5%	5%	5%	5%	5%	5%	5%	3%	3%
	Ground (grass)	*Entolasia stricta* (Wiry Panic), *Imperata cylindrica* (Blady Grass) and *Themeda triandra* (Kangaroo Grass)	35%	35%	40%	40%	30%	25%	25%	30%	30%	35%
	Ground (other)	*Xanthorrhoea latifolia*, *Pteridium esculentum* (Common Bracken) and *Ptilothrix deusta*, *Doryanthes excelsa* (Gymea Lily)	60%	60%	60%	60%	50%	40%	40%	25%	30%	30%
	Exotic	Nil	-	-	-	-	-	-	-	-	-	-
MP 12	Canopy	*Eucalyptus pilularis* (Blackbutt), *Angophora costata* (Smooth-barked Apple), *E. globoidea* (White Stringybark), *Corymbia gummifera* (Red Bloodwood), *E. microcorys* (Tallowwood) and *E. piperita* (Sydney Peppermint)	40%	40%	40%	40%	40%	35%	30%	30%	35%	35%
	Midstorey	*Leptospermum polygalifolium* (Tantoon), *Allocasuarina littoralis* (Black She-oak), *Glochidion ferdinandi var. ferdinandi* (Cheese Tree) and *Exocarpos cupressiformis* (Cherry Ballart)	30%	30%	30%	30%	30%	15%	15%	15%	20%	20%
	Shrub	*Pultenaea euchila* (Orange Pultenaea), *Boronia pinnata* and *Banksia spinulosa* (Hairpin Banksia)	10%	10%	10%	5%	10%	5%	5%	10%	10%	10%
	Ground (grass)	*Themeda triandra* (Kangaroo Grass), *Entolasia stricta* (Wiry Panic), and *Austrostipa sp.*	40%	40%	40%	30%	30%	20%	20%	20%	20%	20%
	Ground (other)	*Xanthorrhoea latifolia* and *Ptilothrix deusta*	40%	40%	40%	30%	30%	10%	15%	15%	15%	10%
	Exotic	*Senecio madagascariensis* (Fireweed)	-	-	-	-	-	-	0.5%	50%	-	-
MP 13	Canopy	*Eucalyptus sparsifolia* (Narrow-leaved Stringybark), *Corymbia maculata* (Spotted Gum), *E. paniculata* (Grey Ironbark) and *E. microcorys* (Tallowwood)	40%	40%	40%	40%	50%	25%	25%	40%	40%	40%

Monitoring Site	Dominant Floristics		Projected Foliage Cover (%)									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	Midstorey	*Allocasuarina torulosa* (Forest Oak), *Syncarpia glomulifera* (Turpentine) and *Callistemon salignus* (Willow Bottlebrush)	40%	40%	40%	40%	40%	10%	10%	10%	10%	20%
	Shrub	*Hibbertia aspera* (Rough Guinea Flower), *Pultenaea euchila* (Orange Pultenaea), *Breynia oblongifolia* (Coffee Bush) and *Leptospermum polygalifolium* (Tantoon)	5%	5%	5%	5%	5%	2%	3%	3%	2%	2%
	Ground (grass)	*Imperata cylindrica* (Blady Grass), *Poa labillardierei* (Tussock), *Themeda triandra* (Kangaroo Grass) and *Oplismenus imbecillis* (Creeping Beard Grass).	60%	60%	60%	70%	70%	60%	60%	70%	70%	70%
	Ground (other)	*Lomandra longifolia* (Spiny-headed Mat-rush), *Doryanthes excelsa* (Gymea Lily), *Lepidosperma laterale*, *Patersonia sericea* and *Lomandra multiflora* (Many-flowered Mat-rush)	30%	30%	40%	40%	40%	30%	30%	40%	45%	40%
	Exotic	Nil	-	-	-	-	-	-	-	-	-	-
MP 14	Canopy	*Angophora costata* (Smooth-barked Apple), *Eucalyptus eugenioides* (Thin-leaved Stringybark), *E. microcorys* (Tallowwood), and *E. paniculata* subsp. *paniculata* (Grey Ironbark)	35%	40%	40%	40%	40%	40%	40%	40%	40%	40%
	Midstorey	*Allocasuarina torulosa* (Forest Oak), *Callistemon salignus* (Willow Bottlebrush) and *Glochidion ferdinandi* (Cheese Tree)	25%	25%	25%	25%	25%	25%	25%	25%	20%	25%
	Shrub	*Leucopogon juniperinus* (Prickly Beard-heath), *Pultenaea villosa* (Hairy Bush-pea), *Leptospermum polygalifolium* (Tantoon) and *Hibbertia aspera* (Rough Guinea Flower)	10%	15%	15%	15%	15%	15%	15%	15%	15%	15%
	Ground (grass)	*Themeda triandra* (Kangaroo Grass), *Poa labillardierei* (Tussock) and *Entolasia stricta* (Wiry Panic)	80%	80%	80%	80%	80%	80%	75%	75%	75%	75%
	Ground (other)	*Lomandra longifolia* (Spiny-headed Mat-rush), *Doryanthes excelsa* (Gymea Lily) and *Brunoniella pumilio* (Dwarf Blue Trumpet)	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
	Exotic	*Setaria sphacelata* (South African Pigeon Grass)	5%	5%	5%	5%	2%	2%	1%	1%	2%	2%
MP 15	Canopy	*Eucalyptus pilularis* (Blackbutt), *Angophora costata* (Smooth-barked Apple), *Corymbia gummifera* (Red Bloodwood) and *E. microcorys* (Tallowwood)	45%	45%	45%	45%	45%	45%	40%	40%	45%	50%

Monitoring Site	Dominant Floristics		Projected Foliage Cover (%)									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	Midstorey	*Allocasuarina torulosa* (Forest She-oak) and *Acacia irrorata* (Green Wattle)	20%	20%	15%	15%	15%	15%	10%	10%	10%	10%
	Shrub	*Hibbertia vestita* (Hairy Guinea Flower), *Breynia oblongifolia* (Coffee Bush) and *Phyllanthus gunnii* (Scrubby Spurge)	10%	10%	10%	10%	10%	10%	15%	15%	10%	10%
	Ground (grass)	*Themeda triandra* (Kangaroo Grass), *Entolasia stricta* (Wiry Panic) and *Imperata cylindrica* (Blady Grass)	30%	30%	30%	30%	25%	25%	25%	25%	25%	30%
	Ground (other)	*Doryanthes excelsa* (Gymea Lily), *Lomandra longifolia* (Spiny-headed Mat-rush), *Pteridium esculentum* (Common Bracken), *Lepidosperma laterale* and *Xanthorrhoea macronema*	60%	60%	60%	60%	50%	50%	55%	55%	55%	60%
	Exotic	*Lantana camara* (Lantana)	5%	5%	1%	1%	1%	1%	1%	1%	1%	1%
MP 16	Canopy	*Eucalyptus pilularis* (Blackbutt), *E. propinqua* (Small-fruited Grey Gum), *E. microcorys* (Tallowwood) and *Angophora costata* (Smooth-barked Apple)	50%	50%	50%	50%	50%	50%	50%	50%	50%	45%
	Midstorey	*Allocasuarina torulosa* (Forest Oak), *Syncarpia glomulifera* (Turpentine) and *Glochidion ferdinandi var. ferdinandi* (Cheese Tree)	30%	30%	30%	30%	30%	30%	35%	30%	25%	30%
	Shrub	*Leucopogon juniperinus* (Prickly Beard-heath) and *Acacia floribunda* (White Sally Wattle)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
	Ground (grass)	*Poa labillardierei* (Tussock), *Imperata cylindrica* (Blady Grass), and *Oplismenus imbecillis* (Creeping Beard Grass)	50%	50%	40%	40%	30%	25%	25%	25%	25%	30%
	Ground (other)	*Carex appressa* (Tall Sedge), *Doodia aspera* (Prickly Rasp Fern), *Lomandra longifolia* (Spiny-headed Mat-rush) and *Calochlaena dubia* (Rainbow Fern)	30%	30%	40%	40%	30%	20%	35%	25%	30%	30%
	Exotic	*Lantana camara* (Lantana)	30%	30%	30%	40%	30%	30%	30%	30%	30%	25%
MP 17	Canopy	*Eucalyptus pilularis* (Blackbutt), *E. microcorys* (Tallowwood), *Syncarpia glomulifera* (Turpentine), *E. acmenoides* (White Mahogany) and *E. propinqua* (Small-fruited Grey Gum)	40%	40%	40%	40%	40%	45%	45%	45%	45%	40%

Monitoring Site	Dominant Floristics		Projected Foliage Cover (%)									
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	Midstorey	*Backhousia myrtifolia* (Grey Myrtle), *Lophostemon confertus* (Brush Box), *Livistona australis* (Cabbage Palm), *Acmena smithii* (Lilly Pilly) and *Allocasuarina torulosa* (Forest Oak)	50%	50%	50%	50%	50%	50%	55%	55%	40%	45%
	Shrub	*Wilkiea huegeliana* (Veiny Wilkiea), *Acacia maidenii* (Maiden's Wattle), *Eupomatia laurina* (Bolwarra) and *Pittosporum multiflorum* (Orange Thorn)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
	Ground (grass)	*Poa labillardierei* (Tussock), *Themeda triandra* (Kangaroo Grass) *Entolasia marginata* (Bordered Panic) and *Oplismenus imbecillis* (Creeping Beard Grass).	40%	40%	40%	40%	40%	25%	20%	20%	20%	15%
	Ground (other)	*Doodia aspera* (Prickly Rasp Fern), *Lomandra longifolia* (Spiny-headed Mat-rush), *Gymnostachys anceps* (Settlers' Twine) and *Calochlaena dubia* (Rainbow Fern)	50%	50%	50%	50%	50%	65%	65%	60%	60%	55%
	Exotic	*Lantana camara* (Lantana)	10%	15%	15%	15%	15%	15%	15%	5%	5%	10%
MP 18	Canopy	*Eucalyptus saligna* (Sydney Blue Gum), *E. microcorys* (Tallowwood), *Syncarpia glomulifera* (Turpentine), and *E. acmenoides* (White Mahogany)	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%
	Midstorey	*Lophostemon confertus* (Brush Box), *Backhousia myrtifolia* (Grey Myrtle), *Cryptocarya glaucescens* (Jackwood), *Allocasuarina torulosa* (Forest Oak) and *Acacia irrorata* (Green Wattle)	25%	25%	25%	25%	25%	25%	25%	30%	30%	30%
	Shrub	*Acacia maidenii* (Maiden's Wattle) and *Denhamia silvestris* (Narrow-leaved Orangebark), *Persoonia linearis* (Narrow-leaved Geebung)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
	Ground (grass)	*Poa labillardierei* (Tussock), *Imperata cylindrica* (Blady Grass), and *Oplismenus imbecillis* (Creeping Beard Grass)	50%	50%	50%	50%	40%	15%	20%	20%	20%	20%
	Ground (other)	*Doodia aspera* (Prickly Rasp Fern), *Lomandra longifolia* (Spiny-headed Mat-rush) and *Gymnostachys anceps* (Settlers' Twine)	50%	50%	50%	50%	40%	30%	35%	50%	50%	50%
	Exotic	*Lantana camara* (Lantana)	10%	15%	15%	15%	15%	15%	15%	10%	15%	15%

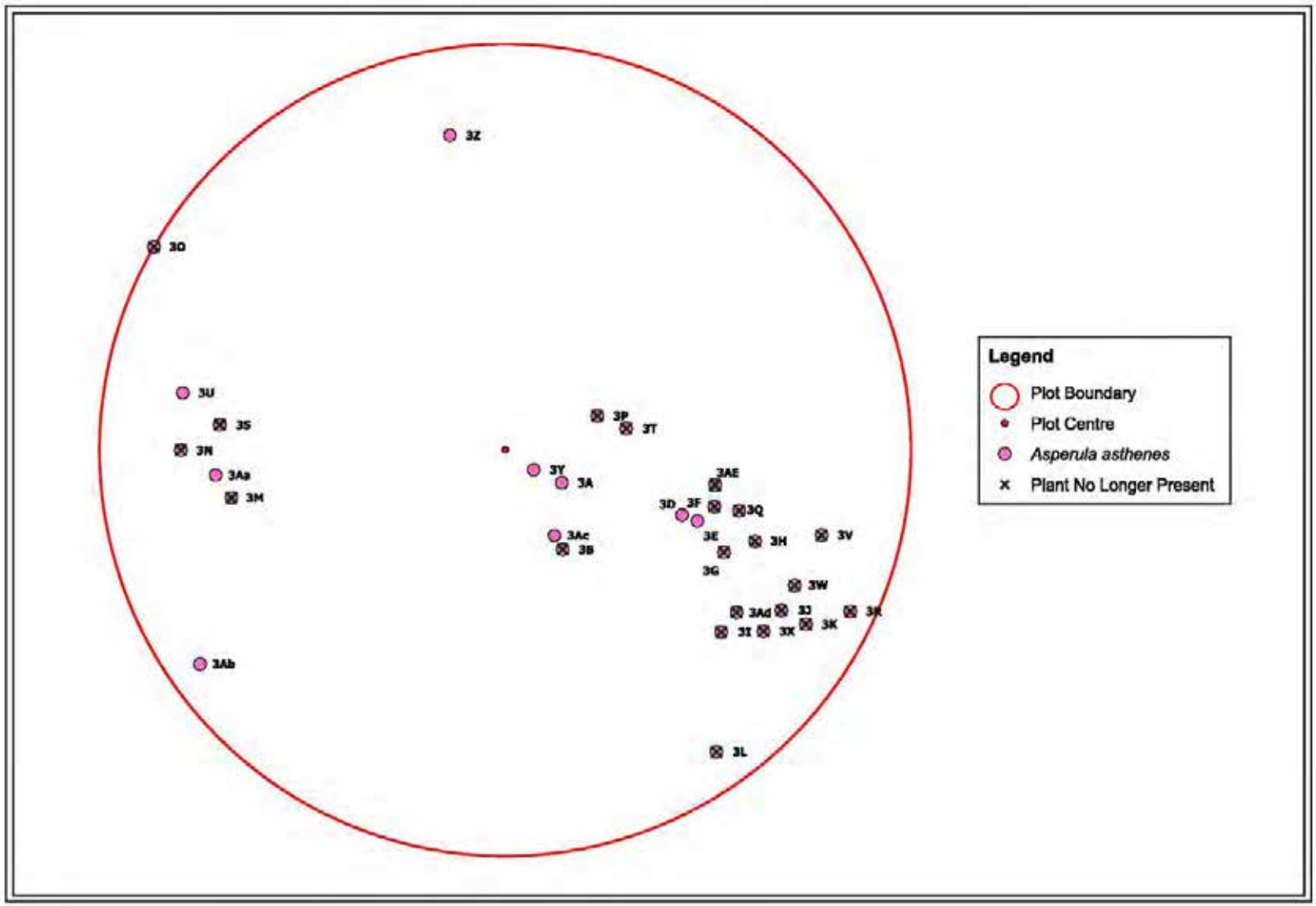
APPENDIX C. THREATENED FLORA MONITORING RESULTS

Biodiversity Offset Area Monitoring Sites

Monitoring Point 3: Asperula asthenes monitoring results

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
3A	160	140	30 x 25	70 x 40	10 x 5	30 x 10	-	-	-	-	60x40	30x30		
3B	280	150	20 x 25	-	5 x 5	-	-	-	60 x 60	70x70	50x40	-		
3C	160	120	40 x 30	40 x 30	170 x 90	200 x 50	110 x 110	110x110	130 x 100	-	-	-		
3D	460	110	50 x 20	30 x 20	-	-	-	-	10 x 20	-	-	20x10		
3E	500	110	55 x 30	30 x 30	45 x 40	5 x 5	-	-	10 x 10	40x40	40x5	30x5		
3F	530	105	50 x 10	30 x 30	60 x 20	60 x 20	80 x 60	100x60	100 x 60	100x60	-	-		
3G	590	115	25 x 35	25 x 40	170 x 80	-	10 x 5	10x5	20 x 20	20x20	5x5	-		
3H	650	110	20 x 20	40 x 20	-	100 x 100	60 x 40	20x40	60 x 40	-	-	-		
3I	690	130	40 x 25	30 x 20	-	-	-	-	-	-	-	-		
3J	780	120	35 x 20	20 x 20	-	80 x 50	-	-	-	-	-	-		
3K	850	120	30 x 30	30 x 30	60 x 15	-	10 x 5	-	30 x 10	-	-	-		
3L	900	145	35 x 45	20 x 10	-	-	-	10x10	-	-	-	-		
3M	680	260	40 x 35	40 x 35	25 x 30	40 x 20	60 x 40	40x2	20 x 5	-	-	-		
3N	790	270	30 x 25	30 x 20	-	-	120 x 50	20x6	10 x 10	10x10	-	-		
3O	990	300	55 x 25	-	-	20 x 5	-	50x30	-	-	-	-		
3P	240	90	40 x 20	40 x 15	40 x 15	40 x 20	150 x 90	-	-	-	-	-		
3Q	590	105	-	40 x 10	-	-	-	50x30	40 x 10	-	-	-		
3R	930	115	-	30 x 30	-	-	-	-	-	-	-	-		

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
3S	700	275	-	20 x 30	5 x 5	-	-	-	20 x 20	30x40	-	-		
3T	300	80	-	-	5 x 25	-	-	-	-	-	-	-		
3U	800	280	-	-	30 x 20	50 x 20	30 x 30	30x30	50 x 20	100x30	40x60	20x15		
3V	800	105	-	-	-	5 x 5	-	-	-	-	-	-		
3W	780	115	-	-	-	80 x 50	80 x 30	40x30	10 x 40	10x10	2x2	-		
3X	770	125	-	-	-	5 x 5	-	-	-	-	-	-		
3Y	85	125	-	-	-	-	40 x 60	30x10	-	100x70	20x20	20x15		
3Z	780	280	-	-	-	-	-	20x20	-	-	-	50x20	3FL	
3AA	710	265	-	-	-	-	-	10x10	30 x 30	25x10	55x30	45x30		
3AB	910	235	-	-	-	-	-	30x30	60 x 30	100x80	80x40	40x10	1FL	
3AC	290	160	-	-	-	-	-	-	30 x 30	30x30	35x30	30X30		
3AD	910	235	-	-	-	-	-	-	40 x 40	40x40	-	-		
3AE	520	100	-	-	-	-	-	-	-	5x5	25x20	-		



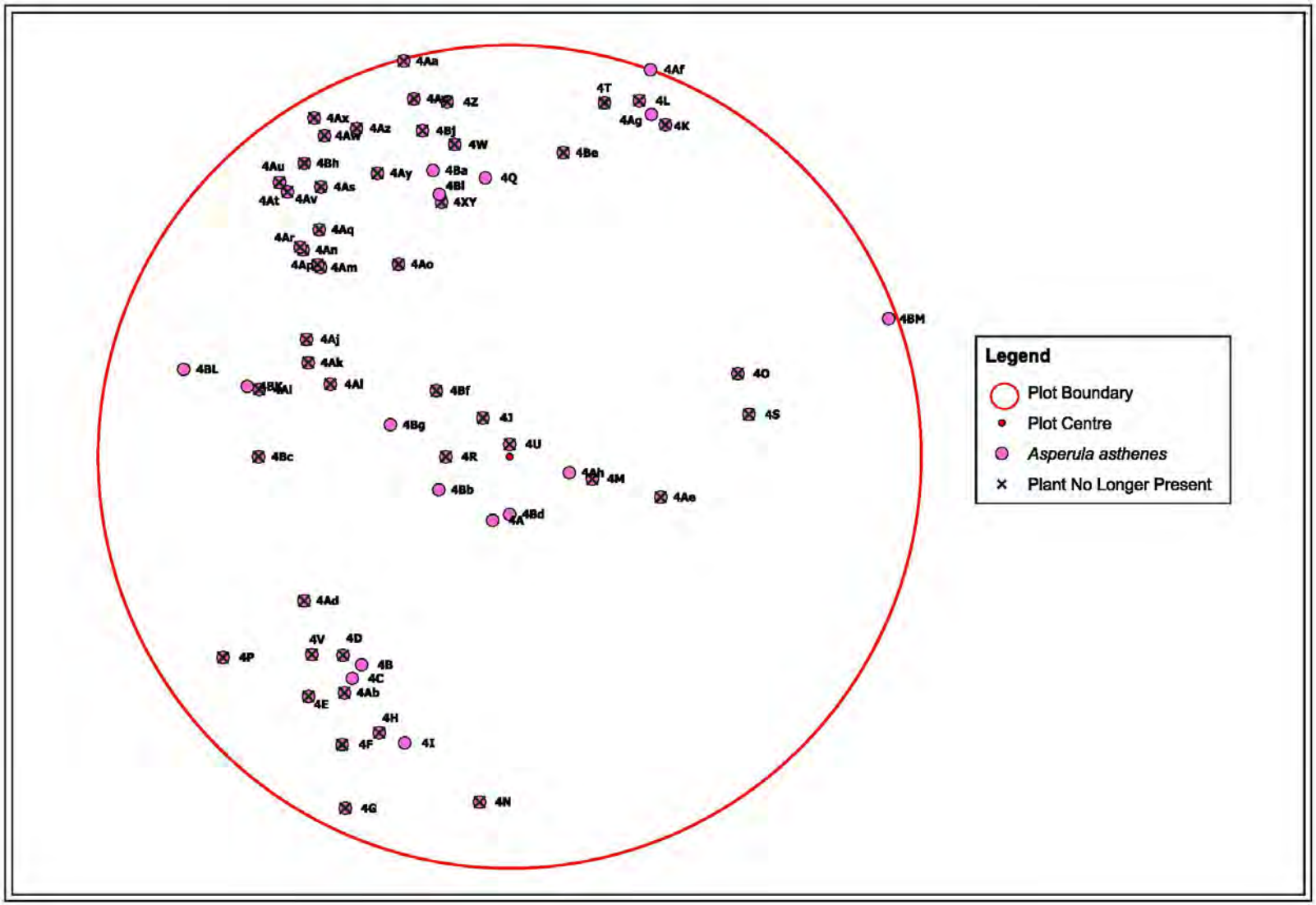
Monitoring Point 3 Asperula asthenes monitoring results 2024

Monitoring Point 4: Asperula asthenes monitoring results

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits
4A	160	195	30 x 20	30 x 20	5 x 5	-	-	-	30 x 20	25x 5	20x10	33X10		
4B	620	215	55 x 20	45 x 25	-	20 x 10	-	-	30 x 30	30 x 20	-	44X15		
4C	660	215	30 x 15	30 x 30	-	5 x 5	-	10x5	100 x 30	100 x 40	40x40	20X20		
4D	630	220	20 x 20	20 x 20	-	20 x 10	45 x 45	45x45	-	-	-	-		
4E	760	220	65 x 20	40 x 20	10 x 5	-	10 x 5	10x5	-	-	-	-		
4F	810	210	70 x 45	70 x 40	10 x 5	-	-	-	-	-	-	-		
4G	940	205	40 x 15	50 x 10	30 x 10	5 x 10	70 x 50	40x40	20 x 20	15 x 15	-	-		
4H	740	205	50 x 30	50 x 30	20 x 10	40 x 30	50 x 40	50x40	10 x 10	-	-	-		
4I	740	200	80 x 15	60 x 40	-	5 x 10	-	-	-	-	-	45X20		
4J	110	325	80 x 30	60 x 30	70 x 10	10 x 70	100 x 80	40x20	-	-	-	-		
4K	890	25	30 x 30	40 x 30	60 x 60	-	-	-	-	-	-	-		
4L	920	20	55 x 35	50 x 25	50 x 30	5 x 3	-	-	-	-	-	-		
4M	210	105	115 x 30	90 x 40	90 x 10	-	-	-	10 x 10	-	-	-		
4N	840	185	110 x 30	100 x 40	50 x 10	40 x 30	40 x 25	15x10	5 x 5	20 x 30	-	-		
4O	590	70	40 x 25	50 x 50	80 x 5	-	-	.-	-	-	-	-		
4P	850	235	-	20 x 20	40 x 2	-	-	-	-	-	-	-		
4Q	680	355	-	20 x 30	180 x 80	60 x 20	50 x 20	5x5	-	-	40x10	20X10		
4R	155	270	-	-	20 x 5	50 x 10	100 x 40	20x10	-	-	-	-		
4S	590	80	-	-	10 x 15	-	-	-	-	-	-	-		
4T	890	15	-	-	10 x 5	-	10 x 5	10x5	20 x 5	-	-	-		
4U	30	0	-	-	20 x 10	-	-		-	-	-	-		
4V	680	225	-	-	80 x 50	-	-		10 x 10	-	-	-		

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits
4W	770	350	-	-	-	20 x 5	50 x 40	20x5	30 x 50	-	-	-		
4X	640	345	-	-	-	50 x 20	80 x 60	15x5	30 x 15	-	-	-		
4Y	600	345	-	-	-	50 x 20	-	30x15	-	-	-	-		
4Z	875	350	-	-	-	30 x 5	70 x 30	30x10	-	-	-	-		
4Aa	995	345	-	-	-	10 x 10	80 x 50	10x10	30 x 10	-	-	-		
4Ab	700	215	-	-	-	10 x 5	-	-	-	-	-	-		
4Ac	900	345	-	-	-	-	10 x 5	10x5	20 x 20	-	-	-		
4Ad	610	235	-	-	-	-	35 x 20	-	-	-	-	-		
4Ae	380	105	-	-	-	-	10 x 5	-	-	-	-	-		
4Af	1000	20	-	-	-	-	55 x 30	5x10	50 x 60	120 x 70	50x40	20X20		
4AG	900	22.5	-	-	-	-	-	20x5	-	50 x 40	45x30	30X15		
4AH	150	105	-	-	-	-	-	20x20	20 x 20	50 x 40	75x30	20X30		
4AI	470	292	-	-	-	-	-	55x30	-	-	-	-		
4AJ	570	300	-	-	-	-	-	20x20	5 x 5	5 x 5	-	-		
4AK	540	295	-	-	-	-	-	45x45	-	-	-	-		
4AL	630	285	-	-	-	-	-	50x30	-	-	-	-		
4AM	650	315	-	-	-	-	-	45x15	-	-	-	-		
4AN	710	315	-	-	-	-	-	210x15	-	-	-	-		
4AO	540	330	-	-	-	-	-	5x5	-	-	-	-		
4AP	660	315	-	-	-	-	-	30x30	-	-	-	-		
4AQ	720	320	-	-	-	-	-	10x5	-	-	-	-		
4AR	720	315	-	-	-	-	-	15x10	-	-	-	-		
4AS	800	325	-	-	-	-	-	5X10	-	-	-	-		

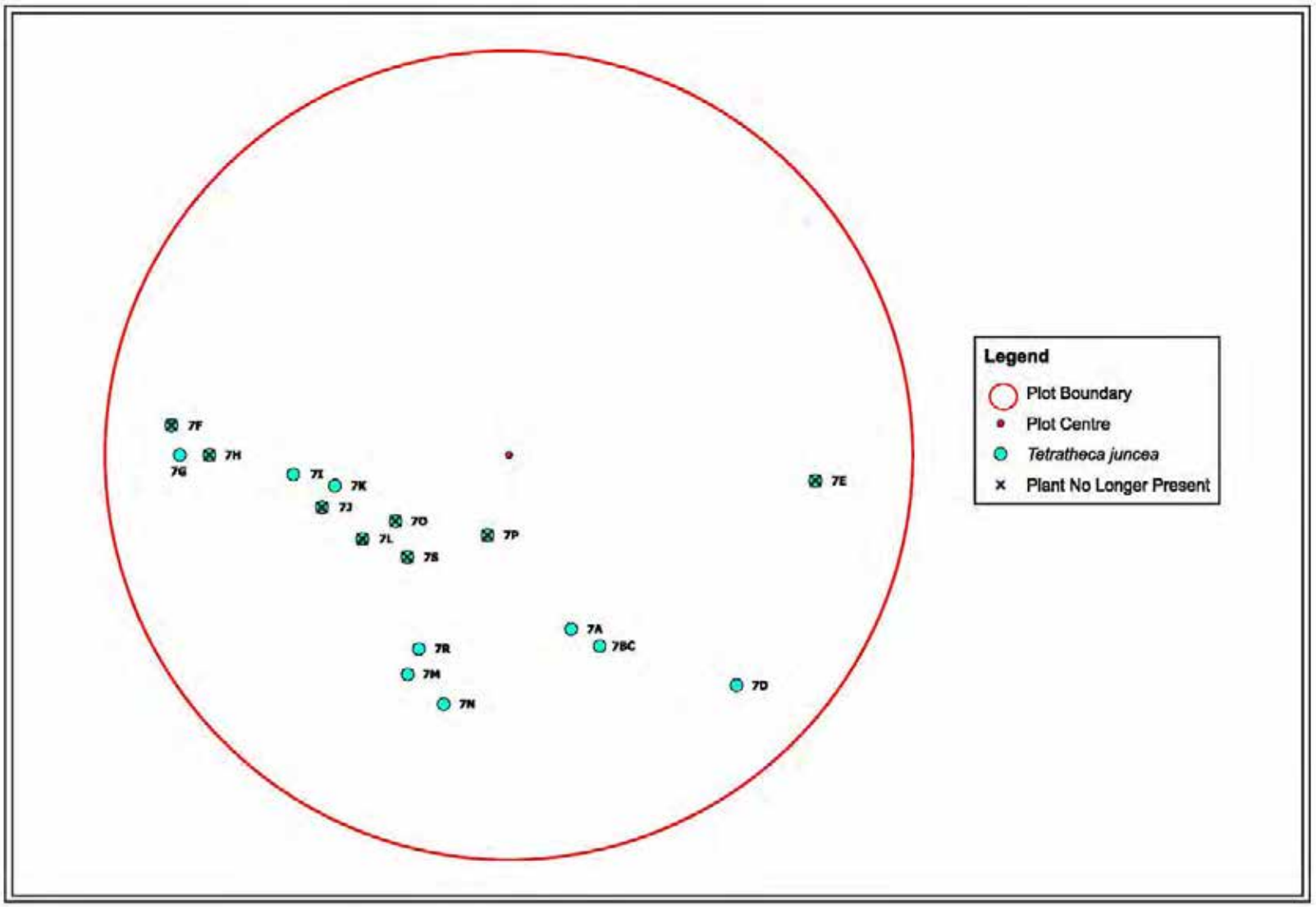
ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits
4AT	840	320	-	-	-	-	-	50X30	10 x 20	-	-	-		
4AU	870	320	-	-	-	-	-	30X45	10 x 10	-	-	-		
4AV	840	320	-	-	-	-	-	60X60	40 x 40	-	10x5	-		
4AW	900	330	-	-	-	-	-	5X5	5 x 5	-	-	-		
4AX	950	330	-	-	-	-	-	30X10	-	-	-	-		
4AY	760	335	-	-	-	-	-	40X30	40 x 40	-	-	-		
4AZ	880	335	-	-	-	-	-	40x20	20 x20	-	-	-		
4BA	720	345	-	-	-	-	-	10X10	-	-	5x5	5X5		
4BB	190	245	-	-	-	-	-	10X10	40 x 15	40 x 15	20x10	40X10	2FL	
4BC	610	270	-	-	-	-	-	50X10	-	-	-	-		
4BD	140	180	-	-	-	-	-	-	10 x 10	10 x 10	26x15	20X15	1FL	
4BE	750	10	-	-	-	-	-	-	10 x 30	40 x 10	-	-		
4BF	240	312	-	-	-	-	-	-	20 x 20	-	-	-		
4BG	285	295	-	-	-	-	-	-	10 x 5	10 x 10	28x15	20X10		
4BH	300	285	-	-	-	-	-	-	5 x 5	5 x 5	5x5	-		
4BI	790	325	-	-	-	-	-	-	20 x 10	30 x 30	70x60	30X30		
4BJ	870	325	-	-	-	-	-	-	10 x 15	-	-	-		
4BK	660	345	-	-	-	-	-	-	10 x 20	-	60x50	60X40		
4BL	820	345	-	-	-	-	-		10 x 10	-	20x10	20X10		
4BM	980	20	-	-	-	-	-	-	-	-	50x40	60X40		



Monitoring Point 4 ***Asperula asthenes monitoring results 2024***

Monitoring Point 7 - Tetratheca juncea monitoring results

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present		Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits	
7A	480	160	70x40	60x40	60x50	10x60	70x40	20x30	25 x 30	80x40	80x50	91x100	38		
7B	470	155	5x 5	10x5	-	10x10	30x20	30x20	-	-	30x20	39x5	4		
7C	500	155	35x15	40x15	70x30	60x30	50x20	70x40	55 x 40	100x55	75x30	43x42	12		
7D	800	135	50x20	60x40	90x50	70x40	10x10	10x10	45 x 30	50x30	60x40	24x16	15		Very dusty but not yellowing
7E	730	95	60x50	90x40	100x70	100x50	110x80	30x60	30 x 60	45x10	-	-			
7F	800	275	60x10	70x20	20x5	-	40x30	40x20	20 x 20	-	-	-			
7G	780	270	40x40	40x40	60x20	-	130x80	100x65	60 x 15	105x30	65x30	95x40	7	2	
7H	710	270	50x10	50x10	90x20	100x50	70x80	50x20	60 x 5	-	-	-			
7I	510	265	30x10	30x10	20x5	-	20x5	20x5	20 x 25	40x10	35x10	40x5			
7J	460	255	40x20	40x30	90x30	100x50	90x60	80x60	70 x 40	55x20	40x5	-			
7K	420	260	70x45	80x40	70x70	100x80	120x85	120x60	60 x 40	90x90	105x80	80x105	41	2	
7L	400	240	45x10	50x10	55x10	20x10	25x10	25x10	-	-	-	-			
7M	570	205	110x70	110x70	110x80	60x20	80x130	30x10	15 x 5	40x15	30x20	15x5			New shoots, though many old dried ones
7N	610	195	45x35	45x35	35x50	80x30	40x25	20x10	25 x 20	40x10	15x10	30x5	2		many new shoots
7O	310	240	-	20x20	20x15	-	-	-	-	-	-	-			
7P	700	195	-	-	-	-	80x60	60x20	50 x 5	-	-	-			
7R	505	205	-	-	-	-	30x40	30x40	35 x 20	45x10	45x5	35x5	1		
7S	340	225	-	-	-	-	-	-	5 x 5	20x5	20x5	-			

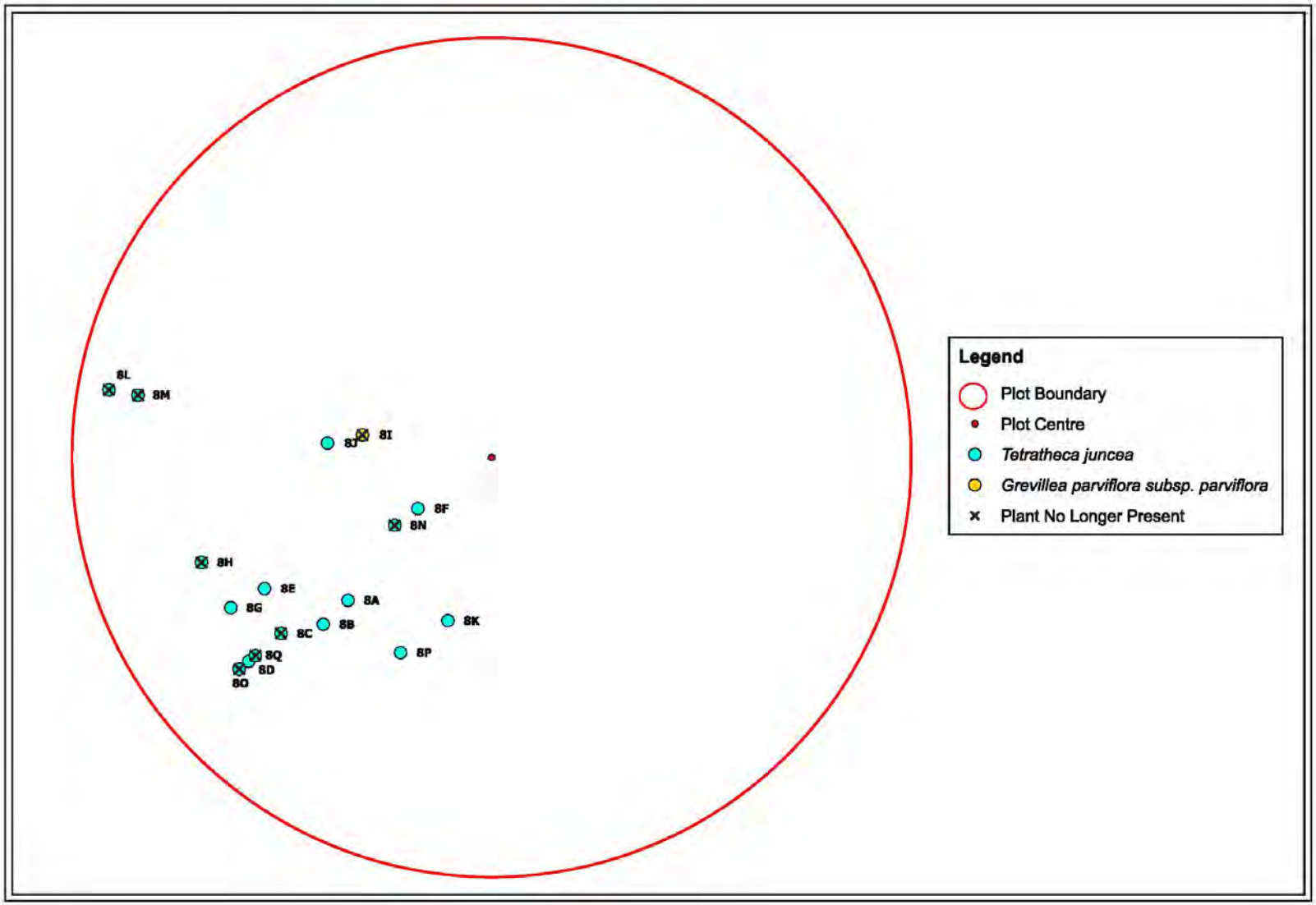


Monitoring Point 7 - Tetratheca juncea monitoring results 2024

Monitoring Point 8 – Tetratheca juncea and Grevillea parviflora monitoring results

ID	Species	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present		Comments
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits	
8A	*Tetratheca juncea*	210	235	110x70	110x80	130x80	80x110	110x50	60x30	30 x 30	90x50	70x40	100x80	38	16	healthy
8B	*Tetratheca juncea*	480	225	40x 30	60x 30	90x 20	80x 20	50x 50	60x60	-	80x10	55x40	30x5	2	0	
8C	*Tetratheca juncea*	560	225	120x110	120x100	-	-	-	-	-	-	-	-			
8D	*Tetratheca juncea*	650	230	110x110	110x110	120x60	45x 10	30x5	60x60	45 x 30	60x45	90x40	110x80	20	2	
8E	*Tetratheca juncea*	750	230	65x30	65x30	40x80	60x30	50x 20	40x20	25 x 5	60x40	70x55	80x40	2	0	
8F	*Tetratheca juncea*	620	240	80x30	90x30	120x50	120x40	60x 30	20x10	30 x 10	65x55	65x70	110x60	12	0	8F and 8G starting to form one clump
8G	*Tetratheca juncea*	710	240	100x50	100x50	80x50	100x50	-	-	5 x 5	-	85x70	110x70	45		
8H	*Tetratheca juncea*	730	250	60x50	60x50	100x40	-	90x 30	90x30	-	-	-	-			
8I	*Grevillea parviflora subsp. parviflora*	310	280	30	30	30	70	60	60x70	-	-	-	-			
8J	*Tetratheca juncea*	390	275	50x 10	50x 10	65x 10	60x 20	60x20	30x20	25 x 15	30x10	45x5	45x5	1	0	yellowing
8K	*Tetratheca juncea*	400	195	60x20	60x20	90x90	170x50	130x60	130x100	75 x 40	105x120	120x80	100x10	6	0	new shoots
8L	*Tetratheca juncea*	920	280	-	-	70x 70	70x 80	100x90	100x30	40 x 5	-	-	-			
8M	*Tetratheca juncea*	850	280	-	-	-	40x20	-	20x10	20 x 5	-	-	-			
8N	*Tetratheca juncea*	280	235	-	-	-	-	50x 20	20x10	20 x 5	40x5	-	-			
8O	*Tetratheca juncea*	780	230	-	-	-	-	-	50x40	25 x 15	-	-	-			

ID	Species	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present		Comments
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits	
8P	*Tetratheca juncea*	510	205	-	-	-	-	-	100x40	60 x 40	90x70	90x90	200x30	3		New shoots
8Q	*Tetratheca juncea*	730	230	-	-	-	-	-	-	5 x 10	-	-	-	-		



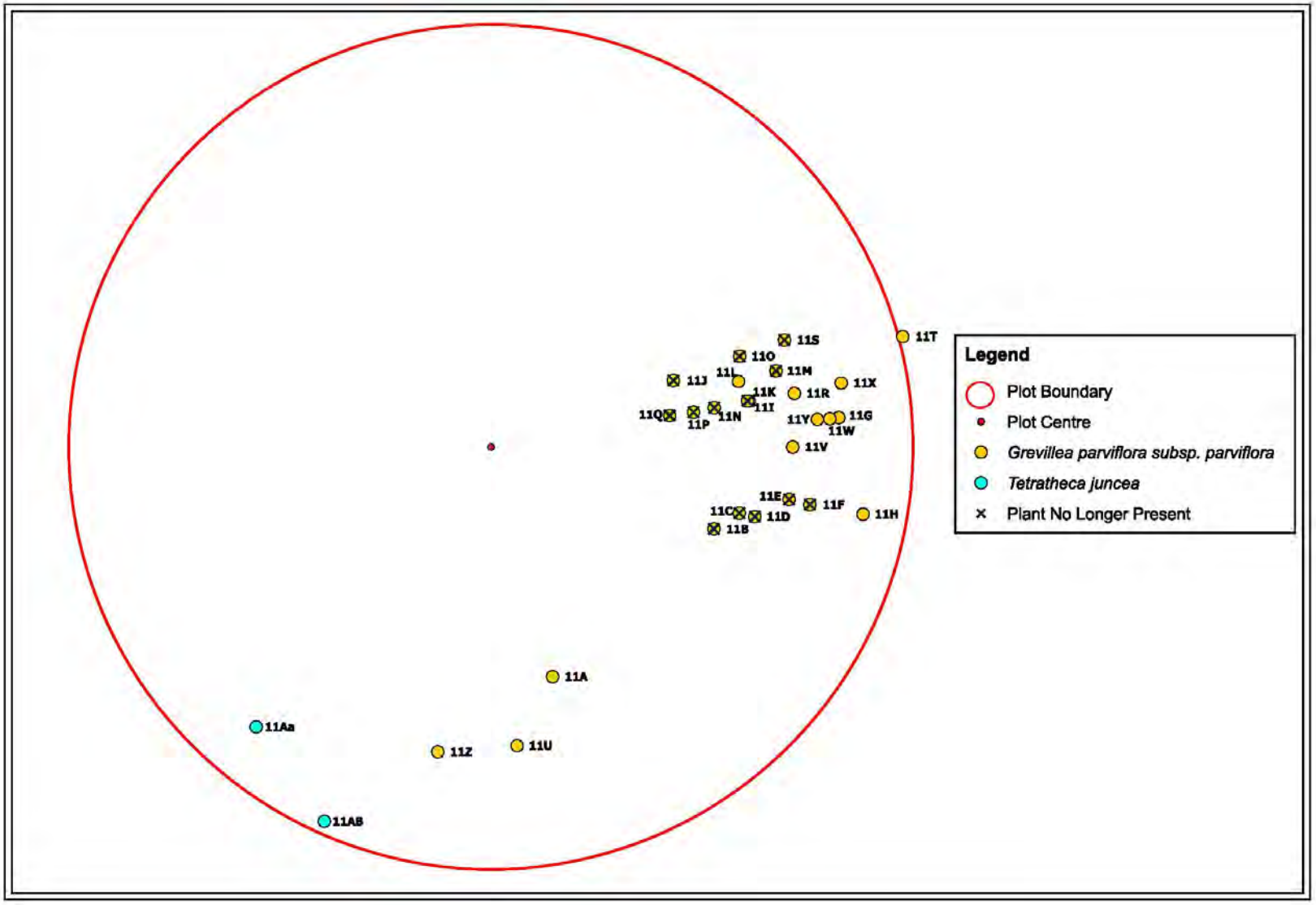
Monitoring Point 8 – *Tetratheca juncea* and *Grevillea parviflora* monitoring results 2024

Monitoring Point 11 - Grevillea parviflora monitoring results

ID	Species	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present		Comments
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits	
11A	*Grevillea parviflora subsp. parviflora*	560	165	90	90	50	45	60	60	-	-	76	71			stem dying back
11B	*Grevillea parviflora subsp. parviflora*	565	110	20	45	-	-	-	18	-	-	-	-			
11C	*Grevillea parviflora subsp. parviflora*	610	105	55	-	-	-	-	-	-	-	-	-			
11D	*Grevillea parviflora subsp. parviflora*	650	105	100	65	-	-	-	-	-	-	-	-			
11E	*Grevillea parviflora subsp. parviflora*	720	100	75	75	41	-	-	-	-	-	-	-			
11F	*Grevillea parviflora subsp. parviflora*	770	100	20	10	-	-	-	-	-	-	-	-			
11G	*Grevillea parviflora subsp. parviflora*	830	85	110	110	80	100	90	95	90	91	75	75			
11H	*Grevillea parviflora subsp. parviflora*	900	100	60	60	30	65	70	80	70	60	60	66	2		healthy
11I	*Grevillea parviflora subsp. parviflora*	620	80	50	50	60	60	55	55	-	-	-	-			
11J	*Grevillea parviflora subsp. parviflora*	460	70	45	35	40	-	-	-	-	-	-	-			
11K	*Grevillea parviflora subsp. parviflora*	620	80	40	40	40	40	-	-	-	-	-	-			
11L	*Grevillea parviflora subsp. parviflora*	610	75	45	55	55	65	65	70	70	62	67	65			
11M	*Grevillea parviflora subsp. parviflora*	700	75	65	70	65	75	80	-	-	-	-	-			

ID	Species	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present		Comments
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits	
11N	*Grevillea parviflora subsp. parviflora*	540	80	35	40	45	45	40	-	-	-	-	-			
11O	*Grevillea parviflora subsp. parviflora*	630	70	20	30	-	-	-	-	-	-	-	-			
11P	*Grevillea parviflora subsp. parviflora*	490	80	45	70	50	30	30	30	-	-	-	-			
11Q	*Grevillea parviflora subsp. parviflora*	430	80	-	20	60	-	-	-	-	-	-	-			
11R	*Grevillea parviflora subsp. parviflora*	730	80	-	-	-	65	65	40	30	62	78	76	2		stems dying
11S	*Grevillea parviflora subsp. parviflora*	740	70	-	-	-	-	20	20	-	-	-	-			
11T	*Grevillea parviflora subsp. parviflora*	1010	75	-	-	-	-	80	95	95	77	73	61			die back
11U	*Grevillea parviflora subsp. parviflora*	710	175	-	-	-	-	40	37	-	-	-	39			healthy
11V	*Grevillea parviflora subsp. parviflora*	715	90	-	-	-	-	-	55	60	80	-	85	5		
11W	*Grevillea parviflora subsp. parviflora*	800	85	-	-	-	-	-	65	60	62	65	70			healthy
11X	*Grevillea parviflora subsp. parviflora*	840	80	-	-	-	-	-	60	85	91	95	85	7		
11Y	*Grevillea parviflora subsp. parviflora*	770	85	-	-	-	-	-	25	55	-	41	44			okay
11Z	*Grevillea parviflora subsp. parviflora*	720	190	-	-	-	-	-	55	55	65	70	67	1		
11AA	*Tetratheca juncea*	865	220	-	-	-	-	-	75x50	80 x 50	110x80	90x90	90x110	162	56	

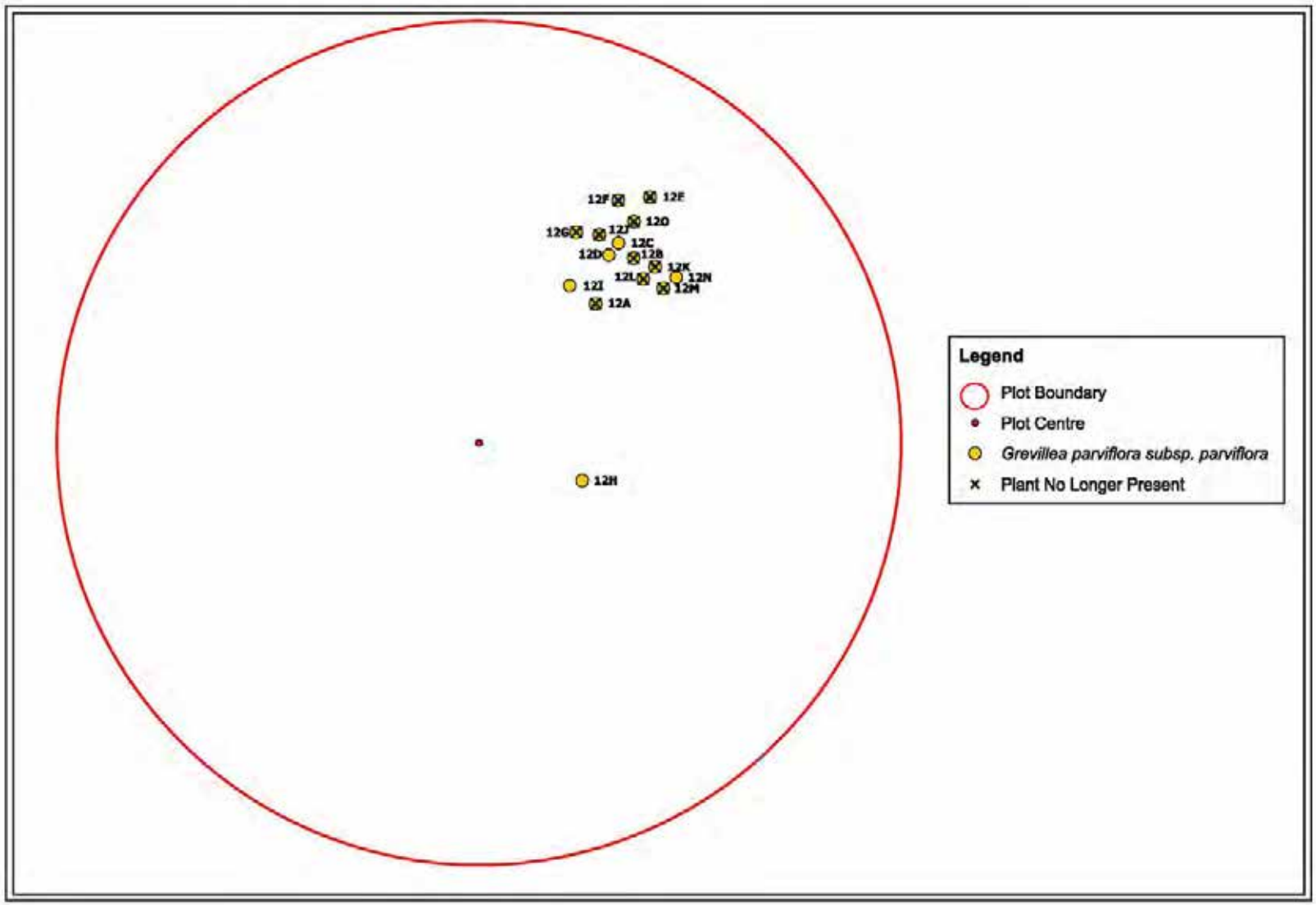
ID	Species	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present		Comments
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits	
11AB	*Tetratheca juncea*	970	246										60x70	55		First detected 24/09/24



Monitoring Point 11 - *Grevillea parviflora* and *Tetratheca juncea* monitoring results 2024

Monitoring Point 12 - Grevillea parviflora monitoring results

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
12A	430	40	80	80	80	50	-	-	-	-	-	-		
12B	570	40	80	90	60	25	50	55	75	93	100	-		
12C	580	35	65	70	-	50	45	55	50	50	60	65	6FL, NO FRUIT	
12D	540	35	20	25	40	30	-	70	100	113	115	120	10FL, 2FR	
12E	710	35	25	30	-	-	-	-	-	-	-	-		
12F	660	30	25	25	-	-	-	-	-	-	-	-		
12G	550	25	50	50	40	10	-	-	-	-	-	-		
12H	260	110	-	25	55	70	78	78	30	53	61	72		
12I	430	30	-	-	-	50	60	60	70	88	130	140	57FL, NO FRUIT	
12J	570	30	-	-	-	25	-	-	-	-	-	-		
12K	590	45	-	-	-	60	50	70	-	-	-	-		
12L	550	45	-	-	-	30	50	60	-	-	-	-		
12M	570	50	-	-	-	55	65	75	-	-	-	-		
12N	610	50	-	-	-	-	40	60	15	42	45	61	1FL	
12O	640	35	-	-	-	-	-	-	20	30	29	-		

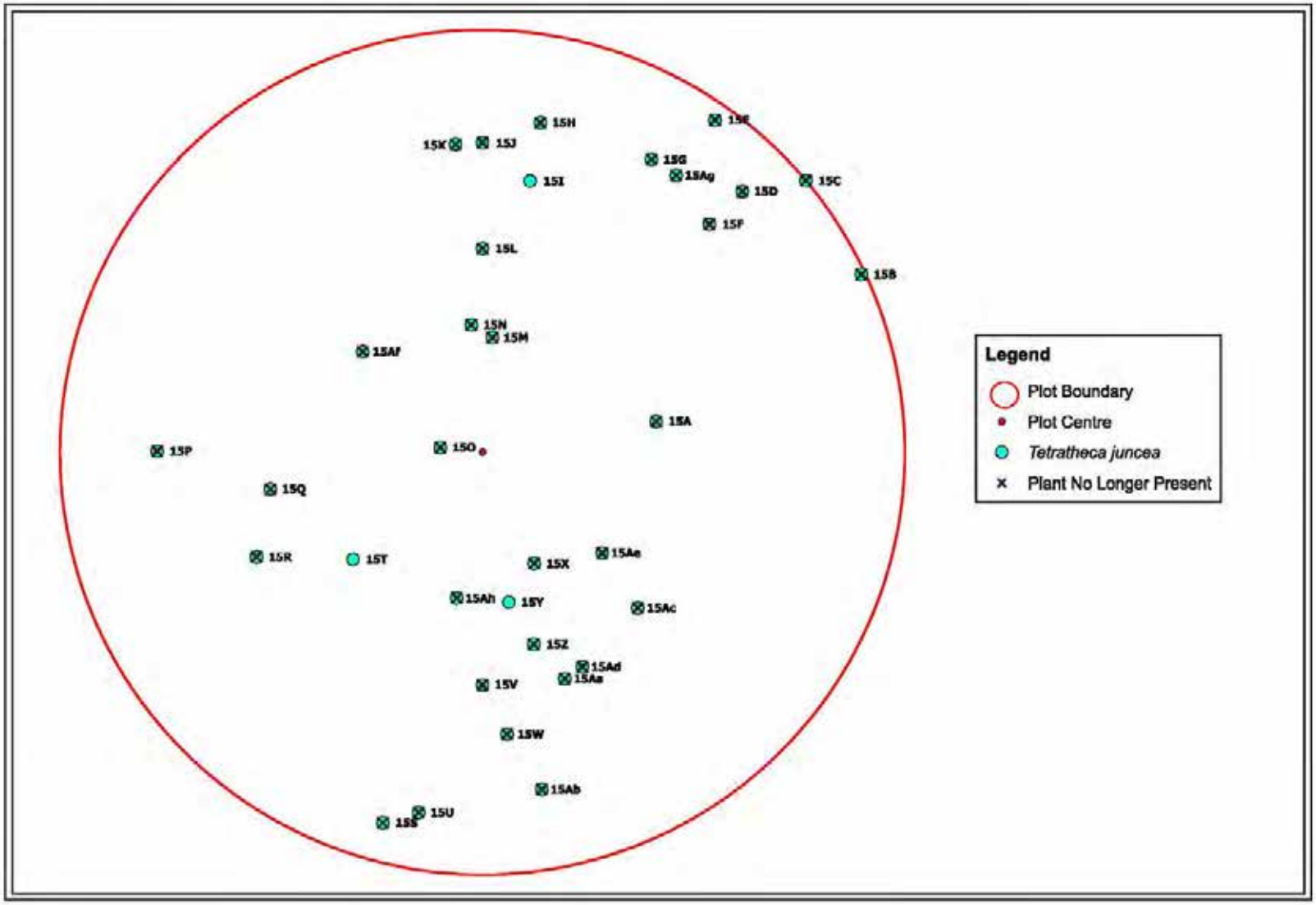


Monitoring Point 12 - *Grevillea parviflora* monitoring results 2024

Monitoring Point 15 - Tetratheca juncea monitoring results

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present		Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits	
15A	420	80	20 x 10	30 x 10	-	-	-	-	-	-	-	-			
15B	990	65	5 x 5	10 x 5	-	-	-	-	-	-	-	-			
15C	1000	50	50 x 50	60 x 40	100 x 30	-	-	-	50x30	-	-	-			
15D	870	45	40 x 40	40 x 40	65 x 20	-	-	-	-	-	-	-			
15E	960	40	75 x 20	80 x 20	90 x 20	-	40x20	40x30	30x30	-	-	-			
15F	780	45	30 x 15	40 x 15	40 x15	30x40	30x20	-	-	-	-	-			
15G	800	35	40 x 25	50 x 25	40 x 20	-	-	-	-	-	-	-			
15H	790	10	5 x 5	10 x 5	-	-	-	-	-	-	-	-			
15I	620	10	60 x 30	60 x 30	-	-	-	-	-	-	-	20X10	1FL		
15J	730	0	20 x 30	40 x 20	40 x 10	-	-	-	-	-	-	-			
15K	730	355	50 x 20	40 x 20	-	-	-	-	-	-	-	-			
15L	480	0	30 x 10	30 x 10	15 x 10	30x20	40x20	30x20	20x30	60x10		-			
15M	270	5	40 x 10	50 x 10	-	50x20	40x30	-	-	-	-	-			
15N	300	355	40 x 10	40 x 10	50 x 10	-	-	-	-	-	-	-			
15O	100	275	20 x 5	20 x 40	-	-	-	-	-	-	-	-			
15P	770	270	60 x 20	50 x 30	50 x 30	40x10	40x10	40x20	40x10	-	-	-			
15Q	510	260	60 x 50	70 x 50	90 x 50	90x30	50x40	80x50	40x30	-	50x10	-			
15R	590	245	70 x 50	70 x 50	80 x 15	-	10x10	-	-	-	-	-			
15S	910	195	20 x 10	20 x 10	-	-	-	-	-	-	-	-			
15T	400	230	30 x 10	30 x 10	-	-	-	-	-	30x10	40x40	30X30	4FL		
15U	870	190	10 x 10	30 x 10	30 x 5	70x20	100x30	90x70	60x60	65x75	90x80	70X30	10FL, 2FR		

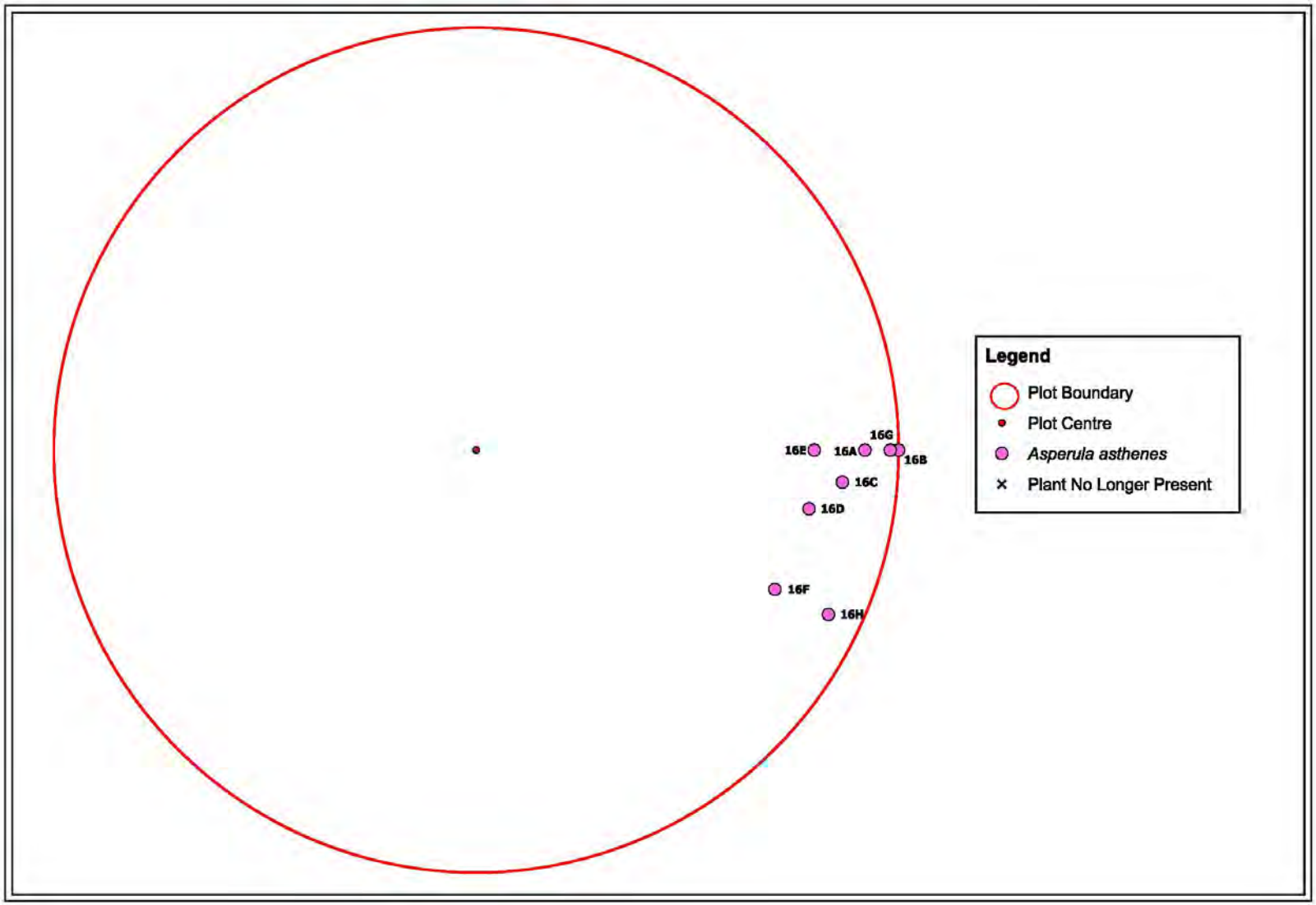
ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present		Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Flowers	Fruits	
15V	550	180	30 x 15	40 x 20	40 x 10	-	-	-	-	-	-	-			
15W	670	175	5 x 5	10 x 5	-	-	-	-	-	-	-	-			
15X	290	155	40 x 10	40 x 10	30 x 5	-	-	-	-	-	-	-			
15Y	360	170	5 x 5	30 x 5	-	20x5	-	-	15x5	20x10	55x30	40X30	5FL		
15Z	470	165	30 x 40	50 x 30	60 x 70	60x20	40x20	-	-	-	-	-			
15AA	570	170	25 x 20	50 x 20	20 x 50	80x20	40x40	-	-	-	-	-			
15AB	810	170	5 x 5	10 x 5	-	-	-	-	-	-	-	-			
15AC	520	135	40 x 10	50 x 15	15 x 50	40x30	60x10	50x30	30x20	50x30	-	-			
15AD	560	160	20 x 30	20 x 30	-	-	40x30	50x30	50x30	-	-	-			
15AE	370	130	-	20 x 10	-	-	-	-	-	-	-	-			
15AF	370	310	-	-	-	10x10	50x30	60x40	30x40	-	-	-			
15AG	800	35	-	-	-	-	-	20x20	2010	-	-	-			
15AH	350	190	-	-	-	-	-	-	50x40	75x80	45x40	-			
15AI	510	165	-	-	-	-	-	-	-	45x10	-	-			



Monitoring Point 15 - *Tetratheca juncea* monitoring results 2024

Monitoring Point 16 - Asperula asthenes monitoring results

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
16A	920	90	-	-	-	-	-	-	50 x 40	40x100	30x10	25X10	2/0	
16B	1000	90	-	-	-	-	-	-	60 x 50	60x50	15x10	15X10		
16C	870	95	-	-	-	-	-	-	30 x 60	40x50	10x5	10X10		
16D	920	100	-	-	-	-	-	-	40 x 40	30x30	30x5	10X15		
16E	800	90	-	-	-	-	-	-	20 x 30	50x30	30x20	25X10	2/0	
16F	780	115	-	-	-	-	-	-	60 x 50	70x60	30x5	20X10	1/0	
16G	980	90	-	-	-	-	-	-	-	-	-	30X10	6/0	First detected 25/09/2024
16H	920	115	-	-	-	-	-	-	-	-	-	10X10	5/0	First detected 25/09/2024

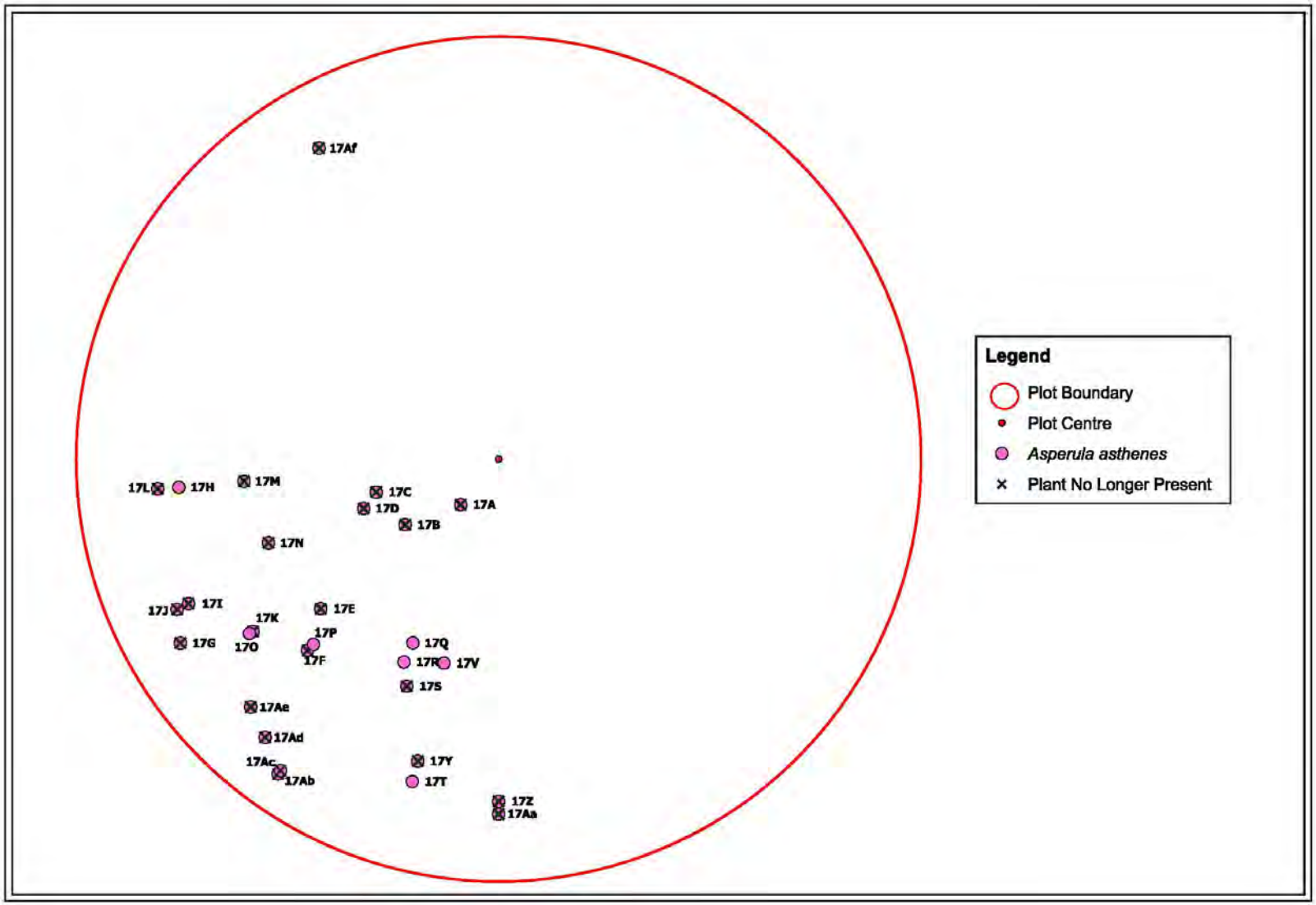


Monitoring Point 16 - *Asperula asthenes* monitoring results 2024

Monitoring Point 17 - Asperula asthenes monitoring results

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
17A	140	220	20 x 5	20 x 5	-	-	-	-	-	-	-	-		
17B	270	235	35 x 15	20 x 10	-	-	-	-	40 x 40	-	-	-		
17C	300	255	40 x 5	30 x 5	-	-	-	-	-	-	-	-		
17D	340	250	5 x 5	10 x 5	-	-	-	-	-	-	-	-		
17E	550	230	80 x 80	80 x 80	-	70x90	70x30	50x50	25 x 10	-	-	-		
17F	640	225	20 x 25	20 x 25	30 x 5	30x60	20x10	20x10	-	-	-	-		
17G	870	240	20 x 10	20 x 10	-	-	-	-	-	-	-	-		
17H	760	265	90 x 35	90 x 35	-	-	-	-	-	-	-	5X10		
17I	810	245	35 x 20	25 x 10	-	-	-	-	5 x 5	-	-	-		
17J	840	245	40 x 60	40 x 50	-	-	-	-	-	-	-	-		
17K	710	235	20 x 5	20 x 10	30 x 10	130x55	20x10	-	-	-	-	-		
17L	810	265	-	-	-	10x5	-	-	-	-	-	-		
17M	605	265	-	-	-	5x5	15x15	-	-	-	-	-		
17N	580	250	-	-	-	10x5	10x5	-	-	-	-	-		
17O	720	235	-	-	-	-	10x5	-	-	-	-	-		
17P	620	225	-	-	-	-	20x10	-	10 x 10	40x15	30x20	25X10	8FL	
17Q	480	205	-	-	-	-	-	35x10	15 x 10	20x20	60x40	65X40	17FL	
17R	530	205	-	-	-	-	-	30x20	-	-	40x30	60X40	5FL	
17S	580	220	-	-	-	-	-	30x10	-	-	-	-		
17T	490	195	-	-	-	-	-	40x30	30 x 20	30x20	40x20	30X10	1FL	
17V	500	195	-	-	-	-	-	5x5	-	-	-	5X10		

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
17W	760	215	-	-	-	-	-	5x10	-	-	-	-		
17X	740	210	-	-	-	-	-	20x20	-	-	-	-		
17Y	740	195	-	-	-	-	-	5x5	-	-	-	-		
17Z	810	180	-	-	-	-	-	10x10	50 x 40	-	-	-		
17AA	840	180	-	-	-	-	-	20x10	20 x 10	80x20	30x70	-		Washed away
17AB	910	215	-	-	-	-	-	10x5	40 x 30	40x30	15x20	-		Washed away
17AC	900	215	-	-	-	-	-	5x5	5 x 10	20x10	-	-		Washed away
17AD	860	220	-	-	-	-	-	10x5	-	-	-	-		
17AE	830	225	-	-	-	-	-	10x10	-	-	-	-		
17AF	850	330	-	-	-	-	-	10x5	-	-	-	-		

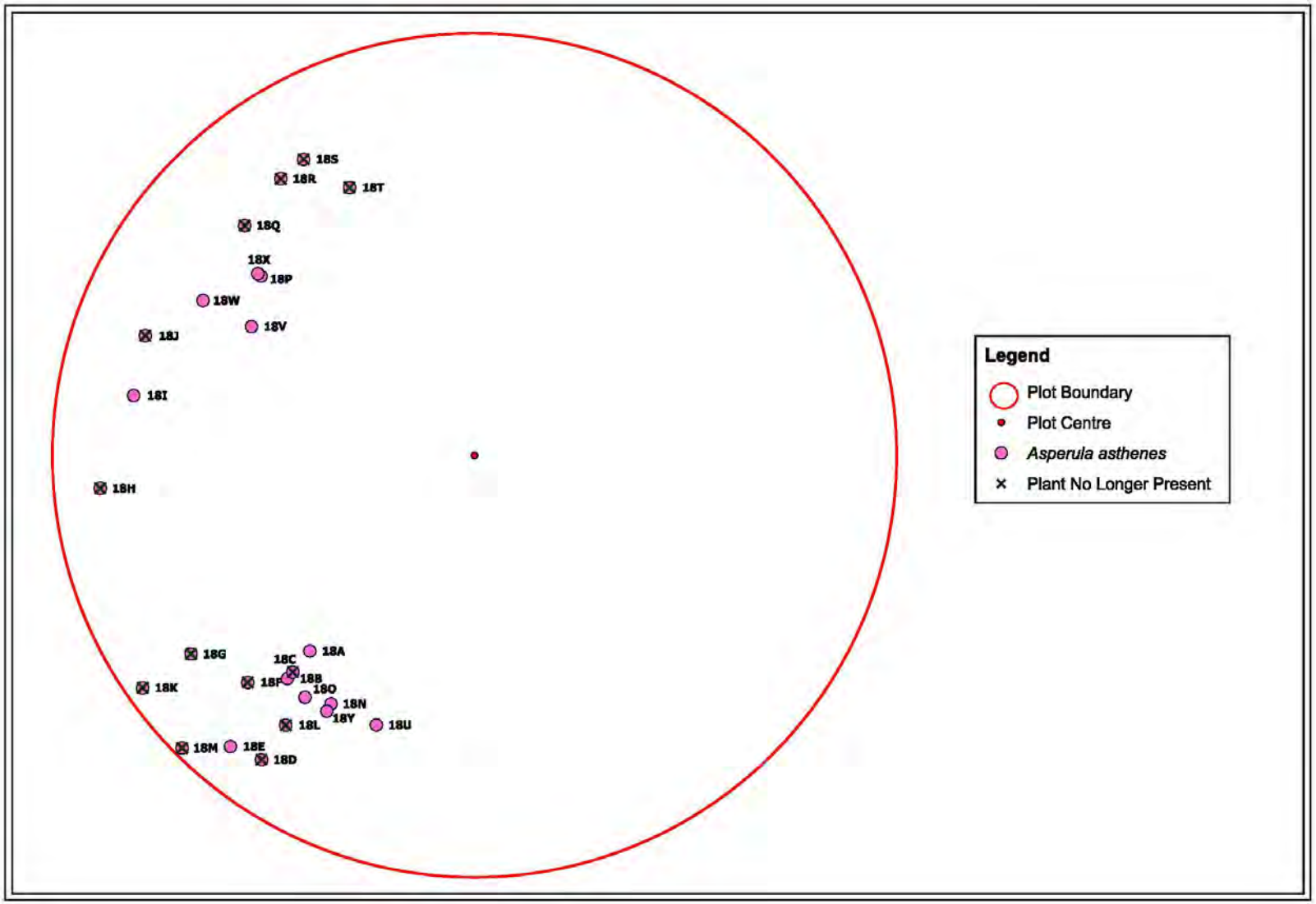


Monitoring Point 17 - *Asperula asthenes* monitoring results 2024

Monitoring point 18 - Asperula asthenes monitoring results

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
18A	610	220	40 x 30	40 x 30	-	-	-	-	30 x10	40x20	5x5	5x5		
18B	690	220	100 x 60	100 x 50	-	-	-	-	15 x 15	15x15	40x30	50x30		
18C	670	225	30 x 20	30 x 20	-	-	-	-	-	-	-	-		
18D	880	215	20 x 40	20 x 40	-	-	-	-	-	-	-	-		
18E	900	220	100 x 90	90 x 90	10 x 5	-	10 x 5	10 x5	5 x 10	20x20	5x3	15x5	2fl	
18F	760	225	70 x 80	70 x 90	-	-	-	-	-	-	-	-		
18G	820	235	70 x 30	70 x 40	10 x 5	-	-	-	-	-	-	-		
18H	890	265	5 x 10	20 x 10	-	-	-	-	-	-	-	-		
18I	820	280	30 x 40	30 x 30	-	-	-	-	-	45x20	70x40	40x30	3fl	
18J	830	290	55 x 30	50 x 30	5 x 5	-	5 x 5	1x1	-	-	-	-		
18K	960	235	50 x 10	40 x 15	-	-	-	5x5	-	-	-	-		
18L	780	215	10 x 10	20 x 20	-	-	-	-	-	-	-	-		
18M	980	225	30 x 10	20 x 10	-	-	-	-	-	-	-	-		
18N	680	210	-	-	40 x 10	60x10	75x50	70x70	60 x 50	40x40	40x40	30x30		
18O	700	215	-	-	-	70x16	30x20	30x30	25 x 40	40x20	50x30	30x10	2fl	
18P	660	310	-	-	-	10x26	45x15	10x10	10 x 10	50x10	15x5	20x5		
18Q	770	315	-	-	-	60x21	-	25x10	-	-	-	-		
18R	800	325	-	-	-	-	-	10x10	-	-	-	-		
18S	810	330	-	-	-	-	-	10x15	-	-	-	-		
18T	700	335	-	-	-	-	-	10x10	-	-	-	-		
18U	680	200	-	-	-	-	-	-	30 x 30	30x20	60x20	60x20		

ID	Distance	Bearing	Clump Size (cm)										Flowers/Fruit Present	Comments
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024		
18V	610	300	-	-	-	-	-	-	10 x 10	60x20	40x10	25x10		
18W	740	300	-	-	-	-	-	-	10 x15	40x10	42x20	35x25x	7fl	
18X	670	310	-	-	-	-	-	-	-	-	20x5	20x5		
18Y	700	210	-	-	-	-	-	-	-	-	-	25x10	1	First detected 25/09/2024



Monitoring point 18 - *Asperula asthenes* monitoring results 2024

APPENDIX D. PHOTO MONITORING

Monitoring Point 1 (MP 1)

MP 1 2015

MP 1 2017

MP 1 2018

MP 1 2019

MP 1 2020

MP 1 2021

MP 1 2022

MP 1 2023

MP 1 2024

Monitoring Point 2 (MP 2)

MP 2 2015

MP 2 2017

MP 2 2018

MP 2 2019

MP 2 2020

MP 2 2021

MP 2 2022

MP 2 2023

MP 2 2024

Monitoring Point 3 (MP 3)

MP 3 2015

MP 3 2017

MP 3 2018

MP 3 2019

MP 3 2020

MP 3 2021

MP 3 2022

MP 3 2023

MP 3 2024

Monitoring Point 4 (MP 4)

MP 4 2015

MP 4 2017

MP 4 2018

MP 4 2019

MP 4 2020

MP 4 2021

MP 4 2022

MP 4 2023

MP 4 2024

Monitoring Point 5 (MP 5)

MP 5 2015

MP 5 2017

MP 5 2018

MP 5 2019

MP 5 2020

MP 5 2021

MP 5 2022

MP 5 2023

MP 5 2024

Monitoring Point 6 (MP 6)

MP 6 2015

MP 6 2017

MP 6 2018

MP 6 2019

MP 6 2020

MP 6 2021

MP 6 2022

MP 6 2023

MP 6 2024

Monitoring Point 7 (MP 7)

MP 7 2015

MP 7 2017

MP 7 2018

MP 7 2019

MP 7 2020

MP 7 2021

MP 7 2022

MP 7 2023

MP 7 2024

Monitoring Point 8 (MP 8)

MP 8 2015

MP 8 2017

MP 8 2018

MP 8 2019

MP 8 2020

MP 8 2021

MP 8 2022

MP 8 2023

MP 8 2024

Monitoring Point 9 (MP 9)

MP 9 2015

MP 9 2017

MP 9 2018

MP 9 2019

MP 9 2020

MP 9 2021

MP 9 2022

MP 9 2023

MP 9 2024

Monitoring Point 10 (MP 10)

MP 10 2015

MP 10 2017

MP 10 2018

MP 10 2019

MP 10 2020

MP 10 2021

MP 10 2022

MP 10 2023

MP 10 2024

Monitoring Point 11 (MP 11)

MP 11 2016

MP 11 2017

MP 11 2018

MP 11 2019

MP 11 2020

MP 11 2021

MP 11 2022

MP 11 2023

MP 11 2024

Monitoring Point 12 (MP 12)

MP 12 2015

MP 12 2017

MP 12 2018

MP 12 2019

MP 12 2021

MP 12 2022

MP 12 2023

MP 12 2024

Monitoring Point 13 (MP 13)

MP 13 2015

MP 13 2017

MP 13 2018

MP 13 2019

MP 13 2021

MP 13 2022

MP 13 2023

MP 13 2024

Monitoring Point 14 (MP 14)

MP 14 2015

MP 14 2017

MP 14 2018

MP 14 2019

MP 14 2021

MP 14 2022

MP 14 2023

MP 14 2024

Monitoring Point 15 (MP 15)

MP 15 2015

MP 15 2017

MP 15 2018

MP 15 2019

MP 15 2021

MP 15 2022

MP 15 2023

MP 15 2024

Monitoring Point 16 (MP 16)

MP 16 2015

MP 16 2017

MP 16 2018

MP 16 2019

MP 16 2021

MP 16 2022

MP 16 2023

MP 16 2024

Monitoring Point 17 (MP 17)

MP 17 2015

MP 17 2017

MP 17 2018

MP 17 2019

MP 17 2021

MP 17 2022

MP 17 2023

MP 17 2024

Monitoring Point 18 (MP 18)

MP 18 2015

MP 18 2016

MP 18 2017

MP 18 2019

MP 18 2021

MP 18 2022

MP 18 2023

MP 18 2024

APPENDIX F. STAFF CONTRIBUTIONS

The following staff were involved in the project:

Name	Qualification	Title	Contribution
Rachel Neal	BBSc (Hons)	Ecologist	Field surveys – flora surveys, site inspection, monitoring, nest box monitoring Report writing
Kane Blundell	Grad Dip Spatial Sc	Ecologist	GIS Figures
Olivia Szekelyhidy	BSc. Zool	Ecologist	Field surveys, nest box monitoring
Stephanie Gilmour	BSc. Zool	Ecologist	Field surveys, nest box monitoring
Mark Dean	BEnvSc	Ecologist	Report review
Samara Schulz	BEnvSc & Mgt (Hons) Accredited BAM Assessor	Principal Botanist	Report review

APPENDIX G. LICENSING

Wedgetail employees involved in the current study are licensed or approved under the *Biodiversity Conservation Act 2016* (License Number: SL102506, Expiry: 31 May 2026) and the *Animal Research Act 1985* to harm/trap/release protected native fauna and to pick for identification purposes native flora and to undertake fauna surveys.