La Trobe University Offset Site Year 3 ecological monitoring

FINAL REPORT

Prepared for La Trobe University

19 December 2023

Biosis offices

NEW SOUTH WALES

Albury
Phone: (02) 6069 9200
Email: albury@biosis.com.au

Newcastle
Phone: (02) 4911 4040
Email: newcastle@biosis.com.au

Sydney
Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Western Sydney
Phone: (02) 9101 8700
Email: sydneyoffice@biosis.com.au

Wollongong
Phone: (02) 4201 1090
Email: wollongong@biosis.com.au

VICTORIA

Ballarat
Phone: (03) 5304 4250
Email: ballarat@biosis.com.au

Melbourne (Head Office)
Phone: (03) 8686 4800
Email: melbourne@biosis.com.au

Wangaratta
Phone: (03) 5718 6900
Email: wangaratta@biosis.com.au

Document information

Report to:	La Trobe University
Prepared by:	Hayley Sime and Sarah Hilliar
Biosis project no.:	39591
File name:	39591.Yr 3.Monitoring.Report.LaTrobeOffset.FIN01.20231219
Citation:	Biosis 2023. La Trobe University Offset Site – Year 3 ecological monitoring. Report for La Trobe University. Sime, H. & Hilliar, S. Biosis Pty Ltd. Melbourne, VIC. Project no. 39591

Document control

Version	Internal reviewer	Date issued
Draft version 01	Jane Kenny	08/12/2023
Final version 01	Jane Kenny	19/12/2023

Acknowledgements

Biosis acknowledges the contribution of the following people and organisations in undertaking this study:

- La Trobe University: Antony Inglis
- Nangak Tamboree Wildlife Sanctuary: Michael Cincotta
- Victorian Government Department of Environment, Energy and Climate Action for access to the Victorian Biodiversity Atlas and Native Vegetation Information Tools
- Australian Government Department of Climate Change, Energy, the Environment and Water for access to the Protected Matters Search Tool of the Australian Government

Biosis staff involved in this project were:

- Joshua Orchard (assistance in the field)
- Henri Liswoyo (mapping)
- Jane Kenny (quality assurance)

Contents

Tables

Figures

Photos

1. Introduction

1.1 Background

Biosis Pty Ltd (Biosis) is engaged by La Trobe University (La Trobe) to undertake annual ecological monitoring at the La Trobe University offset site in accordance with the approved Offset Management Plan (OMP) (Biosis 2020). The offset site is located in the south-western corner of the campus, just west of Sports Field Lake (Figure 1).

The site was established to offset the removal of 3.203 hectares of native vegetation, 23 Matted Flax-lily *Dianella amoena* plants and 1.26 hectares of suitable Matted Flax-lily habitat for the development of the La Trobe University Sports Precinct (Stage 3). Matted Flax-lily is listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and critically endangered under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act).

The offset site is known to provide habitat for Matted Flax-lily. One Matted Flax-lily was recorded within the offset site in 2019 (Biosis 2019) an additional two were recorded during the 2022 survey (Biosis 2023) and a further three MFL were recorded in 2023. The 2.81 hectare offset site meets the quantity and quality requirements for an offset of Matted Flax-lily habitat as determined by the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the EPBC Act in association with the approval conditions for EPBC 2018/8343 for the La Trobe University Sports Precinct Stage 3.

The Offset Management Plan (Biosis 2020) specifies a range of management actions for the offset site, including weed management, revegetation works, ecological burning and protection of the habitat values from degradation by development and unauthorised access. Management of the offset site will involve protection and active ecological management of 2.81 hectares of vegetation, which is potential Matted Flax-lily habitat and supports remnant Matted Flax-lily individuals and patches of Plains Grassy Woodland Ecological Vegetation Class (EVC) 55.

Ecological monitoring and reporting in accordance with the OMP was undertaken by Biosis in 2021 (Year 1, Biosis 2021) and 2022 (Year 2, Biosis 2023). The current report presents the results of the third year of OMP implementation in 2023 (Year 3), at the La Trobe University offset site. The report includes the findings of the ecological monitoring activities and a summary of compliance against management actions specified in the OMP. At the time of the report submission (December 2023) many of the outstanding actions have been addressed.

1.2 Purpose

This report details the findings of the third year of ecological monitoring undertaken in November 2023. The monitoring is undertaken in accordance with the OMP (Biosis 2020) and focuses on vegetation management. Where further actions are required to meet OMP management targets, recommendations are provided. This report documents:

- Management measures commenced and completed during the reporting period.
- Changes in management measures and rationale for changes.
- Detailed description of the baseline monitoring program.
- Results and analysis of baseline monitoring data.

- Discussion of baseline ecological monitoring results.
- Recommendations for management and/or additional monitoring.

1.3 Relationship to other documents

This monitoring report is to be read in conjunction with the following documents:

- The endorsed OMP (Biosis 2020), which identifies the targets to manage the offset site.
- *Vegetation condition assessment and offset suitability for Matted Flax-lily* (Biosis 2019) that details the biodiversity values of the offset site.

1.4 The offset site

The offset site (approximately 2.81 hectares) is located in the south-western corner of the La Trobe University Bundoora campus, just west of Sports Field Lake. It occurs on a portion of land otherwise known as 906 Plenty Road, Bundoora (Figure 1). The property is currently zoned as Public Use Zone 2 (PUZ2) and is covered by Environmental Significance Overlay – Schedule 2 (ESO2).

The broader land parcel includes areas that support degraded Plains Grassy Woodland EVC 55 and areas that have been cleared for the development of a variety of sporting fields and related infrastructure. The offset site has been designated as suitable Matted Flax-lily habit based on presence of the original topsoil and some native vegetation in the ground layer. While some parts of the offset area are dominated by weeds, Matted Flax-lily have been known to persist in these habitats. The offset site includes four habitat zones surrounded by areas dominated by introduced species. All areas, including sections dominated by introduced vegetation, will be managed to provide the Matted Flax-lily offsets for development of the Stage 3 Sporting Precinct (EPBC Referral 2018/8343).

The study area is within the:

- Victorian Volcanic Plain Bioregion
- Yarra River Basin
- Management area of Melbourne Water
- Darebin Shire
- Traditional lands of the Wurundjeri.

1.4.1 Landscape context

The offset site is within the La Trobe University Bundoora campus and is near residential housing, university buildings and other facilities. The campus provides several important values for native wildlife including a corridor of native vegetation between Darebin Creek and Gresswell Forest Nature Conservation Reserve and a large (30 hectare) Wildlife Sanctuary. Much of the remnant vegetation around the university campus (including the offset site) is known habitat for Matted Flax-lily. Land immediately south of the proposed offset area managed by the City of Banyule supports a remnant population of Matted Flax-lily.

Additionally, Darebin Creek is approximately 30 metres from the western boundary of the offset, flowing south. The creek is an important habitat feature in north-east Melbourne providing connectivity for wildlife between the suburbs and the larger Yarra River corridor.

1.4.2 Ecological values

Flora and fauna species recorded from the offset site are detailed in Appendix 1 of the OMP and an updated list (including 2023 records) is provided in Appendix 1 of this report.

Significant ecological values in the offset area were recorded in 2019 prior to the creation of the OMP (Biosis 2019). These values are still present in 2023 and include:

- 1.28 ha of native vegetation classified as Plains Grassy Woodland EVC 55 which has a bioregional conservation status of endangered.
- Known habitat for Matted Flax-lily, listed as threatened under the EPBC Act and FFG Act. Six individuals are known to occur within the offset area (Figure 4).

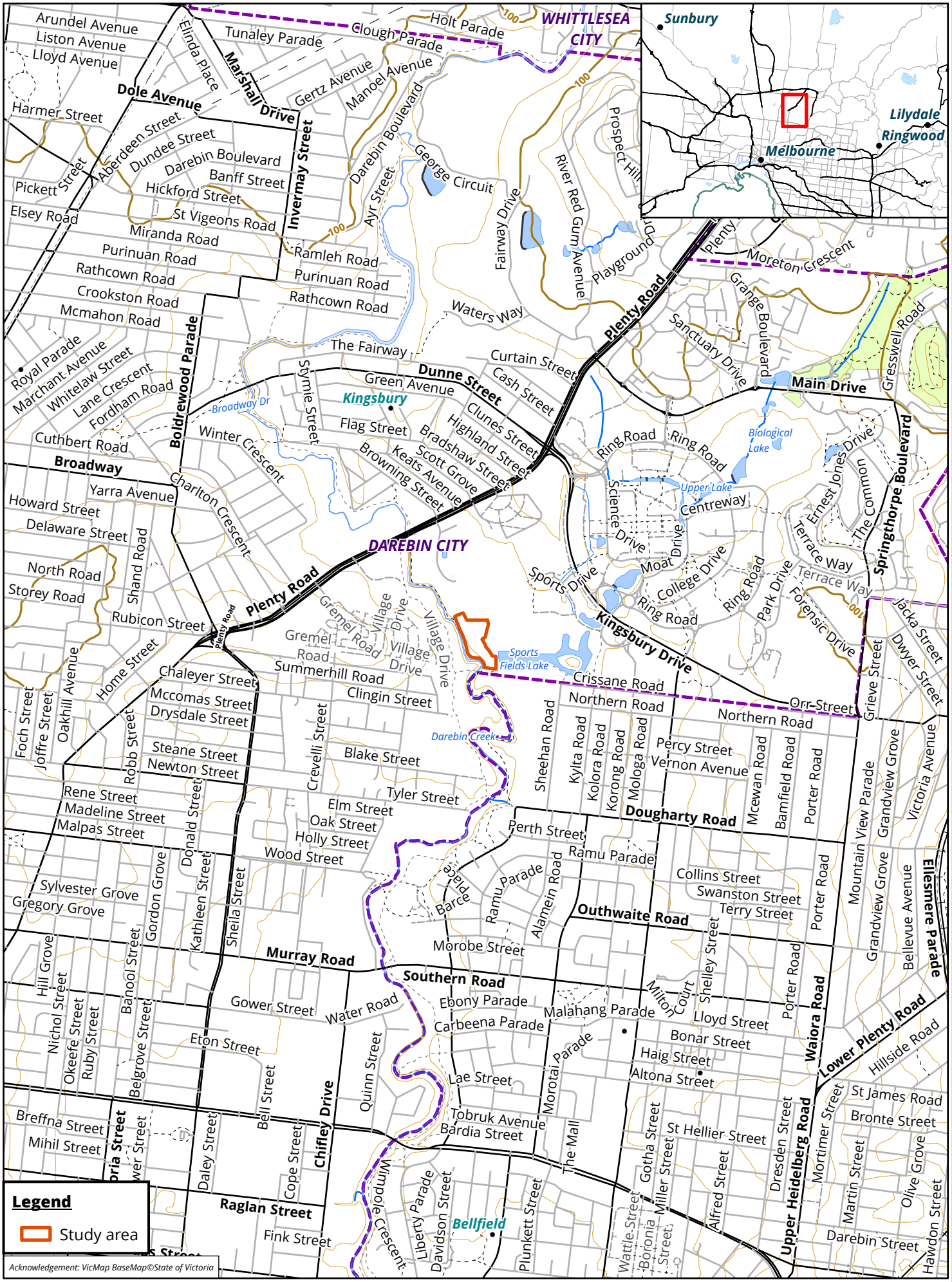


Figure 1 Location of the study area

biosis

Matter: 39591,
Date: 16 November 2023 ,
Prepared for: HS, Prepared by: SKM, Last edited by: hliswoyo
Layout: 34751_F1_Location
Project: P:\34700s\34751\Mapping\34751_LaTrobe_Stage3_OffsetMFLmonitoring.aprx

0 250 500 750 1,000
Metres
Scale: 1:25,000 @ A4
Coordinate System GDA 1994 MGA Zone 55

N

00

2. Compliance and reporting requirements

2.1 Responsibilities of La Trobe University

La Trobe University is responsible for the implementation of the OMP and the management of the offset site in perpetuity via a covenant. Management responsibilities are detailed in the OMP and include:

1. Implementing the OMP.
2. Ensuring all staff and contractors comply with all OMP requirements.
3. Ensuring preparation of ongoing management audit/review.
4. Ensuring preparation of annual management objectives for the next year including targets and standards.
5. Appointing of consultant ecologist and specialist bushland management contractor to implement management of the site.
6. Reporting to Trust for Nature (TfN) and DCCEEW as required.

Each of these tasks will be undertaken by dates specified in the OMP (Biosis 2020). La Trobe's compliance with the OMP is addressed in Section 3.2 of this report.

An annual report will be prepared based on annual monitoring that details the works completed and provides an assessment against the targets established in the OMP. The works program was audited at the end of Year 1 and will be audited again at the end of Year 4 (2024), Year 8 (2028), Year 10 (2030) and Year 18 (2038).

2.2 Responsibilities of all staff or contractors on site

All staff or contractors working within the offset site must:

- Undertake all works in accordance with the OMP.
- Report any issues or incidents to the Project Manager.

For the current reporting year (Year 3; 2023), all staff and contractors worked in accordance with the OMP and all issues or incidents were reported to the Project Manager.

2.3 Environmental approvals

Vegetation removal associated with the construction of the La Trobe University Sports Precinct Stage 3 has been authorised under the EPBC Act approval (EPBC 2018/8343). Vegetation proposed for removal is described in the biodiversity assessment report prepared by Biosis (2019).

2.4 Enforcement

Compliance with the approved OMP is mandatory under the EPBC act approval and will be subject to enforcement by DCCEEW.

2.5 Reporting

Unless otherwise advised by the Minister, the landowner, via the approval holder (La Trobe), must submit a report annually to TfN and DCCEEW for the period of the approval (i.e. until 2040). Reports are to be submitted at least two months prior to the anniversary date of the execution of the OMP to allow time for compliance to be assessed before the anniversary date. Reports will also be published on the La Trobe website within three months of every 12 month anniversary.

The annual report will address progress against the commitments set out in the OMP. Annual reports will provide enough detail in the form of written comments and supporting evidence that an assessor can easily determine the completion of/progress against the management commitments and completion criteria for the offset site.

The annual report will include:

- Details of management actions, including on ground works, undertaken within the reporting period.
- Results of monitoring activities, including fence condition, weeds, pest animals, habitat quality, vegetation quality and ground cover biomass accumulation / the cover of open ground.
- Tracking of results in comparison to management performance targets and completion criteria.
- Site photographs including those from five permanent photo point locations.
- Details of compliance or non-compliance with the schedule of management actions (Table 1).
- Details of compliance or non-compliance with performance targets (Section 3.2).
- Details of any incidents or new and emerging management issues, with recommendations for corrective action and plan review in order to obtain the offset completion criteria.
- Any triggers exceeded and which corrective actions were implemented.
- Results of Matted Flax-lily monitoring events.

2.6 Data management

The qualified ecologist undertaking ecological components of the monitoring program will retain all monitoring data in an appropriate database format. Spatial data will be maintained within an appropriate GIS file format (e.g. ESRI shape file). All flora and fauna records will be submitted to DEECA for incorporation into the Victorian Biodiversity Atlas (VBA) as per the requirements of relevant licences.

La Trobe will ensure all records of inductions, inspections and monitoring are stored safely and are readily accessible for auditing. Types of records relevant to this plan include:

- All monitoring, inspection and compliance reports.
- Induction and training records.
- Correspondence with public authorities.
- Reports on incidents impacting on biodiversity values and follow-up actions.
- Spatial data.

3. Monitoring compliance results with management actions

3.1 Approach to monitoring

This report details the findings of annual monitoring during Year 3 (2023). Monitoring at the end of Year 3 aimed to determine whether the management actions specified in the OMP are being undertaken and La Trobe is compliant. Evidence of compliance was monitored and includes factors such as:

- Fence and gate condition.
- Extent of weed cover (especially high threat and woody weeds).
- Native vegetation quality.

3.2 Management actions completed at Year 3 (2022)

The management actions specified in the approved OMP for the current reporting period (calendar year 2023) are listed in Table 1 alongside a compliance assessment for Year 3. Cells shaded green indicates compliance, cells shaded orange indicates partial compliance, and cells shaded red indicates non-compliance. Where non-compliance was reported, recommendations are provided to ensure compliance going forward.

Notably, all of the relevant actions specified for this period have been completed or are ongoing in accordance with the OMP in 2023. In summary, La Trobe University has satisfactorily complied with the OMP during the 2023 reporting year.

Table 1 Year 3 progress against management actions for the offset site as outlined in the OMP

Management item	Year 3 action (Biosis 2020)	Progress at end of Year 3
Long-term protection	The offset area will be secured in-perpetuity via a covenant as to part Section 3A Victorian Conservation Trust Act 1972, to be registered on the title prior to the commencement of development associated with the Stage 3 Sporting Precinct.	Compliant; Covenant with Trust for Nature has been secured and registered
Annual works program	Prior to any works being undertaken each year an annual works program will be developed by an experienced bushland regenerator.	Compliant; Annual works program prepared by Darebin Creek Management Committee.

Management item	Year 3 action (Biosis 2020)	Progress at end of Year 3
Fencing, information and access control	Establish fencing and or other access control devices (i.e. gates) to control access to the offset site and repair promptly if damage occurs.	Compliant; Fencing and access control has been established and maintained.
	Establish posts to mark the boundary of the offset site for management and monitoring purposes under supervision from a qualified ecologist.	Compliant; Posts to mark the boundary of the offset site have been established.
	Control access and any passive use to minimise impacts on native vegetation.	Compliant; Offset site is adequately fenced, and gates are locked to minimise access.
	Provide access for management vehicles into the offset site, using the existing track network. No additional vehicle access is to be established.	Compliant; No new tracks have been established within the offset site. The existing track network is used for vehicle access.
	Surveys of the offset boundary and any associated access control infrastructure will be conducted quarterly, and when visiting the site to conduct other monitoring or management actions.	Compliant; Fencing was in good condition during the Year 3 compliance monitoring.
Weed control	Treat all existing infestations of woody weeds within 12 months, and eradicate within three years. Continuous follow-up control to eradicate woody weed seedlings and other regeneration.	Non-compliant; Evidence of extensive weed removal and treatment was observed during the Biosis site visit. The land management team have attended the site frequently throughout 2023 to manage woody weed infestations. However, many infestations of woody weeds still occur within the habitat zone such as Gorse *Ulex europaeus* (See Figure 7). Woody weeds have not been eradicated in

Management item	Year 3 action (Biosis 2020)	Progress at end of Year 3
		three years and require extensive management to bring under control within the next 12 months.
	Spot spraying of weeds with appropriate herbicide will be undertaken, particularly through spring and early summer.	Compliant; Land management team are frequently attending the site and undertaking spraying of weeds.
	Target weeds will be treated before seed set; this requires repeated monitoring and treatment during the growing season.	Ongoing; Weeds are still present, however, management is underway.
	Ensure the absence of high threat woody weeds within the offset area through monitoring and where found to occur, control and eliminate promptly. Preferably control nearby infestations to prevent the spread of these species.	Ongoing; Weeds are still present, however, management is underway.
	Control works will ensure that the total cover of perennial weeds will be reduced to no more than 2% and preferably eliminated. Specific targets include: a reduction of high threat weeds in accordance with Table 4; perennial grassy weeds will be reduced to less than 1% total cover; and broadleaf weeds reduced to no more than 2% cover.	Partially compliant; Weeds are still present however, management is underway. Cover of weeds across the offset site much higher than the goals specified in the OMP (average cover of 65% in the quadrats), but many species showed a reduction in cover between 2022 and 2023.
	Total weed cover (annual and perennial weeds) reduced from 50% cover to 20% cover.	Ongoing; High threat weeds throughout the offset site and weed covers in quadrats have shown decreasing cover between 2022 and 2023, however total cover is still high than 20%. For example, the cover of Toowoomba Canary Grass *Phalaris aquatica* alone is currently 25%.

Management item	Year 3 action (Biosis 2020)	Progress at end of Year 3
	Monitoring will be undertaken to demonstrate the effectiveness of weed control works and the results are to be used to adapt future control works and targets.	Ongoing; Year 3 monitoring complete.
	Any populations of new and emerging high threat weeds will be treated promptly and eliminated. This will be done in consultation with TfN.	Ongoing; Land management team have undertaken regular weed control throughout the 3rd year of management.
	Any other significant environmental weeds identified during the ongoing site monitoring will also be controlled in consultation with TfN.	Ongoing; As above.
	During weed control, natural regeneration of indigenous flora will be protected from off-target damage.	Ongoing; No evidence of damage to indigenous flora was observed during the monitoring events.
Weed monitoring	Weed monitoring conducted annually in spring as part of the annual monitoring event.	Compliant; results of weed monitoring included in this report.
Pest animals	Control and seek to locally eliminate European Hares, European Rabbits, cats and foxes and using appropriate control techniques including poison baits or similar methods, without significant soil disturbance (i.e. ripping of warrens is not acceptable).	Compliant; Four rabbit warrens observed during a survey, however, they were deemed inactive.

Management item	Year 3 action (Biosis 2020)	Progress at end of Year 3
	Fumigate rabbit warrens within three weeks of detection. Fumigation works will be conducted by a suitably qualified operator.	Compliant: No active rabbit warrens were observed in 2023.
Pest animal monitoring	Pest animal monitoring will occur annually in November. This will include a systematic survey of the offset site lasting no longer than thirty minutes.	Compliant: A night survey was undertaken and no rabbits or hares were observed within the offset site.
Biomass/ organic litter	Engage a qualified contractor to produce a fire management plan which allows for an ecological burning regime described in the following dot points:	Compliant: Planned burns in sections of the offset site were undertaken in 2023.
	Undertake ecological burning over the offset area (or parts there-of) so that no area is burnt more frequently than every two years;	
	When planning burns, liaise with any relevant regulator regarding appropriate planning and permits in a timely manner;	
	Plan and conduct ecological burning within different seasons to promote regeneration of a variety of species and remove debris created by the control of woody weeds.	
Understorey diversity and recruitment	Active weed management to be undertaken as outlined in Section 3.8.2 of the OMP.	Compliant; The land management team have visited site on a several occasions and undertaken weed management, i.e. spraying and woody weed removal. Refer to weed control items above for compliance.

Management item	Year 3 action (Biosis 2020)	Progress at end of Year 3
	Biomass will be managed to enhance recruitment.	Compliant (ongoing); Planned burns were undertaken in 2023. Organic litter cover is currently 7% which is within the acceptable range (<10%) as outlined in Section 3.8 of the OMP.
Revegetation	Once weed and biomass control activities have established areas with a low cover of weeds, these areas will be sown with a variety of suitable native graminoids (Appendix 1). This direct seeding will target a minimum establishment density of five grasses per square metre.	Not applicable - This action cannot occur until several years of weed and biomass control has occurred.
Baseline site condition monitoring	Within three months approval of the OMP and prior to the commencement of any management activities a suitably experienced botanist will systematically survey the site and collect information on flora species by the establishment of five permanent five by five metre monitoring quadrats.	Compliant; Baseline monitoring of the offset site was undertaken on 21 October 2021.
Continuous monitoring	Regular site inspections (of about two hours at least every two months) will be undertaken to provide general condition observations. The Landowner must keep a diary of any works conducted within the offset site and record any observations which could influence or initiate a management response.	Compliant; land management group keeps records of daily works and general condition observations. Daily works records are available for review.
Woodland monitoring	The condition of the Plains Grassy Woodland will be assessed annually during spring. This will be done using the offset site as a single unit and using the habitat hectare method.	Compliant – Vegetation Quality Assessment undertaken during Year 3 of monitoring.
Matted Flax-lily monitoring	Surveys of translocated Matted Flax-lily individuals to occur annually during late spring to early summer.	Not applicable - Translocation of Matted Flax-lily individuals has not yet occurred. Due to occur in 2024.

Management item	Year 3 action (Biosis 2020)	Progress at end of Year 3
Revegetation monitoring	Monitoring of the revegetation works will commence in the spring of Year 3.	Not applicable – Plants used in the revegetation are too young to be effectively monitored. This will need to be commenced in the spring of Year 4.
Reporting	La Trobe must submit a report annually to TfN and DCCEEW for the period of the approval (i.e. until 2040). Reports are to be submitted at least two months prior to the anniversary date of the execution of the OMP. The annual report will address progress against commitments set out in the OMP.	Compliant once the 2023 monitoring report (this report) is submitted to TfN and DCCEEW.

4. Key offset outcomes and vegetation monitoring methods

4.1 Key offset outcomes

The key environmental outcomes / criteria to be achieved through protection and management of the offset site are:

- Permanent legal protection of 2.81 hectares of Matted Flax-lily habitat.
- Physical protection of the habitat area from manageable threats including grazing by domestic stock, weed infestations and degradation by pest animals.
- Attainment of Matted Flax-lily habitat condition completion criteria (below), as measured by habitat monitoring.

4.1.1 Future site condition – completion criteria

The 2.81 hectare offset site must achieve the following:

- Be dominated by good quality native vegetation (target Vegetation Quality Assessment [VQA] site condition score of 30 - 45/75).
- Support a population of Matted Flax-lily with a density of at least 2 to 5 plants per hectare.

4.2 Methods

The Year 3 flora assessment was undertaken on 9 and 10 November 2023 by Sarah Hilliar (Senior Botanist), Hayley Sime (Botanist) and Joshua Orchard (Graduate Ecologist). Five permanent 5 x 5 metre quadrats were monitored during the assessment. The quadrat locations are shown in Figure 3 and their placement within the offset site is explained in the OMP (Biosis 2020).

4.2.1 Photo point monitoring

Photo points were established at each quadrat in 2020 and photos are taken annually. Four photos were taken facing into the quadrat from each corner and photos were digitally labelled with the quadrat number and orientation (e.g. Q1 NW to denote the north-west corner of quadrat 1). Each photo was taken standing approximately 1.5 metres back from each corner of the quadrat. See Appendix 3 for photos.

There have been ongoing issues with consistency of photo points between 2020 and 2022. As a result, permanent pickets were installed in the remaining three corners in 2023.

4.2.2 Vegetation monitoring

The following attributes were recorded at each 5 x 5 metre monitoring quadrat:

- Flora species, noting whether the species is native or introduced and/or a high threat weed.
- Total percent cover of each species using a modified Braun-Blanquet cover abundance scale (Table 2).
- Total native vegetation cover (%).
- Total weed cover (%).
- Cover of bare ground, leaf litter, soil crust, bryophytes and inter-tussock space (%).

- Vegetation height (cm) (Section 4.2.2.1).
- Biomass (Section 4.2.2.2)

Table 2 Modified braun blanquet cover abundance categories

Value	Cover and abundance	Low %	Mid %	High %
+	Cover <5%, less than 3 individuals	1	2.5	4
1	Cover <5%, more than 3 individuals	1	2.5	4
2	Cover 5-25%, any number of individuals	5	14.5	24
3	Cover 25-50%, any number of individuals	25	35.5	50
4	Cover 50-75%, any number of individuals	50	65.5	74
5	Cover 75-100%, any number of individuals	75	87.5	100

4.2.2.1 Vegetation height

A measuring stick was placed vertically at 1 metre intervals inside each quadrat 16 times (Figure 2).

At each interval the height of the tallest vegetation touching the stick was recorded.

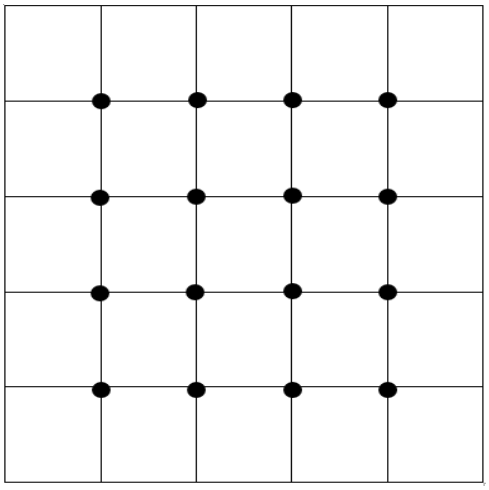


Figure 2 Locations of vegetation height measurements taken at 1 metre intervals

4.2.2.2 Biomass assessment

Four samples of biomass accumulation were recorded at each of the five quadrats. The golf ball biomass assessment method(Williams, Marshall, & Morgan 2015) was used to measure how open or dense vegetation is. A 1 x 1 metre quadrat was placed at each corner of the 5 x 5 metre quadrats. Eighteen golf balls were randomly dropped into the 1 x 1 metre quadrat from a height of 1.3 metres. The visibility of the golf balls from a standing position above the quadrat was scored as follows:

- Any golf ball that was more than 90% visible was given a score of 1.
- Any golf ball that was 33% to 90% visible was given a score of 0.5.
- Any golf ball that was less than 33% visible was given a score of 0.

Average golf ball scores for a given 5 x 5 metre quadrat can be categorised as follows (Morgan 2015):

- High biomass (0-5): low golf ball visibility, which suggests that biomass reduction (e.g. through fire and/or grazing) is required.
- Moderate biomass (6-14): moderate golf ball visibility, which suggests that the need for biomass reduction should continue to be closely monitored.
- Low biomass (15-18): high golf ball visibility, which suggests that biomass reduction is not required.

4.2.3 General site inspection and walkover

During the offset suitability assessment in September 2019, a preliminary flora species list was collected for the offset site. The flora species list is updated annually during monitoring with new species observations.

While the current species list is relatively comprehensive, it is not exhaustive. Some species may not have been observed due to their very low abundance, dormancy or seasonal conditions. Though the timing of the November 2023 monitoring captured the peak flowering period for many species, some species had recently finished flowering or were not yet flowering, making it difficult to identify some specimens to species level. It is expected that more species will be added to the list in the coming years.

During the site visit, relevant management issues were noted and, where appropriate, their locations were mapped using a GPS-enabled tablet, typically to an accuracy of 3 metres. Where relevant, the location of woody weeds, new and emerging weeds and evidence of pest animals was mapped.

4.2.4 Vegetation Quality Assessment

A Vegetation Quality Assessment (VQA) was undertaken for all patches of native vegetation based on DEECA's habitat hectare method (DSE 2004) and the Guidelines (DELWP 2017). The entire offset zone was assigned a single VQA score as prescribed within the OMP.

4.2.5 Remnant Matted Flax-lily location and health

A targeted survey for Matted Flax-lily was undertaken within all suitable habitat throughout the offset site. Any Matted Flax-lily plants encountered were assigned a number and mapped using GPS enabled tablets. The following health attributes were measured for each of the Matted Flax-lily observed in the offset site:

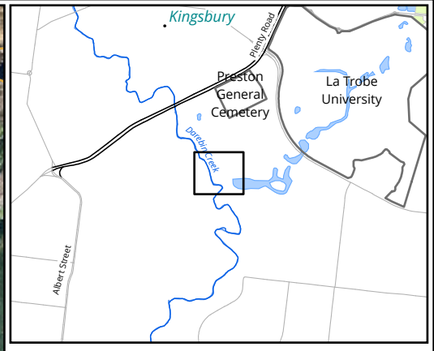
- Foliage health.
- Maximum leaf length.
- Maximum leaf width.
- Number of leaf tufts.
- Number of inflorescences.
- Weed cover, native cover and bare ground cover within a 1 metre radius.

4.2.6 Data management

A project database has been established and will be maintained allowing for data storage and protection, data extraction, quality control, analysis, interpretation, reporting and presentation.

4.2.7 Future monitoring

Future annual ecological monitoring must follow the methods outlined in the OMP, whilst incorporating the specific methods outlined above.



Legend

- Study area
- Quadrat

Figure 3 Location of quadrats

0 10 20 30 40 50

Metres

Scale: 1:1,200 @ A3

Coordinate System: GDA 1994 MGA Zone 55

N

biosis

Matter: 39591,
Date: 24 November 2023 ,
Prepared for: SH, Prepared by: SKM, Last edited by: hliswoyo
Layout: 34751_F3_Quadrats
Project: P:\34700s\34751\Mapping\
34751_LaTrobe_Stage3_OffsetMFLmonitoring.aprx

5. Results of vegetation monitoring

A summary of targets as outlined in the OMP and the status of these targets during the Year 3 (2023) monitoring event of the offset site is provided in Table 3.

Table 3 Summary of progress against targets at end of Year 3

Item	Year 10 target	Outcome at end of Year 3
Weeds	Eliminate woody weeds	Woody woods recorded within offset area, however evidence of woody weed removal was noted. Most woody weeds encountered in the offset site are young recruits (see Figure 7 for locations of woody weeds). Mature woody weeds are very limited and have clearly been targeted for management.
	Cover of perennial grassy weeds to no more than 2% cover across the site	Cover of perennial grassy weeds currently 46%, much greater than the goal of 2% across the site. However, each species of perennial grassy weed has shown a decrease from 2022 cover.
	Cover of broad leaf weeds to no more than 2% cover across the site	Cover of broad leaf weeds currently 42% across the monitoring quadrats. This is much greater than 2% across the site
	No mature woody weeds present within the offset area at the completion of Year 2. Maintain cover of woody weeds at negligible levels in perpetuity.	Mature woody weeds present within offset area. Most woody weeds encountered in the offset site are young recruits. Mature woody weeds are very limited and have clearly been targeted for management.
Revegetation	Revegetation should increase the cover of native vegetation to greater than 25% across the offset site.	Large areas remain <25% of native vegetation
Vegetation quality	Offset site to be dominated by good quality native vegetation (VQA site condition score of 30 - 45/75)	VQA score of the offset site as a single habitat zone is 41 /75.
Matted Flax-lily	Support a population of Matted Flax-lily (MFL) with a density of at least 2 to 5 plants per hectare. Maintain or improve the size and health of the remnant MFL population within the offset site.	NA - translocation of MFL has not yet occurred. Due to occur in 2024. Annual survey undertaken and five healthy remnant MFL plants recorded. This is an increase from the three MFL recorded in 2022.

5.1 General Vegetation quality

The offset site must be dominated by high quality native vegetation (VQA site condition score of 30-45/75) by the end of Year 10 as stated in Section 3.4.1 of the OMP.

The initial site condition report (Biosis 2019) identified four habitat zones within the offset area. These zones are shown in Figure 4 and Figure 7and the 2019 VQA scores are presented in Table 4.
The OMP states that a VQA is to be undertaken on an annual basis using the offset site as a single habitat zone. The results of the Year 3 (2023) VQA are presented in Table 5.

Table 4 VQA results of native vegetation within the offset site (Biosis 2019)

Habitat Zone ID			4.2	7	8	A
EVC #: Name			Plains Grassy Woodland EVC 55			
		Max Score	Score	Score	Score	Score
Site Condition	Large Old Trees	10	0	0	0	0
	Canopy Cover	5	0	5	5	0
	Lack of Weeds	15	4	4	4	4
	Understorey	25	5	5	5	5
	Recruitment	10	5	5	0	5
	Organic Matter	5	3	3	3	3
	Logs	5	0	0	0	0
	Total Site Score		**17**	**22**	**17**	**17**
Landscape Value	Patch Size	10	1	1	1	1
	Neighbourhood	10	0	0	0	0
	Distance to Core	5	0	0	0	0
	Total Landscape Score		1	1	1	1
HABITAT SCORE		100	**18**	**23**	**18**	**18**
Habitat points = #/100		1	0.18	0.23	0.18	0.18

Table 5 VQA results of the offset site as a single habitat zone

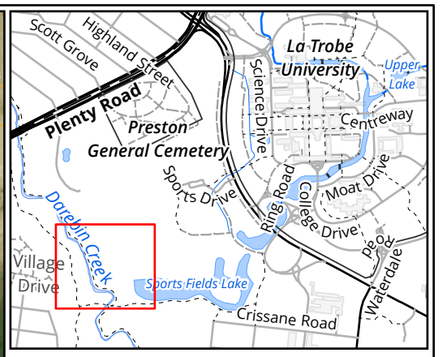
EVC #: Name			Plains Grassy Woodland EVC 55
		Max Score	Score
Site Condition	Large Trees	10	3
	Tree Canopy Cover	5	2
	Lack of Weeds	15	0
	Understorey	25	15
	Recruitment	10	10
	Organic Matter	5	5
	Logs	5	5
	Total Site Score		**40**
Landscape Value	Patch Size	10	1
	Neighbourhood	10	0
	Distance to Core Area	5	0
	Total Landscape Score		1
HABITAT SCORE		100	**41**
Habitat points = #/100		1	0.41

5.2 Matted Flax Lily Health monitoring

The entire offset site was surveyed for the presence of remnant Matted Flax Lily individuals. Each Matted Flax Lily was measured for several health attributes (see Table 6) and the location of each plant mapped using a GPS enabled tablet (Figure 4).

Table 6 Matted Flax Lily health

Plant No / Clone No	Foliage health rating	Max length (cm)	Max width (cm)	Number of leaf tufts	Number of inflorescences	Weed cover within a 1m radius (%)	Native cover within a 1m radius (%)	Bare ground within a 1m radius (%)	Management required?
1	Good	15	1.5	25	0	5	15	80	Not currently
2	No foliage present during November survey. Plant first recorded in 2022 and assumed to still be present.								
3	Good	22	1.5	15	8	40	1	40	Not currently
4	Moderate	17	1.5	40	23	5	85	10	Not currently
5	Good	29	1.5	1	1	15	25	60	Not currently



Legend

- Study area
- Matted Flax-lily (Biosis 2023)

Habitat Zones

- (VVP_0055_61) Plains Grassy Woodland

Figure 4 Distribution of *Dianella amoena* - Matted Flax-lily

0 10 20 30 40 50

Metres

Scale: 1:1,200 @ A3

Coordinate System: GDA 1994 MGA Zone 55

N

Matter: 39591,
Date: 24 November 2023 ,
Prepared for: HS, Prepared by: HL, Last edited by: hliswoyo
Layout: F4_MFL_locations
Project: P:\39500s\39591\Mapping\
39591_LTU_Yr3_offset_monitoring.aprx

5.3 Quadrat monitoring

Quadrat monitoring was undertaken on 9 and 10 November 2023, which is an appropriate time to survey, as many of the species at La Trobe were in flower or fruit and were readily identifiable. The results of the quadrat monitoring are discussed here and displayed in Appendix 2.

5.3.1 Flora species

A total of 93 flora species were recorded during the Year 3 monitoring (a combination of quadrat data and incidental species) (Appendix 1). This list includes 22 native species and 71 introduced species. Eighty-seven species were recorded within quadrats comprising 19 native species and 68 introduced species.

One threatened flora species was recorded; Matted Flax-lily *Dianella amoena* (listed as endangered under the EPBC Act and critically endangered under the FFG Act). This species was not recorded in any of the quadrats; however, five individuals were recorded throughout the offset site in 2023 (Figure 4).

5.3.2 Life forms

Vegetation quality assessments assign native species into lifeforms and each benchmark VQA score has an expected number and cover of lifeforms. A high VQA score is assigned to a patch of vegetation that supports a diversity and cover of lifeforms that is similar to the benchmark.

In year 3, 77% of lifeforms were recorded during the VQA assessment across the offset site. Lifeforms such as prostrate shrubs and large herbs have a much lower diversity and cover in the offset site than the VQA benchmark and therefore result in a low Understorey score.

5.3.3 Vegetation diversity and cover

The number of native species (Figure 5) and cover of native species (Figure 6) within the monitoring quadrats remains lower than the diversity and cover of weed species in 2023. Overall, species richness of indigenous flora remains low, ranging from two to six species within the five 5 x 5 metre quadrats. Weed species cover has reduced since 2022 from an average cover of 6% to 4.81% in the quadrats.

Cover of indigenous flora is low within each of the quadrats, ranging from 2% to 6% cover. Quadrat 1 supports the highest native vegetation cover, however, this is still a low cover of 6%.

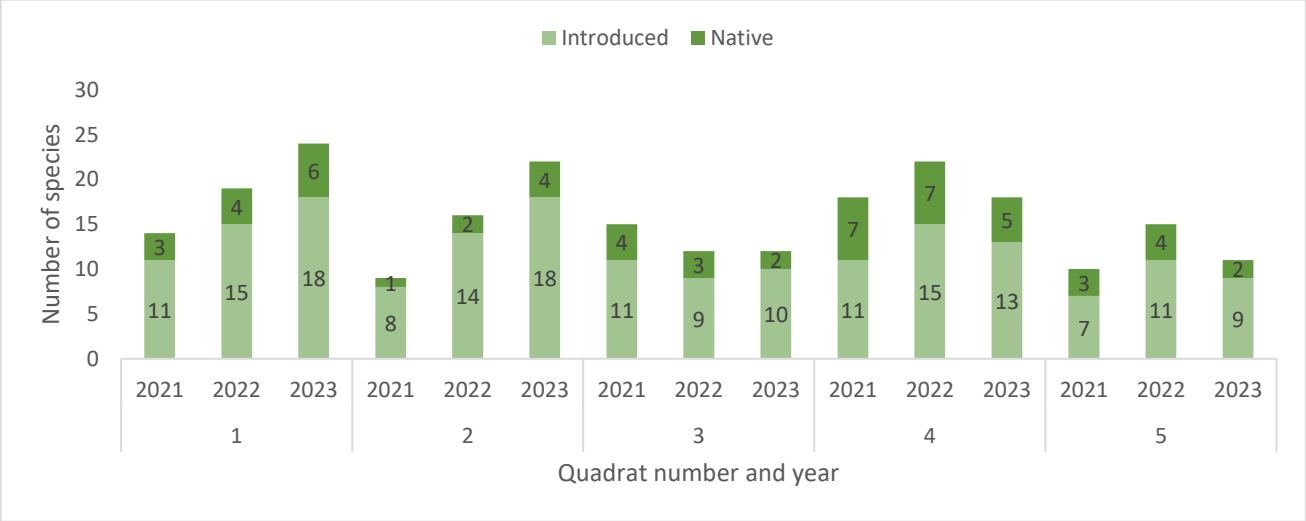


Figure 5 Number of indigenous and introduced flora species in each quadrat in 2021, 2022 and 2023

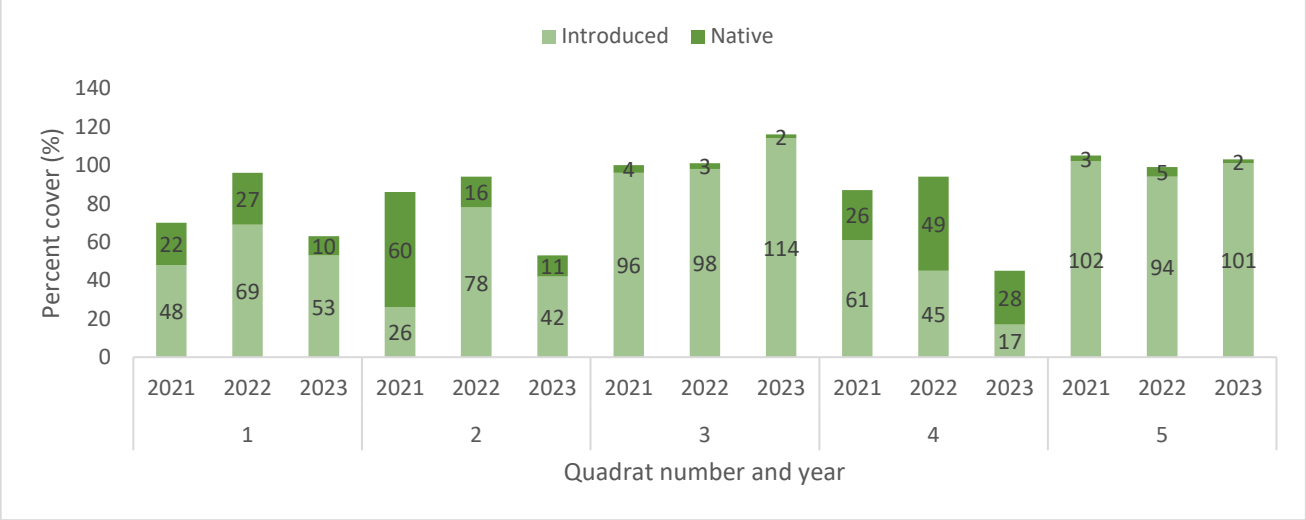


Figure 6 Cover of indigenous and introduced flora species in each quadrat in 2021, 2022 and 2023

5.3.4 Weed management

A key performance target, to assist in attainment of a habitat score of at least 30-45/70, is to eliminate woody weeds and reduce the abundance of perennial, introduced pasture grasses such as Chilean Needle-grass *Nassella neesiana*, Toowoomba Canary-grass *Phalaris aquatica* and Cocksfoot *Dactylis glomerata.*

The weed reduction target for introduced perennial grasses is set at <2% total cover. In Year 3, perennial grass cover peaked at 65% cover in quadrat 3, with an average cover of 13% across all quadrats. This average demonstrates a decrease in cover of perennial weedy grasses from 25% in 2022.

Mean total weed cover within the five monitoring quadrats during Year 3 monitoring in November 2023 was 65.4% which is close to a 10% reduction in cover from 2022 (74%). While the reduction in weed cover is a positive trend, it is still very far from the 2% cover that is specified for the offset site in the OMP.

Toowoomba Canary Grass and Chilean Needle-grass are the dominant perennial weed species across the study area. Other notable weed infestations include Serrated Tussock *Nassella trichotoma*, Montpellier Broom

Genista monspessulana and Gorse *Ulex europaeus*, which were recorded prolifically in areas that have not yet been managed by the land management team. These species were largely absent from the areas that have been targeted by weed management.

Improving the lack of weeds score by reducing the cover of weed species throughout the offset site will provide opportunities for additional understorey lifeforms to establish. These outcomes will elevate the offset site condition score to the required level to achieve the defined completion criteria.

The declared noxious weeds and high threat weeds recorded during years 1, 2 and 3 are listed in Table 7. These weed species should be the focus of future weed management programs at La Trobe University.

Table 7 List of declared noxious weeds and high threat weeds recorded during Year 1, 2 and 3 within the offset site

CaLP Act status	Scientific name	Common name
R	*Asparagus asparagoides*	Bridal Creeper
R	*Allium triquetrum*	Angled Onion
RC	*Cirsium vulgare*	Spear Thistle
RC	*Crataegus monogyna*	Hawthorn
RC	*Echium plantagineum*	Paterson's Curse
RC	*Genista monspessulana*	Montpellier Broom
RC	*Lycium ferocissimum*	African Box-thorn
R	*Nassella neesiana*	Chilean Needle-grass
RC	*Nassella trichotoma*	Serrated Tussock
R	*Oxalis pes-caprae*	Soursob
RC	*Rosa rubiginosa*	Sweet Briar
RC	*Rubus anglocandicans*	Common Blackberry
RC	*Ulex europaeus*	Gorse

5.3.5 Woody Weeds

Several large infestation of woody weeds were observed within the study area. Gorse was the most extensive of these species. Most woody weeds appear to have recently recruited, meaning that the majority of woody weeds within the offset site are not mature. While weed management activities have clearly targeted some areas of woody weed infestation, this recent recruitment event means the offset site is not compliant with the goal of eliminating woody weeds by year 10.

Location of woody weeds is shown in figure 7.

5.3.6 Biomass accumulation

Where there is a sustained build up in ground cover biomass over any one year, resulting in a reduction of inter grass tussock space to an average of less than 30%, biomass will need to be actively reduced. Inter-tussock space is important for plant recruitment and is used as a collective term for bare ground, bryophytes, lichens and soil crust, all of which provide a medium upon which plant recruitment can occur (DSE 2004). Across all quadrats there was an average of 4% cover of inter tussock space, a 2% reduction compared to 2021 and significantly lower than the target of 30%.

This result corresponded with a mean golf ball score of 7 which indicates there is a moderate cover of biomass within the offset site.

A low golf ball score is indicative of high biomass across the offset site. This is evident in Quadrat 5, which is dominated by introduced species such as Toowoomba Canary-grass and Cocksfoot, which can both grow to 1 metre in height. Table 8 summarises the biomass accumulation results for each of the five quadrats.

Table 8 Mean inter-tussock space, golf ball score and maximum vegetation height for the five permanent monitoring quadrats in Year 3

Quadrat	Cover of inter tussock space (%)	Mean golf ball score	Mean maximum vegetation height (cm)
1	12	14 - moderate biomass	19
2	15	15 - low biomass	19
3	1	1 - high biomass	48
4	50	17 - low biomass	7
5	1	4 - high biomass	43
MEAN	**16**	**13 – moderate biomass**	**27**
TARGET	**30 (+/- 10)**	**≥15 – low biomass**	**≤25**

5.4 Pest animal control

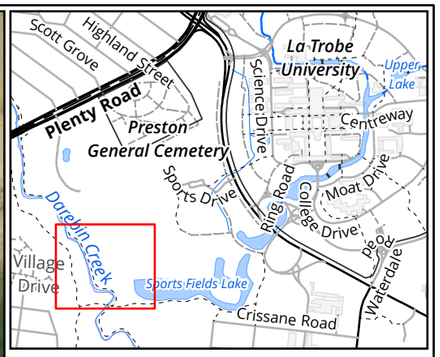
There must be no active rabbit warrens or fox dens within the offset site (Objective 9 of the OMP) and new and emerging pest animals must be controlled (Objective 10 of the OMP). No active rabbit warrens or fox dens and no signs of new and emerging pest animals were recorded during monitoring in December 2023

Surveys for active warrens, rabbits and hares were undertaken in 2023.

5.5 General site condition

Weed cover remains high within the offset site, however, there is evidence of extensive weed management and native revegetation being undertaken (spraying and removal of high threat woody weeds). Visual evidence of recent ecological burns was observed throughout the site and within the monitoring quadrats through the low biomass in some areas. Biomass (especially biomass of perennial weedy grasses) remains high in the areas that have not been burned.

Fencing is in a good condition and rubbish is absent from the offset area.



Legend

Study area

Woody weeds (Biosis 2023)

- *Rubus anglocandicans* - Common Blackberry
- *Genista monspessulana* - Montpellier Broom
- *Ulex europaeus* - Gorse

Habitat Zones

(VVP_0055_61) Plains Grassy Woodland

Figure 7 Woody weed locations

0 10 20 30 40 50

Metres

Scale: 1:1,200 @ A3

Coordinate System: GDA 1994 MGA Zone 55

N

biosis

Matter: 39591,
Date: 24 November 2023 ,
Prepared for: HS, Prepared by: HL, Last edited by: hliswoyo
Layout: F5_WW_locations
Project: P:\39500s\39591\Mapping\
39591_LTU_Yr3_offset_monitoring.aprx

6. Discussion and recommendations

6.1 Conclusions

La Trobe University satisfactorily complied with most objectives of the OMP during the 2023 reporting year. Most specified management actions for the year were completed in accordance with the OMP, except where they were considered not relevant at that point in time or where environmental conditions prevented them from occurring (i.e. assessing success / health of revegetation).

While total weed cover dropped by 10% within the monitoring quadrats, weed cover is still well about the goals specified for year 10. Additionally, cover of woody weeds remains high across the site due to an apparent recent recruitment event. This means the OMP goal of eradicating all woody weeds by year 3 has not been met. There is evidence of extensive weed management (including woody weeds) onsite, and continued efforts may effectively reduce the cover of weeds over the next 12 months.

Some progress is needed towards meeting certain management objectives and targets over the coming years. Particular attention will need to be given to ensuring that vegetation quality and weed control targets are met. This will require diligent implementation of the OMP (e.g. weed control actions), regular monitoring of progress and adapting of management actions accordingly, where relevant. Management of declared noxious weeds should be a high priority in the next two to three years and biomass control through the use of planned burns should be utilised.

6.2 Recommendations

6.2.1 Management recommendations

Based on results of the Year 3 monitoring, the following management actions in accordance with the OMP will assist in ensuring the 10 year targets for vegetation quality and Matted Flax-lily are met:

- Continue the comprehensive weed management program and, where possible, increase the intensity of the woody weed management program. Weed management can include herbicide spraying, manual removal and ecological burns under appropriate seasonal conditions. While weed covers are (on average)
- Monitor for any new and emerging weeds and continuously treat those weeds to avoid further seed set, dispersal and infestation.
- Continue to revegetate areas not identified as patches with locally indigenous species.
- Continue to undertake biomass reduction to assist with weed control and recruitment of native species.
- Maintain a progressive annual works plan which caters to current conditions and prescribes ongoing management with the promotion of perennial grasses.
- The OMP outlines several specific weed targets for the offset area. For this report, we have used the target of <2% cover of perennial introduced grasses and broad leaf weeds. This target is repeated throughout the OMP and thus used in this monitoring report. There are other targets that are discussed within the OMP which may prove to be more achievable i.e. an overall reduction from approximately 50% perennial weed cover to 20% perennial weed cover or a 50% reduction of the

baseline monitoring cover of perennial weeds. La Trobe University could consider undertaking a review of the OMP to clarify these targets.

6.3 Management actions for Year 4 (2024)

Refer to Table 5 of the OMP for management actions specified for Year 4 and beyond.

References

Biosis 2008. *Amaroo Business Park: Conservation Reserve Ecological Management Plan*, Report prepared for Goodman. Nicholson. R. Biosis Pty Ltd. Melbourne, Victoria. Project no 6518.

Biosis 2020a. *Amaroo Business Park: Conservation Reserve Ecological Management Plan*, Report prepared for Goodman. Woodward. R. Biosis Pty Ltd. Albury, NSW. Project no 31750.

Biosis 2020b. *Amaroo Business Park: Flora and fauna assessment*, Report prepared for Goodman. Tate. J. Biosis Pty Ltd. Melbourne, VIC. Project no 31749.

DELWP 2017. 'Guidelines for the Removal, Destruction or Lopping of Native Vegetation', Victorian Government Department of Environment, Land, Water, and Planning. East Melbourne, Victoria. https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/91146/Guidelines-for-the-removal,-destruction-or-lopping-of-native-vegetation,-2017.pdf.

DSE 2004. *Native Vegetation: Sustaining a living landscape. Vegetation Quality Assessment Manual – Guidelines for applying the Habitat hectares scoring method. Version 1.3*, Victorian Government Department of Sustainability and Environment. Melbourne, VIC. https://www.environment.vic.gov.au/__data/assets/pdf_file/0016/91150/Vegetation-Quality-Assessment-Manual-Version-1.3.pdf.

Williams NSG, Marshall AJ, & Morgan JW 2015. *Land of sweeping plains. Managing and restoring the native grasslands of south eastern Australia.*, CSIRO Publications Victoria, Melbourne, VIC.

Appendices

Appendix 1 Flora

The following abbreviations and symbols are relevant to this Appendix:

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
PMST	Protected Matters Search Tool	
State listings (FFG Act)		
x	Extinct	Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
P	Protected (public land only)	
Weed status (CaLP Act,)		
SP	State prohibited species	Victorian *Catchment and Land Protection Act 1994* (CaLP Act)
RP	Regionally prohibited species	
RC	Regionally controlled species	
R	Restricted species	

A1.1 Flora species recorded from the offset site

Table A1.1 Flora species recorded from the offset site

Status	Scientific Name	Common Name
Indigenous species		
	Acacia implexa	Lightwood
P	*Acacia mearnsii*	Black Wattle
	Acacia melanoxylon	Blackwood
	Acaena spp.	Sheep's Burr
	Allocasuarina spp.	Sheoak
	Amyema quandang var. *quandang*	Grey Mistletoe
	Anthosachne scabra s.l.	Common Wheat-grass
	Arthropodium sp. 3 (*aff. Strictum*)	Small Chocolate-lily
	Asperula conferta	Common Woodruff
	Atriplex semibaccata	Berry Saltbush
	Carex tereticaulis	Poong'ort
	Cassinia sifton	Drooping Cassinia
	Cynodon dactylon	Couch
EN, cr, P	*Dianella amoena*	Matted Flax-lily
	Eleocharis spp.	Spike Sedge
	Erodium spp.	Heron's Bill
	Eucalyptus camaldulensis	River Red-gum
	Eucalyptus ovata	Swamp Gum
P	*Euchiton japonicus s.s.*	Creeping Cudweed
	Exocarpos spp.	Ballart
	Juncus spp.	Rush
	Lepidosperma laterale	Variable Sword-sedge
	Melaleuca ericifolia	Swamp Paperbark
	Oxalis perennans	Grassland Wood-sorrel
	Poa labillardierei	Common Tussock-grass
	Rumex spp.	Dock
	Rytidosperma pilosum	Velvet Wallaby-grass
	Rytidosperma setaceum	Bristly Wallaby-grass
P	*Senecio quadridentatus*	Cotton Fireweed
	Themeda triandra	Kangaroo Grass
Introduced species		
	Aira elegantissima	Delicate Hair-grass
	Allium neapolitanum	Naples Onion
R	*Allium triquetrum*	Angled Onion
	Arctotheca calendula	Cape Weed
R	*Asparagus asparagoides*	Bridal Creeper

Status	Scientific Name	Common Name
	Avena barbata	Bearded Oat
	Briza maxima	Large Quaking-grass
	Briza minor	Lesser Quaking-grass
	Bromus hordeaceus	Soft Brome
	Cenchrus clandestinus	Kikuyu
	Centaurium erythraea	Common Centuary
	Cerastium spp.	Mouse-ear Chickweed
RC	*Cirsium vulgare*	Spear Thistle
RC	*Crataegus monogyna*	Hawthorn
	Dactylis glomerata	Cocksfoot
RC	*Echium plantagineum*	Paterson's Curse
	Ehrharta erecta	Panic Veldt-grass
	Ehrharta longiflora	Annual Veldt-grass
	Erigeron spp.	Fleabane
	Fraxinus angustifolia	Desert Ash
	Galium aparine	Cleavers
RC	*Genista monspessulana*	Montpellier Broom
	Geranium dissectum	Cut-leaf Crane's-bill
	Helminthotheca echioides	Ox-tongue
	Holcus lanatus	Yorkshire Fog
	Hypochaeris radicata	Flatweed
	Lysimachia arvensis	Pimpernel
RC	*Lycium ferocissimum*	African Box-thorn
	Malva sp.	Mallow
R	*Nassella neesiana*	Chilean Needle-grass
RC	*Nassella trichotoma*	Serrated Tussock
R	*Oxalis pes-caprae*	Soursob
	Paspalum dilatatum	Paspalum
	Phalaris aquatica	Toowoomba Canary-grass
	Plantago lanceolata	Ribwort
	Romulea rosea	Onion Grass
RC	*Rosa rubiginosa*	Sweet Briar
RC	*Rubus anglocandicans*	Common Blackberry
	Sonchus asper s.s.	Rough Sow-thistle
	Sonchus oleraceus	Common Sow-thistle
	Trapapogon porrifolius	Salsify
	Trifolium spp.	Clover
RC	*Ulex europaeus*	Gorse
	Verbascum spp.	Mullein
	Vicia sativa	Common Vetch

Status	Scientific Name	Common Name
	Vulpia bromoides	Squirrel-tail Fescue

Appendix 2 Vegetation diversity and cover results

Table 9 Quadrat 1 - Vegetation cover and diversity using percentage cover and modifed Braun Blanquet (BB) cover

Quadrat 1		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Native species							
Crassula spp.	Crassula					1	+
Euchiton japonicus	Creeping Cudweed			1	1		
Microlaena stipoides var. *stipoides*	Weeping Grass					1	1
Oxalis perennans	Grassland Wood-sorrel					1	+
Poa labillardierei var. labillardierei	Common Tussock-grass	10	2	15	2	3	+
Rytidosperma spp.	Wallaby Grass	2	1	1	1		
Senecio spp.	Groundsel					1	1
Themeda triandra	Kangaroo Grass	10	2	10	2	3	1
Introduced species							
Acetosella vulgaris	Sheep Sorrell			1	+		
Aira elegantissima	Delicate Hair-grass	1	1	1	1	1	1
Avena barbata	Bearded Oat	10	2	2	1	2	1
Briza maxima	Large Quaking-grass	1	1	1	+	1	1
Bromus hordeaceus						3	1
Centaurium erythraea	Common Centaury			1	1	1	1
Cerastium spp.	Mouse-ear Chickweed	1	1			1	1
Cirsium vulgare	Spear Thistle					1	+
Dactylis glomerata	Cocksfoot			1	1		

Quadrat 1		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Echium plantagineum	Patersons Curse			1	1	1	+
Ehrharta longiflora	Annual Veldt-grass	1	1	1	1	1	+
Erigeron sp.	Fleabane			1	+		
Hypochaeris radicata	Flatweed					2	1
Lactuca serriola	Prickly Lettuce					1	+
Nassella neesiana	Chilean Needle-grass	20	2	45	3	15	2
Nassella trichotoma	Serrated Tussock	10	2	10	2	2	1
Sonchus asper	Rough Sow-thistle	1	+			2	1
Sonchus oleraceus	Common Sow-thistle			1	1		
Trifolium spp.	Clover			1	1	1	1
Vicia spp.	Vetch	1	1	1	1	2	1
Vulpia myuros	Rat's-tail Fescue			1	1	15	2

Table 10 Quadrat 2 - Vegetation cover and diversity using percentage cover and modifed Braun Blanquet (BB) cover

Quadrat 2		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Native species							
Dianella amoena	Matted Flax-lily			1	+		
Eucalyptus melliodora	Yellow Box					1	+
Microlaena stipoides var. stipoides	Weeping Grass					2	1
Oxalis perennans	Grassland Wood-sorrel					1	+
Themeda triandra	Kangaroo Grass	60	4	15	2	7	2
Introduced species							
Aira elegantissima	Delicate Hair-grass	1	1	1	1	1	1
Avena barbata	Bearded Oat					1	1
Briza maxima	Large Quaking-grass			2	1	4	1
Briza minor	Lesser Quaking-grass					2	1
Bromus hordeaceus	Soft Brome	1	1			2	1
Centaurium erythraea	Common Centaury			1	1	1	+
Dactylis glomerata	Cocksfoot	10	2	1	1	1	+
Hypochaeris radicata	Flatweed			1	1	1	+
Lactuca serriola	Prickly Lettuce					1	1
Linum trigynum	French Flax					1	1
Nassella neesiana	Chilean Needle-grass	5	2	40	3	10	2
Nassella trichotoma	Serrated Tussock	2	1	10	2	3	1
Phalaris aquatica	Toowoomba Canary-grass					2	1
Paspalum dilatatum	Paspalum			1	1		
Phalaris aquatica	Toowoomba Canary-grass	5	2	15	2	2	1
Plantago lanceolata	Ribwort	1	1	1	1	2	1

Quadrat 2		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Sonchus asper s.s.	Rough Sow-thistle			1	+	1	+
Trifolium spp.	Clover			1	1	3	1
Vicia spp.	Vetch	1	1	2	1	4	1
Vulpia myuros	Rat's-tail Fescue			1	1	2	1

Table 11 Quadrat 3 - Vegetation cover and diversity using percentage cover and modifed Braun Blanquet (BB) cover

Quadrat 3		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Native species							
Carex tereticaulis	Poong'ort			1	+		
Cyperus sp.	Flat Sedge					1	1
Eragrostis spp.	Love Grass	1	+				
Eucalyptus melliodora	Yellow Box					1	+
Eucalyptus ovata	Swamp Gum			1	+		
Galium spp.	Bedstraw	1	+				
Oxalis perennans	Grassland Wood-sorrel	1	+				
Poa labillardierei var. labillardierei	Common Tussock-grass			1	1		
Rytidosperma setaceum	Bristly Wallaby-grass	1	+				
Introduced species							
Agrostis capillaris	Brown-top Bent					1	+
Allium triquetrum	Angled Onion	3	1			1	+
Briza minor	Lesser Quaking-grass	1	+				
Cenchrus clandestinus	Kikuyu			20	2		
Centaurium erythraea	Common Centaury			1			
Cerastium spp.	Mouse-ear Chickweed	2	1				
Cynodon dactylon	Couch	1	1			40	3
Cyperus eragrostis	Drain Flat-sedge					2	1
Dactylis glomerata	Cocksfoot	80	5				
Helminthotheca echioides	Ox-tongue			1	+	1	+
Hypochaeris radicata	Flatweed	1	+				
Oxalis pes-caprae	Soursob					1	+

Quadrat 3		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Paspalum dilatatum	Paspalum			2	1		
Phalaris aquatica	Toowoomba Canary-grass			70	4	65	4
Plantago lanceolata	Ribwort	1	+	1	1	1	+
Rumex spp.	Dock			1	1	1	+
Sonchus asper s.s.	Rough Sow-thistle	1	+	1	1		
Sonchus oleraceus	Common Sow-thistle	1	+	1	1		
Trifolium spp.	Clover	2	1				
Vicia spp.	Vetch	3	1			1	+

Table 12 Quadrat 4 - Vegetation cover and diversity using percentage cover and modifed Braun Blanquet (BB) cover

Quadrat 4		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Native species							
Anthosachne scabra s.l.	Common Wheat-grass	1	1				
Asperula spp.	Woodruff	1	1	15	2	6	2
Eucalyptus camaldulensis	River Red-gum	1	+	1	+	10	2
Juncus spp.	Rush	1	+				
Oxalis perennans	Grassland Wood-sorrel	1	1			1	+
Poa labillardierei var. labillardierei	Common Tussock-grass	20	2	25	2	10	2
Rytidosperma spp.	Wallaby Grass			1	1	1	+
Senecio quadridentatus	Cottony Fireweed			1	1		
Themeda triandra	Kangaroo Grass	1	1	5	1		
Introduced species							
Asparagus asparagoides	Bridal Creeper	3	1			1	+
Avena barbata	Bearded Oat	2	1				
Briza minor	Lesser Quaking-grass			1	1		
Bromus diandrus	Great Brome					1	+
Centaurium erythraea	Common Centaury			1	1		
Cirsium vulgare	Spear Thistle	1	+			1	1
Dactylis glomerata	Cocksfoot	20	2	30	3	2	1
Ehrharta erecta	Panic Veldt-grass	1	1	1	1	1	+
Ehrharta longiflora	Annual Veldt-grass					2	1
Erigeron sp.	Fleabane			1	1	1	1
Hypochaeris radicata	Flatweed	1	+	1	1		
Lactuca serriola	Prickly Lettuce					1	+

Quadrat 4		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Lycium ferocissimum	African Box-thorn			1	1		
Lysimachia arvensis	Scarlet Pipernel			1	1		
Nassella leucotricha	Texas Needle-grass	1	1				
Nassella neesiana	Chilean Needle-grass	5	2			1	1
Nassella trichotoma	Serrated Tussock	25	2				
Paspalum dilatatum	Paspalum			1	1		
Phalaris aquatica	Toowoomba Canary-grass			2	1	2	1
Plantago lanceolata	Ribwort					1	+
Sonchus asper s.s.	Rough Sow-thistle	1	+	1	1		
Sonchus oleraceus	Common Sow-thistle	1	+	1	1	1	1
Trifolium spp.	clover			1	1		
Ulex europaeus	Gorse			1	1		
Vicia spp.	Vetch			1	1	1	+

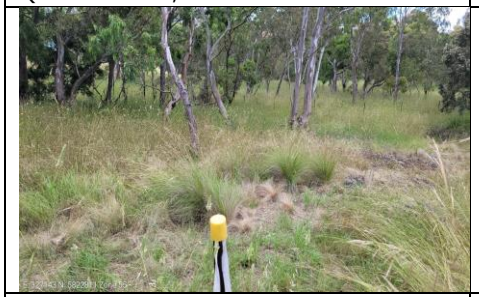
Table 13 Quadrat 5 - Vegetation cover and diversity using percentage cover and modifed Braun Blanquet (BB) cover

Quadrat 5		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Native species							
Asperula conferta	Common Woodruff	1	1	1	1		
Carex tereticaulis	Poong'ort			1	1		
Eucalyptus camaldulensis	River Red-gum			2	1		
Juncus spp.	Rush			1	1		
Geranium spp.	Crane's Bill	1	+				
Rumex spp.	Dock	1	+				
Introduced species							
Briza minor	Lesser Quaking-grass			1	+		
Cenchrus clandestinus	Kikuyu					15	2
Centaurium erythraea	Common Centaury			1	1		
Cirsium vulgare	Spear Thistle	1	1				
Dactylis glomerata	Cocksfoot	95	5	5	2	25	2
Erigeron bonariensis	Flaxleaf Fleabane					1	+
Genista monspessulana	Montpellier Broom					1	+
Helminthotheca echioides	Ox-tongue					1	+
Hypochaeris radicata	Flatweed	1	1	1	1		
Paspalum dilatatum	Paspalum			1	1		
Phalaris aquatica	Toowoomba Canary-grass			80	5	55	4
Plantago lanceolata	Ribwort	1	1	1	1	1	1
Rosa rubiginosa	Sweet Briar			1	+		
Rumex spp.	dock			1	1		
Sonchus oleraceus	Common Sow-thistle	1	1	1	1	1	+

Quadrat 5		2021		2022		2023	
Scientific name	**Common name**	**% cover**	**BB cover**	**% cover**	**BB cover**	**% cover**	**BB cover**
Trifolium spp.	Clover			1	1		
Ulex europaeus	Gorse	1	1				
Vicia spp.	Vetch	2	1			1	1

Appendix 3 Photo points

1. Photo points – Quadrat 1 – 2021, 2022, 2023

			
Quadrat 1 NW, 2021	Quadrat 1 NE, 2021	Quadrat 1 SE, 2021	Quadrat 1 SW, 2021
			
Quadrat 1 NW, 2022	Quadrat 1 NE, 2022	Quadrat 1 SE, 2022	Quadrat 1 SW 2022
			
Quadrat 1 NW, 2023	Quadrat 1 NE, 2023	Quadrat 1 SE, 2023	Quadrat 1 SW 2023

2. Photo points – Quadrat 2 - 2021, 2022, 2023			
			
Quadrat 2 NW, 2021	Quadrat 2 NE, 2021	Quadrat 2 SE, 2021	Quadrat 2 SW, 2021
			
Quadrat 2 NW, 2022 – no photo	Quadrat 2 NE, 2022	Quadrat 2 SE, 2022	Quadrat 2 SW, 2022
			
Quadrat 2 NW, 2023	Quadrat 2 NE, 2023	Quadrat 2 SE, 2023	Quadrat 2 SW, 2023

3. Photo points – Quadrat 3 - 2021, 2022, 2023

			
Quadrat 3 NW, 2021	Quadrat 3 NE, 2021	Quadrat 3 SE, 2021	Quadrat 3 SW, 2021
			
Quadrat 3 NW, 2022	Quadrat 3 NE, 2022	Quadrat 3 SE, 2022	Quadrat 3 SW, 2022
			
Quadrat 3 NW, 2023	Quadrat 3 NE, 2023	Quadrat 3 SE, 2023	Quadrat 3 SW, 2023

4. Photo points – Quadrat 4 - 2021, 2022, 2023

			
Quadrat 4 NW, 2021	Quadrat 4 NE, 2021	Quadrat 4 SE, 2021	Quadrat 4 SW, 2021
			
Quadrat 4 NW, 2022	Quadrat 4 NE, 2022	Quadrat 4 SE, 2022	Quadrat 4 SW, 2022
			
Quadrat 4 NW, 2023	Quadrat 4 NE, 2023	Quadrat 4 SE, 2023	Quadrat 4 SW, 2023

5. Photo points – Quadrat 5 - 2021, 2022, 2023

			
Quadrat 5 NW, 2021	Quadrat 5 NE, 2021	Quadrat 5 SE, 2021	Quadrat 5 SW, 2021
			
Quadrat 5 NW, 2022	Quadrat 5 NE, 2022	Quadrat 5 SE, 2022	Quadrat 5 SW, 2022
			
Quadrat 5 NW, 2023	Quadrat 5 NE, 2023	Quadrat 5 SE, 2023	Quadrat 5 SW, 2023