

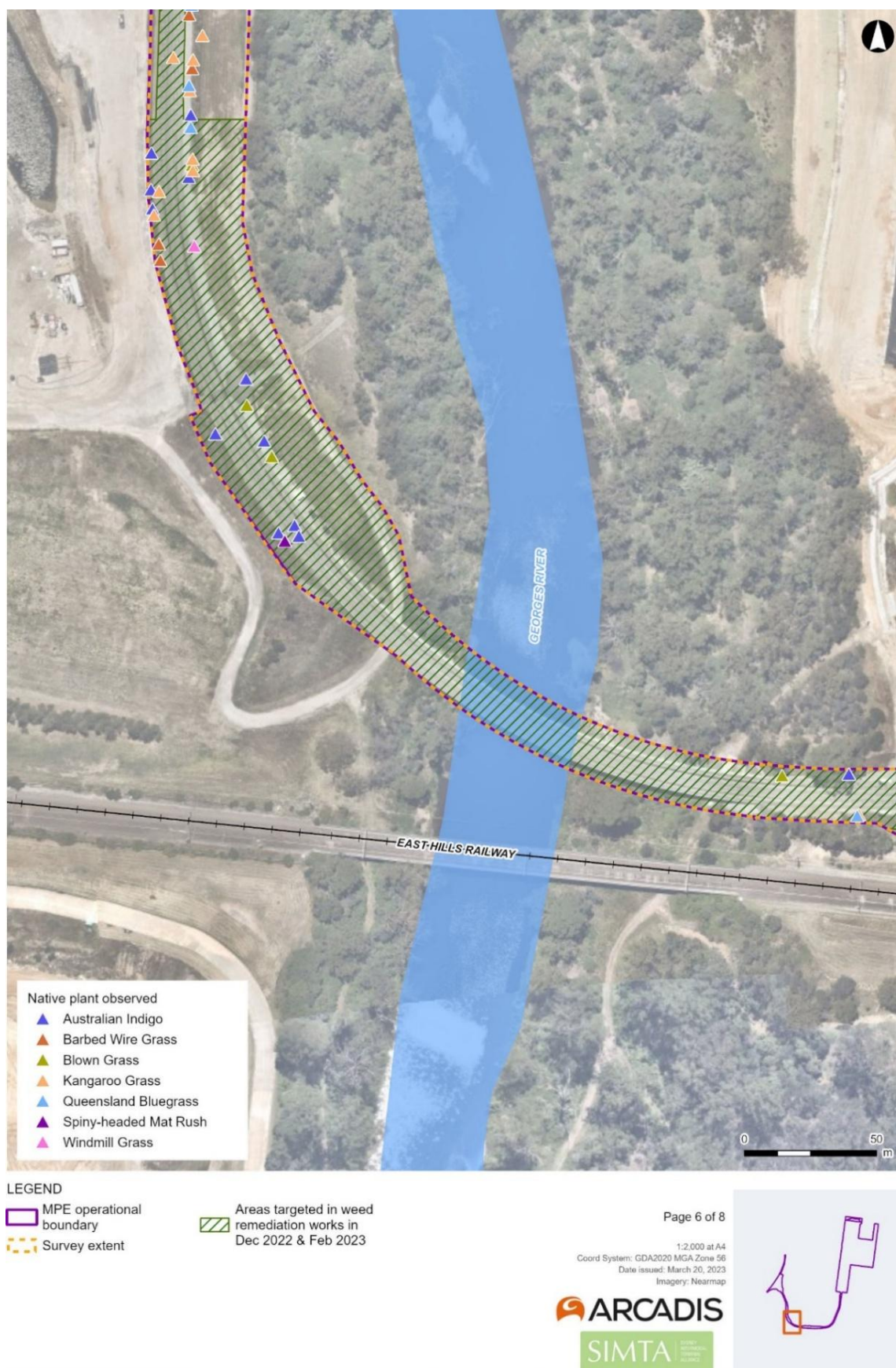


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (6 of 8)

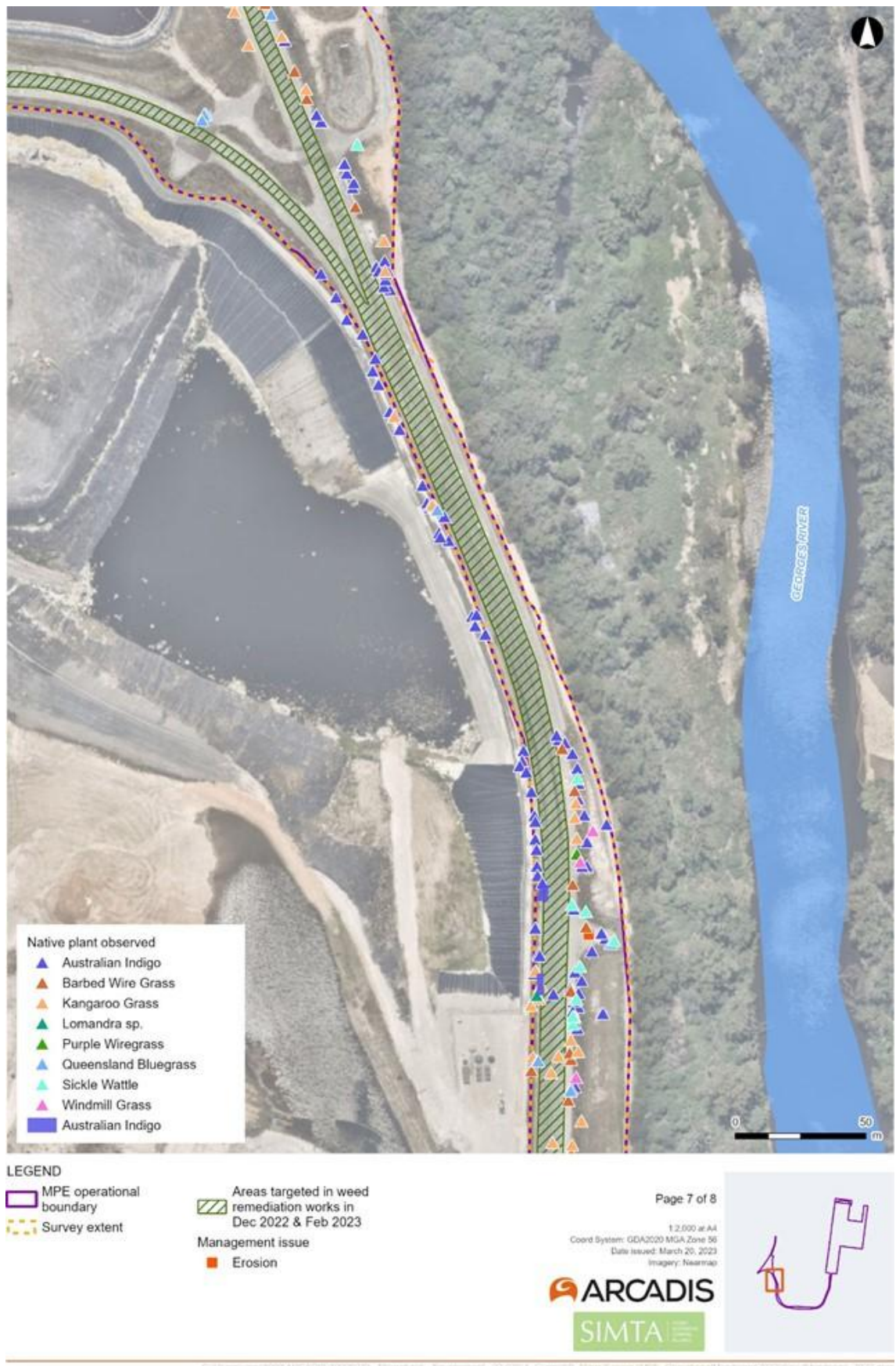


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (7 of 8)

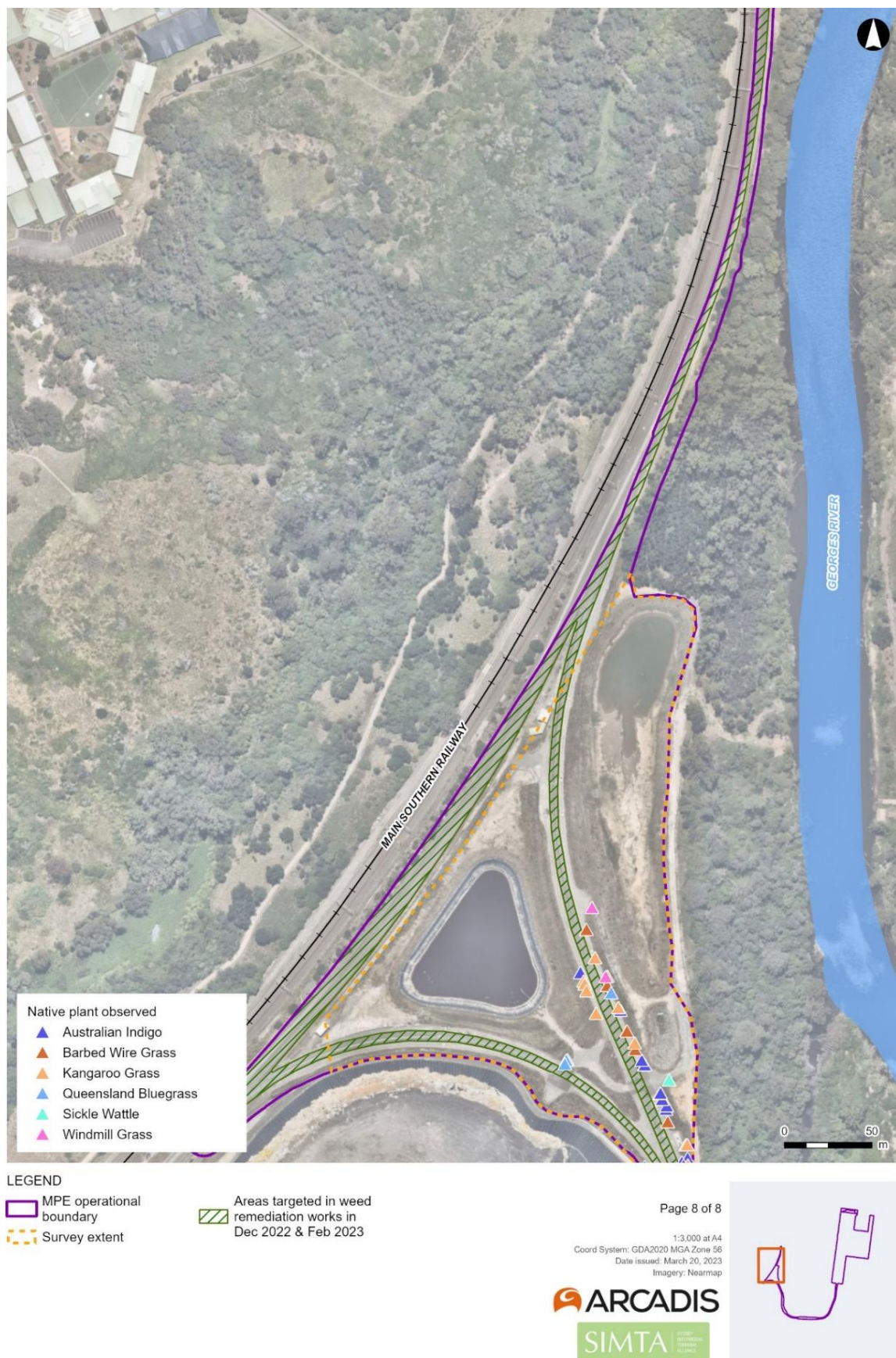


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (8 of 8)

Recommendations

Weed monitoring and weed remediation works should continue throughout the 2025/26 monitoring year. Table 4 summarises the recommendations for weed remediation within the MIP. Additionally, the weed remediation works being conducted by Toolijooa in the RALP have been compared against the criteria in Appendix C and are considered to be consistent.

Recommended actions documented in previous weed monitoring reports are included in Appendix D. The catalogue has been reviewed and updated to reflect works which have been completed and is considerate of the revegetation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.

Table 4 Recommended actions for weed remediation in the MIP

Area	Recommendation
All areas	Targeted weed remediation to continue during the 2025/26 monitoring year and is to be conducted using the same methods and at the same locations as previously conducted
Rail Access Land Package (RALP)	Weed remediation works will focus on controlling priority and key weed species (Appendix A and Appendix B)
	Suppression of environmental weeds and encroachment into areas of bushland should occur where possible
	Hand weeding should be conducted for individuals, whereas slashing and herbicide spraying should be adopted to target larger patches of weeds. However, extreme care must be taken when conducting any weed management within the RALP, as many native grasses have become established
	Hand weeding is only feasible on annual species such as <i>Themeda quadrivalvis</i> (Grader Grass) and <i>Senecio madagascariensis</i> (Fireweed) due to their relatively small root system
	Contractors should identify the extent of the works zone and discuss 'No Go' zones with all involved in the works. Weeding must be restricted to identified weeds and native species to be retained should be identified prior to works commencing
	Priority and aggressive weed species outside revegetated RALP areas should be removed. Weeds that should be targeted include <i>Senecio madagascariensis</i> (Fireweed)
	- Large patches of <i>Eragrostis curvula</i> (African Lovegrass), <i>Chloris gayana</i> (Rhodes Grass) and <i>Themeda quadrivalvis</i> (Grader Grass) between the RALP and the East Hills train line should be slashed regularly to prevent seeding events (Figure 2 (5 of 8)). This will reduce the colonisation of these grasses into revegetation areas - Slashing should only occur when plants are not seeding to prevent further spread. As more native species become established in these areas, slashing may impact their growth; therefore, non-targeted slashing should be avoided - Application of herbicide within the RALP and in areas adjacent to the Moorebank biobank site should be conducted to prevent overspray (off-target poisoning). If herbicide application occurs, recommended herbicides for tussock grass, <i>Chloris gayana</i> (Rhodes Grass) and <i>Eragrostis curvula</i> (African Lovegrass), include glyphosate or flupropanate, while plants are actively growing during summer and spring. Native vegetation outside the

Area	Recommendation
	RALP fence must not be impacted by herbicide during weed remediation works - No herbicide spraying should be conducted outside the RALP, specifically adjacent to ecologically sensitive areas south of the MPE Operational facility (Figure 2). Manual weed remediation works in ecologically sensitive areas should not extend beyond the construction envelope of the RALP. If further clarification is necessary, the project ecologist should be consulted - Batters that currently have limited vegetation cover should be colonised by a native seed mix as soon as practical. This will ensure that these areas are not colonised by weed species and will further reduce erosion during heavy rainfall events - Continue to collect litter from within the RALP and in adjacent areas
IMEX building and adjacent drainage infrastructure	Soft batters within the trunk drainage system and retention basin/swale at the north-eastern extent of the facility should be inspected for weed growth. Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Warehouse areas	Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Eastern boundary drainage infrastructure	- Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan - Erosion in the drainage infrastructure should be controlled by planting additional native ground cover species to maintain batters during heavy rainfall events
Landscaped areas along Bushmasters Avenue	- Continued maintenance of these landscaped areas should be maintained at a frequency that does not increase the current abundance of identified weed species. This is pertinent for areas where landscaped species have died back, and bare ground is more abundant - Areas adjacent to cleared areas in the MPW operational area should be sprayed for weeds to limited the potential for spreading
APZ area – northern MPW	Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Sediment basins adjacent to BioBank site	Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan

References

Arcadis (2019a) Urban Design and Landscape Plan. Moorebank Precinct East Stage 1

Arcadis (2019b) Operational Flora and Fauna Management Plan. Moorebank Logistics Park – East Precinct

Arcadis (2019c) Landscape Vegetation Management Sub Plan. Moorebank Precinct East Stage 2

Arcadis (2020) MPE Operational – Weed Monitoring Report December 2020

Arcadis (2020) Urban Design and Landscape Plan. Moorebank Precinct East Stage 2

Bureau of Meteorology (BOM) (2021) Climate Data Online. Weather and Climate: Holsworthy Aerodrome NSW (station 066161) <http://www.bom.gov.au/climate/dwo/IDCJDW2161.latest.shtml>

NSW Department of Primary Industries (DPI) (accessed 2021) NSW WeedWise. priority weeds for the Greater Sydney. <https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=3>

APPENDIX A PRIORITY WEED PROFILES



Lantana (*Lantana camara*)



Fireweed (*Senecio madagarsensis*)



Alligator Weed (*Alternanthera philoxeroides*)



African Olive (*Olea europea* subsp. *cuspidata*)



Lantana (*Lantana camara*)



Fireweed (*Senecio madagarsensis*)



Bridal Creeper (*Asparagus asparagoides*)



Peruvian Primrose (*Ludwigia peruviana*)

APPENDIX B KEY WEED PROFILES



Rhodes Grass (*Chloris gayana*)



Patterson's Curse (*Echium plantaganium*)



African Love Grass (*Eragrostis curvula*)



Coolatai Grass (*Hyparrhenia hirta*)



Grader Grass (*Themeda quadrivalvis*)



Red Natal Grass (*Melinis repens*)

APPENDIX C WEED REMEDIATION WORKS TRACKING

Priority	Action	Action description	Current performance assessment
1	Eradicate 'priority' weeds	Target 'priority' weed species through manual removal and herbicide treatment. Herbicide application should consider timing (i.e., applying herbicide when weeds are actively growing) and best practice methodologies. Areas outlined by coloured polygons in Figure 2 should be prioritised.	One priority weed species are present within the RALP: <i>Senecio madagascariensis</i> (Fireweed). These should be removed as a priority. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
2	Removal of key and aggressive weed species	Key weed species, including African Lovegrass, Rhodes Grass, Paterson's Curse, Coolatai Grass and Grader Grass, should be removed from revegetated areas of soft batter. Aggressive weed species, including Moth Vine and Castor Oil Plant, should be removed from all operational areas using a combination of manual and herbicide control. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Key weed species, including Rhodes Grass, African Lovegrass, Coolatai Grass, Paterson's Curse, and Grader Grass, are colonising soft batters in the RALP. These weeds should be removed. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
3	Suppress further colonisation of environmental weeds and encroachment into areas of bushland	Control of exotic species adjacent to the biobank site and ecologically sensitive areas. Manual removal should be adopted in areas adjacent to threatened flora locations. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Weed growth is stabilising through continued weed management on soft batters adjacent to the biobank site and ecologically sensitive areas. Manual removal, including routine slashing, is being used to prevent present weeds from reaching seeding maturity and further encroaching on adjacent high-value areas (biobank site and ecologically sensitive areas containing threatened plant species). All works should be restricted to the operational area and not extend into the biobank site or identified ecologically sensitive areas. Slashing should only be conducted when weed species are not in flower to prevent further spread. Appropriate slashing time is during winter for most species.

Priority	Action	Action description	Current performance assessment
4	Slashing of invasive grasses to prevent seeding.	Management of invasive grasses such as Rhodes Grass and African Love Grass through regular mowing or slashing. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Slashing has been adopted to manage the regrowth of invasive grasses (African Lovegrass, Grader Grass) within the RALP in ballast and gravel areas. Some areas beyond the Georges River bridge are yet to be managed. Slashing should be used to manage large expanses of exotic grassland to prevent seeding events. However, as native grasses become established, extreme care must be taken, and indiscriminate slashing must be avoided. A contractor with knowledge of native species should be employed to carry out this task, in failing that, an ecologist should be on site to monitor weed remediation.
5	Reduce cover of weeds within the RALP	Reduction of weed cover by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019).	Works should involve targeted slashing of mature plants and removing flowering and seed heads to minimise seeding. Targeted slashing has been previously employed to control weed colonisation on soft batters. However, it must be continued to limit the re-colonisation of weeds within the RALP. Future weed control actions will focus on removing and reducing the cover of priority and key weed species and suppressing the further colonisation of common weeds, which is consistent with the rehabilitation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.
6	Remove herbaceous and woody weeds within the operational area and trunk drainage infrastructure.	Reduction in herbaceous and woody weeds by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	Weed cover has generally remained low within trunk drainage infrastructure and at the north-eastern extent of the MIP East operational facility.

APPENDIX D RECOMMENDED ACTIONS CATALOGUE

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
April 2020	Eradicate priority weeds species, including Bridal Creeper, Alligator Weed, Lantana, Fireweed and African Olive	Completed	Most instances of these weeds have been removed from the RALP. Small instances of Fireweed occur, however these are being managed by the current weed remediation works within the RALP.
April 2020	Remove key and aggressive weed species within RALP, including Golden Wreath Wattle, Moth Vine, Castor Oil Plant, Small-leafed Privet, Grader Grass and Balloon Vine	Commenced	Grader Grass has been observed colonising remediated areas within the RALP. This species should be removed to prevent further colonisation and infestations. Golden Wreath Wattle, Moth Vine and Castor Oil Plant on the southern side of the RALP in the area between the operational boundary and the East Hills line rail corridor. Consideration should be given to the management of these areas to reduce encroachment into recently remediated areas.
June 2020	Planning should commence to revegetate soft batters and undeveloped areas within the MPE operational facility with native species in accordance with the approved Urban Design and Landscaping Plan (Arcadis 2019a, Arcadis 2020)	Commenced	Revegetation has commenced for remediated areas using a hydro-mulch containing a seed palette commensurate with the UDLP (Arcadis 2020). Previous instances of native seed setting have been colonized by weed species within the RALP and should be cleared and re-set with a native seed mix as soon as practical.
December 2020	Exotic species, specifically <i>Medicago polymorpha</i> (Burr Medic), should be removed from grassland on either side of the RALP at its eastern extent, closest to the operational area.	Commenced	Targeted manual removal, including slashing, has been conducted for exotic species outside the RALP fencing. A qualified bush regeneration contractor should be used to avoid impacts on

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			native species. Strictly no herbicide should be used in this area, and works should not extend beyond the RALP construction envelope. Where possible, contractors should not access/pass through adjacent areas.
December 2021	Collect litter scattered through the RALP and in adjacent areas	Commenced	Litter remains in the RALP and adjacent areas.
December 2021	Control aggressive weed species Coolatai Grass and Paterson's Curse within the RALP	Commenced	New instances of aggressive weed species Coolatai Grass and Paterson's Curse within the RALP should be removed as soon as practicable to avoid the spread of these species into ecologically sensitive areas adjacent to the RALP.
February 2022	Continued targeted slashing of woody and herbaceous weeds within the RALP.	Completed	Majority of large woody weeds have been removed from the RALP. Continue regular slashing of large woody weeds to remove the fertile seed head and discourage further germination of these weeds within the RALP should occur.
December 2022	Prioritise weed remediation works for priority and key weed species which have experienced accelerated growth in recent months.	Commenced	Areas of particularly high biomass of priority and key weed species should be prioritised for weed remediation works in coming months to avoid mass seeding events.
	Begin remediation of soft batters which have slipped following extreme rainfall events in recent weeks	Not started	Areas within the operational facility, including a number of areas within the RALP, require urgent batter remediation in areas of batter slipping.
December 2022	Begin weed remediation of gravel and ballast areas along RALP	Commenced	Removal of all vegetation in gravel and ballast areas due along RALP using slashing and

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			herbicide due to safety concerns of train operators and prevent spread of weeds.
December 2022	Continue weed remediation works along the soft batters within the RALP.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
February 2023	Continue weed remediation works along the soft batters within the RALP beyond Georges River bridge.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
April 2023	No weed remediation has occurred since February 2023. Expected to recommence in June 2023, in same areas that have previously been remediated.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
June 2023	Continue weed remediation works along the soft batters within the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
December 2023	Toolijooa Environmental Restoration inducted as primary weed control contractors. Weed remediation recommenced throughout the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.

APPENDIX E REMEDIATION PROGRESS PHOTOGRAPHS



April 2021



December 2023



December 2025



April 2021



December 2023



December 2025



April 2021



December 2023



December 2025



April 2021



December 2023



December 2025



April 2021



December 2023



December 2025



April 2021



December 2023



December 2025



April 2021



December 2023



December 2025

APPENDIX F FLORA SPECIES INVENTORY

Scientific name	Common name	Exotic	Priority/key weed
<i>Acacia falcata</i>	Hickory Wattle		
<i>Acacia parramattensis</i>	Parramatta Wattle		
<i>Acacia saligna</i>	Golden Wreath Wattle	*	
<i>Alternanthera philoxeroides</i>	Alligator weed	*	Priority
<i>Alternanthera pungens</i>	Khaki Weed	*	
<i>Araujia sericifera</i>	Moth Vine	*	
<i>Asparagus asparagoides</i>	Bridal Creeper	*	Priority
<i>Atriplex semibaccata</i>	Creeping Saltbush		
<i>Austrodanthonia spp.</i>	-		
<i>Avena spp.</i>	Oats	*	
<i>Bidens pilosa</i>	Cobbler's Pegs	*	
<i>Brassica rapa</i>	Field Mustard	*	
<i>Briza maxima</i>	Quaking Grass	*	
<i>Briza minor</i>	Shivery Grass	*	
<i>Cenchrus clandestinus</i>	Kikuyu Grass	*	
<i>Centaureum spp.</i>	-	*	
<i>Chloris gayana</i>	Rhodes Grass	*	Key
<i>Chloris truncata</i>	Windmill Grass		
<i>Cirsium vulgare</i>	Spear Thistle	*	
<i>Convolvulus erubescens</i>	Pink Bindweed		
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	*	
<i>Cyclospermum leptophyllum</i>	Slender Celery	*	
<i>Cynodon dactylon</i>	Common Couch		
<i>Cymbopogon refractus</i>	Barbed Wire Grass		
<i>Cyperus eragrostis</i>	Umbrella Sedge	*	
<i>Daviesia ulicifolia</i>	Gorse Bitter Pea		
<i>Dichanthium sericeum</i>	Queensland Bluegrass		
<i>Dichondra repens</i>	Kidney Weed		
<i>Echium plantagineum</i>	Paterson's Curse	*	Key
<i>Eragrostis brownii</i>	Brown's Lovegrass		
<i>Eragrostis curvula</i>	African Lovegrass	*	Key
<i>Euchiton spp.</i>	-		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Foeniculum vulgare</i>	Fennel	*	
<i>Glycine clandestina</i>	-		

Scientific name	Common name	Exotic	Priority/key weed
<i>Hardenbergia violacea</i>	False Sarsaparilla		
<i>Hypochoeris radicata</i>	Catsear	*	
<i>Indigofera australis</i>	Australian Indigo		
<i>Juncus usitatus</i>	-		
<i>Lantana camara</i>	Lantana	*	Priority
<i>Lachnagrostis filiformis</i>	Blown Grass		
<i>Lactuca serriola</i>	Prickly Lettuce	*	
<i>Linum trigynum</i>	French Flax	*	
<i>Lolium perenne</i>	Perennial Ryegrass	*	
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush		
<i>Lysimachia arvensis</i>	Scarlet Pimpernel	*	
<i>Ludwigia peruviana</i>	Peruvian water primrose	*	Priority
<i>Medicago polymorpha</i>	Burr Medic	*	
<i>Melilotus alba</i>	Bokhara	*	
<i>Melinis repens</i>	Red Natal Grass	*	Key
<i>Modiola caroliniana</i>	Red-flowered Mallow	*	
<i>Olea europaea</i> subsp. <i>cuspidate</i>	African Olive	*	Priority
<i>Paspalum dilatatum</i>	Paspalum	*	
<i>Persicaria decipiens</i>	Slender Knotweed		
<i>Phytolacca octandra</i>	Inkweed	*	
<i>Plantago lanceolata</i>	Lamb's Tongues	*	
<i>Portulaca oleracea</i>	Common Purslane		
<i>Rumex crispus</i>	Curled Dock	*	
<i>Senecio madagascariensis</i>	Fireweed	*	Priority
<i>Setaria parviflora</i>	-	*	
<i>Sida rhombifolia</i>	Paddy's Lucerne	*	Key
<i>Solanum nigrum</i>	Black-berry Nightshade	*	
<i>Solanum sisymbriifolium</i>		*	
<i>Sonchus oleraceus</i>	Common Sowthistle	*	
<i>Tagetes minuta</i>	Stinking Roger	*	
<i>Themeda quadrivalvis</i>	Grader Grass	*	Key
<i>Themeda triandra</i>	-		
<i>Trifolium arvense</i>	Haresfoot Clover	*	
<i>Trifolium repens</i>	White Clover	*	
<i>Trifolium michelianum</i>	Bolansa Clover	*	
<i>Verbena bonariensis</i>	Purpletop	*	

Scientific name	Common name	Exotic	Priority/key weed
<i>Verbena rigida</i> var. <i>Rigida</i>	Veined Verbena	*	

MIP BI-MONTHLY WEED MONITORING REPORT – FEBRUARY 2026

Introduction

Arcadis has been commissioned to conduct bi-monthly weed monitoring surveys within the operational areas of Moorebank Precinct East (MPE) and Moorebank Precinct West (MPW). These areas together are known as the Moorebank Intermodal Precinct (MIP).

The MPE operational facility includes the Import and Export Terminal (IMEX), Rail Access Land Package (RALP), warehouses, distribution facilities and freight village, and stormwater trunk drainage infrastructure and landscaping areas. The MPW operational facility includes the landscaped vegetation along Bushmasters Avenue (Figure 1).

Regular monitoring of the MIP operational facilities will inform the land manager of weed cover, and the presence of any weeds listed as 'priority' for the Greater Sydney Local Land Services region under the *Biosecurity Act 2015*.

The schedule for the bi-monthly weed monitoring inspections for the 2025-26 monitoring year are detailed in Table 1. This document will be treated as live throughout the monitoring year and will be updated at the end of each inspection.

Table 1 Schedule for bi-monthly weed inspections

Inspection month	Date completed
June 2025	25/06/2025
August 2025	27/08/2025
October 2025	05/11/2025
December 2026	12/12/2025
February 2026	19/03/2026
April 2026	TBC

Background

The Operational Flora and Fauna Management Plan (OFFMP) for MPE (dated 13 January 2023) and MPW (dated 8 November 2024) provides management measures to protect the biodiversity values of the adjacent BioBank site to the MIP.

MIP (East and West Precincts) is managed in accordance with two Operational Environmental Management Plans (OEMP) and sub-plans:

- *Operational Environmental Management Plan Moorebank Logistics Park – East Precinct* (OEMP MPE) Revision 19 dated 20 November 2024 applies to MPE
- *OEMP Moorebank Intermodal Precinct - West Precinct Stage 2* (OEMP MPW) dated 6 May 2024 applies to MPW.

The OFFMP for both precincts includes requirements from the following approvals and Condition of Consent (CoC):

- **Moorebank East Precinct Stage 2 (SSD 7628):**
 - CoC B127 – the Applicant must:

- (a) Take all reasonable steps to manage pests and vermin on the site
 - (b) Manage declared noxious weeds on the site in accordance with the requirements of the *Noxious Weeds Act 1993*
 - (c) Inspect the site on a regular basis, no less than every 3 months, to ensure that these measures are working effectively, and that pests, vermin or noxious weeds are not present on site in sufficient numbers to pose an environmental hazard or cause the loss of amenity in the surrounding area.
- **Moorebank West Precinct Stage 2 (SSD 7709):**
 - CoC B83 – the Applicant must:
 - (a) Implement measures to manage pests, vermin and declared noxious weeds on the site
 - (b) Inspect the site on a regular basis to ensure that these measures are working effectively, and that pests, vermin or noxious weeds are not present on site in sufficient numbers to pose an environmental hazard or cause the loss of amenity in the surrounding area.

In 2022, LOGOS Property took over the management of the warehouse and distribution facilities, as well as the overall management of MPE and MPW. In July 2024, ESR Group acquired the remaining interest in LOGOS, and overall management of the MIP East and West Precinct, is now the responsibility of ESR Australia & NZ (ESR). Qube Logistics will continue to maintain responsibility for the IMEX (Import Export Rail Terminal) and the Rail Link for MPE. This change in ownership does not impact the current reporting period or the current reporting requirements.

Arcadis has been monitoring the MPE operational facility for weed occurrence since April 2020. The RALP, which includes the MPE operational RALP, has seen significant change and works over the time Arcadis has conducted weed monitoring. Additionally, works conducted in MPW in 2023/24 have changed the layout and vegetation spread in the RALP. Several weed remediation events have occurred since the inception of weed monitoring, detailed below in Table 2.

Table 2 Summary of weed events throughout monitoring history

Timing	Summary of events	Weed contractor
Spring 2020	• Weeds removed from batters and revegetated with native species, as per the Urban Design and Landscaping Plan (UDLP) for MPE • Cumberland Plain Seeds were procured to provide technical oversight of revegetation effort	Spray Grass Solutions
December 2021	• As per recommendations from Spray Grass Solutions and Cumberland Plain Seeds, the monitoring methodology was changed • Changes included reporting on cover on 'priority' weeds	

Timing	Summary of events	Weed contractor
	species and key weeds specific to the project.	
December 2022 to June 2023	• Weed remediation works commenced • Priority weed species were targeted • Native species were identified throughout the RALP to avoid accidental removal.	P&E Services
December 2023 to present	• Weed remediation works continued • Regular maintenance of priority weed species via slashing, hand removal and herbicide spraying	Toolijooa Environmental Restoration

Methodology

Arcadis ecologist Kate Mauger attended the MIP operational area on 19 March 2026. Monitoring involved traversing the MIP operational facility on foot, surveying landscaped areas, stormwater infrastructure and soft batters adjoining the RALP for increases in weed abundance of the identified species in Appendix A and Appendix B. The areas surveyed are presented in Figure 1.

The weather on the 19 March was rainy, with a maximum temperature of 25.3°C, and the weather recorded at Holsworthy Aerodrome (station 066161) (BOM 2025).

Study Limitations

The data presented within this report is restricted to what was observed and recorded by the attending Arcadis ecologists during the site assessment on 19 March 2026.

Monitoring of weeds was restricted to the operational facility; weeds were not assessed within the bounds of the active construction areas surrounding new warehouses or other infrastructure.

Surveys were not undertaken in areas extending beyond the junction between the QUBE RALP and the Southern Sydney Freight Line (SSFL).



- Legend
- MPW operational boundary
 - MPE operational boundary
 - Weed monitoring survey extent



C:\Users\cb98137\ARCADIS\30294730 - Moorebank IP - Operational Monitoring 2025-2026 - 4. GIS and figures\3. GIS Team\A_Current\B_Maps\WeedMonitoring\WeedMonitoring_2022_v2.aprx
Created by : EM Updated by : CB QA by : KM

Figure 1. Survey extent within the MPI operational facility

Results

Results of the weed monitoring surveys during the February 2026 survey are summarised below in Table 3. Weed records, previously recorded threatened flora species records, and instances of native species within the survey extent are shown in Figure 2.

Progress photographs of monitoring locations are provided in Appendix E and a complete flora species inventory in Appendix F.

Table 3 Summary of weed abundances across all inspection areas in MPI, for the current survey

Inspection area	Weed abundances for current survey	Photo of inspection area
Moorebank Precinct East (MPE)		
Rail Access Land Package (RALP)	Steep areas along berms are being avoided for slashing due to safety concerns. Additionally, the small amounts of exotic vegetation are currently stabilising these berms, and will be targeted once construction is finalised in the MPW areas.	

Inspection area	Weed abundances for current survey	Photo of inspection area
IMEX building and adjacent drainage infrastructure	• <i>Acacia falcata</i> (Hickory Wattle) continue to grow unimpeded by weeds. • Areas adjacent to the fenceline show significant grow of <i>Melinis repens</i> (Red Natal Grass), which should be removed to avoiding spreading through the drainage infrastructure	

Inspection area	Weed abundances for current survey	Photo of inspection area
Warehouse areas	- Majority of this area has now been claimed by the Moorebank Avenue Upgrade project and is unable to be surveyed adequately - Occurrences of weeds in the warehouse area and the adjacent drainage infrastructure is restricted to scattered individuals of <i>Senecio madagascariensis</i> (Fireweed), <i>Plantago lanceolata</i> (Plantain), <i>Trifolium arvense</i> (Clover) and exotic grasses like <i>Chloris gayana</i> (Rhodes Grass), <i>Sporobolus africanus</i> (Parramatta Grass), <i>Paspalum urvillei</i> (Giant Paspalum) and <i>Ehrharta erect</i> (Panic Veldtgrass).	

Inspection area	Weed abundances for current survey	Photo of inspection area
Eastern boundary drainage infrastructure	Majority of this area has now been claimed by the Moorebank Avenue Upgrade project and is unable to be surveyed adequately	

Inspection area	Weed abundances for current survey	Photo of inspection area
Moorebank Precinct West (MPW)		
Landscaped areas along Bushmasters Avenue	- Landscapes vegetation is in good condition, with minor weed incursions - Weed species present include <i>Sonchus oleraceus</i> (Common Sowthistle), <i>Chloris virgata</i> (Rhodes Grass), <i>Bidens pilosa</i>, <i>Conyza bonariensis</i> (Fleabane), <i>Cyclosporum leptophyllum</i> (Slender Celery), and <i>Tagetes minuta</i> (Stinking Roger). - Areas with limited to no landscaped vegetation are particularly susceptible to weed incursion from cleared areas (see adjacent photo)	

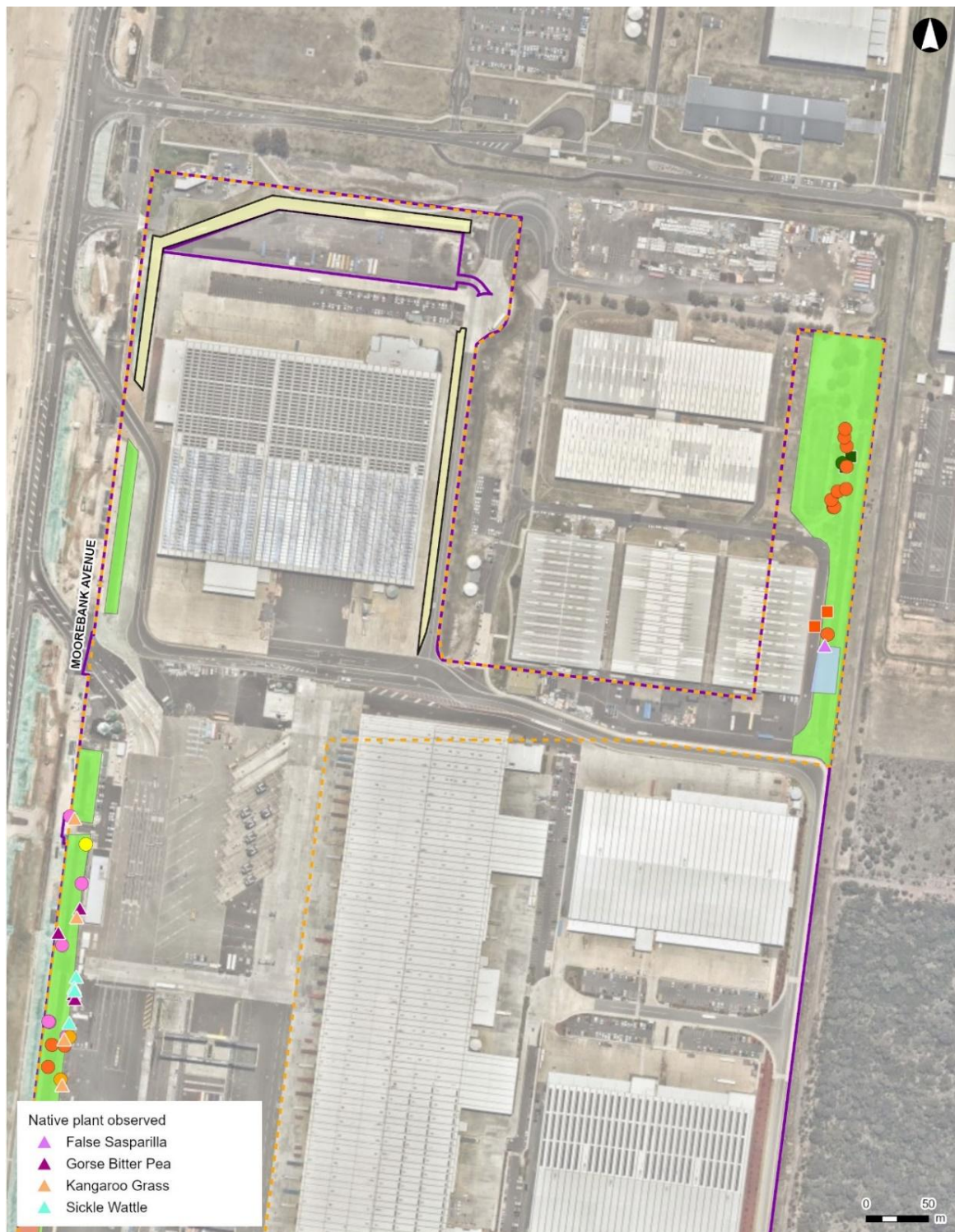
Inspection area	Weed abundances for current survey	Photo of inspection area
APZ area – northern MPW	• Suppression of <i>Medicago polymorpha</i> and other herbacious weeds occuring in this area (<i>Sonchus oleraceus</i> (Common Sowthistle), <i>Cirsium vulagre</i>) • Methods include slashing and hand removal around native species • Large stands of the native shrub <i>Dodonea viscosa</i> are growing unimpeded.	

Sediment basins adjacent
to BioBank site

- Spot spraying, and hand pulling of weeds occurring along boundary of basins and BioBank site
- No significant increases in weed coverage were observed around the basin outlet points



Inspection area	Weed abundances for current survey	Photo of inspection area
		



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Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (1 of 8)

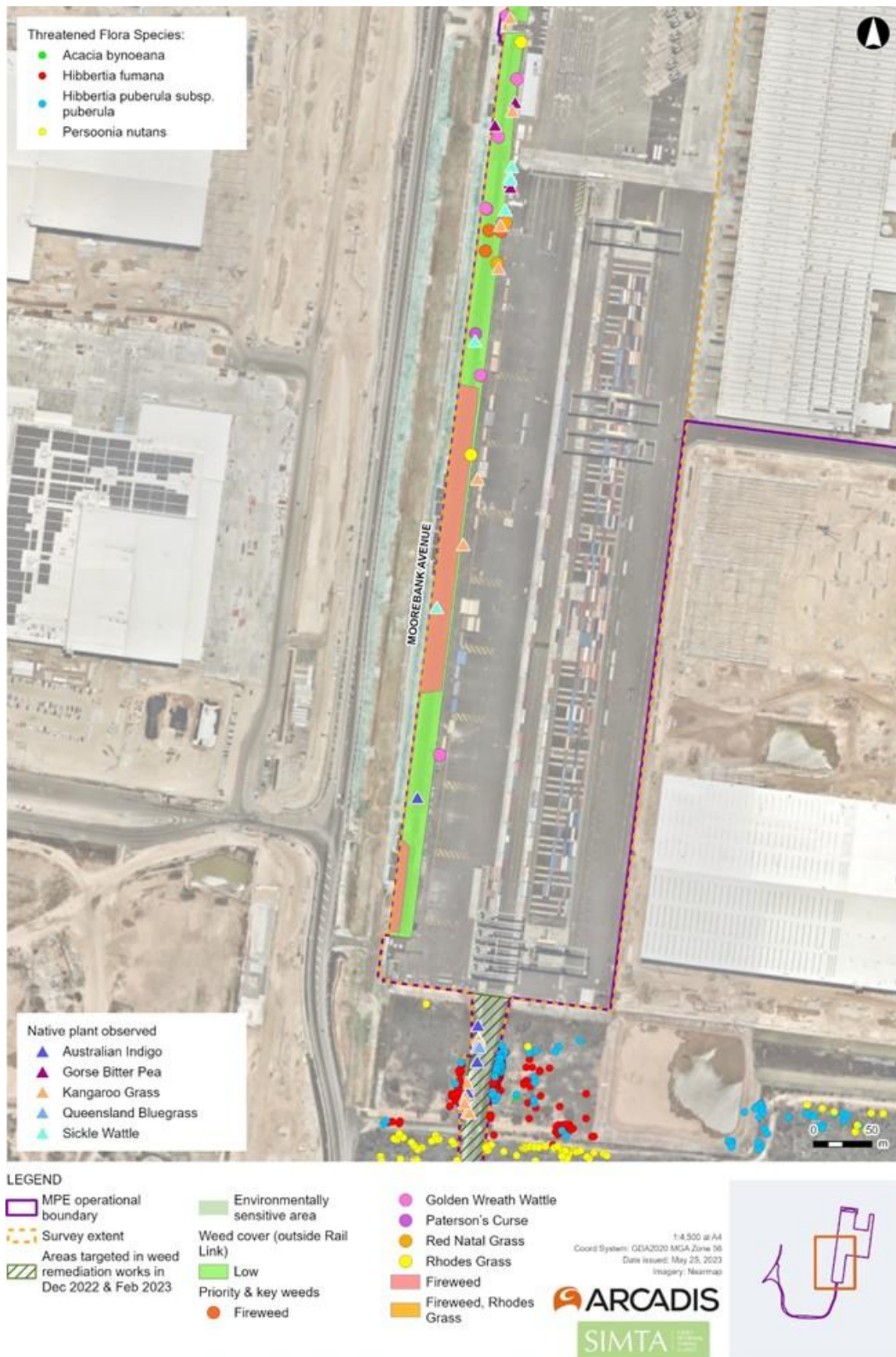


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (2 of 8)

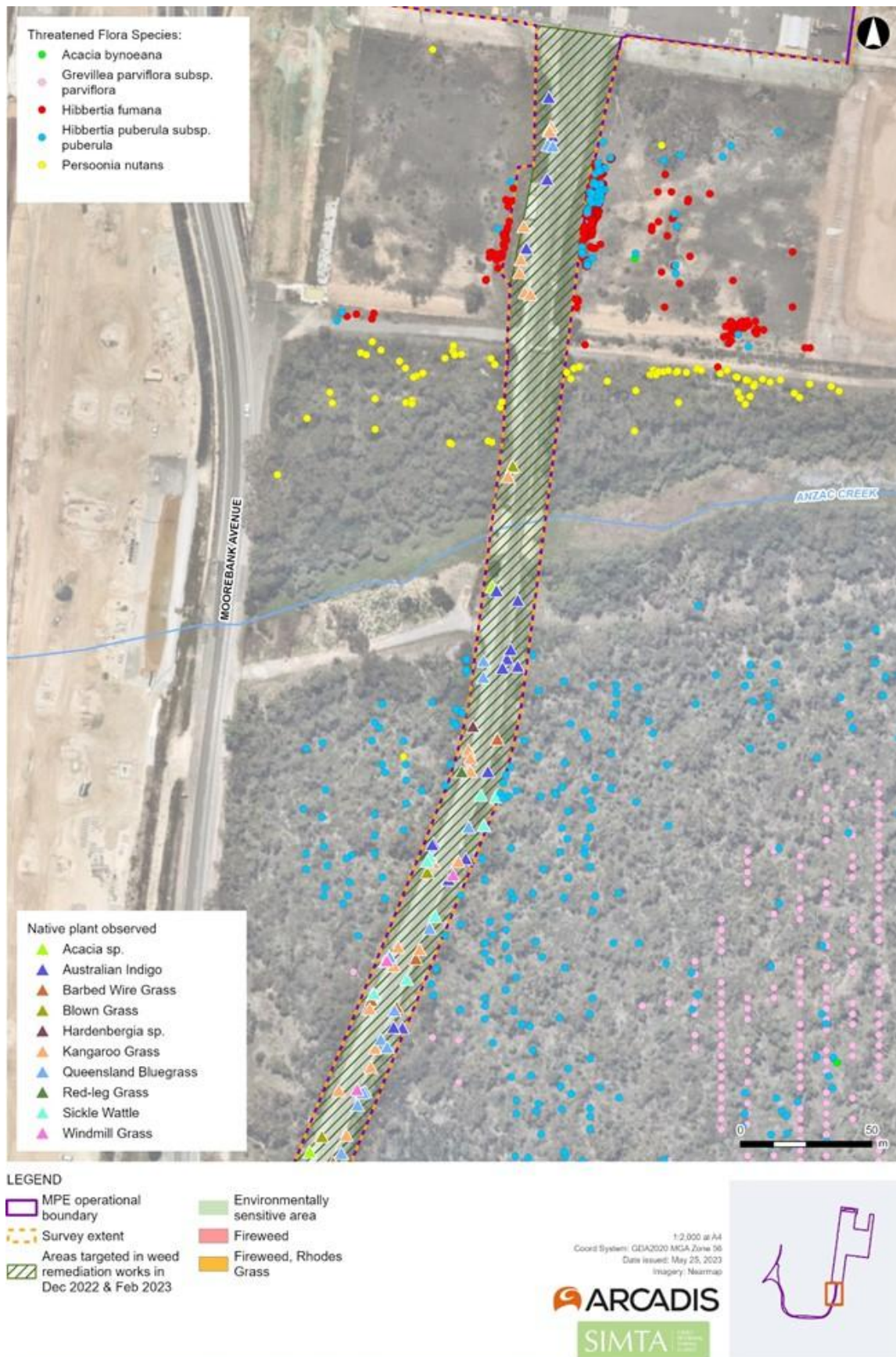


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (3 of 8)

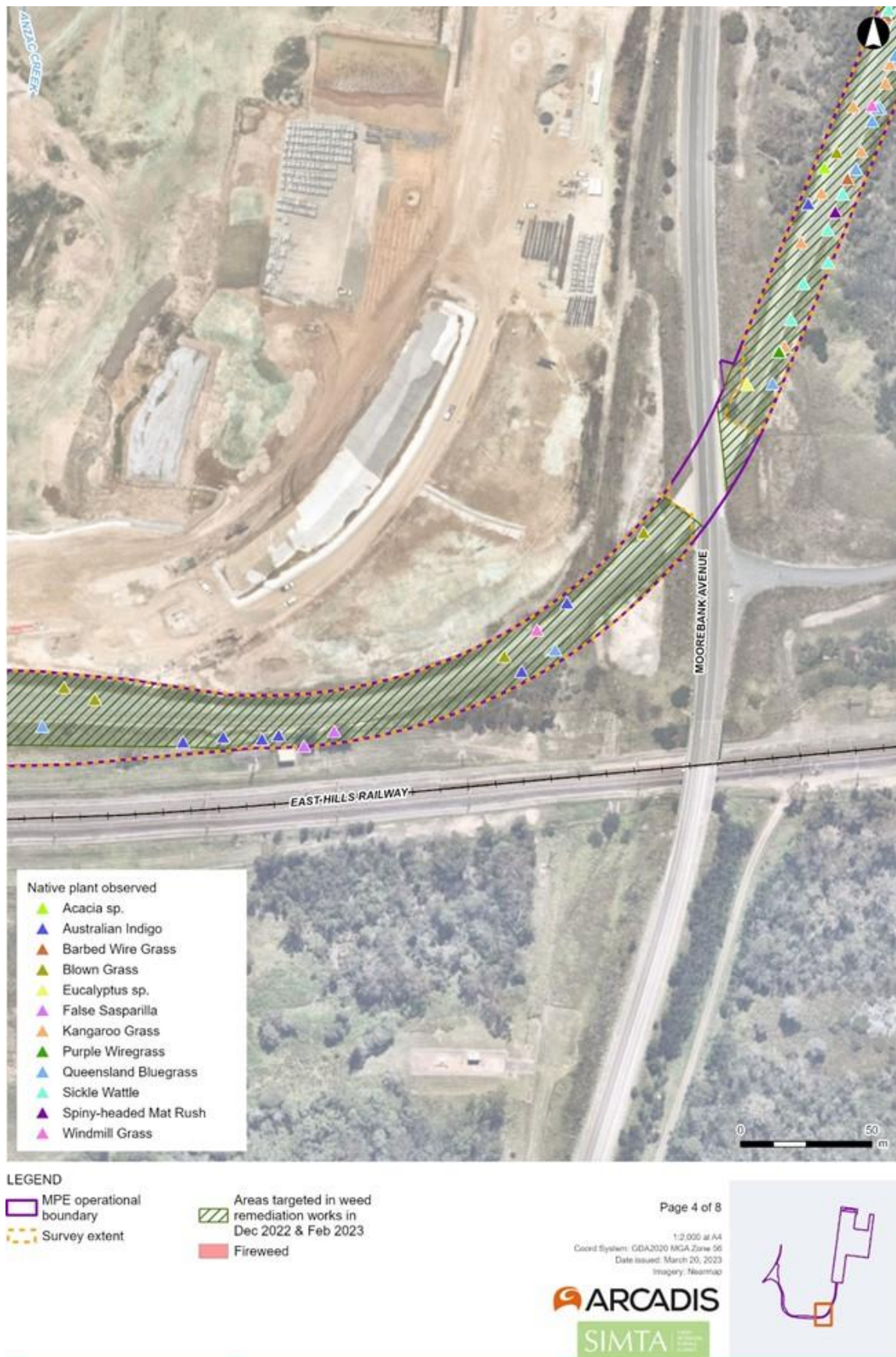


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (4 of 8)



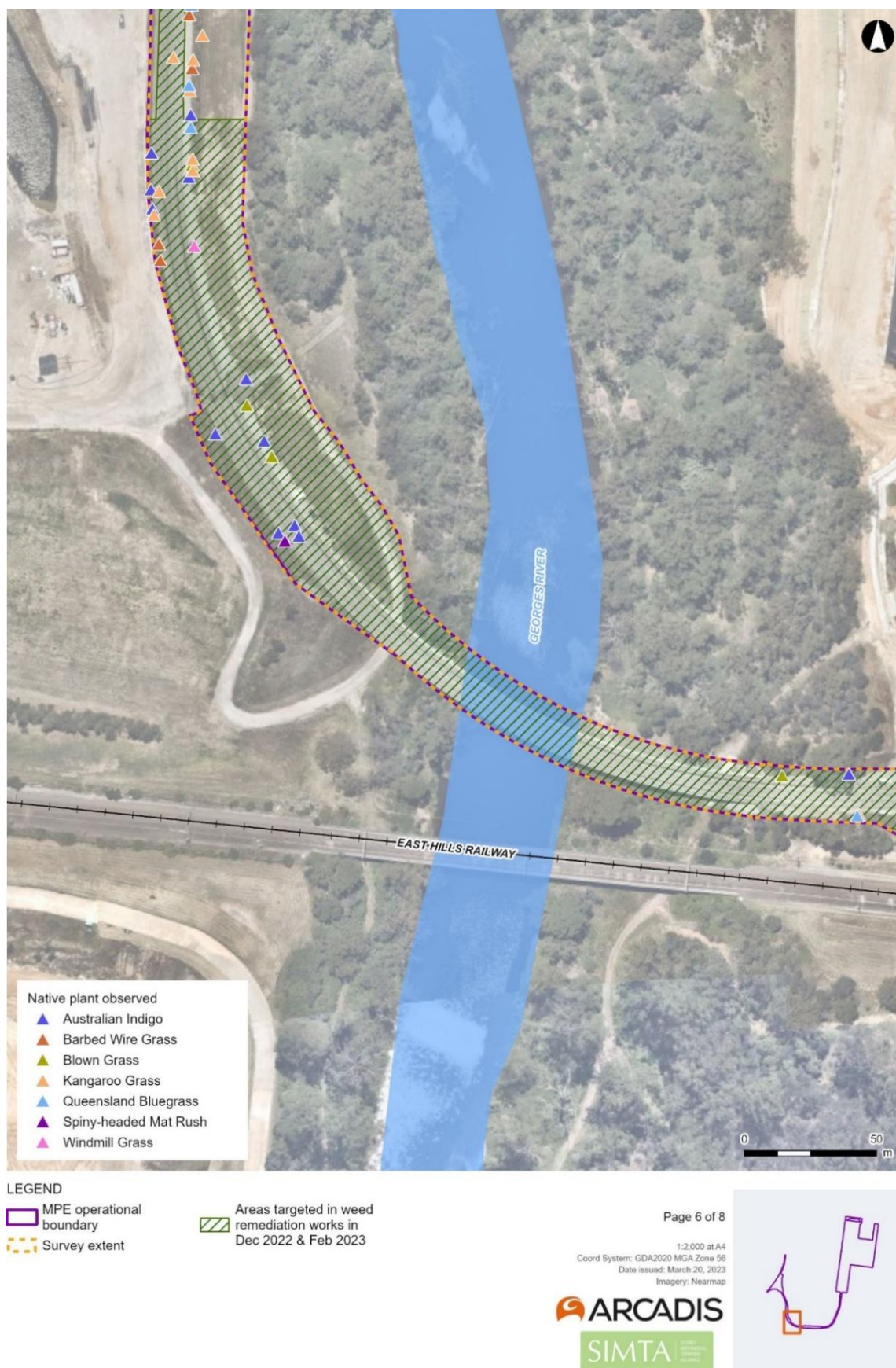


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (6 of 8)

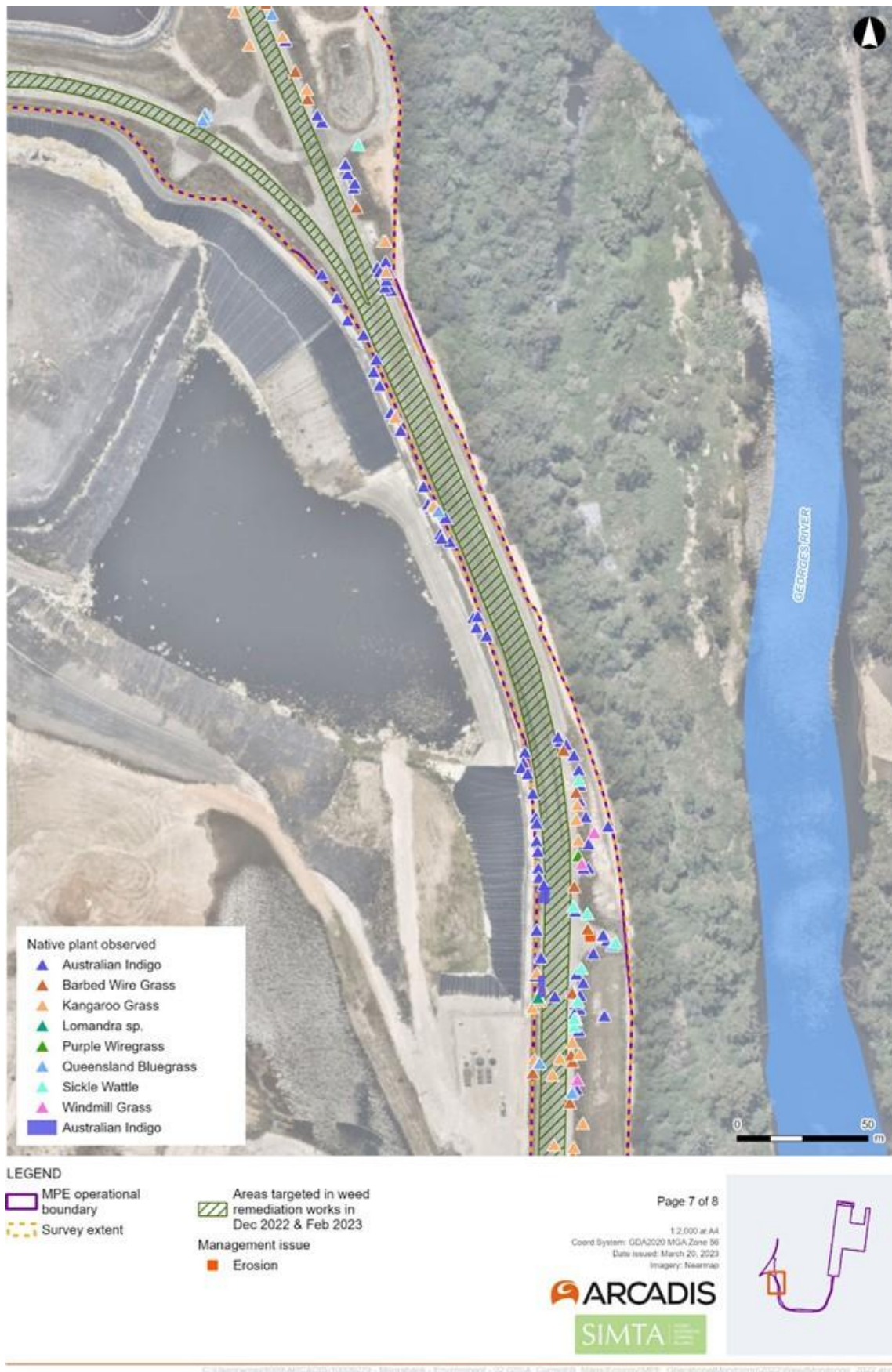


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (7 of 8)

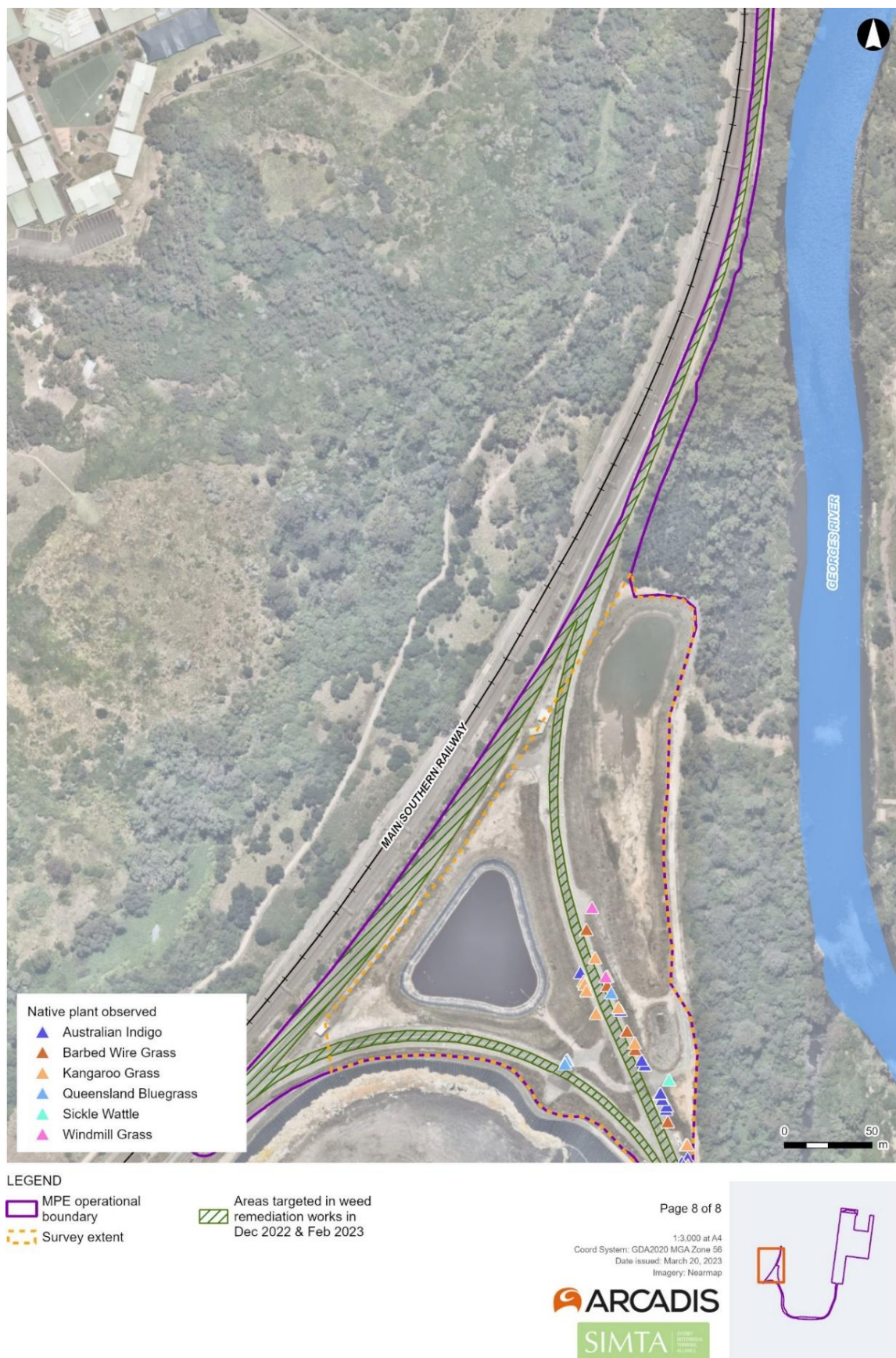


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (8 of 8)

Recommendations

Weed monitoring and weed remediation works should continue throughout the 2025/26 monitoring year. Table 4 summarises the recommendations for weed remediation within the MIP. Additionally, the weed remediation works being conducted by Toolijooa in the RALP have been compared against the criteria in Appendix C and are considered to be consistent.

Recommended actions documented in previous weed monitoring reports are included in Appendix D. The catalogue has been reviewed and updated to reflect works which have been completed and is considerate of the revegetation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.

Table 4 Recommended actions for weed remediation in the MIP

Area	Recommendation
All areas	Targeted weed remediation to continue during the 2025/26 monitoring year and is to be conducted using the same methods and at the same locations as previously conducted
	Weed monitoring reports to be sent to all relevant stakeholders, contractors and consultants that need to be aware of weeds within the Moorebank Intermodal Precinct
Rail Access Land Package (RALP)	Weed remediation works will focus on controlling priority and key weed species (Appendix A and Appendix B)
	Suppression of environmental weeds and encroachment into areas of bushland should occur where possible
	Hand weeding should be conducted for individuals, whereas slashing and herbicide spraying should be adopted to target larger patches of weeds. However, extreme care must be taken when conducting any weed management within the RALP, as many native grasses have become established
	Hand weeding is only feasible on annual species such as <i>Themeda quadrivalvis</i> (Grader Grass) and <i>Senecio madagascariensis</i> (Fireweed) due to their relatively small root system
	Contractors should identify the extent of the works zone and discuss 'No Go' zones with all involved in the works. Weeding must be restricted to identified weeds and native species to be retained should be identified prior to works commencing
	Priority and aggressive weed species outside revegetated RALP areas should be removed. Weeds that should be targeted include <i>Senecio madagascariensis</i> (Fireweed)
	- Large patches of <i>Eragrostis curvula</i> (African Lovegrass), <i>Chloris gayana</i> (Rhodes Grass) and <i>Themeda quadrivalvis</i> (Grader Grass) between the RALP and the East Hills train line should be slashed regularly to prevent seeding events (Figure 2 (5 of 8)). This will reduce the colonisation of these grasses into revegetation areas - Slashing should only occur when plants are not seeding to prevent further spread. As more native species become established in these areas, slashing may impact their growth; therefore, non-targeted slashing should be avoided
	Application of herbicide within the RALP and in areas adjacent to the Moorebank biobank site should be conducted to prevent overspray (off-

Area	Recommendation
	target poisoning). If herbicide application occurs, recommended herbicides for tussock grass, <i>Chloris gayana</i> (Rhodes Grass) and <i>Eragrostis curvula</i> (African Lovegrass), include glyphosate or flupropanate, while plants are actively growing during summer and spring. Native vegetation outside the RALP fence must not be impacted by herbicide during weed remediation works - No herbicide spraying should be conducted outside the RALP, specifically adjacent to ecologically sensitive areas south of the MPE Operational facility (Figure 2). Manual weed remediation works in ecologically sensitive areas should not extend beyond the construction envelope of the RALP. If further clarification is necessary, the project ecologist should be consulted - Batters that currently have limited vegetation cover should be colonised by a native seed mix as soon as practical. This will ensure that these areas are not colonised by weed species and will further reduce erosion during heavy rainfall events - Continue to collect litter from within the RALP and in adjacent areas
IMEX building and adjacent drainage infrastructure	Soft batters within the trunk drainage system and retention basin/swale at the north-eastern extent of the facility should be inspected for weed growth. Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Warehouse areas	Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Eastern boundary drainage infrastructure	- Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan - Erosion in the drainage infrastructure should be controlled by planting additional native ground cover species to maintain batters during heavy rainfall events
Landscaped areas along Bushmasters Avenue	- Continued maintenance of these landscaped areas should be maintained at a frequency that does not increase the current abundance of identified weed species. This is pertinent for areas where landscaped species have died back, and bare ground is more abundant - Areas adjacent to cleared areas in the MPW operational area should be sprayed for weeds to limited the potential for spreading
APZ area – northern MPW	Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Sediment basins adjacent to BioBank site	Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan

References

Arcadis (2019a) Urban Design and Landscape Plan. Moorebank Precinct East Stage 1

Arcadis (2019b) Operational Flora and Fauna Management Plan. Moorebank Logistics Park – East Precinct

Arcadis (2019c) Landscape Vegetation Management Sub Plan. Moorebank Precinct East Stage 2

Arcadis (2020) MPE Operational – Weed Monitoring Report December 2020

Arcadis (2020) Urban Design and Landscape Plan. Moorebank Precinct East Stage 2

Bureau of Meteorology (BOM) (2021) Climate Data Online. Weather and Climate: Holsworthy Aerodrome NSW (station 066161) <http://www.bom.gov.au/climate/dwo/IDCJDW2161.latest.shtml>

NSW Department of Primary Industries (DPI) (accessed 2021) NSW WeedWise. priority weeds for the Greater Sydney. <https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=3>

APPENDIX A PRIORITY WEED PROFILES



Lantana (*Lantana camara*)



Fireweed (*Senecio madagarsensis*)



Alligator Weed (*Alternanthera philoxeroides*)



African Olive (*Olea europea* subsp. *cuspidata*)



Lantana (*Lantana camara*)



Fireweed (*Senecio madagarsensis*)



Bridal Creeper (*Asparagus asparagoides*)



Peruvian Primrose (*Ludwigia peruviana*)

APPENDIX B KEY WEED PROFILES



Rhodes Grass (*Chloris gayana*)



Patterson's Curse (*Echium plantaganium*)



African Love Grass (*Eragrostis curvula*)



Coolatai Grass (*Hyparrhenia hirta*)



Grader Grass (*Themeda quadrivalvis*)



Red Natal Grass (*Melinis repens*)

APPENDIX C WEED REMEDIATION WORKS TRACKING

Priority	Action	Action description	Current performance assessment
1	Eradicate 'priority' weeds	Target 'priority' weed species through manual removal and herbicide treatment. Herbicide application should consider timing (i.e., applying herbicide when weeds are actively growing) and best practice methodologies. Areas outlined by coloured polygons in Figure 2 should be prioritised.	One priority weed species are present within the RALP: <i>Senecio madagascariensis</i> (Fireweed). These should be removed as a priority. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
2	Removal of key and aggressive weed species	Key weed species, including African Lovegrass, Rhodes Grass, Paterson's Curse, Coolatai Grass and Grader Grass, should be removed from revegetated areas of soft batter. Aggressive weed species, including Moth Vine and Castor Oil Plant, should be removed from all operational areas using a combination of manual and herbicide control. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Key weed species, including Rhodes Grass, African Lovegrass, Coolatai Grass, Paterson's Curse, and Grader Grass, are colonising soft batters in the RALP. These weeds should be removed. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
3	Suppress further colonisation of environmental weeds and encroachment into areas of bushland	Control of exotic species adjacent to the biobank site and ecologically sensitive areas. Manual removal should be adopted in areas adjacent to threatened flora locations. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Weed growth is stabilising through continued weed management on soft batters adjacent to the biobank site and ecologically sensitive areas. Manual removal, including routine slashing, is being used to prevent present weeds from reaching seeding maturity and further encroaching on adjacent high-value areas (biobank site and ecologically sensitive areas containing threatened plant species). All works should be restricted to the operational area and not extend into the biobank site or identified ecologically sensitive areas. Slashing should only be conducted when weed species are not in flower to prevent further spread. Appropriate slashing time is during winter for most species.

Priority	Action	Action description	Current performance assessment
4	Slashing of invasive grasses to prevent seeding.	Management of invasive grasses such as Rhodes Grass and African Love Grass through regular mowing or slashing. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Slashing has been adopted to manage the regrowth of invasive grasses (African Lovegrass, Grader Grass) within the RALP in ballast and gravel areas. Some areas beyond the Georges River bridge are yet to be managed. Slashing should be used to manage large expanses of exotic grassland to prevent seeding events. However, as native grasses become established, extreme care must be taken, and indiscriminate slashing must be avoided. A contractor with knowledge of native species should be employed to carry out this task, in failing that, an ecologist should be on site to monitor weed remediation.
5	Reduce cover of weeds within the RALP	Reduction of weed cover by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019).	Works should involve targeted slashing of mature plants and removing flowering and seed heads to minimise seeding. Targeted slashing has been previously employed to control weed colonisation on soft batters. However, it must be continued to limit the re-colonisation of weeds within the RALP. Future weed control actions will focus on removing and reducing the cover of priority and key weed species and suppressing the further colonisation of common weeds, which is consistent with the rehabilitation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.
6	Remove herbaceous and woody weeds within the operational area and trunk drainage infrastructure.	Reduction in herbaceous and woody weeds by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	Weed cover has generally remained low within trunk drainage infrastructure and at the north-eastern extent of the MIP East operational facility.

APPENDIX D RECOMMENDED ACTIONS CATALOGUE

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
April 2020	Eradicate priority weeds species, including Bridal Creeper, Alligator Weed, Lantana, Fireweed and African Olive	Completed	Most instances of these weeds have been removed from the RALP. Small instances of Fireweed occur, however these are being managed by the current weed remediation works within the RALP.
April 2020	Remove key and aggressive weed species within RALP, including Golden Wreath Wattle, Moth Vine, Castor Oil Plant, Small-leafed Privet, Grader Grass and Balloon Vine	Commenced	Grader Grass has been observed colonising remediated areas within the RALP. This species should be removed to prevent further colonisation and infestations. Golden Wreath Wattle, Moth Vine and Castor Oil Plant on the southern side of the RALP in the area between the operational boundary and the East Hills line rail corridor. Consideration should be given to the management of these areas to reduce encroachment into recently remediated areas.
June 2020	Planning should commence to revegetate soft batters and undeveloped areas within the MPE operational facility with native species in accordance with the approved Urban Design and Landscaping Plan (Arcadis 2019a, Arcadis 2020)	Commenced	Revegetation has commenced for remediated areas using a hydro-mulch containing a seed palette commensurate with the UDLP (Arcadis 2020). Previous instances of native seed setting have been colonized by weed species within the RALP and should be cleared and re-set with a native seed mix as soon as practical.
December 2020	Exotic species, specifically <i>Medicago polymorpha</i> (Burr Medic), should be removed from grassland on either side of the RALP at its eastern extent, closest to the operational area.	Commenced	Targeted manual removal, including slashing, has been conducted for exotic species outside the RALP fencing. A qualified bush regeneration contractor should be used to avoid impacts on

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			native species. Strictly no herbicide should be used in this area, and works should not extend beyond the RALP construction envelope. Where possible, contractors should not access/pass through adjacent areas.
December 2021	Collect litter scattered through the RALP and in adjacent areas	Commenced	Litter remains in the RALP and adjacent areas.
December 2021	Control aggressive weed species Coolatai Grass and Paterson's Curse within the RALP	Commenced	New instances of aggressive weed species Coolatai Grass and Paterson's Curse within the RALP should be removed as soon as practicable to avoid the spread of these species into ecologically sensitive areas adjacent to the RALP.
February 2022	Continued targeted slashing of woody and herbaceous weeds within the RALP.	Completed	Majority of large woody weeds have been removed from the RALP. Continue regular slashing of large woody weeds to remove the fertile seed head and discourage further germination of these weeds within the RALP should occur.
December 2022	Prioritise weed remediation works for priority and key weed species which have experienced accelerated growth in recent months.	Commenced	Areas of particularly high biomass of priority and key weed species should be prioritised for weed remediation works in coming months to avoid mass seeding events.
	Begin remediation of soft batters which have slipped following extreme rainfall events in recent weeks	Not started	Areas within the operational facility, including a number of areas within the RALP, require urgent batter remediation in areas of batter slipping.
December 2022	Begin weed remediation of gravel and ballast areas along RALP	Commenced	Removal of all vegetation in gravel and ballast areas due along RALP using slashing and

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			herbicide due to safety concerns of train operators and prevent spread of weeds.
December 2022	Continue weed remediation works along the soft batters within the RALP.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
February 2023	Continue weed remediation works along the soft batters within the RALP beyond Georges River bridge.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
April 2023	No weed remediation has occurred since February 2023. Expected to recommence in June 2023, in same areas that have previously been remediated.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
June 2023	Continue weed remediation works along the soft batters within the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
December 2023	Toolijooa Environmental Restoration inducted as primary weed control contractors. Weed remediation recommenced throughout the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.

APPENDIX E REMEDIATION PROGRESS PHOTOGRAPHS



April 2021



December 2023



February 2026



April 2021



December 2023



February 2026



April 2021



December 2023



February 2026



April 2021



December 2023



February 2026



April 2021



December 2023



February 2026



April 2021



December 2023



February 2026



April 2021



December 2023



February 2026

APPENDIX F FLORA SPECIES INVENTORY

Scientific name	Common name	Exotic	Priority/key weed
<i>Acacia falcata</i>	Hickory Wattle		
<i>Acacia parramattensis</i>	Parramatta Wattle		
<i>Acacia saligna</i>	Golden Wreath Wattle	*	
<i>Alternanthera philoxeroides</i>	Alligator weed	*	Priority
<i>Alternanthera pungens</i>	Khaki Weed	*	
<i>Araujia sericifera</i>	Moth Vine	*	
<i>Asparagus asparagoides</i>	Bridal Creeper	*	Priority
<i>Atriplex semibaccata</i>	Creeping Saltbush		
<i>Austrodanthonia spp.</i>	-		
<i>Avena spp.</i>	Oats	*	
<i>Bidens pilosa</i>	Cobbler's Pegs	*	
<i>Brassica rapa</i>	Field Mustard	*	
<i>Briza maxima</i>	Quaking Grass	*	
<i>Briza minor</i>	Shivery Grass	*	
<i>Cenchrus clandestinus</i>	Kikuyu Grass	*	
<i>Centaureum spp.</i>	-	*	
<i>Chloris gayana</i>	Rhodes Grass	*	Key
<i>Chloris truncata</i>	Windmill Grass		
<i>Cirsium vulgare</i>	Spear Thistle	*	
<i>Convolvulus erubescens</i>	Pink Bindweed		
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	*	
<i>Cyclospermum leptophyllum</i>	Slender Celery	*	
<i>Cynodon dactylon</i>	Common Couch		
<i>Cymbopogon refractus</i>	Barbed Wire Grass		
<i>Cyperus eragrostis</i>	Umbrella Sedge	*	
<i>Daviesia ulicifolia</i>	Gorse Bitter Pea		
<i>Dichanthium sericeum</i>	Queensland Bluegrass		
<i>Dichondra repens</i>	Kidney Weed		
<i>Echium plantagineum</i>	Paterson's Curse	*	Key
<i>Eragrostis brownii</i>	Brown's Lovegrass		
<i>Eragrostis curvula</i>	African Lovegrass	*	Key
<i>Euchiton spp.</i>	-		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Foeniculum vulgare</i>	Fennel	*	
<i>Glycine clandestina</i>	-		

Scientific name	Common name	Exotic	Priority/key weed
<i>Hardenbergia violacea</i>	False Sarsaparilla		
<i>Hypochoeris radicata</i>	Catsear	*	
<i>Indigofera australis</i>	Australian Indigo		
<i>Juncus usitatus</i>	-		
<i>Lantana camara</i>	Lantana	*	Priority
<i>Lachnagrostis filiformis</i>	Blown Grass		
<i>Lactuca serriola</i>	Prickly Lettuce	*	
<i>Linum trigynum</i>	French Flax	*	
<i>Lolium perenne</i>	Perennial Ryegrass	*	
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush		
<i>Lysimachia arvensis</i>	Scarlet Pimpernel	*	
<i>Ludwigia peruviana</i>	Peruvian water primrose	*	Priority
<i>Medicago polymorpha</i>	Burr Medic	*	
<i>Melilotus alba</i>	Bokhara	*	
<i>Melinis repens</i>	Red Natal Grass	*	Key
<i>Modiola caroliniana</i>	Red-flowered Mallow	*	
<i>Olea europaea</i> subsp. <i>cuspidate</i>	African Olive	*	Priority
<i>Paspalum dilatatum</i>	Paspalum	*	
<i>Persicaria decipiens</i>	Slender Knotweed		
<i>Phytolacca octandra</i>	Inkweed	*	
<i>Plantago lanceolata</i>	Lamb's Tongues	*	
<i>Portulaca oleracea</i>	Common Purslane		
<i>Rumex crispus</i>	Curled Dock	*	
<i>Senecio madagascariensis</i>	Fireweed	*	Priority
<i>Setaria parviflora</i>	-	*	
<i>Sida rhombifolia</i>	Paddy's Lucerne	*	Key
<i>Solanum nigrum</i>	Black-berry Nightshade	*	
<i>Solanum sisymbriifolium</i>		*	
<i>Sonchus oleraceus</i>	Common Sowthistle	*	
<i>Tagetes minuta</i>	Stinking Roger	*	
<i>Themeda quadrivalvis</i>	Grader Grass	*	Key
<i>Themeda triandra</i>	-		
<i>Trifolium arvense</i>	Haresfoot Clover	*	
<i>Trifolium repens</i>	White Clover	*	
<i>Trifolium michelianum</i>	Bolansa Clover	*	
<i>Verbena bonariensis</i>	Purpletop	*	

Scientific name	Common name	Exotic	Priority/key weed
<i>Verbena rigida</i> var. <i>Rigida</i>	Veined Verbena	*	

MIP BI-MONTHLY WEED MONITORING REPORT – APRIL 2026

Introduction

Arcadis has been commissioned to conduct bi-monthly weed monitoring surveys within the operational areas of Moorebank Precinct East (MPE) and Moorebank Precinct West (MPW). These areas together are known as the Moorebank Intermodal Precinct (MIP).

The MPE operational facility includes the Import and Export Terminal (IMEX), Rail Access Land Package (RALP), warehouses, distribution facilities and freight village, and stormwater trunk drainage infrastructure and landscaping areas. The MPW operational facility includes the landscaped vegetation along Bushmasters Avenue (Figure 1).

Regular monitoring of the MIP operational facilities will inform the land manager of weed cover, and the presence of any weeds listed as 'priority' for the Greater Sydney Local Land Services region under the *Biosecurity Act 2015*.

The schedule for the bi-monthly weed monitoring inspections for the 2025-26 monitoring year are detailed in Table 1. This document will be treated as live throughout the monitoring year and will be updated at the end of each inspection.

Table 1 Schedule for bi-monthly weed inspections

Inspection month	Date completed
June 2025	25/06/2025
August 2025	27/08/2025
October 2025	05/11/2025
December 2026	12/12/2025
February 2026	19/03/2026
April 2026	21/05/2026

Background

The Operational Flora and Fauna Management Plan (OFFMP) for MPE (dated 13 January 2023) and MPW (dated 8 November 2024) provides management measures to protect the biodiversity values of the adjacent BioBank site to the MIP.

MIP (East and West Precincts) is managed in accordance with two Operational Environmental Management Plans (OEMP) and sub-plans:

- *Operational Environmental Management Plan Moorebank Logistics Park – East Precinct* (OEMP MPE) Revision 19 dated 20 November 2024 applies to MPE
- *OEMP Moorebank Intermodal Precinct - West Precinct Stage 2* (OEMP MPW) dated 6 May 2024 applies to MPW.

The OFFMP for both precincts includes requirements from the following approvals and Condition of Consent (CoC):

- **Moorebank East Precinct Stage 2 (SSD 7628):**
 - CoC B127 – the Applicant must:

- (a) Take all reasonable steps to manage pests and vermin on the site
 - (b) Manage declared noxious weeds on the site in accordance with the requirements of the *Noxious Weeds Act 1993*
 - (c) Inspect the site on a regular basis, no less than every 3 months, to ensure that these measures are working effectively, and that pests, vermin or noxious weeds are not present on site in sufficient numbers to pose an environmental hazard or cause the loss of amenity in the surrounding area.
- **Moorebank West Precinct Stage 2 (SSD 7709):**
 - CoC B83 – the Applicant must:
 - (a) Implement measures to manage pests, vermin and declared noxious weeds on the site
 - (b) Inspect the site on a regular basis to ensure that these measures are working effectively, and that pests, vermin or noxious weeds are not present on site in sufficient numbers to pose an environmental hazard or cause the loss of amenity in the surrounding area.

In 2022, LOGOS Property took over the management of the warehouse and distribution facilities, as well as the overall management of MPE and MPW. In July 2024, ESR Group acquired the remaining interest in LOGOS, and overall management of the MIP East and West Precinct, is now the responsibility of ESR Australia & NZ (ESR). Qube Logistics will continue to maintain responsibility for the IMEX (Import Export Rail Terminal) and the Rail Link for MPE. This change in ownership does not impact the current reporting period or the current reporting requirements.

Arcadis has been monitoring the MPE operational facility for weed occurrence since April 2020. The RALP, which includes the MPE operational RALP, has seen significant change and works over the time Arcadis has conducted weed monitoring. Additionally, works conducted in MPW in 2023/24 have changed the layout and vegetation spread in the RALP. Several weed remediation events have occurred since the inception of weed monitoring, detailed below in Table 2.

Table 2 Summary of weed events throughout monitoring history

Timing	Summary of events	Weed contractor
Spring 2020	• Weeds removed from batters and revegetated with native species, as per the Urban Design and Landscaping Plan (UDLP) for MPE • Cumberland Plain Seeds were procured to provide technical oversight of revegetation effort	Spray Grass Solutions
December 2021	• As per recommendations from Spray Grass Solutions and Cumberland Plain Seeds, the monitoring methodology was changed • Changes included reporting on cover on 'priority' weeds	

Timing	Summary of events	Weed contractor
	species and key weeds specific to the project.	
December 2022 to June 2023	• Weed remediation works commenced • Priority weed species were targeted • Native species were identified throughout the RALP to avoid accidental removal.	P&E Services
December 2023 to present	• Weed remediation works continued • Regular maintenance of priority weed species via slashing, hand removal and herbicide spraying	Toolijooa Environmental Restoration

Methodology

Arcadis ecologist Nathan Banks attended the MIP operational area on 21 May 2026 (referred to as 'April 2026 survey' for this report). Monitoring involved traversing the MIP operational facility on foot, surveying landscaped areas, stormwater infrastructure and soft batters adjoining the RALP for increases in weed abundance of the identified species in Appendix A and Appendix B. The areas surveyed are presented in Figure 1.

The weather on the 21 May was sunny, with a maximum temperature of 20.2°C, and the weather recorded at Holsworthy Aerodrome (station 066161) (BOM 2025).

Study Limitations

The data presented within this report is restricted to what was observed and recorded by the attending Arcadis ecologists during the site assessment on 21 May 2026.

Monitoring of weeds was restricted to the operational facility; weeds were not assessed within the bounds of the active construction areas surrounding new warehouses or other infrastructure.

Surveys were not undertaken in areas extending beyond the junction between the QUBE RALP and the Southern Sydney Freight Line (SSFL).



- Legend
- MPW operational boundary
 - MPE operational boundary
 - Weed monitoring survey extent



C:\Users\cb98137\ARCADIS\30294730 - Moorebank IP - Operational Monitoring 2025-2026 - 4. GIS and figures\3. GIS Team\A_Current\B_Maps\WeedMonitoring\WeedMonitoring_2022_v2.aprx
Created by : EM Updated by : CB QA by : KM

Figure 1. Survey extent within the MPI operational facility

Results

Results of the weed monitoring surveys during the April 2026 survey are summarised below in Table 3. Weed records, previously recorded threatened flora species records, and instances of native species within the survey extent are shown in Figure 2.

Progress photographs of monitoring locations are provided in Appendix E and a complete flora species inventory in Appendix F.

Table 3 Summary of weed abundances and actions required across all inspection areas in MPI, for the current survey

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
Moorebank Precinct East (MPE)			
Rail Access Land Package (RALP)	- New occurrences of <i>Asparagus asparagoides</i> (Bridal Creeper) was observed between the IMEX terminal and Moorebank Avenue bridge (see green area in Appendix G). <i>Hyparrhenia hirta</i> (Coolatai Grass) and <i>Themeda quadrivalvis</i> (Grader Grass) have increased in cover between the IMEX terminal and Moorebank Avenue bridge (see pink area in Appendix G). - Suggested that bush regenerator contractors focus weeding efforts on these species during the winter month, when weed growth is slower. Other weeds such as <i>Senecio</i>	Will be reported on in the June 2026 weed report	

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
	<i>madagascariensis</i> (Fireweed) and <i>Andropogon virginicus</i> (Whiskey Grass) can be targeted during this time. An area of established native <i>Themeda triandra</i> (Kangaroo Grass) was slashed by another contractor in the RALP (see orange area in Appendix G). An investigation as to why this occurred is required, as the slashing of grass heads will reduce the native seed load required to support ongoing native species coverage in the RALP.		

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
IMEX building and adjacent drainage infrastructure	• <i>Acacia falcata</i> (Hickory Wattle) continue to grow unimpeded by weeds. • Areas adjacent to the fenceline show significant grow of <i>Melinis repens</i> (Red Natal Grass), which should be removed to avoiding spreading through the drainage infrastructure.	• Continue to monitoring native vegetation within drainage infrastructure for priority weed infestations. • Status of <i>Melinis repens</i> (Red Natal Grass) removal to be reported on in the June 2026 weed report.	

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
Warehouse areas	- Majority of this area has now been claimed by the Moorebank Avenue Upgrade project and is unable to be surveyed adequately - Occurrences of weeds in the warehouse area and the adjacent drainage infrastructure is restricted to scattered individuals of <i>Senecio madagascariensis</i> (Fireweed), <i>Plantago lanceolata</i> (Plantain), <i>Trifolium arvense</i> (Clover) and exotic grasses like <i>Chloris gayana</i> (Rhodes Grass), <i>Sporobolus africanus</i> (Parramatta Grass), <i>Paspalum urvillei</i> (Giant Paspalum) and <i>Ehrharta erect</i> (Panic Veldtgrass).	Continue to monitoring native vegetation in these areas for priority weed infestations.	

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
Eastern boundary drainage infrastructure	Majority of this area has now been claimed by the Moorebank Avenue Upgrade project and is unable to be surveyed adequately	Continue to monitoring native vegetation in these areas for priority weed infestations.	

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
Moorebank Precinct West (MPW)			
Landscaped areas along Bushmasters Avenue	- No immediate actions required – landscaped vegetation is in good condition, with minor weed incursions - Weed species present include <i>Sonchus oleraceus</i> (Common Sowthistle), <i>Chloris virgata</i> (Rhodes Grass), <i>Bidens pilosa</i>, <i>Conyza bonariensis</i> (Fleabane), <i>Cyclospermum leptophyllum</i> (Slender Celery), and <i>Tagetes minuta</i> (Stinking Roger). - Areas with limited to no landscaped vegetation are particularly susceptible to weed incursion from cleared areas (see adjacent photo)	- Continue to monitoring native vegetation in these areas for priority weed infestations. - Areas of cleared vegetation still remain.	

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
APZ area – northern MPW	• Suppression of <i>Medicago polymorpha</i> and other herbacious weeds (i.e., <i>Sonchus oleraceus</i> (Common Sowthistle), and <i>Cirsium vulgare</i> (Spear Thistle)) occuring in this area, via slashing and hand removal • Large stands of the native shrub <i>Dodonea viscosa</i> are growing unimpeded. Sapling eucalypts are growing within this area.	• Continue to monitoring native vegetation in these areas for priority weed infestations.	

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
OSD and outlet (north)	• Area of <i>Olea europaea</i> subsp. <i>cuspidata</i> (African Olive) are present along the BioBank edge (see yellow area in Appendix G). • Spot spraying, and hand pulling of weeds occurring along boundary of basins and BioBank site • No significant increases in weed coverage were observed around the basin outlet points	• Continue to monitoring native vegetation in these areas for priority weed infestations.	

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
OSD and outlet (central)	- Spot spraying, and hand pulling of weeds occurring along boundary of basins and BioBank site - No significant increases in weed coverage were observed around the basin outlet points	Continue to monitoring native vegetation in these areas for priority weed infestations.	

Inspection area	Actions required from current survey	Status of actions	Photo of inspection area
OSD and outlet (south)	- Minor occurrences of <i>Cortaderia</i> spp. (Pampas Grass) occurring in the outlet of this section (see blue area in Appendix G). - Spot spraying, and hand pulling of weeds occurring along boundary of basins and BioBank site - No significant increases in weed coverage were observed around the basin outlet points	Continue to monitoring native vegetation in these areas for priority weed infestations.	

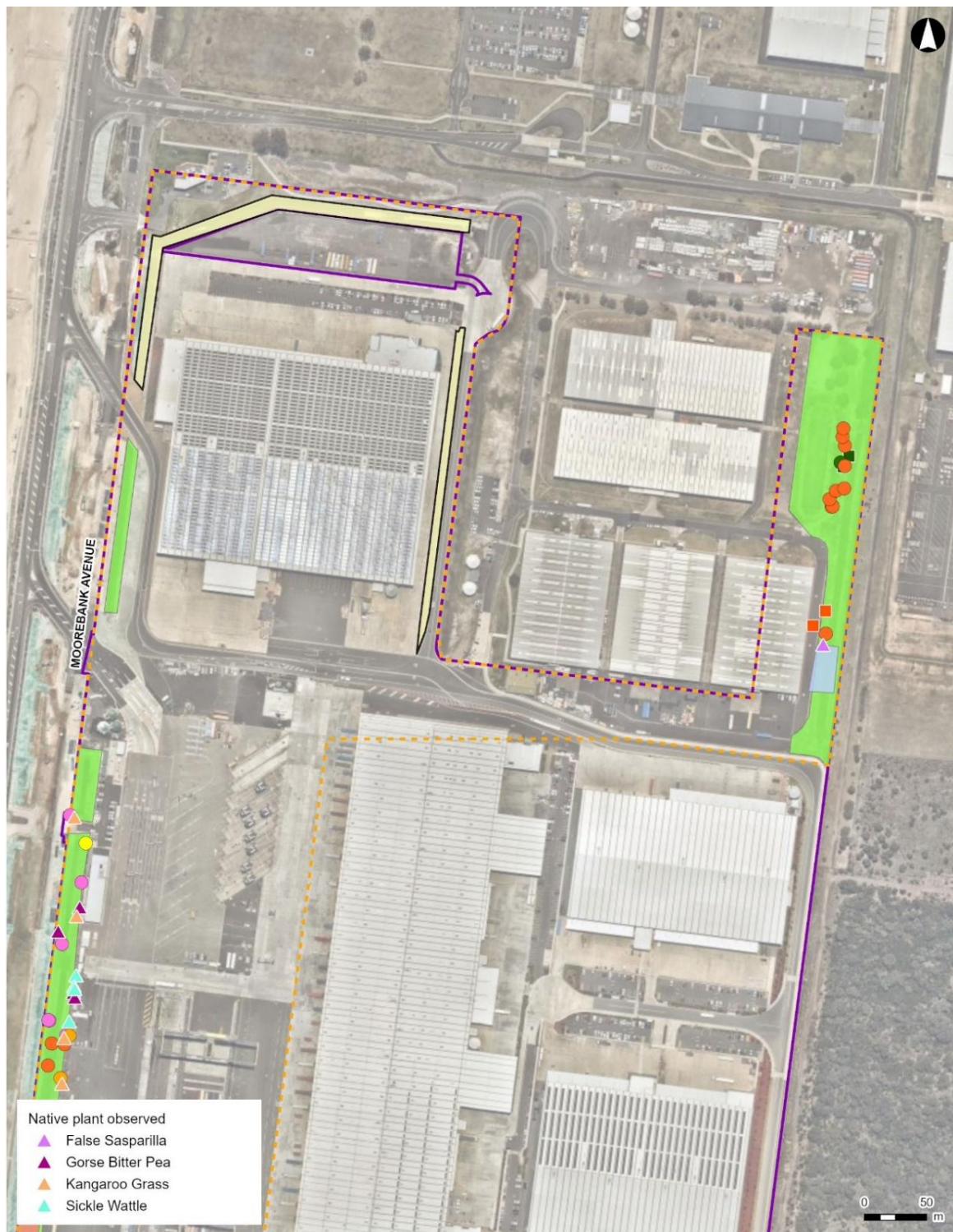


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (1 of 8)

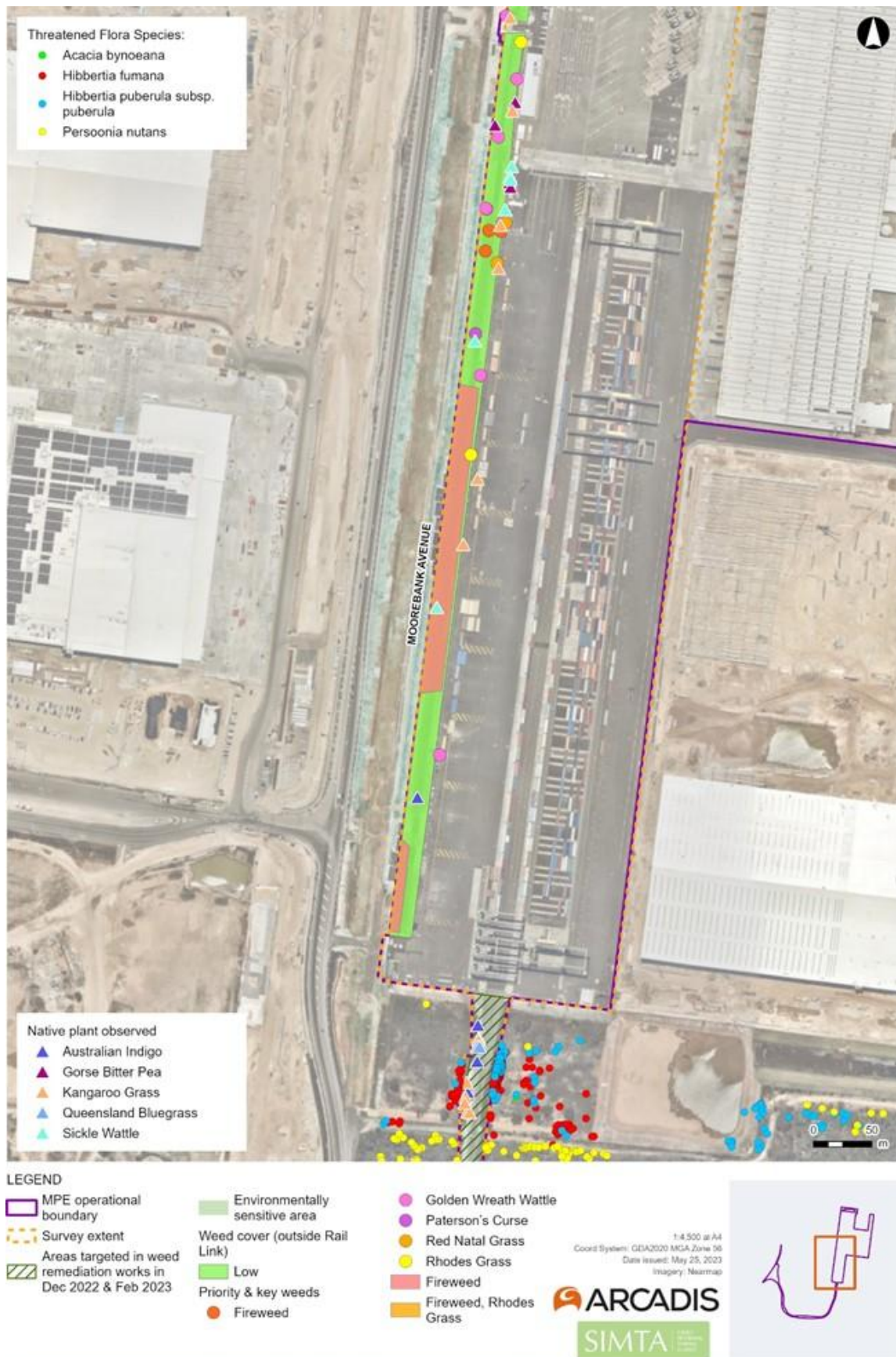


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (2 of 8)

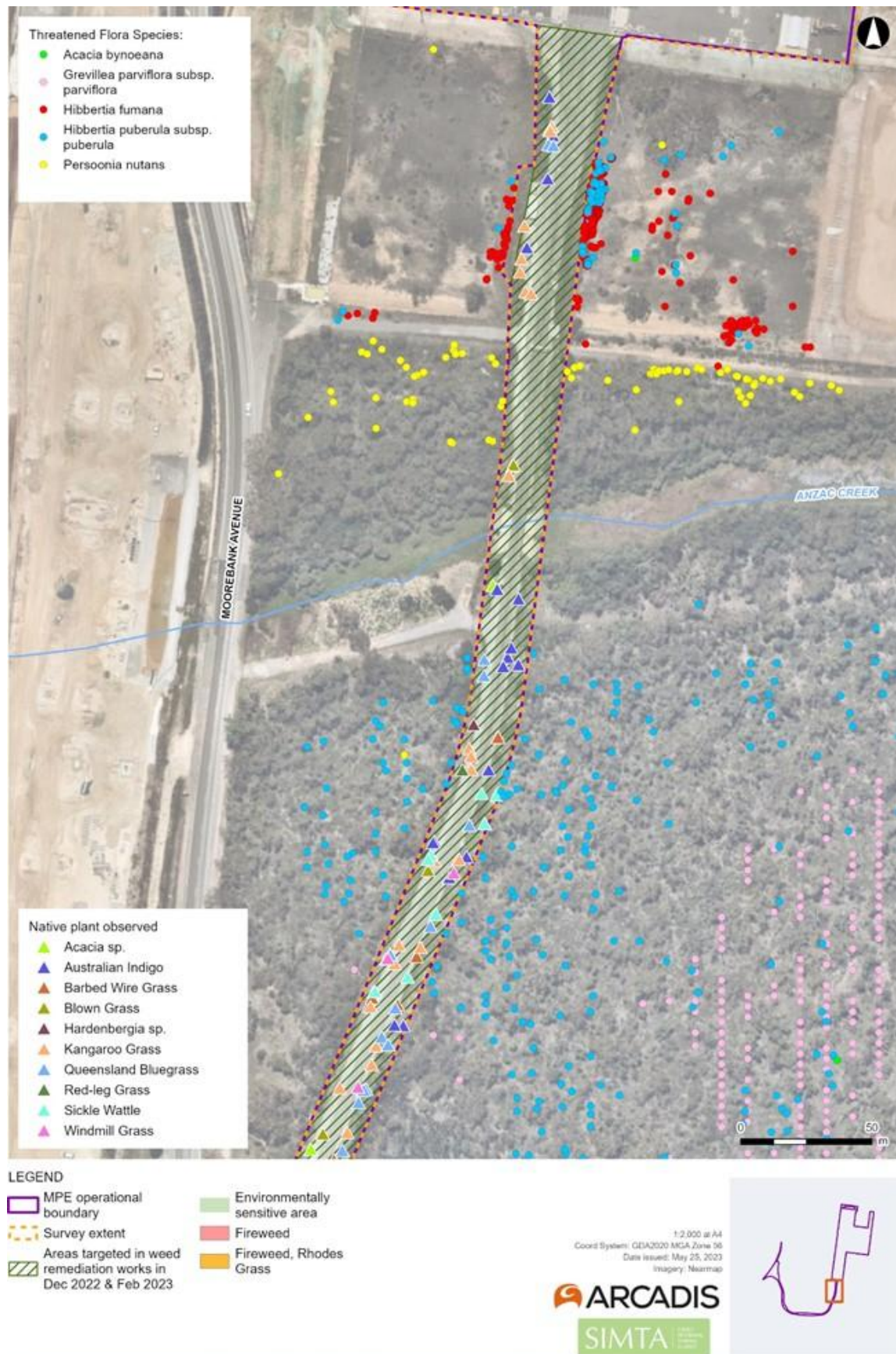


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (3 of 8)

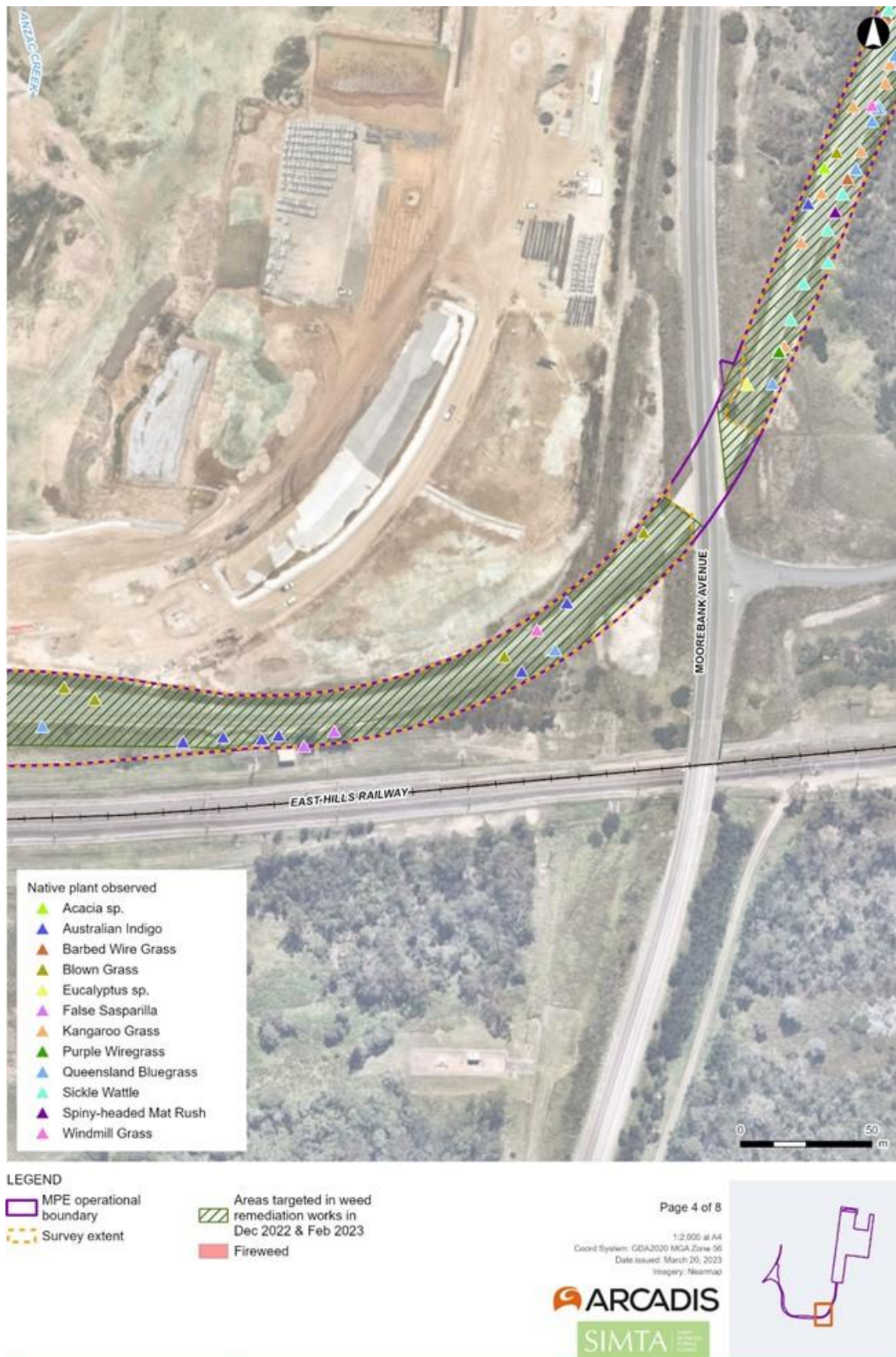


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (4 of 8)



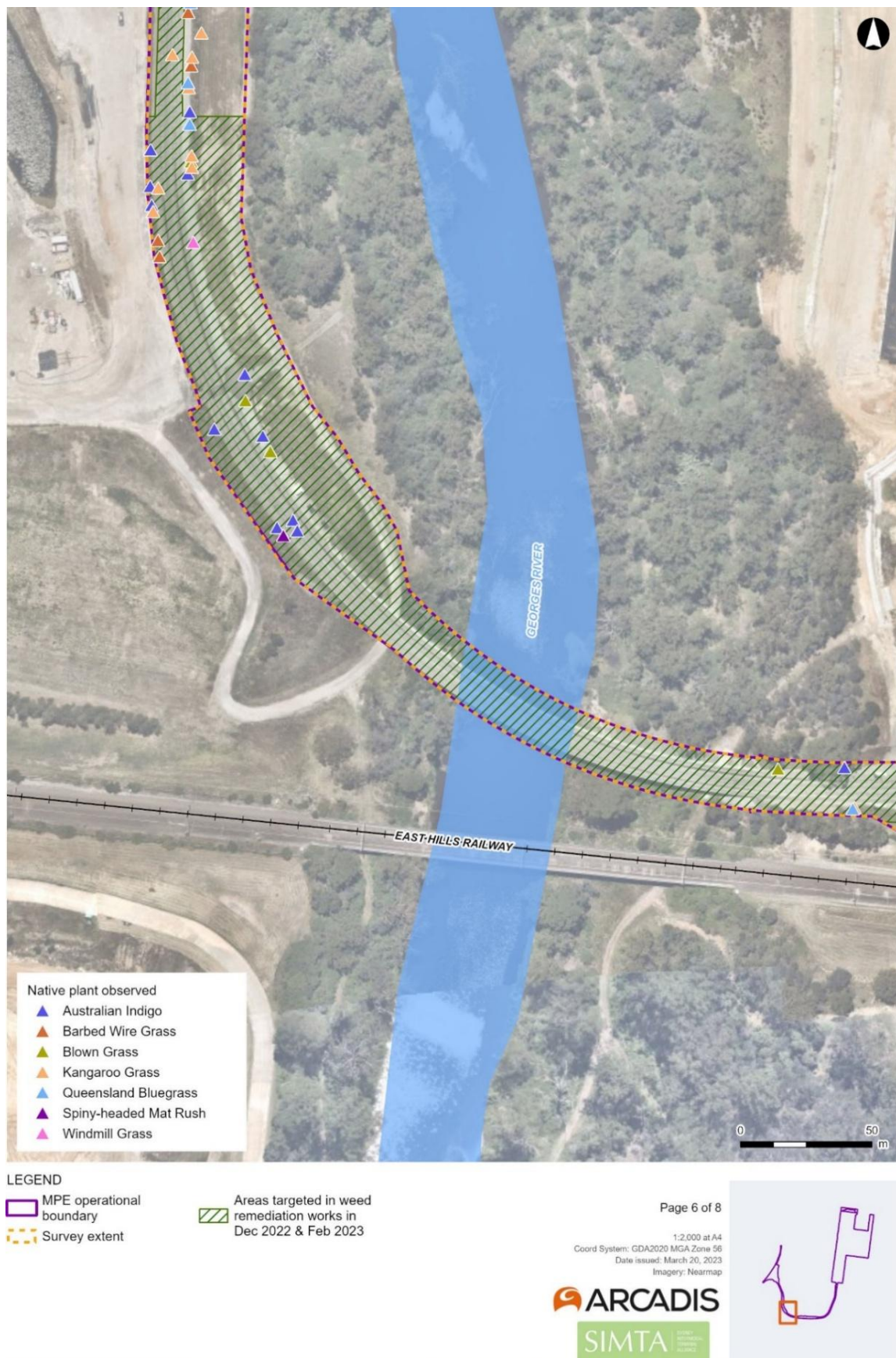


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (6 of 8)

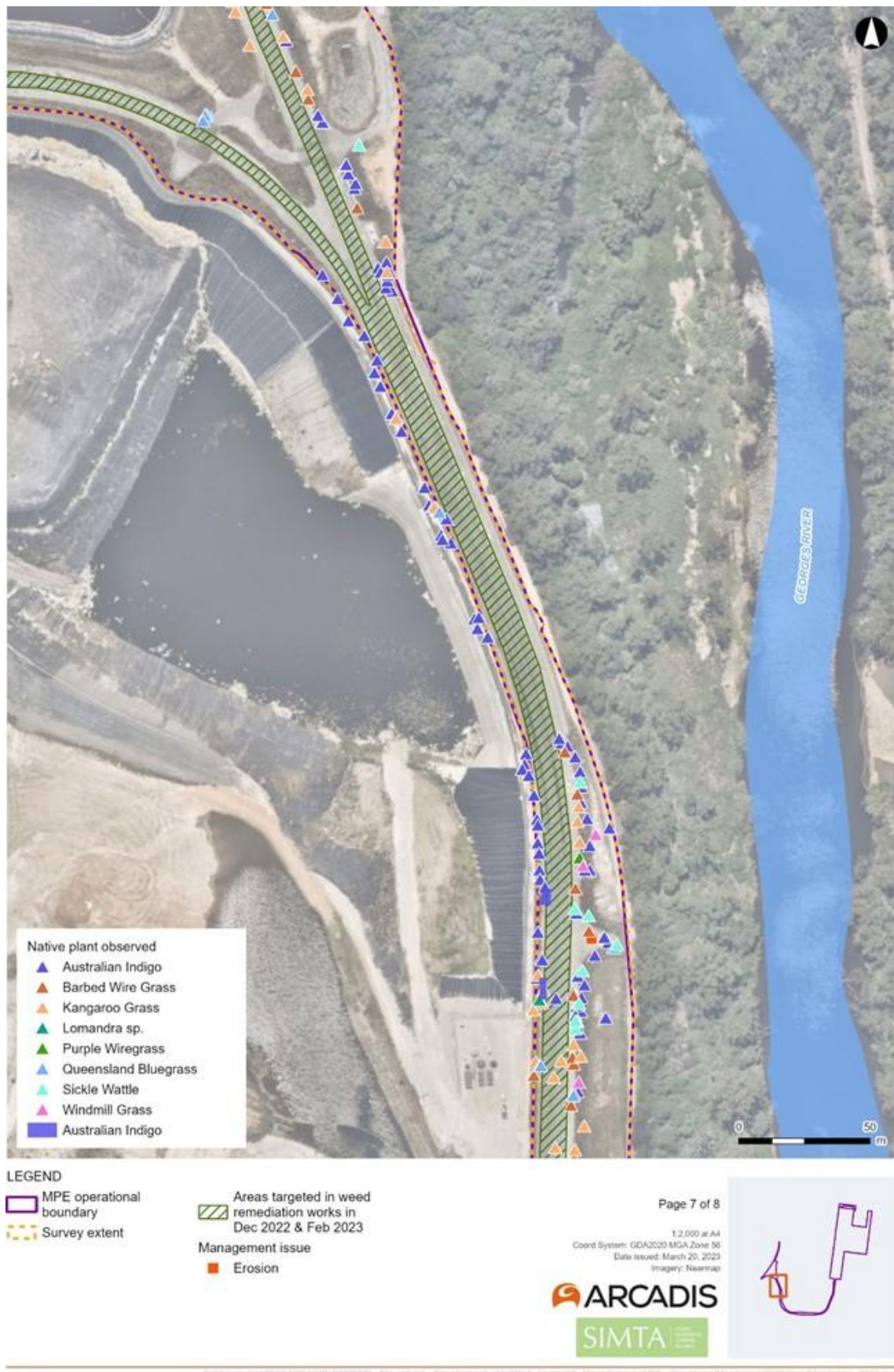


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (7 of 8)

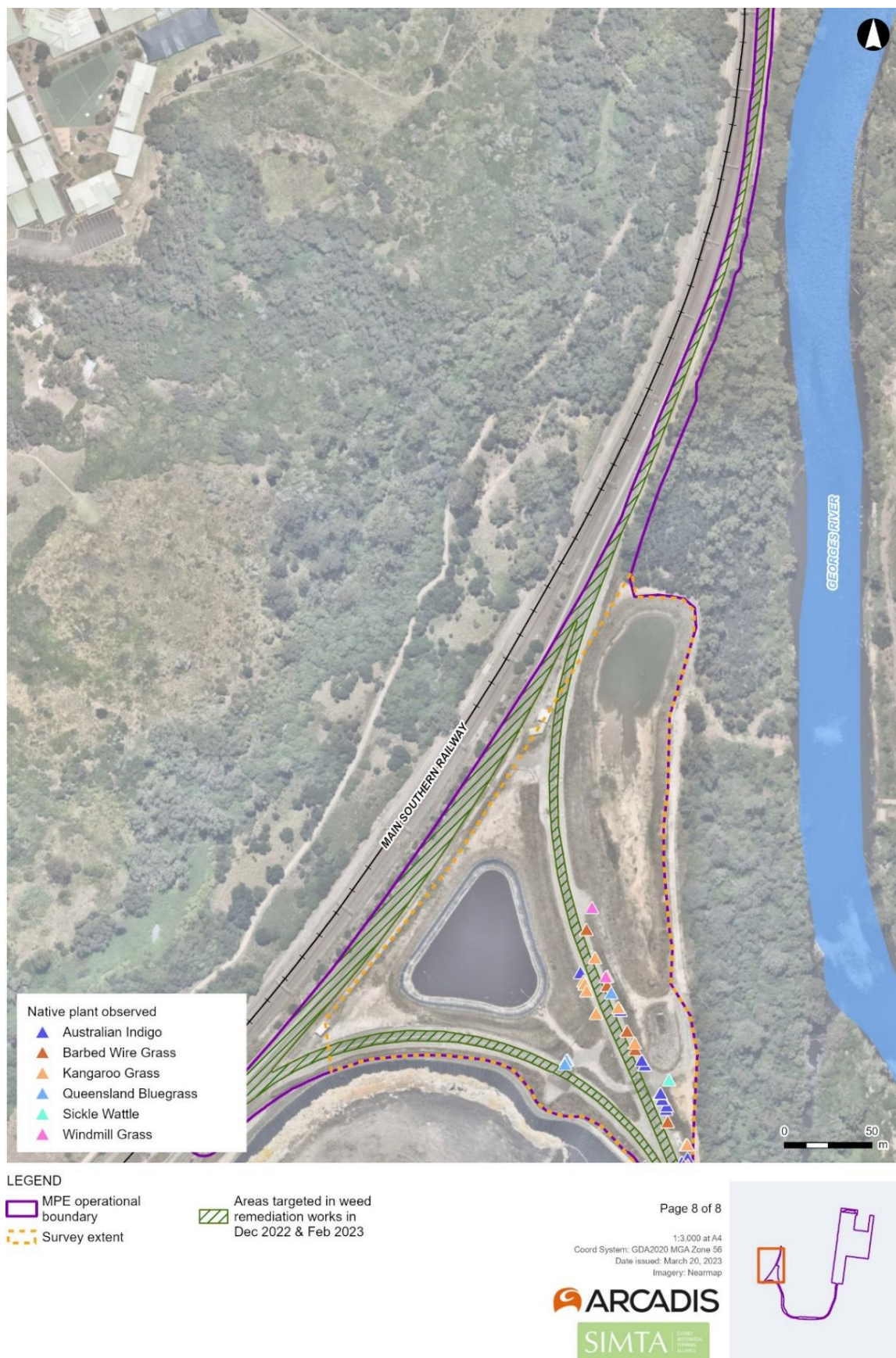


Figure 2 Instances of weeds, native species and threatened flora records in the survey extent and MIP operational boundary (8 of 8)

Recommendations

Weed monitoring and weed remediation works should continue throughout the 2025/26 monitoring year. Table 4 summarises the recommendations for weed remediation within the MIP. Additionally, the weed remediation works being conducted by Toolijooa in the RALP have been compared against the criteria in Appendix C and are considered to be consistent.

Recommended actions documented in previous weed monitoring reports are included in Appendix D. The catalogue has been reviewed and updated to reflect works which have been completed and is considerate of the revegetation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.

Table 4 Recommended actions for weed remediation in the MIP

Area	Recommendation
All areas	Targeted weed remediation to continue during the 2025/26 monitoring year and is to be conducted using the same methods and at the same locations as previously conducted
	Weed monitoring reports to be sent to all relevant stakeholders, contractors and consultants that need to be aware of weeds within the Moorebank Intermodal Precinct
Rail Access Land Package (RALP)	Weed remediation works will focus on controlling priority and key weed species (Appendix A and Appendix B)
	Suppression of environmental weeds and encroachment into areas of bushland should occur where possible
	Hand weeding should be conducted for individuals, whereas slashing and herbicide spraying should be adopted to target larger patches of weeds. However, extreme care must be taken when conducting any weed management within the RALP, as many native grasses have become established
	Hand weeding is only feasible on annual species such as <i>Themeda quadrivalvis</i> (Grader Grass) and <i>Senecio madagascariensis</i> (Fireweed) due to their relatively small root system
	Contractors should identify the extent of the works zone and discuss 'No Go' zones with all involved in the works. Weeding must be restricted to identified weeds and native species to be retained should be identified prior to works commencing
	Priority and aggressive weed species outside revegetated RALP areas should be removed. Weeds that should be targeted include <i>Senecio madagascariensis</i> (Fireweed)
	- Large patches of <i>Eragrostis curvula</i> (African Lovegrass), <i>Chloris gayana</i> (Rhodes Grass) and <i>Themeda quadrivalvis</i> (Grader Grass) between the RALP and the East Hills train line should be slashed regularly to prevent seeding events (Figure 2 (5 of 8)). This will reduce the colonisation of these grasses into revegetation areas - Slashing should only occur when plants are not seeding to prevent further spread. As more native species become established in these areas, slashing may impact their growth; therefore, non-targeted slashing should be avoided
	Application of herbicide within the RALP and in areas adjacent to the Moorebank biobank site should be conducted to prevent overspray (off-

Area	Recommendation
	target poisoning). If herbicide application occurs, recommended herbicides for tussock grass, <i>Chloris gayana</i> (Rhodes Grass) and <i>Eragrostis curvula</i> (African Lovegrass), include glyphosate or flupropanate, while plants are actively growing during summer and spring. Native vegetation outside the RALP fence must not be impacted by herbicide during weed remediation works - No herbicide spraying should be conducted outside the RALP, specifically adjacent to ecologically sensitive areas south of the MPE Operational facility (Figure 2). Manual weed remediation works in ecologically sensitive areas should not extend beyond the construction envelope of the RALP. If further clarification is necessary, the project ecologist should be consulted - Batters that currently have limited vegetation cover should be colonised by a native seed mix as soon as practical. This will ensure that these areas are not colonised by weed species and will further reduce erosion during heavy rainfall events - Continue to collect litter from within the RALP and in adjacent areas
IMEX building and adjacent drainage infrastructure	Soft batters within the trunk drainage system and retention basin/swale at the north-eastern extent of the facility should be inspected for weed growth. Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Warehouse areas	Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Eastern boundary drainage infrastructure	- Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan - Erosion in the drainage infrastructure should be controlled by planting additional native ground cover species to maintain batters during heavy rainfall events
Landscaped areas along Bushmasters Avenue	- Continued maintenance of these landscaped areas should be maintained at a frequency that does not increase the current abundance of identified weed species. This is pertinent for areas where landscaped species have died back, and bare ground is more abundant - Areas adjacent to cleared areas in the MPW operational area should be sprayed for weeds to limited the potential for spreading
APZ area – northern MPW	Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan
Sediment basins adjacent to BioBank site	Weed levels should be controlled through herbicide application, slashing and hand weeding. Weed remediation works should be conducted in accordance with the approved Weed Management Plan

References

Arcadis (2019a) Urban Design and Landscape Plan. Moorebank Precinct East Stage 1

Arcadis (2019b) Operational Flora and Fauna Management Plan. Moorebank Logistics Park – East Precinct

Arcadis (2019c) Landscape Vegetation Management Sub Plan. Moorebank Precinct East Stage 2

Arcadis (2020) MPE Operational – Weed Monitoring Report December 2020

Arcadis (2020) Urban Design and Landscape Plan. Moorebank Precinct East Stage 2

Bureau of Meteorology (BOM) (2021) Climate Data Online. Weather and Climate: Holsworthy Aerodrome NSW (station 066161) <http://www.bom.gov.au/climate/dwo/IDCJDW2161.latest.shtml>

NSW Department of Primary Industries (DPI) (accessed 2021) NSW WeedWise. priority weeds for the Greater Sydney. <https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=3>

APPENDIX A PRIORITY WEED PROFILES



Lantana (*Lantana camara*)



Fireweed (*Senecio madagarsensis*)



Alligator Weed (*Alternanthera philoxeroides*)



African Olive (*Olea europea* subsp. *cuspidata*)



Lantana (*Lantana camara*)



Fireweed (*Senecio madagarsensis*)



Bridal Creeper (*Asparagus asparagoides*)



Peruvian Primrose (*Ludwigia peruviana*)

APPENDIX B KEY WEED PROFILES



Rhodes Grass (*Chloris gayana*)



Patterson's Curse (*Echium plantaganium*)



African Love Grass (*Eragrostis curvula*)



Coolatai Grass (*Hyparrhenia hirta*)



Grader Grass (*Themeda quadrivalvis*)



Red Natal Grass (*Melinis repens*)

APPENDIX C WEED REMEDIATION WORKS TRACKING

Priority	Action	Action description	Current performance assessment
1	Eradicate 'priority' weeds	Target 'priority' weed species through manual removal and herbicide treatment. Herbicide application should consider timing (i.e., applying herbicide when weeds are actively growing) and best practice methodologies. Areas outlined by coloured polygons in Figure 2 should be prioritised.	One priority weed species are present within the RALP: <i>Senecio madagascariensis</i> (Fireweed). These should be removed as a priority. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
2	Removal of key and aggressive weed species	Key weed species, including African Lovegrass, Rhodes Grass, Paterson's Curse, Coolatai Grass and Grader Grass, should be removed from revegetated areas of soft batter. Aggressive weed species, including Moth Vine and Castor Oil Plant, should be removed from all operational areas using a combination of manual and herbicide control. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Key weed species, including Rhodes Grass, African Lovegrass, Coolatai Grass, Paterson's Curse, and Grader Grass, are colonising soft batters in the RALP. These weeds should be removed. Progress has been made through remediation works within the RALP. Continued management must be undertaken to work towards eradication.
3	Suppress further colonisation of environmental weeds and encroachment into areas of bushland	Control of exotic species adjacent to the biobank site and ecologically sensitive areas. Manual removal should be adopted in areas adjacent to threatened flora locations. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Weed growth is stabilising through continued weed management on soft batters adjacent to the biobank site and ecologically sensitive areas. Manual removal, including routine slashing, is being used to prevent present weeds from reaching seeding maturity and further encroaching on adjacent high-value areas (biobank site and ecologically sensitive areas containing threatened plant species). All works should be restricted to the operational area and not extend into the biobank site or identified ecologically sensitive areas. Slashing should only be conducted when weed species are not in flower to prevent further spread. Appropriate slashing time is during winter for most species.

Priority	Action	Action description	Current performance assessment
4	Slashing of invasive grasses to prevent seeding.	Management of invasive grasses such as Rhodes Grass and African Love Grass through regular mowing or slashing. Areas outlined by coloured polygons in Figure 2 should be prioritised.	Slashing has been adopted to manage the regrowth of invasive grasses (African Lovegrass, Grader Grass) within the RALP in ballast and gravel areas. Some areas beyond the Georges River bridge are yet to be managed. Slashing should be used to manage large expanses of exotic grassland to prevent seeding events. However, as native grasses become established, extreme care must be taken, and indiscriminate slashing must be avoided. A contractor with knowledge of native species should be employed to carry out this task, in failing that, an ecologist should be on site to monitor weed remediation.
5	Reduce cover of weeds within the RALP	Reduction of weed cover by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019).	Works should involve targeted slashing of mature plants and removing flowering and seed heads to minimise seeding. Targeted slashing has been previously employed to control weed colonisation on soft batters. However, it must be continued to limit the re-colonisation of weeds within the RALP. Future weed control actions will focus on removing and reducing the cover of priority and key weed species and suppressing the further colonisation of common weeds, which is consistent with the rehabilitation methodology proposed by Spray Grass Solutions and Cumberland Plain Seeds.
6	Remove herbaceous and woody weeds within the operational area and trunk drainage infrastructure.	Reduction in herbaceous and woody weeds by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	Weed cover has generally remained low within trunk drainage infrastructure and at the north-eastern extent of the MIP East operational facility.

APPENDIX D RECOMMENDED ACTIONS CATALOGUE

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
April 2020	Eradicate priority weeds species, including Bridal Creeper, Alligator Weed, Lantana, Fireweed and African Olive	Completed	Most instances of these weeds have been removed from the RALP. Small instances of Fireweed occur, however these are being managed by the current weed remediation works within the RALP.
April 2020	Remove key and aggressive weed species within RALP, including Golden Wreath Wattle, Moth Vine, Castor Oil Plant, Small-leafed Privet, Grader Grass and Balloon Vine	Commenced	Grader Grass has been observed colonising remediated areas within the RALP. This species should be removed to prevent further colonisation and infestations. Golden Wreath Wattle, Moth Vine and Castor Oil Plant on the southern side of the RALP in the area between the operational boundary and the East Hills line rail corridor. Consideration should be given to the management of these areas to reduce encroachment into recently remediated areas.
June 2020	Planning should commence to revegetate soft batters and undeveloped areas within the MPE operational facility with native species in accordance with the approved Urban Design and Landscaping Plan (Arcadis 2019a, Arcadis 2020)	Commenced	Revegetation has commenced for remediated areas using a hydro-mulch containing a seed palette commensurate with the UDLP (Arcadis 2020). Previous instances of native seed setting have been colonized by weed species within the RALP and should be cleared and re-set with a native seed mix as soon as practical.
December 2020	Exotic species, specifically <i>Medicago polymorpha</i> (Burr Medic), should be removed from grassland on either side of the RALP at its eastern extent, closest to the operational area.	Commenced	Targeted manual removal, including slashing, has been conducted for exotic species outside the RALP fencing. A qualified bush regeneration contractor should be used to avoid impacts on

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			native species. Strictly no herbicide should be used in this area, and works should not extend beyond the RALP construction envelope. Where possible, contractors should not access/pass through adjacent areas.
December 2021	Collect litter scattered through the RALP and in adjacent areas	Commenced	Litter remains in the RALP and adjacent areas.
December 2021	Control aggressive weed species Coolatai Grass and Paterson's Curse within the RALP	Commenced	New instances of aggressive weed species Coolatai Grass and Paterson's Curse within the RALP should be removed as soon as practicable to avoid the spread of these species into ecologically sensitive areas adjacent to the RALP.
February 2022	Continued targeted slashing of woody and herbaceous weeds within the RALP.	Completed	Majority of large woody weeds have been removed from the RALP. Continue regular slashing of large woody weeds to remove the fertile seed head and discourage further germination of these weeds within the RALP should occur.
December 2022	Prioritise weed remediation works for priority and key weed species which have experienced accelerated growth in recent months.	Commenced	Areas of particularly high biomass of priority and key weed species should be prioritised for weed remediation works in coming months to avoid mass seeding events.
	Begin remediation of soft batters which have slipped following extreme rainfall events in recent weeks	Not started	Areas within the operational facility, including a number of areas within the RALP, require urgent batter remediation in areas of batter slipping.
December 2022	Begin weed remediation of gravel and ballast areas along RALP	Commenced	Removal of all vegetation in gravel and ballast areas due along RALP using slashing and

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
			herbicide due to safety concerns of train operators and prevent spread of weeds.
December 2022	Continue weed remediation works along the soft batters within the RALP.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
February 2023	Continue weed remediation works along the soft batters within the RALP beyond Georges River bridge.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
April 2023	No weed remediation has occurred since February 2023. Expected to recommence in June 2023, in same areas that have previously been remediated.	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
June 2023	Continue weed remediation works along the soft batters within the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.
December 2023	Toolijooa Environmental Restoration inducted as primary weed control contractors. Weed remediation recommenced throughout the RALP	Commenced	Future weed remediation works should include targeted slashing and spraying of priority and key weed species, whilst avoiding native species by hand weeding within a one metre buffer zone of native individuals.

APPENDIX E REMEDIATION PROGRESS PHOTOGRAPHS



April 2021



December 2023



April 2026



April 2021



December 2023



April 2026



April 2021



December 2023



April 2026



April 2021



December 2023



April 2026



April 2021



December 2023



April 2026



April 2021



December 2023



April 2026



April 2021



December 2023



April 2026

APPENDIX F FLORA SPECIES INVENTORY

Scientific name	Common name	Exotic	Priority/key weed
<i>Acacia falcata</i>	Hickory Wattle		
<i>Acacia parramattensis</i>	Parramatta Wattle		
<i>Acacia saligna</i>	Golden Wreath Wattle	*	
<i>Alternanthera philoxeroides</i>	Alligator weed	*	Priority
<i>Alternanthera pungens</i>	Khaki Weed	*	
<i>Araujia sericifera</i>	Moth Vine	*	
<i>Asparagus asparagoides</i>	Bridal Creeper	*	Priority
<i>Atriplex semibaccata</i>	Creeping Saltbush		
<i>Austrodanthonia spp.</i>	-		
<i>Avena spp.</i>	Oats	*	
<i>Bidens pilosa</i>	Cobbler's Pegs	*	
<i>Brassica rapa</i>	Field Mustard	*	
<i>Briza maxima</i>	Quaking Grass	*	
<i>Briza minor</i>	Shivery Grass	*	
<i>Cenchrus clandestinus</i>	Kikuyu Grass	*	
<i>Centaureum spp.</i>	-	*	
<i>Chloris gayana</i>	Rhodes Grass	*	Key
<i>Chloris truncata</i>	Windmill Grass		
<i>Cirsium vulgare</i>	Spear Thistle	*	
<i>Convolvulus erubescens</i>	Pink Bindweed		
<i>Conyza bonariensis</i>	Flaxleaf Fleabane	*	
<i>Cyclospermum leptophyllum</i>	Slender Celery	*	
<i>Cynodon dactylon</i>	Common Couch		
<i>Cymbopogon refractus</i>	Barbed Wire Grass		
<i>Cyperus eragrostis</i>	Umbrella Sedge	*	
<i>Daviesia ulicifolia</i>	Gorse Bitter Pea		
<i>Dichanthium sericeum</i>	Queensland Bluegrass		
<i>Dichondra repens</i>	Kidney Weed		
<i>Echium plantagineum</i>	Paterson's Curse	*	Key
<i>Eragrostis brownii</i>	Brown's Lovegrass		
<i>Eragrostis curvula</i>	African Lovegrass	*	Key
<i>Euchiton spp.</i>	-		
<i>Ficinia nodosa</i>	Knobby Club-rush		
<i>Foeniculum vulgare</i>	Fennel	*	
<i>Glycine clandestina</i>	-		

Scientific name	Common name	Exotic	Priority/key weed
<i>Hardenbergia violacea</i>	False Sarsaparilla		
<i>Hypochoeris radicata</i>	Catsear	*	
<i>Indigofera australis</i>	Australian Indigo		
<i>Juncus usitatus</i>	-		
<i>Lantana camara</i>	Lantana	*	Priority
<i>Lachnagrostis filiformis</i>	Blown Grass		
<i>Lactuca serriola</i>	Prickly Lettuce	*	
<i>Linum trigynum</i>	French Flax	*	
<i>Lolium perenne</i>	Perennial Ryegrass	*	
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush		
<i>Lysimachia arvensis</i>	Scarlet Pimpernel	*	
<i>Ludwigia peruviana</i>	Peruvian water primrose	*	Priority
<i>Medicago polymorpha</i>	Burr Medic	*	
<i>Melilotus alba</i>	Bokhara	*	
<i>Melinis repens</i>	Red Natal Grass	*	Key
<i>Modiola caroliniana</i>	Red-flowered Mallow	*	
<i>Olea europaea subsp. cuspidate</i>	African Olive	*	Priority
<i>Paspalum dilatatum</i>	Paspalum	*	
<i>Persicaria decipiens</i>	Slender Knotweed		
<i>Phytolacca octandra</i>	Inkweed	*	
<i>Plantago lanceolata</i>	Lamb's Tongues	*	
<i>Portulaca oleracea</i>	Common Purslane		
<i>Rumex crispus</i>	Curled Dock	*	
<i>Senecio madagascariensis</i>	Fireweed	*	Priority
<i>Setaria parviflora</i>	-	*	
<i>Sida rhombifolia</i>	Paddy's Lucerne	*	Key
<i>Solanum nigrum</i>	Black-berry Nightshade	*	
<i>Solanum sisymbriifolium</i>		*	
<i>Sonchus oleraceus</i>	Common Sowthistle	*	
<i>Tagetes minuta</i>	Stinking Roger	*	
<i>Themeda quadrivalvis</i>	Grader Grass	*	Key
<i>Themeda triandra</i>	-		
<i>Trifolium arvense</i>	Haresfoot Clover	*	
<i>Trifolium repens</i>	White Clover	*	
<i>Trifolium michelianum</i>	Bolansa Clover	*	
<i>Verbena bonariensis</i>	Purpletop	*	

Scientific name	Common name	Exotic	Priority/key weed
<i>Verbena rigida</i> var. <i>Rigida</i>	Veined Verbena	*	

APPENDIX G NEW WEED OCCURNACES – APRIL 2026



Figure 3 New weed occurrences observed during the April 2026 survey (1 of 2)



Figure 3 New weed occurrences observed during the April 2026 survey (2 of 2)

APPENDIX B. REMOTE CAMERA: FAUNA SPECIES INVENTORY

Species Camera ID: Wattle Grove	Pest monitoring						Connectivity			
	TC-02	TC-01	TC-03	TC-07	TC-08	TC-09	TC-06	TC-04	TC-05	C1-05
Australasian Swamphen (<i>Porphyrio melanotus</i>)								X		
Australian Raven (<i>Corvus coronoides</i>)				X						
Black Rat* (<i>Rattus rattus</i>)							X	X		X
Common Myna (<i>Acridotheres tristis</i>)						X		X		
Domestic Cat* (<i>Felis catus</i>)		X				X				
Eastern Grey Kangaroo (<i>Macropus giganteus</i>)	X							X		
Fairy wren (<i>Malurus cyaneus</i>)										X
Red Fox* (<i>Vulpes vulpes</i>)		X	X	X		X		X	X	
Swamp Wallaby (<i>Wallabia bicolor</i>)	X							X		
White Faced Heron (<i>Egretta novaehollandiae</i>)										X

Species Camera ID: Georges River	Connectivity								Pest Monitoring	
	TC01/ TC01	TC03	TC04	TC05	TC06/TC08	TC07	TC08/TC02	TC09	TC02	C15/TC07
Australian Raven (<i>Corvus coronoides</i>)					X					
Black Rat* (<i>Rattus rattus</i>)	X									
Brown hare* (<i>Lepus europaeus</i>)	X		X						X	
Brushtail Possum (<i>Trichosurus vulpecula</i>)									X	
Domestic Cat* (<i>Felis catus</i>)		X	X	X					X	
Red Fox* (<i>Vulpes vulpes</i>)	X	X		X					X	
Rusa Deer* (<i>Rusa timorensis</i>)		X		X						
Swamp Wallaby (<i>Wallabia bicolor</i>)		X	X	X			X		X	
White Faced Heron (<i>Egretta novaehollandiae</i>)							X			

APPENDIX C. EPBC OFFSET SITES - ANNUAL MONITORING REPORT

MOOREBANK PRECINCT EAST - EPBC OFFSET SITE

EPBC Threatened Flora Monitoring Report

31/05/2026



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MOOREBANK LOGISTICS PARK - PRECINCT EAST

EPBC Threatened Flora Monitoring Report

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Report No

1.0

Date

31/05/2025

Revision Text

B

This report has been prepared for ESR in accordance with the terms and conditions of appointment. Arcadis Australia Pacific Pty Limited (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

REVISIONS

Revision	Date	Description	Prepared by	Approved by
A	14/05/2026	First draft	AJ, EC	EE
B	31/05/2026	Final	AJ, EC	EE

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1 INTRODUCTION

Arcadis was commissioned by ESR to undertake annual monitoring and reporting requirements in accordance with federal approval conditions for the Moorebank Logistics Precinct East operational facility Project (**EPBC 2011/6229**) (herein referred to as the MPE Project).

1.1 Project background

The MPE Project was approved as a Controlled Action with conditions under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 6 March 2014. Construction of the MPE project commenced in mid-2016, with operations being launched in a staged manner from Q2-2020. The MPE Project includes an intermodal terminal and warehouse/distribution facility, offering container storage and warehousing solutions with direct rail access to Port Botany.

The MPE Project was approved to directly impact populations of two threatened flora species listed under the EPBC Act:

- Removal of 17 *Persoonia nutans* (Nodding Geebung) listed as Endangered under the EPBC Act and *Biodiversity Conservation Act 2016* (BC Act); and,
- Removal of 20 *Grevillea parviflora* subsp. *parviflora* (Small-flower Grevillea) listed as Vulnerable under the EPBC Act and BC Act.

Impacts to EPBC Act-listed threatened flora species occurred at two locations within the MPE Project footprint:

- A portion of Stage 1, Package 1: the Rail Link; and,
- The MPE Stage 2 Modification 2 project area – onsite stormwater detention basin (OSD) 2 (which includes a section of the MPL East Stage 2 project footprint).

A total of 11 *Persoonia nutans* and 20 *Grevillea parviflora* subsp. *parviflora* were removed to make way for the MPE Rail Link construction. An additional six *Persoonia nutans* were removed during the construction of the OSD basin at the southern extent of the MPE Stage 2 project site.

1.2 Conditions of approval (EPBC 2011/6229)

The referral decision lists a series of conditions of approval (CoA) to which the proponent is required to comply with to lawfully undertake the action. This Threatened Flora Monitoring report is required as part of CoA 6 of EPBC 2011/6229, which stipulates the requirement for a Threatened Flora Offset Management Plan (TFOMP). The TFOMP details the monitoring procedures as required in CoA 6(e) provided in Table 1 below.

Table 1. CoA (EPBC 2011/6229): Condition 6

CoA	Requirement
6	For the better protection of <i>Persoonia nutans</i>, <i>Grevillea parviflora</i> subsp. <i>parviflora</i> (and potentially, <i>Hibbertia</i> sp. Bankstown and Bynoe's Wattle pending the outcome of conditions 3 and 4), the person taking the action must engage a suitably qualified expert to prepare a Threatened Flora Offset Management Plan (TFOMP) (or plans) for the approval of the Minister. The TFOMP must include (but need not be limited to): (a) Details of a direct offset that satisfies the requirement of the Department's offset policy, in accordance with the offset user guide (including timeframes for the delivery or acquisition of the direct offset); (b) Maps (s) and shapefile that identify the location and boundaries of the direct offset; (c) Details of the management action and performance objectives which will maintain and enhance the <i>Persoonia nutans</i> and <i>Grevillea parviflora</i> subsp. <i>parviflora</i> habitat and/or population covered by the TFOMP (including duration, intensity, and timing of management actions); (d) An assessment of the baseline population and distribution for <i>Persoonia nutans</i> and <i>Grevillea parviflora</i> subsp. <i>parviflora</i> within the direct offset, including: • The number of plants protected and their location; and • Plant and habitat protection (e) Measures for regular monitoring of the status of individuals of <i>Persoonia nutans</i> and <i>Grevillea parviflora</i> subsp. <i>parviflora</i> and their habitat as measured against the baseline population and distribution, including: • Fluctuations in population size and distribution; and • Response to disturbance and/or management actions (f) Provisions to revise the approved TFOMP in response to monitoring associated with condition 6 (e) • Native vegetation clearance must not occur until the TFOMP has been approved. The TFOMP must be implemented once approved. • Should the action result in, or be likely to result in, residual impacts to <i>Hibbertia</i> sp. Bankstown or Bynoe's Wattle (as determined by the Minister), the TFOMP must also demonstrate how it meets the standards described in (a) and (f), for these two species.

1.3 Project objectives

Objectives of monitoring, survey methodologies, timings and guidelines are detailed in the TFOMP prepared by Arcadis in 2017 and updated in 2020. Monitoring commenced for the MPE Project in spring 2019 and is undertaken annually for a 20-year period.

This monitoring report addresses the conditional requirements to monitor *Grevillea parviflora* subsp. *parviflora* and *Persoonia nutans* and presents the results of the fifth-year monitoring survey (2025-2026) within the designated EPBC offset sites (Figure 1).

Annual EPBC Offset Site Monitoring (2025-26)

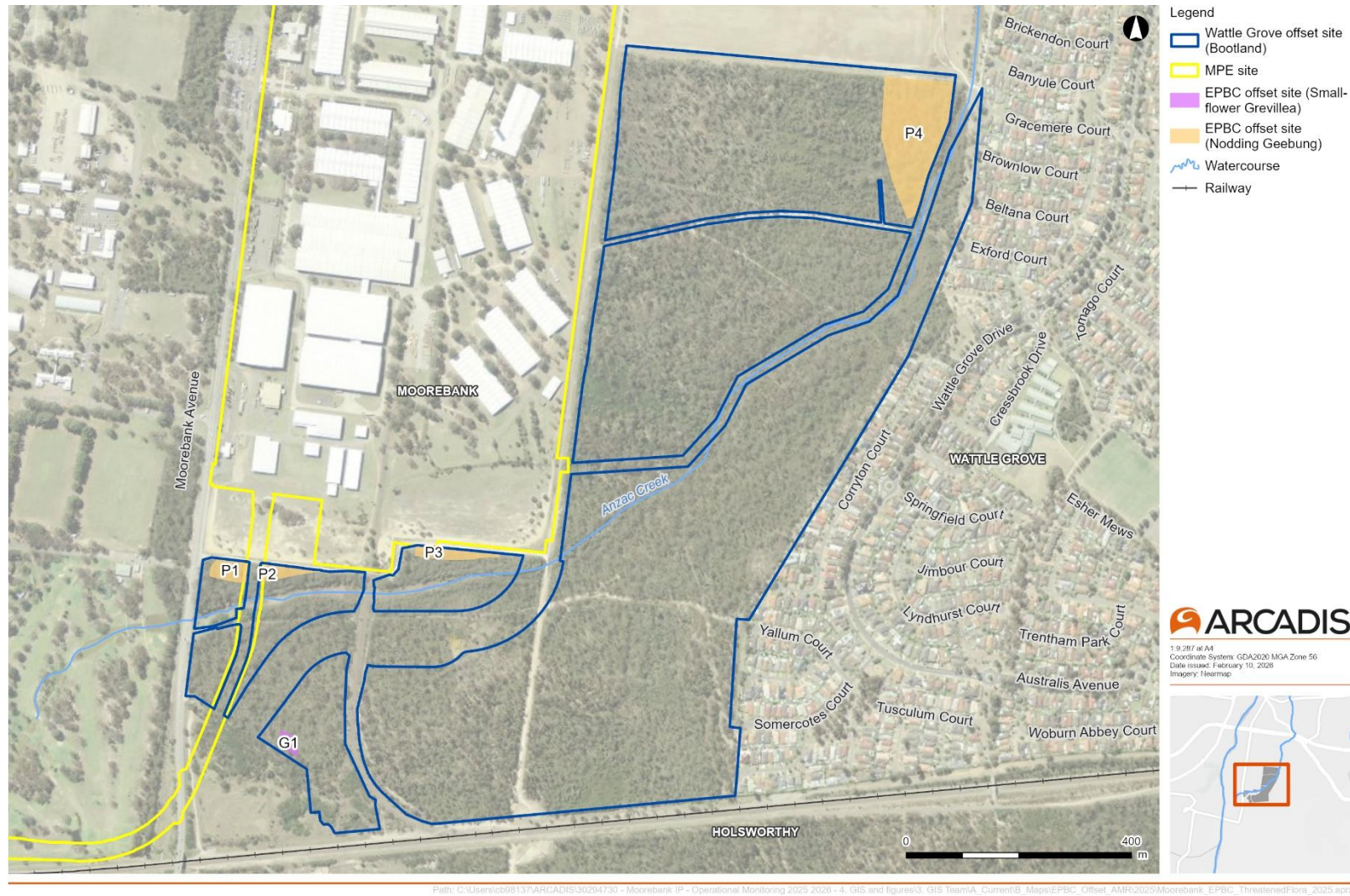


Figure 1. EPBC offset sites within Wattle Grove offset area; adjacent to the MPE site

1.4 Project documents

The following project documents were reviewed prior to establishing offset sites and referenced during the inaugural monitoring surveys to ensure adherence to the EPBC offsetting requirements and to maximise the chance of success in achieving the monitoring objectives:

- BioBanking Agreement (BA341) for Moorebank Intermodal Terminal Biobank Site (OEH 2017);
- Biodiversity Assessment Report: Biobanking Agreement – Wattle Grove Offset Area, Casula Offset Area and Moorebank Conservation Area (WSP & Parsons Brinckerhoff 2017);
- Biodiversity Management Implementation Plan (Arcadis 2019);
- Conditions attached to the approval: SIMTA Moorebank Intermodal Terminal Facility, Sydney, NSW (EPBC 2011/6229) (DoE 2014); and,
- Threatened Flora Offset Management Plan (Arcadis 2020a).

1.5 Establishment of offset sites

Five designated offset sites were established to satisfy offset obligations for impacts to EPBC-listed threatened flora generated by the MPE Project. The offset sites are situated within the Wattle Grove offset area, which forms part of the BA341 Moorebank biobank site. A formal Biobanking agreement between the Commonwealth Government and the NSW Government was established as the legal instrument to implement management, monitoring and auditing of the site and to protect the offset land in perpetuity.

In accordance with the revised TFOMP (Arcadis 2020a), four offset sites are designated for conserving *Persoonia nutans*, and one for *Grevillea parviflora* subsp. *parviflora*. It is anticipated that the conservation and management of EPBC offset sites will maintain the initial number of plants/stems of these species and will result in a population increase over a 20-year management period. To satisfy offset obligations generated by the action the following must be achieved across the designated offset sites:

- 171 *Persoonia nutans* individuals to achieve 100% of the offset obligation (as per Table 3-3 of TFOMP, Arcadis 2020a); and,
- 159 *Grevillea parviflora* subsp. *parviflora* individuals to achieve 100% of the offset obligation (Table 3-4 of TFOMP, Arcadis 2020a).

Offset calculations were prepared for *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* based on guidance provided in the EPBC Offset Assessments Guide (DOEE 2012). Offset calculations and associated species information (temporal scale, risk scales, future habitat quality, result confidence) have been included within the approved TFOMP (Arcadis 2020a). These calculations assessed and supported the suitability of the proposed offset sites to achieve at least 100 percent of the required EPBC offset for the MPE project over a period of 20 years.

A total of 155 *Persoonia nutans* and 142 *Grevillea parviflora* subsp. *parviflora* form the start value across the five designated offset sites. Over the 20-year time horizon and active management of the offset sites, the start populations of *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* are to increase by 16 and 17 individuals, respectively, to meet at least 100% of the offset obligation. The details of the offset site populations is provided in Table 2 and Table 3 below.

Table 2. Details of EPBC offset sites: *Persoonia nutans*

EPBC Offset Site	Area	Number of individual plants to be conserved within the offset site per the EPBC Act offset requirement	Offset requirement objective
P1	0.25 ha	31 plants of <i>Persoonia nutans</i>	Increase <i>Persoonia nutans</i> population within EPBC Offset Sites by 16 plants over 20 years
P2	0.2 ha	46 plants of <i>Persoonia nutans</i>	
P3	0.26 ha	35 plants of <i>Persoonia nutans</i>	
P4	2.17 ha	43 plants of <i>Persoonia nutans</i>	
Total	2.88 ha	155 plants of <i>Persoonia nutans</i>	

Table 3. Details of EPBC offset sites: *Grevillea parviflora* subsp. *parviflora*

EPBC Offset Site	Area	Number of stems to be conserved within the offset site per the EPBC Act offset requirement	Offset requirement objective
G1	0.24 ha	142 stems of <i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Increase <i>Grevillea parviflora</i> subsp. <i>parviflora</i> population within EPBC Offset Sites by 17 plants over 20 years

1.6 Monitoring history

The inaugural monitoring survey occurred in spring 2019 when four EPBC offset sites were established in accordance with the TFOMP (Arcadis 2017). The four offset sites were established to directly offset impacts to 11 *Persoonia nutans* and 20 *Grevillea parviflora* subsp. *parviflora* associated with the MPE Project.

In 2020, an additional six *Persoonia nutans* plants were impacted by the MPE Stage 2 development and subsequently required offsetting in accordance with the EPBC Offsetting Guide. The TFOMP was updated (Arcadis 2020a) to include the additional impacts and document how the additional offset would be achieved. During the second year of monitoring, an additional *Persoonia nutans* offset site (P4) was established at the northern extent of the Wattle Grove offset area. The P4 offset site was monitored along with the existing *Persoonia nutans* offset sites (P1, P2, P3 and P4), and *Grevillea parviflora* subsp. *parviflora* offset site (G1) during 2021, 2022, 2023 and within the current 2024 assessment.

Offset sites P1, P2, P3 and G1 were subject to wildfire 18 months prior to commencement of the monitoring program. The fire burnt through the southern portion of the Wattle Grove offset area which destroyed most start populations of *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* previously recorded. Offset site P4 was unaffected.

A summary of the species census results since inception of the respective EPBC offset sites (P1-P4, G1) is provided in Table 4. A summary of the previous 2023 monitoring is included in Section 1.6.1.

Table 4 Population census results of previous monitoring years (2019-2023)

Census Year	P1	P2	P3	P4	G1
2019	9	3	100	-	143
2020	13	0	77	43	60
2021	12	0	39	41	50
2022	7	1	28	32	112
2023	7	1	28	32	146

Census Year	P1	P2	P3	P4	G1
2024	7	1	38	34	75

1.6.1 Summary of year 5 (2024-2025) monitoring results

In spring 2024, monitoring was conducted for the four *Persoonia nutans* (P1, P2, P3 and P4) offset sites and the *Grevillea parviflora* subsp. *parviflora* offset site (G1). The population census recorded **80** individuals of *Persoonia nutans* and **75** individuals of *Grevillea parviflora* subsp. *parviflora*.

Of the 80 *Persoonia nutans* individuals identified, seven were identified across offset sites P1, one at P2, 38 at P3 and 34 individuals at offset site P4. A thorough search was conducted throughout offset sites P1, P2, P3 and P4 to re-locate *Persoonia nutans* individuals previously tagged during the previous monitoring surveys (2019, 2020, 2021, 2022 and 2023) and to record any new plants which may have recruited. Searches re-located 60 tagged *Persoonia nutans* individuals and identified 20 new plants. A total of eight individuals located during the previous year's survey (2023 monitoring event) were not re-located in P1, P3 and P4 and are presumed to have died between the 2023 and current surveys.

1.6.1.1 Offset site condition: *Persoonia nutans* (P1-P4)

Generally, *Persoonia nutans* within offset sites were observed to be in good condition, with approximately 89 percent of all individuals observed to be in healthy condition. No evidence of impacts from mammals (trampling or grazing) was observed. However, there was some evidence of damage from insects on juvenile plants in offset site P4. A diversity of native plant species was recorded across all offset sites, and exotic species occurrence was restricted to the edges of bushland, specifically on the interface between access tracks and bushland. *Eragrostis curvula* (African Lovegrass) was the most encountered weed species.

1.6.1.2 Offset site condition: *Grevillea parviflora* subsp. *parviflora* (G1)

Grevillea parviflora subsp. *parviflora* stems were found throughout the site, with greater densities observed towards the northeast and southwest of the offset site, and lower densities of plants distributed centrally. Some *Grevillea parviflora* subsp. *parviflora* stems were observed to be flowering at the time of the survey but did not appear to have seed present. Plants were generally sparsely scattered. However, close groupings of up to five plants were occasionally observed, generally in areas where leaf litter and ground cover species were absent.

The condition of vegetation across the G1 offset site was observed to be in good condition. Tagging individual *Grevillea parviflora* subsp. *parviflora* is not required as part of the annual monitoring. However generally, *Grevillea parviflora* subsp. *parviflora* within the offset site were observed to be in healthy condition, with 74 individuals were observed to be healthy. No evidence of impacts from mammals (trampling or grazing) was observed.

2 METHODS

In addition to the annual monitoring undertaken across the entire Wattle Grove Offset Area, specific monitoring is to be undertaken within the EPBC offset sites (G1, P1-P4). In accordance with EPBC Act CoA 6(e), annual monitoring of the EPBC Offset sites will be undertaken as part of operational monitoring of the MPE site. These monitoring events comprise a full population census applying the parallel field traverse method (also referred to as parallel transects by Cropper (1993)). In addition, there is habitat assessment, and additional photo points specific to the EPBC offset locations to monitor changes in site characteristics and identify potential impacts.

This section identifies how the specified monitoring activities for offset sites G1 and P1 – P4 are to be undertaken in accordance with Table 6-1 of the TFOMP (Arcadis 2020a). The required monitoring activities and timing is presented in Table 5 below and detailed within the respective sections.

Table 5 Specified monitoring activities for the EPBC offset sites (Arcadis 2020a)

Monitoring activity	Frequency	Report section
Population census	Annually in spring	Section 2.1
Habitat assessment		Section 2.2
Photo point monitoring		Section 2.3

2.1 Population census

Targeted searches for *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* were conducted within the respective offset sites. The following procedure and data were collected:

- Systematic transects at five-metre spacing were walked covering the entirety of each site;
- The location of individual plants was recorded using an Arc-GIS-enabled iPad to an accuracy of ± 5 -10 metres;
- Total counts were made for *Grevillea parviflora* subsp. *parviflora* and *Persoonia nutans* within the designated offset sites;
- For *Persoonia nutans* the following was recorded for each individual observed:
 - Size (height and spread)
 - General health (i.e. insect damage, stress etc)
 - Reproductive status (i.e. evidence of flowering and fruiting)
 - Individuals marked with numbered metal tags for tracking across monitoring periods
- Classification of individuals into growth stages:
 - Juveniles: smaller individuals lacking reproductive material (flowers and seeds); and,
 - Adults: larger individuals displaying reproductive material (flowers and seeds).

2.2 Habitat assessment

Offset sites were evaluated for habitat suitability for *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora*. An assessment of the habitat value of each offset site was determined by quantitatively measuring the condition of native vegetation, noting significant changes to site characteristics (i.e. vegetation growth, weed occurrence, erosion) and identifying potential impacts.

The condition of native vegetation within each offset site was measured using vegetation quadrats in accordance with Section 5.3 of the Biodiversity Assessment Method (BAM) (DPIE, 2020). BAM quadrats were undertaken at each of the offset sites, with two undertaken in offset site P4 due to its large area. Results of BAM quadrats were used to inform upon the following vegetation attributes:

- Percent foliage cover of canopy species
- Percent foliage cover of shrub species
- Percent foliage cover of ground cover species
- Percent foliage cover of exotic species

A Vegetation Integrity (VI) score was calculated using the results of vegetation quadrats conducted at each offset site. VI scores will be compared between monitoring periods to measure changes to vegetation conditions. It is anticipated that the VI score continually improves and the contributing attributes (composition, function etc.) move towards the benchmark scores for the present Plant Community Type (PCT), being PCT 883 *Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion*.

Notes were made for observations of native vegetation dieback within or surrounding the EPBC offset sites.

2.3 Photo points

Four photo points were established on the perimeter of each EPBC offset site, and a single photo point was established centrally within each offset site. Photo points on the boundary were captured in a single cardinal direction. In the middle of the plot, four photographs were captured from the central photo point in the four cardinal directions.

Photo points are located at metal boundary stakes and a stake in the middle of the offset site. The metal stakes were demarcated with a numbered metal tag identifying the relevant photo point. The locations of photo points and the orientation of photographs are presented in Appendix D.

2.4 Assessment qualifications and limitations

Arcadis ecologists undertook annual monitoring of EPBC offset sites over five days between 8 October 2025 and 18 November 2025.

Generally, the weather on the survey dates was sunny, and the temperature was mild to warm. Weather records from the nearest weather station, Holsworthy Aerodrome AWS (station 066161), for the surveyed dates, are presented in **Error! Reference source not found.**

Threatened flora searches were undertaken during the recommended survey season for *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* (DPIE 2019a, 2019b) to maximise the chance of detection.

Table 6. Surveying ecologists and climatic conditions during EPBC offset site monitoring

Date	Surveying ecologists	Temperature		Rain (mm)
		Min (°C)	Max (°C)	
08/10/2025	Brendan Fletcher, Emma Teusner	11.0	31.5	0.0
09/10/2025	Brendan Fletcher, Emma Teusner	18.1	28.8	0.0

Date	Surveying ecologists	Temperature		Rain (mm)
		Min (°C)	Max (°C)	
21/10/2025	Brendan Fletcher, Acacia Jennings, Emily Cleghorn	15.1	24.1	0.0
24/10/2025	Brendan Fletcher, Acacia Jennings	15.7	25.3	0.0
18/11/2025	Kate Mauger, Acacia Jennings	8.8	28.5	0.0

2.4.1 Limitations

In offset sites burned by the bushfire (P1, P2, P3 and G1), *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* transects were difficult to conduct due to common post-bushfire recruitment species such as *Acacia spp.*, *Melaleuca nodosa* (Prickly-leaved Paperbark), and *Petrophile sessilis* (Conesticks) creating dense thickets and hindering access. Transects were recorded on GPS devices to keep track of approximate lines. In some small areas where walking in straight lines was not possible, ecologists sought to prioritise areas of high-quality habitat.

Due to the density of bushland in some offset sites and the inconspicuous nature of seedling *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora*, transects may have failed to locate/re-locate all the plants present.

3 RESULTS

The results of the 2024 monitoring events for *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* are detailed within the following sections.

3.1 Population census for EPBC threatened flora

3.1.1 *Persoonia nutans*

Table 7 Summary of changes to *Persoonia nutans* populations across Offset Sites P1, P2, P3 and P4.

Census Year	P1	P2	P3	P4
2019	9	3	100	-
2020	13	0	77	43
2021	12	0	39	41
2022	7	1	28	32
2023	7	1	28	32
2024	7	1	38	34
2025 (current)	7	3	40	36
Total 2025				86

A thorough search was conducted throughout offset sites P1, P2, P3 and P4 to re-locate *Persoonia nutans* individuals previously tagged between the 2019 and 2023 surveys, and any new plants which may have recruited. Searches re-located 77 tagged *Persoonia nutans* individuals and identified nine new plants. A total of four individuals located during the previous year's survey (2024 monitoring event) were not re-located in P4 and are presumed to have died between the 2024 and current surveys.

Of the 86 recorded *Persoonia nutans* across the offset sites, about six percent were juveniles and the remainder were adult plants greater than one metre in height and width. Six juvenile *Persoonia nutans* were recorded within P3, a site that was impacted by the 2018 wildfire, however, no juveniles were recorded within P1 and P2. Offset site P4, which was not impacted by the wildfire, recorded one juvenile individual. The population dynamics of *Persoonia nutans* within each offset site are discussed below. The juvenile *Persoonia nutans* observed in offset sites P3 and P4 were all within about eight metres of a road or access track.

Across all sites the number of *Persoonia nutans* observed increased by six individuals since 2024. A new individual was recorded in each site, with one additional individual recorded in P1, two additional individuals recorded in both P2 and P4, and four additional individuals were recorded in P3 (Figure 2).

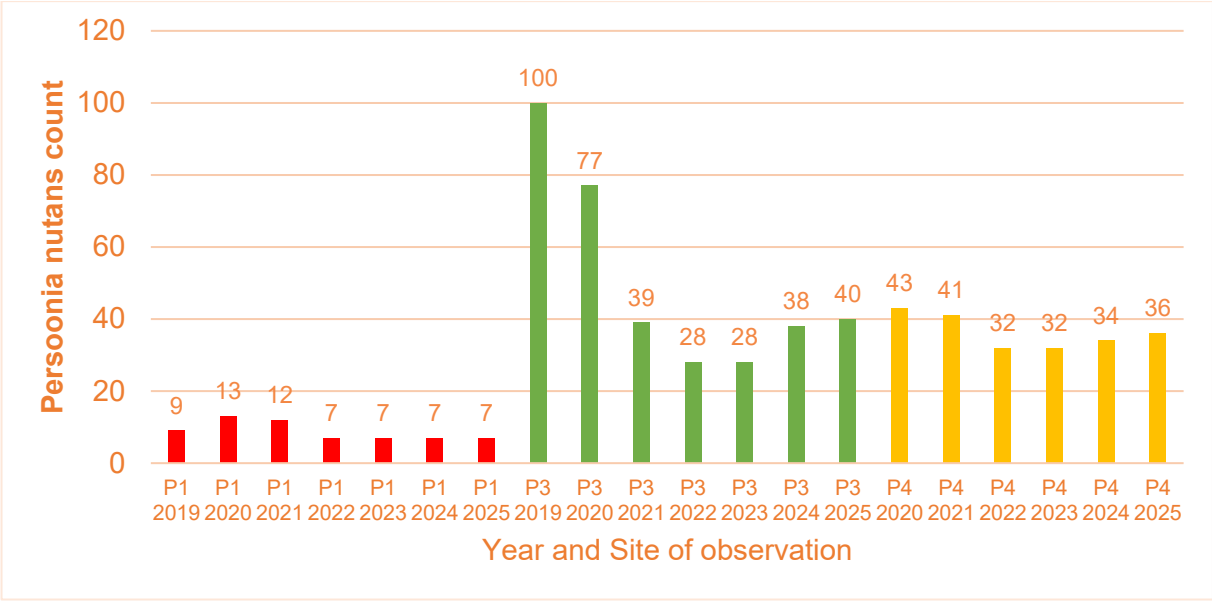


Figure 2: *Persoonia nutans* counts at each offset site since monitoring commenced. Site P2 has been omitted due to a small number (<3 individuals) of *Persoonia nutans* observed since 2019.

Generally, *Persoonia nutans* within offset sites were observed to be in healthy condition, with approximately 98 percent of all individuals observed to be in healthy condition. No evidence of impacts from mammals (trampling or grazing) was observed. However, there was some evidence of damage from insects in offset site P4.

Offset site P1

A total of seven *Persoonia nutans* were found in offset site P1 during the 2025 survey. All seven individuals were adult plants, and six of the seven plants identified had been previously recorded and were marked with numbered metal tags. One individual observed was unmarked, indicating that they could be new recruits. The one individual that were not reobserved could have perished or its tag could have fallen off. A summary of changes to the *Persoonia nutans* population within offset site P1 has been presented in Table 8.

Table 8. Summary of changes to *Persoonia nutans* population in offset site P1

Offset site P1	Count
Count of individuals from 2024 survey	7
Existing individuals	6
New individuals	1
Total	7
Individuals not re-located (presumed dead)	1

Persoonia nutans within offset site P1 were located towards the northern boundary of the offset site in disturbed areas near an access track (



Figure 3). *Persoonia nutans* were observed growing as individuals and in small groupings on a sandy soil profile interspersed amongst tussocks of African Lovegrass and beneath burnt Conesticks. *Persoonia nutans* were more prevalent in exposed areas with reduced leaf litter and vegetation cover.

All *Persoonia nutans* were found to be in a healthy condition and did not exhibit any signs of insect damage.

Offset site P2

During the 2025 monitoring event, three *Persoonia nutans* was identified within offset site P2. The existing *Persoonia nutans* was first observed within the 2022 survey and remains in a healthy condition with no sign of insect damage. Two additional individuals were recorded, each about three metres either side of the existing individual. Both new recorded individuals were observed to be in adult life stage and in a healthy condition.

Table 9. Summary of changes to *Persoonia nutans* population in offset site P2

Offset site P2	Count
Count of individuals from 2023 survey	1

Offset site P2	Count
Existing individuals	1
New individuals	2
Total	3
Individuals not re-located (presumed dead)	0

Offset site P3

A total of 40 *Persoonia nutans* were identified in offset site P3 during the 2025 survey, consisting of 34 adult plants and six juvenile plants. Of the 40 individuals identified, 36 had been recorded and marked with numbered metal tags during previous surveys. The additional four plants are considered to have germinated since the 2024 surveys. A total of two *Persoonia nutans* recorded during the previous 2024 surveys were not able to be re-located and are presumed to have died. A summary of changes to the *Persoonia nutans* population within offset site P3 has been presented in Table 10.

Table 10. Summary of changes to *Persoonia nutans* population in offset site P3

Offset site P3	Count
Count of individuals from 2023 survey	38
Existing individuals	36
New individuals	4
Total	40
Individuals not re-located (presumed dead)	2

The majority of individuals were observed growing in dense groupings along the northern boundary of the offset site interspersed amongst tussocks of African Lovegrass beneath stands of *Kunzea ambigua* (Tickbush). Individuals were observed to prefer the bushland's disturbed edge adjacent to an access track (

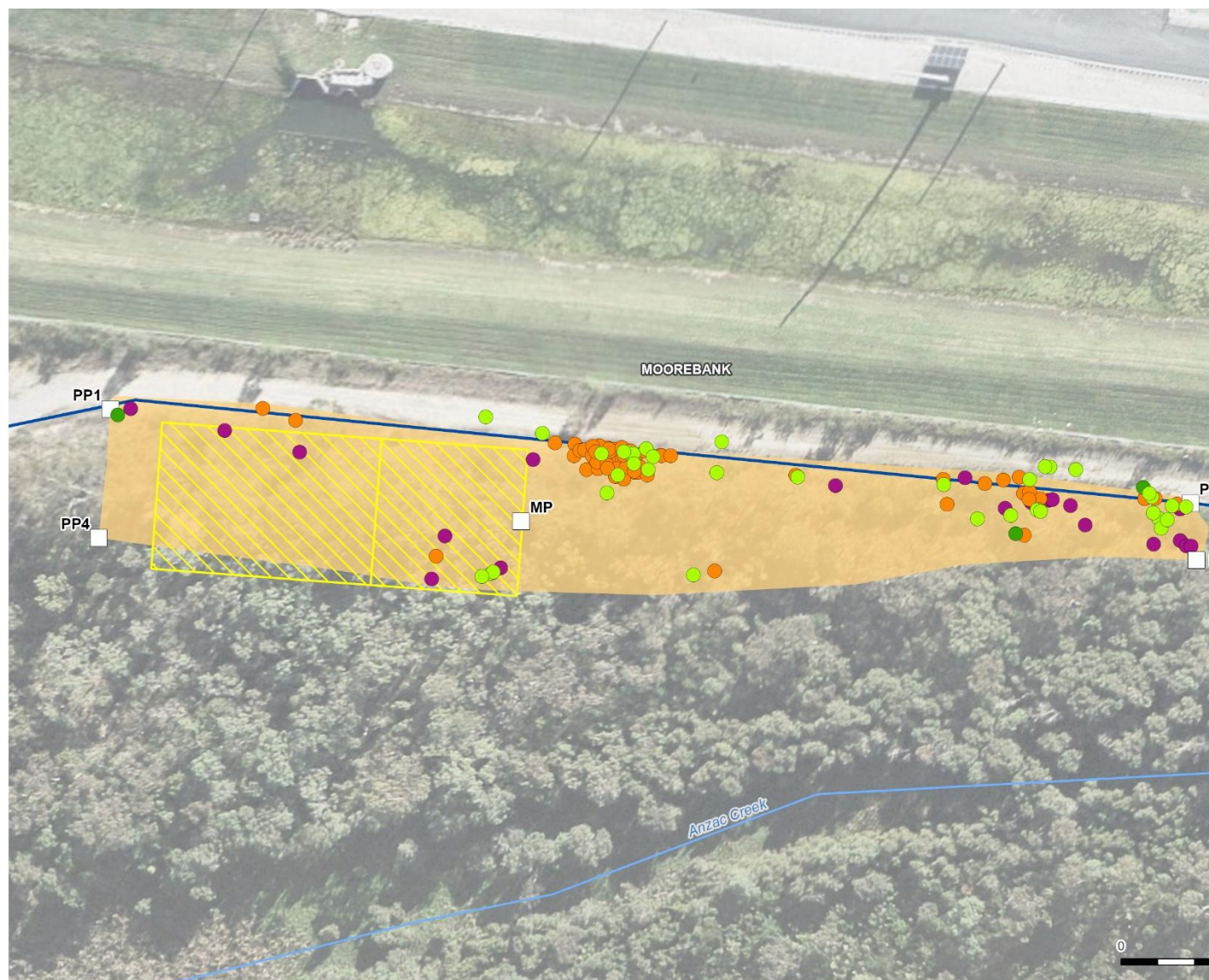


Figure 5).

Offset Site P4

A total of 36 *Persoonia nutans* were identified in offset site P4 during the 2025 survey. Of the 36 individuals identified, 34 had been previously recorded and marked with numbered metal tags during previous monitoring surveys. During field surveys two individuals of *Persoonia nutans* were observed to have died, one of which had been previously tagged in 2024 and was in poor health. Despite the death of these two individuals, the number of existing individuals remains consistent with the 2024 total of 34, therefore it is likely that two of existing individuals observed were not recorded last year and their tags were from a previous year of monitoring.

Two new individuals were observed both of which are in adult life stage and were in a healthy condition. A summary of changes to the *Persoonia nutans* population within offset site P4 has been presented in Table 11.

Table 11. Summary of changes to *Persoonia nutans* population in offset site P4

Offset site P4	Count
Count of individuals from 2023 survey	34
Existing individuals	34
New individuals	2
Total	36
Individuals not re-located (presumed dead)	2

Persoonia nutans within offset site P4 were distributed throughout Hard-leaved Scribbly Gum Woodland. Individuals were identified in areas of open woodland with a sparse shrub layer as well as areas densely vegetated with mid-storey species and shrubs.

Of the *Persoonia nutans* found, 35 individuals were in healthy condition, and one was in moderate condition. This individual had been observed in 2024 in a healthy condition, therefore indicating that its health condition has worsened over the year. Compared to the other offset sites, P4 had the highest rate of insect damage with four individuals exhibiting low effects of insect damage.

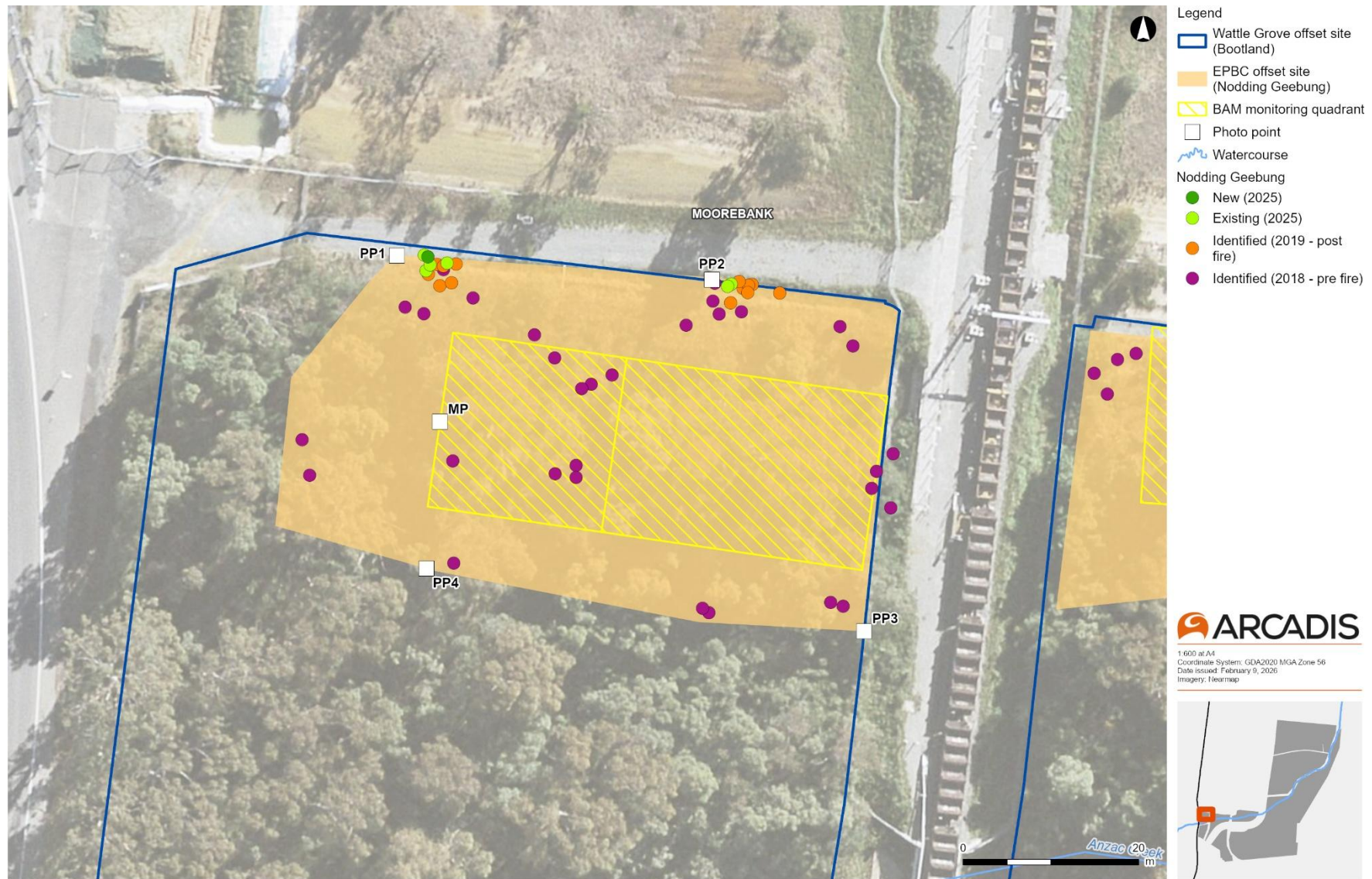


Figure 3. Offset site P1: *Persoonia nutans* records 2025

Annual EPBC Offset Site Monitoring (2025-26)

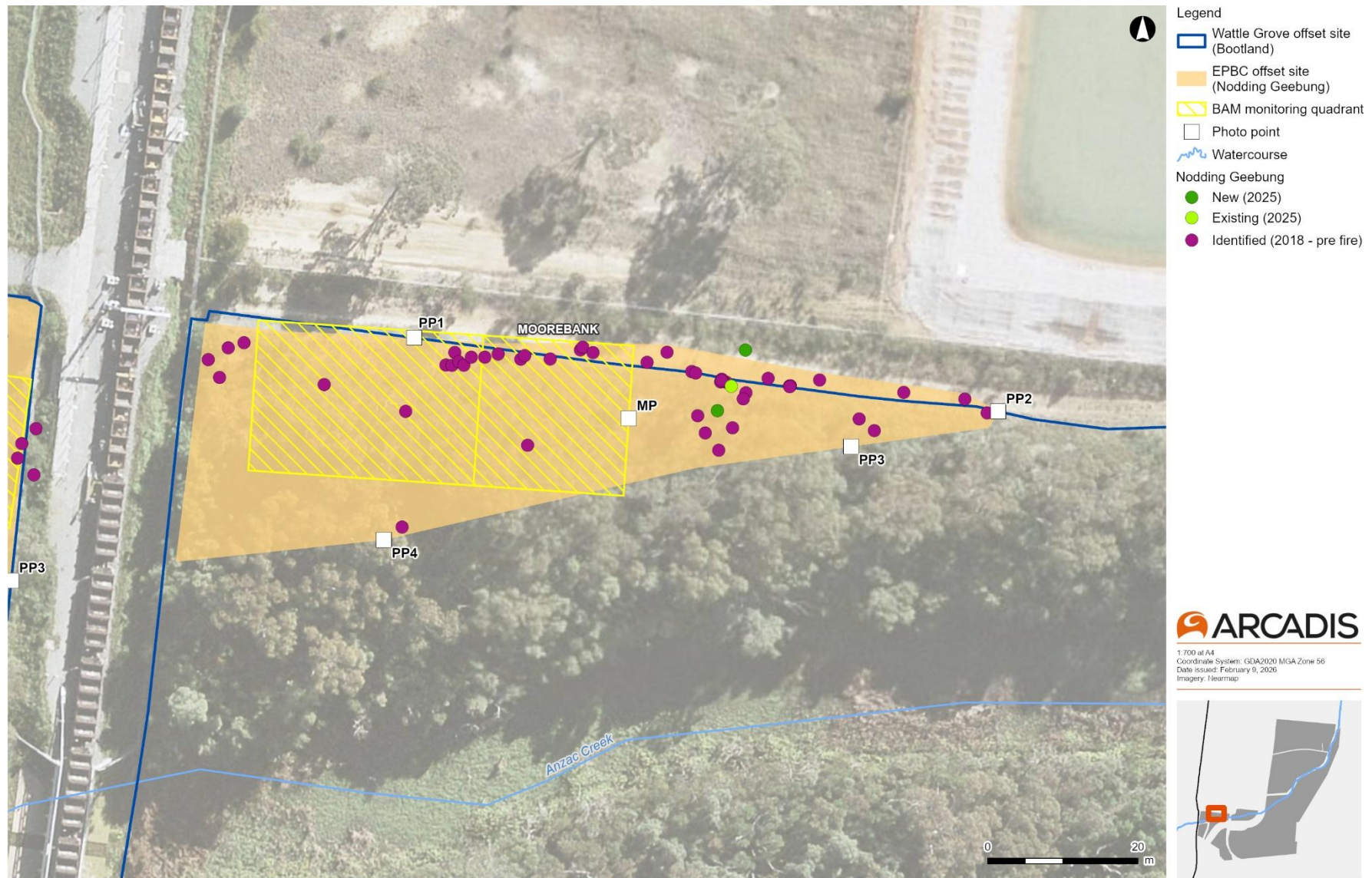


Figure 4. Offset site P2: *Persoonia nutans* records 2025

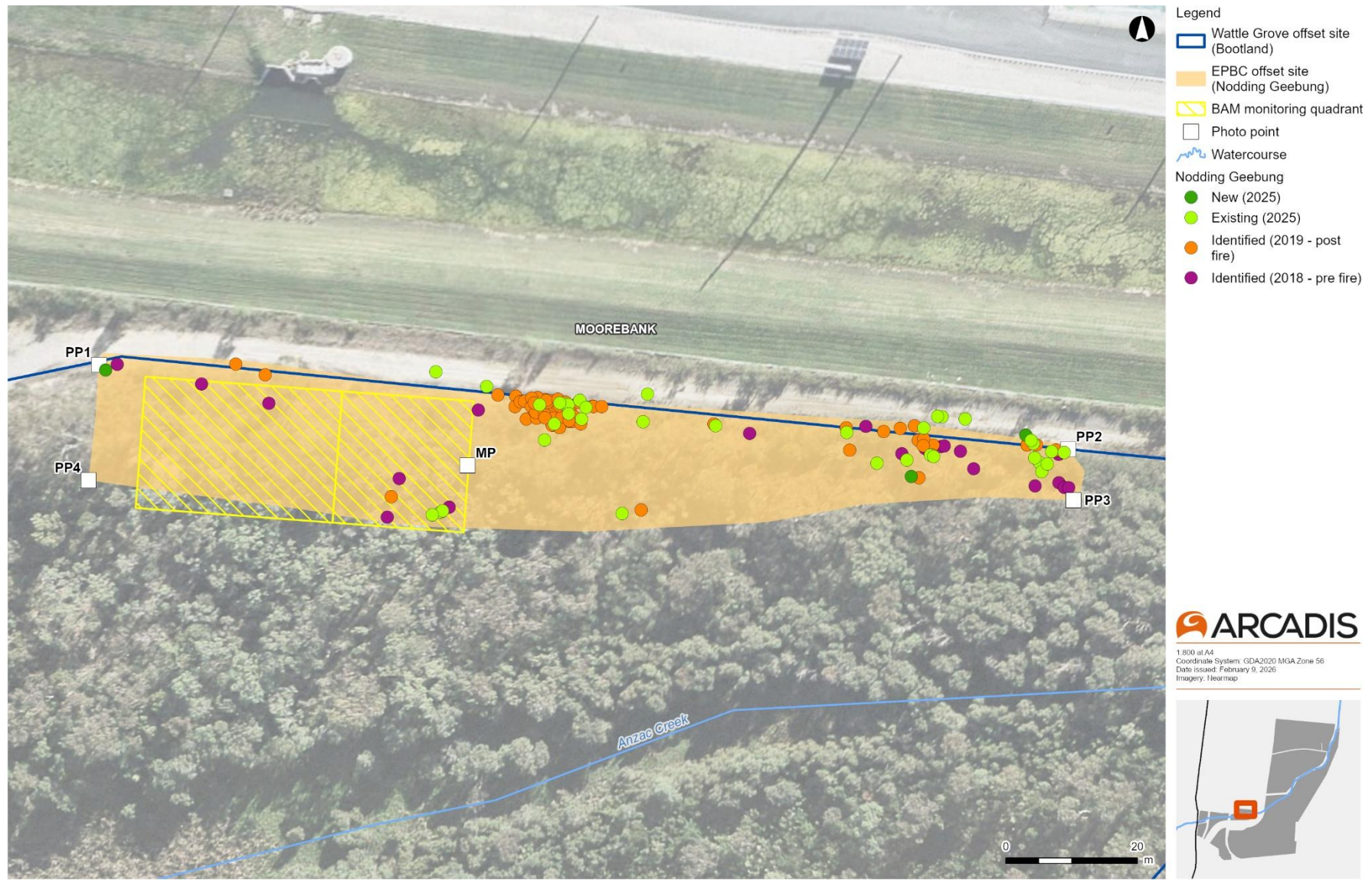


Figure 5. Offset site P3: *Persoonia nutans* records 2025

Annual EPBC Offset Site Monitoring (2025-26)



Figure 6. Offset site P4: *Persoonia nutans* records 2025

3.1.2 *Grevillea parviflora* subsp. *parviflora*

Offset site G1

A total of 77 *Grevillea parviflora* subsp. *parviflora* stems were identified within offset site G1 during the 2025 survey. Unlike *Persoonia nutans*, the TFOMP (Arcadis 2020) did not include a requirement to mark *Grevillea parviflora* subsp. *parviflora* individuals during the 2019 survey, therefore, recruitment and death rates within the population cannot be accurately determined. Furthermore, as the plants are capable of suckering from a rootstock and most populations demonstrate a degree of vegetative spread, counts of individual genets in a population is very difficult as new shoots can be mistaken for distinct plants. Consistent with the methodology implemented in 2024, a point was dropped and the number of individuals within about a three-meter diameter were counted. The 2025 survey has seen an increase in *Grevillea parviflora* subsp. *parviflora*, with an increase of two *Grevillea parviflora* subsp. *parviflora* individuals since the 2023-2024 survey. The number of individuals recorded is more closely aligned with the numbers observed in 2020, 2021 and 2024, compared to the 2022 and 2023 surveys. The population was observed to have a similar distribution to previous surveys (

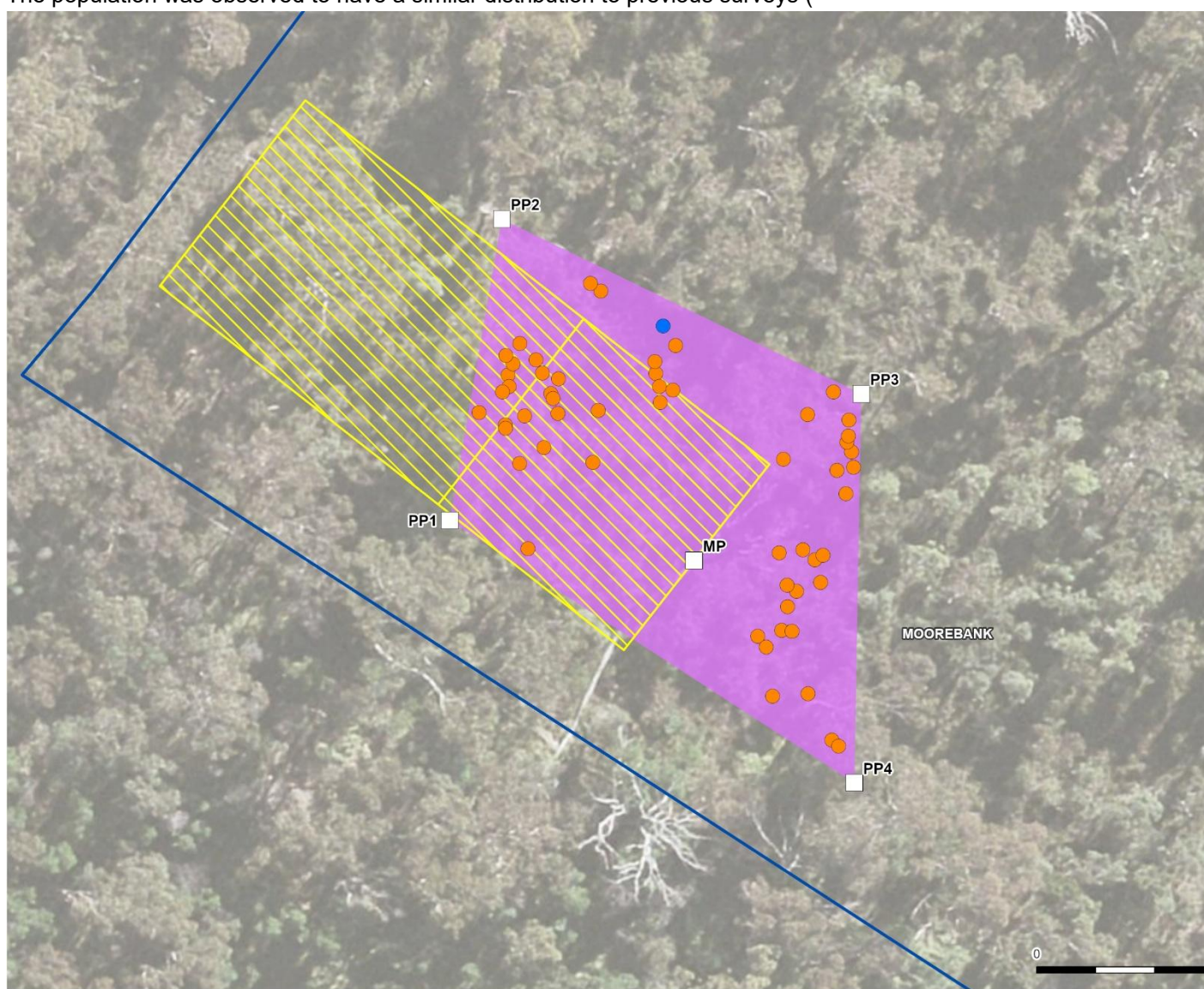


Figure 8).

Path: C:\Users\cb98137\ARCADIS\30294730 - Moorebank IP - Operational Monitoring 2025 2026 - 4. GIS and figures\3. GIS Team\A_Current\B_Maps\EPBC

A summary of changes to the *Grevillea parviflora* subsp. *parviflora* population within offset site G1 across the annual monitoring events is presented in Table 12.

Table 12. Summary of changes to *Grevillea parviflora* subsp. *parviflora* population in offset site G1

Offset site G1	Count
Count of stems from 2019 survey	143
Count of stems from 2020 survey	60
Count of stems from 2021 survey	50
Count of stems from 2022 survey	112
Count of stems from 2023 survey	146
Count of stems from 2024 survey	75
Count of stems from (current) 2025 survey	77

The distribution of *Grevillea parviflora* subsp. *parviflora* found throughout the site was largely similar to the 2024 survey, with the addition of two newly identified individuals towards the north of the site. Greater densities were observed towards the northeast and southwest of the offset site, and lower densities of plants distributed centrally. Some *Grevillea parviflora* subsp. *parviflora* stems were observed to be flowering at the time of the survey but did not appear to have seed present. Plants were generally sparsely scattered. However, close groupings of up to five plants were occasionally observed, generally in areas where leaf litter and ground cover species were absent.

Generally, *Grevillea parviflora* subsp. *parviflora* within the offset site were observed to be in healthy condition. No evidence of impacts from mammals (trampling or grazing) was observed.

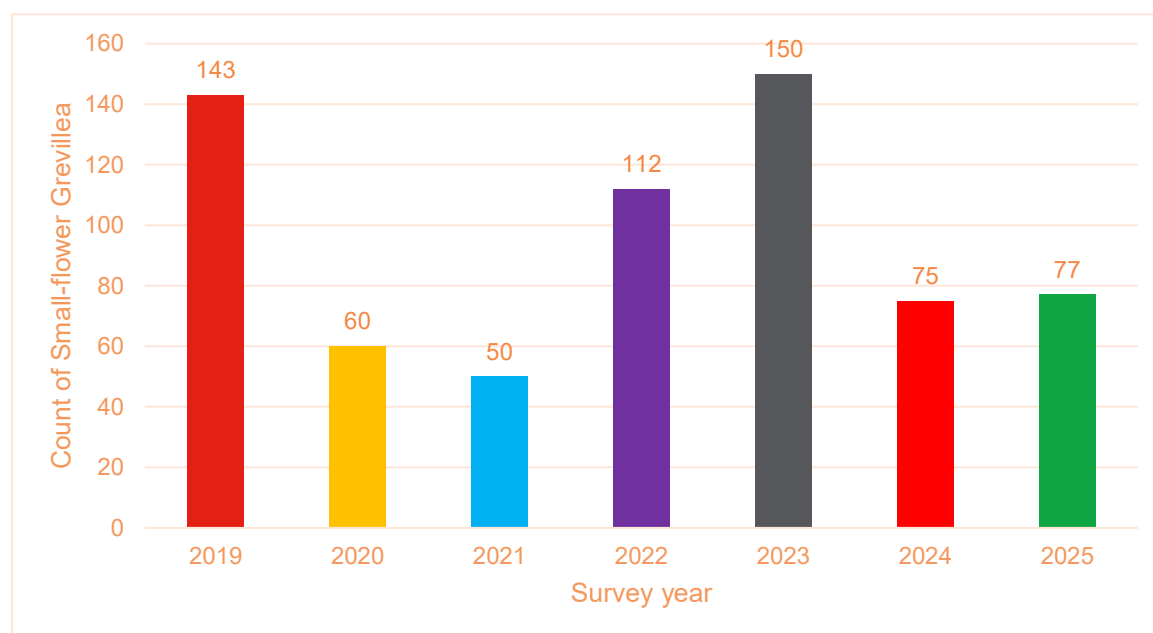


Figure 7. Total number of *Grevillea parviflora* subsp. *parviflora* observed at the site since observation began in 2019.

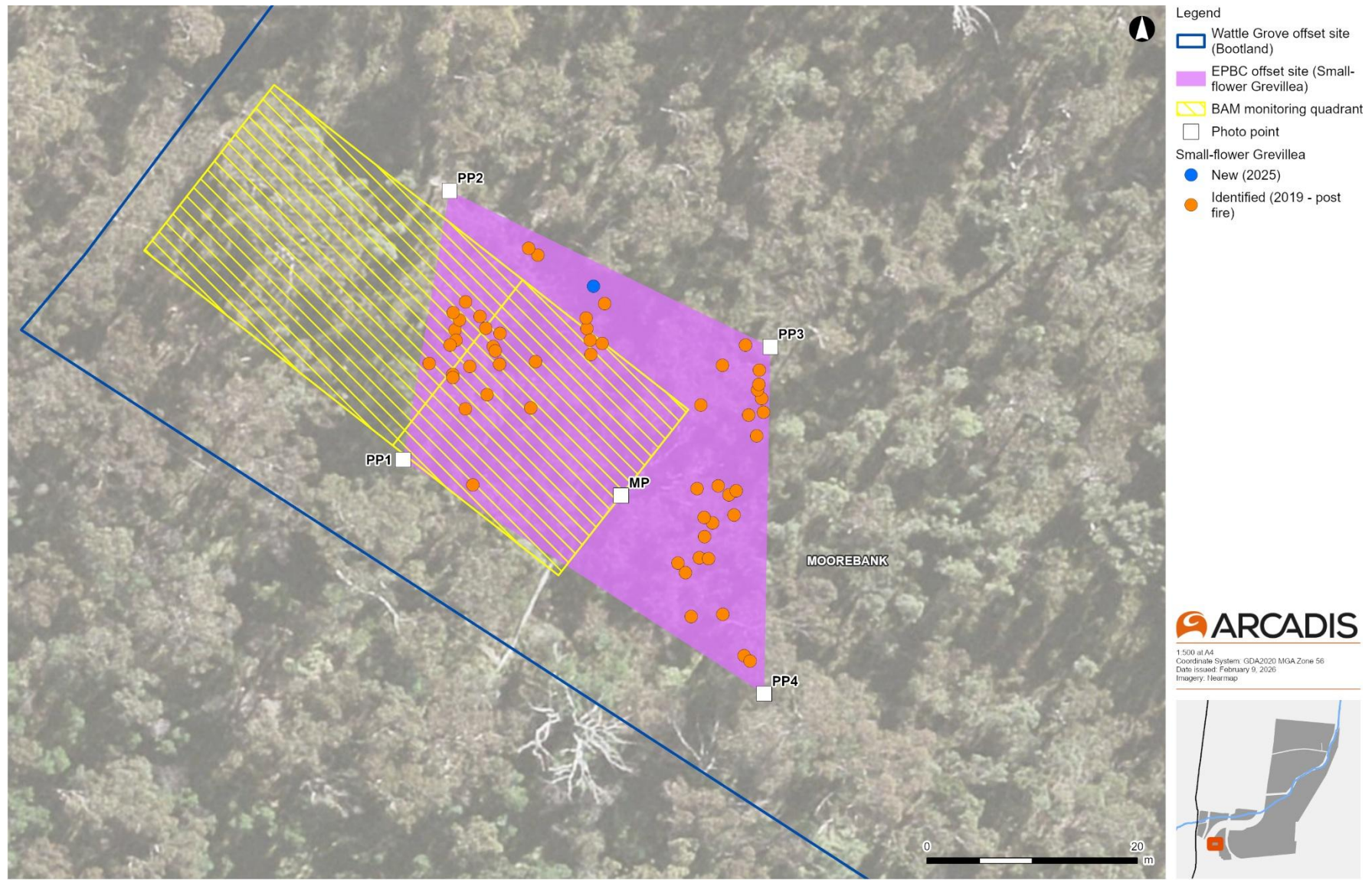


Figure 8. Offset site 4: *Grevillea parviflora* subsp. *parviflora* records 2025, whereby one record can be indicative of cluster of *Grevillea parviflora* subsp. *parviflora*

3.2 Habitat assessment

All five EPBC offset sites are situated within PCT 883 *Hard-leaved Scribbly Gum – Parramatta Red Gum heathy woodland of the Cumberland Plain, Sydney Basin Bioregion*. This community is one of several unique dry shrub woodland communities found on poorly consolidated sand deposits on hinterland plains and valleys of the Sydney region. This community occurs on old stream deposits at Holsworthy (Tozer et al. 2010).

This vegetation has a woodland formation comprising an open, low-growing eucalypt cover dominated by *Eucalyptus racemosa* (Hard-leaved Scribbly Gum), *Angophora bakeri* (Narrow-leaved Apple) and *Eucalyptus parramattensis* subsp. *parramattensis* (Parramatta Red Gum). A sparse cover of *Melaleuca decora* (Tall Paperbark) and *Melaleuca nodosa* (Prickly-leaved Paperbark) is often present. *Banksia* spp., *Hakea* spp., *Acacia* spp., *Leptospermum* spp., and *Melaleuca* spp., provide a well-developed shrub layer. The ground layer typically supports a diverse mix of species, including a high cover of grasses and sedges (Tozer et al. 2010).

3.2.1 *Persoonia nutans*

3.2.1.1 General habitat preference (OEH, 2019)

The ecology of *Persoonia nutans* is poorly known, and this species has a disjunct distribution. The southern population of *Persoonia nutans*, which includes this population, is isolated and consists of relatively small populations in the Liverpool, Campbelltown, Bankstown and Blacktown local government areas. The southern population occupies tertiary alluvium extending onto shale sandstone transition communities into Cooks River/Castlereagh Ironbark Forest.

Habitat preference is not well understood; however, abundance at sites appears to be related to disturbance history, as sites with higher abundance appear to be more disturbed. The frequency of disturbance, particularly fire, is of vital importance for the management and conservation of *Persoonia nutans*.

The species prefers low woodland communities dominated by Hard-leaved Scribbly Gum and Narrow-leaved Apple with a diverse understorey of sclerophyllous shrub species. *Persoonia nutans* is an obligate seeder and, therefore, may be difficult to detect during targeted surveys even if it is present, as it can be stored in the seed bank, and the number of above-ground individuals will fluctuate in space and time (DEC 2006).

3.2.1.2 Offset Site P1 (*Persoonia nutans*)

The patch of Hard-leaved Scribbly Gum – Parramatta Red Gum heathy woodland within offset site P1 recorded a VI score of **72.8/100**. This patch of vegetation had a complete structure including native species from each vegetation stratum, canopy, shrub and ground layer. Weed cover across the offset site was low, with only scattered occurrences of African Lovegrass present (0.1% cover). The habitat assessment results for site P1 are presented within Table 13 and discussed below.

Table 13. Habitat assessment summary: EPBC Offset Site P1

Attributes	PCT Benchmark	Survey results	Dominant species
Tree cover	28	21.0	<i>Angophora bakeri</i> (10%), <i>Eucalyptus racemosa</i> (5%), <i>Acacia decurrens</i> (5%)
Shrub cover	82	65.9	<i>Melaleuca nodosa</i> (40%), <i>Leptospermum trinervium</i> (10%), <i>Acacia longifolia</i> (5%)

Attributes	PCT Benchmark	Survey results	Dominant species
Ground cover	66	5.0	<i>Microlaena stipoides</i> (3%), <i>Entolasia stricta</i> (1%)
Exotic cover	NA	0.1	<i>Eragrostis curvula</i> (0.1%)
VI Score	100	72.8	

The upper stratum comprised four tree species: *Acacia decurrens* (Black wattle), *Angophora bakeri* (Narrow-leaved Apple), *Eucalyptus paramatensis* (Parramatta Red Gum) and *Eucalyptus racemosa* (Hard-leaved Scribbly Gum). Canopy cover was 21.0 percent across the quadrat.

Native shrub cover was 65.9 percent across the quadrat, with 13 different species identified in this stratum. The dominant shrub species included *Melaleuca nodosa* (Prickly-leaved Paperbark), *Leptospermum trinervium* (Slender Tea-tree), *Acacia longifolia* (Sydney Green Wattle) and *Callistemon linearifolius* (Netted Bottle Brush).

12 ground layer species were recorded within the BAM vegetation quadrat, having a combined cover of 5.0 percent. The dominant ground cover species included *Entolasia stricta* (Wiry Panic) and *Microlaena stipoides* (Weeping Grass).

Weeds cover was generally low across the offset site, with one exotic flora species being identified. Weed cover was recorded as 0.1 percent, comprising of African Lovegrass. A representative photograph of the habitat within the P1 offset site is provided in Plate 1 below.



Plate 1 Vegetation within EPBC Offset Site P1

3.2.1.3 Offset Site P2 (*Persoonia nutans*)

The patch of Hard-leaved Scribbly Gum – Parramatta Red Gum heathy woodland within offset site P2 recorded a VI score of **58.5/100**. The vegetation assemblage is fully structured with an established canopy, shrub layer and developing ground layer. There is little to no weed occurrence within the core of the offset site. Invasive grasses are present on the northern boundary of the offset site, on the peripheries of natural bushland next to a vehicle access track.

The habitat assessment results for site P2 are presented within Table 14 and discussed below.

Table 14. Habitat assessment summary: EPBC Offset Site P2

Attribute	PCT Benchmark	Survey results	Dominant species
Tree cover	28	29.0	<i>Eucalyptus racemosa</i> (15%), <i>Acacia parramattensis</i> (10%)
Shrub cover	82	36.2	<i>Melaleuca nodosa</i> (20%), <i>Exocarpos cupressiformis</i> (5%), <i>Hakea sericea</i> (5%)
Ground cover	66	17.0	<i>Lomandra longifolia</i> (10%), <i>Microlaena stipoides</i> (5%)
Exotic cover	NA	1.0	<i>Eragrostis curvula</i> (1%)
VI Score	100	58.5	

Four species were present within the canopy stratum: *Acacia paramatensis* (Parramatta Wattle), *Angophora bakeri* (Narrow-leaved Apple), *Eucalyptus paramatensis* (Parramatta Red Gum) and *Eucalyptus racemosa* (Hard-leaved Scribbly Gum). The canopy recorded a cover of 29 percent across the quadrat.

A total of 9 shrub species were identified in the vegetation quadrat. The dominant shrubs species present include *Melaleuca nodosa* (Prickly-leaved Paperbark), *Exocarpos cupressiformis* (Native Cherry), *Hakea sericea* (Needlebush) and *Melaleuca decora* (Tall Paperbark). The total shrub cover recorded for the quadrat was 36.2 percent.

The ground stratum covered 17.0 percent, including eight different flora species. The dominant ground covers species included *Lomandra longifolia* (Spiny-headed Mat Rush), *Microlaena stipoides* (Weeping grass) and *Entolasia stricta* (Wiry Panic).

Weeds cover was generally low across the offset site, with one exotic flora species being identified. Weed cover was recorded as 1.0 percent, comprising African Lovegrass. Patches of African Lovegrass are present along the northern boundary of the offset site on the periphery of bushland next to an access track.

A representative photograph of the habitat within the P2 offset site is provided in Plate 2 below.



Plate 2 Vegetation within EPBC Offset Site P2

3.2.1.4 Offset Site P3 (*Persoonia nutans*)

The patch of Hard-leaved Scribbly Gum – Parramatta Red Gum heathy woodland within offset site P3 recorded a VI score of **67.1/100**. The assemblage has recovered significantly since the wildfire and contains a diverse shrub and ground cover stratum. Within the natural bushland, weed occurrence is sparse. Weed occurrence was only observed on the northern boundary, on the peripheries of bushland adjacent to a vehicle access track.

The habitat assessment results for site P3 are presented within Table 15 and discussed below.

Table 15. Habitat assessment summary: EPBC Offset Site P3

Attributes	PCT Benchmark	Survey results	Dominant species
Tree cover	28	27.0	<i>Angophora bakeri</i> (20%), <i>Eucalyptus racemosa</i> (5%) <i>Acacia binervia</i> (2%)
Shrub cover	82	24.9	<i>Hakea sericea</i> (5%), <i>Petrophile sessilis</i> (5%), <i>Leptospermum parvifolium</i> (5%)
Ground cover	66	24.6	<i>Imperata cylindrica</i> (10%), <i>Microlaena stipoides</i> (5%) <i>Leptochloa</i> spp. (5%)
Exotic cover	NA	1.0	<i>Eragrostis curvula</i> (0.5%), <i>Gomphocarpus</i> spp. (0.5%)
VI Score	100	67.1	

Three canopy species were identified within the vegetation quadrat: *Angophora bakeri* (Narrow-leaved Apple), *Eucalyptus racemosa* (Hard-leaved Scribbly Gum) and *Acacia binervia* (Coast Myall). Canopy cover accounted for 27 percent across the quadrat.

Shrubs accounted for 24.9 percent cover across the quadrat. A total of 16 native shrubs species were identified, including *Petrophile sessilis* (Prickly Conesticks), *Hakea sericea* (Bushy needlewood), *Melaleuca decora* (Tall Paperbark), *Melaleuca thymifolia* (Thyme Honey-myrtle) and *Leptospermum parvifolium* (Lemon-scented Tea Tree).

A total of 16 ground cover species was recorded within the vegetation quadrat, accounting for a cover of 24.6 percent. Groundcover species identified included *Imperata cylindrica* (Cogon grass) *Entolasia stricta* (Wiry Panic), *Leptochloa species*, and *Microlaena stipoides* (Weeping Grass).

Weed cover was generally low across the offset site, with two exotic flora species being identified. African lovegrass and a *Gomphocarpus species* each recorded a percentage cover of 0.05 percent, totalling one percent. Similarly to other offset sites, weed occurrence was mainly restricted to the peripheries of intact bushland adjacent to a vehicle access track.

A representative photograph of the habitat within the P3 offset site is provided in Plate 3 below.



Plate 3 Vegetation within EPBC Offset Site P3

3.2.1.5 Offset site P4 (*Persoonia nutans*)

The patch of Hard-leaved Scribbly Gum – Parramatta Red Gum heathy woodland within offset site P4 recorded an average VI score of **80.8/100** across the two vegetation quadrats (74.3 VI & 87.2 VI). Due to the large size of the offset site, two vegetation quadrats were conducted to give a representative condition score for vegetation. The results of each quadrat area are summarised in Table 16 **Error! Reference source not found.** and Table 17 and discussed below. The 2018 wildfire did not impact this patch of bushland. This assemblage has an established canopy and a well-developed tall shrub layer, transitioning from a densely shrubby woodland to open woodland. Where shrubs density was less, ground covers were more prominent.

Table 16. Habitat assessment summary: EPBC Offset Site P4(A)

Attributes	PCT Benchmark	Survey result	Dominant species
Tree cover	28	20.0	<i>Eucalyptus haemastoma</i> (12%), <i>Angophora bakeri</i> (8%)
Shrub cover	82	50.3	<i>Melaleuca nodosa</i> (20%), <i>Hakea sericea</i> (10%), <i>Petrophile sessilis</i> (5%)
Ground cover	66	29.8	<i>Lomandra longifolia</i> (15%), <i>Lepidosperma latens</i> (10%), <i>Entolasia stricta</i> (1%)
Exotic cover	NA	0	None
VI Score	100	74.3	

Table 17. Habitat assessment summary: EPBC Offset Site P4(B)

Attributes	PCT Benchmark	Survey results	Dominant species
Tree cover	28	74.0	<i>Eucalyptus parramattensis</i> (52%), <i>Angophora bakeri</i> (20%)
Shrub cover	82	76.0	<i>Melaleuca nodosa</i> (20%), <i>Bossiaea heterophylla</i> (20%), <i>Hakea sericea</i> (20%)
Ground cover	66	22.3	<i>Austrostipa puberula</i> (10%), <i>Themeda triandra</i> (5%)
Exotic cover	NA	0.4	<i>Senecio madagascariensis</i> (0.1%) <i>Briza maxima</i> (0.1%)
VI Score	100	87.2	

Canopy cover was recorded at 74 percent in the vegetation quadrat in P4(B) and 20 percent in P4(A). The dominant tree species across the offset site are *Eucalyptus parramattensis* (Parramatta Red Gum), *Angophora bakeri*, *Eucalyptus haemastoma* and *Angophora bakeri*. The average canopy cover of the offset site is above the benchmark tree cover scores for the Hard-leaved Scribbly Gum – Parramatta Red Gum heathy woodland community.

Shrub cover differs through the offset site, with some areas having a more open shrubby structure and others a dense thicket of shrubs. Shrub cover at two vegetation quadrats recorded 50.3 percent and 76.0 percent. A suite of tall shrub species are common across the site, including *Melaleuca nodosa* (Prickly-leaved Paperbark), *Hakea sericea* (Bushy Needlewood) and *Bossiaea heterophylla*. A total of 28 different shrubs species was recorded across vegetation quadrats conducted within the offset site.

A total of 26 ground cover species were recorded across the two vegetation quadrats conducted within offset site P4. The ground covers differed across the sites measuring 29.8 percent at P4(A) location and 22.3 percent at P4(B). Forbs and twining plants were common within the ground stratum.

Ground species present included *Lomandra longifolia*, *Lepidosperma latens*, *Melaleuca nodosa*, *Bossiaea heterophylla*.

No exotic species were recorded within P4(A), and four exotic flora species were recorded within P4(B). These were *Senecio madagascariensis*, *Conyza bonariensis*, a *Lolium* species and *Briza maxima*, and totalled 0.4 percent.

A representative photograph of the habitat within the P4 offset site is provided in



Plate 4 below.



Plate 4. Vegetation within EPBC Offset Site P4

3.2.2 Small-flower Grevillea

3.2.2.1 General habitat preference (OEH, 2019)

Small-flower Grevillea has a habitat preference for sandy or light clay soils, usually over thin shales, often with lateritic ironstone gravels and nodules. Populations of Small-flower Grevillea in the Sydney region usually occur on Tertiary sands and alluvium and soils derived from the Mittagong Formation.

This species occurs in a range of vegetation types, from heath and shrubby woodland to open forest. Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Southern Sydney occurrences are typically at 100-300m ASL. Often occurs in open, slightly disturbed sites such as along tracks.

Habitat preference of this species also includes open, slightly disturbed sites such as along tracks.

3.2.2.2 Offset Site G1 (Small-flower Grevillea)

The Hard-leaved Scribbly Gum – Parramatta Red Gum heathy woodland patch within offset site G1 recorded a VI score of **75.9/100**. The assemblage has a sparse canopy cover and a well-developed shrub and ground stratum. A diversity of native flora species are present, and the occurrence of weeds was absent. The habitat assessment results for site G1 are presented within Table 18 and discussed below.

Table 18. Habitat assessment summary: EPBC offset site G1

Attributes	PCT Benchmark	Survey results	Dominant species
Tree cover	28	17.2	<i>Eucalyptus parramattensis</i> (15%), <i>Angophora bakeri</i> (2%)
Shrub cover	82	43.9	<i>Melaleuca nodosa</i> (25%), <i>Hakea sericea</i> (10%), <i>Leptospermum trinervium</i> (5%)
Ground cover	66	49.0	<i>Cyathochaeta diandra</i> (35%) <i>Entolasia stricta</i> (10%)
Exotic cover	NA	0	
VI Score	100	75.9	

The canopy stratum comprises three different tree species and recorded a cover of 17.2 percent within the vegetation quadrat. Trees species within the offset site include *Angophora bakeri* (Narrow-leaved Apple) and *Eucalyptus paramatensis* (Parramatta Red Gum).

Shrub cover was relatively uniform across the offset site and continues to regenerate following the wildfire in 2018, recording a cover of 42.9 percent. A total of 13 different shrubs species were identified, including *Melaleuca nodosa* (Prickly-leaved Paperbark), *Hakea sericea* (Bushy Needlewood) and *Leptospermum trinervium* (Flaky-barked Tea-tree).

Ground cover species, including grasses, forbs, herbs and scrambling plants, recorded a cover of 49.0 percent across the vegetation quadrat, a large increase compared to previous years. 15 different species were identified, dominated by *Cyathochaeta diandra* and *Entolasia stricta* (Wiry Panic).

The offset site vegetation quadrat recorded no weed cover.

A representative photograph of the habitat within the G1 offset site is provided in Plant 5 below.



Plate 5. Vegetation within EPBC Offset Site G1

3.3 Photo point monitoring

Annual monitoring photographs are presented in Appendix C.

4 REVIEW OF CURRENT MANAGEMENT ACTIONS

The offset sites were established within high-condition patches of native vegetation within the BA341 biobank site. This has minimised the need for management actions to protect the extant populations of *Grevillea parviflora* subsp. *parviflora* and *Persoonia nutans* since 2019. Despite the 2018 wildfire (a stochastic event) which killed a large proportion of the adult plants in the southern offset sites (P1, P2, P3 and G1), other threats including feral animal grazing, inappropriate access from public leading to trampling or habitat degradation (i.e. dumping), which can be managed, are not apparent or jeopardising the remaining individuals. However, invasive weed species, namely African Lovegrass, are increasingly threatening the preferred habitat for *Persoonia nutans* in P1, P2 and P3.

Being a biobank site, native vegetation and biodiversity values are subject to improvement through a combination of management activities including weed removal, bush regeneration, soil stabilisation and habitat enhancement. In 2022, EcoLogical was engaged by National Internodal (owner of the BA341 biobank site) to commence active management of the site. Prior to this the biobank site was being passively managed, which was restricted to maintenance of infrastructure (i.e. fencing, gates), erosion and sediment control works and annual monitoring.

In 2025 EcoLogical have conducted a suite of bush regeneration activities (weed removal, revegetation, and brush matting) across the broader biobank site and the Wattle Grove offset sites. These works have targeted a range of invasive species, including Lantana, Ludwigia, African Lovegrass, Privet, Blackberry, Pampas Grass, Fireweed, Crofton Weed, Whiskey Grass, and Japanese Honeysuckle. Woody weeds were controlled using the cut and paint method, while grasses were slashed and selectively spot sprayed to protect threatened species. Pampas Grass seeds were collected and disposed of off-site to prevent further spread. Vine weeds were skirted and left in place, with ground material carefully spot sprayed. Herbaceous weeds such as Fireweed and Crofton Weed were treated by spraying or hand removal, depending on their proximity to sensitive vegetation. Ludwigia infestations in waterways were managed through targeted spot or high-volume spraying. These actions have supported bush regeneration and the protection of native biodiversity in the offset area.

African Lovegrass and (*Andropogon virginicus*) have been identified as weeds occurring in proximity to *Persoonia nutans* despite the Conservation Advice indicating that the poor nutrient soil communities within which these species having a low susceptibility to weed invasions (NSW NPWS, 2004). Treatment of these weeds along access trails and nearby areas will reduce the potential for further weed encroachment which would likely lead to habitat degradation. However, it will not resolve the ongoing issues of weed encroachment and inundation from African Lovegrass currently ongoing in P1, P2 and P3 offset areas.

An evaluation of the management and performance of offset sites against the recovery strategies of *Grevillea parviflora* subsp. *parviflora* (DEWHA 2008) and *Persoonia nutans* (DEC 2006) has been included Table 19.

Table 19. Assessment of the offset sites and implemented management action against the recovery strategies of Small-flowered Grevillea (DEWHA 2008) and Persoonia nutans (DEC 2006)

Threatened species	Recovery strategies	Timing and duration	Performance criteria		Comments
			Objective	Status (2025)	
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Restrict access to sites	Year 1: 20 years	Fencing installed and maintained to remain functional	Achieved	An existing cyclone fence follows the external boundary of the Wattle Grove offset site. All EPBC offset sites are within the Wattle Grove offset site boundary fence. EPBC offset sites have been demarcated with metal pickets. Exclusion fencing for individual offset sites has not been erected. All areas within the boundary fence are secure and can only be accessed by relevant personnel with a regulated key managed by Knight Frank. Additional fencing has been installed along the MPE operational Rail Link passing through the western corner of the Wattle Grove offset site, delineating the bushland environment from the rail corridor. During the 2025/2026 survey period, the boundary fence was found to have numerous breaches along its length. It is recommended that fence management issues be corrected urgently to ensure the protection of the Wattle Grove offset site.
	Create and maintain weed-free bushland areas	Primary weed control: Year 1-5	<5% weed cover	Achieved	Targeting weed control works were conducted throughout the Wattle Grove offset area over the past 12 months. These works targeted Lantana, <i>Ludwigia</i>, African Lovegrass, Privet, Blackberry, Pampas Grass, Fireweed, Crofton Weed, Whiskey Grass and Japanese Honeysuckle. Weed levels within the offset site remain low and don't threaten <i>Grevillea parviflora</i> subsp. <i>parviflora</i> at this stage. Site inspection did not identify any notable weed infestations.
	Ensure appropriate fire regimes for species	Conduct ecological burns every 6-20 years	Monitoring of burn site is to be undertaken every six months. The net gain	Achieved	A wildfire directly impacted the EPBC offset site in April 2018.

Annual EPBC Offset Site Monitoring (2025-26)

Threatened species	Recovery strategies	Timing and duration	Performance criteria		Comments
			Objective	Status (2025)	
	(minimum fire-free period of 8 - 15 years)	in winter: 20 years	in the number of stems over the duration of management to meet the offset obligation		No ecological burns will be conducted within the EPBC offset site until later in 2026. At this time, the appropriateness of an ecological burn will be assessed to determine whether it will positively impact the populations of <i>Grevillea parviflora</i> subsp. <i>parviflora</i> .
	Avoid spraying herbicide within the vicinity of the species	At all times (monitored annually in spring): 20 years	No damage to threatened species through inappropriate herbicide use. Evidence would trigger corrective actions	Achieved	During the monitoring year, no herbicide spraying has been conducted within the offset site.
	Monitor species for grazing or damage, this may indicate large macropod overabundance to inform control frequency	Monitored annually in spring: 20 years	Evidence of excessive grazing would trigger corrective actions under the overabundant herbivore management action plan	Achieved	No evidence was observed to suggest that <i>Grevillea parviflora</i> subsp. <i>parviflora</i> have been impacted through grazing or trampling by large macropods.
	Protect individuals from pedestrian traffic along formal tracks, use fencing if required	Year 1: 20 years	Fencing installed and maintained to remain functional	Achieved	The location of EPBC offset sites have been demarcated using metal star pickets with secured yellow caps. The delineation of boundaries will act to remind personnel working within the Wattle Grove offset area of a sensitive area. All personnel working with the Wattle Grove offset area should be aware of sensitive areas during the initial biobank site induction. During the 2025/2026 survey period, the boundary fence was found to have numerous breaches along its length. It is recommended that fence management issues be corrected urgently to ensure the protection of the Wattle Grove offset site.
	Ensure that this species is considered	At all times: 20 years	Net gain in the number of stems over the duration of management	Achieved	The Moorebank Avenue Realignment Works (MARW) project is currently in the construction phase. The project dissects the southern position of

Annual EPBC Offset Site Monitoring (2025-26)

Threatened species	Recovery strategies	Timing and duration	Performance criteria		Comments
			Objective	Status (2025)	
	in all works and future planning matters		to meet the offset obligation		the Wattle Grove Offset Area, following an easement through the BA341 biobanks site, and passes approximately 30 metres to the north-west of the G1 offset site. The project will not directly impact the offset site; however, it is possible that indirect impacts could occur through construction and operation of the project like introduction of novel weeds and weed encroachment which could lead to habitat degradation. Mitigation measures have been considered and adopted by the MARW during detailed design that will minimise impact to native vegetation beyond the construction limits of the project. Regardless, being a biobank site increased focus has been shifted to locations (i.e. new edges) which are adjacent to the new road corridor. The bush regeneration contractor will likely have an increased focus on minimising/preventing indirect impacts including introduction of novel weeds and weed encroachment into the biobank site.
<i>Persoonia nutans</i>	Restrict access to sites	Year 1 - 20 years	Fencing installed and maintained to remain functional	Achieved	An existing cyclone fence follows the external boundary of the Wattle Grove offset site. All EPBC offset sites are within the Wattle Grove offset site boundary fence. EPBC offset sites have been demarcated with metal pickets. Exclusion fencing for individual offset sites has not been erected. All areas within the boundary fence are secure and can only be accessed by relevant personnel with a regulated key managed by Knight Frank. Additional fencing has been installed along the MPE operational Rail Link passing through the western corner of the Wattle Grove offset site, delineating the bushland environment from the rail corridor.

Annual EPBC Offset Site Monitoring (2025-26)

Threatened species	Recovery strategies	Timing and duration	Performance criteria		Comments
			Objective	Status (2025)	
					During the 2025/2026 survey period, the boundary fence was found to have numerous breaches along its length. It is recommended that fence management issues be corrected urgently to ensure the protection of the Wattle Grove offset site.
	Create and maintain weed-free bushland areas	Primary weed control: Year 1-5	<5% weed cover	Achieved	Weed levels across <i>Persoonia nutans</i> offset sites have plateaued. BAM vegetation quadrat conducted within offset sites P1, P2, P3 and P4(A and B) recorded weed covers of less than three percent; 0.1, 1.0, 1.0, 0 and 0.4 respectively. Weed covers at each <i>Persoonia nutans</i> offset site are estimated at less than 5 percent cover. Weed presence consists, of individuals on the peripheries of natural bushland. The invasive grass species African Lovegrass was observed at three of the offset areas, P1, P2 and P3. Most occurrences of this species are restricted to the disturbed edges of bushland parallel to existing access tracks. There is some evidence to suggest that weeds identified within the offset sites are negatively impacting <i>Persoonia nutans</i> individuals with smothering from African Lovegrass observed to be hindering the spread of <i>Persoonia nutans</i> in P1, P2 and P3 offset areas
	Ensure appropriate fire regimes for species (minimum fire-free period of 10 years)	Annually in spring: 20 years	Monitoring of burn site is to be undertaken every six months. Net gain in the number of plants over the duration of management to meet the offset obligation	Not achieved	A wildfire directly impacted the EPBC offset sites in April 2018. This wildfire did not coincide with timings or suitable conditions for ecological burning with respect to <i>Persoonia nutans</i>. No ecological burns will be conducted within the EPBC offset site until later in 2026. At this time, the appropriateness of an ecological burn will be assessed to determine whether it will positively impact the populations of <i>Persoonia nutans</i>.

Annual EPBC Offset Site Monitoring (2025-26)

Threatened species	Recovery strategies	Timing and duration	Performance criteria		Comments
			Objective	Status (2025)	
	Monitor site for <i>Acacia baileyana</i> , which may outcompete species	Annually in spring: 20 years	Evidence of encroachment by this species would trigger corrective actions (see section)	Achieved	<i>Acacia baileyana</i> was not identified within the BAM monitoring quadrat undertaken to assess habitat quality, nor was it identified in other areas of the offset sites.
	Monitor species for grazing or damage, this may indicate large macropod overabundance to inform control frequency	Monitored annually in spring: 20 years	Evidence of excessive grazing would trigger corrective actions under the overabundant herbivore management action plan (see Section 7.2)	Achieved	No evidence was observed to suggest that <i>Persoonia nutans</i> have been impacted through grazing or trampling by large macropods.
	Protect individuals from pedestrian traffic along formal tracks, use fencing if required	Year 1: 20 years	Fencing installed and maintained to remain functional	Not achieved	The location of EPBC offset sites have been demarcated using metal star pickets with secured yellow caps. The delineation of boundaries will act to remind personnel working within the Wattle Grove offset site of a sensitive area. All personnel working with the Wattle Grove offset area should be aware of sensitive areas during the initial biobank site induction. During the 2025/2026 survey period, the boundary fence was found to have numerous breaches along its length. It is recommended that fence management issues be corrected urgently to ensure the protection of the Wattle Grove offset site.
	Ensure that this species is considered in all works and future planning matters	At all times: 20 years	Net gain of 16 plants over the duration of management to meet the offset obligation	Achieved	The Moorebank Avenue Realignment Works (MARW) project is currently in its construction phase. The project dissects the southern position of the Wattle Grove Offset Area, following an easement through the BA341 biobanks site. The project will not directly impact the offset sites of <i>Persoonia nutans</i> and is unlikely to indirectly impact habitat or the present populations due being separated from the project footprint by Anzac Creek.

Annual EPBC Offset Site Monitoring (2025-26)

Threatened species	Recovery strategies	Timing and duration	Performance criteria		Comments
			Objective	Status (2025)	
					It is possible that removal and remediation of a section of disused rail spur (DURS) at the southern extent of the Wattle Grove offset area may be initiated as part of the MARW project of works. The remediation/rehabilitation footprint of DURS does not intersect EPBC offset sites. The MPE Stage 1 CEMP (under which the DURS works will be undertaken) would include appropriate mitigation measures to manage impacts associated with the surrounding vegetation (within the EPBC offset site).

5 DISCUSSION & RECOMMENDATIONS

The 2025 survey marked the seventh monitoring event for offset sites P1, P2, P3 and G1 and the sixth monitoring event for offset site P4. Comparisons can be made between this year's data and the results of previous monitoring events to analyse population dynamics of *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* within EPBC offset sites (P1-P4 and G1), specifically:

- Fluctuations in population size and distribution; and
- Response to disturbance and/or management actions.

The condition of vegetation has been scored, and a habitat assessment has been conducted for offset sites across monitoring periods to provide more context to changes in *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* populations.

Changes to *Persoonia nutans* and *Grevillea parviflora* subsp. *parviflora* populations across offset sites P1, P2, P3, P4 and G1 are discussed below.

5.1.1 *Persoonia nutans*

A comparison of results for *Persoonia nutans* between the 2019 and 2025 monitoring events are discussed below.

Census Year	P1	P2	P3	P4
2019	9	3	100	-
2020	13	0	77	43
2021	12	0	39	41
2022	7	1	28	32
2023	7	1	28	32
2024	7	1	38	34
2025 (current)	7	3	40	36
Total 2025				86

Population assessment

5.1.1.1.1 Population Census Summary

A total of 50 individuals of *Persoonia nutans* were identified across offset sites P1, P2 and P3 during the 2025 monitoring event in comparison to 46 individuals in 2024, 36 individuals recorded in 2023, 37 individuals recorded in 2022, 51 individuals recorded in 2021, 90 individuals recorded in 2020, and 112 individuals recorded in 2019.

A total of 36 individuals were recorded in P4, which is a decrease from 43 individuals recorded during the establishment of the site in 2020. Across all sites, the number of *Persoonia nutans* individuals has decreased from 92 (2021) to 86 individuals recorded during the 2025 surveys.

The offset populations of *Persoonia nutans* have decreased and remained below the start number of individuals (155) since 2020 across all offset sites (P1-P4). Since 2023 an increase has been observed in offset sites P3 and P4. A comparison of population counts at each offset site across survey years is presented in Appendix E.

5.1.1.1.2 Population Threats and Dynamics

Of the 80 individuals recorded during the previous survey (2024) across all four offset sites, 12 were juvenile plants considered to be sensitive to environmental variables and at reasonable risk of perishing. During the current surveys only seven of the 86 individuals were identified as juveniles. Considering 77 of these 86 individuals were existing (nine new individuals), two marked individuals have perished since the 2024 surveys. Of the 77 individuals that were re-found in 2025, 73 were adults, and four were juveniles, inferring that four out of the 12 juveniles recorded in 2024 survived to adulthood whilst the majority have perished. The six “new” adults recorded are best explained by having lost tags, or not previously been observed, as *Persoonia nutans* take longer than one year to reach maturity therefore they are not truly “new” individuals.

The high turnover rate of recruitment and mortality may result from the 2018 fires that burnt sites P1, P2 and P3. Following the fires, habitat space may have been made available to *Persoonia nutans*, allowing them to access limiting resources of soil moisture, light, and nutrients. As other plants in the fire-affected sites recover, they may have shaded out the juvenile *Persoonia nutans* plants, resulting in plant mortality. However, too frequent fire is thought to be detrimental to *Persoonia nutans* populations, although the critical fire frequency for *Persoonia nutans* has not yet been determined.

Persoonia nutans populations are known to be dynamic throughout the landscape and fluctuations in space and time of above ground individuals is considered to be a natural occurrence (DEC 2005). These fluctuations make the number of individuals and populations difficult to estimate (DEC 2005). To reach the offset requirements, the total number of individuals needs to reach 155 with only 86 individuals counted in this monitoring year. To achieve 155 individuals of *Persoonia nutans*, a higher persistence of juveniles is required.

It was anticipated that a proportion of the juvenile *Persoonia nutans* observed during monitoring events would not survive the following year due to several environmental and ecological factors. The majority of juvenile plants recorded are in dense clusters containing many individuals. It is possible that the death of the juvenile plants represents a natural dieback whereby the strongest plants in the cluster survive and utilise the available resources. In other locations of the Wattle Grove offset area, which were unaffected by the 2018 wildfire, large numbers of adult *Persoonia nutans* are present though are rarely observed in close proximity to each other. It is expected that only a small number of individuals within clusters of *Persoonia nutans* juveniles will persist to become adult plants.

The current surveys recorded a net increase of six individuals, across the four *Persoonia nutans* sites, with offset area P1 recording the same total number of individuals and sites P2, P3 and P4 each recording an increase of two individuals. New recruitment at sites P2, P3 and P4 is a positive sign that *Persoonia nutans* is continuing to germinate and replace individuals that perish. This is particularly positive at P2, where the population has increased again after three previous consecutive years having just one individual and has reached the population number ($n=3$) in 2019 at the establishment of the offset site. P1 has recorded a consistent seven *Persoonia nutans* since 2022, therefore suggesting that this population has potentially stabilised.

Overall, *Persoonia nutans* population at the offset sites is showing an increasing trend since their low of 68 individuals in 2022 and 2023.

New individuals were generally recorded within or in close proximity to existing clusters of juveniles. At P3, the three juvenile individuals from the 2024 monitoring year that were re-found, were in areas away from dense clusters. This could indicate that an increase in the distribution of *Persoonia nutans* across the site will reduce interspecies competition and may provide a greater chance of individuals persisting to maturity.

5.1.1.1.3 Conclusions

Using the EPBC offsetting policy, it was calculated that 155 *Persoonia nutans* require conservation and management within offset sites, with a net gain of 16 *Persoonia nutans* individuals over a 20-year period to achieve the required offset target (total population of 171 individuals). Unforeseen impacts from the 2018 wildfire saw the majority of the *Persoonia nutans* population within offset sites burnt. Regeneration of the species over the past four years has seen a fluctuation in the recovery of the population, with 133 individuals recorded in 2020 survey, 92 in the 2021 survey, 68 individuals recorded in the 2022 and the 2023 survey, 80 individuals in 2024 and 86 individuals recorded in the 2025 survey. Whilst this survey year has marked a continued population growth of *Persoonia nutans*, it is considered that some level of intervention will be required to achieve the final net gain population size (171 individuals) across the offset sites. Corrective actions were suggested in previous reports to promote the germination of *Persoonia nutans*. This included the establishment of experimental disturbance plots for offset sites P1, P2 and P3 (discussed in more detail below). Another corrective action to be considered includes the planting of individuals. This would involve seed collection, germination and establishment of seedlings in a greenhouse, followed by planting during the appropriate seasonal and climatic conditions.

However, these corrective actions have yet to be put in place and implemented. It is anticipated that with adaptive management and ongoing monitoring, the population of *Persoonia nutans* within offset sites will increase to 171 individuals within the 20-year time frame.

Habitat assessment and potential impacts

5.1.1.1.4 Current Habitat Conditions

Current surveys found that patches of Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland within offset site P3, and P4 achieved a greater VI score across the board, than was recorded in 2024, whilst P1 and P2 recorded slightly lower VI scores compared to 2024 (Table 20). An increasing or decreasing vegetation condition does, however, not necessarily reflect an increase in habitat value for *Persoonia nutans*, as the abundance of this species can often be related to disturbance history. Sites with higher abundance appear to be more disturbed (DPIE 2019).

Exotic species cover was recorded to be relatively low across all offset sites over the 2025 monitoring period. Consistent with previous years, P4(a) recorded zero exotic species cover. Exotic cover in both P1 and P2 declines from 2024 to 2025, with percentages dropping from 0.8% to 0.1% in P1 and from 2.1% to 1.0% in P2. However, increases were observed in P3, and for the first time since 2022, exotic species were present in P4(b).

Of note there was a considerable increase in shrubs at P4(b) from 34.8 per cent cover in 2024 to 76.0 per cent cover in 2025, an increase in 41.2 per cent shrub cover in one year.

Table 20. A summary of changes to vegetation condition at offset sites P1, P2, P3, P4a and P4b across monitoring periods

Offset site	Monitoring year	Cover across BAM quadrat				VI score
		Tree	Shrub	Groundcover	Exotic	
P1	2019	11.5	47.7	4.2	0.2	52.5
	2020	16	46	6.8	0.1	64.8
	2021	20	41.1	14.1	0.2	64.4

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Offset site	Monitoring year	Cover across BAM quadrat				VI score
		Tree	Shrub	Groundcover	Exotic	
	2022	20	43.7	9.6	0.3	68.6
	2023	7.5	20.2	1.2	0.1	68.6
	2024	16.5	61.4	4.6	0.8	77.3
	2025	21.0	65.9	5.0	0.1	72.8
P2	2019	52.5	4.7	19.4	0.6	51.8
	2020	47.3	15.5	22.1	0	56.5
	2021	47	21.5	41.9	0.2	67.2
	2022	30.2	10.4	6.5	0.5	41.8
	2023	15	47	18.3	3	41.8
	2024	23	26.4	14.5	2.1	59.2
	2025	29.0	36.2	17.0	1.0	58.5
P3	2019	22.5	8	17.3	0.1	51.5
	2020	36	5.7	22.9	0.2	59.6
	2021	37.2	12.6	26	0.2	63.5
	2022	37	9.7	17.6	0.2	55.8
	2023	25.1	3.1	3.1	0.5	55.8
	2024	26.0	12.6	23.2	0.5	64.9
	2025	27.0	24.9	24.6	1.0	67.1
P4a	2020	45	43.9	25.4	0	73.4
	2021	40.5	49.8	26.2	0	72.4
	2022	8.1	15	7.4	0	37
	2023	0.8	37.9	26.9	0	37
	2024	10	39.8	25	0	65.7
	2025	20.0	50.3	29.8	0	74.3
P4b	2020	32.4	18	8.2	50	50
	2021	32.2	46.4	19.7	0.1	70.6
	2022	12.1	40.1	4.3	0.1	59.7
	2023	17	56.9	23.3	0	59.7

Offset site	Monitoring year	Cover across BAM quadrat				VI score
		Tree	Shrub	Groundcover	Exotic	
	2024	10	34.8	33.6	0	70.5
	2025	74.0	76.0	22.3	0.4	87.2

5.1.1.1.5 Current Threats

No obvious signs of impact on *Persoonia nutans* were observed within the offset sites. Some minor insect damage was observed on a few individuals; however, it appears that this damage may be existing from previous years. There were no signs of foraging or trampling upon this species by mammals.

Adult *Persoonia nutans* are at less risk of being outcompeted by other plant species compared to juveniles of its species. Currently, there is significant competition in the shrub and understorey layers as there is an overabundance of post-fire recruiters like *Acacia decurrens* (Black Wattle), *Imperata cylindrica* (Blady Grass), *Pimelea linifolia*, *Platysace ericoides*, *Pultenaea villosa* (Hairy Bush-pea) and *Trachymene incisa*. An increase in native shrub and ground stratum vegetation cover within offset sites P1, P2 and P3 may be reducing the availability of space and resources (light, water etc.) for *Persoonia nutans* to regenerate.

In previous monitoring years, juvenile *Persoonia nutans* were observed to be on the peripheries of offset sites P1 and P3. This was thought to be as result of there being less competition from other native plants along the edges of the site compared to the centre of the sites. The edges typically were characteristic of more open areas, and less native plants, allowing the juvenile plants the space to survive. However, in contrast, during the 2025 monitoring year, more juveniles were observed closer towards the centre of the P3 offset sites. One potential reason for this is the presence of exotic weed grasses, such as African lovegrass, along the edges of P3 next to the road corridor. Whilst *Persoonia nutans* are known to tolerate disturbance associated with weed incursion (DEC, 2006), habitat degradation and/or competition through invasion, establishment, intensification and/or spread of weeds, such as African lovegrass, to the extent that the area of suitable habitat is reduced, can pose as a key risk to the survival of the species (DCCEW, 2025). Therefore, the presence of African lovegrass along the boundary of offset site P3 may be reducing suitable habitat, causing juveniles to regenerate further within the offset site, where exotic weeds are less prevalent. At the same time, the higher native shrub and ground-stratum vegetation cover is limiting the available space and resources available for juveniles to survive to adult-stage. These confounding habitat conditions may be contributing to the overall reduction in juvenile presence in 2025.

It is likely that too frequent disturbance, and potentially a long-term absence of disturbance, may be detrimental to the persistence of *Persoonia nutans* in local populations. In this instance, the presence of a seed bank is essential for persistence after a fire event. If fires occur at an interval too small to allow the re-establishment of a soil-stored seed bank following a previous fire event, then local extinction will occur. A long-term absence of fire may also be detrimental to the persistence of the species, as recruitment is likely to be largely dependent upon disturbance. This critical fire frequency rate has not yet been determined. However, the NSW National Parks and Wildlife Service (NPWS) suggests greater than 7-year intervals, and the Threatened Species Hazard Reduction List for the Bushfire Environmental Assessment Code states that fire should not occur more frequently than once every ten years in the habitat of *Persoonia nutans* (DEC 2006).

Corrective actions

It is evident that *Persoonia nutans* populations within offset sites that burned in 2018 are fluctuating, with new individuals germinating and other juvenile plants perishing. This fluctuation is due to the opportunistic nature of post-bushfire vegetation recovery and the high levels of competition amongst post-fire recruitment specialist species. Although a moderate proportion of juvenile *Persoonia nutans* identified during the 2019 monitoring period have perished, each proceeding monitoring event has recorded recruitment suggesting that population recovery is ongoing.

Nothing is known of the longevity of the soil-stored seed bank of *Persoonia nutans*. It appears germination is promoted, not only by fire, but also by physical disturbance (NSW NPWS 1996; D. Wotherspoon pers. com.). It is not known whether the seed bank is completely exhausted by a single fire. The extent to which germination occurs in the absence of disturbance is unknown, although observations during the 1996 survey (NSW NPWS 1996) indicate such germination is likely to be rare.

The trends of *Persoonia nutans* over the 2024-2025 and 2025-2026 monitoring years suggest their recruitment/regeneration is localised nature and maybe be being impacting by confounding variables, such as high native plant competition in the centre of the offset sites, and intolerance to exotic weeds, such as African Lovegrass present on the disturbed edge of the offset sites. This has initiation a management response to support the germination of individuals with bushland areas of the offset sites, specifically for P1, P2 and P3.

Whilst experimental disturbance plots were not implemented into the 2025/2026 monitoring year, they could be implemented during the 2026/2027 monitoring season. Experimental disturbance plots will be positioned in areas of the offset sites where individuals do not currently occur but have been recorded as occurring prior to the 2018 wildfire. In each of the experimental plots, the following actions will be implemented:

- Disturbance stimulus - a disturbance stimulus, including raking of leaf litter back to bare earth, will be trialled to promote germination in areas where viable seed may be present
- Competition control - selective pruning or removal of ground layer and shrubs to reduce competition to *Persoonia nutans* and encourage recruitment/survival of juvenile plants

A conservative methodology will be developed for each offset site considering all present biodiversity values prior to implementation. As per the requirements of the TFOMP, NSW DPIE (EES) and the Commonwealth Department of Climate Change, Environment and Water (DCCEW) will be consulted prior to the implementation of the proposed adaptive management measure. Further, approvals and endorsement from the Biodiversity Conservation Trust and National Intermodal (responsible for implementing the BA341 biobank site) will also need to be sought prior to implementing. The methodology and results of experimental disturbance plots will be presented in the 2026 -2027 annual monitoring report for the EPBC offset sites.

Weed control works already occurring in the EPBC offset site should also include the access tracks adjacent to P1, P2 and P3 offset areas to control the spread of African Lovegrass and encourage the growth of more juvenile individuals.

If *Persoonia nutans* populations across offset sites shows a decline in future surveys, a translocation project could be initiated whereby seeds collected from adult individuals in offset sites P3 and P4 are propagated at an offsite location and re-introduced at a later stage as young plants.

Table 21. Recommended corrective actions

Identified issues	Offset site	Recommended action
Encroaching Blackberry at offset site P4	P4	Blackberry infestation should be monitored and controlled as necessary to prevent encroachment into the offset site.
Increased cover of African Lovegrass along the edges of offset sites and nearest access roads	P1, P2, P3	Continued monitoring of African Lovegrass adjacent to access roads within EPBC offset sites. Weed control methods targeting African Lovegrass should be immediately implemented to reduce further inundation. Manual control methodologies should be prioritised unless a targeted herbicide treatment that has no risk of over spray or off-target poisoning can be used. An example of a selective herbicide that is suitable for the control of African Lovegrass within offset areas is Flupropanate granular herbicide.
Native plant species outcompeting <i>Persoonia nutans</i> (i.e. smothering, occupying open areas)	All offset sites	Juvenile <i>Persoonia nutans</i> in plots P1, P2 and P3 should be monitored for smothering from native plant species. On a quarterly basis, inspection should be made of juvenile <i>Persoonia nutans</i> with offset sites P1, P2 and P3. Any native plants observed to be crushing or smothering individuals should be cut back. i.e. Slender Devils Twine observed on juvenile <i>Persoonia nutans</i> should be removed.
Lack of recruitment of <i>Persoonia nutans</i> in bushland areas at offset sites P1, P2 and P3	P1, P2, P3	Establishment of experimental disturbance plots in offset sites to: • Encourage the germination of <i>Persoonia nutans</i> individuals within bushland • Increase distribution of <i>Persoonia nutans</i> across sites • Reduce competition from native and exotic vegetation • Increase overall population numbers of <i>Persoonia nutans</i>

5.1.2 *Grevillea parviflora* subsp. *parviflora* offset sites

A comparison of results for *Grevillea parviflora* subsp. *parviflora* between the 2020 and 2025 monitoring events have been discussed below.

Population assessment

The 2025 monitoring survey saw an increase in the number of stems of *Grevillea parviflora* subsp. *parviflora* within offset site G1. The population has increased from 75 to 77 stems, marking an increase of 2.6 percent. The distribution of *Grevillea parviflora* subsp. *parviflora* remained consistent, with greatest densities observed in the northwest and southeast. The two newly identified individuals were located towards the north of the site in the centre.

Fire impacted the G1 site in 2018, removing all above-ground biomass of *Grevillea parviflora* subsp. *parviflora*. The findings from the 2025 survey reveals that the population of *Grevillea parviflora* subsp. *parviflora*.

parviflora is semi-resilient with the population flourishing in 2022 and 2023 and, over the last two years, the population has stabilised to above the density present in 2021. The fluctuations and the ability to recover could be attributed to the soil seed banks or more likely the capability of suckering from rootstock. Counts of individual genets in a population is very difficult as new shoots can be mistaken for distinct plants, as *Grevillea parviflora* subsp. *parviflora* demonstrate a degree of vegetative spread particularly after disturbances such as fire (DPIE 2019a). During 2024 an overall increase in shrub cover and specifically ground cover was observed compared to previous survey years, which may have explained the decrease in *Grevillea parviflora* subsp. *parviflora* observed in 2024 due to decreased access to light resources and need to compete in areas of high biomass. 2025 monitoring results indicate that shrub and grass cover have continued to increase, whilst litter cover has decreased by about 40%. Despite this, the population has remained stable, with two new individuals observed in healthy condition.

Habitat assessment and potential impacts

It was calculated using the EPBC offsetting policy that 142 *Grevillea parviflora* subsp. *parviflora* require conservation and management within offset sites to achieve a net gain of at least 17 individuals over a 20-year period. Due to unforeseen impacts from the 2018 wildfire, all *Grevillea parviflora* subsp. *parviflora* within the offset site perished. The 2023 survey was promising as the recorded *Grevillea parviflora* subsp. *parviflora* population last year met the EPBC offsetting policy conservation and management requirements. However, the 49% decrease that occurred in 2024, confirms that fluctuating biomass, disturbance and climatic variability impact this result.

The condition of Hard-leaved Scribbly Gum - Parramatta Red Gum heathy woodland within the offset site has improved in condition as demonstrated by a VI score of 75.9, greater than all previously recorded VI scores (Table 22). As the offset site has recovered from the fires in 2018, there has been a large increase in the groundcover and shrub vegetation which may be responsible for the decrease in *Grevillea parviflora* subsp. *Parviflora* between 2023 and 2024. Although shrub and grass cover continued to increase in 2025, the overall increase of vegetation integrity score suggests the habitat's composition, structure and function have generally improved. This improved habitat quality has likely contributed to population stabilisation and explains why, despite denser shrub and ground layers, the population shows a net increase of two individuals.

Weed cover has remained absent with no weed cover recorded since the 2022 survey period (Table 22).

Table 22. Changes in vegetation cover at offset site G1 across monitoring periods (2019 - 2024)

Census year	Tree	Shrub	Groundcover	Exotic	VI score
2019	9.1	22.6	9.2	0.1	37.7
2020	24	21.2	17	0.1	47
2021	27.3	41.2	41.9	0.1	55.7
2022	21	28.5	15.4	0.5	49.3
2023	5.5	16	1.2	0	49.3
2024	20.5	13.8	26.5	0	54.5
2025	17.2	43.9	50.5	0	75.9

The two new individuals of *Grevillea parviflora* subsp. *parviflora* observed were in good health condition and showed no signs of insect damage. Of the existing individuals, most were recorded to be in a healthy condition (99%) and individuals were not observed to have been foraged by animals. Weed occurrence within the offset area is not impacting the occurrence or persistence of this species.

The large decrease in population size from 2023 to 2024 (from 146 to 75 individuals) was attributed to the large increase in ground cover and suggested that areas of open woodland with sparser shrub and ground layer vegetation support healthy populations of *Grevillea parviflora subsp. parviflora*. However, since 2024, the ground cover has continued to increase (by about 90%), yet the population has remained stable with no significant reductions in population. This suggests that there are additional ecological and habitat factors influencing the population, and survival cannot be attributed to the extent of open woodland solely.

Kunzea ambigua is known to compete against *Grevillea parviflora subsp. parviflora*, as it is an “aggressive early coloniser of bare sites” and has high seedling recruitment in disturbed areas (NPWS, 2002). This may have direct or indirect effects on the recruitment and recovery, including spread, of *Grevillea parviflora subsp. parviflora* following habitat disturbance. BAM data from 2024 show that *Kunzea ambigua* was present within the G1 offset site in 2024, however, were absent during the 2025 monitoring year. This may suggest that the habitat composition and structure has stabilised since the high level of disturbance from the 2018 bushfires, and reduction of *Kunzea ambigua* has allowed for better recruitment of *Grevillea parviflora subsp. parviflora*.

Corrective actions

It was previously recommended that the population be monitored for another year prior to implementing any management actions to increase the population of *Grevillea parviflora subsp. parviflora* considering the high degree of fluctuation in population. The trend shown in 2024 that an increase in groundcover results in a decrease in population, was not shown in this monitoring year, whereby a 90% increase in groundcover showed no decrease in population. This suggests that multiple factors are influencing the recruitment and survival of *Grevillea parviflora subsp. parviflora*, such as the presence of competing species such as *Kunzea ambigua*, and overall increase in vegetation integrity scores. It is recommended that ongoing monitoring is continued before further management actions are implemented.

It is not suggested that individuals be tracked for monitoring as has been done for *Persoonia nutans*. *Grevillea parviflora subsp. parviflora* is capable of suckering from a rootstock, and most populations demonstrate a degree of vegetative spread, particularly after disturbances such as fire. Therefore, it would be futile trying to track individuals via stems to monitor recruitment and death rates.

Table 23. Recommended corrective actions

Identified issues	Recommended action
Moderate infestation of African Lovegrass, is beginning to encroach on the <i>Persoonia nutans</i> offset sites	Infestations of African Lovegrass should be monitored and controlled as necessary to prevent encroachment into the offset site.
Native plant species outcompeting <i>Grevillea parviflora subsp. parviflora</i> (i.e. smothering, occupying open areas)	Monitoring of the <i>Grevillea parviflora subsp. parviflora</i> population over the following year to determine whether individuals are reducing in areas that are becoming increasingly vegetated by other native plant species.

5.1.3 Adaptive management

In terms of the provisions to revise the Management Action Plan under the Biobanking agreement, these are conducted at five yearly intervals and are specifically driven by the result of annual reporting

and effectiveness of biodiversity gain at the direct offset site(s). Any revision or modification of the Management Action Plan must be approved by NSW DPIE (EES).

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