Eastern Creek Business Hub– VMP Implementation Annual Progress Monitoring Report: Year 3 2024

Report prepared by Narla Environmental for Western Sydney Parklands Trust

April 2024

NARLA
environmental

Report:	Eastern Creek Business Hub Vegetation Monitoring Report
Prepared for:	Toolijooa Environmental Restoration
Prepared by:	Narla Environmental Pty Ltd
Project no:	TOOL68
Date:	April 2024
Version:	Final v1.0

Narla Environmental Pty Ltd
www.narla.com.au

Report Certification

Works for this report were undertaken by:

Staff Name	Position
Luke Johnson *BSc*	Narla Environmental Project Manager/Ecologist
Gemma Hicks *BBioCon*	Narla Environmental Ecologist

Document Control

Revision	Document Name	Issue Date	Internal Document Review
Draft v1.0	Eastern Creek Business Hub Vegetation Monitoring Report	21/03/24	Luke Johnson
Draft v2.0	Eastern Creek Business Hub Vegetation Monitoring Report	16/04/24	Luke Johnson
Draft v3.0	Eastern Creek Business Hub Vegetation Monitoring Report	16/04/24	Luke Johnson
Final v1.0	Eastern Creek Business Hub Vegetation Monitoring Report	17/04/24	Luke Johnson

Table of Contents

1. INTRODUCTION 5
   1.1 Project Background 5
   1.2 Site Description 5
2. METHODOLOGY 7
   2.1 Annual Monitoring Assessment 7
   2.2 Monitoring Requirements 9
      2.2.1 Biometric Benchmarks 9
   2.3 Study Limitations 9
3. RESULTS 11
   3.1 Species Richness and Cover 11
4. DISCUSSION 14
      4.1.1 Annual Change in Mean Native Species Abundance 14
      4.1.2 Annual Change in Mean Exotic Species Abundance 14
5. MANAGEMENT ACTIONS AND FOCUS FOR YEAR 4 16
6. REFERENCES 17
7. APPENDICES 18

Tables

Table 1. Key Performance Indicators (KPIs) for Establishment Phase (Years 1 – 3). 10
Table 2. Biomentic Benchmarks for Each Identified Plant Community Type (PCT). (ELA 2022) 10
Table 3. Maximum extent of exotic ground layer allowed each year 12
Table 4. Performance against PCT Native Groundcover % Benchmark 13
Table 5. Performance criteria – Year 3. 15

1. Introduction

1.1 Project Background

Narla Environmental Pty Ltd (Narla) has been engaged by the Western Sydney Parklands Trust to conduct vegetation monitoring and mapping of weed densities and for the protection, restoration and rehabilitation of Cumberland Plain Woodlands and Shale-Gravel Transition Forest ecological communities. These vegetation communities are associated with the development of the Eastern Creek Quarter Shopping Centre, Eastern Creek. All works on the ground and monitoring parameters are in accordance to "Vegetation Management Plan" Prepared by Ecological Australia (ELA 2021).

The VMP details the works to be undertaken to meet requirements set out within the Biosecurity Act 2015 and in accordance with environmental best practices. VMP works will be aimed at restoring the 'Endangered Ecological Community' Shale Plains Woodland (SPW), a component of Cumberland Plain Woodland (CPW), which is listed as Critically Endangered under the NSW Biodiversity Conservation Act 2016 (BC Act 2016). The VMP Works will also aim to restore the Alluvial Woodland (AW), a part of River-Flat Eucalyptus Forest (RFEF) which is also listed as an 'Endangered Ecological Community' under the BC Act 2016.

The general aim of the VMP is to detail the rehabilitation of areas adjacent to the development including roads and services, weed removal, revegetation, on-going maintenance, and monitoring requirements. To track progress towards achieving this goal surveys were conducted in February 2024 within the bushland areas of the VMP to establish baseline data for ongoing monitoring (ELA 2021).

This report aims to track the changes to the health and diversity of flora and fauna existing within the site over time and to address the performance criteria identified by the initial VMP through vegetation surveys and photo monitoring.

1.2 Site Description

The site is located within Blacktown City Council (BCC) Local Government Area in Eastern Creek. The VMP area is approximately 17.6 ha in size (Appendix A). The site is bordered by Westlink (M7) to the east, Great Western Highway (A44) to the south, Eastern Creek Quarter Shopping Centre to the west, and bushland and a reserve to the north. The VMP area is a mostly flat and includes areas of remnant bushland and grasslands.

The VMP has divided works into three (3) management zones (Appendix B). These zones have been created to better manage and maintain restoration treatments and objectives.

- Zone 1: Regeneration; comprised of remnant bushland to be regenerated to RFEF and CPW ecological communities
- Zone 2: Revegetation; comprised of areas mostly dominated by pasture grass with few native shrubs or trees present, includes potential batters and a gas line easement.
- Zone 3: Revegetation – Wetlands; comprised of areas to be revegetated to native wetland, includes the construction of the channel base within constructed creek swales and an onsite stormwater detention basin to comply with Blacktown City Council stormwater design. Stage 3 of the development has not yet been completed and as such, the wetlands are not functionally operational. This zone of the VMP is still under the Developers control.

Ecological Australia (ELA) has undertaken the VMP monitoring works in Year 1 and Year 2. These works included photo point monitoring and quadrat data collection. Muru Mittigar has undertaken the on-ground VMP works, including site preparation, primary weed control works.

Due to the COVID-19 lock downs and restrictions throughout Year 1 causing severe and extensive delays to the implementation of the VMP from July to November 2021. The delays were communicated to the Department via email on 5 August 2021. DAWE responded in agreeance to halting works due to COVID-19 and stated that works could be resumed when possible.

Toolijooa Pty Ltd via a tender process were appointed as the new bush regeneration contractors in October 2023 and began Year 3 onsite works in November 2024. Narla Environmental took over as the Project Ecologist in February 2024, undertaking the VMP monitoring and reporting works for Year 3.

This report captures all the work undertaken in Year 3, covering the period from January – December 2023.

2. Methodology

2.1 Annual Monitoring Assessment

A monitoring assessment was undertaken by Narla Ecologists, Luke Johnson and Gemma Hicks, on 13th of February 2024.

A total of eight (8) monitoring plots across three (3) management zones were established in February 2021 (). The monitoring plots were sampled for full floristic diversity and cover, in line with the 'plot based floristic vegetation survey' in the Biodiversity Assessment Method (BAM) (DPIE 2020). To achieve a more general overview of the vegetation condition within each zone and ensure they were sampled appropriately, ELA established permanent monitoring plots 20m x 20m (200m^2). The start of each plot was marked with a star picket and cap with the coordinates and bearing recorded. Data collected within each plot included:

- The growth form for each native species;
- Scientific name of each native and exotic species; and
- Estimate of the foliage cover of each native and exotic species within the boundaries of the plot including all attached plant material, alive or dead, rooted in or overhanging the plot. Cover was recorded:
    - in decimals if less than 1% (e.g. 0.1, 0.2)
    - in whole numbers up to 5% (e.g. 1, 2, 3)
    - to the nearest 5% if >5% cover (e.g. 5, 10, 15, 20, 25).
- Count (when ≤10) or estimate (when >10) the number of individuals of each native and exotic species rooted within the plot. Record abundance as:
    - counts of 1, 2, 3…
    - estimates of 10, 20, 30…
    - 100, 200, 300…
    - 1000, 2000, 3000…
- Photo points were taken at the 0m mark (star picket) (**Figure 1**, **Appendix C**).

Figure 1. Photo Points and Direction Photo Taken

2.2 Monitoring Requirements

Section 7 of the VMP (ELA 2022) specifies that baseline monitoring will be undertaken prior to works being commenced to establish a benchmark for performance. This is to include the establishment of photo points and vegetation survey quadrats. Progress reports will then be prepared on an annual basis throughout the establishment period (Years 1 – 3) and bi-annually until the VMP is fully implemented (Years 4 – 10).

2.2.1 Biometric Benchmarks

Native Vegetation Integrity Benchmarks (or Biometric benchmarks) have been developed by OEH for the composition, structure and function of vegetation communities, based upon the best-on-offer condition for the same vegetation type in the contemporary landscape.

WPST are committed to achieving Biometric Benchmark 2 conditions, i.e. achievement of between 50% - 100% of the benchmarks for all of their precincts within their Biodiversity Strategy. Further commitments to achieving biometric benchmarks for this site are identified in Table 1.

Biometric benchmarks for the two ecological communities identified onsite are identified in Table 2.

2.3 Study Limitations

This study was not intended to provide a complete inventory of all flora and fauna species with potential to occur within each zone. The species list provided for each monitoring plot was restricted to what was observed during the site assessment by the Narla Ecologist. The timing of the survey may not have coincided with emergence times of some species of flora, such as seasonally flowering herbs.

Table 1. Key Performance Indicators (KPIs) for Establishment Phase (Years 1 – 3).

KPIs for All Monitoring Plots During Establishment Phase
Commencement or completion of all tasks outlined in the VMP. Management of priority weeds as per statutory regulations. No *Rubus fruticosus spp. agg.* Patches over $4m^2$. Revegetation is to be undertaken with a minimum of 60% of the benchmark levels for species diversity provided in Appendix C of the VMP (ELA). At one year post planting, a minimum of 80% survival rate of all vegetation strata planted in each zone (e.g. tree, shrub and groundcover). Any localised plant failure within planting areas are addressed with no area larger than 2m x 2m without surviving plants at one year post planting. Maintenance replanting is to replace plants with the same growth form (i.e. tree for tree etc.) and must not decrease species diversity. Any new species to be planted must be from the community being emulated and of local provenance or of provenance for climate change adaptation if required. Monitoring and reporting undertaken in accordance with Section 7 of the VMP (ELA).
KPIs for All Monitoring Plots at the completion of Year 3
Woody weeds and exotic vines to be less than 5% cover, not allowed to set seed and no establishment of new species. Exotic ground covers 60% of original extent. Native vegetation cover no less than 60% of biometric benchmark in **Table 2.**

Table 2. Biomentic Benchmarks for Each Identified Plant Community Type (PCT). (ELA 2022)

Plant Community Type (PCT)	Vegetation Community	Vegetation Species Richness			Vegetation Cover (%)		
		Canopy	Shrub	Groundcover	Canopy	Shrub	Groundcover
849	Shale Plains Woodland	5	8	34	52%	18%	77%
835	River Flat Eucalypt Forest	4	8	20	21%	21%	78%

3. Results

3.1 Species Richness and Cover

Narla's year 3 vegetation monitoring showed the condition of Eastern Creek Business Hub was highly variable, with results bushland ranging from poor-quality (low native species richness and high weed cover) to high quality (high native species richness and very low weed cover). Mean species richness and cover collected from 2023 is displayed and is compared against the data collected during the previous monitoring in Table 3 and Table 4. Numbers in red indicate an increase in mean exotic species richness or cover or a decrease in mean native species richness and cover. Numbers in green indicate an increase in mean native species richness or cover or a decrease in mean exotic species richness and cover.

Table 3. Maximum extent of exotic ground layer allowed each year.

Management Zone	Monitoring Plot Location	Baseline	Year 1 (ELA)	Year 2 (ELA)	Year 3	Year 4	Year 6	Year 8	Year 10
Zone 1: Maximum exotic ground layer required		**N/A**	**15.6**	**14.5**	**13.4**	**12.3**	**11.2**	**10**	**8.9**
Zone 1 actual groundcover abundance	SP1 SP3 SP5 SP6	22.3	42.3	32	27.5	-	-	-	--
Zone 2: Maximum exotic ground layer required		**N/A**	**49**	**45.5**	**42**	**38.5**	**35**	**31.5**	**28**
Zone 2 actual groundcover abundance	SP4 SP8	70	71.5	97	95.5	-	-	-	-
Zone 3: Maximum exotic ground layer required		**N/A**	**31.5**	**29.3**	**27**	**24.8**	**22.5**	**20.3**	**18**
Zone 3 actual exotic ground layer required	SP2 SP7	45	62.5*	82*	87*	-	-	-	-
Overall Maximum exotic ground layer required	**N/A**	**N/A**	**36.8**	**34.2**	**31.6**	**28.9**	**26.3**	**23.7**	**21**
Overall actual exotic ground layer required	-	52.6	61.9	60.5	60.6	-	-	-	-

*****Only minor staged works have been completed within Zone 3 as Stage 3 of the development has not yet been completed. Stormwater basins are currently not functionally operational. This zone of the VMP is still under the Developers control and will be progressed to compliance requirements on completion of Stage 3 of the development.

Table 4. Performance against PCT Native Groundcover % Benchmark.

Plant Community Type (PCT)	Management Zone	Monitoring Plot Location	Baseline	Year 1 (ELA)	Year 2 (ELA)	Year 3	Year 4	Year 6	Year 8	Year 10
PCT – 849 minimum required			**N/A**	**30.8**	**38.5**	**46.2**	**50**	**53.9**	**57.8**	**61.6**
PCT - 849 groundcover abundance	Zone 1	SP1	9.7	13.9	34	43.8	-	-	-	-
	Zone 1	SP3								
	Zone 1	SP6								
	Zone 2	SP4								
	Zone 2	SP8								
PCT – 835 minimum required			N/A	31.2	39	46.8	50.7	54.6	58.5	62.4
PCT - 835 groundcover abundance	Zone 1	SP5	10.9	12.5	21	30*	-	-	-	-
	Zone 3	SP2								
	Zone 3	SP7								

*See discussion in Section 4.1.1.

4. Discussion

4.1.1 Annual Change in Mean Native Species Abundance

Of the two (2) PCT's monitored within the Eastern Creek Business Hub, both showed an increase in mean native species abundance. PCT 835 includes the cover percentage of SP2 and SP7 which falls within Management Zone 3. As previously mentioned, bush regeneration works have not been conducted within Management Zone 3 as this stage of the development is yet to be completed and handed over to WSPT. Therefore, the data presented for this community in **Table 4** is not reflective the effectiveness of the bush regeneration works for PCT 835, as the native cover for the areas of the PCT 835 being actively managed is 89%.

The overall increase in mean native species richness could be attributed to many factors. The recent weather conditions may be providing favourable conditions for the emergence and flowering of native herbs and grasses (which were observed within more plots) and may have been less conspicuous during the previous survey period. Increased mean species richness may also be the result of both active (planting) and passive (natural regeneration) species recruitment following bush regeneration works which was observed throughout several of the subject reserves. It is worth noting that although the Native Groundcover abundance does not meet the benchmark requirements, there are positive trends to be observed which show positive signs for the plant communities.

The overall changes in mean native species cover could be attributed to discrepancies between observers as a result of observer bias or the overestimation of baseline data. Such fluctuations are to be expected in the initial years within monitoring and are expected to plateau with continued monitoring if weather conditions remain consistent. Furthermore, the BAM method of identifying species cover is not an 'exact science' and some variability (up to 10%) is to be expected.

4.1.2 Annual Change in Mean Exotic Species Abundance

Of the three (3) Vegetation Management Zones monitored within the Eastern Creek Business Hub, one (1) showed an increase in mean exotic species abundance, and two (2) showed a decrease in abundance.

The slight overall increase in mean exotic species richness may similarly be attributed to prevailing weather conditions such as heavy rainfall, which assists the distribution of exotic seed dispersal as a result of water runoff. This overall increase could also be ongoing effects of the interruptions bush regenerators faced as a result of the Covid-19 restrictions.

The reduction in mean exotic species abundance in some zones may be attributed to bush regeneration works that have occurred within the subject reserves as well as potential discrepancies between observers as a result of observer bias or the overestimation of baseline data. It should be noted that although the decreases in abundance do not meet the requirements, there is an overall declining trend across most zones which is optimistic for the future of the area.

It is expected that information collated from the analysis of long-term monitoring data (i.e., over a 10-year timeframe) will divulge more meaningful information regarding the progress of regeneration works. As such, the continuation of annual monitoring will be vital in ensuring key performance indicators are on track and met.

Table 5. Performance criteria – Year 3.

Performance Criteria	Results following Year 3 2024 Survey.
KPIs for All Monitoring Plots During Establishment Phase	
Commencement or completion of all tasks outlined in the VMP.	On Track; With the exception of works within Management Zone 3. All tasks have been commenced.
Management of priority weeds as per statutory regulations. No Blackberry patches over 4 m².	Criteria met; stabilisation of *Rubus futicosus sp. agg* population in Management Zones 1 and 2, bush regeneration works occurring throughout to manage all priority weeds.
Revegetation is to be undertaken with a minimum of 60% of the benchmark levels for species diversity provided in Appendix C of the VMP (ELA).	Criteria met; 75% of species provided in Appendix C of the VMP were installed throughout Year 2.
At one year post planting, a minimum of 80% survival rate of all vegetation strata planted in each zone (e.g. tree, shrub and groundcover).	Partial; Initial planting completed in year 1 had a survival rate of approximately 50% (ELA). No infill planting has occurred in year 3. Infill planting is required for year 4.
Any localised plant failure within planting areas are addressed with no area larger than 2m x 2m without surviving plants at one year post planting.	Partial; whilst infill planting was not conducted within year 3, weed management and exotic suppression have resulted in better establishment of surviving plantings. Infill planting is required in year 4.
Maintenance replanting is to replace plants with the same growth form (i.e. tree for tree etc.) and must not decrease species diversity. Any new species to be planted must be from the community being emulated and of local provenance or of provenance for climate change adaptation if required.	Not met; Infill planting has not been undertaken following initial revegetation. Infill planting to be undertaken in year 4.
Monitoring and reporting undertaken in accordance with Section 7 of the VMP (ELA).	Criteria met; This report has been prepared for year 3 of the monitoring.
KPIs for All Monitoring Plots at the completion of Year 3	
Woody weeds and exotic vines to be less than 5% cover, not allowed to set seed and no establishment of new species.	Criteria met; 4.2% woody weeds and exotic vines. No new species of woody weeds or exotic vines stablished within Management Zones 1 and 2.
Exotic groundcover covers 60% of original extent.	Partial; whilst overall exotic ground layer across all three (3) zones is 60.6% in total, an increase from previous 60.5% (ELA 2022). Percentage cover for species less than 1% have been rounded up (see **Section 4**). Therefore, percentage covers should be used as a general guide.
Native vegetation cover to be no less than 60% of biometric benchmark in **Table 2**.	Criteria met; PCT 849 at 90.8% of benchmark, PCT 835 at 64.1% of benchmark.

5. Management actions and Focus for Year 4

Bush regeneration works should continue throughout Management Zones 1 and 2 to ensure annual and long term KPIs are met and to maintain the suppression of weed cover. Infill planting is required in year 4 to compensate for the 50% survival rate of plantings that occurred in year 2. Revegetation efforts should be continued to ensure seedlings are established.

Zone 3 to remain in holding until Stage 3 of the development is completed and the stormwater flow is sufficient to meet the design to provide functional operation of the wetland. Zone 3 to be monitored for any threats to other zones and actioned accordingly.

6. References

Department of Planning and Environment (DPE) (2023a) BioNet Vegetation Classification. https://www.environment.nsw.gov.au/research/Visclassification.htm

Department of Planning and Environment (DPE) (2023b) eSPADE v2.1 https://www.environment.nsw.gov.au/eSpade2Webapp#

Department of Primary Industries (DPI) (2022) NSW WeedWise: Priority weeds for the Greater Sydney https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=34

Department of Planning, Industry and Environment (DPIE) (2020) Biodiversity Assessment Method

Eco Logical Australia 2018. Eastern Creek Retail Centre Vegetation Management Plan. Prepared for Western Sydney Parklands Trust.

Eco Logical Australia 2022. Eastern Creek Business Hub – VMP Implementation Progress Annual Report: Year 2 2022. Prepared for Western Sydney Parklands Trust.

PlantNET (2024) The NSW Plant Information Network System, Royal Botanic Gardens and Domain Trust, Sydney. http://plantnet.rbgsyd.nsw.gov.au

7. Appendices

Appendix A. VMP Survey Area (ELA 2022).

Appendix B. Management Zones and Monitoring Locations within the VMP Area (ELA 2022).

Appendix C. Comparative Site Photos from Year 1 to Year 3.

Monitoring Location	2021	13th February 2024
SP1 (Zone 1)	4th March 	

Monitoring Location	2021	13th February 2024
SP2 (Zone 3)	4th March 	

Monitoring Location	2021	13th February 2024
SP3 (Zone 3)	5th March 	

Monitoring Location	2021	13th February 2024
SP4 (Zone 2)	5th March 	

Monitoring Location	2021	13th February 2024
SP5 (Zone 1)	5th March 	

Monitoring Location	2021	13th February 2024
SP6 (Zone 1)	5th March 	

Monitoring Location	2021	13th February 2024
SP7 (Zone 3)	7th March 	

Monitoring Location	2021	13th February 2024
SP8 (Zone 2)	7th March 	

Appendix D. Vegetation Monitoring Data

Native Vegetation – March 2021 (ELA)

Species	% Projected foliage cover in quadrats								% Sitewide Total Cover
	SP1 (Zone 1)	SP2 (Zone 3)	SP3 (Zone 1)	SP4 (Zone 2)	SP5 (Zone 1)	SP6 (Zone 1)	SP7 (Zone 3)	SP8 (Zone 2)	
Acacia falcata						<1			0
Angophora subvelutina						<1			0
Aristida vagans	<1					<1			0
Asperula conferta	<1								0
Brunoniella australis	<1		<1			<1			0
Bursaria spinosa	<1		<1		<1				0
Centello asiatica	<1							<1	0
Chellanthes sieberi					<1	<1			0
Chloris truncata		<1		<1					0
Chloris ventricosa			<1						0
Commelina cyanea			<1	<1		<1			0
Cyoerus gracillis					<1	<1			0
Daviesia ulicifolia						<1			0
Dianella longifolia			<1						0
Dichondra repens	<1		2			<1			0
Digitaria parviflora					<1				0
Einadia nutans			<1			<1			0
Entolasia marginata					<1				0
Eragrostis leptostachya			<1	<1	<1	<1			0
Eriochloa pseudoacrotricha	<1								0

Eucalyptus moluccana	17		1		3	<1			2
Eucaltyptus tetricornis	<1		16	<1	20	11			5
Euchiton sphaericus	<1	<1					<1		0
Glycine tabacina	<1		<1		<1	<1			0
Jacksonia scoparia					<1				0
Juncus usitatus		<1			<1		5		1
Lachnagrostis filiformis		<1					<1		0
Microlaena stipoides	<1		30	<1	35	35		10	6
Oxalis perennans				<1					0
Paspalidium distans	<1		<1		<1	<1			0
Persicaria decipens							<1		0
Rytidosperma sp.						<1			0
Sporobolus creber	<1			<1	<1	<1			0
Themeda triandra	<1				<1	<1			0
Wahlenbergia gracillis				<1		<1			0
Total Cover	**19**	**0**	**50**	**0**	**64**	**48**	**5**	**10**	**25**
Total Species	**15**	**6**	**13**	**8**	**16**	**20**	**4**	**2**	**36**

Exotic Vegetation – March 2021 (ELA)

Species	% Projected foliage cover in quadrats								% Sitewide Total Cover
	SP1 (Zone 1)	SP2 (Zone 3)	SP3 (Zone 1)	SP4 (Zone 2)	SP5 (Zone 1)	SP6 (Zone 1)	SP7 (Zone 3)	SP8 (Zone 2)	
Araujia sericfera	<1		<1		<1	<1			0
Asparagus asparagoides			<1		10	2			1
Asparagus plumosus	<1		<1	<1	<1	<1		<1	0
Axonopus fissifolius								<1	0
Bidens pilosa	<1			<1	<1		<1		0
Bidens sp.			15		<1				2
Briza subaristata				<1	<1			<1	0
Bromus catharticus			<1						
Cenchrus clandestinum		<1					<1		0
Cirsium vulgare	<1	<1			<1	<1		<1	0
Conzya sp.	<1	<1		<1	<1	<1	<1	<1	0
Cyclospermum leptophyllum							<1		0
Cynodon dactylon	10	<1	<1	70	<1	<1		30	12
Ceperus eragrostis		5		<1			<1		1
Digitaria sanguinallis							<1		0
Echinochloa colona		<1							0
Ehrharta erecta			<1		<1	<1			0
Eragrostis curvula	<1			<1	<1				0
Erythrina cristo-galli									0
Gamochaeta sp.		<1							0
Hypericum perforatum				5					1

Hypochaeris radicata					<1	<1		<1	0
Ligustrum lucidum			<1	<1	<1	<1			0
Ligustrum sinense			<1		<1	<1			0
Lycium ferocissimum			5		<1				1
Medicago polymorpha							<1		0
Modiola caroliniana		<1					<1		0
Olea europaea subsp. cuspidata						<1			0
Paspalum dilatum	25	10	<1	15	<1	<1	<1	20	8
Plantago lanceolata	<1	<1		<1			<1		0
Polygonum aviculare		<1					<1		0
Rumex crispus		<1		<1			<1		0
Senecio madagascariensis	<1	<1	<1	<1	<1	<1	<1	<1	0
Setaria parviflora	20	<1	<1	<1	<1	<1	<1	<1	2
Sida rhombifolia	<1				5	2			1
Solanum linnaeanum	<1				<1	<1	<1		0
Solanum nigrum	<1				<1	<1			0
Solanum pseudocapsicum			<1		<1	<1			0
Symphyotrichum subulatum	<1	<1		<1			<1	<1	0
Trifolium sp.		<1					15		2
Verbena bonariensis	<1	20		<1			40	<1	7
Verbena rigida								<1	0
Total Cover	**55**	**35**	**21**	**90**	**15**	**4**	**55**	**50**	**55**
Total Species	**16**	**17**	**14**	**15**	**22**	**17**	**18**	**13**	**41**

Native Vegetation – February 2022 (ELA)

Species	% Projected foliage cover in quadrats								% Sitewide Total Cover
	SP1 (Zone 1)	SP2 (Zone 3)	SP3 (Zone 1)	SP4 (Zone 2)	SP5 (Zone 1)	SP6 (Zone 1)	SP7 (Zone 3)	SP8 (Zone 2)	
Acacia falcata						<1			0
Angophora subvelutina						<1			0
Aristida vagans	<1					<1			0
Asperula conferta	<1								0
Brunoniella australis	<1		<1			<1			0
Bursaria spinosa	<1		<1		<1				0
Centello asiatica	<1							<1	0
Chellanthes sieberi					<1	<1			0
Chloris truncata		<1		<1					0
Chloris ventricosa			<1						0
Commelina cyanea			<1	<1	<1	<1			0
Cyoerus gracillis					<1	<1			0
Daviesia ulicifolia						<1			0
Dianella longifolia			<1						0
Dichondra repens	<1		5			<1			1
Digitaria parviflora					<1				0
Einadia nutans			<1			<1			0
Entolasia marginata					<1				0
Eragrostis leptostachya			<1	<1	<1	<1			0
Eriochloa pseudoacrotricha	<1								0

Eucalyptus moluccana	17		2		10	5			4
Eucaltyptus tetricornis	1		16	<1	20	11			5
Euchiton sphaericus	<1	<1					<1		0
Glycine tabacina	<1		<1		<1	<1			0
Jacksonia scoparia					<1				0
Juncus usitatus		<1			<1		10		1
Lachnagrostis filiformis		<1					<1		0
Microlaena stipoides	<1		35	<1	45	40		10	14
Oxalis perennans				<1					0
Paspalidium distans	<1		<1		<1	<1			0
Persicaria decipens		<1					<1		0
Rytidosperma sp.		<1				<1			0
Sporobolus creber	<1			<1	<1	<1			0
Themeda triandra	<1				<1	<1			0
Wahlenbergia gracillis				<1		<1			0
Total Cover	**32**	**4**	**61**	**5**	**76**	**63**	**5**	**10**	**45**
Total Species	**15**	**6**	**13**	**8**	**16**	**20**	**4**	**2**	**37**

Exotic Vegetation – February 2022 (ELA)

Species	% Projected foliage cover in quadrats								% Sitewide Total Cover
	SP1 (Zone 1)	SP2 (Zone 3)	SP3 (Zone 1)	SP4 (Zone 2)	SP5 (Zone 1)	SP6 (Zone 1)	SP7 (Zone 3)	SP8 (Zone 2)	
Araujia sericfera	<1		<1		<1	<1			0
Asparagus asparagoides			<1		10	10			2
Asparagus plumosus	<1		<1	<1	<1	<1		<1	0
Axonopus fissifolius								<1	0
Bidens pilosa	<1			<1	<1		<1		0
Bidens sp.			10		<1				1
Briza subaristata				<1	<1			<1	0
Bromus catharticus			<1						
Cenchrus clandestinum		<1					<1		0
Cirsium vulgare	<1	<1			<1	<1		<1	0
Conzya sp.	<1	<1		<1	<1	<1	<1	<1	0
Cyclospermum leptophyllum							<1		0
Cynodon dactylon	15	<1	<1	70	<1	<1		30	13
Ceperus eragrostis		5		<1			<1		1
Digitaria sanguinallis							<1		0
Echinochloa colona		<1							0
Ehrharta erecta			<1		<1	<1			0
Eragrostis curvula	<1			<1	<1				0
Erythrina cristo-galli									0
Gamochaeta sp.		<1							0

Hypericum perforatum				5					1
Hypochaeris radicata					<1	<1		<1	0
Ligustrum lucidum			<1	<1	<1	<1			0
Ligustrum sinense			<1		<1	<1			0
Lycium ferocissimum			<1		<1				0
Medicago polymorpha							<1		0
Modiola caroliniana		<1					<1		0
Olea europaea subsp. cuspidata						<1			0
Paspalum dilatum	30	20	<1	15	<1	<1	<1	15	9
Plantago lanceolata	<1	<1		<1			<1		0
Polygonum aviculare		<1					<1		0
Rumex crispus		<1		<1			<1		0
Senecio madagascariensis	<1	<1	<1	<1	<1	<1	<1	<1	0
Setaria parviflora	20	<1	<1	<1	<1	<1	<1	<1	2
Sida rhombifolia	<1				10	50			7
Solanum linnaeanum	<1				<1	<1	<1		0
Solanum nigrum	<1				<1	<1			0
Solanum pseudocapsicum			<1		<1	<1			0
Symphyotrichum subulatum	<1	<1		<1			<1	<1	0
Trifolium sp.		<1					20		2
Verbena bonariensis	<1	10		<1			20	<1	3
Verbena rigida								<1	0
Total Cover	**87**	**70**	**26**	**93**	**26**	**30**	**55**	**50**	**62**
Total Species	**16**	**17**	**14**	**15**	**22**	**17**	**18**	**13**	**41**

Native Vegetation – February 2024 (Narla)

Species	% Projected foliage cover in quadrats								% Sitewide Total Cover
	SP1 (Zone 1)	SP2 (Zone 3)	SP3 (Zone 1)	SP4 (Zone 2)	SP5 (Zone 1)	SP6 (Zone 1)	SP7 (Zone 3)	SP8 (Zone 2)	
Acacia falcata									0
Acacia implexa				1					1
Angophora subvelutina									0
Aristida vagans									0
Asperula conferta	<1								0
Brunoniella australis	<1		<1			5			5
Bursaria spinosa	<1		2	1	<1	5			8
Centello asiatica								<1	0
Chellanthes sieberi						1			1
Chloris truncata		<1		<1		1	<1		1
Chloris ventricosa									0
Commelina cyanea			<1	5	1	1			8
Cyoerus gracillis			<1						0
Daviesia ulicifolia									0
Dianella longifolia	<1								0
Dichondra repens			1		20	3			24
Digitaria parviflora					<1				0
Dodonea viscosa				1					1
Einadia nutans									0
Entolasia marginata					<1				0
Eragrostis leptostachya	10			10					20

Eriochloa pseudoacrotricha	<1								0
Eucalyptus moluccana	10		2		5	1			18
Eucaltyptus tetricornis	1		20	5	25	40			91
Euchiton sphaericus		<1							0
Gahnia sp.						<1			0
Glycine candenesta	1			1	1	<1			3
Glycine tabacina	1								1
Hardenbergia obtusifolia						5			5
Jacksonia scoparia									0
Juncus usitatus		<1		1					1
Lachnagrostis filiformis		<1							0
Microlaena stipoides	<1		40	20	35				95
Oxalis perennans									0
Paspalidium distans	<1								0
Persicaria decipens		<1							0
Rytidosperma sp.		<1							0
Sporobolus creber	10			3					13
Themeda triandra	<1				1	1			2
Wahlenbergia gracillis				1					1
Wahlenbergia violacea						<1			0
Total Cover	**34**	**1**	**65**	**49**	**89**	**63**	**0**	**0**	**38**
Total Species	**14**	**6**	**8**	**12**	**10**	**13**	**1**	**1**	**41**

Exotic Vegetation – February 2024

Species	% Projected foliage cover in quadrats								% Sitewide Total Cover
	SP1 (Zone 1)	SP2 (Zone 3)	SP3 (Zone 1)	SP4 (Zone 2)	SP5 (Zone 1)	SP6 (Zone 1)	SP7 (Zone 3)	SP8 (Zone 2)	
Anagallis arvensis				<1					0
Araujia sericfera			<1						0
Asparagus asparagoides			<1		2	1			3
Asparagus plumosus	<1		<1	1	<1	1			2
Aster subulatus				<1			3	5	8
Axonopus fissifolius									0
Bidens pilosa			50	1					51
Bidens sp.									0
Briza subaristata				1					1
Bromus catharticus				<1	<1		1		1
Cenchrus clandestinum							1		1
Cirsium vulgare						<1			0
Conzya sp.				1					1
Cyclospermum leptophyllum									0
Cynodon dactylon	15	5		80				10	110
Cyperus eragrostis	<1			1					1
Digitaria parviflora					<1				0
Digitaria sanguinallis									0
Echinochloa colona									0
Entolasia marginata					<1				0

Ehrharta erecta									0
Eragrostis curvula	15			3					18
Erythrina cristo-galli							<1		0
Gamochaeta sp.									0
Hypericum perforatum									1
Hypochaeris radicata									0
Juncus acutus								5	5
Ligustrum lucidum									0
Ligustrum sinense									0
Lycium ferocissimum									0
Medicago minima				<1					0
Medicago polymorpha									0
Modiola caroliniana									0
Olea europaea subsp. cuspidata									0
Paspalum dilatum	1		<1	10				1	12
Paspalum urvillei			<1			10	80	50	140
Pavonia hastata						<1			0
Plantago lanceolata		<1	5	2		1	1		0
Polygonum aviculare		<1		<1					0
Rubus fruticosus spp. agg.								1	1
Rumex crispus									0
Senecio madagascariensis		1		1		<1		<1	0
Setaria incrassata						<1			0
Setaria parviflora			5	20				<1	25

Sida rhombifolia	10	10	1	1	<1	1	2		25
Solanum linnaeanum				<1		<1			0
Solanum nigrum						<1			0
Solanum pseudocapsicum									0
Symphyotrichum subulatum				<1					0
Tradescantia fluminensis			<1						0
Trifolium sp.									0
Verbena bonariensis		30	<1	<1			40	5	75
Verbena rigida									0
Total Cover	**41**	**46**	**61**	**123**	**3**	**15**	**128**	**68**	**60.6**
Total Species	**6**	**6**	**11**	**20**	**6**	**11**	**8**	**9**	**53**

NARLA

environmental

Eastern Sydney Office
Suite 2.01 4/10 Bridge Street
Pymble
NSW 2073
Ph: 02 9986 1295

www.narla.com.au