Final Report

Annual Report (Year 3): Ravenhall Industrial Precinct Offset Site, Victoria

Prepared for

Dexus C/- Citius Property Development

February 2023

Ecology and Heritage Partners Pty Ltd

MELBOURNE: 292 Mt Alexander Road, Ascot Vale VIC 3032 **GEELONG:** 230 Latrobe Terrace, Geelong West VIC 3218
BRISBANE: Level 22, 127 Creek Street, Brisbane QLD 4000 **ADELAIDE**: 78 Edmund Avenue, Unley SA 5061
CANBERRA: 19-23 Moor Street, Turner ACT 2612 **SYDNEY:** Level 5, 616 Harris Street, Ultimo NSW 2007
www.ehpartners.com.au | 1300 839 325

DOCUMENT CONTROL

Assessment	Annual Report for the Ravenhall Industrial Precinct Offset Reserve
Address	91-167 Palm Street, Ravenhall, Victoria
Project number	15770
Project director	Shannon LeBel (Associate Ecologist)
Project manager	Samantha Barron (Consultant Botanist)
Report reviewer	Shannon LeBel (Associate Ecologist)
Report prepared by	Samantha Barron (Consultant Botanist)
EHP Field Staff	Claire Mackay (Field Ecologist), Sara Petrovic (Field ecologist), Matt Boyd (Zoologist), Sarah Hill (Field Ecologist), Richard Moore (Field Ecologist), David Heaton (Zoologist / Bushfire Consultant), Jamie Willey (Ecologist), Samantha Barron (Consultant Botanist)
Mapping	Monique Elsley (GIS Officer) and Petra Sorensen (GIS Officer).
File name	15770_EHP_Ravenhall_ Yr3Report _Final_09022023
Client	Dexus C/- Citius Property Development
Bioregion	Victorian Volcanic Plain
Catchment Management Authority	Melbourne Water
Local Government Authority	Melton City Council
DELWP region	Port Phillip
Acknowledgments	Graham Rushton (Senior Project Manager) – Citius Property Development
	Jon Nester and the crew from Aus Eco Solutions for management works

Report versions	Comments made by	Date submitted
Draft	Send to client for review	12/01/2023
Final	Clarifications around fencing and signage mitigation	09/02/2023

Ecology and Heritage Partners acknowledge the Traditional Owners of the country we live and work on, and we pay our respect to Elders past, present and emerging.

CONTENTS

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by DWPL Nominees Pty Ltd and Dexus Wholesale Management Ltd (herein referred to as 'Dexus') to undertake ecological monitoring and oversee management works for the Ravenhall Industrial Precinct offset site, located at 91-167 Palm Street, Ravenhall, Victoria (Figure 1). The on-site offset has been established to protect at least 13.37 hectares of *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP), 28.98 hectares of Striped Legless Lizard *Delma impar* (SLL) habitat, and a population of Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* (SRF). Several patches of Plains Grassland (PG) are also used to generate offset credits in order to partially satisfy Condition 51 of Planning Permit PA2013-4050/5 issued by the City of Melton.

The following conditions apply to the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval (EPBC 2015/7486):

Condition 2: Construction

2. *In order to protect NTGVPP, SLL and SRF to be retained in the on-site offset:*

a. *The approval holder must ensure that no construction activities occur within the on-site offset, excluding activities required in the Conservation Management Plan for the on-site offset.*

b. *After the construction phase is complete, the on-site offset must be protected by permanent fencing that restricts vehicle access to the on-site offset.*

c. *The approval holder must implement the Construction Environmental Management Plan (CEMP).*

Condition 3: On-site offsets

3. *To compensate for the loss of up to 18.02 ha of NTGVVP, up to 40.23 ha of SLL habitat, and up to13 SRF, the approval holder must secure the on-site offset with a covenant prior to commencement of construction. The on-site offset must contain at least 13.37 ha of NTGVVP, at least 28.98 ha of SLL habitat and at least 86 SRF plants.*

To satisfy Condition 3, an on-site offset was established and secured in perpetuity through a Section 69 agreement (VC_CFL-3086_01) under the *Conservation, Forest and Lands Act 1978*, and an on-site Management Plan (OMP) was developed. A CMP was also developed and approved by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) – formally Department of Agriculture, Water and the Environment (DAWE) under the EBPC Act to guide the management, monitoring and auditing works, as per Condition 2.

The management, monitoring and auditing works required to be undertaken within the offset site are detailed in the CMP (Ecology and Heritage Partners 2019) and OMP prepared for the section 69 agreement (VC_CFL-3086_01). Specifically, the works relate to the protection and ecological monitoring of the quality of the native vegetation and significant ecological values present within the offset site, as specified in the landowner agreement (VC_CFL-3086_01), including three matters of National Environmental Significance (NES); NTGVVP, Spiny Rice-flower and Striped Legless Lizard.

Ecology and Heritage Partners subcontracted Aus Eco Solutions Pty Ltd (AES) to implement pest plant and animal control, biomass reduction and revegetation for the ecological management works for the Year 3 works.

This report outlines the results of the Year 3 annual monitoring and addresses the management, in accordance with the CMP and OMP. The section 69 agreement was secured on title on the 28 November 2019, and this report addresses the monitoring and reporting requirements of the approved management plan for the offset site.

1.2 Objectives

The overall objective of the CMP is to protect and improve the quality and extent of native vegetation and significant ecological values present within the offset site, as specified in the landowner agreement (VC_CFL-3086_01). This includes the populations of nationally significant species listed under the EPBC Act, Spiny Rice-flower and Striped Legless Lizard, as well as the threatened ecological community, *Natural Temperate Grassland of the Victorian Volcanic Plain*.

1.3 Offset Site Security

Condition 3 of the EPBC Act approval specifies that the land identified as the on-site offset in approval 2015/7486 adjacent to the clearing site must be protected in perpetuity to compensate for impacts to the nationally significant ecological community NTGVVP, SRF and SLL using a conservation covenant. A Section 69 Agreement (VC_CFL-3086_01) was entered under the *Conservation, Forests and Lands Act 1987* between DWPL Nominees Pty Ltd and Dexus Wholesale Management as the landowners and DELWP (title secured and registered 28 November 2019).

2 MONITORING METHODS

Baseline data to determine the condition and extent of PG and NTGVVP, as well as the current population status of SLL and SRF within the offset site was undertaken on the 14 June 2019 to inform the CMP (Ecology and Heritage Partners 2019) and OMP . Ecological management and monitoring is actively undertaken annually over a period of 10 years to ensure that the quality conditions outlined within the CMP and OMP are met.

Ecological monitoring in Year 3 was undertaken to monitor the quality and extent of PG and NTGVVP, as well as the population status of residing SLL and the retained SRF populations within the offset site. The following section outlines the methods used to undertake the monitoring in Year 3, in accordance with the CMP (Ecology and Heritage Partners 2019) and OMP (VC_CFL-3086_01).

2.1 Native Vegetation

The following methods have been undertaken in accordance with the CMP (Ecology and Heritage Partners 2019), OMP (VC_CFL-3086_01) and associated federal policy documents, *Nationally Threatened Ecological Communities of the Victorian Volcanic Plain: Natural Temperate Grassland & Grassy Eucalypt Woodland* (Commonwealth of Australia 2011a) and *Commonwealth Listing Advice on Natural Temperate Grassland of the Victorian Volcanic Plain* (Threatened Species Scientific Committee 2008):

- To assess changes in quality and extent of PG and NTGVVP, the following monitoring was undertaken:
    - The extent of PG and NTGVVP was mapped and a Habitat Hectare assessment (as per the *Vegetation Quality Assessment Manual: Guidelines for applying the habitat hectares scoring method* (DSE 2004) was undertaken to determine the overall quality (i.e. condition); and,
    - Photo point (see Figure 4) monitoring was undertaken at photo points established in Year 1, which were placed in areas of native vegetation and predominantly weeds:
- An assessment of suitable habitat (i.e. extent, quality and structure) for SLL and SRF was undertaken to determine the effectiveness of management for the existing populations;
- Weed Monitoring to determine the effectiveness of management:
    - Broad weed mapping to record the overall cover, extent and composition (i.e. herbaceous, grassy, woody) of weeds within the offset site; and,
    - The cover and extent of all high threat weeds, as per the CMP, was mapped and recorded.

2.2 Spiny Rice-flower

The following methods have been undertaken in accordance with the CMP (Ecology and Heritage Partners 2019), OMP (VC_CFL-3086_01) and the survey guidelines outlined within *the Significant impact guidelines for the critically endangered Spiny Rice-flower* (*Pimelea spinescens* subsp. *spinescens*) (DEWHA 2009):

- Monitoring was completed by suitably qualified botanists (i.e. botanists with prior survey experience);
- Multiple surveys were undertaken to ensure the survey effort was adequate;

- Monitoring was conducted at least six months post fire;
- Monitoring was conducted between April and August when the species is flowering;
- Survey effort included all potential habitat areas i.e. remnant grassland including degraded grassland;
- Transects at less than 5 metre intervals were undertaken in all areas of potential habitat;
- The number and location of all plants were recorded and individually marked with a stake and GPS coordinates; and,
- A broad assessment of the vegetation condition within the site was also recorded.

Spiny Rice-flower monitoring is undertaken annually for the first four years, and then every second year (i.e. years 6, 8 and 10), as per the CMP (Ecology and Heritage Partners 2019).

2.3 Striped Legless Lizard

The following methods have been undertaken in accordance with the CMP (Ecology and Heritage Partners 2019), OMP (VC_CFL-3086_01) and the *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act* (Commonwealth of Australia 2011b):

- 10 tile grids (10 x 5 tiles per grid) were established in March 2020 (Figure 3);
- Tiles were established in areas of suitable habitat (i.e. tussock grassland or grassy habitat) at least three months before the survey period to allow 'bedding-in';
- Tiles were checked a minimum of eight times between September and December under suitable conditions (early morning on warm, still days);
- Time of survey, weather conditions and the ambient temperature will be recorded for each grid; and,
- Morphological data including sex, body size and reproductive condition will be recorded for all individuals captured, as well as dorsal head shots for unique identification purposes.

Striped Legless Lizard monitoring will be undertaken annually for the first four years, and then every second year (i.e. years 6, 8 and 10), as per the CMP (Ecology and Heritage Partners 2019).

3 MONITORING RESULTS

3.1 Native Vegetation

Baseline data collection to determine the current condition and extent of native vegetation within the offset site was undertaken on 14 June 2019. The baseline data informed the EPBC Conservation Management Plan objectives and section 69 Management Plan associated with the offset site.

In Year 3, detailed vegetation monitoring was undertaken on 10 February, 17 March, 14 and 15 June, 4 October, and 8 November 2022, by a suitably qualified Botanist. A habitat hectare assessment was undertaken to assess any changes in the vegetation quality and/or extent, and a description is provided below. Habitat hectare scores for vegetation are provided in Appendix 1.

In Year 3, most of the vegetation patches (extent and quality) remained consistent with Year 2, however a large portion (4.34 hectares) of PG3a (zone 2D) was not recorded as PG due to the low cover of native vegetation (<25%) and a high cover of perennial weeds (>70%), particularly Ribwort *Plantago lanceolata* (Plate 1). Small discrete patches of PG were present throughout this area; however, they did not have the required 25% native cover to be mapped as a patch (Plate 2). PG3a is identified as zone 2D (SLL habitat) in the OMP (VC_CFL-3086_01). The changes to vegetation quality and extent are largely attributed to increased rainfall during 2022 that resulted in seasonal increases in weed cover across the site.

To increase the cover of tussock-grasses (i.e. improve SLL habitat) in PG3a (zone 2D), direct seeding works are proposed in Year 5, with site preparation works to begin in Year 4 by AES. This area will be subject to intensive weed control in Year 4 and direct seeding in Year 5. This action will encourage native vegetation colonisation and expansion throughout the linear section of the offset site, ultimately improving the cover and quality of native vegetation, and habitat for Striped Legless Lizard and Spiny Rice-flower.

Plate 1. Large area dominated by Ribwort (previously PG3a) (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 2. Swath of Kangaroo Grass on the southern boundary (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Native vegetation patches in the western section of the reserve remained consistent throughout Year 3, however weed cover from annual weeds in particular has increased. Native vegetation patches (PG1a, PG1b and PG1c on Figure 2 – zones 2B, 2C, 2H) are still dominated by Kangaroo Grass *Themeda triandra,* with

swathes of Wallaby-grass and Spear-grass *Austrostipa* spp. Biomass is high in these patches, and there is limited inter-tussock space (10-15cm) (Plate 3). Weed cover from pasture grasses (typically annual weeds) was high (>60%) throughout the offset site, and moderate (30-40%) within patches. Grassland patches that qualify as NTGVVP (Figure 2) had lower weed cover (25%), largely due to increased biomass from Kangaroo Grass and limited recruitment space. However, these areas contained scattered drifts of high threat weeds such as Serrated Tussock *Nassella trichotoma* and Chilean Needle-grass *Nassella neesiana* (Plate 4). Most of these areas have been successfully sprayed to prevent increased spread, however there are small sections and scattered individuals that still require follow-up work. Herbaceous weeds were common throughout the western section; however, these were largely limited to the edges of patches, particularly along the boundaries of the offset site (Plate 5; Plate 6).

Plate 3. High biomass with limited inter-tussock space within the western section of PG1b (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Plate 4. Serrated Tussock scattered throughout PG1b (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Plate 5. Chilean Needle-grass along the northern boundary within the linear section of the offset site (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 6. Serrated Tussock along the southern boundary of the offset site (Ecology and Heritage Partners Pty Ltd 08/11/2022).

The quality and extent of native vegetation in the eastern section of the offset site remained consistent throughout Year 3, with slight reductions in quality due to increased weed cover. PG patches in the eastern section were dominated by Wallaby-grass and Spear-grass, with scattered Kangaroo Grass (Plate 7; Plate 8). Weed cover within this section was higher than previous years (<70%), with annual grasses and herbaceous

weeds increasing in cover and extent (Plate 9; Plate 10). High threat herbaceous weeds, including Artichoke Thistle *Cynara cardunculus* subsp. *flavescens*, Patterson's Curse *Echium plantagineum*, Ribwort, Galenia *Aizoon pubescens*, and Cat's-ear *Hypochaeris* spp., increased in overall cover in Year 3. Additionally, high threat grassy weeds, including Cane Needle-grass *Nassella hyalina*, Serrated Tussock, and Chilean needle-grass are present throughout the eastern section of the reserve, however the cover and extent is less than the western section and these species have not increased in cover or extent in Year 3.

Plate 7. Spear-grass within the southern section of PG3d (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 8. Drift of Wallaby-grass within pg1b (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 9. Soft Brome *Bromus hordeaceus* with PG1b (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 10. Wild Oats *Avena* spp. within PG3b (Ecology and Heritage Partners Pty Ltd 04/10/2022).

3.2 Spiny Rice-flower

The objective of the Spiny Rice-flower monitoring was to ensure that the population is maintained or improved through management of threats to the population, based on the initial 86 individuals recorded within the offset site reserve as detailed in the CMP (Ecology and Heritage Partners 2019).

Monitoring in Year 3 was undertaken during the species flowering period, by suitably qualified botanists on 14 and 15 June 2022. Identified individuals were marked with a GPS and staked for future monitoring.

In year 3, an additional three SRF plants were recorded within the offset area (63 in Year 1; 90 in Year 2; 93 in Year 3; Figure 2). The majority of SRF observed contained flowering material and appeared in good health (Plate 11 - Plate 14). Although several individuals within the western portion of PG1b were not located in Year 2 or 3 (Figure 2), this patch of native vegetation contains a high level of biomass, which potentially influenced the detectability of SRF in this area. Since the plants could not be located for two consecutive years, they are presumed dead, however, a planned burn is proposed for this section of the offset site, which may encourage the plants to re-sprout once biomass has been reduced.

Plate 11. Healthy Spiny Rice-flower within Kangaroo Grass within PG1c (zone 2H) (Ecology and Heritage Partners 15/06/2022).

Plate 12. Staked flowering Spiny Rice-flower within the PG1c (zone 2H) (Ecology and Heritage Partners 04/10/2022).

Plate 13. Healthy Spiny Rice-flower within the 2021 burn area (PG3f / zone 4A) (Ecology and Heritage Partners 14/06/2022).

Plate 14. Staked flowering Spiny Rice-flower within the PG1c (zone 2H) (Ecology and Heritage Partners 04/10/2022).

High threat weeds such as Serrated Tussock, Chilean Needle-grass, Artichoke Thistle and Galenia have the potential to out-compete or smother Spiny Rice-flower plants and prevent recruitment. Importantly, native grasses with high biomass (due to a lack of episodic disturbance such as fire), including Kangaroo-grass can also out-compete Spiny Rice-flower plants. Ongoing targeted weed control, including hand weeding around SRF, and biomass removal through ecological burns will mitigate these threats to SRF plants.

Ecology and Heritage Partners were notified by Aus Eco Solutions on 1 September 2022 about a potential breach to the offset site from the V/Line development adjoining the eastern boundary of the offset site. It is our understanding that a water hose had been placed into the offset site and was releasing water in the grassland, and it was placed directly on top of one Spiny Rice-flower (Plate 15; Plate 16). Citius and Dexus were notified on the 1 September 2022 and the hose was removed immediately.

A site inspection was undertaken on 12 September to determine if there has been any significant damage to the grassland and Spiny Rice-flower. The site inspection revealed no damage to the grassland vegetation or Spiny Rice-flower within the offset site.

Plate 15. Water pipe within the offset site (PG3f / zone 4A) (AES 01/09/2022).

Plate 16. Water pipe on top of Spiny Rice-rice flower (PG3f / zone 4A) (AES 01/09/2022).

3.3 Striped Legless Lizard

Striped Legless Lizard monitoring was undertaken on the 20 and 28 September, 4, 11, and 19 October, 3, 10 and 22 November by qualified Zoologists. In Year 3, there has been a decrease in the number of Striped Legless Lizard found compared with Year 1 and Year 2 with 21, 24, and 18 individuals recorded, respectively (Plate 17; Plate 18; Table 1). Three other grassland reptiles were recorded using the artificial refuge, including Eastern Blue Tongue *Tiliqua scincoides*, Little Whip Snake *Suta flagellum*, and Tiger Snake *Notechis scutatus* (Plate 19; Plate 20). There was an increase in the number of Tiger Snakes recorded (Table 1; Table 2).

Table 1. Total number of individuals recorded during SLL tile checks.

Scientific Name	Common Name	Year 1	Year 2	Year 3
REPTILES				
Delma impar	Striped Legless Lizard	21	24	18
Notechis scutatus	Tiger Snake	-	3	8
Suta flagellum	Little Whip Snake	1	21	25
Tiliqua scincoides	Eastern Blue Tongue	8	55	36
FROGS				
Limnodynastes tasmaniensis	Spotted Marsh Frog	-	-	31

Scientific Name	Common Name	Year 1	Year 2	Year 3
MAMMALS				
*Mus musculus**	House Mouse	-	6	1

Notes: * = Introduced species.

Plate 17. Striped Legless Lizard observed within the offset site during check four (Ecology and Heritage Partners Pty Ltd 11/10/2022).

Plate 18. Striped Legless Lizard observed within the offset site during check eight (Ecology and Heritage Partners Pty Ltd 28/09/2022).

Plate 19. Little Whip Snake under a tile in the offset site (Ecology and Heritage Partners 22/11/2022).

Plate 20. Eastern Blue Tongue that was found under the artificial tiles in the offset site (Ecology and Heritage Partners 22/11/2022).

Table 2. Summary of survey results from Striped Legless Lizard surveys (Year 3).

Date	Observer	Time	Avg Air Temp °C	Avg Cloud Cover (avg)	Avg Wind Direction and Spd	Avg Above Tile Temp °C	Avg Under Tile Temp °C	Observations & Tile Grid No.									
								1	2	3	4	5	6	7	8	9	10
20/09/2022	SP, CM, DH	10:35 - 1:00	16.85	40	25.95 (NNE)	29.9	15.7	EBT X1	LWS X1; SMF X	LWS X1	SMF X1	SMF X15, LWS X2; EBT X1	EBT X1; SMF X2	SMF X1; EBT X2	-	TS X1	**SLL X3;** EBT X2; SMF X1; LWS X1
28/09/2022	CM & SP	9.58 - 12:40	14.3	100	27.74 (SSE)	16.65	12.6	EBT X1	-	EBT X1	SMF X6	SMF X14; LWS X2; EBT X1	EBT X2; **SLL X1;** TS X1; SMF X1	TS X3; EBT X1	EBT X3	EBT X5; **SLL X1**	SMF X3; LWS X2; EBT X4; **SLL X1**
4/10/2022	SP & CM	10:08 - 12:11	13.85	95	17.6km (SE)	18.9	14.85	LWS X1; EBT X4	SMF X1	**SLL X1**	SMF X4	SMF X11; EBT X1	**SLL X1;** SMF X1; EBT X1	SMF X1; EBT X1	**SLL X1;** EBT X2	**SLL X1;** EBT X2	EBT x4; LWS X2
11/10/2022	SP & CM	11:11-2:02	16.6	66	21 (NE)	28.2	16.1	LWS X2; EBT X2	SMF X1	-	**SLL X1;** SMF X3	LWS X1; SMF X7	**SLL X1;** EBT X2; SMF X1	-	-	LWS X1; EBT X5	TS X1; LWS X1; SMF X1 EBT X4
19/10/2022	CM & MB	11:14 - 1:05	19.1	0	13 SE	39.1	21.1	EBT X1; LWS X1	-	-	SMF X2	SMF X7	-	TS X2; EBT X1	**SLL X1**	-	**SLL X2,** LWS X2; EBT X3; TS X1
03/11/2022	CM & SH	9:40 - 12:15	12.9	83	21.6 (SW)	21.1	13.9	LWS X1; EBTX 2	SMF X2	-	LWS X1; SMF X6	SMF X8; LWS	-	TS X1	**SLL X1**	EBT X4	LWS X3; EBT X3

Date	Observer	Time	Avg Air Temp °C	Avg Cloud Cover (avg)	Avg Wind Direction and Spd	Avg Above Tile Temp °C	Avg Under Tile Temp °C	Observations & Tile Grid No.									
								1	2	3	4	5	6	7	8	9	10
												X2; EBT X1					
10/11/2022	RM	7:45-11:53	19.2	50	31 (NNE)	28.1	20.7	-	HM X1	-	SMF X2	LWS X1	LWS X1	EBT X1	-	-	LWS X1; EBT X1
22/11/2022	CM & RM	9:30 - 12:45	14.3	95	27.75 (W)	30	17.5	LWS X2; EBT X2	SMF X2	-	SMF X5; LWS X1	SMF X6; LWS X 2	**SLL X1**; SMF X1; TS X1	SMF X2; EBT X2	**SLL X1**	**SLL X2**; EBT X2	EBT X2; LWS X2

Notes: Avg = average; EBT = Eastern Blue Tongue; LWS = Little Whip Snake; TS = Tiger Snake; SLL = Striped Legless Lizard, SMF= Spotted Marsh Frog, HM= House Mice.

3.4 Management Action Plan

An assessment of completed actions to date against the Management Action Plan table in the section 69 OMP is provided in the following sections.

3.5 Weeds

Overall weed cover in Year 3 has increased throughout the offset site, particularly annual and herbaceous weeds, with approximately 20-30% cover observed. Species composition remains stable with no new introductions, however, the total extent and cover of weeds has increased. An increase in weed cover is associated with increased rainfall and warm temperatures. Weed cover remains highest at the edges of the offset site, around rock piles, and within areas of disturbance (e.g. inundated areas, dams, tracks, and fence lines). The dominant perennial species include Serrated Tussock, Chilean Needle-grass, Artichoke Thistle, Galenia, Patterson's Curse, Ribwort, Cat's-ear, and African Box-thorn *Lycium ferocissimum*. A large number of weeds have successfully set seed in Year 3; increased cover from higher rainfall reduced the effectiveness and amount of weed control required.

The overall cover (%) of all weeds recorded throughout the offset site is provided below in Table 3.

Table 3. Weed Cover throughout the Ravenhall Offset Site (November 2022).

Scientific Name	Common Name	Existing / Emerging	Zones	Current Cover %	s.69 Target Achieved (Y/N)
WOODY WEEDS					
Lycium ferocissimum	African Box-thorn	Existing	2A, 2C, 2D	<5%	N
Marrubium vulgare	Horehound	Emerging	2C, 2D, 2E, 3A, 3B, 3D	1%	
Prunus spp.	-	Existing	2D	<1%	
Rosa rubigonsa	Sweet Briar	Existing	2A, 2C, 2D, 3B	<5%	
HERBACEOUS WEEDS					
Aizoon pubescens	Galenia	Existing	All Zones	5-10%	N
Arctotheca calendula	Capeweed	Existing	All Zones	10-15%	N
Cirsium vulgare	Spear Thistle	Existing	All Zones	5-10%	N
Convolvulus arvensis	Common Bindweed	Existing	2D	1%	N
Cynara cardunculus	Artichoke Thistle	Existing	All Zones	10-15%	N
Ecballium elaterium	Squirting Cucumber	Emerging	2D	<1%	N
Echium plantagineum	Paterson's Curse	Existing	All Zones	10-15%	N
Helminthotheca echioides	Ox-tongue	Existing	All Zones	5-10%	N
Hypochaeris spp. and *Brassica* spp. *etc*	Flat Weeds and Mustards	Existing	All Zones	5%	N

Scientific Name	Common Name	Existing / Emerging	Zones	Current Cover %	s.69 Target Achieved (Y/N)
Plantago spp.	Ribwort	Existing	All zones (high cover in zone 2D)	<40% all zones excluding 2D. 50-90% in zone 2D.	N
Lactuca serriola	Prickly Lettuce	Existing	All zones	1%	N
Malva spp.	Mallow	Existing	2A, 2C	<1%	N
Sonchus spp.	Sow-thistle	Existing	All Zones	5%	N
Xanthium spinosum	Bathurst Burr	Existing	2D, 2E, 3A, 3B, 3C, 3D, 3E	1%	N
GRASSY WEEDS					
Avena spp.	Oats	Existing	All zones	15% in patches 15-40% outside patches	N
Agrostis capillaris	Brown-top Bent	Existing	All zones	5-10%	N
Anthoxanthum odoratum	Sweet Vernal Grass	Existing	All zones	5-15%	N
Briza spp.	Quaking Grass	Existing	All zones	5-10%	N
Brome spp.	Brome	Existing	All zones	15-40%	N
Cynodon dactylon spp. *dactylon*	Couch	Existing	All zones	<5%	N
Dactylis glomerata	Cocksfoot	Existing	All zones	5-10%	N
Ehrharta erecta / *Ehrharta longiflora*	Panic Veldt-grass / Annual Veldt-grass	Existing	All zones	10-15%	N
Holcus lanatus	Yorkshire Fog	Existing	All Zones	5-10%	N
Cenchrus clandestinus	Kikuyu	Existing	All zone (predominantly along fence lines and in areas of disturbance)	<5%	N
Lolium rigidum / *Lolium perenne*	Wimmera Rye-grass / Perennial Rye-grass	Existing	All zones	15-40%	N
Nassella hyalina	Cane Needle-grass	Emerging	3B	<5%	N
Nassella neesiana	Chilean Needle-grass	Existing	All zones. Present in moderate abundance in zones 2D; 3B; 3C, 4A; 5A; 5B.	Approx. 5-15%	N

Scientific Name	Common Name	Existing / Emerging	Zones	Current Cover %	s.69 Target Achieved (Y/N)
Nassella trichotoma	Serrated Tussock	Existing	All zones. Cover varies throughout: moderate-high cover in zones 2E, 2G, 2F, 2D, 2I.	15%	
Paspalum dilatatum	Paspalum	Existing	2A, 2D, 2E	3%	N
Phalaris aquatica	Toowoomba Canary-grass	Existing	2A, 2D, 2E	5%	N
Vulpia spp.	Fescue	Existing	All zones	25%	N

3.5.1 Woody Weeds

Targets to be achieved:

- Eliminate all listed woody weeds, with no mature plants present by the end of Year 2.
- <1% cover of all listed woody weeds, which no mature plants present at the end of Year 2.
- Minimise off-target damage.
- <1% cover of all woody weeds, with no mature plants present at the end of Year 2.

Action completed:

Overall cover of woody weeds across the offset site is low, with approximately <5% cover of mature and re-sprouting plants. Woody weeds are typically restricted to the perimeter of the offset site, particularly in areas where rock/rubble piles are present, such as zones 2A, 2D and 3C. Common woody weeds include African Box-thorn and Sweet Briar *Rosa rubigonsa* (approx. 5% cover throughout) (Plate 21; Plate 22).

The majority of woody weeds have been controlled within the offset site, however there are scattered individuals that are re-sprouting and/or germinating and should be addressed in Year 4. While all woody weeds are considered high-threat, many of the mature plants are restricted to areas of disturbance and rock/rubble piles and don't appear to be spreading throughout areas of native vegetation. Despite this, mature plants are a source of seed and should be removed in Year 4 by Aus Eco Solutions.

Plate 21. Mature African Box-thorn along the southern boundary fence within zone 2A (adjacent 3A) (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Plate 22. Sweet Briar re-sprouting within zone 3A (Ecology and Heritage Partners Pty Ltd 04/10/2022).

3.5.2 Grassy Weeds

The cover of grassy weeds (perennial and annual) has increased from low-moderate in Year 3 to moderate-high in Year 4, however this varies between zones. The dominant high threat grasses within patches are Chilean Needle-grass and Serrated Tussock (approx. 10-15% cover throughout). Areas of high weed cover (>70%) tend to be at the perimeter of the offset site or in areas that are frequently disturbed and degraded areas (i.e. management tracks, bordering the dams, and rubbish/rubble piles).

Large areas of Serrated Tussock and Chilean Needle-grass have been effectively sprayed, resulting in large areas devoid of vegetation (Plate 23; Plate 24). While the cover of Serrated Tussock and Chilean needle-grass has been reduced in Year 3 many plants still set seed within the offset site, and several isolated drifts and scattered individuals occur throughout the offset site; Year 4 works should focus on controlling these within patches of native vegetation. During the site inspection, a high cover of Chilean Needle-grass and Serrated Tussock was observed between zones 2A/2B and 2C, and particularly throughout 2D and between 2C and 2E, and throughout 3B. Aus Eco Solutions focussed much of the Serrated Tussock and Chilean Needle-grass works along the boundary in the western section (zone 2D), throughout the linear section (zone 2D, 2H) and in the eastern section (3A – 3E, 4A – 4C) along the boundary of patches and isolated occurrences.

Plate 23. Mature Serrated Tussock within the southwest corner of PG1b (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 24. Areas of Serrated Tussock and Chilean Needle-grass that have been controlled within the offset site (zone 2D) (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Cane Needle-grass was observed in the eastern section of the offset site. Occurrences are largely isolated to wet areas, such as drainage lines and on the boundary of the dams (zones 3B and 3E). Aus Eco Solutions have targeted these areas and will continue to undertake targeted works to prevent further spread into the offset site.

The cover of annual grasses was high throughout Year 3; the dominant species included Rye-grass *Lolium* spp., Brome *Bromus* spp., Quaking Grass *Briza* spp., and Oats *Avena* spp. (Plate 25; Plate 26).

Plate 25. High cover of Rye-grass throughout PG3a (zone 2D) (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Plate 26. Annual grasses within the eastern portion of PG1b (zone 2E) (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Other high threat grassy weeds were observed in low numbers (<5% cover), including Kikuyu *Cenchrus clandestinus* and Couch *Cynodon dactylon* var. *dactylon.* These species were particularly prevalent in low lying areas in the eastern section of the offset site (e.g. 3A – 3E, 4A – 4C). Isolated areas of Couch were sprayed by AES in Year 3.

Grassy Weed control was also undertaken post-burn areas (Appendix 2), however targeted weed control is required in Year 4 to reduce the overall cover of grassy weeds within this area and promote native vegetation establishment and spread.

3.5.3 Herbaceous Weeds

Target to be achieved:

- No increase in cover beyond the cover listed in Table 6 (of the section 69 Management Plan) for each zone for all herbaceous weeds.
- Minimise off-target damage (avoid all native plants).
- <1% cover of all new and emerging herbaceous weeds at the end of Year 10.

Action completed:

The overall cover of herbaceous weeds has not increased from low-moderate in Year 2, however the density and extent of occurrences have increased, due to increased rainfall and warm temperatures. Overall cover varies from 10-80% with some areas being dominated by herbaceous weeds, and some isolated occurrences that include several scattered plants. The dominant herbaceous species include Ribwort, Patterson's Curse, Rough Sow-thistle *Sonchus asper*, Ox-tongue *Helminthotheca echioides*, Artichoke Thistle, Galenia, Blue Heron's-bill *Erodium crinitum*, Cape Weed *Arctotheca calendula* and Soursob *Oxalis pes-caprae* (Plate 27; Plate 28).

Plate 27. Mature Artichoke Thistle within PG3a (zone 2D) (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 28. Patterson's Curse flowering within PG3b (zone 3B) (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Herbaceous weed cover is lowest (10-15%) within high-quality patches of native vegetation, particularly within all zones in the western section of the offset site, excluding 2D, 2G and 2F. Within high-quality areas, high weed cover is largely restricted to the perimeter of native vegetation, particularly in rock/rubble piles, or in areas regularly disturbed (i.e. management tracks and fence lines). A high cover (10 – 80%) of herbaceous weeds was observed throughout zones 2D, 2G, 2F, 3B, 4A and 5A with Ribwort becoming the dominant species in areas of Plains Grassland, especially zone 2D (Plate 29). Ribwort within zone 2D (Figure 2) has increased to approximately 60-80%, with some areas being at 90% cover. Intensive weed control and direct seeding is proposed within zone 2D to encourage native vegetation establishment and spread, ultimately improving the cover and quality of native vegetation, and habitat for Striped Legless Lizard and Spiny Rice-flower.

Plate 29. Ribwort within the southeast corner of the western section (proposed direct seeding area on Figure 2) (zone 2D) (Ecology and Heritage Partners Pty Ltd 05/10/2022).

In Year 3, Aus Eco Solutions have focused herbaceous (broadleaf weed control in AES report) weed control works in the north-eastern corner of the western section (zone 2E), along the southern boundary in the western section (zone 2D), the western section of the linear strip (zone 2D), and the northern area of the eastern section of the site (3A – 3E, 4A – 4C, 5A and 5B). Plants had been sprayed with an appropriate herbicide and were observed as dead/dying in November, however, many plants still set seed in Year 3 (Plate 30; Plate 31). This is largely due to favourable weather conditions, including warmer temperatures and increased rainfall.

Plate 30. Artichoke Thistle dying after being sprayed with herbicide (PG3c / zone 2D) (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Plate 31. Patterson's Curse dying after being sprayed with herbicide (PG3c / zone 2D) (Ecology and Heritage Partners Pty Ltd 04/10/2022).

3.5.4 Biomass Management

Target to be achieved:

Ecological burn

- No single area to be burnt more than once every five years.

- Sufficient bare ground (approximately 20% - 40% cover) maintained to maintain space for recruitment of herbs and grasses.
- No loss of native plant diversity as a result of burning regimes.
- Burn widths of no more than 60 meters wide, to allow movement of Striped Legless Lizard into adjacent unburnt areas following a burn.

Slashing

- Slashing to occur no more than once annually.
- Sufficient bare ground (approximately 20% - 40% cover) maintained to maintain space for recruitment of herbs and grasses.
- No loss of native plant diversity as a result of slashing regimes.

Action Completed

An Ecological Burn was undertaken by Aus Eco Solutions in 25 May 2022 (Plate 32 – Plate 35). The Ecological Burn reduced the overall cover of biomass within the western section of the reserve (Figure 2). Following the burn, native species established quickly, with a good cover of Wallaby Grass noted in the Aus Eco Solutions *Ravenhall Grassland Offset – Final Report 2022* (Aus Eco Solutions 2022a). Several herbaceous species also emerged, including Jersey Cudweed *Laphangium luteoalbum*, Sheep's Burr *Acaena echinata*, and Common Bindweed *Convolvulus angustissimus*.

Despite pre-burn weed control works being undertaken, weed germination and establishment post-burn were common and follow-up works are required to control weeds, particularly herbaceous weeds, and promote native species growth and spread. The dominant species were Cape Weed, Patterson's Curse, Artichoke Thistle, and Cat's-ear. Year 4 weed control works should continue to target high threat grasses and herbaceous species that emerge in the burn area.

Plate 32. Autumn burn underway by AES crew members (Ecological burn on Figure 2) (Aus Eco Solutions 25/05/2022).

Plate 33. Completed ecological burn (Ecological burn on Figure 2) (Aus Eco Solutions 25/05/2022).

Plate 34. Ecological burn area regrowing (Ecological burn on Figure 2) (Ecology and Heritage Partners Pty Ltd 14/06/2022).

Plate 35. Ecological burn area regrowing (Ecological burn on Figure 2) (Aus Eco Solutions 2022).

An ecological burn is proposed in Autumn 2023 within PG1b (zone 2C; Figure 2). This area is dominated by Kangaroo Grass, with swaths of Wallaby-grass and Spear-grass. High threat grassy weeds also occur throughout this area as drifts and individuals. The proposed ecological burn will aid in controlling high threat weeds, annual weeds and reducing biomass, thus increasing inter-tussock space, promoting germination and establishment of herbaceous species, and improving species diversity and Striped Legless Lizard habitat.

3.5.5 Pest Animals

Target to be achieved:

- No surface disturbance within the credit site.
- No active rabbit warrens to be present.
- No active fox dens to be present.
- No rubbish.
- Minimal artificial piles of logs and rocks.
- Control numbers of rabbits and foxes.
- Control numbers of any new and emerging pest animals.

Action Completed

No evidence of pest animals was observed by Ecology and Heritage Partners in Year 3. However, pest animals were observed by Aus Eco Solutions, as outlined in the annual report (AES 2022). AES (2022) observed pest animals, namely European Rabbit *Oryctolagus cuniculus*, within the rock piles in the western section.

Importantly, a portion of the offset site fence (see Section 3.6 for details) was removed along the north-western boundary, which may have resulted in an increase in pest animals in Year 3.

3.5.6 Fencing / Stock Exclusion

Target to be achieved:

- Erect fencing to DELWP fencing standards in BushBroker Information Sheet 12 – Standards for Management – Fencing. Ensure fence is rabbit proof.
- Maintain fencing to DELWP fencing standards in Bushbroker Information Sheet 12 – Standards for Management – Fencing

Action completed:

Ecology and Heritage Partners were notified by Aus Eco Solutions on 10 August 2022 about a breach on the north-western boundary of the offset site. The fence and offset site signs had been damaged in sections by civil contractors to facilitate the development of the warehouses and related infrastructure (e.g. roads). Bunting had been placed sporadically along the fence line where the fence had been damaged, and temporary no-go zone fencing was placed approximately 1-2 metres within the offset site to facilitate development of a retaining wall and road outside of the offset site (Plate 36; Plate 37). Citius and Dexus were notified on 10 August 2022.

Plate 36. Fence damage from adjoining construction on the north-western boundary (AES 10/08/2022).

Plate 37. Section of fence that have been damaged during infrastructure installation (AES 10/08/2022).

Based on information provided by Citius and Dexus, due to the location and design of the adjacent road, the contractor had to work right up to the boundary of the fence line. Due to the wetter than usual conditions from high winter rainfall, soil type and large embedded rocks present in this area of the site, the contractor was unable to keep the works to the boundary line without boulders becoming unstable and toppling over, impacting the fence stability.. This meant that some sections of impact encroached upon the offset site. The removal of large rocks within the offset site fence line resulted in soil slumping and gaps under the fence. Although some sections of the fence were damaged, there has been no unauthorised access to the offset site. The offset signs remain attached to the fence intermittently along the northwest boundary (Plate 38 – Plate 45).

It should be noted that the contractor was instructed at the time to temporary fencing to replace the damaged areas and re-install signage (which was completed), however, the new final fence installation has

been continually delayed due to being unable to complete the concrete road (which had to be installed prior to being able to complete the verge and then the fencing). This is now being programmed in over February 2023.

Plate 38. Gap between temporary fencing and offset site fencing (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 39. Section of fence on the north-western boundary that has been removed (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 40. Gap between temporary fencing and offset site fencing (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 41. Section of fence on the north-western boundary that has been removed (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 42. Offset site fence following adjoining construction (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 43. Fence damage during construction (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 44. Temporary fencing within the offset site adjacent to the retaining wall (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Plate 45. Spill fence at the bottom of the temporary fencing (Ecology and Heritage Partners Pty Ltd 04/10/2022).

3.5.7 Unauthorised Human Access

There is no evidence of unauthorised access to the offset site in Year 3. While there has been some sections of fencing removed by civil contractors on the northern boundary in the western section of the offset site (see Section 3.5), there has been no unauthorised access to the site.

3.5.8 Rubbish

Rubbish across the site is low. Rubbish is largely windblown rubbish, such as bunting from nearby development (Plate 46 – Plate 49). This rubbish is continually removed by Aus Eco Solutions as required.

Removal of small windblown rubbish is regularly removed from the offset site; however, larger rubbish (e.g. old fencing and rock/rubble) is difficult to remove due to the size and location. Removal would likely result in damage to the ecological values within the offset site.

Plate 46. Windblown rubbish on the southern boundary (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Plate 47. Rubbish observed within the offset site (Ecology and Heritage Partners Pty Ltd 04/10/2022).

Plate 48. Bunting within the offset site from the adjacent construction (Ecology and Heritage Partners Pty Ltd 08/11/2022).

Plate 49. Construction rubbish within the offset site (Ecology and Heritage Partners Pty Ltd 08/11/2022).

4 CONCLUSION AND RECOMENDATIONS

Year 3 monitoring has shown that native vegetation remains stable despite increased rainfall promoting weed growth throughout the offset site.

Most of the vegetation patches (extent and quality) remained consistent with Year 2, however a large portion of PG3a (4.34 hectares) was not recorded as PG due to the low cover of native vegetation (<25%) and a high cover of perennial weeds (>70%), particularly Ribwort *Plantago lanceolata*. To increase the cover of tussock-grasses in PG3a (zone 2D), ultimately improving the cover and quality of native vegetation and habitat for Striped Legless Lizard and Spiny Rice-flower, direct seeding works are proposed in Year 5, with site preparation works to begin in Year 4 by AES. This area will be subject to intensive weed control in Year 4 and direct seeding in Year 5.

To prevent spread of high threat weeds into patches of high-quality native vegetation Aus Eco Solutions have undertaken targeted weed control within the periphery of larger patches, particularly within the north-western section that has large areas of Serrated Tussock and Chilean Needle-grass. Herbaceous weed control was also undertaken on mature plants scattered throughout the site, particularly within the boundary.

Although targeted weed control has been undertaken throughout the offset site, an increase in rainfall throughout Year 3 has resulted in an increase in weed growth and increased seed set, particularly from herbaceous and annual weeds. Consequently, biomass has also increased across the site, but particularly within the western section that is dominated by Kangaroo Grass, Serrated Tussock and Chilean Needle-grass. Year 3 management will focus on preventing any new emerging patches and reducing biomass by undertaking an ecological burn within the north-western section of the offset site.

As discussed in Section 3.5.6, the adjacent construction works have resulted in the removal/damage to the fence on the north-western boundary of the offset site. The area will continue to be monitored to ensure that no damage to the site occurs. Once construction has been completed, the fence will be reinstated and any rehabilitation works required (e.g. direct seeding) will be undertaken.

REFERENCES

Aus Eco Solutions (2022a). *Ravenhall Grassland Offset – Final Report 2022*. Aus Eco Solutions, Ballan, Victoria.

Aus Eco Solutions (2022b). *Ravenhall Grassland Reserve Autumn Ecological Burn Plan 2022*. Aus Eco Solutions, Ballan, Victoria.

Commonwealth of Australia (2011a). *Nationally Threatened Ecological Communities of the Victorian Volcanic Plain: Natural Temperate Grassland & Grassy Eucalypt Woodland*. Department of Sustainability, Environment, Water, Population and Communities, Canberra, Australian Capital Territory.

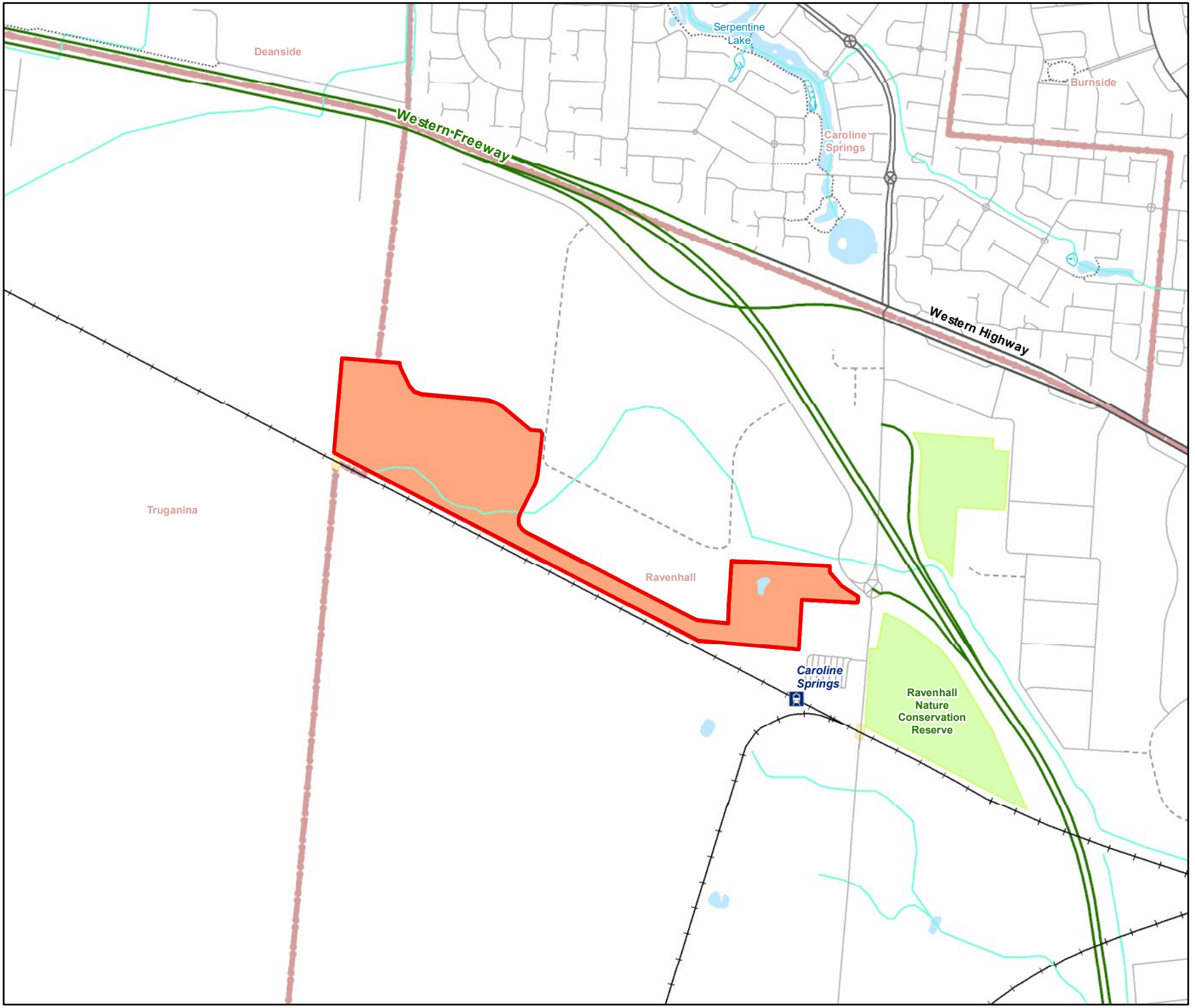
Commonwealth of Australia (2011b). *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act*. Department of Sustainability, Environment, Water, Population and Communities, Canberra, Australian Capital Territory.

DEWHA (2009). *Significant impact guidelines for the critically endangered Spiny Rice-flower (Pimelea spinescens subsp. spinescens.* Nationally threatened species and ecological communities EPBC Act Policy Statement 3.11. Commonwealth of Australia, 2009.

DSE (2004). *Vegetation quality assessment manual: Guidelines for applying the habitat hectares scoring method.* Version 1.3. Victorian Department of Sustainability and Environment, Melbourne Victoria.

Ecology and Heritage Partners (2019). Conservation Management Plan: Ravenhall Industrial Precinct, Victoria. Prepared for DWPL Nominees Pty Ltd and Dexus Wholesale Management Limited.

Threatened Species Scientific Committee (2008). *Commonwealth Listing Advice on Natural Temperate Grassland of the Victorian Volcanic Plain.* Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/42-listing-advice.pdf.



Legend

- Study Area
- Railway
- Freeway
- Major Road
- Collector Road
- Minor Road
- Proposed Road
- Walking Track
- Minor Watercourse
- Permanent Waterbody
- Wetland/Swamp
- Parks and Reserves
- Crown Land
- Localities

Figure 1

Location of the study area

Ravenhall Industrial Precinct
On-site Offset Reserve

N

0 250 500

Metres

ecology & heritage partners

14716_Fig01_StudyArea 8/12/2021 psorensen

Legend

- Study Area
- Property boundary
- Internal 6m buffer
- Ecological burn
- Proposed 2023 ecological burn
- Proposed direct seeding area
- New Spiny Rice-flower record (2022 survey)
- Previously surveyed Spiny Rice-flower could not be located (2022)
- Spiny Rice-flower (2021 survey)
- Previously surveyed Spiny Rice-flower could not be located (2021)
- Spiny Rice-flower (2020 survey)
- Spiny Rice-flower
- Striped Legless Lizard habitat

EPBC Act listed community

- Natural Temperate Grassland of the Victorian Volcanic Plain

Ecological Vegetation Class

- Plains Grassland

Figure 2

Ecological features

Ravenhall Industrial Precinct
On-site Offset Reserve

N

0 100 200
Metres

ecology & heritage partners

15770_Fig02_EcoFeat_SRF 25/11/2022 melsley

Aerial source: Nearmap 2022

APPENDICES

Appendix 1. Habitat Hectare Assessment

Table A1.1. Habitat hectare assessment for Year 3.

Management Zone		1a, 1b, 1C	2a, 2b, 2c	3a, 3b, 3c, 3d, 3f - 3i
Vegetation Zone		**PG1**	**PG2**	**PG3**
Bioregion		VVP	VVP	VVP
EVC / Tree		PG	PG	PG
EVC Number		132_61	132_61	132_61
EVC Conservation Status		Endangered	Endangered	Endangered
Patch Condition	Large Old Trees /10	NA	NA	NA
	Canopy Cover /5	NA	NA	NA
	Under storey /25	15	10	5
	Lack of Weeds /15	4	6	0
	Recruitment /10	6	3	3
	Organic Matter /5	3	3	2
	Logs /5	NA	NA	NA
	Treeless EVC Multiplier	1.36	1.36	1.36
	Subtotal =	38.08	29.92	13.60
Landscape Value /25		15	15	15
Habitat Points /100		53.08	44.92	28.6
Habitat Score		**0.53**	**0.43**	**0.29**

Notes: PG = Plains Grassland, VVP = Victorian Volcanic Plain.

Appendix 2. Ravenhall Grassland Offset– Final Report 2022 (AES 2022a)

Aus Eco Solutions
restoring native ecosystems

Ravenhall Grassland Offset - Final Report

2022

Report for Dexus / Ecology & Heritage Partners

PREPARED BY:

Rachel Nelsson, Aus Eco Solutions
11 Smallmans Rd, Ballan, 3342
| rachel@ausecosolutions.com.au
www.ausecosolutions.com.au

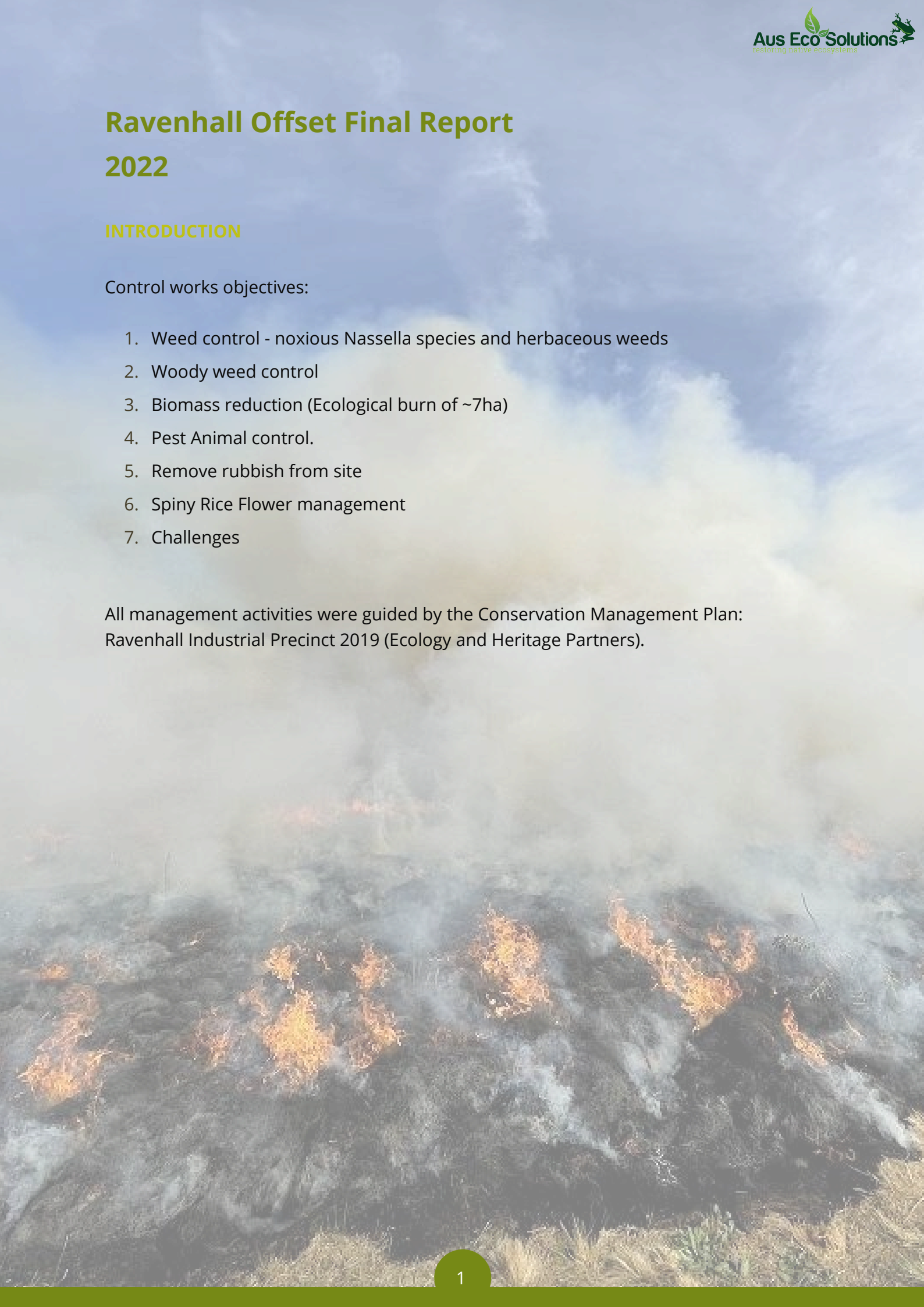
Ravenhall Offset Final Report 2022

INTRODUCTION

Control works objectives:

1. Weed control - noxious Nassella species and herbaceous weeds
2. Woody weed control
3. Biomass reduction (Ecological burn of ~7ha)
4. Pest Animal control.
5. Remove rubbish from site
6. Spiny Rice Flower management
7. Challenges

All management activities were guided by the Conservation Management Plan: Ravenhall Industrial Precinct 2019 (Ecology and Heritage Partners).



Ravenhall Offset Mapping

Image 1: Ravenhall Offset site

1. Weed Control - Noxious Grasses & Herbaceous Weeds

1.1. Site Observations

- The Northern boundary of the Western section has had parts of the reserve fence removed and replaced with temp fencing by the construction crews working adjacent to the grasslands. The access gate on the N/E corner of the western section was moved approximately 20m west where road construction has made the grassland now inaccessible.
- Cape Weed, Artichoke Thistle and Patterson's Curse has emerged after the ecological burn and will require ongoing control until grasses are established. Nassella grasses will also need to monitored and targeted as they emerge.
- There are still some very large patches of Chilean Needle Grass and Serrated tussock in the western section of the grassland some of these larger patches have been sprayed around the border to prevent spread and any isolated patches have been treated to help prevent any further infestation in the burn area.
- The area that connects the two larger grasslands will require ongoing control of broadleaf weeds and grassy weeds. This area contains Plains Grassy Wetland and the adjacent construction may be affecting the hydrology of the Wetland with retaining walls affecting water flow.
- Artichoke and Pattersons Curse will continue to be an ongoing issue in the Eastern section as well as the the Western section.
- Cane Needle Grass has been observed growing in the drainage areas of the eastern section, these emerging patches have been targeted in previous treatments and have been greatly reduced. With monitoring and ongoing targeted treatment the infested areas will be kept under control.

1.2 Works Completed

- Nassella grasses including Serrated Tussock, Chilean Needle Grass and Cane Needle Grass have both been controlled through most of the eastern section including the 2021 burn area and the rock area using an active chemical (Glyphosate) and a residual chemical (Flupropanate)
- Serrated Tussock and Chilean Needle Grass were controlled in parts of the western section including the 2022 burn area and boundary fence lines using an knockdown chemical (Glyphosate) and a residual chemical (Flupropanate). Using these two chemicals together assists with killing the adult plant quickly to prevent seed set whilst also providing residual control of the emerging seed bank.
- Artichoke Thistle, Cape Weed and Paterson's Curse have been treated across the eastern section including the rock areas and around the fenceline areas disturbed by the fence installation. The 2021 and 2022 burn areas were also treated for noxious broadleaf weeds in the eastern and western sections including buffers to prevent seed entering inter-tussock spacing. Noxious broadleaf weeds were also treated along disturbed fenceline areas in the western section.
- The linear section of the grasslands was treated for Nassella grasses including Serrated Tussock, Chilean Needle Grass and Cane Needle Grass. Due to the amount of Spiny Rice Flowers growing in parts of this area the selective herbicide Flupropanate was used without any knockdown herbicide to protect significant flora.

Broadleaf and ST control both from the Western section

Post burn of the 2022 burn area, This area will require follow up weed control to assist native grasses to establish.

The map below shows approximate areas treated.
Areas treated for Nassella grasses in yellow and treated for broadleaf weeds in blue.

Ravenhall 2021-2022 Weed spraying areas

Untitled layer

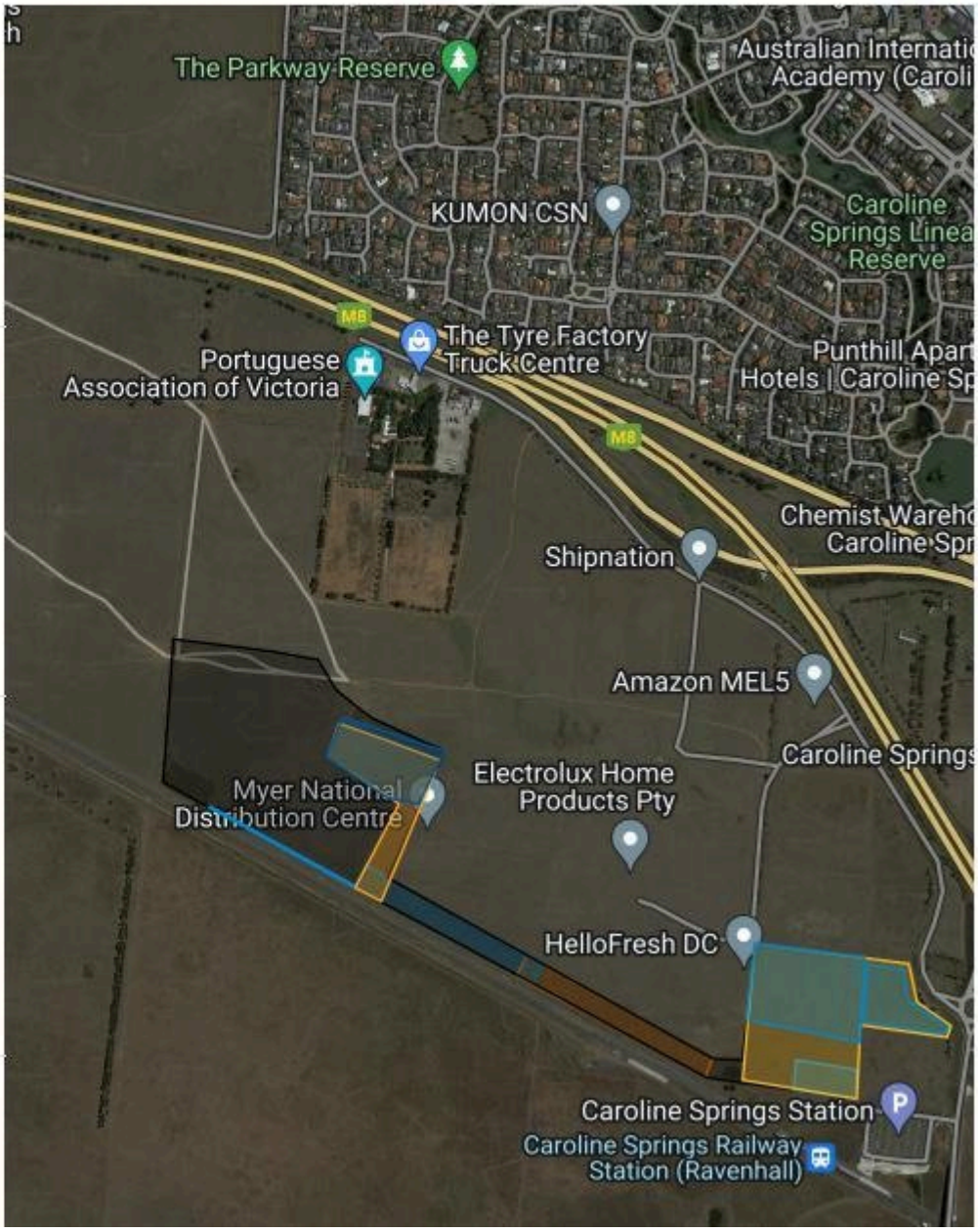
- Ravenhall boundary
- Broadleaf Weed Control
- Nassella Grass Control Flupropanate Only

Noxious grassy weed control

- Noxious grassy weed control
- Noxious grassy weed control
- Broadleaf Weed Control
- Fenceline Broadleaf Weed Control

Broadleaf weed control

- Broadleaves weed control and Hand weeding around SRF plants.
- Broadleaf weed control
- Broadleaf Weed control



2. Woody Weed Control

2.1. Site Observations

- Boxthorn is now mostly controlled with a few remaining shrubs growing in the rock pile in the S/W corner of the grasslands. Follow up will need to be completed on emerging Boxthorns and Briar Rose across the site.

2.2 Works Completed

- Cutting and Painting Boxthorn growing in rock piles.

New Boxthorn seedling that will need to be controlled within the Western section

3. Pest Animal Control

3.1. Site Observations

- The large rocks within the Western section harbour the majority of rabbits within the offset. It would be beneficial to perform a spotlight investigation to confirm numbers of pest animals within the offset site.

3.2 Works Complete

- Follow up Boxthorn control was performed within the large rock area to further remove Rabbit harbour.

4. Biomass Reduction (Ecological Burn)

4.1. Site Observations

- Follow up weed control will need to be performed in the 2022 burn area to reduce the emerging weeds and assist the Native grasses to establish in the area.
- It is also recommended that the Southern section of the Eastern area be ecologically burnt in future to further assist with reducing the weed densities within the Eastern section.

4.2 Works Completed

- The burn plan was created for an Autumn burn.
- All fire preparation was completed, this included pre burn weed control, fire break creation and notifications.
- An ecological burn occurred within 2.6 hectare area of the Ravenhall grassland offset site in the western portion of the reserve. The burn area was selected due to the weed control that has already been conducted in this section.

Autum 2022 post burn picture of Western section

5. Rubbish Removal

- Rubbish collection of materials that have come from adjacent developement was completed this year and there was 7 bags of rubbish collected. Follow up ribbish removal will need to be perfmored for areas adjancent to the develoipments as rubbish contiunes to come in.

6. Spiny Rice Flower Management

6.1 Site observations

- Spiny Rice Flowers have been located by our team as weed control commenced. The site is home to over 100+ Spiny Rice Flowers, with more and more being found every day. The plants have been staked / flagged accordingly to assist with weed control onsite and to avoid these areas when driving.
- Spiny Rice Flowers have been found in a few areas adjoining the offset including S/W boundary where 16 plants were found with potentially more.
- The Spiny Rice Flowers growing in the burn area have re-sprouted from root stock and are looking healthy pictured below.

6.2 Works completed

- Hand weeding 2m buffer around Spiny Rice Flowers.

SRF sprouting back post 2022 burn in western section

7. Challenges

Consistent challenges that the Ravenhall Offset faces include:

- Invasive weed seed from neighbouring land (Vline), which spread into the reserve.
- Noxious weed invasion from neighbouring properties, soil disturbance along fence lines with developments happening around the area.
- The large rocks harbour the majority of rabbits within the offset.
- Access to western section of grassland is difficult without access from the western gate although this will change once development is complete.
- Annual grass encroachment from disturbed areas.
- Large amounts of rain have made access to some sections of the site difficult. The abundance of rain has also aided invasive weed growth within the reserve.

Access gate in the western section is not accessible and has had some damage to the ground outside the reserve since the heavy rainfall

Appendix 3. Ravenhall Grassland Reserve Autumn Ecological Burn Plan 2022 (AES 2022b)

Ravenhall Grassland Reserve
Autumn Ecological Burn Plan 2022

Developed by
Jon Nester, Branch Manager
Bch Applied Science Environmental Management
PUAFIR412 Conduct Simple Prescribed Burn
PUAFIR413 Develop Simple Prescribed Burn

Burn Plan	
Project No:	A2295
Project Name:	Ravenhall Grassland Offset Y3
Address:	Palm Springs Road, Ravenhall
Client:	Ecology & Heritage Partners / Dexus
Client Contact:	Samantha Barron
Revision No.:	1
Date	06/04/2022
Burn Window	Autumn 2022

Table of Contents

1. Objectives

This plan contains excerpts from the Conservation Management Plan: Ravenhall Industrial Precinct, Victoria. Ecology and Heritage Partners, 2019.

Native grassland offset site dominated by a mixture of native and exotic grass species including; Kangaroo Grass (*Themeda triandra*) Spear Grasses (*Austrostipa spp*) and Wallaby Grasses (*Rytidosperma spp)*. Kangaroo Grass requires frequent biomass removal to prevent senescence of Kangaroo Grass and the build up of detritus.

The objectives of an Autumn, low intensity and patchy burn within Ravenhall offset are to achieve:

- Conduct any burns in a patchy or mosaic fashion over no more than one third to half the site. A high percentage of bare ground to be available for recruitment of native species, potentially increasing site biodiversity.

- Reduction of weedy biomass existing in a specific area of the offset - post herbicide treatments.

- Reduction in overall biomass to increase efficiency of weed control (easily located) and reduce off-target damage as there will be less obstruction from native plants.

- Deplenish weed seed stock in the soil bank.

An ecological burn is planned to occur within an 2.6 hectare area of the Ravenhall grassland offset site in the western portion of the reserve. The burn area has been selected due to the weed control that has already been conducted in this section. Burning in conjunction with continued weed control will significantly contribute to achieving the Management Plan's goal of ensuring weed density does not increase beyond the level attained at year 10 of management and that the Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) ecological community is maintained or improved.

2. Threatened Species Management

The conservation reserve supports two Ecological Vegetation Classes (EVCs), Heavier-soils Plains Grassland (EVC 132_61) and Plains Grassy Wetland (EVC 125), as well as areas of predominantly exotic vegetation. Both EVCs present are grass tussock dominated vegetation types, devoid of trees or large shrubs. Plains Grassland typically occupies fertile cracking basalt soils prone to seasonal waterlogging in areas receiving at least 500 mm annual rainfall (DSE 2011). Plains Grassy Wetland is characterised by a ground cover dominated by grasses, and small sedges and herbs. The vegetation is typically species-rich on the outer verges but is usually species-poor in the wetter central areas (DSE 2011).

Both EVCs have a conservation significance rating of Endangered. Within the areas of Plains Grassland, one nationally listed ecological community, listed as critically endangered under

the EPBC Act, was recorded: Natural Temperate Grassland of Victorian Volcanic Plain (NTGVVP).

The following critically endangered flora species have been observed within Ravenhall offset:

- *Pimelea spinescens* subsp. spinescens - Spiny Rice Flower

The following vulnerable fauna species have been observed within Ravenhall offset:

- *Delma impar* - Striped Legless Lizard

The proposed burn area has approximately <10 identified *Pimelea spinescens* plants. Majority of the site's *Pimelea spinescens* are located in the north-eastern section of the burn area accumulated in a patch. The EPBC Act, guidelines for managing *Pimelea spinescens,* recommends implementing a fire management plan of cool, quick mid-Autumn fires. Planned burning is an essential tool in managing this species as it helps the plants to re-sprout, regrow as well as promote germination.

3. Site Description

The Ravenhall Industrial Precinct is located at 91-167 Palm Springs Road, Ravenhall, Victoria, south of the Western Highway, north of the Ballarat train line and west of Christies Road, approximately 21 kilometres west of the Melbourne CBD. For the most part, the study area is relatively flat consisting of both indigenous and exotic grassland vegetation, with areas of intact remnant grassland containing embedded and loose basalt rocks. The Ravenhall offset area appears to have been predominantly used for agricultural purposes, and was grazed by horses until March 2020.

This conservation reserve will form the on-site offset location, and will be managed to protect and enhance at least 13.37 hectares of the Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) nationally significant ecological community, 28.98 hectares of confirmed habitat for the nationally significant Striped Legless Lizard *Delma impar*, and 86+ nationally significant Spiny Rice-flower *Pimelea spinescens subsp. spinescens specimens*.
The conservation reserve provides strategic connectivity between designated conservation areas to the immediate south (Ravenhall North Grassland) and west (Deer Park Quarry Grassland) that have been identified as part of the Melbourne Strategic Assessment and the Biodiversity Conservation Strategy, as well as an existing conservation reserve on Christies Road, to the immediate east.

Only a portion of the offset will be burnt this Autumn, leaving the remainder of the site for harbour for native species refuge while the burnt portion recovers over the rest of Spring. The proposed burn area is set within the far Eastern side of the offset.

4. Mapping

Image 1. The green polygon represents the Ravenhall Grassland Reserve and the red square is the proposed burn location.

5. Burn Sequence

Slashed fire breaks will be implemented prior to burning on all stages around the perimeter and internal firebreaks. These firebreaks will be approximately 6m in width (slashed with tractor slasher). All slashed areas will be wet down before beginning the burn sequence.

A burn briefing will be held prior to the burn at the Ballan depot. The fire crew will be briefed on the burn plan using the SMEACS system. On arrival at the grassland reserve, a second briefing will be held to confirm fire crew roles and responsibilities, highlight evacuation points and check equipment and water levels prior to the burn.

A walkthrough will be conducted prior to the burn to confirm no hard rubbish or flammable materials has been thrown over the fences into the reserve.

Prior to the official ignition, a small patch of grass to the North of the reserve will be ignited in order to blow smoke across the site and alert any native fauna that a burn is imminent.

Ignition will begin along the mid section of the Sector C control line. Two drip touch operators will spot ignite every 2-3m simultaneously. The progress of the burn will be monitored as the spots back burn into the wind. Spot ignition will also be used on the Sector D & B control lines until both drip touch operators reach Sector A. Once the fire has burnt in approximately 2-3m along Sector D & B and the control lines are secured, a line ignition will be conducted in an arc formation to join the the back burning fire and create a relatively high intensity.

A post-burn debrief will be held to discuss what went well and what can be improved on next time. A mop-up team will stay behind to monitor the burn site for an additional two hours to ensure all vegetation has been extinguished and the fire breaks are safe and secure.

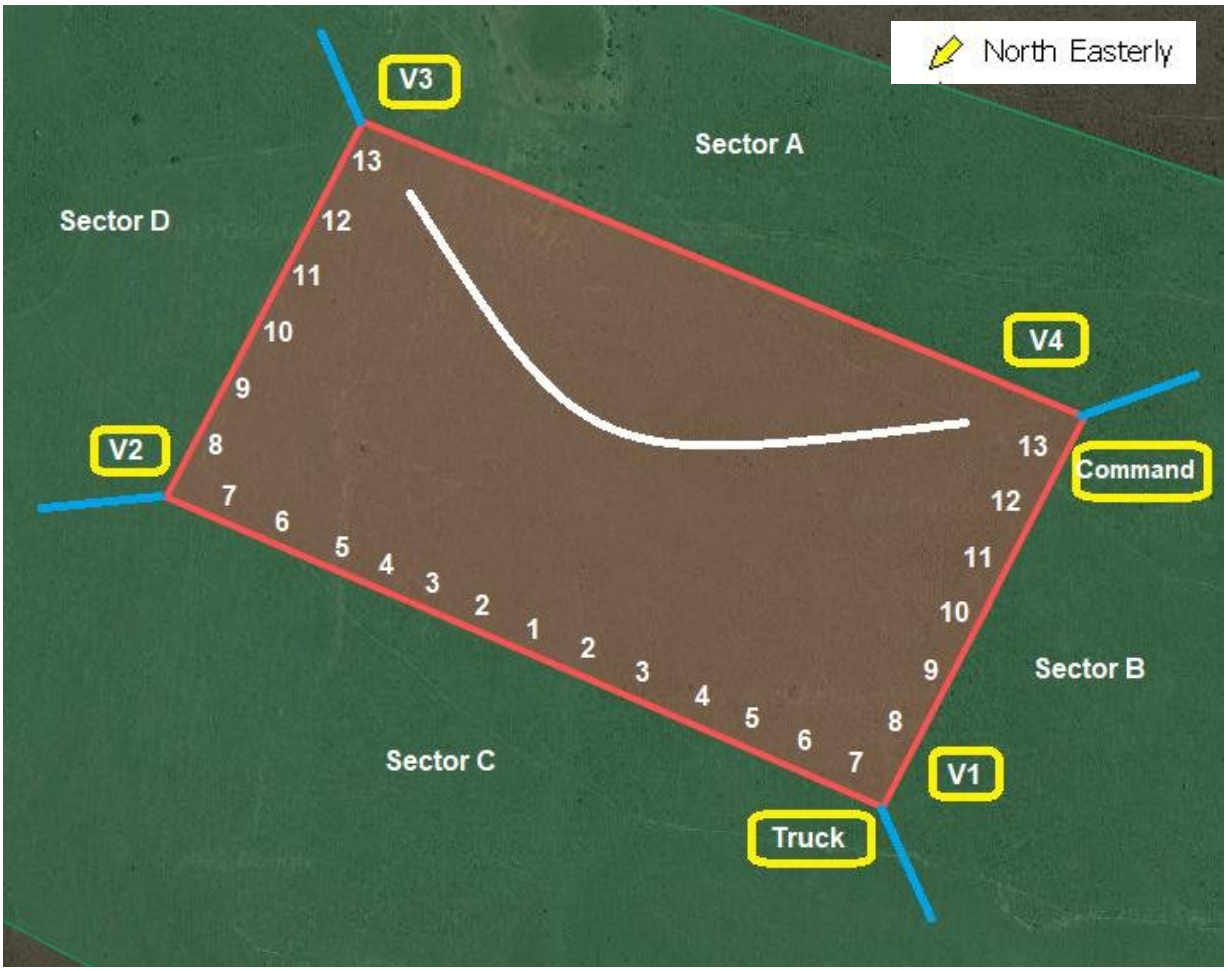


Image 2: Ravenhall Ignition Sequence. Note that each side has been designated a sector, vehicles are highlighted yellow and the ignition sequence numbered.

6. Assets & Threats

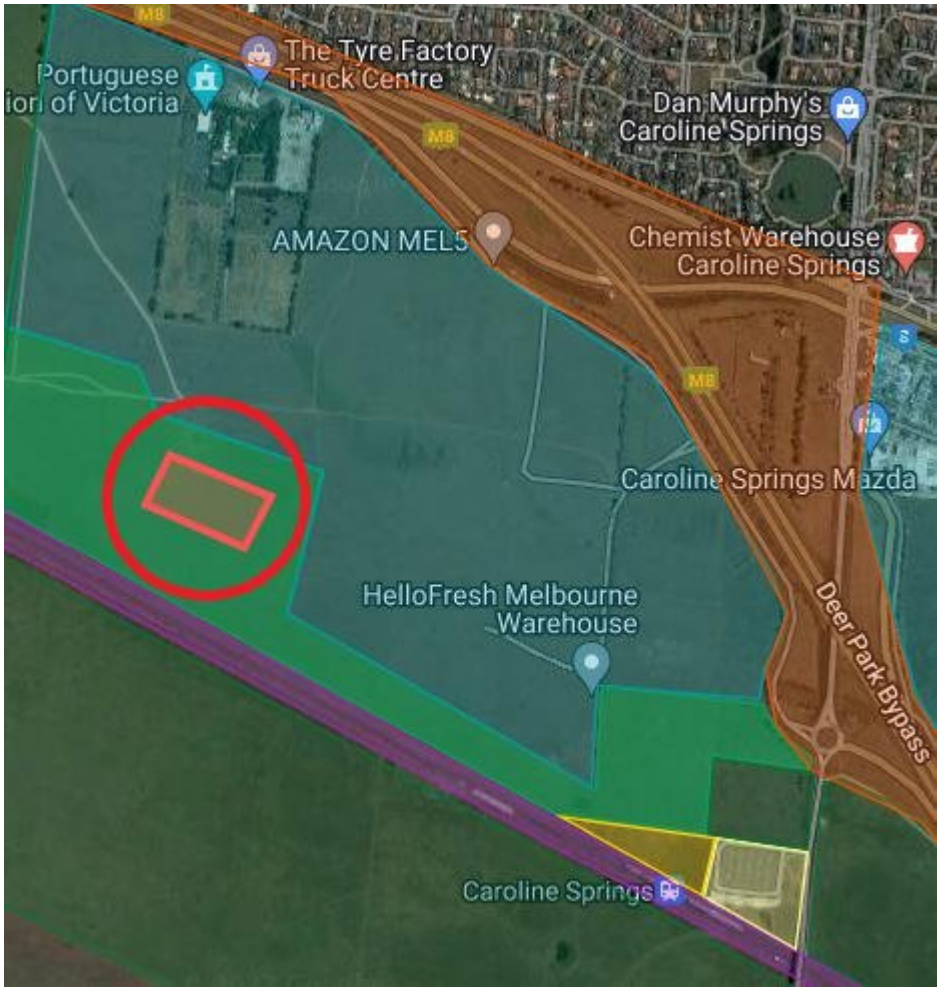


Image 3: The noticeable assets and threats for the Ravenhall offset burn include:

- Rail track/Reserve/Infrastructure (Purple)
- Adjacent Roadways (Western FWY and Palm Springs Road & Christies Road) (Orange)
- Industrial areas (Blue)
- Caroline springs train station (yellow)
- Grasslands or grassland reserves (Green)
- Proposed burn area (Red)

.

7. Burn Plan Details

Burn Details					
CFA Station Area	Caroline Springs CFA District 14	**Incident Controller (IC)**	Jon Nester	**Nominated Burn Controller**	Michael Rykers
Burn Location	Palm Springs Road, Ravenhall				
Map Reference (Melways)	MAP358 E4		**Area(ha)** 2.6ha	**Traffic Management Required?**	☒ Yes ☐ No
Proposed Date	Autumn (No council permit required)		**Season**	☐ Winter ☐ Summer	☐ Spring ☒ Autumn
Burn Type	☐ Fire Prevention	☐ Windrow	☐ Rubbish	☒ Environmental	☐ Other

Physical Properties				
Slope	Flat 0°-5° ☒	Gentle 6°-15° ☐	Steep 16°- 20° ☐	Very Steep 21°+ ☐
Aspect N/A	North ☐	South ☐	East ☐	West ☐

Fuel Type	Grass	Heath	Scrub	Forest	Other
	☒	☐	☐	☐	☐

Containment Lines			
Fire break	Slashed ☒	Mineral earth ☐	Natural (Creek line) ☐
Wet Edge	Water ☒	Foam ☐	Retardant ☐
Natural Barriers (Description)	• Palm Spring Road (East) • Vline Rail and Train Station (South) • Western FWY (North) • Hopkins Road (West)		
Ignition Method	**Perimeter** ☒Hand ☐ Flamethrower ☐Aerial	**Internal** ☒Hand ☐ Flamethrower ☐Aerial ☐ N/A	
Lighting Pattern	Line ☒	Spot ☒	Distance between Spots (m) 2-3m

Overall Fuel Hazard	Moderate	High	Very High	Extreme	Curing	t/ha
	☒	☐	☐	☐	80%	6

Prescribed Burn Prescription						
Burn Class	**FDI (Max)**	**Temp**	**RH(%)**	**Wind Speed km**	**Preferred Wind Direction**	**FFMC (%)**
Low intensity mosaic	0-11 Low-Mod	15-25	50-60	1-18	Northeast	12-14%
Notifications:						
Vicfire 1800 668 511 ☒	Neighbours (letter drop) ☒	CFA / Council ☒	Vline ☒	Vicroads ☒	Development (Dexus, Rokon, Quantum, E&HP) ☒	Boral Quarry ☒
Notification Comments:						
Stakeholders / Consultation						
Neighbours ☒	CFA ☒	Vicroads ☒	Vline and Train Station ☒	Boral Quarry ☒		
Consultation comments:						
Authorization (tick box for approval granted)						
VicRoads ☐	Council ☐	Vline ☐	CFA ☐	VicTrack ☐	Dexus (and subcontractors) ☐	
Follow-up Patrol / Mop Up	Yes ☒	No ☐				

Table 1. Burn plan details.

8. Communication Systems / Calls

On the fireground Aus Eco Solutions will be using **UHF Channel 14** with call signs as per the command matrix.

9. Command Matrix

Incident Controller (IC): J. Nester Command Vehicle						
Nominated Burn Controller: M.Rykers Vehicle 4						
V1		V2		V 3		Truck
TBC	TBC	TBC	TBC	TBC	TBC	TBC

Table 2. Command Matrix

10. Overall Fuel Hazard Checklist

Appendix 2. Sample fuel assessment field work form v3

Date Assessed:	29/3/22	Assessors:	J. Nester
Sampling Location:	Ravenhall	Veg Type:	VVP Grassland

Plot Information			
Plot No.	1	2	3
Zone:	West	East	North
Easting (GDA94 MGA UTM):			
Northing (GDA94 MGA UTM):			

Canopy height (Assess over a 20m radius)			
Average Height to Top of Canopy:	m	m	m
Average Height to Base of Canopy:	m	m	m

Bark fuel (Assess over a 20m radius)															
Stringybark Fuel Hazard:	NP	M	H	VH	E	NP	M	H	VH	E	NP	M	H	VH	E
Ribbon Bark Fuel Hazard:	NP	M	H	VH		NP	M	H	VH		NP	M	H	VH	
Other Bark Fuel Hazard:	L	M	H			L	M	H			L	M	H		

Select the Bark Hazard rating from above that will be used to determine Overall Fuel Hazard. (Only use the Stringybark hazard rating if more than 10% of the trees are Stringybark **AND** it has the highest rating. Otherwise use the bark with next highest rating.)

Bark Fuel Hazard:	L	M	H	VH	E	L	M	H	VH	E	L	M	H	VH	E

Elevated fuel layer (Assess over a 10m radius)															
Elevated % Cover:	%					%					%				
Elevated % Dead	%					%					%				
Elevated Fuel Ave Height (m)	m					m					m				
Elevated Fuel Hazard:	L	M	H	VH	E	L	M	H	VH	E	L	M	H	VH	E

Near-surface fuel layer (Assess over a 10m radius)															
Near-surface % Cover:	60	%				50	%				50	%			
Near-surface % Dead	55	%				50	%				50	%			
NS Average Height (cm):	50	cm				50	cm				60	cm			
NS Fuel Hazard:	L	M	H	VH	E	L	M	H	VH	E	L	M	H	VH	E

Surface fuel layer (Assess over a 10m radius)															
Surface Litter % Cover:	<20	%				<20	%				<20	%			
Average Litter Depth (mm):	<5	mm				<5	mm				<5	mm			
Surface Fuel Hazard	L	M	H	VH	E	L	M	H	VH	E	L	M	H	VH	E

Combined Surface and Near-surface Fine Fuel Hazard calculation (refer Section 7)															
Combined Hazard	L	M	H	VH	E	L	M	H	VH	E	L	M	H	VH	E

Overall Fuel Hazard calculation (refer Section 8)															
Overall Fuel Hazard	L	M	H	VH	E	L	M	H	VH	E	L	M	H	VH	E

Are the plots representative of the average fuels across the sampling location?	Yes	No

If no, explain any significant difference between plots. For example, wet gully runs through the sampling area, no plots were located in this gully.

6-7t/Ha.

Table 3. OFH Checklist - Average 6t/ha.

11. Administration and Tasks:

Fireground Operations	Tasks
Incident Controller	Overseeing entire operation
Nominated Burn Controller	Drip Torch ignition
Rig 1	Wet line and patrol as per ignition plan
Rig 2	Wet line and patrol as per ignition plan
Rig 3	Wet line and patrol as per ignition plan
Rig 4	Wet line and patrol as per ignition plan
Truck	Tanker on site 3000lt water capacity

Table 4. Tasks.

12. Resources List:

Equipment	Required
First Aid Kit / Burn Kit and mobile phone (must be operational and in service)	X1 per rig
PPC / PPE: (Per Person)	Gloves Hard hat (if applicable) Steel capped boots Cotton drill long pants and long sleeve shirt Safety glasses P2 Respirator mask V/Line vest (if applicable)
UHF radios	All AES personal to have
Wind readers	X1 per car
Drip torches and Matches	3+
Fuel (jerry cans)	3+
Flagging Tape	X1
Burn Plan	X1 per vehicle
Warning signs (Traffic, pedestrians)	n/a
Functioning spray hoses	x2 per rig, x1 truck
Water	As much as required to complete works
Standpipes	x3
Filler Hoses	x3
Fire Extinguisher	1 per rig (3)
Shovel / rake hoe	1-2 per rig (4-8)
Leaf Blower	1
4WD Ford Ranger	-
4WD Toyota Landcruiser	-
Truck - 3000L water tank	-
500L Slip on Units	X1
600L Slip on Units	X1
400L Slip on Units	X1

Table 5. Resources List.

13. Safety - Risk / Control Measures

The documents that are required to be completed prior to the burn include:

- Site specific burn plan
- Pre-work briefing
- Job Safety and Environmental Analysis (JSEA) / Job Safety Brief (JSB)
- Safe Operating Procedures (SOP) for conducting burns and using all equipment onsite.
- Daily Work Report (DWR) - Site specific
- Fire permit (if required)
- A burn report will follow up after the implementation of the prescribed burn.

These documents are also required to be on the fireground on the day of the burn. The Incident Controller will be in charge of these documents, as well as the burn plan.

See below Table 6 for potential site/activity hazards and their associated control measures.

Risk / Control Measure		
Risk	**Preventive Control**	**Mitigation Control**
Flammable liquids (diesel/unleaded Petrol)	Use a fuel mix ratio of Diesel 70%, Unleaded 30% to reduce flammability. Use minimum amounts of fuel and only as required. All vehicles contain spill kits and fire extinguishers. Use only industry standard fuel containers	- Continually monitoring of the usage of flammable liquids used onsite - Ensure fuel is protected from hot sun and hot materials including drip torches. - Store fuel away from dry organic matter and away from burn control areas.
Injury from fire (burns / scalds / blisters)	Training to be undertaken by crew on safe procedures and equipment safety (i.e. drip torches). Follow all burn procedures outlined in company SOP. Work in pairs/groups and act as a spotter for your partner/s. All vehicles must contain up to date and stocked first aid kits. Ensure all crew are briefed on site specific burn plan and procedure prior to burn commencing Carry UHF radios to communicate with other crew	- Crew burn briefings - Pair up inexperienced operators -Wear appropriate PPE including cotton long pants, long sleeved shirt, leather boots and gloves. -No Rubber boots, gloves or polyester clothing is to be worn. -Be aware of surroundings and trip hazards.
Change in weather conditions (wind, temperature, RH)	Check weather conditions prior to burn commencing. Commence burn only if forecasts indicate low to moderate wind speeds Monitor wind speeds and direction via mobile weather app throughout the progress of the burn.	Be mindful and aware of change in wind direction. Ensure fire breaks are placed around the entire burn perimeter to prevent spread in the event of wind changing direction/s. Measure wind speeds via a hand held wind meter to account for variances from weather apps. Do no burn in wind speeds exceeding 18-20 km/hr Do not burn on days where total fire bans have been put in place
Smoke hazards on the community & employees.	Burn on days when the wind direction will carry the smoke to have the least effect on local communities and establishments. Notify landholders in the area 24-48 hours prior to the scheduled burn Employees wear appropriate PPE including P2 masks and safety goggles/glasses. Task rotation to minimise smoke exposure.	Notify landholders in the area 24-48 hours prior to the scheduled burn.

Fire escaping control area	Produce fires of low intensity only and burn small sections at a time. Burn a large fire break at the end of the control zone to which the wind is directed and work backwards from this point. Burns will be restricted to daylight hours only to ensure high light visibility	Follow fire break plan layout and procedure as per burn plan
Fire restarting after patrol period	Ensure 2-3m of control area boundaries are blacked out with water spray units (cold, wet) to prevent escape. Ensure logs and livestock feces are extinguished to prevent embers or flare up within or adjacent to the control area.	Patrol the area for 1-5 hours after no smoke or smoldering is visible from the control area (time is dependent on area and weather conditions).

Table 6. Risk / control measures.

Fire Crew Sign In:

Name	Role	Signature	Date
	IC		
	Ignition Control		
	Wet Lines		
	Wet Lines		
	Wet Lines		
	Wet Lines		
	Wet Lines		
	Wet Lines		

Table 7. Fire crew sign in.

Visitor Sign In:

Name	Role	Signature	Date

Table 8. Visitor sign in.

12. BURNING OPERATION CHECKLIST *(new checklist to be completed on each burn day)*

Burn Checklist				
Burn IC	Stephanie Grylls	**Burn Approved**	☐Y ☐N	**Sectors -**
Notifications Completed	☐Y ☐ N	**Pre Burn Work Completed**	☐ Y ☐N	**Sector Leaders -**
Briefing Complete	☐ Y ☐ N	**Operators signed onto JSB**	☐ Y ☐ N	**Date -** _____

Weather					
Forecast	Max Temp	Max Wind	Min RH	Max FDI	Wind Direction
Day 1					
Day 2					
Day 3					
Actual (On Site)	**NOTE: Record more regularly if noticeable change in fire behaviour is recorded**				
Commencement					
30 min					
1 hr					
1.5 hr					
2 hr					
2.5 hr					
3 hr					
Completion					

FMC %	Pre Burn		**Lighting Crew**			
	On the Day					
Hot Debriefing	Completed		**Lighting Pattern**	Strip ☐	Spot ☐	Distance between Spots (m)
	Y ☐	N ☐				
Risk Assessment	Completed		**Risk Mitigation**	Completed	**Traffic Management**	In place

	Y☐	N ☐		Y ☐	N ☐		Y ☐	N ☐			
Resources On Site											
Truck		Slip-ons		Other		Command Vehicle		Quick Fill		Drip Torches	
UHF		Signage		Lighter Fuel		Catering		Total Personnel			
Fire Behavior											
Flame Height Average		**Scorch Height**		**Spotting Distance**		**ROS**					
Patrol Organized	Y ☐ N☐	**Responsible Person**		**Times**		**Operations Completed**		Time	Date		
Objectives Achieved	Y ☐ N☐	**Comments**									
Risks / Safety Issues	Y ☐ N☐	**Comments**									

Table 9. Burn operation checklist.