

ROSENTHAL ESTATE, SUNBURY
CONSERVATION MANAGEMENT PLAN
YEAR 3 MONITORING

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1. INTRODUCTION, METHODS & SUMMARY

T.F. & A. Millett, C/- Urban Design and Management Pty. Ltd. engaged Brett Lane and Associates Pty. Ltd. (BL&A) to monitor the results of the implementation of a Conservation Management Plan (CMP) for the Rosenthal Estate residential development located at 100 Vineyard Road, Sunbury (EHP 2015a).

The Conservation Management Plan relates to two conservation reserves (Eastern Reserve and Western Reserve), totalling 12.64 hectares.

A site assessment of both reserves was undertaken on 20th December 2018 to:

- Assess the extent to which the year three management actions from the CMP had been implemented; and
- Implement monitoring requirements set out in the CMP.

Species records and all cover estimates were recorded for each management zone within each reserve. Cover estimates were then extrapolated for each reserve (as a whole) by weighing data by the relative areas of the management zones.

Note that very high grassy biomass over much of the site reduced the ability to observe low-lying flora during the current site monitoring. This was considered to limit the ability to accurately determine indigenous and introduced species diversity and cover.

Implementation of the CMP has been hampered by the following.

- Difficulties in obtaining permission to burn the site
- Extremely dry seasonal conditions impacting most management actions but particularly the success rate of revegetation using tubestock

Monitoring has been impacted by the following.

- The mass germination of soil stored weed seed post-burn – while these weeds have a high cover most of these weeds are low threat species

Future management actions will focus on the following.

- Revegetation using direct seeding rather than tubestock planting
- Implementation of hot (high intensity) burn in the Western Reserve
- Weed control across both reserves

Progress against management actions listed in Table 13 of the Offset Management Plan (EHP 2015b) – as requested by Hume City Council – are set out in Appendix 2.

The actions being implemented are meeting the requirements of both the CMP and OMP.

This investigation was undertaken by a team from BL&A comprising Chris Lee (Botanist) and Alan Brennan (Senior Ecologist & Project Manager).

2. EASTERN RESERVE

2.1. Monitoring results

Table 1 provides an assessment of the extent to which year three management actions set out in the CMP for the Eastern Reserve have been implemented. This table also references sections of this report which provide adaptive management recommendations. Table 2 details the photo-point locations, Table 3 the biomass cover, Table 4 the weed cover and Table 5 the indigenous species cover.

Key findings are listed below.

- Vegetation biomass remains high (similar to December 2017).
- Indigenous vegetation cover showed a slight decrease from December 2017 (32% to 30%) while weed cover had increased (from 60% to 65%). These changes are not significant given the natural variability in vegetation growth and extent over time and the variability in assessing broad areas for vegetative cover.
- Woody weed control had been undertaken in the past, however, in some areas small plants that had been unsighted and so left untreated are now beginning to re-establish. As a result, woody weeds now require further follow up control to maintain the present low levels and avoid re-establishment.
- Effective control of high threat perennial grass weeds such as Serrated Tussock, Perennial Rye-grass, Cocksfoot, Chilean Needle-grass and Paspalum was clearly evident. Serrated Tussock cover has increased slightly by 1% and follow up control is required to continue making gains in eliminating this weed. Serrated Tussock produces over 100,000 seeds per plant. These seeds are dispersed by wind. As such re-infestation is likely to be occurring from adjoining areas.
- Herbicide spraying is most effective when plants are actively growing and are not stressed during dry conditions. The continuing dry conditions are hampering the effectiveness of herbicide as a means of weed control.
- A number of weed species were found to have increased in cover since December 2017, particularly Bearded Oat, Chilean Needle-grass and Toowoomba Canary-grass.
- A total of 38 weed species were recorded (three more than in December 2017).
- A total of 19 indigenous flora species were recorded (one more than in December 2017).
- The actions being implemented are meeting the requirements of both the CMP and OMP.

Table 1: Eastern reserve year 3 management actions

Action	Management action	Responsible entity	Timing of action	Implementation notes and recommendations
3.1	Conduct weed control and implement revegetation plan	Landowner / Bushland Management Contractor	As per Table 2 of CMP	Overall, woody weed control has been undertaken successfully, though some smaller plants missed and some areas require further follow up control. Control of high-threat perennial grasses evident. Weed management approach recommended (see Section 2.2.1).
3.2	Monitor populations of pest animals and conduct control works if required	Landowner / Pest Animal Contractor	Late summer / early autumn	Contractor to continue to monitor for pest animal activity during all site visits.
3.3	Conduct monitoring of all vegetation and Golden Sun Moth habitat	Suitably qualified ecological specialist	Two years after commencement of works	Undertaken in December 2018. No Golden Sun Moth recorded.
3.4	Maintain fences	Landowner/Fencing Contactor	As required	Fences and access gates in good repair.
3.5	Monitor organic litter and biomass density and develop ecological burn or fuel reduction plan if appropriate	Landowner / Bushland Management Contractor	Outside of the GSM active season (October – January)	Monitoring undertaken in May 2018. Biomass levels very high. Further biomass management recommended (see Section 2.2.2).
3.6	Monitor and assess works, and prepare progress report	Suitably qualified ecological specialist	Two years after commencement of works	Weed cover remains high. Continuing weed management recommended (see Section 2.2.1)
3.7	Commence supplementary planting within Management Zone B of each reserve	Landowner / Bushland Management Contractor / Local nursery	Early Spring Year 2 – subject to availability of plants and environmental conditions	Undertaken in August 2018.

Table 2: Eastern Reserve photo-points

Photo-point #	December 2017	December 2018
1		
2		

Photo-point #	December 2017	December 2018
3		
4		

Photo-point #	December 2017	December 2018
5	 A photograph showing a field of tall, dry grasses under a clear sky. The grasses are a mix of green and brown, indicating a late autumn or winter scene.	 A photograph showing a field of tall, dry grasses under a cloudy sky. The grasses are predominantly brown. A red timestamp "20.12.2018" is visible in the bottom right corner.
6	 A photograph showing a grassy field with a slight rise in the background under a blue sky with scattered clouds. The grasses are mostly brown.	 A photograph showing a grassy field with a slight rise in the background under a cloudy sky. The grasses are a mix of green and brown. A red timestamp "20.12.2018" is visible in the bottom right corner.

Photo-point #	December 2017	December 2018
7		
8		

Photo-point #	December 2017	December 2018
9	 A photograph showing a field of tall, green and yellow grass. In the background, there are trees and a commercial building with a red and white facade under a clear sky.	 A photograph showing a field of tall, yellowish-brown grass. In the background, there are trees and a commercial building with a red and white facade under a cloudy sky. A date stamp '20/12/2018' is visible in the bottom right corner of the image.

Table 3: Eastern Reserve biomass observations

Estimate	December 2015	December 2016	December 2017	December 2018
Total native vegetation cover (%)	40	32	32	30
Total weed cover (%)	45	74	60	65
Litter cover (%)	-	27	40	35
Biomass cover (%)	-	99	95	95
Biomass – main height range (m) (min)	-	0.3	0.3	0.3
Biomass – main height range (m) (max)	-	1.2	1.2	1.2

Table 4: Eastern Reserve weed cover observations

Common name	Scientific name	High-threat	Projective foliage cover (%)			
			December 2015	December 2016	December 2017	December 2018
Weed species						
African Box-thorn	<i>Lycium ferocissimum</i>	X	<1			1
Artichoke Thistle	<i>Cynara cardunculus</i>	X	<1			<1
Bearded Oat	<i>Avena barbata</i>		1	6	2	5
Blackberry	<i>Rubus fruticosus</i> spp. agg.	X	2	<1	<1	1
Brown-top Bent	<i>Agrostis capillaris</i>		1		1	1
Chilean Needle-grass	<i>Nassella neesiana</i>	X	1	1	4	10
Flatweed	<i>Hypochaeris radicata</i>		1	1	1	2
Perennial Rye-grass	<i>Lolium perenne</i>		10	22	15	10
Prairie Grass	<i>Bromus catharticus</i>		<1*	1	3	3
Ribwort	<i>Plantago lanceolata</i>		2	<1	3	5
Serrated Tussock	<i>Nassella trichotoma</i>	X	10	13	3	4
Sheep Sorrel	<i>Acetocella vulgaris</i>		2		2	2
Soft Brome	<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>		<1*	2	1	1
Spear Thistle	<i>Cirsium vulgare</i>	X	1	<1		1
Sweet Briar	<i>Rosa rubiginosa</i>	X	1		1	1
Sweet Vernal-grass	<i>Anthoxanthum odoratum</i>		1			<1
Tall Mallow	<i>Malva sylvestris</i>		<1	<1	<1	
Toowoomba Canary-grass	<i>Phalaris aquatica</i>	X	10	1	1	7
Barley Grass	<i>Hordeum</i> sp.		NA	<1	<1	<1
Cape Weed	<i>Arctotheca calendula</i>		NA	<1		
Clustered Dock	<i>Rumex conglomeratus</i>		NA	<1	<1	<1
Cocksfoot	<i>Dactylis glomerata</i>	X	NA	16	20	20

Common name	Scientific name	High-threat	Projective foliage cover (%)			
			December 2015	December 2016	December 2017	December 2018
Common Peppergrass	<i>Lepidium africanum</i>		NA	<1	<1	<1
Common Sow-thistle	<i>Sonchus oleraceus</i>		NA	<1	3	3
Curled Dock	<i>Rumex crispus</i>		NA	<1	<1	<1
Hogweed	<i>Polygonum aviculare</i>		NA	<1	<1	<1
Hop Clover	<i>Trifolium campestre</i> var. <i>campestre</i>		NA	<1	<1	<1
Indian Mustard	<i>Brassica X juncea</i>		NA	<1	<1	1
Medic	<i>Medicago</i> sp.		NA	<1	<1	
Narrow-leaf Clover	<i>Trifolium angustifolium</i> var. <i>angustifolium</i>		NA	<1	<1	<1
Onion Grass	<i>Romulea rosea</i>		NA	<1	<1	<1
Ox-tongue	<i>Helminthotheca echioides</i>		NA	<1	<1	1
Panic Veldt-grass	<i>Ehrharta erecta</i> var. <i>erecta</i>	X	NA	<1	<1	<1
Paspalum	<i>Paspalum dilatatum</i>	X	NA		1	2
Paterson's Curse	<i>Echium plantagineum</i>	X	NA			<1
Prickly lettuce	<i>Lactuca serriola</i>		NA	<1	1	1
Red-flower Mallow	<i>Modiola caroliniana</i>		NA	<1	2	
Rough Dog's-tail	<i>Cynosurus echinatus</i>		NA	2	2	1
Squirrel-tail Fescue	<i>Vulpia bromoides</i>		NA	2	2	1
Tall Fescue	<i>Festuca arundinacea</i>	X	NA	<1	<1	<1
Texas Needle-grass	<i>Nassella leucotricha</i>	X	NA	<1	<1	<1
Big Heron's-Bill	<i>Erodium botrys</i>		NA			<1
Total number of species				33	35	38

* = assumed to be less than one given combined cover was recorded as one under *Bromus* spp.

Table 5: Indigenous flora species recorded in the Eastern Reserve

Common name	Scientific name	Management Zone		Total
		A	B	
Blue Devil	<i>Eryngium ovinum</i>	X		X
Bristly Wallaby-grass	<i>Rytidosperma setaceum</i>	X		X
Brown-back Wallaby-grass	<i>Rytidosperma duttonianum</i>	X	X	X
Club Sedge	<i>Isolepis</i> sp.		X	X
Common Wheat-grass	<i>Anthosachne scaber</i>	X	X	X
Fibrous Spear-grass	<i>Austrostipa semibarbata</i>	X	X	X
Finger Rush	<i>Juncus subsecundus</i>	X	X	X
Grey Tussock-grass	<i>Poa sieberiana</i>	X		X
Kangaroo Grass	<i>Themeda triandra</i>	X	X	X
Knead Spear-grass	<i>Austrostipa bigeniculata</i>	X	X	X
Lemon Beauty-heads	<i>Calocephalus citreus</i>	X		X
Quizzical Spear-grass	<i>Austrostipa stuposa</i>	X		X
Rough Spear-grass	<i>Austrostipa scabra</i>	X	X	X
Sheep's Burr	<i>Acaena echinata</i>	X	X	X
Short Wallaby-grass	<i>Rytidosperma carphoides</i>	X		X
Slender Bindweed	<i>Convolvulus angustissimus</i> subsp. <i>omnigracilis</i>	X		X
Slender Dock	<i>Rumex brownii</i>	X	X	X
Variable Willow-herb	<i>Epilobium billardierianum</i>	X	X	X
Matt Spurge	<i>Euphorbia dallachyana</i>	x	x	x
Total Number of species		18	12	19

2.2. Adaptive management recommendations

2.2.1. Weed control

Continued intensive weed control is required for the following *Nassella* species in the Eastern Reserve:

- Serrated Tussock;
- Chilean Needle-grass; and
- Texas Needle-grass.

Serrated Tussock cover increased slightly during 2018, while Chilean Needle-grass cover has risen from a cover of 4% to a cover of 10%.

Weed control should commence early in 2019, after the Golden Sun Moth flight season ends and before the peak seeding period for the above listed weeds commences. Weed control should occur during times of the year when weeds are actively growing so that treatment is most effective. It is noted that winter 2019 is again expected to be relatively dry.

The focus for year 4 should be on weed control, again concentrating on the least-weedy portion of the Eastern Reserve and then progressing through to the most-weedy portion. Solarisation should be considered as a weed control technique. This would involve covering highly weedy areas with plastic to help decrease overall weed cover.

The additional species listed below should be closely monitored and controlled immediately following any works that exposes significant areas or bare earth as well as following any future ecological or biomass-reduction burning:

- Cocksfoot
- Bearded Oat
- Perennial Rye-grass
- Toowoomba Canary-grass
- Paspalum
- Spear Thistle
- Paterson's Curse

The above species have the ability to spread rapidly.

2.2.2. Biomass management

Biomass management burns are recommended for the east reserve for 2019 once the high weed cover is addressed as burning can enable additional recruitment for (particularly) *Nassella* weed species.

Once weed cover is decreased, a hot (high intensity) burn in areas with greater weed cover, and a cool burn in areas with greater indigenous flora is recommended to be undertaken. This would reduce biomass, most importantly the cover of weeds (including dead/sprayed weeds), as well as facilitate the recruitment of indigenous species. In addition, the availability of bare ground would provide more suitable habitat for Golden Sun Moth.

2.2.3. *Revegetation*

Much of the low-lying ephemeral drainage line which divides the south-eastern higher ground from the remainder of the higher ground, known as Management Zone B, almost exclusively supported weeds. The existing management plan prescribes revegetation for Management Zone B. Revegetation may be achieved through planting and/or direct seeding and should predominantly consist of indigenous grass species which are known to occur on the site. The optimum time for revegetation is likely to be in Autumn or early-mid Winter when weed cover and competition from weeds is minimal. Given the low levels of success experienced so far using tubestock in revegetation it is recommended that direct seeding be used in 2019.

This change in approach is consistent with the adaptive management approach required by the CMP (EHP 2015a).

3. WESTERN RESERVE

3.1. Monitoring results

Table 6 provides an assessment of the extent to which year three management actions set out in the Conservation Management Plan for the Western Reserve have been implemented. This table also references sections of this report which provide adaptive management recommendations. Table 7 details the photo-point locations, Table 8 the biomass cover, Table 9 the weed cover and Table 10 the indigenous species cover.

Key findings are listed below.

- Vegetation biomass remains very high overall despite an ecological burn undertaken in 2018. A flush of weed germination after the burn has probably contributed to this.
- Indigenous vegetation cover has decreased since December 2017 and has returned to levels noted in December 2015. These changes are not significant given the natural variability in vegetation growth and extent over time and the variability in assessing broad areas for vegetative cover.
- Weed cover has increased from 50% cover to 60% cover since December 2017. This may be a response to the ecological burn undertaken in 2018. Most of these species are low threat weeds.
- Woody weed control had been undertaken in the past, but smaller plants are beginning to re-establish and they require follow up control.
- Of the key weed species, Brown-top Bent, Flatweed and Toowoomba Canary-grass have increased in cover (slightly) since December 2017. Overall, cover of most weeds has remained similar to December 2017, with only slight changes in cover.
- Of the other weed species, only Cocksfoot has increased significantly from 10% to 20% cover since December 2017.
- A total of 40 weed species were recorded.
- A total of 30 indigenous flora species were recorded.
- The actions being implemented are meeting the requirements of both the CMP and OMP.

Table 6: Western Reserve year 3 management actions

Action	Management action	Responsible entity	Timing of action	Implementation notes and recommendations
3.1	Conduct weed control and implement revegetation plan	Landowner / Bushland Management Contractor	As per Table 2 of CMP	Overall, woody weed control has been undertaken successfully. Further control is required to treat mature and recruiting plants. Control of high-threat perennial grasses evident. Weed management approach recommended (see Section 3.2.1).
3.2	Monitor populations of pest animals and conduct control works if required	Landowner / Pest Animal Contractor	Late summer / early autumn	Contractor to continue to monitor for pest animal activity during all site visits.
3.3	Conduct monitoring of all vegetation and Golden Sun Moth habitat	Suitably qualified ecological specialist	Two years after commencement of works	Undertaken in December 2018. No Golden Sun Moth recorded.
3.4	Maintain fences	Landowner/Fencing Contactor	As required	Fences and access gates in good repair.
3.5	Monitor organic litter and biomass density and develop ecological burn or fuel reduction plan if appropriate	Landowner / Bushland Management Contractor	Outside of the GSM active season (October - January)	Monitoring and burn undertaken in May 2018. Biomass levels remain high overall. Further biomass management recommended (see Section 3.2.2).
3.6	Monitor and assess works, and prepare progress report	Suitably qualified ecological specialist	Two years after commencement of works	Weed cover remains high. Weed management recommended (see Section 3.2.1)
3.7	Commence supplementary planting within Management Zone B of each reserve	Landowner / Bushland Management Contractor / Local nursery	Early Spring Year 2 – subject to availability of plants and environmental conditions	Undertaken in August 2018.

Table 7: Western Reserve photopoints

Photopoint #	December 2017	December 2018
17		
18		

Photopoint #	December 2017	December 2018
19		
20		

Photopoint #	December 2017	December 2018
21		
23		

Photopoint #	December 2017	December 2018
24		
25		

Photopoint #	December 2017	December 2018
26		
29		

Photopoint #	December 2017	December 2018
32		
33		

Photopoint #	December 2017	December 2018
34		
35		

Photopoint #	December 2017	December 2018
36		
37		

Photopoint #	December 2017	December 2018
38		
39		

Table 8: Western Reserve biomass observations

Observation	December 2015	December 2016	December 2017	December 2018
Total native vegetation cover (%)	35	50	40	35
Total weed cover (%)	50	59	50	60
Litter cover (%)	-	12	20	15
Biomass cover (%)	-	96	94	96
Biomass – main height range (m) (min)	-	0.4	0.4	0.4
Biomass – main height range (m) (max)	-	1.1	1.1	1.3

Table 9: Western Reserve weed cover observations

Common name	Scientific name	High-threat	Projective foliage cover (%)			
			December 2015	December 2016	December 2017	December 2018
Weed species						
African Box-thorn	<i>Lycium ferocissimum</i>	X	<1	<1	<1	<1
Artichoke Thistle	<i>Cynara cardunculus subsp. flavescens</i>	X	<1	<1	<1	<1
Bearded Oat	<i>Avena barbata</i>		1	4	3	3
Brown-top Bent	<i>Agrostis capillaris</i>		<1		1	2
Chilean Needle-grass	<i>Nassella neesiana</i>	X	5	1	3	3
Drain Flat-sedge	<i>Cyperus eragrostis</i>		1	<1	<1	<1
Flatweed	<i>Hypochaeris radicata</i>		<1	2	1	2
Galenia	<i>Galenia pubescens var. pubescens</i>		2	<1	1	1
Narrow-leaf Clover	<i>Trifolium angustifolium var. angustifolium</i>		1	<1	1	1
Perennial Rye-grass	<i>Lolium perenne</i>		5	21	10	8
Prairie Grass	<i>Bromus catharticus</i>		<1	2	2	2
Prunus	<i>Prunus sp.</i>		<1	<1	<1	<1
Red-flower Mallow	<i>Modiola caroliniana</i>			<1	<1	<1
Ribwort	<i>Plantago lanceolata</i>		<1	1	1	2
Serrated Tussock	<i>Nassella trichotoma</i>	X	10	8	5	4
Sheep Sorrel	<i>Acetosella vulgaris</i>		2	<1	1	1
Soft Brome	<i>Bromus hordeaceus subsp. hordeaceus</i>		<1	4	3	3
Spear Thistle	<i>Cirsium vulgare</i>	X	3	<1	1	1
Sweet Briar	<i>Rosa rubiginosa</i>	X	5	<1	1	1
Sweet Vernal-grass	<i>Anthoxanthum odoratum</i>		1		<1	1

Common name	Scientific name	High-threat	Projective foliage cover (%)			
			December 2015	December 2016	December 2017	December 2018
Toowoomba Canary-grass	<i>Phalaris aquatica</i>	X	10		6	7
Yorkshire Fog	<i>Holcus lanatus</i>	X	4	3	4	3
Big Heron's-bill	<i>Erodium botrys</i>		NA	<1	<1	<1
Cocksfoot	<i>Dactylis glomerata</i>	X	NA	10	10	20
Common Peppergrass	<i>Lepidium africanum</i>		NA	<1	<1	1
Curled Dock	<i>Rumex crispus</i>		NA	<1	<1	<1
Fiddle Dock	<i>Rumex pulcher</i> subsp. <i>pulcher</i>		NA		<1	<1
Garden Dandelion	<i>Taraxacum officinale</i> spp. <i>agg.</i>		NA	<1	<1	<1
Indian Mustard	<i>Brassica X juncea</i>		NA	<1	<1	<1
Onion Grass	<i>Romulea rosea</i>		NA	1	<1	<1
Ox-tongue	<i>Helminthotheca echioides</i>		NA	<1	<1	1
Paterson's Curse	<i>Echium plantagineum</i>	X	NA	<1	<1	<1
Rough Dog's-tail	<i>Cynosurus echinatus</i>		NA	<1	<1	<1
Rough Sow-thistle	<i>Sonchus asper</i>		NA	<1	1	1
Squirrel-tail Fescue	<i>Vulpia bromoides</i>		NA	9	4	4
Tall Fescue	<i>Festuca arundinacea</i>	X	NA	1	1	1
Texas Needle-grass	<i>Nassella leucotricha</i>	X	NA	1	1	1
Trefoil	<i>Lotus</i> sp.		NA	1	1	1
Variiegated Thistle	<i>Silybum marianum</i>	X	NA	<1	<1	<1
Fennel	<i>Foeniculum vulgare</i>		NA			<1
Total number of species				35	39	40

Table 10: Indigenous flora species recorded in the Western Reserve

Common name	Scientific name	Management Zone		Total
		A	B	
Black Sheoak	<i>Allocassuarina littoralis</i>	X		x
Blue Devil	<i>Eryngium ovinum</i>	X	X	X
Bristly Wallaby-grass	<i>Rytidosperma setaceum</i>	X		X
Brown-back Wallaby-grass	<i>Rytidosperma duttonianum</i>	X		X
Common Tussock-grass	<i>Poa labillardierei</i>		X	X
Common Wallaby-grass	<i>Rytidosperma caespitosum</i>	X		X
Common Wheat-grass	<i>Anthosachne scabra</i> s.l.	X	X	X
Fibrous Spear-grass	<i>Austrostipa semibarbata</i>	X	X	X
Fine-head Spear-grass	<i>Austrostipa oligostachya</i>	X		X
Grassland Wood-sorrel	<i>Oxalis perennans</i>	X		X
Grey Tussock-grass	<i>Poa sieberiana</i>	X		X
Kangaroo Grass	<i>Themeda triandra</i>	X	X	X
Kneed Spear-grass	<i>Austrostipa bigeniculata</i>	X	X	X
Pale Rush	<i>Juncus pallidus</i>	X	X	X
Purple Coral Pea	<i>Hardenbergia violacea</i>	X		X
River Red-gum	<i>Eucalyptus camaldulensis</i>	X	X	X
Rough Spear-grass	<i>Austrostipa scabra</i>	X	X	X
Rush	<i>Juncus</i> sp.	X		X
Sheep's Burr	<i>Acaena echinata</i>	X		X
Short Wallaby-grass	<i>Rytidosperma carphoides</i>	X		X
Sifton Bush	<i>Cassinia sifton</i>	X		X
Slender Bindweed	<i>Convolvulus angustissimus</i> subsp. <i>omnigracilis</i>	X		X

Common name	Scientific name	Management Zone		Total
		A	B	
Slender Dock	<i>Rumex brownii</i>	X	X	X
Small St John's Wort	<i>Hypericum gramineum</i>	X		X
Spear Grass	<i>Austrostipa</i> sp.		X	X
Supple Spear-grass	<i>Austrostipa mollis</i>	X		X
Variable Willow-herb	<i>Epilobium billardierianum</i>	X	X	X
Weeping Grass	<i>Microlaena stipoides</i> var. <i>stipoides</i>	X		X
Windmill-Grass	<i>Chloris truncate</i>	X		X
Wiry Dock	<i>Rumex dumosus</i>	X		X
Total number of species		28	12	30

3.2. Adaptive management recommendations

3.2.1. Weed control

A continuing intensive weed control effort is still required for the following *Nassella* species in the Western Reserve:

- Serrated Tussock;
- Chilean Needle-grass; and
- Texas Needle-grass.

Serrated Tussock cover was reduced slightly during 2018 while Chilean Needle-grass cover has remained unchanged. Perennial Rye-grass cover has decreased slightly, but Cocksfoot has increased significantly.

This control effort should commence early in 2019, after the Golden Sun Moth flight season ends and before the peak seeding period for the above listed weeds. Weed control should occur during times of the year when weeds are actively growing so that treatment is most effective. It is noted that winter 2019 is again expected to be relatively dry.

Nassella control in this low-lying weedy area is likely to require long acting systemic herbicides. This is an acceptable change to the management prescribed by the CMP (EHP 2015a) given the adaptive management approach being taken. Systemic herbicides will more effectively control weeds as required under the CMP (EHP 2015a).

The spread of Serrated Tussock seed by wind is also considered likely to significantly hamper weed control success if not controlled. This species seeds poorly the year or two following fire. Frequent burns (e.g. yearly and preferably hot but not coinciding with Golden Sun Moth activity) should therefore be aimed for in areas supporting heavy infestations of Serrated Tussock. A burn should be planned for autumn 2019 (and has since occurred).

The additional species listed below should be closely monitored and controlled immediately following weed control which exposes significant areas or bare earth as well as following any ecological or biomass-reduction burning:

- Artichoke Thistle
- Variegated Thistle
- Sweet Briar
- Spear Thistle
- Toowoomba Canary-grass
- African Box-thorn
- Cocksfoot
- Paterson's Curse

Although most of the above species are currently in relatively low abundance, they have the ability to spread rapidly.

3.2.2. Biomass management

Biomass-management burnings took place in the northern part of the reserve in May 2018, though by December 2018 weed cover has return to near previous year levels. The overall cover of *Nassella* species has remained near previous year levels and the biomass

(including dead plant material) cover remains very high. The low-lying wetter ground in the southern part of the reserve currently supports extremely high weed cover. This area is dominated by Cocksfoot with noticeable Chilean and Texas Needle-grasses. Only a very small amount of indigenous flora has been observed in these areas (e.g. Weeping Grass).

The biomass management proposed for the Western Reserve in 2019 is provided in graphic form at Appendix 1. The weedier, northern portions of the Western Reserve should be treated with a hot (high intensity) burn in Autumn 2019. Whereas, northern areas with higher indigenous flora cover (particularly Kangaroo Grass), and where indigenous plantings have been placed, should be treated with cool (low intensity) burns. Areas unburnt in 2018 should aim to be burnt in 2019.

Given the availability of bare ground following a burn, weed control should be conducted soon after fire in order to reduce competition from weeds and to facilitate the recruitment of indigenous species. Following initial treatment, weed control should be conducted frequently (at least every two months) following the burn. Weed control should be prioritised in areas supporting the highest cover of indigenous species.

The extremely weedy southern part of the reserve is not recommended for burning until weeds such as *Nassella* are reduced to lower levels with weed control and solarisation (covering weedy areas with plastic).

3.2.3. Revegetation

Revegetation conducted to date has had mixed success. Overall only approximately 50% of plants have survived. This lower than expected survival rate is likely to be due to the continuing dry conditions.

Portions of the southern part of the western reserve includes low-lying, wetter ground, and almost exclusively supported weeds. The immediate management effort in this area should be focusing upon bringing down weed cover levels with weed management and possibly solarisation. Aside from tubestock planting, revegetation by direct seeding of indigenous grass species should be considered and trialled in different microhabitats (e.g. dry slopes, drainage lines and soaks, etc) as a potentially more effective revegetation method than tubestock planting.

Approximately 1000 plants have already been planted as clustered tube-stock plantings following biomass management burn in August 2018. Within drier, sloped areas, plantings in bands may be a useful revegetation strategy. This would initially include planting two or three bands of indigenous plants along slope contours, and controlling weeds within and between bands. In subsequent years, additional bands would be added between and beyond original bands, with more bands being added every year to slowly close gaps in native vegetation. This strategy would continue until indigenous self-seeding fills in gaps and weedy species are naturally excluded. This change in approach is consistent with the adaptive management approach required by the CMP (EHP 2015a).

For new and old plantings, consider the use of rabbit exclusion devices such as chicken wire to aid the establishment of planted vegetation.

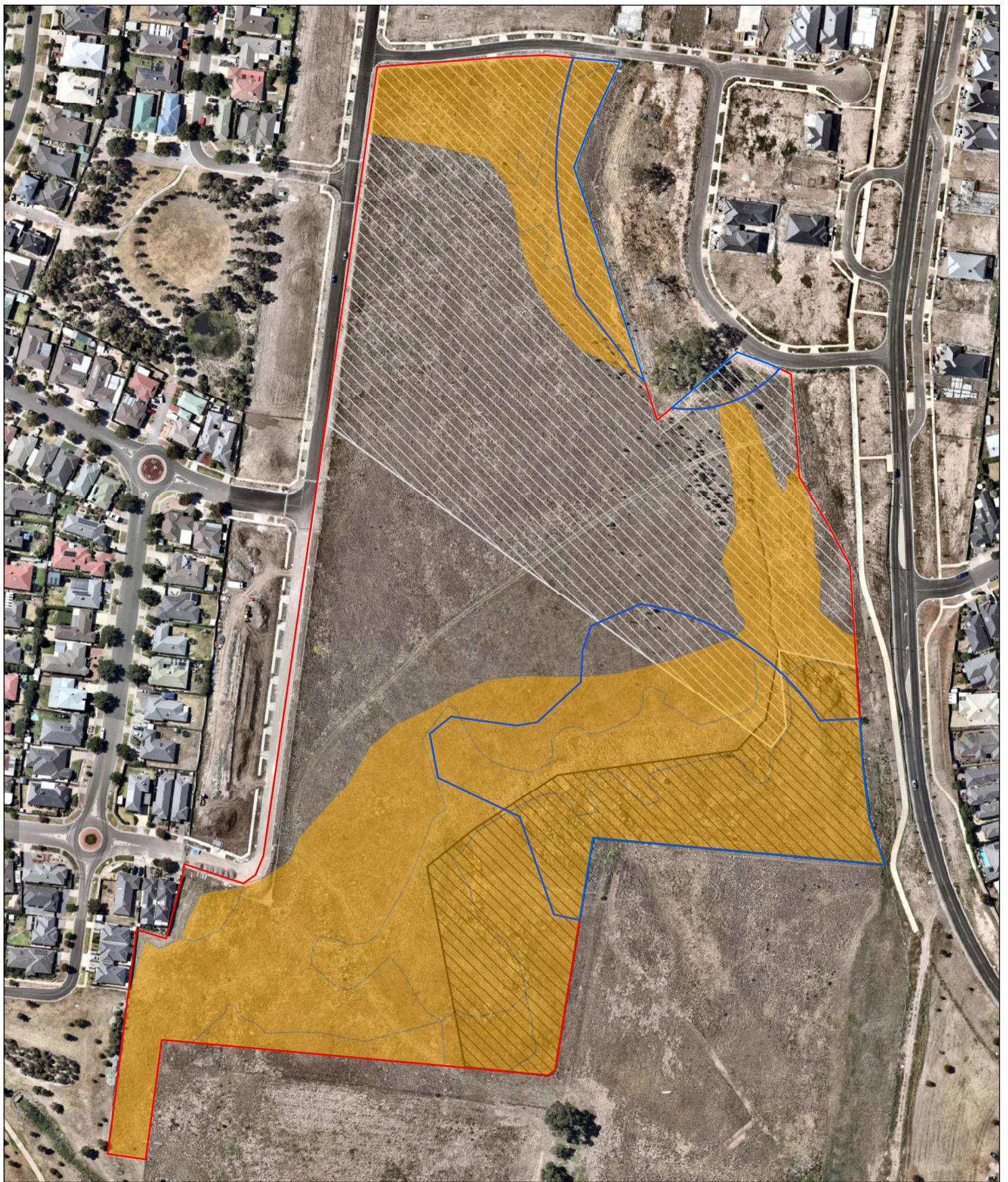
4. REFERENCES

Brett Lane & Associates (BL&A) 2017, Rosenthal Estate Conservation Management Plan Year 1 Monitoring - Report No. 15148 (2.0), Brett Lane & Associates Pty Ltd, Hawthorn East, consultant report prepared for Urban Design & Management Pty Ltd.

Ecology and Heritage Partners (EHP) 2015a, Conservation Management Plan: Rosenthal Estate, 100 Vineyard Road, Sunbury, Victoria, Consultant report for Urban Design and Management Pty. Ltd.

Ecology and Heritage Partners (EHP) 2015b, Offset Management Plan: Rosenthal Estate, 100 Vineyard Road, Sunbury, Victoria, Consultant report for Urban Design and Management Pty. Ltd.

Appendix 1: Proposed 2019 weed and biomass management for Western Reserve



Appendix 1: Proposed 2019 weed and biomass management for Western Reserve

Project: 100 Vineyard Road, Sunbury **Client:** TF and A Millett **Date:** 18/01/2019

 Weedy areas

Management zones

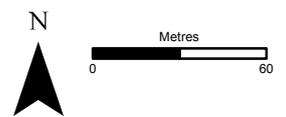
 A

 B

Management actions

 Autumn burn

 Eliminate Nassella weeds then slash when soils are dry and keep cut material in place



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Appendix 2: Progress against management actions listed in Table 13 of the Offset Management Plan (EHP 2015b)

Year	Action	Management action	Responsible authority / personnel	Timing of action	Date completed
2	2.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	19/12/17
2	2.6	Commence supplementary planting within Management Zone B of <i>in-situ</i> reserves	Landowner/Bushland Management Contractor	Early Spring Year 2 – subject to availability of plants and environmental conditions	CONDITIONS NOT SUITABLE
2	2.7	Monitor and assess works, and prepare progress report for both <i>in-situ</i> and <i>ex-situ</i> offsets	Suitably qualified ecological specialist	Two years after commencement of OMP for both <i>in-situ</i> and <i>ex-situ</i> offsets	IN SITU 23/1/18
3	3.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	THREATS OUT 2018
3	3.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	MAY 2018
3	3.3	Conduct monitoring for Golden Sun Moth	Suitably qualified ecological specialist	Three years after commencement of OMP	DECEMBER 2018
3	3.4	Maintain fences	Landowner/Fencing Contractor	As required	2018
3	3.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	MAY 2018
3	3.6	Continue supplementary planting within Management Zone B of <i>in-situ</i> reserves	Landowner/Bushland Management Contractor	Early Spring Year 3 – subject to availability of plants and environmental conditions	WINTER 2018
4	4.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	
4	4.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	
4	4.3	Conduct monitoring for vegetation and Golden Sun Moth	Suitably qualified ecological specialist	Four years after commencement of OMP	
4	4.4	Maintain fences	Landowner/Fencing Contractor	As required	

PLANNING AND ENVIRONMENT ACT 1987

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27 JAN 2016

INSTRUMENT NO. 11801

THREATS OUT 2018

MAY 2018

DECEMBER 2018

2018

MAY 2018

WINTER 2018



Table 13: Management Actions Table

Year	Action	Management action	Responsible authority / personnel	Timing of action	Date completed
0	0.1	Implement on-title legal agreements for offset site	Liaise between the landowner, DELWP and Council.	Within three months of this plan being approved by DELWP and DoE	2016
0	0.2	Acquire baseline monitoring data	Suitably qualified ecological specialist	Within three months of this plan being approved by DELWP and DoE	8/12/15
0	0.3	Prepare tenders for relevant management contractors where required	Landowners / engaged consultants	Prior to commencement of development	27/5/16
1	1.1	Install permanent fences and access gates surrounding the offset sites	Landowner	Within three months of this plan being approved by DELWP and DoE	2016
1	1.2	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	8/12/16
1	1.3	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	8/12/16
1	1.4	Conduct monitoring for Golden Sun Moth	Suitably qualified ecological specialist	One year after commencement of OMP	16/2/17
1	1.5	Monitor biomass density and implement stock grazing regime or develop ecological burn/ fuel reduction plan if appropriate	Landowner/Bushland Management Contractor/CFA	Summer/Autumn	8/12/16
1	1.6	Contract nursery for seed collection and propagation of native species suitable for supplementary planting into Management Zone B of each <i>in-situ</i> reserve.	Landowner/Bushland Management Contractor/Local Nursery	Year 1 for potential supplementary planting in Year 2 or Year 3 and progressively on an annual or biennial basis. Management Zone B - <i>in-situ</i> reserves only.	-
2	2.1	Conduct weed control	Landowner/Bushland Management Contractor	Species dependent	19/12/17
2	2.2	Monitor populations of pest animals and conduct control works if required	Landowner/Pest Animal Contractor	After peak breeding season - late summer/early autumn	19/12/17
2	2.3	Conduct monitoring for vegetation and Golden Sun Moth	Suitably qualified ecological specialist	Two years after commencement of OMP	19/12/17
2	2.4	Maintain fences	Landowner/Fencing Contractor	As required	19/12/17

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Sheet No

Signature of Responsible Authority