INDIGENOUS DESIGN
ENVIRONMENTAL MANAGEMENT

Report for Wellington Shire Council

West Sale Aerodrome EPBC 2017/8106 - Year 3 Monitoring Results

December 2021

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Citation

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Disclaimer

Acknowledgements

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Version Control

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Draft 1.1	16/02/2022	First draft, first review	B. Imbery	T. Brooker
Draft 1.2	18/02/2022	First draft, second review	H. Schinagl	T. Brooker
Final	21/02/2022	Final released to client		

Contents

1 Introduction

1.1 Project Background

Indigenous Design has been engaged by Wellington Shire Council to undertake ecological monitoring within Grassland Zone 4A, an offset for *Environment Protection & Biodiversity Conservation* (EPBC) Act 1999 Approval 2017/8106 for a runway extension. The site is protected on title through CW_CFL-3055_01, an agreement under a Section 69 of the Victorian *Conservation, Forest and Lands Act 1987* (the Landowner Agreement). The site protected by the Section 69 agreement is 13 hectares in size, though only a subset of this area totalling 3 hectares is relevant to the EPBC Act Approval.

1.2 Scope

Monitoring was completed for Year 3 as detailed in the EPBC Offset Management Plan for the site (EthosNRM, 2018a), and included:

- Native species cover and diversity - establish 9 transects with 10 cover quadrats and 1 diversity quadrat along each transect;
- Weed species cover and diversity - to be recorded as per the above transect and quadrat establishment;
- Establish 9 photo points at the 25m point of each transect, with 5 photos taken, 1 in each direction & 1 at the ground;
- Pest animal monitoring - to be recorded as per the above transect and quadrat establishment; and
- Record Biomass accumulation.

Further detail on the monitoring methods can be found in the EPBC Offset Management Plan (OMP) (EthosNRM, 2018a).

The assessment was completed at the end of a warm, wet spring and therefore it is considered likely to have been a good representation of the species present and their coverage. However, it is possible that some annual, deciduous or dormant taxa may not have been visible, or have been overlooked during assessments. Additionally, some taxa have not been identified to specific or intraspecific rank due to the absence of flowering or other material typically used for identification.

2 Methods

2.1 Species Cover & Diversity

Across the 13ha Protected Area, 9 (50m) transects were established including 3 within the EPBC Offset Site to monitor species cover. (*Map 1*)

A 50cm² quadrat was placed at 5m intervals and the following recorded:

- % native graminoid cover;
- % high threat weed (exotic) vegetation cover (and portion % that is a high threat);
- % bare ground;
- % herbaceous cover;
- % cover lichen or moss; and
- % other.

In addition to the 9 x 50cm^2 quadrats assessed per transect, one species diversity quadrat (10x10m in size) was located between the 25m and 35m points along each of the transects established. A modified Braun-Blanquet cover-abundance was then used to assess coverage of native and weed species (*Table 1*).

Table 1 - Modified Braun-Blanquet Cover - Abundance Class (taken from (EthosNRM, 2018a))

Score	Cover	Abundance
0	0%	Species absent
+	<5%	Few Individuals
1	<5%	More than a few individuals
2	5-20%	Any number of individuals
3	20-50%	Any number of individuals
4	50-75%	Any number of individuals
5	75-100%	Any number of individuals

2.2 Biomass Accumulation

Biomass monitoring for inter-tussock space was monitored at 18 random quadrats across the site, utilising the rapid assessment of biomass - the 'golf Ball Method' as described in Appendix 4 of the OMP (EthosNRM, 2018a). The total quadrat score was then compared to the recommended action (*Table 2*).

Table 2 - Biomass accumulation score and recommended action (taken from EthosNRM 2018)

Biomass	Golf Ball Total Score	Action
High	0-5	Requires disturbance
Medium	6-14	Monitor for thickening
Low	15-18	No action required

Golf balls within the photographs are scored: 1 if more than 90% of the ball is visible; 0 if a ball is less than 33% is visible and all other balls 0.5.

2.3 Photopoints

Nine photo points across the Protected Area were established and permanently marked with star pickets. The photo points were located at the midway point of each of the 9 transects established for species cover and diversity. 5 photos were taken at each location:

- North;
- South
- East;
- West; and
- taken directly down from at the 25m point.

3 Results

Monitoring was undertaken on the 7th of December 2021.

3.1 Species Cover & Diversity

Appendix 1 provides the field data and *Table 3* provides a summary of results for the species cover monitoring. Total exotic cover averaged 16% across the 90 quadrats monitored and total high threat exotic cover averaged 10%. Graminoid cover was recorded as averaging 52% and herbaceous species 7% (*Table 3*).

Table 3 - Native & exotic species cover results from 50cm² cover quadrats

Attribute	Average (%)
Native Graminoid Cover	52
Total Exotic Cover	16
High Threat Exotic Cover	10
Bare Ground	13
Herbaceous Cover	7
Lichen/Moss Cover	10
Other Cover	2

Results of the all species monitoring quadrat is provided in *Table 4.*

In total, 26 native species were recorded across all transects, along with 13 exotic species, 6 of which were High Threat weed species.

Table 4 - Year 3 results for all species quadrats

Scientific Name	Common Name	Exotic	T1	T2	T3	T4	T5	T6	T7	T8	T9
Acaena x ovina	Australian Sheep's Burr		+			2	1	1			
Agrostis capillaris	Brown top Bent	HT							1		
Aira sp.	Hair Grass	HT	2	3		2	3	3	2	3	3
Anthosachne scabra	Common Wheat Grass				+						2
Anthoxanthum odoratum	Sweet Vernal-grass	HT	+		2	2	1		2	2	2
Asperula conferta	Common Woodruff					1	2	2			
Austrostipa mollis	Supple Spear-grass		1		+						
Austrostipa rudis	Veined Spear Grass			2	2				3	3	
Bossiaea prostrata	Creeping Bossiaea					1					
Briza maxima	Large Quaking Grass	*	+		3			1			
Caesia calliantha	Blue Grass-lily			+			1				
Centaurium erythraea	Common Centaury	*			+				+	1	1
Convolvulus erubescens	Australian Bindweed					+		1			
Dichelachne rara	Common Plume-grass		1	1	2	2	3			2	2
Eragrostis brownii	Common Love-grass		+			1					

Scientific Name	Common Name	Exotic	T1	T2	T3	T4	T5	T6	T7	T8	T9
Erigeron sp.	Fleabane	*					+				1
Euchiton sp.	Cud-weed		+		1	1				2	
Euchiton sphaericus	Common Cud-weed			2							
Holcus lanatus	Yorkshire Fog	HT	+	2			2	2	3	2	2
Hypericum gramineum	Small St John's Wort		1	1	2			+	1	1	
Hypochaeris radicata	Cat's Ear	*	2	2	2		1	2	2	2	2
Lomandra filiformis	Wattle Mat-rush										2
Lomandra filiformis ssp. coriacea	Wattle Mat-rush		+								
Lotus corniculatus	Birds-foot trefoil	*		1					1		
Lysimachia arvensis	Scarlet Pimpernel	*	1					1			
Lythrum hyssopifolia	Lesser Loosestrife				+			1			
Microlaena stipoides var stipoides	Weeping Grass									2	2
Oxalis perennans	Grassland Wood-sorrel			+	1	1	1	2	1	2	2
Paspalum dilatatum	Paspalum	HT	+						2		
Poa labillardierei	Common Tussock-grass		2	2	2		1	2	2	2	
Plantago gaudichaudii	Narrow Plantain					2					
Romulea rosea	Onion Grass	*	+		1						
Rumex dumosus	Wiry Dock		+	+							
Rytidosperma sp.	Wallaby Grass		1	2	2		1	3	1	2	
Rytidosperma racemosum	Wallaby Grass							1			
Schoenus apogon	Common Bog-sedge		2	1	2	3	2	2	2	2	2
Sonchus oleraceus	Sow Thistle	HT	+			+		+			
Themeda triandra	Kangaroo Grass		2	2	3	4	4	2	3	2	3
Wahlenbergia multicaulis	Blue Bells						1	1			1

3.2 Exotic Fauna

Any occurrences of exotic fauna was recorded whilst completing the transect/quadrat monitoring, with none noted / observed.

3.3 Biomass Accumulation

The site currently has a medium biomass and monitoring for thickening will continue.

Table 5 - Biomass accumulation result score and action

Quadrat #	Biomass	Score	Action
1	Medium	13	Monitor for thickening
2	Low	15	No action required
3	Low	17	No action required
4	Medium	10.5	Monitor for thickening
5	Low	15.5	No action required
6	Medium	14	Monitor for thickening
7	Medium	13	Monitor for thickening
8	Medium	11.5	Monitor for thickening
9	Medium	12	Monitor for thickening
10	Medium	10	Monitor for thickening
11	Low	17.5	No action required
12	Medium	8.5	Monitor for thickening
13	Medium	14	Monitor for thickening
14	Medium	12.5	Monitor for thickening
15	Medium	10	Monitor for thickening
16	Medium	8.5	Monitor for thickening
17	Medium	12.5	Monitor for thickening
18	Medium	6	Monitor for thickening
Average	**Medium**	**12**	**Monitor for thickening**

Quadrat scores are provided in *Table 5* and photos of biomass accumulation transects are provided in *Appendix 2*.

3.4 Photopoints

Forty-five photos were taken during monitoring (five per transect) and are provided in *Appendix 3*.

4 Discussion

The methods employed in the year 3 monitoring event match the requirements of the OMP, but do not match data available for year 1. Although many of the same attributes can be derived from a number of other sources, differences in collection methods make them incompatible for comparison. Nonetheless, some conclusions can be drawn in order to provide direction for future activities across the site.

Information is available from a number of sources including:

- The EthosNRM field work in relation to losses and offsets for the runway proposal (EthosNRM, 2018; EthosNRM, 2018a), which was completed using the Victorian Vegetation Quality Assessment or habitat hectare method. These assessments are completed through subjective assessment of total cover of weeds / species and are dependent on seasonality, timing of completion and experience / proficiency of assessors in providing accurate % cover.
- The DELWP Landowner Agreement (LOA) site audit completed in February 2021 (DELWP, 2021).
- Listing advice for the Gippsland Red Gum (*Eucalyptus tereticornis* subsp. *mediana*) Grassy Woodland and Associated Native Grassland community.

4.1 Diversity

The OMP (EthosNRM, 2018a) noted 49 native species and 35 weed species had been recorded within the 13 hectare Protected Area. A site visit and walk over in early November 2021 by Indigenous Design recorded 40 native species within the 13 hectare Protected Area. Both of these previous diversity assessments used a meandering method of recording species. The Year 3 monitoring recorded 26 native species and 13 exotic species within the 900 m^2 assessed during diversity quadrat assessments.

It is not believed that there has been a decrease in the number of species present on site either native or exotic, rather the differences in methodology and area sampled resulted in fewer species records.

Following the next round of monitoring using a consistent format, additional analysis can be made in regard to the site's diversity.

4.2 Native Cover

Native Graminoid cover was recorded as averaging 52% in Year 3's monitoring and native herbaceous cover 7%, as compared to 70% and 16% cover respectively by Ethos NRM following the 2017 field work (EthosNRM, 2018a). This difference in cover is likely as a result of the recent fire event (which occurred 10 months previously in February) decreasing cover in the short term and the time of year of the monitoring. Monitoring completed earlier in spring may have resulted in a higher cover of herbaceous species which are largely annual in their growth cycle and the primary pioneering species after disturbance. In addition, the data has been derived through 2 different methods and caution should be exercised when making any specific comparisons.

The listing advice for the community also identifies that 50% or more of the vegetation cover of the ground layer (i.e. excluding bare ground) is made up of native grasses and grass-like plants (such as sedges, rushes, lilies, Lomandra and similar plants) (DAWE, 2022). The site currently meets this definition.

4.3 Exotic Cover

Comparison of data from each monitoring period is to be used to determine if weed cover triggers have been realised. The requirement of the OMP (as listed in Appendix 2) is to reduce cover of all high threat weeds by the end of Year 3 to less than <5% cover and to prompt a management action in response (*Table 6*) (EthosNRM, 2018a).

Table 6 - Weed Cover triggers (Table 7 of the OMP)

Trigger	Action
Increase in weed cover across the entire site beyond the % specified in Appendix 2	Increase frequency of weed control. Review methods and chemical used.
20% increase in weed cover within quadrats from baseline data	Increase frequency of weed control. Review methods and chemical used.

Total exotic cover averaged 16% across the 90 quadrats monitored in Year 3 and total high threat exotic cover averaged 10%. The 2017 field work completed by Ethos recorded total weed cover in the offset site as 10% (EthosNRM, 2018a), however the LOA commenced in 2018 with an assessed 20% total weed cover and high threat weed cover of 15%. The DELWP audit completed in February 2021 estimated at least 10% cover but concluded that cover estimates for 13 ha where the grass cover is dense are difficult to make accurately and it was quite possible that cover had reduced since the LOA was executed (DELWP, 2021).

A number of factors contribute to this varying result in obtaining a foliage cover estimate:

- The recent ecological burn providing favourable conditions for exotic species germination and growth;
- Subjective verses objective assessments to determine foliage cover totals; and
- Seasonality and climate, given West Gippsland has experienced a wet warm spring/summer.

Without equivalent data from a baseline survey in Year 1, a 20% increase in weed cover within quadrats is not able to be determined (see *Table 6*), however the <5% cover by Year 3 is unlikely to be currently met on site for all high threat species, even though all weed control actions have been implemented.

Whilst higher weed cover may be a triggered response from the ecological burn, additional weed control is recommended to be undertaken in Spring 2022. The 2021-2022 OMP Implementation report details which species require this additional treatment based on broad site inspections completed pre and post burning and since works commenced on site by Indigenous Design in November 2019.

Following the next round of monitoring, additional analysis can be made in regard to the site's exotic and native diversity and change in coverage that may also trigger a management action (see *Table 6*).

4.4 Biomass accumulation

Overall, the site currently has a medium biomass and monitoring for thickening will continue. Even though the whole site was burnt within the previous 10 months, only four of the 18 quadrats required no action with all the remaining quadrats to be monitored for thickening.

In order to more accurately determine the sites progression towards requiring an action, it is recommended that Biomass Accumulation monitoring occur yearly rather than as per the schedule identified in the OMP Table 5 of Year 1, 3, 6, 8 & 10 to ensure changes are identified early for ecological burn planning to be undertaken in a timely manner.

5 Recommendations

A number of recommendations have been made throughout this report and are detailed below.

1. Use Year 3 data as the baseline for future monitoring results to be compared against as no other data set / or coverage information derived using subjective methods is directly comparable.
2. Repeat monitoring at Year 4 as an additional monitoring event, then at the specified Year 8 & 10 as per the OMP. If Year 4 monitoring suggests targets are not being met and new management actions are recommended, additional interim monitoring may be required to track progress.
3. Provide additional analysis in regard to the site's diversity and cover following the next round of monitoring (Year 4).
4. Undertake additional weed control for high threat weed species in response to the recent controlled burn.
5. Complete biomass accumulation monitoring annually.

References

DAWE. (2022, January). *Advice to the Minister for the Environment, Heritage and the Arts from the Threatened Species Scientific Committee on an Amendment to the List of Threatened Ecological Communities under the EPBC Act 1999*. Retrieved from Department of Agriculture, Water and the Environment: https://www.environment.gov.au/biodiversity/threatened/communities/pubs/73-listing-advice.pdf

DELWP. (2021). *CW-CFL-3055 LA01 Monitoring Report.* Melbourne: Victorian Government.

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EthosNRM. (2018). *West Sale Airport Runway Extension - EPBC Offset Proposal.* Bairnsdale: EthosNRM.

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Appendices

Appendix 1 - Cover Data

Transect 1

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Native Graminoid Cover	50	60	70	70	55	60	75	65	65	55
Total Exotic Cover	30	20	5	10	15	12	5	15	15	12
High Threat Exotic Cover	25	5	5	10	5	12	3	4	5	8
Bare Ground	20	10	10	20	25	5	6	5	4	17
Herbaceous Cover	20	10	1	1	8	6	6	2	2	6
Lichen/Moss Cover	1	2	2	5	10	10	10	8	12	5
Other Cover	5	5	1	1	2	1	2	11	6	4

Transect 2

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Native Graminoid Cover	50	40	60	60	70	70	60	40	50	70
Total Exotic Cover	10	25	10	10	10	15	15	25	12	15
High Threat Exotic Cover	5	20	5	8	8	10	10	5	10	5
Bare Ground	15	20	10	12	15	3	8	15	20	10
Herbaceous Cover	5	5	5	1	3	1	1	10	1	3
Lichen/Moss Cover	2	8	15	5	5	15	15	20	20	15
Other Cover	2	1	2	1	2	5	5	10	2	10

Transect 3

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Native Graminoid Cover	50	45	50	50	70	60	40	55	45	50
Total Exotic Cover	25	30	15	20	10	15	20	20	15	20
High Threat Exotic Cover	5	5	5	5	8	10	15	12	10	15
Bare Ground	8	15	5	25	8	5	10	10	12	20
Herbaceous Cover	15	25	8	4	10	2	5	6	5	6
Lichen/Moss Cover	5	10	5	15	10	3	8	5	15	20
Other Cover	3	2	2	12	2	1	3	1	2	2

Transect 4

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Native Graminoid Cover	70	45	65	45	55	50	55	55	60	70
Total Exotic Cover	15	10	10	15	15	15	15	10	8	8
High Threat Exotic Cover	12	8	8	10	10	9	12	5	5	5
Bare Ground	10	25	5	25	8	12	8	12	8	6
Herbaceous Cover	3	1	1	2	2	6	5	3	1	1
Lichen/Moss Cover	15	25	20	5	5	5	10	10	5	5
Other Cover	4	2	5	2	2	2	1	3	1	1

Transect 5

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Native Graminoid Cover	70	60	45	55	70	60	50	55	55	60
Total Exotic Cover	15	15	25	6	8	12	10	12	15	12
High Threat Exotic Cover	12	12	15	5	3	9	8	10	12	8

Bare Ground	10	8	3	20	20	15	15	20	8	20
Herbaceous Cover	3	3	15	8	8	2	1	1	7	2
Lichen/Moss Cover	15	20	20	15	15	20	25	15	20	15
Other Cover	4	1	1	1	1	1	3	1	2	2

Transect 6

	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**
Native Graminoid Cover	60	40	65	60	40	45	60	40	40	10
Total Exotic Cover	5	10	20	15	20	20	15	15	12	40
High Threat Exotic Cover	5	10	20	12	10	8	12	6	6	15
Bare Ground	12	15	5	10	15	20	8	25	20	30
Herbaceous Cover	8	12	1	4	10	12	5	8	8	20
Lichen/Moss Cover	10	12	2	12	10	15	20	5	12	5
Other Cover	1	1	1	2	1	1	4	2	3	2

Transect 7

	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**
Native Graminoid Cover	60	40	35	30	30	50	45	50	70	50
Total Exotic Cover	15	25	25	25	25	20	25	15	15	10
High Threat Exotic Cover	5	15	10	15	20	15	15	5	8	5
Bare Ground	8	10	25	30	15	15	20	8	5	8
Herbaceous Cover	10	15	15	8	6	3	20	8	4	5
Lichen/Moss Cover	5	5	5	5	5	5	5	10	5	5
Other Cover	1	1	2	2	1	4	2	1	1	1

Transect 8

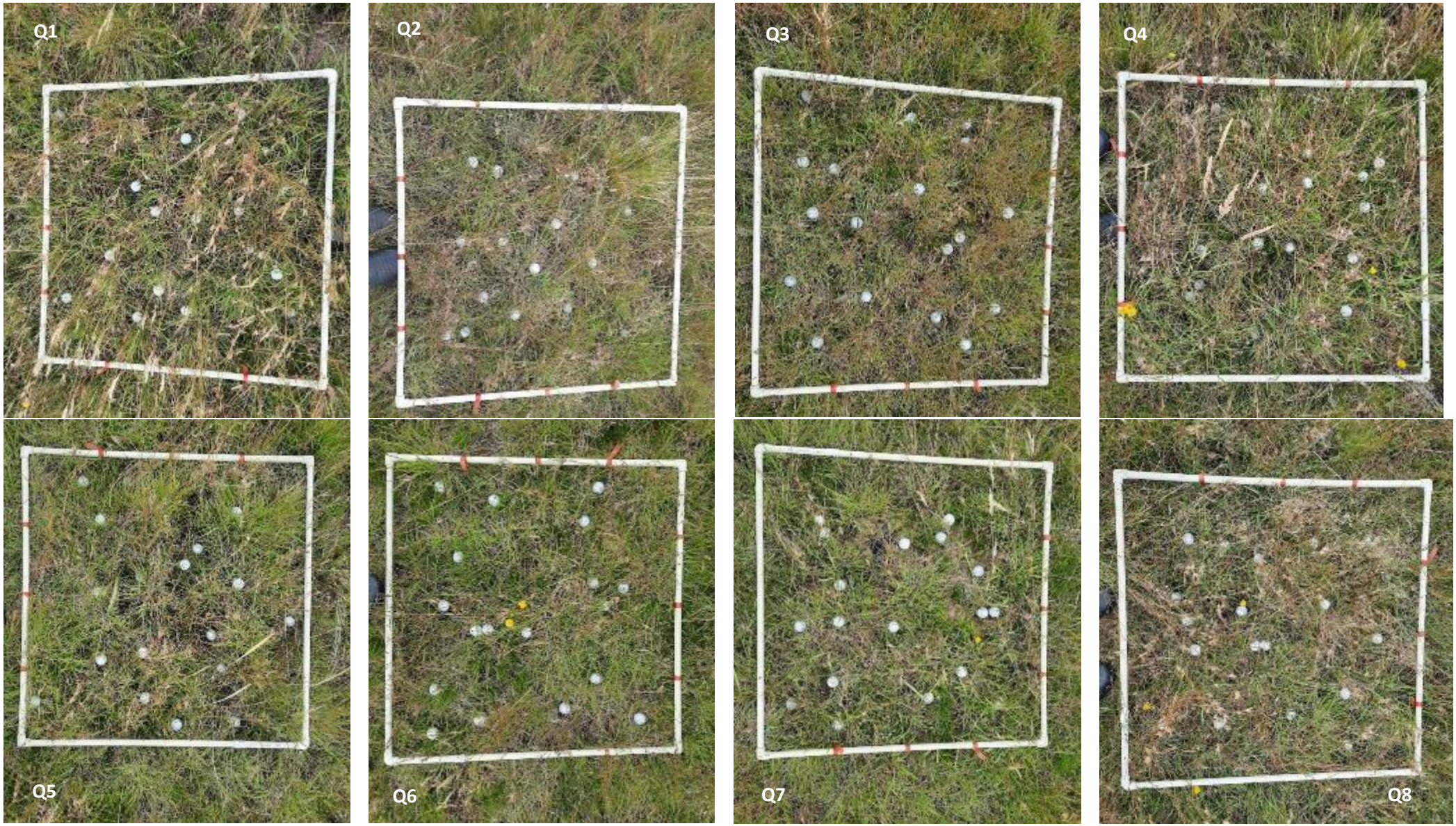
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**
Native Graminoid Cover	40	70	45	30	55	50	45	45	40	55
Total Exotic Cover	8	10	20	20	10	20	25	20	25	25
High Threat Exotic Cover	2	2	12	5	8	5	12	15	15	15
Bare Ground	18	5	30	5	10	15	3	10	3	6
Herbaceous Cover	6	8	8	12	1	20	20	6	2	10
Lichen/Moss Cover	5	5	5	5	10	5	5	10	10	5
Other Cover	1	2	1	1	1	3	3	3	4	3

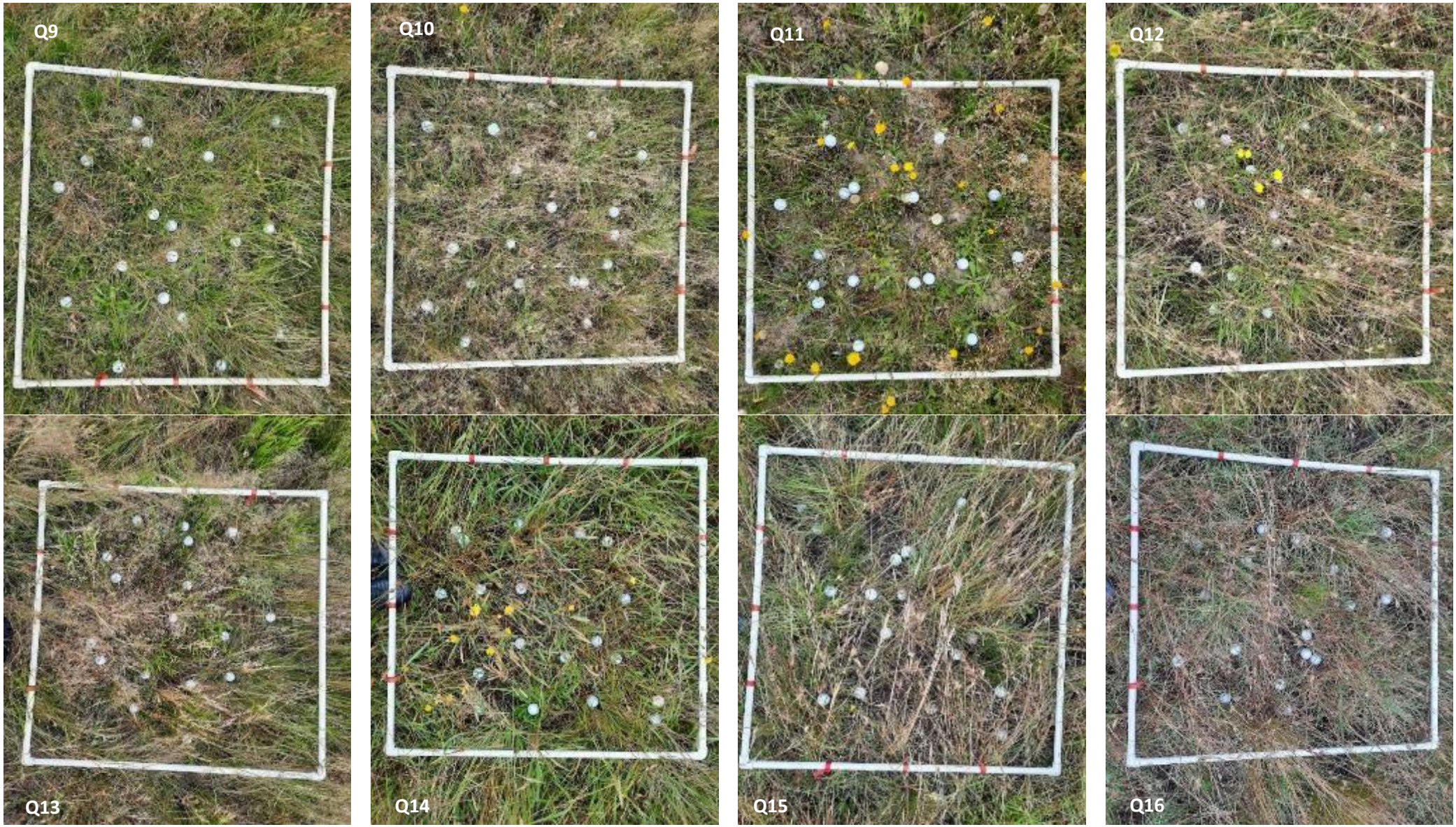
Transect 9

	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**
Native Graminoid Cover	40	50	40	45	22	70	50	45	40	30
Total Exotic Cover	15	20	12	8	40	8	20	20	15	25
High Threat Exotic Cover	12	12	8	2	30	5	15	15	10	20
Bare Ground	12	8	25	30	15	10	8	8	18	15
Herbaceous Cover	10	8	15	6	2	3	8	1	10	12
Lichen/Moss Cover	15	5	15	5	5	10	5	5	10	5
Other Cover	2	2	2	2	2	1	2	2	1	2

Appendix 2 - Biomass Accumulation Photos

Photos of each of the monitored quadrats have been provided below.


Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8


Q9
Q10
Q11
Q12
Q13
Q14
Q15
Q16


Q17


Q18

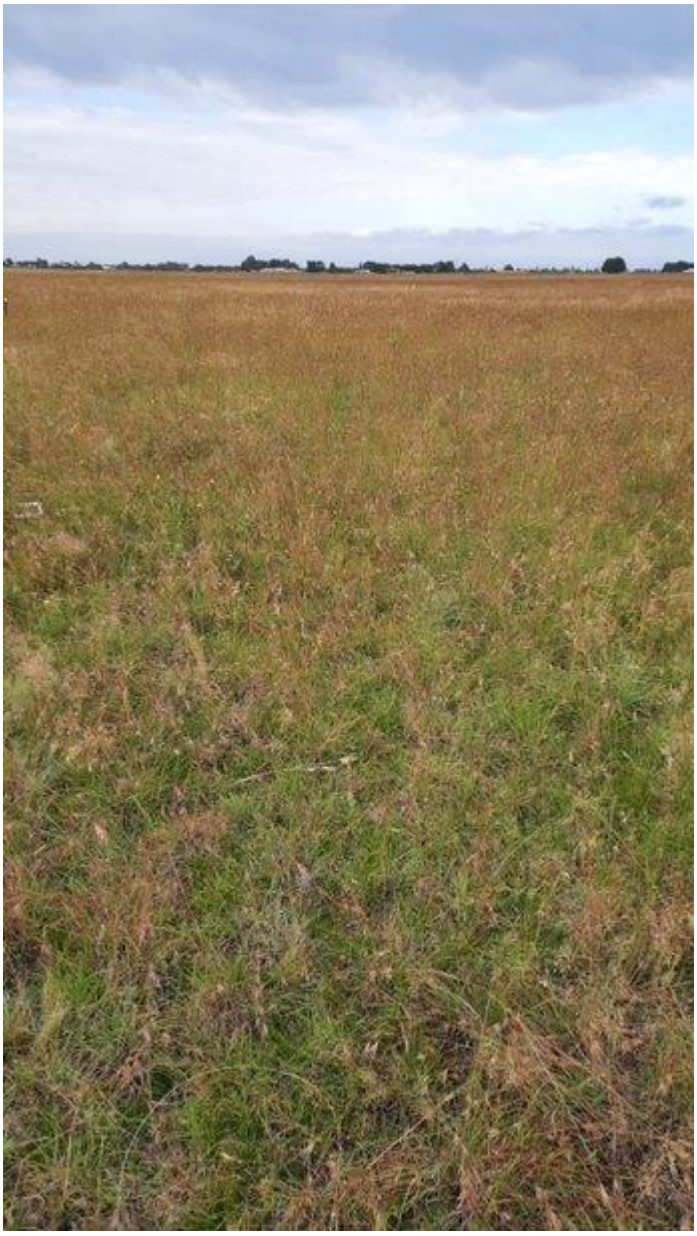
Appendix 3 - Photopoints

Transect 1

a) West of T1

b) East of T1

c) North of T1



d) South of T1

e) Quadrat at 25m

Transect 2

a) North of T2

b) East of T2

c) South of T2

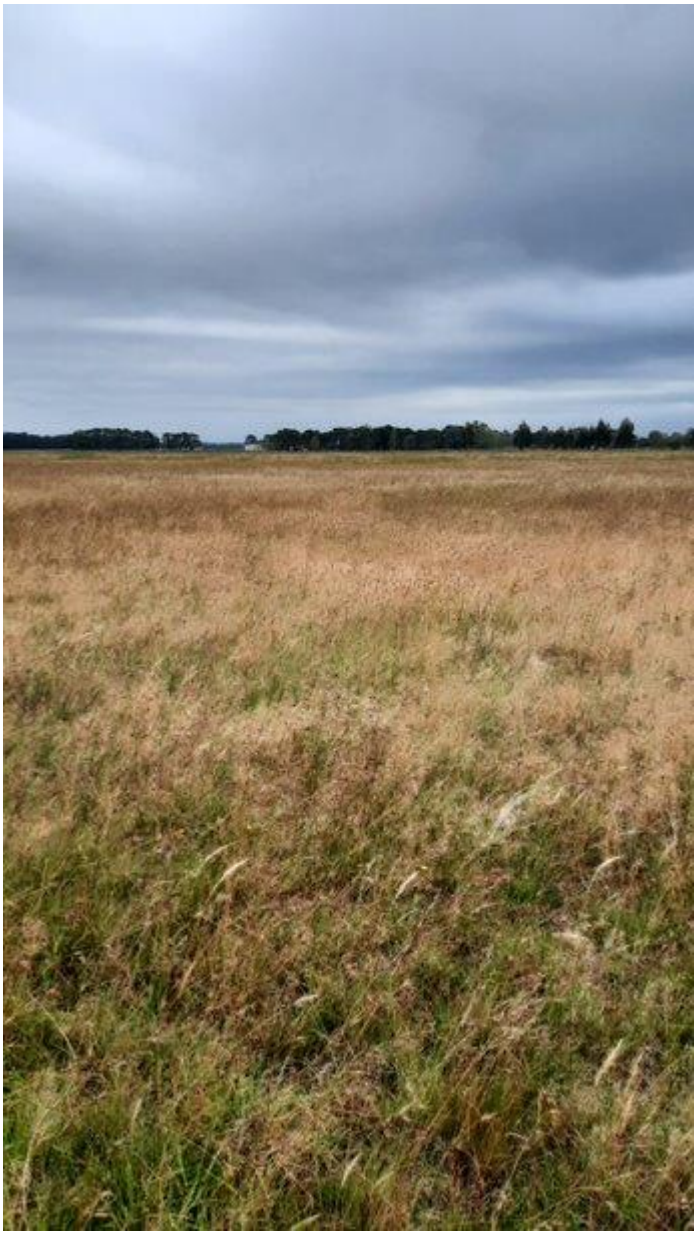
d) West of T2

e) Quadrat at 25m

Transect 3

a) South of T3

b) East of T3



c) North of T3

d) West of T3

e) Quadrat at 25m

Transect 4

a) South of T4

b) West of T4

c) North of T4

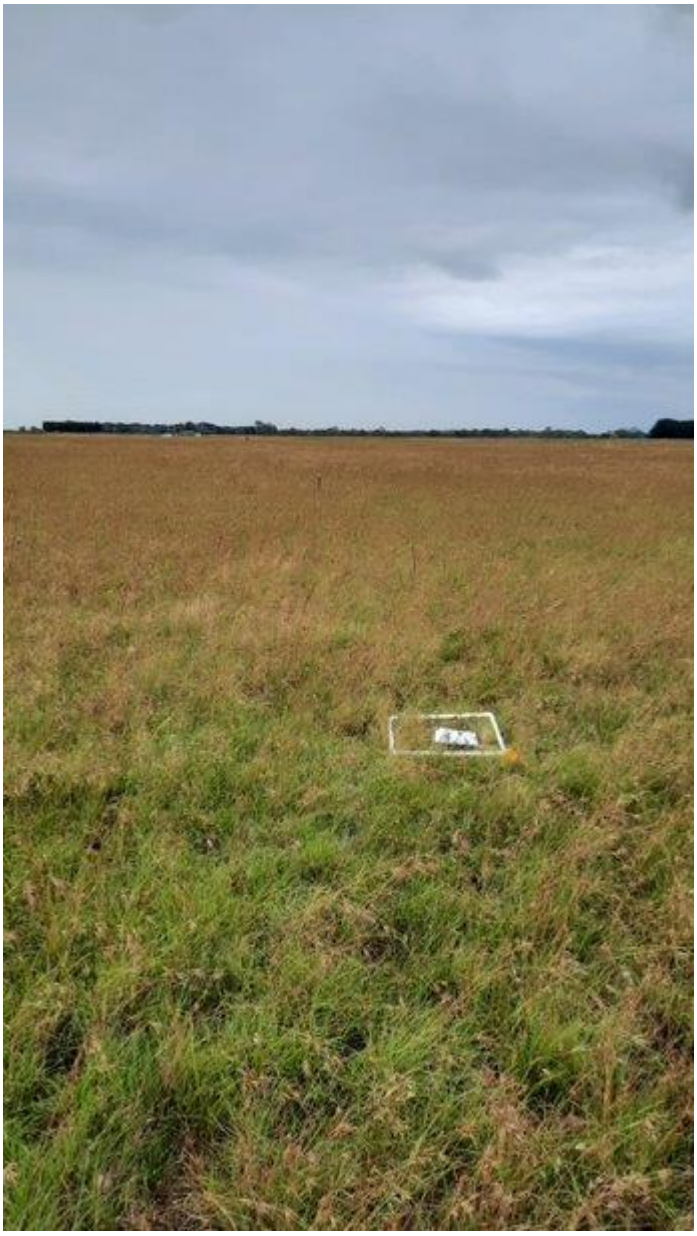
d) East of T4

e) Quadrat at 25m

Transect 5

a) North of T5

b) East of T5



c) West of T5

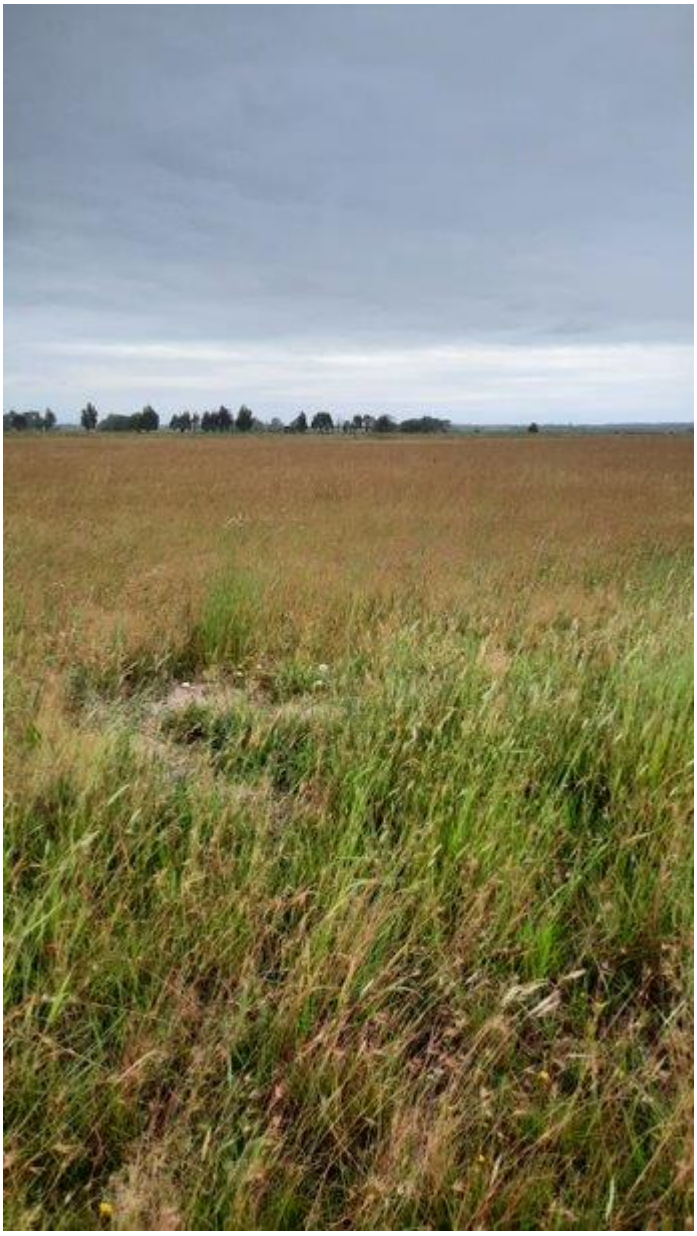
d) South of T5

e) Quadrat at 25m

Transect 6

a) East of T6

b) South of T6



c) West of T6

d) North of T6

e) Quadrat at 25m

Transect 7

a) South of T7

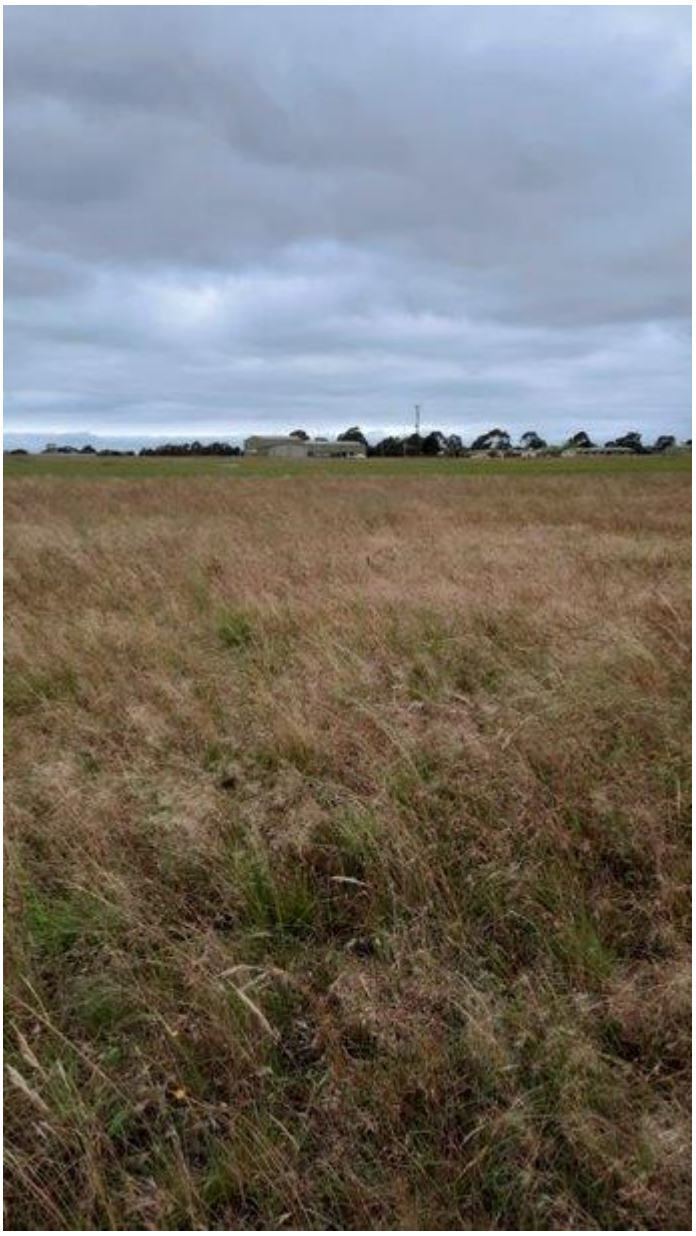
b) East of T7

c) North of T7

d) West of T7

Quadrat at 25m

Transect 8



a) South of T8

b) East of T8

c) North of T8

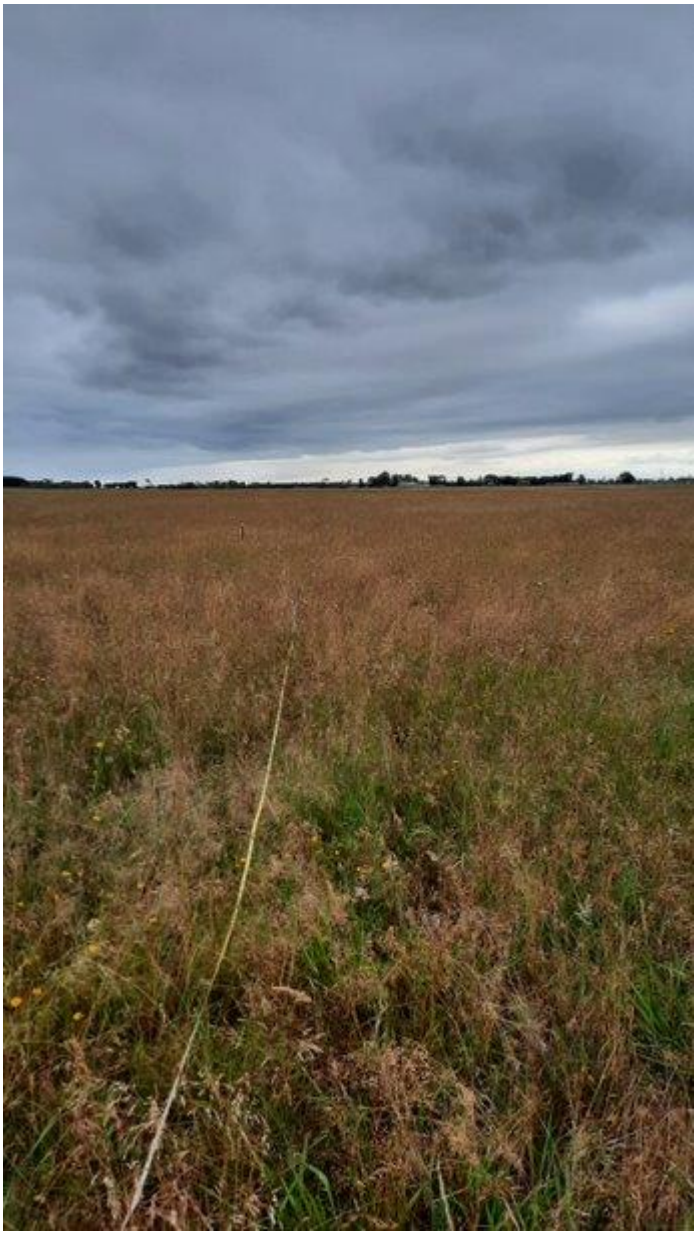
d) West of T8

e) Quadrat at 25m

Transect 9

a) East of T9

b) North of T9



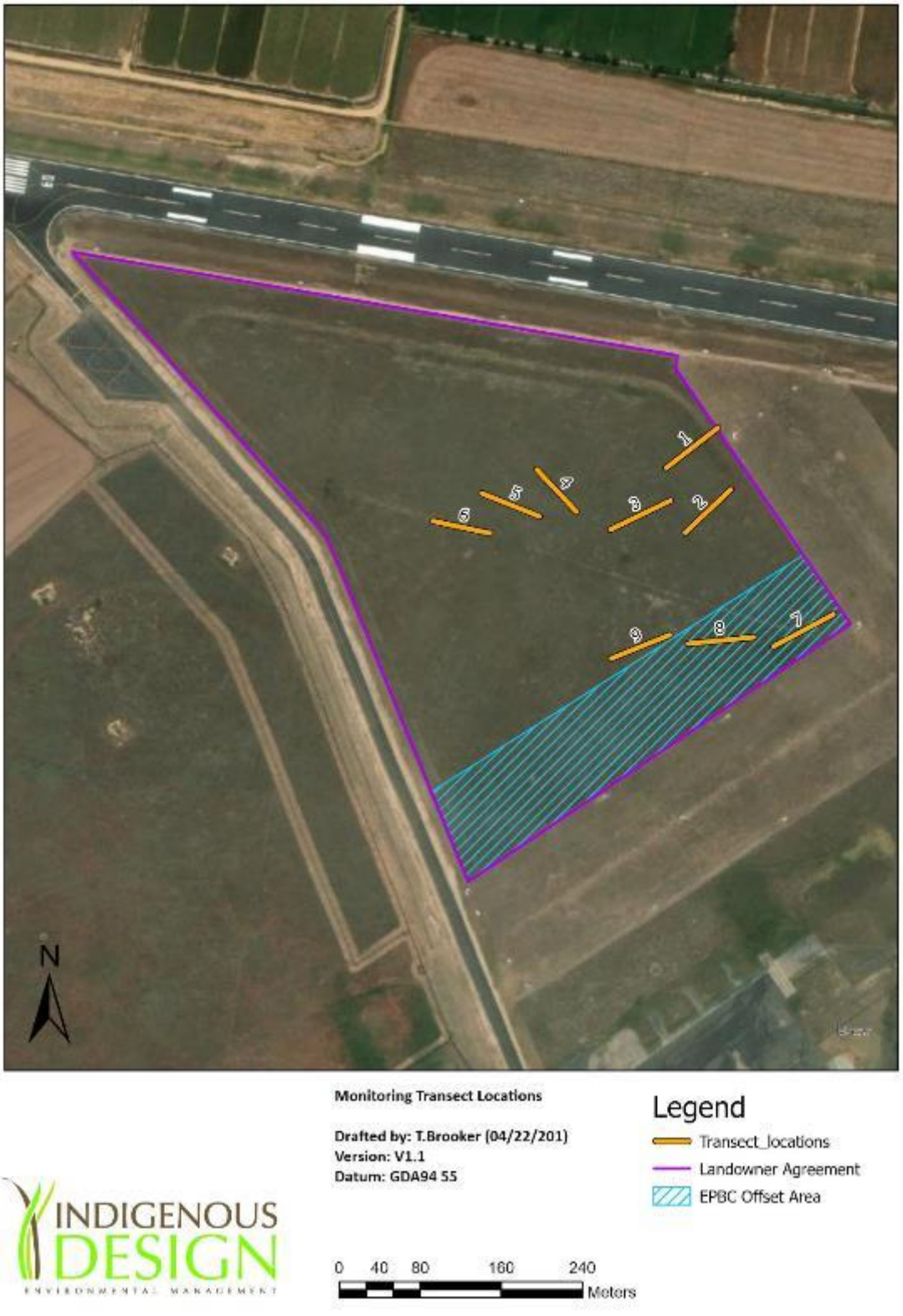
c) West of T9

d) South of T9

Quadrat at 25m

MAPS

Map 1 - Protected Area Transect Locations



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