

Vegetation Inventory Report: Melbourne Strategic Assessment Conservation Area 2

November 2015



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Cover photo: EPBC listed Seasonal Herbaceous Wetland

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Terms and abbreviations

BCS	Biodiversity Conservation Strategy for Melbourne's Growth Areas (DEPI 2013a)
CaLP Act	The Victorian Catchment and Land Protection Act 1994
DELWP	The Victorian Department of Environment, Land, Water and the Environment
DEPI	The former Victorian Department of Environment and Primary Industries (now DELWP)
DSE	The former Victorian Department of Sustainability and Environment (now DELWP)
EPBC Act	The Federal Environment Protection and Biodiversity Conservation Act 1999
EVC	Ecological Vegetation Class, the units used to describe vegetation type in Victoria
FFG Act	The Victorian Flora and Fauna Guarantee Act 1988
MNES	Matters of National Environmental Significance, as listed under the EPBC-Act.
NTG	Natural Temperate Grassland of the Victorian Volcanic Plain
SHW	Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
WGR	Western Grassland Reserve

Contents

1. INTRODUCTION	6
1.1 Purpose and scope	7
1.2 Survey area	7
1.3 Previous survey information	9
2. SURVEY METHODS	10
2.1 Coverage and intensity	10
2.2 Definitions	10
3. SURVEY RESULTS	12
3.1 EPBC-listed 'Matters of National Environmental Significance'	12
3.1.1 Natural Temperate Grassland of the Victorian Volcanic Plain (NTG)	12
3.1.2 Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHW)	13
3.1.3 Spiny Rice-flower <i>Pimelea spinescens</i> subsp. <i>spinescens</i>	16
3.2 FFG-listed values	17
3.3 Ecological Vegetation Classes	18
3.4 Vegetation Patterns: Natural Temperate Grassland Habitat States	20
3.5 Plant taxa	26
3.5.1 Significant native taxa	26
3.5.2 Weeds	28
3.6 Hot Spots	30
4. REFERENCES	31
Appendix 1. List of vascular plants identified	33

TABLES

Table 1.	Plant taxa listed under the EPBC Act, FFG Act or on the DELWP Advisory List (DEPI 2014b).	26
Table 2.	Declared noxious weeds recorded on the surveyed land	28

FIGURES

Figure 1.	The location of Conservation Area 2	8
Figure 2.	NTG in Conservation Area 2 (photo: Adrian Marshall)	13
Figure 3.	Grazed SHW in CA2.	15
Figure 4.	Ungrazed SHW in CA2.	15
Figure 5.	The distributions of Natural Temperate Grassland (NTG) and Seasonal Herbaceous Wetland (SHW)	16
Figure 6.	Spiny Rice-flower <i>Pimelea spinescens</i> subsp. <i>spinescens</i> at Conservation Area 2.	17
Figure 7.	The current distribution of native vegetation classified according to EVC	18
Figure 8.	The likely pre-1750 distribution of Ecological Vegetation Classes	19
Figure 9.	States of Natural Temperate Grassland Habitat	21
Figure 10.	Herb-rich Grassland	22
Figure 11.	Themeda grassland along the eastern boundary	23

Figure 12.	Themeda grassland along the western boundary	23
Figure 13.	C3 Grassland in the south-east of the site	24
Figure 14.	De-rocked Nutrient-enriched Pasture (cropped land) occurs to the right of image; centre is a small portion of C3 Grassland; far left is Seasonal Herbaceous Wetland.	25
Figure 15.	The location of National and State significant plant taxa (i.e. EPBC Act, FFG Act or on the DELWP Advisory List (DEPI 2014b)). Note taxa listed as poorly known in Victoria are not shown. <i>Calotis anthemoides</i> nominated for listing under the FFG Act was recorded by Cook <i>et al.</i> (2013) is also not shown.	27
Figure 16.	Infestation of Serrated Tussock <i>Nassella trichotoma</i> in the north-west corner the site, under which Themeda Grassland is hidden.	28
Figure 17.	The locations of selected weed species. Note <i>Nassella trichotoma</i> and <i>Cynara cardunculus</i> are widespread and only the denser infestations are show; other species which are also very widespread are not shown.	29
Figure 18.	Distribution of 'hot spots' at Conservation Area 2.	30
Figure 19.	This species has been tentatively assigned <i>Asperula sp.</i> and should be investigated further when sufficient material is available.	36

1. INTRODUCTION

The Victorian Government has committed to establish a series of Conservation Areas on the periphery of Melbourne for the conservation of threatened plants, animals and ecological communities (DEPI 2013a). They include a network of small areas within Melbourne's Urban Growth Boundary, as well as the larger Western Grassland Reserve (WGR, 15,000 ha) and the Grassy Eucalypt Woodland Reserve (approximately 1,200 ha).

The establishment of the reserves is the result of the Melbourne Strategic Assessment, which aims to mitigate environmental losses caused by the expansion of Melbourne's Urban Growth Boundary. This expansion will impact 'Matters of National Environmental Significance (MNES)' listed under the Federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). A 'Strategic Impact Assessment' conducted by the Victorian Government recommended ways of mitigating environmental impacts. The mitigation measures agreed to by the Victorian and Australian governments are outlined in the 'Program Report' and the 'Biodiversity Conservation Strategy (DEPI 2013a; DSE 2009). The commitments include regular reporting on ecological outcomes. A Monitoring and Reporting Framework (MRF) provides the logic and basis for monitoring target species and communities. The MRF gives specific Key Performance Indicators (KPIs) for each listed species and vegetation community.

All Conservation Areas will be managed to achieve these management targets. The precise management strategy required to achieve the targets will, however, vary from place to place. Each area is different, and each supports a wide range of plant and animal species, different vegetation patterns, management issues, and other features. Detailed information about the type and distribution of assets and threats is required for each property that is protected. Much of that information will be contained in Fauna Inventory and Vegetation Inventory documents for each property.

The Metropolitan Planning Authority (MPA) is developing the Kororoit Precinct Structure Plan (PSP) which will guide development of the area for housing, local town centres (including shops, services and Council and educational facilities) and conservation areas.

Three conservation areas (CA1, 2 & 3) in the Kororoit PSP were designated for protection in the Biodiversity Conservation Strategy for Melbourne's Growth Corridors (DEPI 2013a). Draft Conservation Concept Plans have been prepared for each of these areas, but further design work is now required for two of the designated conservation areas to:

- ensure the long term viability and protection of the grasslands and Spiny Rice-flower.
- increase the community's appreciation and acceptance of the value of grasslands conservation areas within residential areas.
- ensure greater 'open space' benefit to the public from areas reserved for conservation through the strategic placement and use of access points, picnic and play areas, paths, trails, boardwalks, interpretive signage etc.

This Vegetation Inventory report will also help to inform preparation of a landscape masterplan for Conservation Area 2 (44 ha) within the Kororoit PSP area.

1.1 Purpose and scope

This Vegetation Inventory report forms part of the basic information required to start managing protected land. It should serve as a useful reference for managers, and also the logical basis of management actions. The specific purpose of this document is to:

- Identify and map any EPBC-listed plant species or ecological communities that are the targets of conservation measures under the MSA.
- Provide enough information about the distribution of vegetation on the land to allow management and landscape design planning to proceed. This information includes the distribution of native vegetation types, significant species, and exotic species which threaten natural values.
- Help fulfil (for the survey area) DELWP's commitment to produce a detailed inventory of the vegetation

This document does not:

- constitute a management plan,
- describe the fauna of the survey area,
- make any claims about the likely presence or absence of values not recorded.

1.2 Survey area

This report covers Conservation Area 2, a roughly rectangular area (44 ha) of land that is south of Taylors Road and east of Sinclairs Road, Plumpton. It adjoins the Kororoit Creek in the south. The location of the survey area is shown in Figure 1.

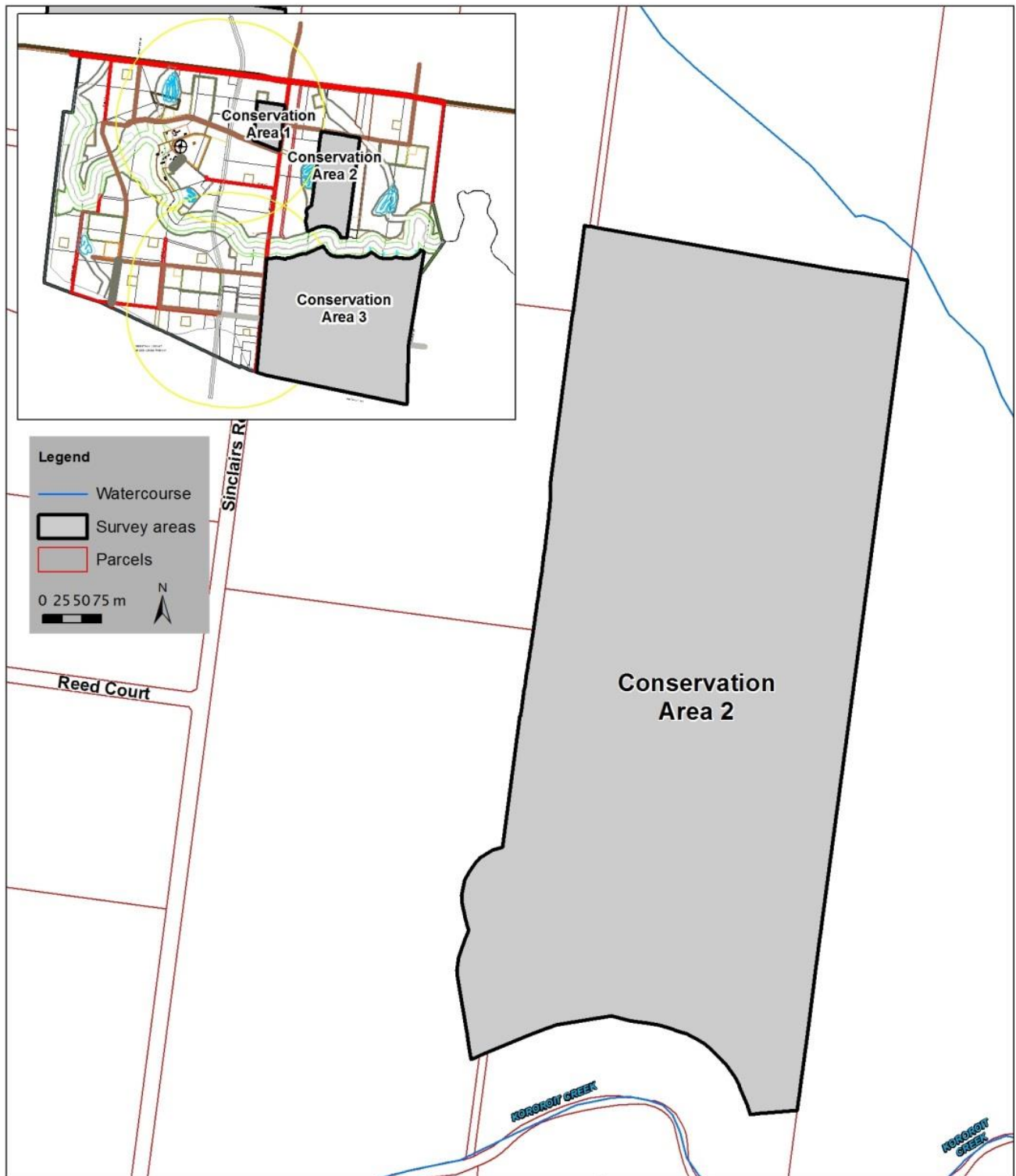


Figure 1. The location of Conservation Area 2

1.3 Previous survey information

The area has been subject to the following known vegetation surveys/reports:

- The Growth Areas Authority (2010) included the area in the Melton–Wyndham Investigation Area: Section H assessed by Biosis Research, however access was not granted to the subject site.
- Biosis Research (Franco and McCutcheon 2011) again had the area included in the Rockbank Marsh 1080 Contract Area for the Growth Areas Authority however access was once again denied.
- Brett Lane & Associates surveyed the land on behalf of the land-owner at the time and presented an accompanying report to submission GCP 356 (Czarny 2011) in relation to the time-stamping native vegetation process undertaken with the MSA (DEPI 2013a;b;c). This report has not yet been provided to Practical Ecology. The data from the report (habitat hectare assessment– TSP_BLA_11045) was resultantly incorporated into the time-stamped data presented in Biodiversity Interactive Maps (DEPI 2012; DELWP 2015a).
- The Biodiversity Conservation Strategy (BCS) (DEPI 2013a) presents information for the site including native vegetation habitat score and records of rare or threatened species. While numerous references are included it is unclear of the source of each item of information. The native vegetation score in the BCS is different to that of the time-stamped data; most notably is the central wetland area being scored significantly lower in the BCS. It is also apparent that the Spiny Rice-flower records presented in the BCS have been duplicated and presented again some 100–200 m offset to the south-west from the original spatial data. In both the BCS and the time-stamped data the extent of native vegetation is inconsistent with the current conditions; most notably is the extent of the wetlands that occur on-site extending across onto the adjacent land.
- Cook, Just and Jolly (2013) surveyed the areas of the site identified as Seasonal Herbaceous Wetlands and provided a report to Melbourne Water.
- DEPI (2013d) reviewed the Seasonal Herbaceous Wetlands (site 12) as part of their report '*The impact of Melbourne's growth on 'seasonal herbaceous wetlands (freshwater) of the temperate lowland plains'*'. This report also provides comment from when DEPI assessed the site in August 2011 as part of the auditing of the time-stamped data.

2. SURVEY METHODS

The site was surveyed using the methods described in (DELWP 2015b) and also included a targeted flora survey for Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* using the methods in DSE (2010).

2.1 Coverage and intensity

The land was surveyed on the 24, 27, 29 (half day) and 30 August 2015. Of that time essentially one day was used to develop a species inventory (two botanists) and half a day (one botanist) to map vegetation. The remainder of the time was used to complete the targeted flora survey (i.e. transects 5m apart for Spiny Rice-flower).

2.2 Definitions

Native vegetation

'Native vegetation' is defined according to DEPI (2013e) "...either...an area of vegetation where at least 25 per cent of the total perennial understory plant cover is native, or any area with three or more canopy trees where the canopy foliage cover is at least 20 per cent of the area".

EPBC-listed communities

EPBC-listed communities are described according to the listing advice provided by the Threatened Species Scientific Committee, posted on the Department of Environment website.

Plant taxonomy

Plant taxonomy follows the Royal Melbourne Botanic Gardens Census of Vascular Plants in Victoria (Walsh and Stajsic 2007) except for departures from this standard within the Victorian Biodiversity Atlas (DEPI 2014a) due to more recent taxonomic publications.

Significance of plants

Several sources are used to describe the conservation status or significance of plant species:

- EBPC listed (Critically Endangered, Endangered, Vulnerable). Follows the lists of species and communities maintained by the Australian Department of the Environment, available on the internet.
- FFG listed. Follows the list maintained by DELWP (updated 2013).
- Victorian Rare or Threatened (VROT; Endangered in Victoria, Vulnerable in Victoria, Rare in Victoria, Poorly Known). Defined by inclusion on either the 'Advisory List of Rare or Threatened Plants in Victoria' (DEPI 2014b), maintained by DELWP.

Categories of Weeds

The Victorian Catchment and Land Protection Act 1994 (CaLP Act) lists noxious weeds in several categories, used here:

- State prohibited weeds “either do not occur in Victoria but pose a significant threat if they invade, or are present, pose a serious threat and can reasonably be expected to be eradicated. If present, infestations of a State prohibited weed are relatively small. They are to be eradicated from Victoria if possible or excluded from the State.”
- Regionally prohibited weeds “are not widely distributed in a region but are capable of spreading further. It is reasonable to expect that they can be eradicated from a region and they must be managed with that goal. Land owners, including public authorities responsible for crown land management, must take all reasonable steps to eradicate regionally prohibited weeds on their land”.
- Restricted weeds are “plants that pose an unacceptable risk of spreading in this State and are a serious threat to another State or Territory of Australia. Trade in these weeds and their propagules; either as plants, seeds or contaminants in other materials is prohibited”.
- Regionally Controlled weeds are “usually widespread in a region. To prevent their spread, ongoing control measures are required. Land owners have the responsibility to take all reasonable steps to prevent the growth and spread of Regionally controlled weeds on their land.”

3. SURVEY RESULTS

3.1 EPBC-listed 'Matters of National Environmental Significance'

Matters of National Environmental Significance (MNES) are those species or communities listed under the EPBC Act. MNES are the specific environmental values referred to by the Key Performance Indicators and targets (DELWP 2015c).

Three matters of national environmental significance are known to occur naturally at the study site:

- Natural Temperate Grassland of the Victorian Volcanic Plain (hereafter NTG)
- Seasonal Herbaceous Wetlands (freshwater) of the Temperate Lowland Plains (hereafter SHW)
- A population of Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*

3.1.1 Natural Temperate Grassland of the Victorian Volcanic Plain (NTG)

NTG is a treeless grassland community occurring on heavy soils on basalt terrain, dominated in intact stands by native tussock-forming grasses of the genera *Themeda*, *Poa*, *Rytidosperma* and/or *Austrostipa*. It also contains a variety of native herbs (notably daisies, *Asteraceae*), which may be dominant in some cases (TSSC 2008). NTG corresponds closely to 'Western (Basalt) Plains Grassland Community' listed under the FFG Act (see below).

In the NTG at the site Kangaroo Grass *Themeda triandra* is the dominant grass species with Wallaby-grasses *Rytidosperma* spp. and Spear-grasses *Austrostipa* spp. also common and more dominant in lower quality areas. Forbs can also dominate areas through the better quality parts of the site including Narrow Plantain *Plantago gaudichaudii*, Cut-leaf Goodenia *Goodenia pinnatifida*, Plains Stackhousia *Stackhousia subterranea*, Grassland Wood-sorrel *Oxalis perennans*, Smooth Solenogyne *Solenogyne dominii*, Lemon Beauty-heads *Calocephalus citreus* and Plains Everlasting *Chrysocephalum* sp. 1. Cotton Fireweed *Senecio quadridentatus* and Jersey Cudweed *Helichrysum luteoalbum* were also widely distributed. Spiny Rice-flower also occurred widely through the better quality areas. Tangled Shrub-violet *Melicytus* sp. aff. *dentatus* (Volcanic Plain variant) occurred near surface rock, old stone walls and rock piles.

NTG covers most of the surveyed land (32 ha, 72%). An area of NTG on the site is shown in Figure 2. The distribution of the community across the site is shown in Figure 5.



Figure 2. NTG in Conservation Area 2 (photo: Adrian Marshall)

3.1.2 Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHW)

SHW is a treeless grassland, sedgeland or herbfield, occurring on heavy soils in fertile terrain which are periodically inundated by shallow water (TSSC 2012). On the site, this community corresponds closely to the EVC 'Plains Grassy Wetland' (see Section 3.3).

The survey area supports 5.5 ha of SHW (13%).

Tangled Lignum *Duma florulenta* occurs throughout the wetlands but at a cover (i.e. <10%) that does not exclude the wetland from belonging to this community. The heaviest darker soils are generally without Tangled Lignum and consist of sparse to dense cover of grasses and forbs. Brown-back Wallaby-grass *Rytidosperma duttonianum* is the dominant grass and forbs often evident include Common Woodruff *Asperula conferta*, Swamp Plantain *Plantago* aff. *gaudichaudii* (Lowland Swamps), Burr-daisies *Calotis* spp., *Goodenia* spp., and Woodland Swamp-daisy *Brachyscome basaltica* var. *gracilis*.

In the northern wetland area there is a distinct lower ring and a central higher area. As the elevation increases Brown-back Wallaby-grass and the forbs listed above are mostly replaced by other species of Wallaby and Spear-grass with an array of chenopods, this includes Leafy Wallaby-grass *Rytidosperma bipartitum* s.s., Short Wallaby-grass *Rytidosperma carphoides*, Short-Crown Spear-grass *Austrostipa curticoma*, Black Cotton-bush *Maireana decalvans*, Wingless Bluebush *Maireana enchylaenoides*, Small-leaf Goosefoot *Chenopodium desertorum* subsp. *microphyllum* and Ruby Saltbush *Enchylaena tomentosa* var. *tomentosa*.

Brett Lane and Associates (Czarny 2011; DEPI 2012) considered the higher central area to be Plain Grassland rather than Plains Grassy Wetland. Cook, Just and Jolly (2013) included it within the wetland area and classified it all as Very High Quality SHW. There is merit in both positions. For the purposes of this assessment it is been incorporated in the SHW, with the main consideration being due to its heavy grey/black soils suggesting a history of inundation and waterlogging; and hence the potential to support wetland flora during wet periods. The survey period occurred during a particularly dry two year period and there was no standing water and generally low moisture levels across the whole wetland (c.f. Franco and McCutcheon (2011) observed shallow (<0.3m) surface water across the wetland); future survey during wetter periods will allow a more definitive assessment of this area. Note the BCS (DEPI 2013a) presents an inadequate representation of the extent of these wetlands.

Under DELWP (2015c) patches larger than 3 ha will be monitored regularly. The northern patch is greater than three ha (4.4 in total; the higher central portion discussed above is 0.9 ha) and extends further west on the adjacent land. The southern patch is 1.1 ha and also extends further off the study area but would not be greater than 3 ha in total. Management of the adjoining portions of SHW outside of the area defined as CA2 will be essential in retaining the wetland values within CA2 into the future..

Grazed and ungrazed SHW is shown in Figure 3 and Figure 4 respectively. The distribution of the community on the site is shown in Figure 5.

The listing advice (TSSC 2012) distinguishes examples of SHW that are of 'Very High Quality' by their species composition. The site as a whole supports ten of the indicator species for 'Very High Quality SHW', and the two patches are considered a 'Very High Quality' because they each contain at least three of these species. The ten species are:

- *Asperula conferta*
- *Brachyscome basaltica* var. *gracilis*
- *Calotis anthemoides*
- *Calotis scabiosifolia* var. *scabiosifolia* (recorded by Cook et al. 2013)
- *Calotis scapigera* (recorded by Cook et al. 2013)
- *Eryngium vesiculosum*
- *Goodenia heteromera* (recorded by Cook et al. 2013)
- *Lobelia pratioides*
- *Marsilea drummondii*
- *Teucrium racemosum*



Figure 3. Grazed SHW in CA2.



Figure 4. Ungrazed SHW in CA2.

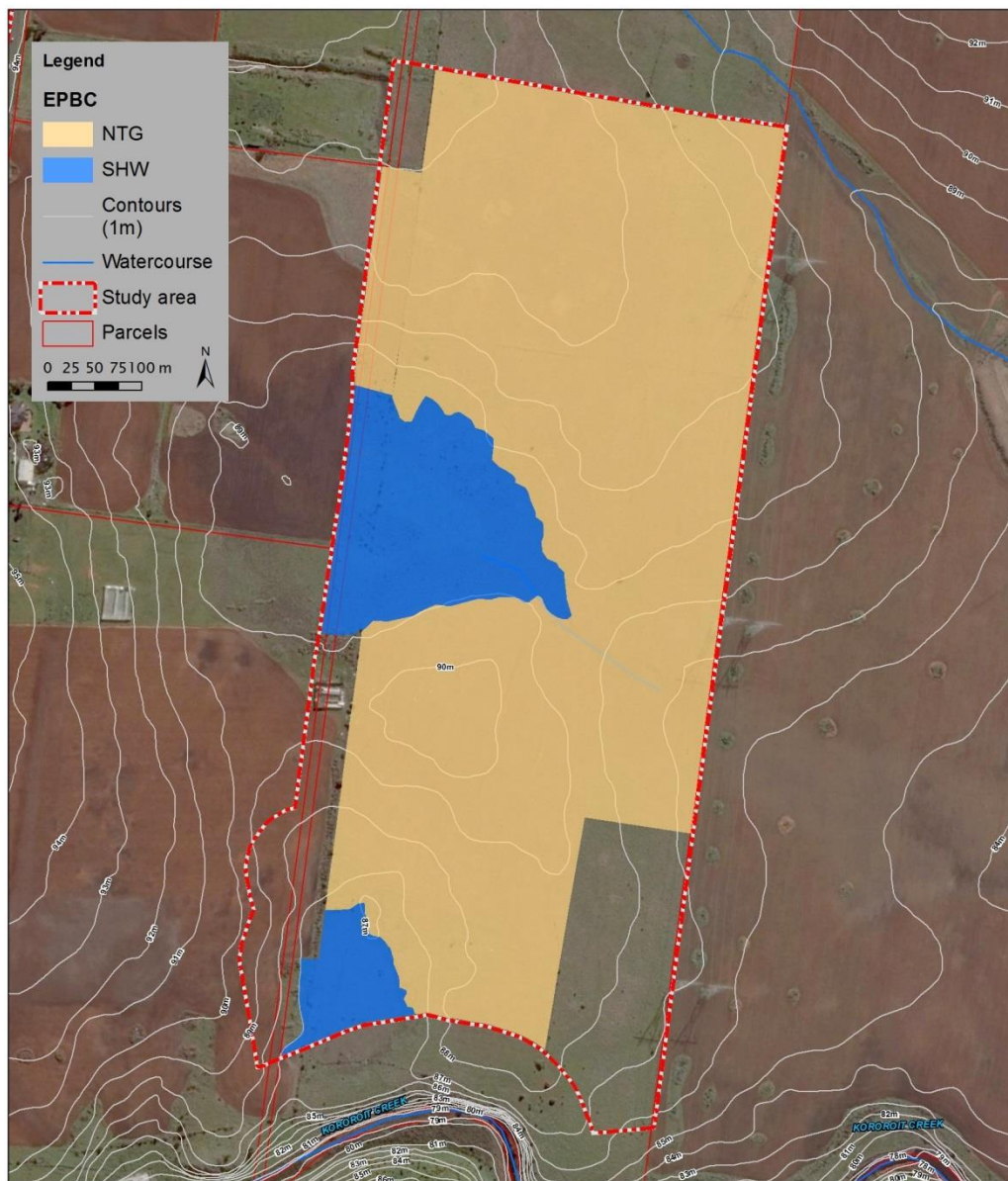


Figure 5. The distributions of Natural Temperate Grassland (NTG) and Seasonal Herbaceous Wetland (SHW)

3.1.3 Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*

Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* is a stunted sub-shrub that grows to 30 cm high. It is limited to the basalt plains of Victoria and listed as critically endangered under the EPBC Act (Department of Environment 2015). Spiny Rice-flower is shown in Figure 6 (Section 3.5.1).

Habitat for the species was traversed in transects 5m apart. The total number of individuals recorded was 118. The location of these records are shown in Figure 15. Note that the distribution is considerably different to the locations shown in the Biodiversity Conservation Strategy (DEPI 2013a); while some of the locations in that document are correct a significant number are erroneous.



Figure 6. Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* at Conservation Area 2.

3.2 FFG-listed values

The Flora and Fauna Guarantee Act 1988 (FFG Act) is the primary Victorian legislation dedicated to the conservation of threatened species and communities. Although the structure of the MSA do not directly relate to the FFG Act, FFG-listed assets provide a useful structure for considering the status of the values in the conservation area.

- One FFG-listed community occurs:
 - ‘Western (Basalt) Plains Grassland Community’, which corresponds directly with the EVC Plains Grassland, discussed below (Section 3.3).
- FFG-listed taxa include:
 - Spiny Rice Flower which is also EPBC listed, and is discussed above.
 - Cut-leaf Burr Daisy *Calotis anthemoides* which is nominated for listing.

3.3 Ecological Vegetation Classes

The survey area contains 41 ha of native vegetation (94% of the CA). The patterns of vegetation within the CA can be described using two EVCs. The current distribution of EVCs is shown in Figure 7 below. The assumed distribution of EVCs before European settlement ('pre-1750') is shown in Figure 8. Note that distribution of the southern patch of Plains Grassy Wetland should be considered approximate due to the earth-works and fill adjoining this area.

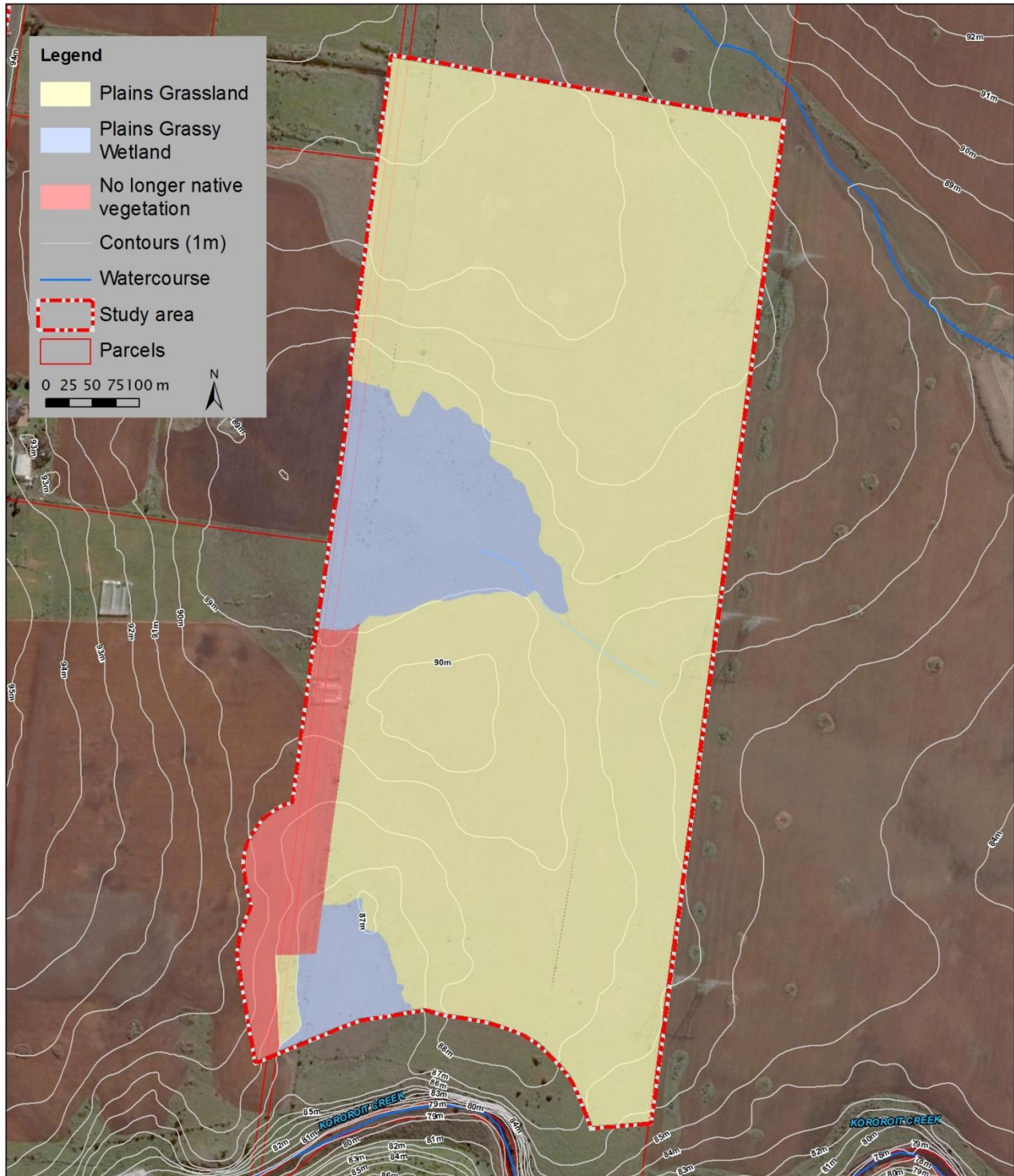


Figure 7. The current distribution of native vegetation classified according to EVC

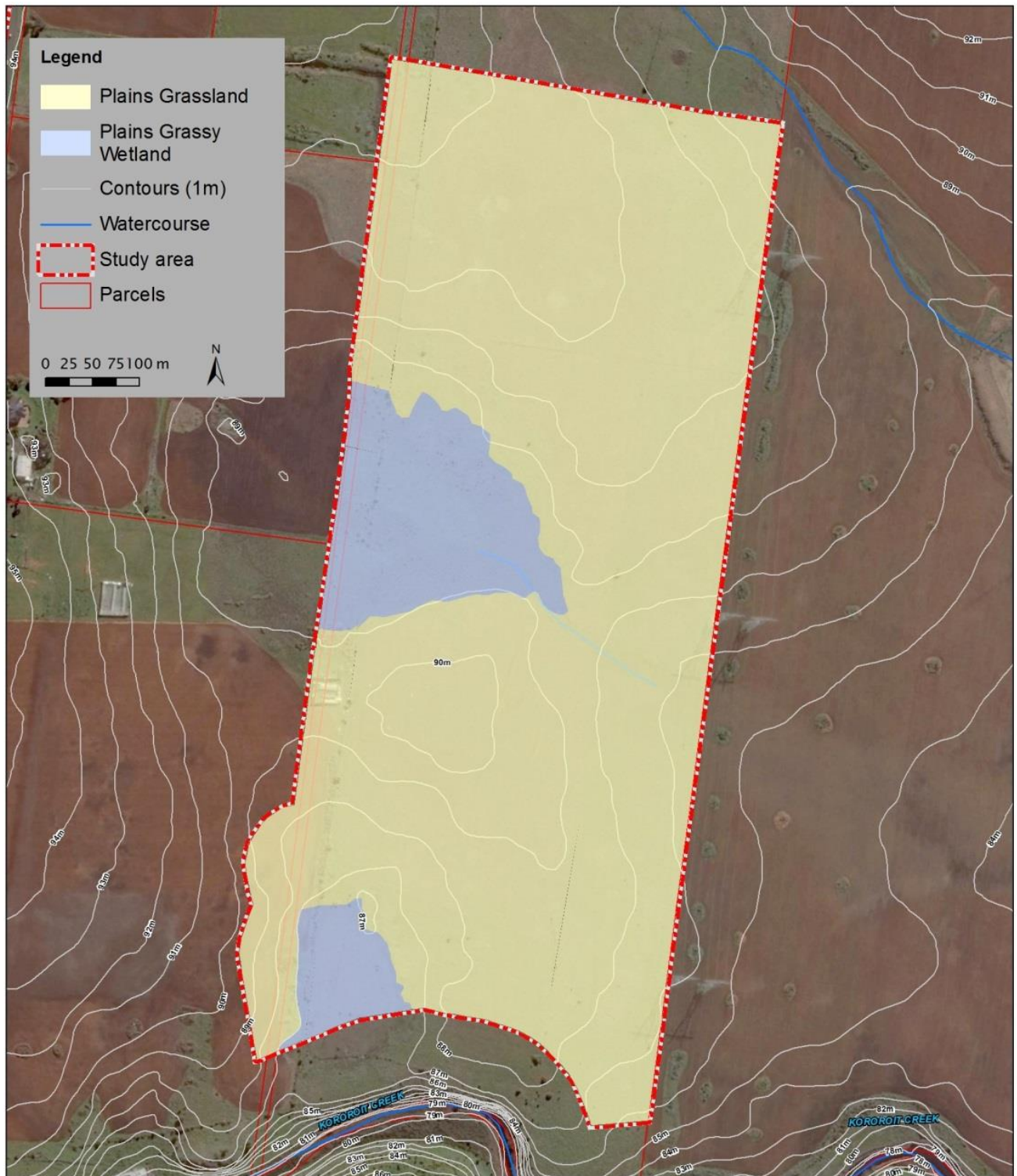


Figure 8. The likely pre-1750 distribution of Ecological Vegetation Classes

Plains Grassland (EVC 132)

This EVC includes areas classified as NTG (see above); although not all areas of Plains Grassland are NTG as some do not satisfy the weed cover criteria. DELWP recognizes several variants of Plains Grassland. *Heavier-soils* Plains Grassland is characterised by the fertile cracking basalt soils that predominate at the site. Some higher areas however do contain lighter more loamy soils that appear to have less cracking. This EVC covers 36 ha of the site (82%).

The site is heavily grazed and has a variable history of disturbance, further detail of the condition states of the Plains grassland areas are provided in Section 3.4.

Plains Grassy Wetland (EVC 125)

This EVC describes low lying areas that are inundated after rains. At the site this EVC corresponds to the two areas identified as SHW (see above). This EVC covers 5.5 ha of the site (13%).

Given the presence of Tangled Lignum both patches of this EVC share affinities with the EVC Lignum Swamp. However, the current cover <10% has been considered not sufficient to be consistent with this EVC. Additionally Lignum Swamp tends to occur on heavy grey clays rather than the blacker clays that occur across most of areas where this vegetation is present across the site. It is possible that with a change from the heavy grazing regime currently in place Tangled Lignum cover will increase over time and some areas may clearly represent Lignum Swamp. Currently it may be more accurate to consider the area a complex of the two EVCs.

As discussed above under SHW, the northern wetland area contains a higher central area with a relatively unique array of flora for the site; it is different from both the surrounding Kangaroo Grass dominated or herb-rich grasslands and also the lower surrounding wetland areas. It has been tentatively included in the Plains Grassy Wetland EVC.

The drainage line that extends from the main northern wetland area has been included in the EVC Plains Grassland. It shares some wetland flora but it is considered the occurrences are too small and infrequent to warrant separation from the surrounding areas.

3.4 Vegetation Patters: Natural Temperate Grassland Habitat States

To assist the management of NTG, DELWP has created a state-transition model (STM) of this ecosystem. This is a conceptual model which describes the structure and dynamics of NTG in a way that is useful for management and planning. Any location within the NTG ecosystem (i.e. NTG habitat including current native vegetation or cleared land) can be described as being in a particular 'state'. Locations may 'transition' (change) between states over time, as a result of natural disturbance or management. The ability to maintain and enhance NTG condition (i.e. reach management targets) depends on the ability to manipulate the transitions between states. Mapping the states is important because locations in a given 'state' share a particular set of management constraints and opportunities.

While some states are generally more intact than others, it is important to acknowledge that 'quality' or 'value' may vary substantially within a given state; and the assignment of a site to a particular state is not the same as a quality assessment.

Natural Temperate Grassland habitat was identified in several states, described below. Their distribution is shown in Figure 9.

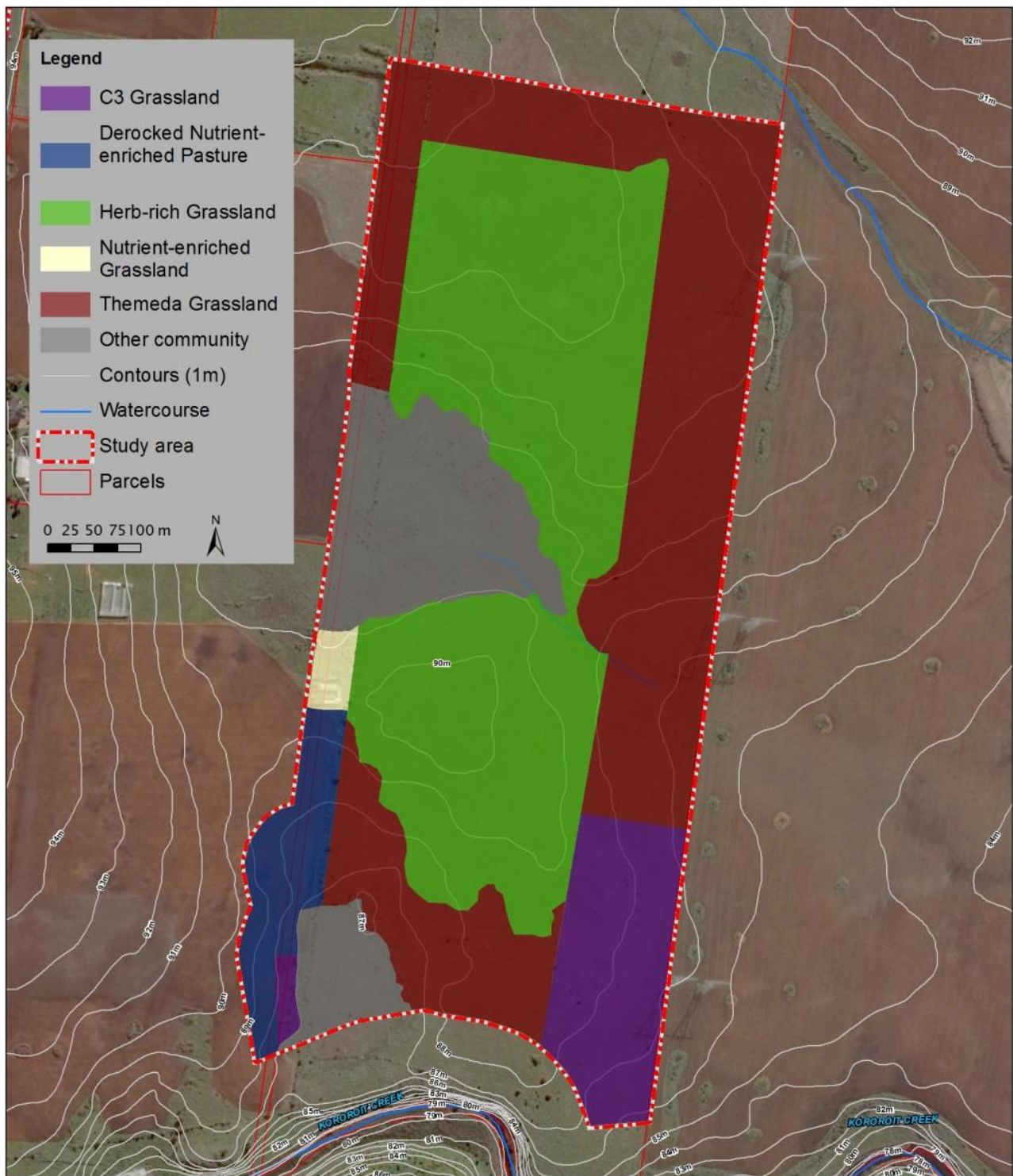


Figure 9. States of Natural Temperate Grassland Habitat

Herb-rich Grassland (HG)

This state includes areas with >10% Kangaroo Grass cover, an obvious cover of sensitive native herbs, and no history of cropping. It is considered of very high value, and is very rare in the landscape. It occupies much of the central areas of the site and is the dominant grassland state on the site. It is consistent (at the site) with the description provided for the higher quality areas of NTG described in Section 3.1.1.

Herb-rich Grassland covers 17 ha of the site (38 %).



Figure 10. Herb-rich Grassland

Themeda Grassland (TG)

This state includes areas with >10% Kangaroo Grass cover, few native herbs, and no history of cropping. It is considered of relatively high value, and is rare in the landscape. Themeda Grassland covers 15 ha of the site (35 %).

It is thought that much of this area has suffered more significance past disturbance/grazing pressure than the HG resulting in a reduced the cover of native herbs (e.g. Figure 11). Artichoke thistle *Cynara cardunculus* subsp. *flavescens*, Serrated Tussock *Nassella trichotoma* and Ribwort *Plantago lanceolata* can be extensive in these areas. Along the north-western boundary is an area where non-grass herbs may have been outcompeted by grasses due to an absence of grazing/fire and this area may transition relatively quickly to herb-rich grassland (Figure 12); in the far north west of the site is very dense infestation of Serrated Tussock.



Figure 11. Themeda grassland along the eastern boundary



Figure 12. Themeda grassland along the western boundary

C3 Grassland (C3G)

This state includes areas with <10% Kangaroo Grass cover and no history of cropping. It is uncommon in the landscape. The examples on site have few native herbs and are generally degraded in relation to the rest of the site. Weed cover is often very high (Figure 13).

C3 Grassland covers 4 ha of the site (9 %).



Figure 13. C3 Grassland in the south-east of the site

Nutrient-enriched Grassland (NG)

This state includes areas with no history of cropping but is nutrient enriched. It only includes a small area in the far west of site that was not accessed by foot due to its current use by the adjacent owners. It is a degraded area that contains sheds (or chook-houses) and a collection of old materials and machinery.

It has been tentatively assigned Nutrient-enriched Grassland and covers 0.4 ha of the site (0.8 %).

De-rocked Nutrient-enriched Pasture (DNP)

This state includes previously ploughed areas with less than 25% cover of native grasses. At the site it includes a recently cropped area in the south-west (Figure 14).

De-rocked Nutrient-enriched Pasture covers 1.9 ha of the site (4 %).



Figure 14. De-rocked Nutrient-enriched Pasture (cropped land) occurs to the right of image; centre is a small portion of C3 Grassland; far left is Seasonal Herbaceous Wetland.

3.5 Plant taxa

One hundred and forty-three vascular plant taxa have been recorded as naturally occurring on the surveyed land. Eighty-eight (88) of these are indigenous (62%).

Appendix 1 lists all of the vascular plant species recorded. Due to the heavy grazing, season of assessment, and limited time available for survey, this should be considered a preliminary list that should be refined with future survey work.

3.5.1 Significant native taxa

One taxon recorded at the site is EPBC and FFG listed: Spiny Rice Flower (refer to Section 3.1.3).

One taxon previously recorded by Cook, Just and Jolly (2013) is nominated for FFG listing: Cut-leaf Burr Daisy *Calotis anthemoides*.

One taxon was tentatively recorded adjacent to the site which is listed as rare in Victoria: Rye Beetle-grass *Tripogon loliiformis*.

Three taxa recorded are listed as poorly known in Victoria (VROT's).

Table 1 lists the National and State significant flora taxa recorded at the site with some brief notes about their occurrence. Figure 15 shows the distribution of some of these taxa.

Table 1. Plant taxa listed under the EPBC Act, FFG Act or on the DELWP Advisory List (DEPI 2014b).

Scientific Name	Common Name	EPBC	FFG	VROT	Observations
<i>Calotis anthemoides</i>	Cut-leaf Burr-daisy		N		Recorded in wetland by Cook et al (2013)
<i>Convolvulus angustissimus</i> <i>subsp. omnigracilis</i>	Slender Bindweed			k	Scattered across site (not mapped)
<i>Eleocharis pallens</i>	Pale Spike-sedge			k	Recorded in central wetland by Cook et al (2013)
<i>Poa labillardierei</i> var. (Volcanic Plains)	Basalt Tussock-grass			k	Recorded in central wetland by Cook et al (2013)
<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Spiny Rice-flower	CR	L	e	Scattered across site (refer to Figure 15)
<i>Tripogon loliiformis</i>	Rye Beetle-grass			r	Potentially occurs on boundary of site; due to timing of survey certainty of identification was not possible
Conservation status under EPBC Act 1999: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependant Conservation status under FFG Act 1988: L: Listed, N: Nominated, X: Rejected, D: Delisted Victorian Rare or Threatened Species (VROT) (DEPI 2014b) x: Presumed extinct, e: Endangered, v: Vulnerable, r: rare and k: poorly known					

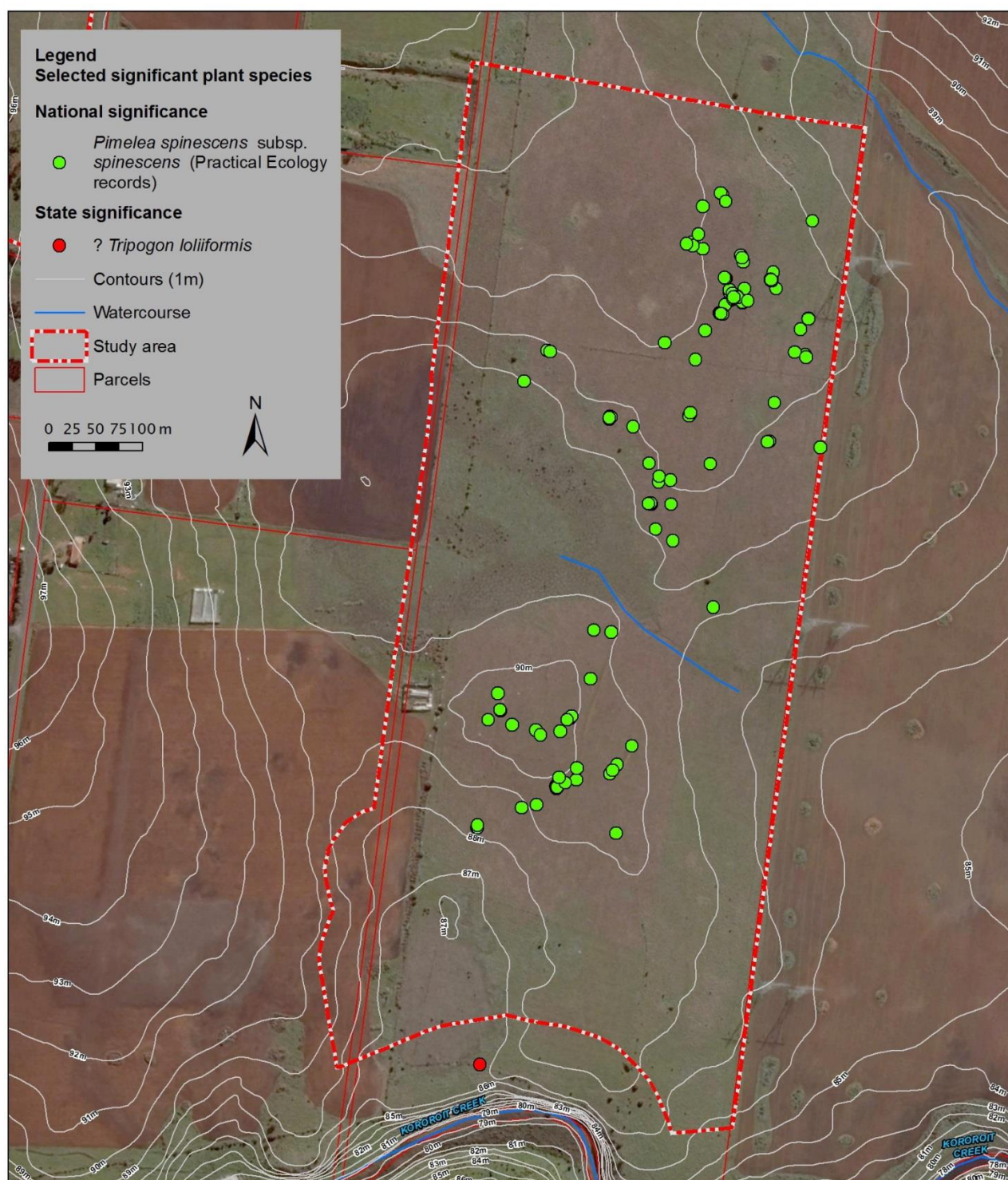


Figure 15. The location of National and State significant plant taxa (i.e. EPBC Act, FFG Act or on the DELWP Advisory List (DEPI 2014b)). Note taxa listed as poorly known in Victoria are not shown. *Calotis anthemoides* nominated for listing under the FFG Act was recorded by Cook *et al.* (2013) is also not shown.

3.5.2 Weeds

Of the 143 plant taxa recorded, 55 were introduced. Some of the introduced plants identified pose serious risks to native vegetation on or near the surveyed land, or to agriculture in the surrounding areas. The identification and mapping of those species is necessary to assist management.

Table 2 lists the species recorded in the study area which are listed under the CaLP Act, and notes their category of listing in the Port Phillip region. Figure 17 shows the distribution on the surveyed land of some of these species; however it should not be considered an exhaustive indication of these species and some very abundant species are not shown.

Table 2. Declared noxious weeds recorded on the surveyed land

CALP Act Category	Scientific Name	Common Name	Observation
Regionally Controlled	<i>Cirsium vulgare</i>	Spear Thistle	Widespread
Regionally Controlled	<i>Cynara cardunculus</i>	Artichoke Thistle	Widespread with some very dense areas of infestation
Regionally Controlled	<i>Lycium ferocissimum</i>	African Boxthorn	Widely scattered
Regionally Controlled	<i>Marrubium vulgare</i>	Horehound	Limited locations
Regionally Controlled	<i>Nassella trichotoma</i>	Serrated Tussock	Widespread with some very dense areas of infestation
Regionally Controlled	<i>Opuntia ?stricta</i>	Prickly Pear	Few isolated occurrences along site boundary
Regionally Controlled	<i>Rosa rubiginosa</i>	Sweet Briar	Lightly scattered
Regionally Controlled	<i>Ulex europaeus</i>	Gorse/Furze	Lightly scattered
Regionally Controlled	<i>Xanthium spinosum</i>	Bathurst Burr	Lightly scattered

In addition to these species, the following is considered a serious weed for management:

- *Galenia pubescens* Blanket Weed (widely scattered with some dense areas)



Figure 16. Infestation of Serrated Tussock *Nassella trichotoma* in the north-west corner the site, under which Themeda Grassland is hidden.

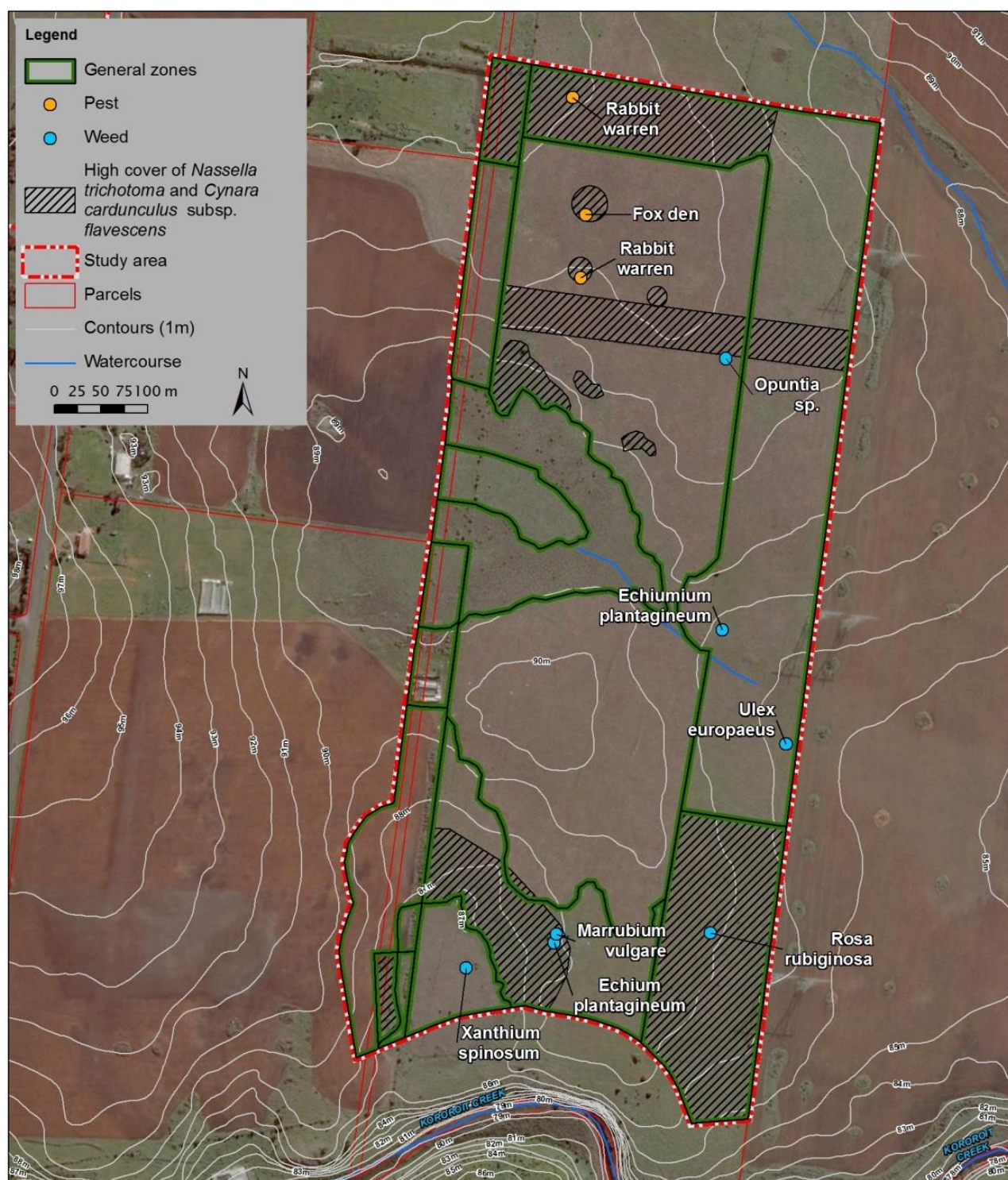


Figure 17. The locations of selected weed species. Note *Nassella trichotoma* and *Cynara cardunculus* are widespread and only the denser infestations are shown; other species which are also very widespread are not shown.

3.6 Hot Spots

The information presented above provides a formal spatial assessment of the values. This section provides a subjective assessment of where these values intersect to create conspicuous concentrations of biological values (and risks), called here “hot spots”. These are the places of particular interest in the conservation area, and places where intensive or intricate management may be justified to protect the values of the site. The assessment of hot spots is necessarily subjective, because it takes into account some intangible quantities, including interesting or unusual juxtapositions of biological values for educational purposes, etc.

In the conservation area, hotspots are identified in two contexts:

- Seasonal Herbaceous Wetlands
- Herb-rich Grasslands

The location of hot spots is shown in Figure 18.

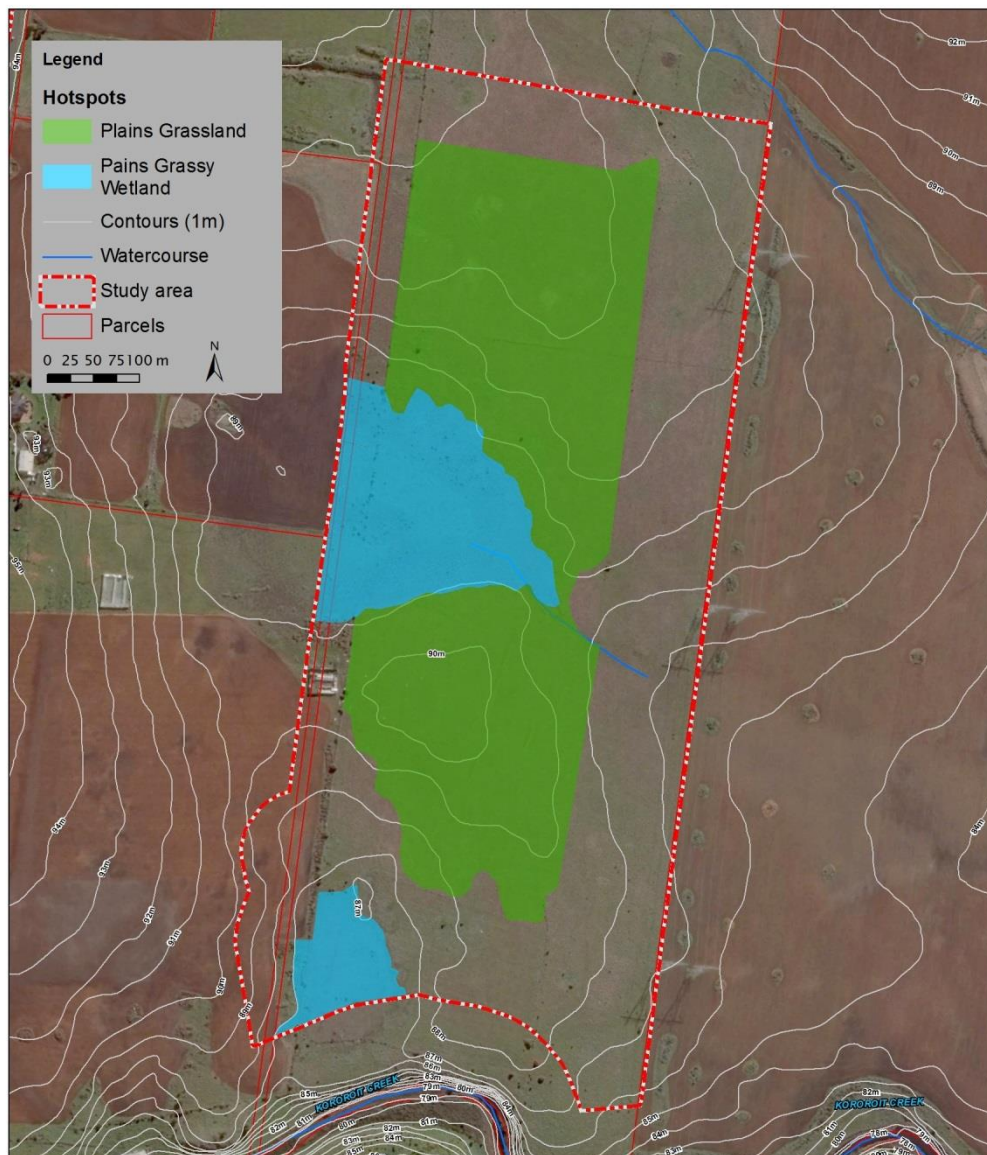


Figure 18. Distribution of ‘hot spots’ at Conservation Area 2.

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Appendix 1. List of vascular plants identified

INDIGENOUS

Family	Scientific Name	Common Name	EPBC	FPG	VROT	Source
FERNS AND ALLIES						
Marsileaceae	<i>Marsilea drummondii</i>	Common Nardoo				
MONOCOTS						
Anthericaceae	<i>Arthropodium spp. (s.s.)</i>	Vanilla Lily				
Cyperaceae	<i>Eleocharis pallens</i>	Pale Spike-sedge			k	Cook et al
Cyperaceae	<i>Eleocharis pusilla</i>	Small Spike-sedge				
Cyperaceae	<i>Schoenus apogon</i>	Common Bog-sedge				
Juncaceae	<i>Juncus bufonius</i>	Toad Rush				
Juncaceae	<i>Juncus flavidus</i>	Gold Rush				
Poaceae	<i>Amphibromus nervosus</i>	Common Swamp Wallaby-grass				
Poaceae	<i>Austrostipa bigeniculata</i>	Kneed Spear-grass				
Poaceae	<i>Austrostipa curticoma</i>	Short-crown Spear-grass				
Poaceae	<i>Chloris truncata</i>	Windmill Grass				
Poaceae	<i>Lachnagrostis filiformis s.s.</i>	Common Blown-grass				
Poaceae	<i>Microlaena stipoides var. stipoides</i>	Weeping Grass				
Poaceae	<i>Poa labillardierei var. (Volcanic Plains)</i>	Basalt Tussock-grass			k	Cook et al
Poaceae	<i>Poa sieberiana</i>	Grey Tussock-grass				
Poaceae	<i>Rytidosperma bipartitum s.s.</i>	Leafy Wallaby-grass				
Poaceae	<i>Rytidosperma carphoides</i>	Short Wallaby-grass				
Poaceae	<i>Rytidosperma duttonianum</i>	Brown-back Wallaby-grass				
Poaceae	<i>Rytidosperma geniculatum</i>	Kneed Wallaby-grass				
Poaceae	<i>Rytidosperma setaceum</i>	Bristly Wallaby-grass				
Poaceae	<i>Themeda triandra</i>	Kangaroo Grass				
Poaceae	<i>?Tripogon loliiformis</i>	Rye Beetle-grass			r	
Poaceae	<i>Walwhalleya proluta</i>	Rigid Panic				
DICOTS						
Amaranthaceae	<i>Alternanthera denticulata</i>	Lesser Joyweed				
Amaranthaceae	<i>Ptilotus spathulatus</i>	Pussy Tails				
Anthemideae	<i>Cotula australis</i>	Common Cotula				
Apiaceae	<i>Daucus glochidiatus</i>	Australian Carrot				
Apiaceae	<i>Eryngium ovium</i>	Blue Devil				
Apiaceae	<i>Eryngium vesiculosum</i>	Prickfoot				
Asteraceae	<i>Brachyscome basaltica var. gracilis</i>	Woodland Swamp-daisy				
Asteraceae	<i>Brachyscome dentata</i>	Lobe-seed Daisy				
Asteraceae	<i>Calocephalus citreus</i>	Lemon Beauty-heads				
Asteraceae	<i>Calotis anthemoides</i>	Cut-leaf Burr-daisy		N		Cook et al
Asteraceae	<i>Calotis scabiosifolia var. scabiosifolia</i>	Rough Burr-daisy				Cook et al
Asteraceae	<i>Calotis scapigera</i>	Tufted Burr-daisy				
Asteraceae	<i>Cassinia arcuata</i>	Drooping Cassinia				
Asteraceae	<i>Chrysocephalum sp. 1</i>	Plains Everlasting				
Asteraceae	<i>Euchiton sphaericus</i>	Annual Cudweed				
Asteraceae	<i>Euchiton spp.</i>	Cudweed				
Asteraceae	<i>Helichrysum luteoalbum</i>	Jersey Cudweed				
Asteraceae	<i>Leptorhynchus squamatus</i>	Scaly Buttons				
Asteraceae	<i>Senecio quadridentatus</i>	Cotton Fireweed				
Asteraceae	<i>Senecio spp.</i>	Groundsel				

Vegetation Inventory Report MSA Conservation Area 2

Family	Scientific Name	Common Name	EPBC	FFG	VROT	Source
Asteraceae	<i>Solenogyne dominii</i>	Smooth Solenogyne				
Asteraceae	<i>Solenogyne gunnii</i>	Hairy Solenogyne				
Asteraceae	<i>Vittadinia cuneata</i>	Fuzzy New Holland Daisy				
Asteraceae	<i>Vittadinia gracilis</i>	Woolly New Holland Daisy				
Campanulaceae	<i>Lobelia pratioides</i>	Poison Lobelia				
Campanulaceae	<i>Wahlenbergia luteola</i>	Bronze Bluebell				
Campanulaceae	<i>Wahlenbergia spp.</i>	Bluebell				
Chenopodioideae	<i>Atriplex semibaccata</i>	Berry Saltbush				
Chenopodioideae	<i>Chenopodium desertorum</i> <i>subsp. microphyllum</i>	Small-leaf Goosefoot				
Chenopodioideae	<i>Einadia nutans</i>	Nodding Saltbush				
Chenopodioideae	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush				
Chenopodioideae	<i>Maireana decalvans s.l.</i>	Black Cotton-bush				
Chenopodioideae	<i>Maireana enchylaenoides</i>	Wingless Bluebush				
Convolvulaceae	<i>Convolvulus angustissimus</i> <i>subsp. angustissimus</i>	Blushing Bindweed				
Convolvulaceae	<i>Convolvulus angustissimus</i> <i>subsp. omnigracilis</i>	Slender Bindweed			k	
Convolvulaceae	<i>Dichondra repens</i>	Kidney-weed				
Crassulaceae	<i>Crassula decumbens</i> var. <i>decumbens</i>	Spreading Crassula				
Crassulaceae	<i>Crassula sieberiana s.l.</i>	Sieber Crassula				
Geraniaceae	<i>Erodium crinitum</i>	Blue Heron's-bill				
Geraniaceae	<i>Geranium retrorsum s.l.</i>	Grassland Crane's-bill				
Goodeniaceae	<i>Goodenia gracilis</i>	Slender Goodenia				
Goodeniaceae	<i>Goodenia heteromera</i>	Spreading Goodenia				Cook et al
Goodeniaceae	<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia				
Goodeniaceae	<i>Velleia paradoxa</i>	Spur Velleia				
Haloragaceae	<i>Haloragis aspera</i>	Rough Raspswort				
Haloragaceae	<i>Haloragis heterophylla</i>	Varied Raspswort				
Hypericaceae	<i>Hypericum gramineum</i> spp. <i>agg.</i>	Small St John's Wort				
Lamiaceae	<i>Mentha satureioides</i>	Creeping mint				
Lamiaceae	<i>Teucrium racemosum s.l.</i>	Grey Germander				
Lythraceae	<i>Lythrum hyssopifolia</i>	Small Loosestrife				
Onagraceae	<i>Epilobium billardierianum</i> <i>subsp. cinereum</i>	Grey Willow-herb				
Oxalidaceae	<i>Oxalis perennans</i>	Grassland Wood-sorrel				
Oxalidaceae	<i>Oxalis sp. aff. exilis</i> <i>(glabrescent)</i>	Small-flower Wood-sorrel				
Plantaginaceae	<i>Plantago aff. gaudichaudii</i> <i>(Lowland Swamps)</i>	Swamp Plantain				
Plantaginaceae	<i>Plantago gaudichaudii</i>	Narrow Plantain				
Plantaginaceae	<i>Plantago varia</i>	Variable Plantain				
Polygonaceae	<i>Duma florulenta</i>	Tangled Lignum				
Portulacaceae	<i>Portulaca oleracea</i>	Common Purslane				
Rubiaceae	<i>Asperula conferta</i>	Common Woodruff				
Rubiaceae	<i>?Asperula sp.</i>	Woodruff				
Sanguisorbeae	<i>Acaena echinata</i>	Sheep's Burr				
Thymelaeaceae	<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Spiny Rice-flower	CR	L	e	
Violaceae	<i>Melicytus dentatus s.s.</i>	Tree Violet				
Violaceae	<i>Melicytus sp. aff. dentatus</i> <i>(Volcanic Plain variant)</i>	Tangled Shrub-violet				

INTRODUCED

Family	Scientific Name	Common Name	Habitat-tbc
MONOCOTS			
Iridaceae	<i>Romulea rosea</i>	Onion Grass	
Poaceae	<i>Aira spp.</i>	Hair Grass	
Poaceae	<i>Avena spp.</i>	Oat	
Poaceae	<i>Bromus hordeaceus subsp. hordeaceus</i>	Soft Brome	
Poaceae	<i>Cynodon dactylon var. dactylon</i>	Couch	
Poaceae	<i>Ehrharta erecta var. erecta</i>	Panic Veldt-grass	
Poaceae	<i>Ehrharta longiflora</i>	Annual Veldt-grass	
Poaceae	<i>Hordeum spp.</i>	Barley Grass	
Poaceae	<i>Lolium perenne</i>	Perennial Rye-grass	
Poaceae	<i>Lolium rigidum</i>	Wimmera Rye-grass	
Poaceae	<i>Nassella trichotoma</i>	Serrated Tussock	
Poaceae	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	
Poaceae	<i>Triticum aestivum</i>	Wheat	
Poaceae	<i>Vulpia bromoides</i>	Squirrel-tail Fescue	
DICOTS			
Aizoaceae	<i>Galenia pubescens var. pubescens</i>	Galenia	
Asteraceae	<i>Arctotheca calendula</i>	Cape weed	
Asteraceae	<i>Aster subulatus</i>	Aster-weed	
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	
Asteraceae	<i>Conyza spp.</i>	Fleabane	
Asteraceae	<i>Cynara cardunculus subsp. flavescent</i>	Artichoke Thistle	
Asteraceae	<i>Gamochaeta purpurea s.l.</i>	Purple Cudweed	
Asteraceae	<i>Gazania linearis</i>	Gazania	
Asteraceae	<i>Helminthotheca echioides</i>	Ox-tongue	
Asteraceae	<i>Hypochaeris radicata</i>	Flatweed	
Asteraceae	<i>Scorzonera laciniata</i>	Scorzonera	
Asteraceae	<i>Sonchus asper s.l.</i>	Rough Sow-thistle	
Asteraceae	<i>Sonchus oleraceus</i>	Common Sow-thistle	
Asteraceae	<i>Xanthium spinosum</i>	Bathurst Burr	
Brassicaceae	<i>Brassica fruticulosa</i>	Twiggy Turnip	
Brassicaceae	<i>Capsella bursa-pastoris</i>	Shepherd's Purse	
Brassicaceae	<i>Lepidium africanum</i>	Common Peppergrass	
Cactaceae	<i>Opuntia spp.</i>	Prickly pear	
Caryophyllaceae	<i>Cerastium glomeratum s.l.</i>	Common Mouse-ear Chickweed	
Caryophyllaceae	<i>Petrorhagia spp.</i>	Pink	
Caryophyllaceae	<i>Silene gallica</i>	French Catchfly	
Chenopodiaceae	<i>Chenopodium album</i>	Fat Hen	
Fabaceae	<i>Medicago polymorpha</i>	Burr Medic	
Fabaceae	<i>Trifolium angustifolium var. angustifolium</i>	Narrow-leaf Clover	
Fabaceae	<i>Trifolium glomeratum</i>	Cluster Clover	
Fabaceae	<i>Trifolium spp.</i>	Clover	
Fabaceae	<i>Ulex europaeus</i>	Gorse	
Gentianaceae	<i>Centaurea tenuiflorum</i>	Slender Centaury	
Geraniaceae	<i>Erodium botrys</i>	Big Heron's-bill	
Geraniaceae	<i>Erodium cicutarium</i>	Common Heron's-bill	
Lamiaceae	<i>Marrubium vulgare</i>	Horehound	
Lamiaceae	<i>Salvia verbenaca</i>	Wild Sage	
Malvaceae	<i>Malva parviflora</i>	Small-flower Mallow	
Malvaceae	<i>Modiola caroliniana</i>	Red-flower Mallow	
Myrsinaceae	<i>Lysimachia arvensis</i>	Pimpernel	
Plantaginaceae	<i>Plantago coronopus</i>	Buck's-horn Plantain	
Plantaginaceae	<i>Plantago lanceolata</i>	Ribwort	
Polygonaceae	<i>Acetosella vulgaris</i>	Sheep Sorrel	

Family	Scientific Name	Common Name	Habitat-tbc
Polygonaceae	<i>Rumex conglomeratus</i>	Clustered Dock	
Polygonaceae	<i>Rumex crispus</i>	Curled Dock	
Rosaceae	<i>Rosa rubiginosa</i>	Sweet Briar	
Solanaceae	<i>Lycium ferocissimum</i>	African Box-thorn	

Notes

Due to the heavy grazing, season of assessment, and limited time available for survey, this should be considered a preliminary list that should be refined with future survey work. These factors also account for the five species previously recorded by Cook *et al.* (2013) but not recorded in this study. One species found within the central wetland tentatively identified as *Asperula sp.* (Figure 19) requires further consideration and when sufficient material is available. A number of germinants considered to belong to the genus *Senecio* could also not be confidently identified. Native *Plantago* taxa listed include *Plantago* aff. *gaudichaudii* (Lowland Swamps), *Plantago gaudichaudii* and *Plantago varia*. The latter two of these taxa were often difficult to separate with many that appeared intermediate.



Figure 19. This species has been tentatively assigned *Asperula sp.* and should be investigated further when sufficient material is available.