
Rockbank Area Wetland Survey

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*Cover photographs (top): Plains Swampy Woodland-Lignum Swamp Complex at site MC1; (bottom left) The nationally vulnerable, EPBC Act listed Growling Grass Frog (*Litoria raniformis*); (bottom centre) The near threatened, FFG Act listed Diamond Firetail (*Stagonopleura guttata*); (bottom left) The vulnerable Arching Flax-lily (*Dianella* sp. aff. *longifolia* (Benambra)) These species have all be observed at wetlands within the study area during either this or previous surveys.*

EXECUTIVE SUMMARY

Project Context and Methodology

Rakali Consulting Pty Ltd was engaged by the Melbourne Water to report on the condition of 45 wetlands in the Rockbank and Tarneit areas after they were assessed using the listing advice for the Environment Protection and Biodiversity Conservation Act (EPBC Act) listed and critically endangered Seasonal Herbaceous Wetland (SHW) community and using the Victorian Index of Wetland Condition (IWC). The wetland assessments were conducted during February and early March 2013 at the end of an extremely dry summer.

The information gathered in this study will feed into the multiple DSS (Development Services Scheme) strategies and PSPs (Precinct Structure Plans) currently being developed for the area. The project will help inform the proposed planning and drainage services works for the area and the protection of natural wetlands with significant values.

Of the 45 sites originally identified to be assessed, sites D2, D9, K2b, K5, K7, L5, N6 and NR3 were terrestrial sites supporting no wetland vegetation, sites N9, NR2 and L3b were farm dams and site N10 had been recently cropped. Land owners did not grant permission to access sites D1, D8, MC4, N7 and NR1.

The remaining sites were all found to support wetland vegetation and were assessed against the EPBC Act criteria and using the IWC. One additional site not identified in the original project brief was also found to support assessable native wetland vegetation. Thus a total of 29 sites were assessed during the course of the field investigation within the study area.

Ecological Vegetation Classes

Four Ecological Vegetation Classes (EVCs) or EVC complexes were identified in the study area which conformed to the description of the federally listed Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains community. These were Plains Grassy Wetland (EVC 125), Lava Plain Ephemeral Wetland (EVC 974), Plains Grassy Wetland/Lignum Swamp Complex (EVC A101) and Ephemeral Drainage-line Grassy Wetland (EVC 678). Although Lava Plain Ephemeral Wetland and Ephemeral Drainage-line Grassy Wetland occur along drainage-lines, SEWPaC has confirmed that vegetation along small seasonal drainage lines can be regarded as falling within the definition of the national ecological community, as long as other criteria detailed in the listing advice for the community are met. These drainage lines have small, localised

catchments similar to other examples of SHW, and as such their dominant water source is not overbank flooding from a large water course.

Four other wetland EVCs were identified in the study area that do not conform to the description of the federally listed Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains community; including Plains Swampy Woodland (EVC 651), Plains Swampy Woodland/Lignum Swamp Complex (EVC 784), Lignum Swamp (EVC 104) and Freshwater Lignum Shrubland (EVC 657). These EVCs may be dominated by tree and shrub-layers with greater than 10% cover, and therefore do not qualify as 'Herbaceous'.

Wetland Characteristics

Wetlands in the study area were mostly broad shallow depressions or narrow ephemeral drainage-lines. The ecological integrity of wetlands in the study area was highly variable. Some have been grossly modified by weed invasion or human induced disturbances such as the construction of banks or dams while others support relatively intact and significant native vegetation.

Wetland Habitat

The wetlands within the study area provide important habitat for a diverse range of native fauna, including significant breeding populations of water birds and frogs. Rare and threatened fauna recorded in these wetlands include the nationally vulnerable and EPBC Act-listed Growling Grass Frog, the nationally endangered and EPBC Act-listed Australasian Bittern, the vulnerable Australasian Shoveler and Eastern Great Egret and the near threatened Royal Spoonbill, Whiskered Tern, Latham's Snipe and Diamond Firetail. While not recently observed in the study area the wetlands also provide suitable habitat for the critically endangered Australian Painted Snipe and vulnerable Brolga.

Survey Limitations

All sites identified as potential wetlands by Melbourne Water that could be accessed were investigated. An additional wetland observed during the course of field work was also inspected. Other wetlands may still occur in the study area that may only be detectable through on-ground surveys. Therefore additional sites of SHW may occur within the study area that were not inspected during this investigation. Further field survey work is therefore required at the individual proposed development site level to ensure all sites of SHW are detected before they or their catchments are disturbed, to prevent further loss of this critically endangered community.

Further, determining whether the investigated sites were 'high quality' examples of SHW was sometimes not possible due to the dry conditions that the region experienced over the summer period. This determination relies on recording the number of key indicator species occurring within the wetland, however many of these species would not have been physiologically active during the survey period. Due to these considerations, the following results should be considered preliminary only, and further survey work is required for verification of some sites.

Vegetation Quality

The listing advice for SHW provides criteria for assessing whether a site is of national environmental significance based on its size, weed cover and whether or not it supports a diversity of species considered to be sensitive to disturbance. Eleven of the sites examined within the study area, sites D6, L1, L4, MC1, MC3, N1, N2, N3, N5, NR1 and the additional site found during the field study (N11), were found to contain three or more indicator species and so qualify as 'high quality' examples of SHW. They are therefore matters of national environmental significance under the EPBC Act. Any development proposal that will impact upon wetlands identified as very high quality remnants of SHW is referable to the Commonwealth government, who must then decide whether development should be permitted and under what circumstances or conditions.

Using the precautionary principle all sites identified with the potential to be very high quality SHW should be treated as such until proven otherwise by a thorough floristic survey under appropriate conditions. Although not enough indicator species were located at sites D3, D4, K3, K4, L2, L3a, L6, MC2, MC5, N4, N8, T1 and Ta1, these thirteen sites were relatively intact and may support sufficient indicator species if surveyed during an appropriate season.

It is considered unlikely that the remaining sites would support a sufficient number of indicator species to be considered high quality due to their relatively degraded condition, however these wetlands should also be surveyed during a more appropriate season to confirm this. These sites should be considered for protection whenever possible on the grounds that they are remnants of bioregionally endangered ecosystems and have intrinsic value for the conservation of native flora and fauna. In an urban context, natural wetlands within open space areas provide; aesthetic values, opportunities for passive recreation such as bird watching and nature study, a resource for environmental education, and ecological services such as insect pest control. For example, while site MC6 does not qualify as SHW as it is dominated by River Red Gums, it provides important wildlife habitat and should be preserved. It is an example of the bioregionally endangered Plains Swampy Woodland EVC.

Groundwater Influence

MC6 and other sites in the study area supporting River Red Gums are groundwater dependent ecosystems. This is because these trees would be unlikely to establish and survive under the low rainfall conditions (as low as 450 mm annually in the Mt Cottrell area) prevalent within the study area without additional water inputs from surface run-off or groundwater. This has implications for the survival and management of these wetlands if urbanisation is to occur within their groundwater catchments. The water requirements of all ground water dependent ecosystems should be investigated and methods devised to ensure all wetlands receive an appropriate amount of good quality water.

Protection and Buffers

For wetlands occurring in areas designated for development, a buffer of native vegetation will also be necessary to protect environmental values. The necessary buffer width required around a wetland to effectively protect it is determined by the type of wetland, proposed land use intensity and the functions of the wetland (WSDE 2005). The Water and Rivers Commission of Western Australia recommends a minimum buffer width of 50 metres around wetlands to protect their environmental values (WRC 2000).

In order to protect the environmental values of these sites the natural physical form and hydrology must be maintained. Therefore if the land around a wetland or drainage line is subject to urban development the storm water runoff from these areas must be directed downstream via an underground pipe, with natural flows to the wetland and drainage line from the upstream undeveloped catchment to be maintained. Buffers of restored native vegetation around these areas will assist in maintaining the ecological health of these wetlands. The width of these buffers should be 30 metres either side of the drainage line from the top of its bank and 50 metres around the wetland (Price et al. 2004).

Native vegetation within buffers should be managed to reduce weed cover to less than 5%, with high threat weeds being kept at less than 1% cover. Where native vegetation is degraded these buffers should be revegetated with species appropriate to the landscape position and EVCs.

Effective weed management will be essential to ensure the continued ecological integrity of wetlands within the proposed grassland reserve and any native vegetation to be retained within the urban growth boundary.

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1.0 INTRODUCTION

1.1 Context

Rakali Consulting Pty Ltd was engaged by the Melbourne Water to assess and report on the condition of 45 wetlands in the Rockbank and Tarneit areas (Map 1). These wetlands had been inundated by natural flooding events in late 2010 and early 2011. The wetland assessments were conducted during February and early March 2013 at the end of one of the driest summers on record.

The information gathered in this study will feed into the DSS (Development Services Scheme) strategies and PSPs (Precinct Structure Plans) currently being developed. A DSS is a plan which identifies the drainage infrastructure, including stormwater quality treatment facilities, which will be required to service properties for future urban developments. This project will help inform the proposed planning and drainage services works for the area, and the protection of natural wetlands with significant values.

Seasonally Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains

The Commonwealth government Environmental Protection and Biodiversity Conservation Act (EPBC Act) lists threatened species and communities which are considered matters of national significance. In March 2012 a new community was listed under the EPBC Act which is referred to as Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (hereafter referred to as SHW in this report).

The vegetation of the Seasonal Herbaceous Wetlands is generally treeless and dominated by an herbaceous ground layer, often with a considerable graminoid component. The herbaceous species present are characteristic of wetter sites, and most of them are typically absent or uncommon in any adjoining dryland grasslands and woodlands.

Trees and shrubs are generally absent to sparse in SHW. When present, they are often confined to the fringes, or occur as scattered emergents within the wetland. Larger woody species that may be present include *Eucalyptus camaldulensis* (River Red Gum) or *Muehlenbeckia florulenta* (Tangled Lignum). However, the projective foliage cover of woody species is usually less than 10%.

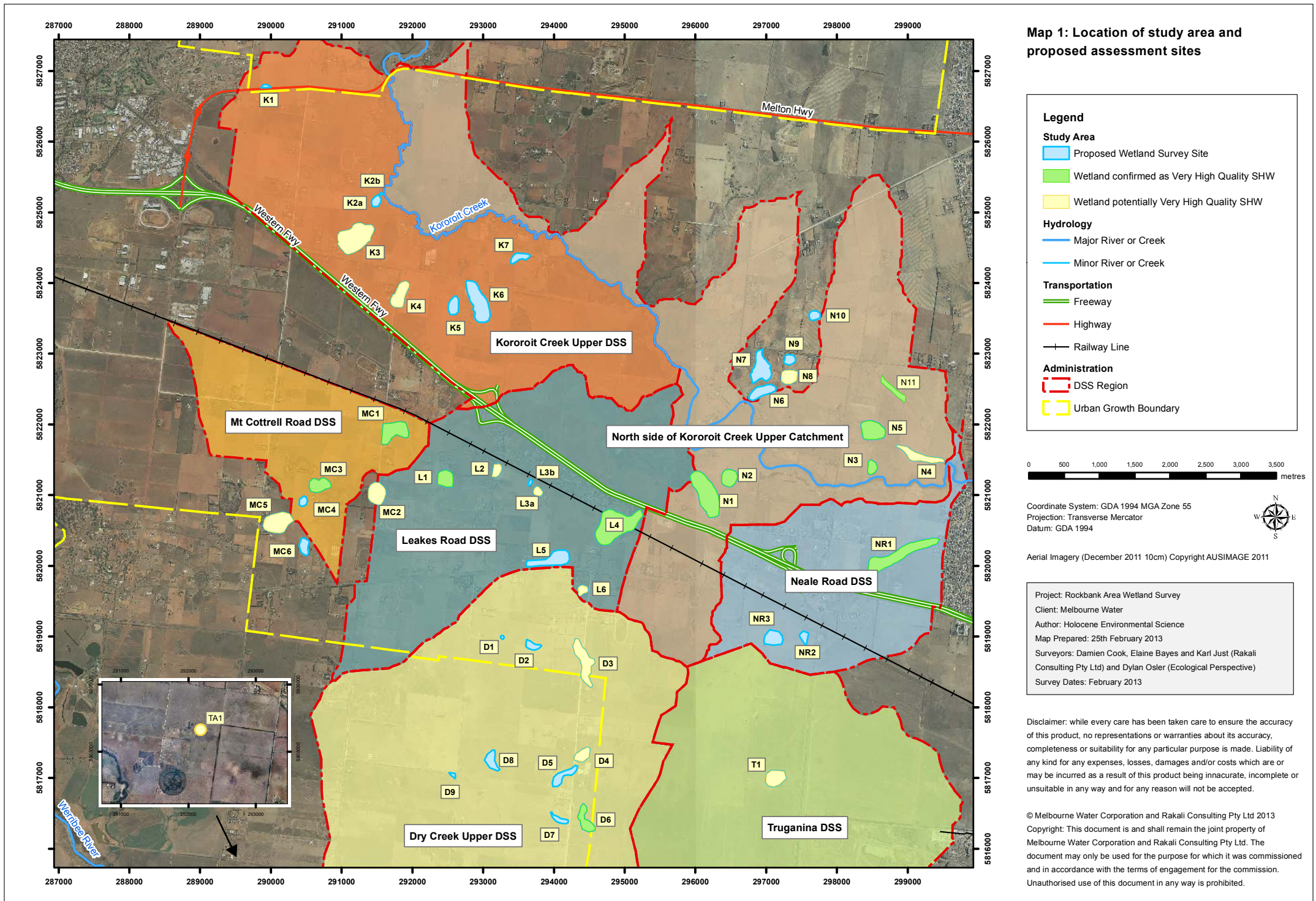
Ground layer herbs are the dominant vegetation layer and are characterised by native plant species that are adapted to seasonal inundation. The vegetation typically comprises a suite of native

wetland graminoids and forbs. The mix of species can vary from site to site. The graminoids present tend to be shorter (mostly <1 m tall) native species. One or more of the following graminoids are typically common or present, sometimes as a dominant or co-dominant: *Amphibromus* spp. (Swamp Wallaby-grasses), *Carex tereticaulis* (Poong'ort), *Deyeuxia* spp. (Reed Bent-grass), *Glyceria* spp. (Australian Sweet-grass), *Lachnagrostis* spp. (Blown Grasses), *Poa labillardierei* (Common Tussock-grass) and *Rytidosperma duttonianum* (Brown-back Wallaby-grass).

A variety of wetland forbs may occur, depending on the region, nature and history of the wetland site. Some genera that typically occur include: *Allitia* (Swamp Daisy), *Asperula* (Woodruff), *Brachyscome* (Daisy), *Craspedia* (Billy-buttons), *Epilobium* (Willow-herb), *Eryngium* (Eryngium), *Lobelia* (Lobelia), *Marsilea* (Nardoo), *Montia* (Water Blinks), *Ornduffia* (Marsh-flower), *Pycnosorus* (Billy-buttons) and *Ranunculus* (Buttercup) (SEWPAC 2012).

This community was once widespread on the fertile plains of temperate lowland south eastern Australia, such as the basalt plain to the west of Melbourne where the study area is situated. The community has been extensively cleared and is subject to ongoing threatened processes such as urban expansion, eutrophication and weed invasion, and is therefore listed as critically endangered

This report identifies areas supporting SHW in the Rockbank area, and where these wetlands are to be impacted by proposed development, makes recommendations as to how they can be protected.



1.2 Project Objectives

Specific tasks completed in relation to each wetland inspected included:

1. Confirming the presence/absence of 'Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains'.
2. If the wetland did not fall under the above category, wetland category/type and its condition using the IWC method was determined
3. Compilation of species lists of all observed flora species.
4. Confirming boundaries of the wetlands.
5. Mapping and describing the extent and type of native vegetation present and the presence of threatened species or vegetation communities.
6. Gathering and reviewing existing literature on existing and potential values within the catchment, including the identification of gaps in available information and use this to direct survey methods and site selection.
7. Discussing implications on national, state and local legislation and policy.
8. Liaising with relevant agencies/stakeholders.
9. Mapping the locations of threatened flora species (if present), and indicating potential habitat for threatened species.
10. Providing recommendations for the protection of values in relation to urban development, in particular drainage and stormwater design.

1.3 Study Area

The wetlands which are the subject of this investigation are located in the Rockbank area, within the Melton Shire Council (Melway Reference Map 344 D3). The majority of this region has been designated for urban growth development.

The study area is situated in the far eastern section of the Victorian Volcanic Plain bioregion. While early survey maps indicate the area was originally dominated by Kangaroo Grass open plains (McDougall 1987), these have now been largely replaced with exotic grasses or derived native grasslands dominated by Wallaby Grass and Spear Grass. Many wetlands were formed in the local area as a result of the blockage of drainage-lines by lava flows or collapse of lava tunnels, creating small depressions (Rosengren 1986). The landscape is also transected by a series of poorly-defined drainage-systems that flow very irregularly, and as such, function more as wetlands rather than streams. The Kororoit Creek, one of the larger streams in the western Melbourne region, runs through the northern section of the study area.

The study area lies within a winter rain-shadow caused by the positioning of the Otways and Brisbane Ranges, which block rain-laden winds from the south-west (Schulz 1991). Consequently the region experiences a very low average rainfall and is one of the driest sections of the Victorian Volcanic Plains. Annual average rainfall varies from approximately 450 mm in the vicinity of Mt Cottrell and reaches 550 mm further north towards the Calder Highway (McDougall 1987). This low rainfall environment supports a biotic community that has strong floristic affinities with the equally low-rainfall areas in northern and north-west Victoria. This includes wetlands with a prominent *Lignum* component which are rare in southern Victoria and an assemblage of disjunct plant species that are more common north of the Great Dividing Range. The study area is considered to have high biogeographic significance due to these affinities with the semi-arid regions of Victoria.

2.0 METHODOLOGY

2.1 Background Research

A desktop study and review of existing information on the identified wetlands/waterbodies was conducted prior to field work. This included examining high quality aerial photography to determine the location of additional wetland sites. Appropriate government databases were interrogated to determine plant species previously recorded in the study area and to determine which Ecological Vegetation Classes (EVCs) had been mapped there. Several past ecological studies that examined some of the wetlands within the study site were also reviewed, including McDougall (1987), Schulz et al. (1991) and Gilmore (2011).

2.2 Field Survey

Fieldwork was undertaken between the 18th of February and 4th of March of 2013. To maximise efficiency the wetlands were surveyed by a team of two ecologists, who surveyed two adjacent wetlands simultaneously. The vegetation of the wetlands was reconnoitered on foot with the aid of high resolution aerial photography to identify the extent of each EVC. Wetland and vegetation boundaries were then annotated onto photographs and reference points were recorded using a handheld GPS. At each assessed site, all vascular plant species were recorded, while fauna data was limited to incidental observations of less common species. The condition of each EVC was determined using the DSE's Index of Wetland Condition methodology. The SEWPaC method was used to determine the presence of 'Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains'.

Where SHWs were identified their condition was determined as per the methods in

"Advice to the Minister for Sustainability, Environment, Water, Population and Communities from the Threatened Species Scientific Committee (the Committee) on an Amendment to the List of Threatened Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)"

As detailed in this SEWPaC document, the wetland buffer zone was determined for high to very high quality 'Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains' wetlands. Melbourne Water's GDE Field Check List was completed for each wetland assessed. Extant water depth and extent were also recorded.

2.3 Incidental Observations

Incidental terrestrial flora species observed outside of wetland areas were recorded, and overall plant lists for each site were collated. Incidental threatened fauna species observed were recorded. Incidental observations of rare and/or threatened flora, fauna, habitat and bird rookeries/nest sites were recorded and referenced with a handheld GPS.

2.4 Taxonomy

Plant taxonomy in this report follows the Flora Information System (DSE, 2012c), with consideration to the Census of Victoria Vascular Plants (Walsh and Stajsic, 2007). An asterisk (*) denotes exotic species and a hash sign (#) denotes indigenous species that may occur outside of their natural range. Fauna taxonomy follows the Victorian Biodiversity Atlas (DSE, 2012b).

The status of flora as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Flora and Fauna Guarantee Act 1988* (FFG Act) and the Department of Sustainability and Environment rare or threatened species advisory lists is provided (DSE, 2007; DSE, 2005).

Box 1: Key for Flora Conservation Status

Status under the *Flora and Fauna Guarantee Act 1988* (FFG Act)

- L** Listed as threatened
X Removed from listing

Conservation Status in Victoria (DSE Advisory List of Rare and Threatened Flora)

- e** Endangered in Victoria: at risk of disappearing from the wild state if present land use and other casual factors continue to operate
v Vulnerable in Victoria; rare, not presently Endangered but likely to become so soon due to continued depletion of; taxa where populations are so low that recovery from a local natural disturbance is doubtful
r Rare in Victoria but not considered otherwise threatened - there are relatively few known populations or the taxon is restricted to a relatively small area
k Poorly known and suspected, but not definitely known to belong to the one of the categories Presumed extinct, Endangered, Vulnerable or Rare in Victoria

Status under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

- EN** Endangered in Australia: A taxon is endangered when it is not critically endangered but is facing a very high risk of extinction in the wild in the near future.
VU Vulnerable in Australia: not presently endangered but at risk of disappearing from the wild over a longer period (20 to 50 years) through continued depletion

Box 2: Key for Fauna Conservation Status**Status under the *Flora and Fauna Guarantee Act 1988* (FFG Act)**

L Listed as threatened

Conservation Status in Victoria (DSE Advisory List of Rare and Threatened Fauna)

- cr** Critically endangered in Victoria: a taxon is critically endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Species Survival Commission 2001), and is therefore considered to be facing an extremely high risk of extinction in the wild
- en** Endangered in Victoria: a taxon is endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Species Survival Commission 2001), and is therefore considered to be facing a very high risk of extinction in the wild
- vu** Vulnerable in Victoria: a taxon is vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Species Survival Commission 2001), and is therefore considered to be facing a high risk of extinction in the wild
- nt** Near Threatened in Victoria: a taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered, or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the future

Status under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

- EN** Endangered in Australia: a taxon is endangered when it is not critically endangered but is facing a very high risk of extinction in the wild in the near future.
- VU** Vulnerable in Australia: a taxon is vulnerable when it is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future.

2.5 Qualifications

All sites identified as potential wetlands by Melbourne Water that could be accessed were investigated. An additional wetland observed during the course of field work was also inspected. Other wetlands may still occur in the study area that may only be detectable through on-ground surveys. Therefore additional sites of SHW may occur within the study area that were not inspected during this investigation. Further field survey work is therefore required at the individual proposed development site level to ensure all sites of SHW are detected before they or their catchments are disturbed, to prevent further loss of this critically endangered community.

Due to the cryptic nature and seasonal growth cycles of certain plants and animals, ecological surveys are often unable to detect all species present at a particular site. The fieldwork for this study was carried out in February-March 2013, so only flora and fauna that were physiologically active or present within the wetlands over this period were recorded. The field work was carried out during one of the driest summers on record. All wetland sites had been totally dry for at least one month (excepting some farm dams) and grasses and herbs had mostly died back to desiccated stems. Annual plant species were mostly absent, except for some withered plants that were still identifiable. Many of the sites were also being grazed, or had recently been grazed by stock.

Given these conditions, the survey was not conducted at an optimal time, particularly for recording herbaceous species. It was particularly difficult to verify whether a site was of 'high quality', as this assessment relies on recording the presence of key indicator species.

The SEWPaC document states that:

"Surveys should be done in the appropriate season when the site is, or has recently been, reasonably wet. This will usually be spring to early summer but can vary depending on the rainfall pattern within seasons. Surveys should be postponed if the wetland vegetation has been recently modified e.g. grazed or mown."

While it is unlikely to be feasible to restrict stock from private properties, it is recommended that further surveys should be undertaken at key sites during wetter conditions, ideally in late spring to early summer following adequate rains. This will enable a conclusive determination of whether a site is of 'high quality'.

Certain fauna species, including wetland birds such as the Australian Painted Snipe and frog species including the Growling Grass Frog, are only likely to be recorded when the wetlands contain more water. Surveys for these species should be conducted within the study area the next time the wetlands contain water in early summer. It is also likely that additional flora and fauna species would be recorded given a greater sampling effort.



Photograph 1: A female Australian Painted Snipe (*Rostratula australis*). Suitable habitat for this nationally vulnerable and EPBC Act-listed species occurs within the study area, however it is only likely to be recorded when wetlands are holding water.

3.0 RESULTS

3.1 Literature review

The most extensive and systematic ecological surveying of wetlands in the western Melbourne region was largely completed in the 1980's and early 1990's. Although much of this information is now out-dated, it is still a valuable resource that requires consideration. In the past several years the region has been the subject a large volume of surveys as a result of the proposed expansion of the Melbourne urban growth boundary. These studies are briefly reviewed below.

Sites of Botanical Significance in the Western Region of Melbourne – K. McDougall (1987)

This study included documentation of key remnants across the plains and foothills of the western Melbourne region. The botanical surveys appeared to be relatively limited for each site and the site descriptions are brief. This study assessed one of the sites included in the current investigation.

Paynes Road Swamp (MC1)

This site was listed as locally significant. Although the site was observed to be heavily grazed, it was described as one of the few wetlands in the region that hadn't been reclaimed for agriculture. This inaccurate statement is probably a reflection of the lack of botanical surveys that had been undertaken at that time. The study by Schulz et al. (1991) several years later would document that many important wetlands still survived in the western Melbourne region (see below).

Sites of Faunal Significance in the Western Wetlands of Melbourne – M. Schulz, C. Beardsell & K. Sandiford (1991)

This project included a study of the fauna and faunal habitat of many of the major wetlands occurring in western Melbourne. Although mostly relating to fauna, the report also provided detail on vegetation and habitat. The study assessed several of the wetlands included as part of the current investigation.

Mt Cottrell Road Swamp (includes site MC5)

This site, which includes MC5, was listed as locally significant and included four spatially separate wetlands. Anecdotal reports suggested that large numbers of waterbirds frequented the wetlands when filled after heavy and prolonged rains. A good diversity of threatened woodland birds was recorded at the site including Diamond Firetail, Jacky Winter, White-winged Triller, Rufous Songlark and Varied Sitella. These species were assumed to move between this wetland and nearby Grey

Box woodlands. The EPBC Act listed Growling Grass Frog (*Litoria raniformis*) is also documented as having been recorded at this site.

Paynes Road, North Swamp (MC1)

The significance of this site was listed as 'indeterminate'. Anecdotal reports suggested that small numbers of waterbirds frequented the swamp when full. The large River Red Gums were described as important nesting and feeding habitat for non-passerine species such as Tawny Frogmouth, Eastern Rosella and Red-rumped Parrot. Significant bird species recorded at the wetland included Whiskered Tern, Latham's Snipe, Australasian Shoveler and Eastern Great Egret. The EPBC Act listed Growling Grass Frog (*Litoria raniformis*) is also listed as having been recorded at this site. The surrounding *Themeda* grasslands were found to support a diverse herpetofauna assemblage.



Photograph 2: Plains Swampy Woodland-Lignum Swamp Complex at the eastern edge of site MC1. The large River Red Gums at this site provide important habitat for a variety of fauna.

Paynes Road, South Swamp (MC2)

This site was listed as locally significant. Few species were recorded at the site, however it was noted that its location close to Paynes Road, North Swamp and Rockbank Railway Swamp, increased its significance. No threatened species were recorded at the site.

Rockbank Railway Swamp (not investigated during the current survey)

This site was listed as locally significant. Anecdotal reports suggested low numbers of waterbirds visited the wetland when water was present. The site was observed to be heavily grazed by rabbits and sheep.

Troups Road Swamp (L4)

This site was listed as regionally significant. Anecdotal reports suggested that large numbers of waterbirds frequented and bred within the swamp when substantial amounts of water were present after heavy rains. Significant breeding populations of waterbirds occurring when the swamp is full included Black-tailed Native Hen, Black-winged Stilt, Red-necked Avocet and Australian Shelduck.

Rare and threatened bird species recorded included the Australasian Bittern, Latham's Snipe, Royal Spoonbill, Brown Quail and Australasian Shoveler. Many of these were believed to move regularly between this site and Deanside Wetlands. The EPBC Act listed Growling Grass Frog (*Litoria raniformis*) is also documented as having been recorded at this site.

A population of Floating pondweed was observed to be a valuable food source for many waterbirds when the wetland was full. Interviews with local farmers revealed that parts of the swamp were burnt to help clear the Lignum from the outer fringe and parts of the southern section were cropped several times.

Sewells Road Swamp (Ta1)

This wetland was regarded to be of local significance for fauna by Beardsell et al. (1991). It was identified as regionally significant for flora by Barlow (1989).

Important sites for biodiversity conservation: Melbourne's urban growth zones – D. Gilmore (2011)

This report documented a series of sites across the western Melbourne region that were considered to be of high ecological significance based on the subjective opinion of Biosis Research staff (based on the collective experience of knowledgeable staff members). Most of the sites were either not within the current study area, or pertained to grassland values. However several sites were discussed.

Site 7 - Lignum Wetland north of Beatty's Road, Rockbank (K3)

Several hundred Growling Grass Frogs (*Litoria raniformis*) were recorded breeding in this wetland after it was filled in 2010, and it was described as highly important for this species. The wetland was also considered important for Latham's Snipe and potentially other shorebirds.



Photograph 3: Plains Grassy Wetland/Lignum Swamp Complex at a wetland in Rockbank. When flooded this site supports a large breeding population of the nationally vulnerable Growling Grass Frog.

Site 8 & 9 - Lignum Wetland south of Beatty's Road, Rockbank (K6 and K4)

These wetlands had not been surveyed but were considered likely to support similar values as Site K3, particularly for Growling Grass Frog.

The Flora Information System or FIS (DSE 2012c) is a database which holds records of plants that have been detected by floristic surveys or collected and lodged at Herbaria. Sites within the study area with records on the FIS are shown in Appendix 6. Of these the following have records which indicate they may support very high quality examples of Seasonal Herbaceous Wetland; E0006000, E0006100, E0478700, E1387000, E1805700, S1415400, T0917500, T2460700, T2463400, T2464400, T2493600 and T2523700. Of these sites only E1805700 (L4 of this study), T2493600 (N1 of this study) and S1415400 (N2 of this study) were inspected during this investigation.

3.2 Vegetation

3.2.1 Overview

Melbourne Water originally identified 45 sites in the Rockbank and Tarneit areas to be assessed against the listing advice for the critically endangered SHW community and for wetland vegetation condition using the Victorian Index of Wetland Condition. Of these sites D2, D9, K2b, K5, K7, L5, N6 and NR3 were terrestrial sites supporting no wetland vegetation, while sites N9, NR2 and L3b were farm dams, and site N10 had been recently cropped. Access was not granted to inspect four of the sites.

A further site within the study area not identified in the original project brief was found to support assessable native wetland vegetation. In this report this site is labelled N11. Thus a total of 29 wetland sites were assessed during the course of the field investigation within the study area.

A total of 217 vascular plant species were recorded in wetlands within the study area over the course of this investigation. This included 109 locally indigenous species and 108 exotic and non-local native species.

Four Ecological Vegetation Classes (EVCs) or EVC complexes were identified in the study area which conformed to the description of the federally listed Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains community: Plains Grassy Wetland (EVC 125); Lava Plain Ephemeral Wetland (EVC 974); Plains Grassy Wetland/Lignum Swamp Complex (EVC A101) and Ephemeral Drainage-line Grassy Wetland (EVC 678).

SEWPaC has confirmed that vegetation along small seasonal drainage lines can be regarded as falling within the definition of the national ecological community, as long as other criteria detailed in the listing advice for the community are met. These drainage lines have small, localised catchments

similar to other examples of SHW, and as such their dominant water source is not overbank flooding from a large water course. The study area supported two wetland EVCs that fall within this criteria, including EVC 678 Ephemeral Drainage-line Grassy Wetland and EVC 974 Lava Plain Ephemeral Wetland.

The structure of native wetland vegetation in the study area varied from woodland dominated by River Red Gums and shrubland dominated by Tangled Lignum, to sedgeland/grassland dominated by a range of sedges, grasses and forbs.

Many sites in the study area that are dominated by herbaceous vegetation were probably naturally devoid of woody species, while at other sites, woody species may have been removed by deliberate clearing, ploughing or grazing pressure. Sites supporting woody species, particularly those supporting River Red Gums, are likely to be ground water dependant. This is because these trees would be unlikely to establish and survive under the low rainfall conditions (as low as 450 mm annually in the Mt Cottrell area) prevalent within the study area without additional water inputs from surface run-off or groundwater. This has implications for the survival and management of these wetlands if urbanisation is to occur within their groundwater catchments (see discussion for an elaboration of this issue).



Photograph 4: River Red Gums within the study area, such as these trees at site MC6, are likely to be dependent on ground water for their survival. Urbanisation will reduce the infiltration of water into local water tables and will adversely affect the health of these trees unless measures are taken to ensure they have an adequate water supply.

All EVCs (wetland and terrestrial) observed within the study area are described in the succeeding sections. The bioregional conservation status and EPBC Act status of the recorded EVCs is summarised in Table 1.

Table 1: Bioregional conservation status and EPBC Act status of EVCs within the study area

Ecological Vegetation Class	Bioregional Conservation Status	EPBC Act status
A101 Plains Grassy Wetland/Lignum Swamp Complex	Unassessed, but both components which make up the complex are endangered	Critically endangered (if Tangled Lignum has <10% cover)
104 Lignum Swamp	Endangered	
125 Plains Grassy Wetland	Endangered	Critically endangered
132_63 Low Rainfall Plains Grassland	Endangered	Critically endangered
649 Stony Knoll Shrubland	Endangered	
651 Plains Swampy Woodland	Endangered	
657 Freshwater Lignum Shrubland	Endangered	
678 Ephemeral Drainage-line Grassy Wetland	Unassessed, highly likely to be endangered	Critically endangered
784 Plains Swampy Woodland/ Lignum Swamp Complex	Unassessed, but both components which make up the complex are endangered	
974 Lava Plain Ephemeral Wetland	Unassessed, highly likely to be endangered	Critically endangered

Bioregional Conservation Status as per the Victorian Volcanic Plain Bioregion

3.2.2 Wetland Ecological Vegetation Classes (EVCs)

EVC 125 Plains Grassy Wetland

Plains Grassy Wetland was the dominant EVC at many of the wetlands in the study area. This EVC is listed as endangered in the Victorian Volcanic Plains bioregion (DSE 2012a) and falls within the definition of the EPBC Act listed SHW community (SEWPAC 2012). At several sites this EVC was fringed by a zone of EVC 657 Freshwater Lignum Shrubland.

Across the study area Plains Grassy Wetland was commonly dominated by grass and sedge species, including *Rytidosperma duttonianum* (Brown-back Wallaby-grass), *Lachnagrostis filiformis* var. 1 (Common Blown-grass), *Amphibromus nervosus* (Common Swamp Wallaby-grass) *Eleocharis acuta* (Common Spike-sedge), *Eleocharis pallens* (Pale Spike-sedge) and *Eleocharis pusilla* (Small Spike-sedge). The drier verges of wetlands often supported terrestrial grass species such as *Themeda triandra* (Kangaroo Grass), *Austrostipa* spp. (Spear-grass) and *Chloris truncata* (Windmill Grass).

Forb (broad-leaved herb) cover and diversity was relatively low at many sites, most likely due to a history of stock grazing which has removed the more palatable species. Herbs that occurred in better quality sites included *Asperula conferta* (Common Woodruff), *Damasonium minus* (Star-fruit), *Dichondra repens* (Kidney-weed), *Goodenia gracilis* (Slender Goodenia), *Myriophyllum simulans* (Amphibious Milfoil), *Marsilea hirsuta* (Short-fruit Nardoo), *Marsilea drummondii* (Common Nardoo) and *Haloragis aspera* (Rough Raspwort). Three species of *Calotis*, all which are relatively uncommon in the region, were recorded at sites N3 and N5. These were *C. scapigera* (Tufted Burr-daisy), *C. anthemoides* (Cut-leaf Burr-daisy) and *C. scabiosifolia* var. *scabiosifolia* (Rough Burr-daisy).

This EVC commonly contains a component of small annual herbs that are only active during the wet and draw-down phases. Considering that all of the sites were very dry at time of assessment these species would have been under-recorded.

Weed cover varied within areas of Plain Grassy Wetland, but was generally low within the core of the wetland and higher around the edges. High threat species that were recorded included **Nassella hyalina* (Cane Needle-grass), **Aster subulatus* (Aster Weed), **Cyperus eragrostis* (Drain Flat-sedge), **Leontodon taraxacoides* subsp. *taraxacoides* (Hairy Hawkbit) and **Paspalum distichum* (Water Couch).

EVC 657 Freshwater Lignum Shrubland

Freshwater Lignum Shrubland occurs around wetland and lake margins on slightly elevated areas above normal inundation levels. This EVC was recorded at several sites as a narrow band around the outer fringes of Plains Grassy Wetland. At all sites the EVC had been partly cleared, leaving only scattered remnants.

Within the study area the vegetation was commonly dominated by *Muehlenbeckia florulenta* (Tangled Lignum) and grasses such as *Rytidosperma duttonianum* (Brown-back Wallaby-grass) and *Rytidosperma caespitosum* (Common Wallaby-grass). Herbaceous diversity was generally low and included more dry-tolerant wetland species such as *Lythrum hyssopifolium* (Less Loose-strife), *Epilobium hirtigerum* (Grey Willow-herb), *Asperula conferta* (Common Woodruff) and *Haloragis aspera* (Rough Raspwort). Weeds recorded within the EVC included **Cirsium vulgare* (Spear Thistle), **Polygonum aviculare* (Wireweed), **Rumex crispus* (Curled Dock) and **Conyza bonariensis* (Fleabane).

EVC 104 Lignum Swamp

Several examples of Lignum Swamp were recorded within the study area. This EVC is relatively uncommon south of the Great Divide, being more common in low rainfall areas in northern and north-west Victoria.

The remnants observed within the study site were dominated by relatively dense *Muehlenbeckia florulenta* (Tangled Lignum), with a grassy-herbaceous field layer including *Rytidosperma duttonianum* (Brown-back Wallaby-grass), *Lythrum hyssopifolium* (Lesser Loosestrife), *Marsilea drummondii* (Common Nardoo), *Marsilea costulifera* (Narrow-leaf Nardoo), *Dichondra repens* (Kidney Weed) and *Eryngium vesiculosum* (Prickfoot). The quality of sites was highly variable, including some that were partly cleared and heavily grazed and others that supported higher floristic diversity. Common weeds recorded in the EVC included **Physalis viscosum* (Sticky Ground-cherry), **Nassella trichotoma* (Serrated Tussock), **Cirsium vulgare* (Spear Thistle) and **Plantago lanceolata* (Ribwort).

EVC A101 Plains Grassy Wetland / Lignum Swamp Complex

EVC A1010 Plains Grassy Wetland / Lignum Swamp Complex is endangered and of restricted extent in the Victorian Volcanic Plain bioregion (Doug Frood pers. comm.). This EVC falls within the definition of the EPBC Act listed SHW community (SEWPaC 2012), as it has less than 10% woody

cover. This EVC has similar floristic composition to EVC 125 Plains Grassy Wetland, but also includes a scattered shrub-layer of *Muehlenbeckia florulenta* (Tangled Lignum).



Photograph 5: Plains Grassy Wetland-Lignum Swamp Complex at site N1. As the cover of Lignum at this site is less than 10% this wetland it still qualifies as a ‘Seasonal Herbaceous Wetland’.

EVC 651 Plains Swampy Woodland

Plains Swampy Woodland in the study area is dominated by an open canopy of usually low, spreading *Eucalyptus camaldulensis* (River Red Gum). The understorey comprises species typical of seasonally inundated or waterlogged sites such as *Rytidosperma duttonianum* (Brown-back Wallaby-grass), *Amphibromus nervosus* (Common Swamp Wallaby-grass), *Marsilea drummondii* (Common Nardoo), *Alternanthera denticulata* (Lesser Joyweed) and *Oxalis exilis* (Shade Wood-sorrel).

EVC 784 Plains Swampy Woodland/Lignum Swamp Complex

Plains Swampy Woodland/Lignum Swamp Complex is a rare vegetation formation mostly restricted to a small number of remnants in the dry rain-shadow areas west of Melbourne. It is dominated by an open canopy of usually low, spreading *Eucalyptus camaldulensis* (River Red Gum), with a

moderately dense shrub-layer comprised of *Muehlenbeckia florulenta* (Tangled Lignum). The understorey is dominated by a mosaic of seasonal wetland flora and terrestrial grasses.

EVC 974 Lava Plain Ephemeral Wetland

Site N4 supported a small example of Lava Plain Ephemeral Wetland. This EVC was originally thought to be restricted to an area near Byaduk Caves and has not been assigned a bioregional status; however it is undoubtedly endangered (Doug Frood pers. comm.).

Lava Plain Ephemeral Wetland occurs along small rocky drainage-lines that only occasionally hold water. The example within the study area was mostly dominated by weeds such as **Nassella trichotoma* (Serrated Tussock), **Cynara cardunculus* (Artichoke Thistle), **Avena barbata* (Wild Oats), **Bromus hordeaceus* (Soft Brome), **Rosa rubiginosa* (Sweet Briar), **Rumex crispus* (Curled Dock), **Xanthium spinosum* (Bathurst Burr), **Juncus acutus* (Spiny Rush) and **Galenia pubescens* (Blanket Weed). Some areas still retained a good cover of indigenous species including *Calotis scapigera* (Tufted Burr-daisy), *Themeda triandra* (Kangaroo Grass), *Amphibromus nervosus* (Common Swamp Wallaby-grass), *Eleocharis acuta* (Common Spike-sedge), *Bothriochloa macra* (Red-leg Grass), *Adiantum aethiopicum* (Maiden-hair Fern), *Alternanthera denticulata* (Lesser Joyweed) and *Dichondra repens* (Kidney-weed). The small shrub *Melicytus dentatus* (Tree Violet) was scattered along the margins of the drainage-line.

Although not observed during this study the endangered and FFG Act listed *Cullen parvum* (Small Scurf-pea) is known to occur within this vegetation type in the local area. This species is summer active and grows most vigorously after substantial summer rain events. It is recommended that further survey work to detect this species in the study area should be conducted during a wetter summer period.

EVC 678 Ephemeral Drainage-line Grassy Wetland

Ephemeral Drainage-line Grassy Wetland occurs along poorly-defined, highly ephemeral drainage systems. It commonly supports a combination of wetland and dryland flora due to the low frequency and short duration of wetting events. The EVC is very rare and mostly restricted to scattered remnants throughout the low-rainfall plains west of Melbourne.

Several occurrences of the EVC were recorded throughout the study area, mostly in the vicinity of Troupes Road South, with one site south of Taylors Road. The remnants near Troupes Road South

were mostly in a relatively degraded condition, being heavily grazed with numerous dams situated along the drainage-lines. The Taylors Road site was much more intact and supported a relatively high cover of native herbs with a good buffer of native vegetation.

The EVC was commonly dominated by *Rytidosperma duttonianum* (Brown-back Wallaby-grass) and *Eleocharis acuta* (Common Spike-sedge) with scattered herbs and prostrate sub-shrubs such as *Haloragis aspera* (Rough Raspwort), *Eryngium ovinum* (Blue Devil), *Marsilea hirsuta* (Short-fruit Nardoo), *Persicaria prostrata* (Creeping Knotweed) and *Alternanthera denticulata* (Lesser Joyweed). These species occurred in association with dryland flora such as *Austrostipa* spp. (Spear Grass) and *Themeda triandra* (Kangaroo Grass).

There was generally a high weed cover at the Troupes Road South sites, including **Nassella neesiana* (Chilean Needle-grass) and **Plantago lanceolata* (Ribwort).

3.2.3 Terrestrial Ecological Vegetation Classes (EVCs)

EVC 132_61 Heavier Soils Plains Grassland/ EVC 132_63 Low-rainfall Plains Grassland

In more ecologically intact areas the dominant native vegetation type surrounding the wetlands was Heavier-soils Plains Grassland or Low-rainfall Plains Grassland, both listed as endangered in the Victorian Volcanic Plains bioregion. Several sites were dominated by *Themeda triandra* (Kangaroo Grass) but the majority comprised a relatively homogenous cover of *Rytidosperma* spp. (Wallaby Grass) and *Austrostipa* spp. (Spear Grass) with scattered *Chloris truncata* (Windmill Grass), and *Bothriochloa macra* (Red-leg Grass).

The quality of most of the grasslands in the study area was relatively low, with few native herbs and high weed cover. Native herbs and sub-shrubs recorded in these areas included *Oxalis perennans* (Grassland Wood-sorrel), *Crassula sieberiana* (Sieber Crassula), *Atriplex semibaccata* (Berry Saltbush) and *Maireana decalvans* (Black Cotton-bush). An extensive area of *Themeda* grassland surrounds sites N3 and N5 where the endangered Spiny Rice-flower has been recorded (Steve Sinclair pers. comm. February 2013).

Common weeds recorded in grasslands included **Nassella neesiana* (Chilean Needle-grass), **Trifolium glomeratum* (Cluster Clover), **Trifolium arvense* (Hare's-foot Clover), **Medicago polymorpha* (Burr Medic), **Cynara cardunculus* subsp. *flavescens* (Artichoke Thistle) and **Lolium rigidum* (Wimmera Rye-grass).

Degraded treeless vegetation

Large areas of the study area carry non-intact vegetation dominated by weeds. These areas are mostly dominated by Needle Grasses (**Nassella neesiana* and **N. hyalina*) and **Lolium rigidum* (Wimmera Rye-grass), with a high cover of **Trifolium glomeratum* (Cluster Clover), **Trifolium arvense* (Hare's-foot Clover) and **Plantago lanceolata* (Ribwort).

EVC 649 Stony Knoll Grassland/Shrubland

Several low stony rises were recorded across the study area, including west of site K6. A brief inspection of these knolls found them to be relatively degraded, with low native species diversity and high weed cover. These areas possibly once supported a cover of shrub species such as *Bursaria spinosa* (Sweet Bursaria), *Melicytus dentatus* (Tree Violet) and *Acacia paradoxa* (Hedge Wattle), but these components appear to have been almost totally cleared.

3.2.4 Rare or threatened plant taxa

Four rare or threatened plant taxa were observed within the study area during this investigation. This included a population of approximately 40 plants of the vulnerable *Dianella sp. aff. longifolia* (Benambra) (Arching Flax-lily) on the drier verges of site MC1.

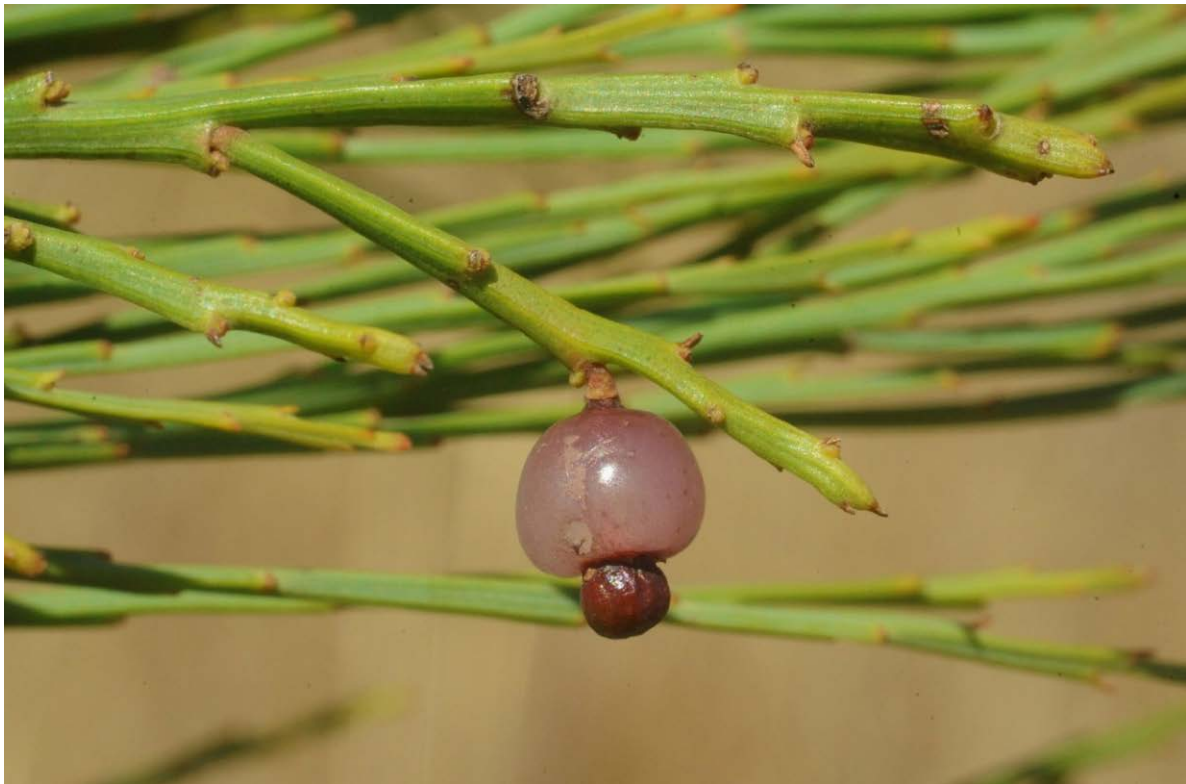
The other three taxa and the sites they occurred at were *Alternanthera* sp. 1 (Plains) (Plains Joyweed) (L4 and MC6), *Eleocharis pallens* (Pale Spike-sedge) (N5 and Ta1) and *Poa labillardierei* var. (Volcanic Plains) (Basalt Tussock-grass) (D3, D4, D6, MC1, MC2 and N5). The conservation status of these taxa within Victoria is regarded as poorly known (DSE 2005).

Another poorly known species, *Wurmbea dioica* subsp. *lacunaria* (Swamp Early Nancy), had been previously recorded at site NR1 by Val Stajsic of the National Herbarium (V. Stajsic pers.comm.). Further rare plant taxa are likely to be recorded if the study area is re-surveyed during wetter conditions.

Of biogeographical interest was the occurrence of *Exocarpos strictus* (Pale-fruit Ballart), also at site MC1. This species of very restricted occurrence on the Victorian Volcanic Plain, being more widespread in other parts of the state, particularly in the east.



Photograph 6: The vulnerable Arching Flax-lily (*Dianella* sp. aff. *longifolia* (Benambra)) at site MC1



Photograph 7: Pale-fruit Ballart (*Exocarpos strictus*) at site MC1

3.3 Wetland Condition Assessment

The study area supports a diverse range of wetlands and water bodies. The ecological integrity of wetlands in the study area is also highly variable. Some have been grossly modified by weed invasion or human induced disturbances such as the construction of banks or dams while others support relatively intact and significant native vegetation. Table 2 details the attributes of each of the wetlands assessed and identifies which sites are very high quality examples of SHW.



Photograph 8: This example of Plains Grassy Wetland at site L2 was heavily grazed and very dry at the time of this investigation. However it still supported a very high cover of indigenous species and has the potential to be a Very High Quality site. Further survey during a wetter period is required to confirm this.

Table 2: Summary of attributes for wetlands surveyed February and March 2013

Site	Size (Ha)	Ecological Vegetation Class (EVC)	Number of indigenous flora	Very High Quality SHW (number of indicator species in parentheses)	IWC Score	Rare Fauna	Water Depth / Extent at time of survey
D3	1.8	Ephemeral Drainage-line Grassy Wetland	21	Potentially (2)	6 (moderate)	None recorded	Dry
D4	4	Ephemeral Drainage-line Grassy Wetland	27	Potentially (2)	4 (poor)	None recorded	Dry
D5	3.4	Ephemeral Drainage-line Grassy Wetland	Not surveyed	Not surveyed	4 (poor)	None recorded	Dry
D6	4	Ephemeral Drainage-line Grassy Wetland	23	Yes (3)	5 (moderate)	None recorded	Dry
D7	1.2	Ephemeral Drainage-line Grassy Wetland	Not surveyed	Not surveyed	5 (moderate)	None recorded	Dry
K1	0.5	Plains Grassy Wetland	9	No (1)	7 (good)	None recorded	Dry
K2a	1.9	Plains Grassy Wetland	3	No (1)	5 (moderate)	None recorded	Dry
K3	15	Plains Grassy Wetland, Plains Grassy Wetland/Lignum Swamp Complex & Plains Swampy Woodland/Lignum Swamp Complex	30	Potentially (1)	8 (good)	Growling Grass Frog, Latham's Snipe ¹	Dry
K4	7	Plains Grassy Wetland & Freshwater Lignum Shrubland	15	Potentially (1)	6 (moderate)	None recorded	Dry
K6	17	Plains Grassy Wetland & Plains Swampy Woodland/Lignum Swamp Complex	17	No (0)	4 (poor)	None recorded	Dry
L1	8.6	Plains Grassy Wetland & Plains Swampy Woodland/Lignum Swamp Complex	24	Yes (3)	8 (good)	None recorded	Dry
L2	3.1	Plains Grassy Wetland/Lignum Swamp Complex	20	Potentially (1)	7 (good)	None recorded	Dry
L3a	1.2	Plains Grassy Wetland	16	Potentially (1)	8 (good)	None recorded	Dry
L4	16.5	Plains Grassy Wetland & Freshwater Lignum Shrubland	26	Yes (4)	7 (good)	Australasian Bittern, Latham's Snipe, Royal Spoonbill, Australasian Shoveler, Growling Grass Frog ²	Dry
L6	2.1	Plains Grassy Wetland	12	Potentially (1)	7 (good)	None recorded	Dry
MC1	15.2	Plains Grassy Wetland, Plains Grassy Wetland/Lignum Swamp Complex & Plains Swampy Woodland/Lignum Swamp Complex	41	Yes (3)	8 (good)	Whiskered Tern, Latham's Snipe, Australasian Shoveler, Eastern Great Egret, Growling	Dry

Site	Size (Ha)	Ecological Vegetation Class (EVC)	Number of indigenous flora	Very High Quality SHW (number of indicator species in parentheses)	IWC Score	Rare Fauna	Water Depth / Extent at time of survey
						Grass Frog ² , Hardhead ³	
MC2	3.6	Plains Grassy Wetland/Lignum Swamp Complex	27	Potentially (2)	5 (moderate)	Growling Grass Frog	Dry
MC3	3	Plains Grassy Wetland & Plains Swampy Woodland/Lignum Swamp Complex	35	Yes (3)	7 (good)	None recorded	Dry
MC5	6.2	Plains Grassy Wetland/Lignum Swamp Complex & Plains Swampy Woodland/Lignum Swamp Complex	27	Potentially (1)	8 (good)	Diamond Firetail, Growling Grass Frog ²	Dry
MC6	2	Plains Swampy Woodland	19	No (1)	7 (good)	None recorded	Dry
N1	13	Plains Grassy Wetland/Lignum Swamp Complex	27	Yes (3)	7 (good)	None recorded	Dry
N2	5.6	Plains Grassy Wetland/Lignum Swamp Complex	24	Yes (4)	8 (good)	None recorded	Dry
N3	2.5	Plains Grassy Wetland	17	Yes (5)	9 (excellent)	None recorded	Dry
N4	0.8	Lava Plain Ephemeral Wetland	16	Potentially (1)	6 (moderate)	None recorded	Dry
N5	10	Plains Grassy Wetland	32	Yes (10)	8 (good)	None recorded	Dry
N8	0.1	Plains Grassy Wetland	12	Potentially (0)	6 (moderate)	None recorded	Dry
N10	2.1	Plains Grassy Wetland?	Not surveyed	Not surveyed	Could not be assessed	None recorded	Dry
N11	2.9	Ephemeral Drainage-line Grassy Wetland	18	Yes (3)	7 (good)	None recorded	Dry
NR1	10	Plains Grassy Wetland	14	Yes (10)	Could not be assessed	Latham's Snipe ³	Dry
T1	1.3	Ephemeral Drainage-line Grassy Wetland	12	Potentially (0)	7 (good)	None recorded	Dry
Ta1	9	Plains Grassy Wetland	25	Potentially (2)	7 (good)	None recorded	Dry

Note: Fauna records displayed in this table are from ¹ Gilmore (2011), ² Beardsell et al. (1991) or ³ DSE (2012b). Sites D5 and D7 could not be accessed so no floristic data is available. IWC assessments for these sites were calculated from what could be observed by standing on the adjacent roadside. Site NR1 could not be accessed during this study, and records for this area were supplied by the National Herbarium.

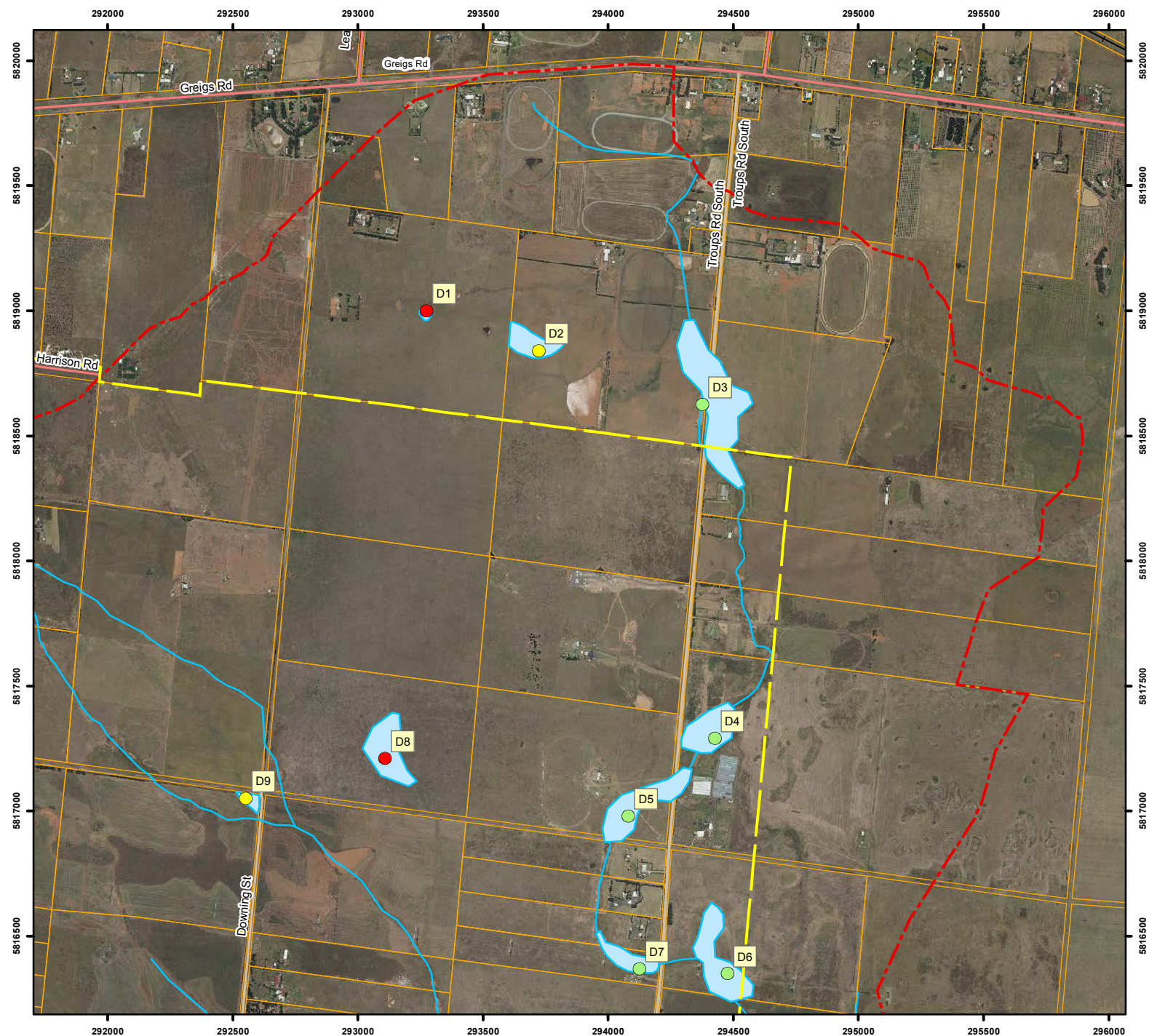
Of the 45 sites originally identified to be assessed, sites D2, D9, K2b, K5, K7, L5, N6 and NR3 were terrestrial sites supporting no wetland vegetation, sites N9, NR2 and L3b were farm dams and site N10 had been recently cropped. Land owners did not grant permission to access sites D1, D8, MC4, N7 and NR1 (this latter site was assessed from historical records).

The remaining sites were all found to support wetland vegetation and were assessed using the IWC methodology and assessed against the listing advice for the critically endangered SHW community. One additional site not identified in the original project brief was also found to support assessable native wetland vegetation. Thus a total of 29 sites were assessed during the course of the field investigation within the study area. These sites ranged in quality from poor to excellent, and eleven qualified as being of Very High Value according to the listing advice (SEWPaC, 2012).

Weed invasion is posing a serious threat to the continued survival of wetland vegetation within the study area. Wetlands often resist weed invasion better than terrestrial native vegetation, as the natural wetting and drying cycles favour indigenous species over most weeds. However, species such as **Nassella hyalina* (Cane Needle-grass), can invade indigenous wetland vegetation and ultimately displace it. Effective weed management will be essential to ensure the continued ecological integrity of wetlands within the proposed grassland reserve and any native vegetation to be retained within the urban growth boundary.

Wetland boundaries and the Ecological Vegetation Classes supported by each wetland site are depicted in Map 2 to Map 25. Wetland sites are grouped by DSS, with an overview map of potential and surveyed sites within each DSS, preceding maps of individual wetland sites (or clusters of two or three thereof) for each DSS. Note: in addition to the 29 assessed wetland sites, potential wetland site N10 and site NR1 (determined to be an example of VHQ SHW based on herbarium records), have also been mapped.

Map 2: Wetlands surveyed within the Dry Creek Upper DSS February 2013



Legend

Study Area

- Proposed Wetland Survey Site

Survey Effort

- Wetland Assessed in situ
- Wetland Assessed in situ; part only
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Sealed Road
- Unsealed Road
- Railway Line

Administration

- Property Boundary
- DSS Region
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th February 2013
Surveyors: Rakali Consulting Pty Ltd
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 3: Wetland boundaries and Ecological Vegetation Classes Dry Creek Upper DSS

Legend
EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- ▨ Site supports Very High Quality SHW
- ▨ Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

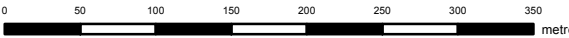
- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- ▭ Property Boundary
- ▭ Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



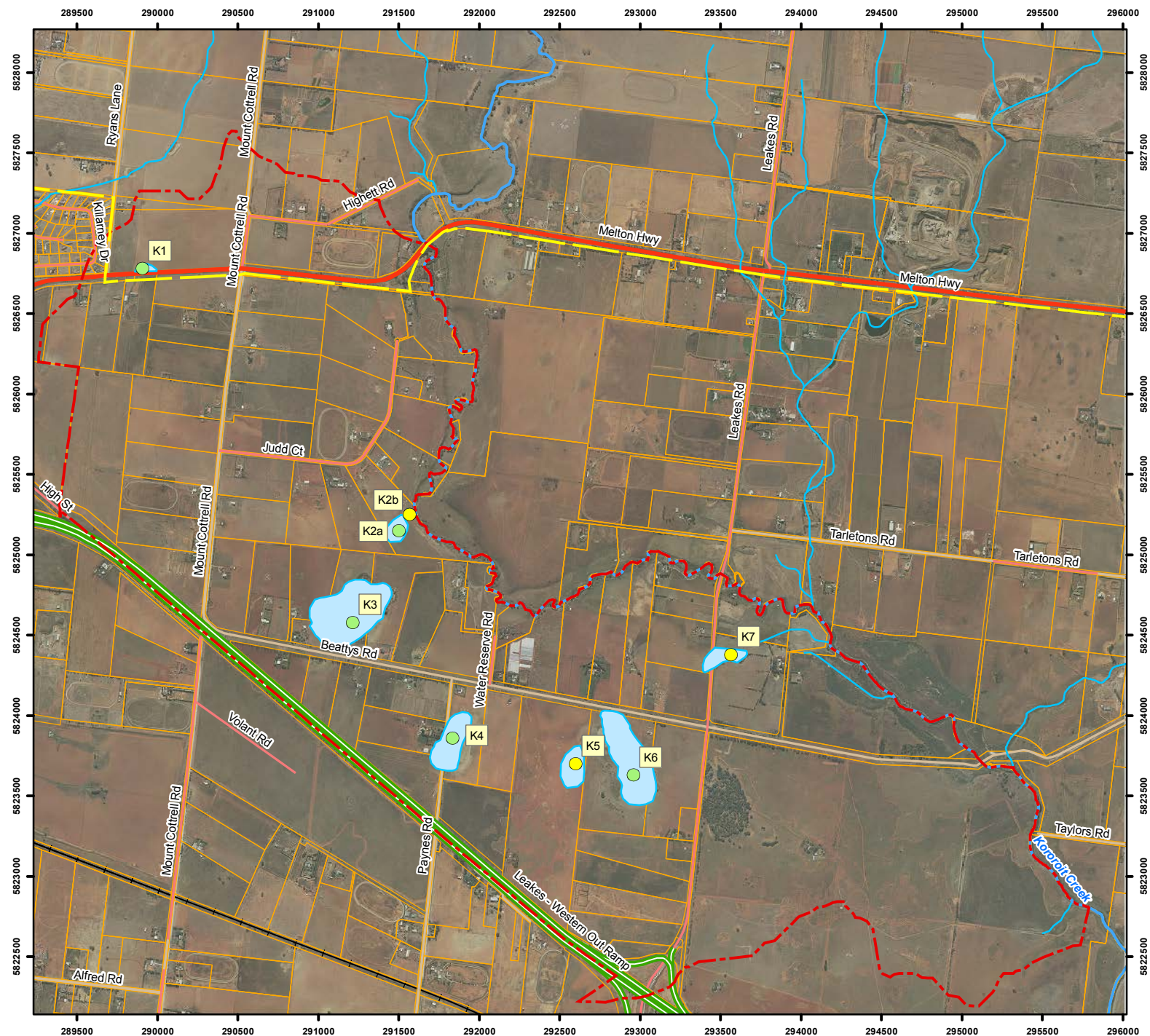
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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd)
and Dylan Osler (Ecological Perspective)
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 6: Wetlands surveyed within the Kororoit Creek Upper DSS February 2013



Legend

Study Area

Proposed Wetland Survey Site

Survey Effort

- Wetland Assessed in situ
- Wetland Assessed in situ; part only
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Sealed Road
- Unsealed Road
- Railway Line

Administration

- Property Boundary
- DSS Region
- Urban Growth Boundary

0 200 400 600 800 1,000 metres

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th February 2013
Surveyors: Rakali Consulting Pty Ltd
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 7: Wetland boundaries and Ecological Vegetation Classes Kororoit Creek Upper DSS



Legend

EPBC Act Listed Wetland

●

 Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)

—

 Site supports Very High Quality SHW

—

 Site potentially supports Very High Quality SHW

Ecological Vegetation Class

■

 Ephemeral Drainage-line Grassy Wetland (EVC 678)

■

 Freshwater Lignum Shrubland (EVC 657)

■

 Lignum Swamp (EVC 104)

■

 Plains Grassy Wetland (EVC 125)

■

 Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)

■

 Plains Swampy Woodland (EVC 651)

■

 Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

■

 Dam, dam wall or artificial levee

Hydrology

—

 Major River or Creek

—

 Minor River or Creek

Transportation

—

 Freeway

—

 Highway

—

 Arterial Sealed

—

 Sealed Road

—

 Unsealed Road

—

 2WD Road

—

 Railway Line

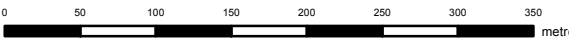
Administration

—

 Property Boundary

—

 Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



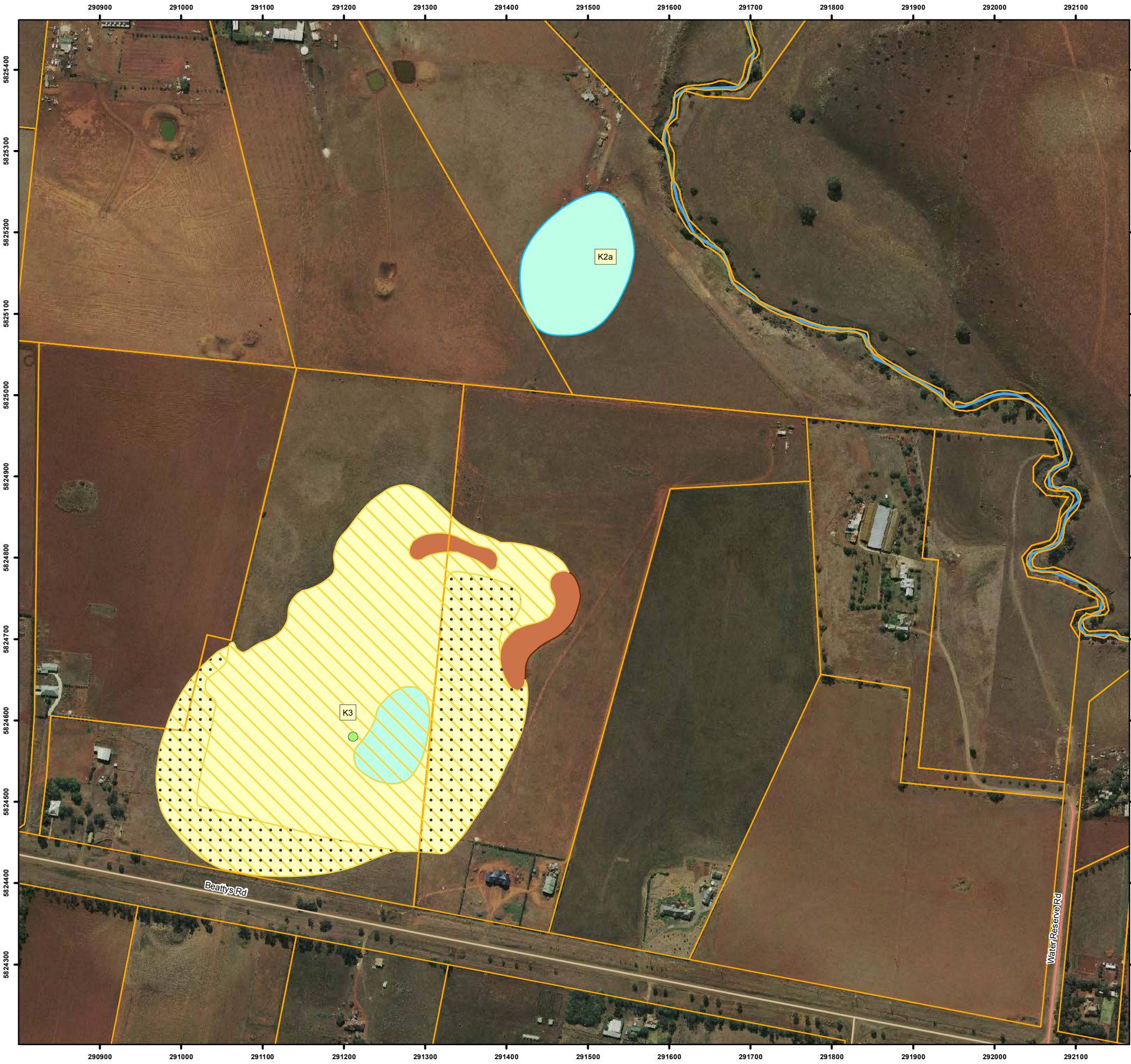
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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd)
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Map 8: Wetland boundaries and Ecological Vegetation Classes Kororoit Creek Upper DSS



Legend

EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101) - Zone 1
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101) - Zone 2
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

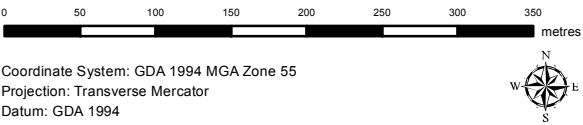
- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

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Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
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Map 9: Wetland boundaries and Ecological Vegetation Classes Kororoit Creek Upper DSS



Legend

EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657) - Zone 1
- Freshwater Lignum Shrubland (EVC 657) - Zone 2
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee
- Spoil

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary

050100150200250300350metres

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

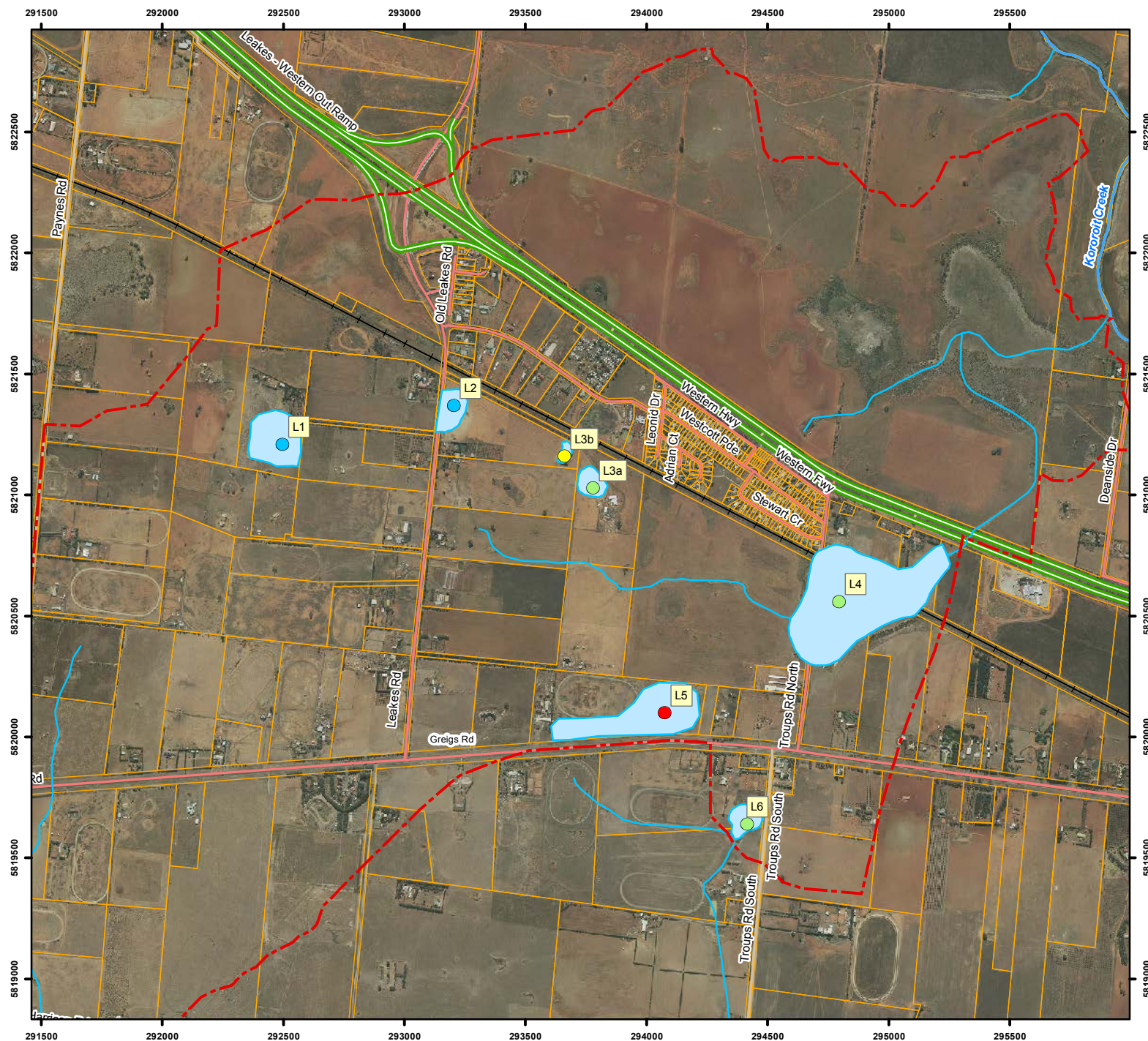
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Client: Melbourne Water
Author: Holocene Environmental Science
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Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 10: Wetlands surveyed within the Leakes Road DSS February 2013



Legend

Study Area

- Proposed Wetland Survey Site

Survey Effort

- Wetland Assessed in situ
- Wetland Assessed in situ; part only
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Sealed Road
- Unsealed Road
- Railway Line

Administration

- Property Boundary
- DSS Region
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



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Author: Holocene Environmental Science
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Surveyors: Rakali Consulting Pty Ltd
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Map 11: Wetland boundaries and Ecological Vegetation Classes Leakes Road DSS

Legend
EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)

- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

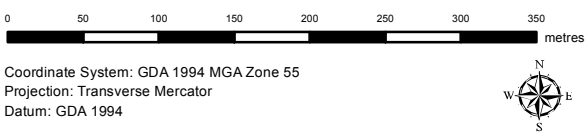
- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary



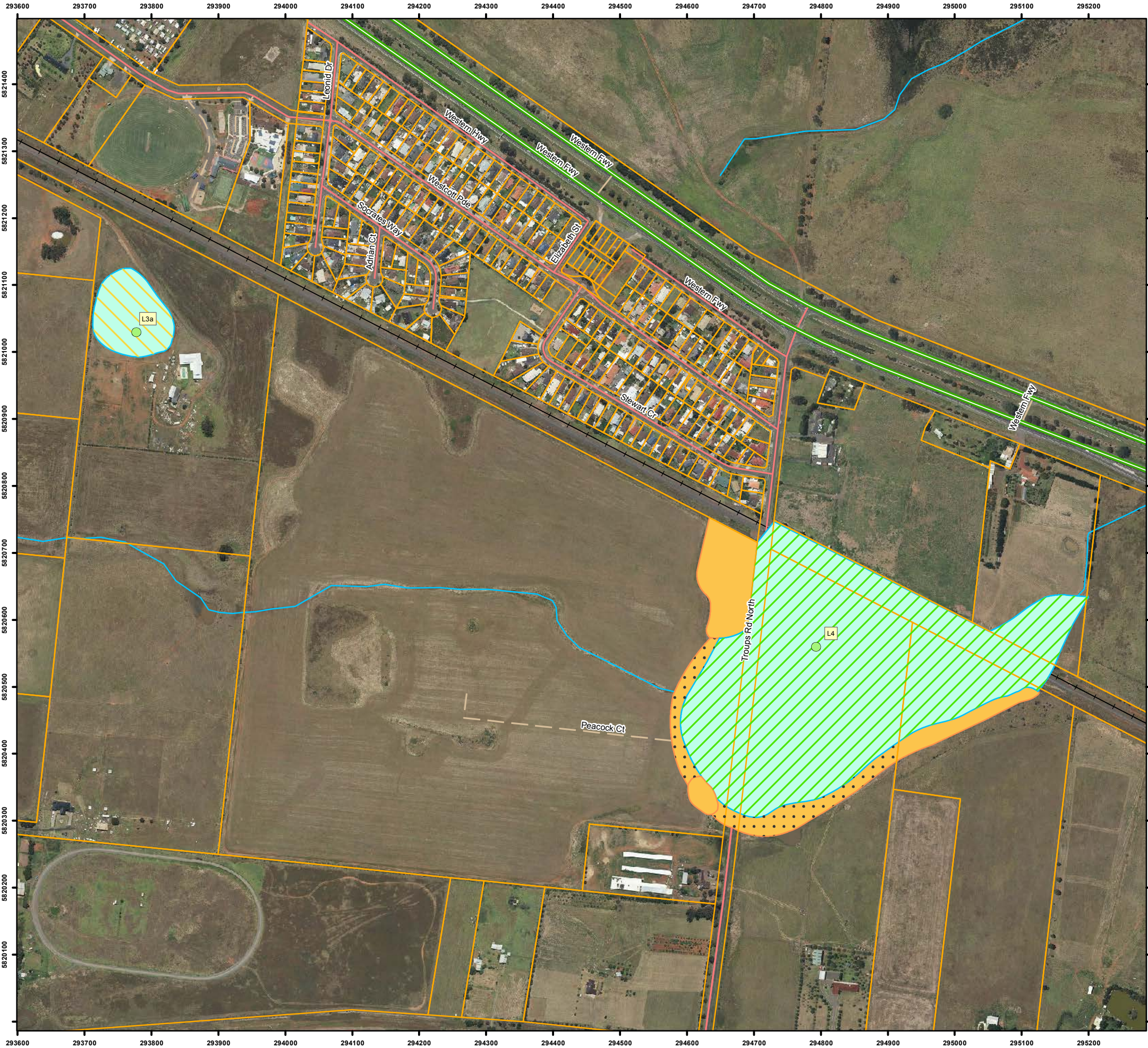
Aerial Imagery (December 2011 10cm) Copyright AUSIMAGE 2013

Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd) and Dylan Osler (Ecological Perspective)
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Map 12: Wetland boundaries and Ecological Vegetation Classes Leakes Road DSS



Legend

EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657) - Zone 1
- Freshwater Lignum Shrubland (EVC 657) - Zone 2
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary

050100150200250300350400

metres

Coordinate System: GDA 1994 MGA Zone 55

Projection: Transverse Mercator

Datum: GDA 1994

N

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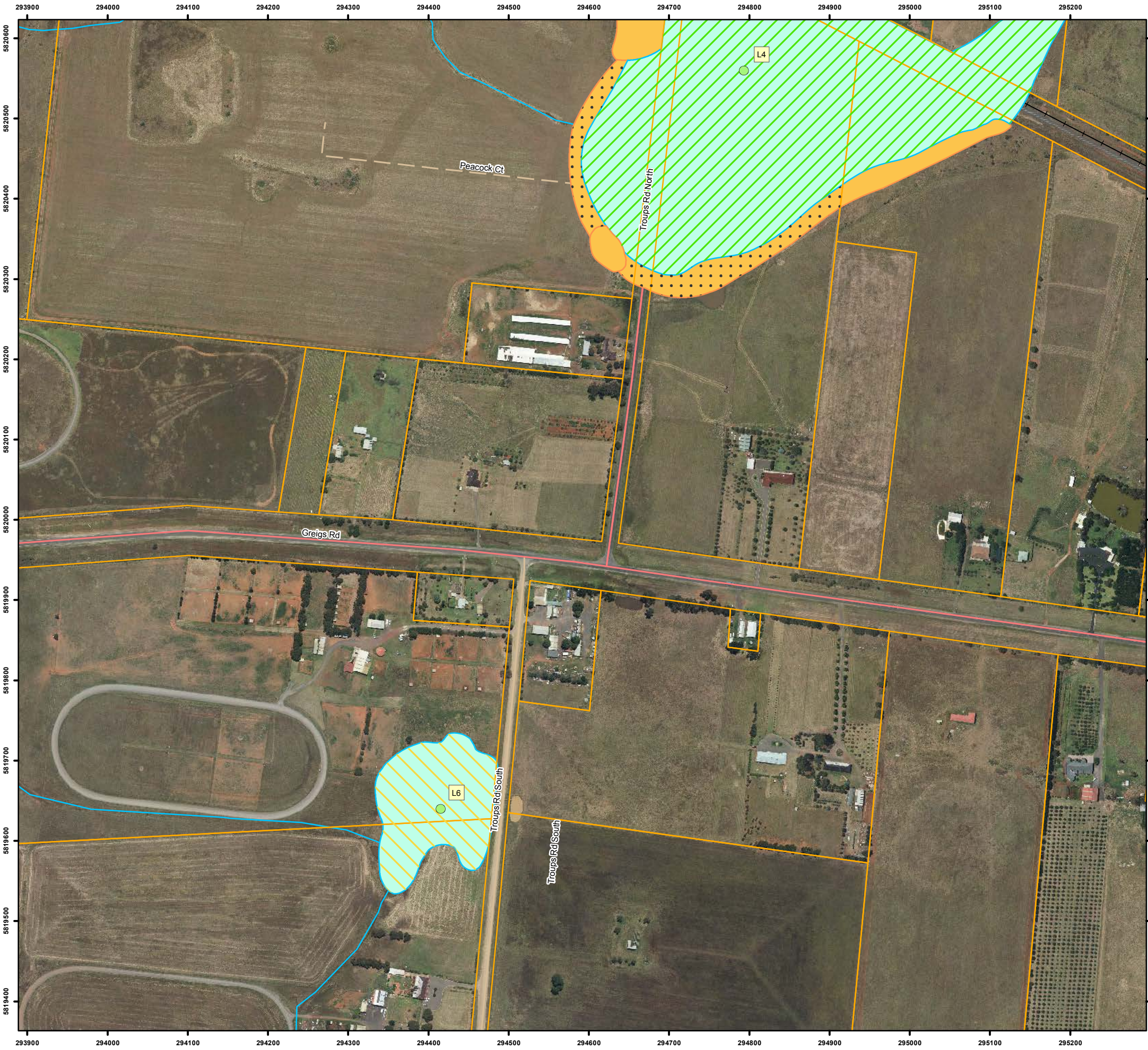
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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd)
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Map 13: Wetland boundaries and Ecological Vegetation Classes Leakes Road DSS



Legend
EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657) - Zone 1
- Freshwater Lignum Shrubland (EVC 657) - Zone 2
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary

050100150200250300350metres

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

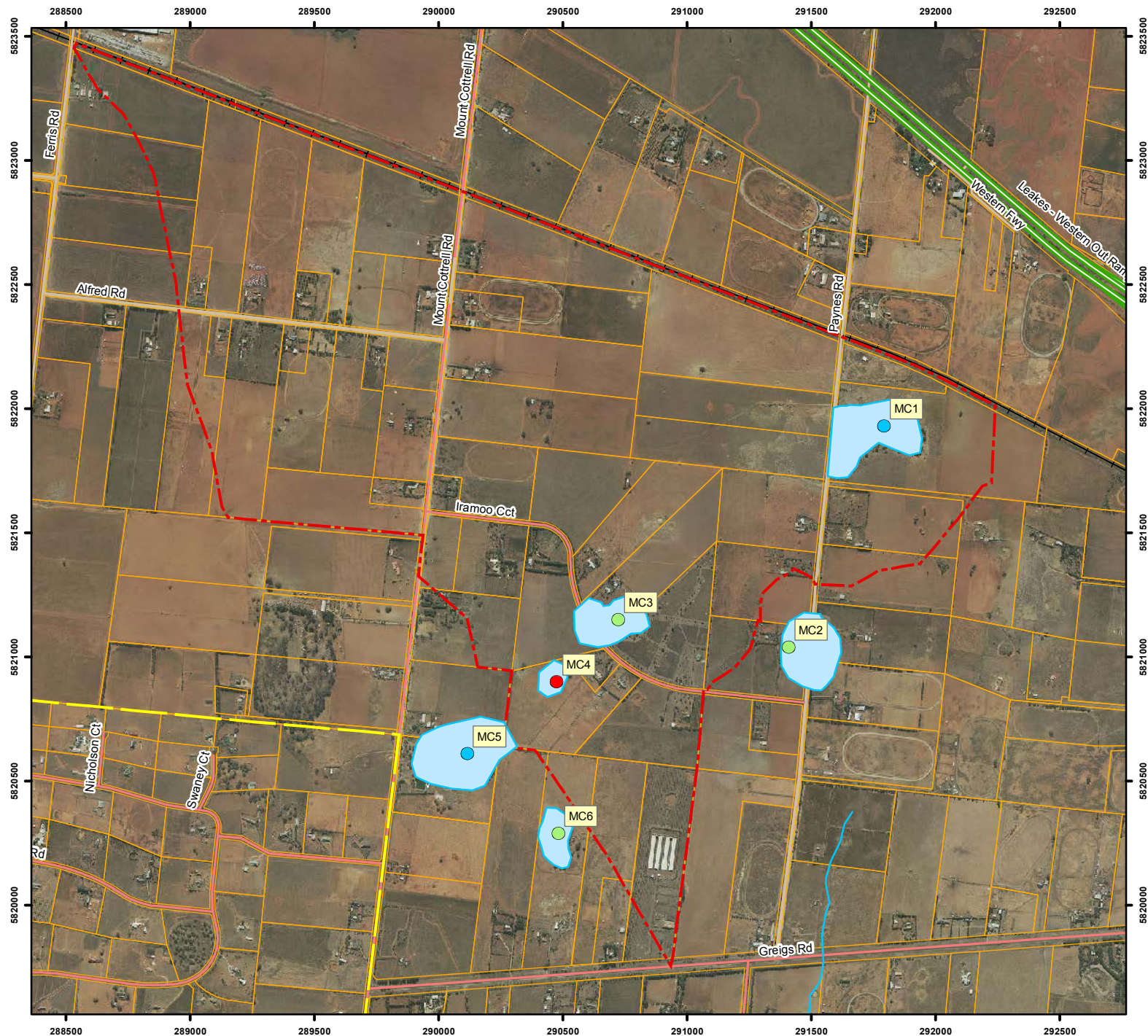
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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd)
and Dylan Osler (Ecological Perspective)
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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**Map 14: Wetlands surveyed within the
Mt Cottrell Road DSS February 2013**



Legend

Study Area

- Proposed Wetland Survey Site

Survey Effort

- Wetland Assessed in situ
- Wetland Assessed in situ; part only
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

Hydrology

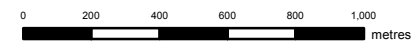
- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Sealed Road
- Unsealed Road
- Railway Line

Administration

- Property Boundary
- DSS Region
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



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Project: Rockbank Area Wetland Survey

Client: Melbourne Water

Author: Holocene Environmental Science

Map Prepared: 25th February 2013

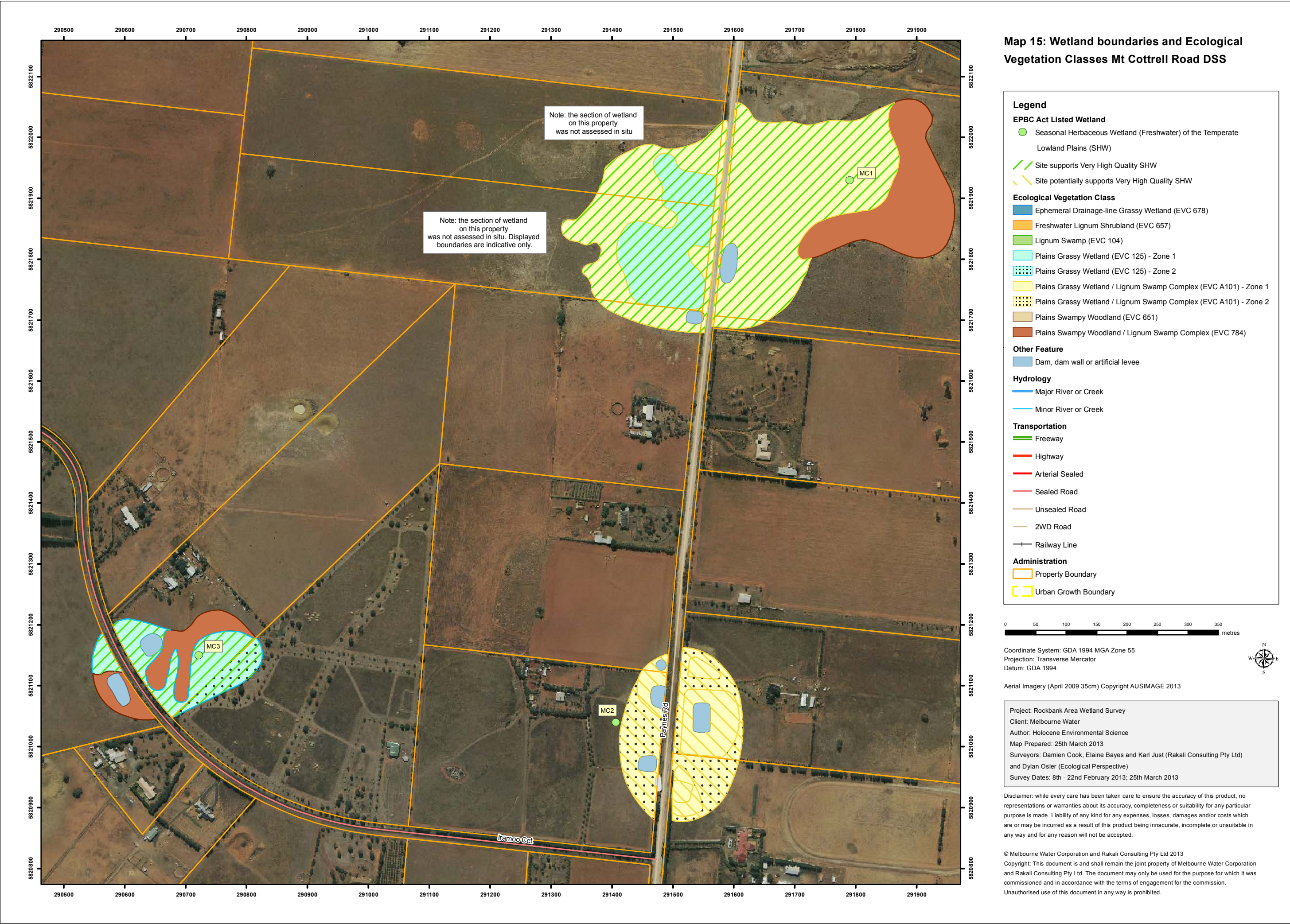
Surveyors: Rakali Consulting Pty Ltd

Survey Dates: 8th - 22nd February 2013; 25th March 2013

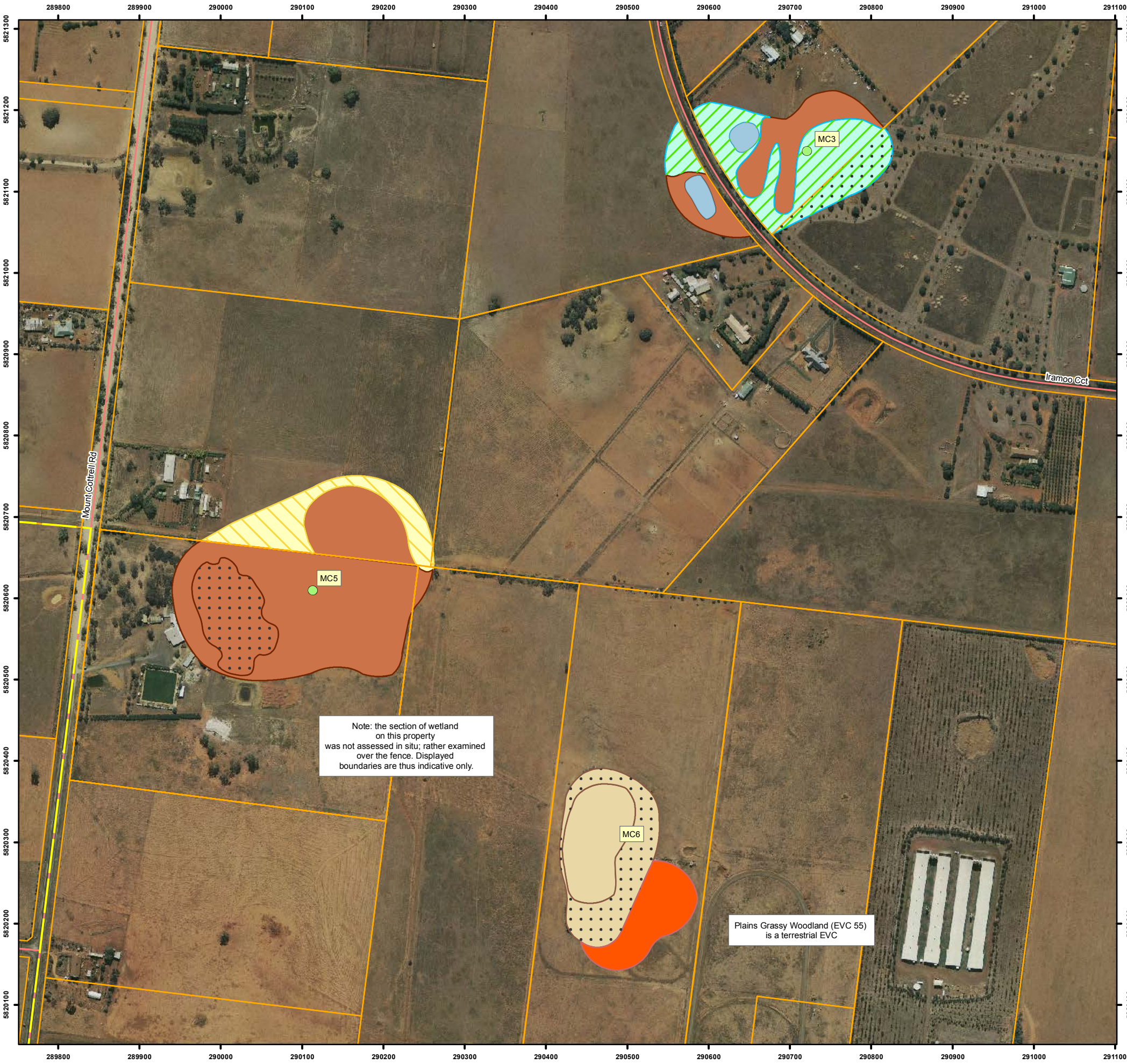
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Map 15: Wetland boundaries and Ecological Vegetation Classes Mt Cottrell Road DSS



Map 16: Wetland boundaries and Ecological Vegetation Classes Mt Cottrell Road DSS



Legend

EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125) - Zone 1
- Plains Grassy Wetland (EVC 125) - Zone 2
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Grassy Woodland (EVC 55)
- Plains Swampy Woodland (EVC 651) - Zone 1
- Plains Swampy Woodland (EVC 651) - Zone 2
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784) - Zone 1
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784) - Zone 2

Other Feature

- Dam, dam wall or artificial levee

Hydrology

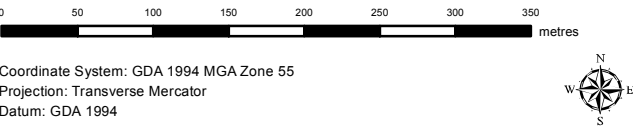
- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary



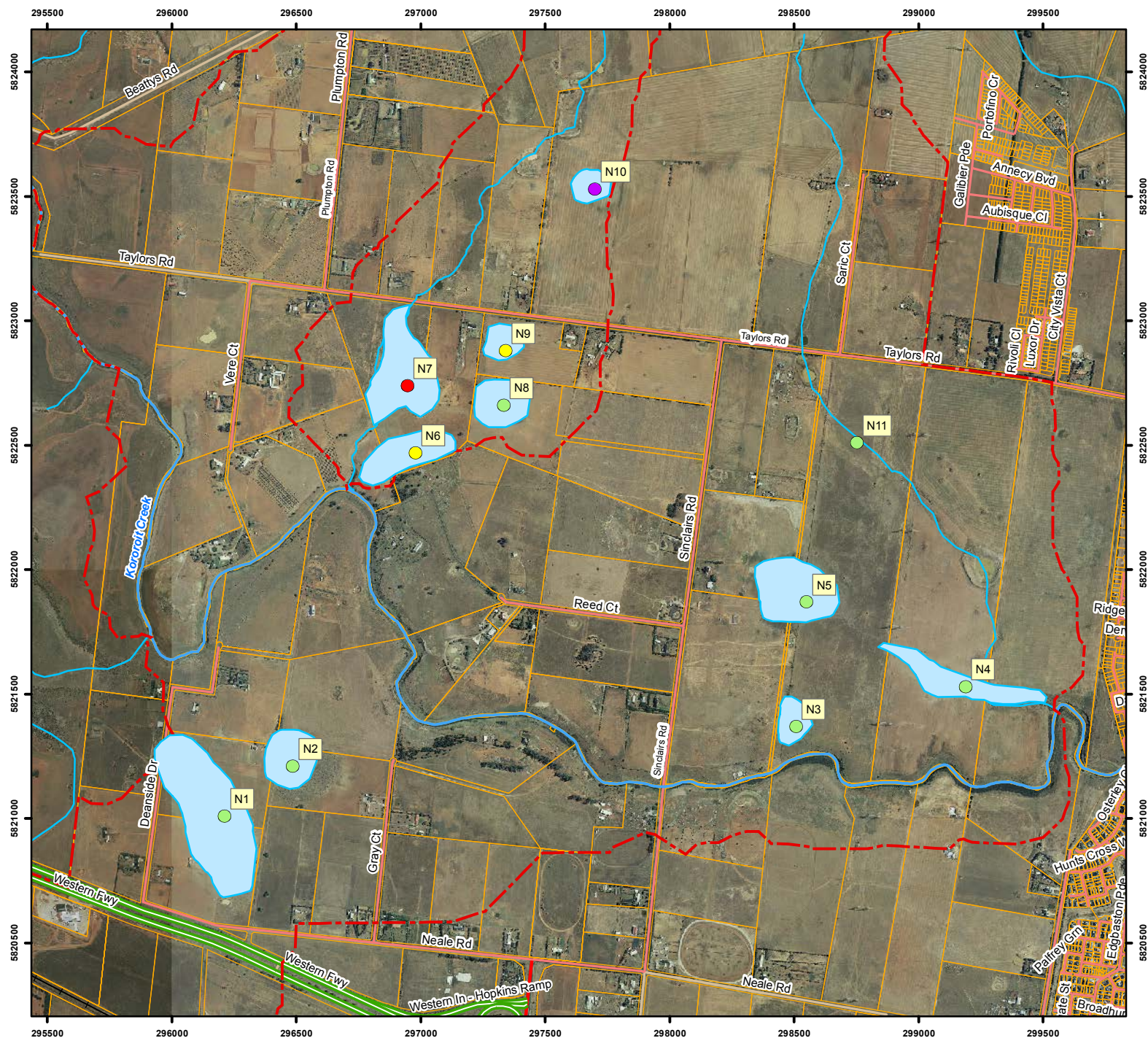
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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd) and Dylan Osler (Ecological Perspective)
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 17: Wetlands surveyed within the North Side of Kororoit Creek DSS February 2013



Legend

Study Area

Proposed Wetland Survey Site

Survey Effort

- Wetland Assessed in situ
- Wetland Assessed in situ; part only
- Site Assessed in situ; potentially a wetland
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Sealed Road
- Unsealed Road
- Railway Line

Administration

- Property Boundary
- DSS Region
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



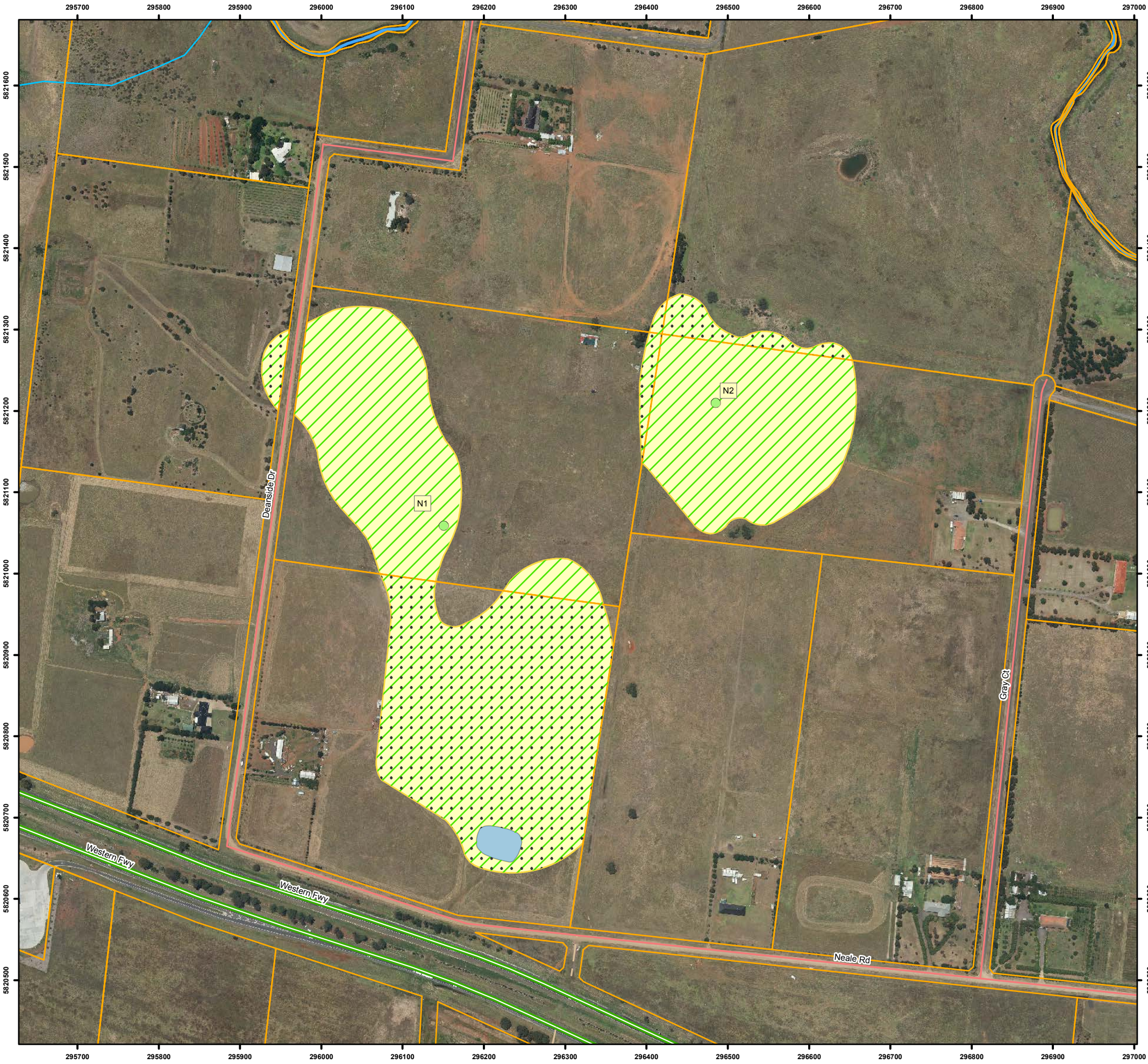
Aerial Imagery (January 2009 15cm) Copyright AUSIMAGE 2013

Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th February 2013
Surveyors: Rakali Consulting Pty Ltd
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 18: Wetland boundaries and Ecological Vegetation Classes North Side of Kororoit Creek DSS



Legend

EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104) - Zone 1
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101) - Zone 1
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101) - Zone 2
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary

050100150200250300350

metres

Coordinate System: GDA 1994 MGA Zone 55

Projection: Transverse Mercator

Datum: GDA 1994

N

E

S

W

Aerial Imagery (December 2011 10cm) Copyright AUSIMAGE 2013

Project: Rockbank Area Wetland Survey

Client: Melbourne Water

Author: Holocene Environmental Science

Map Prepared: 25th March 2013

Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd)

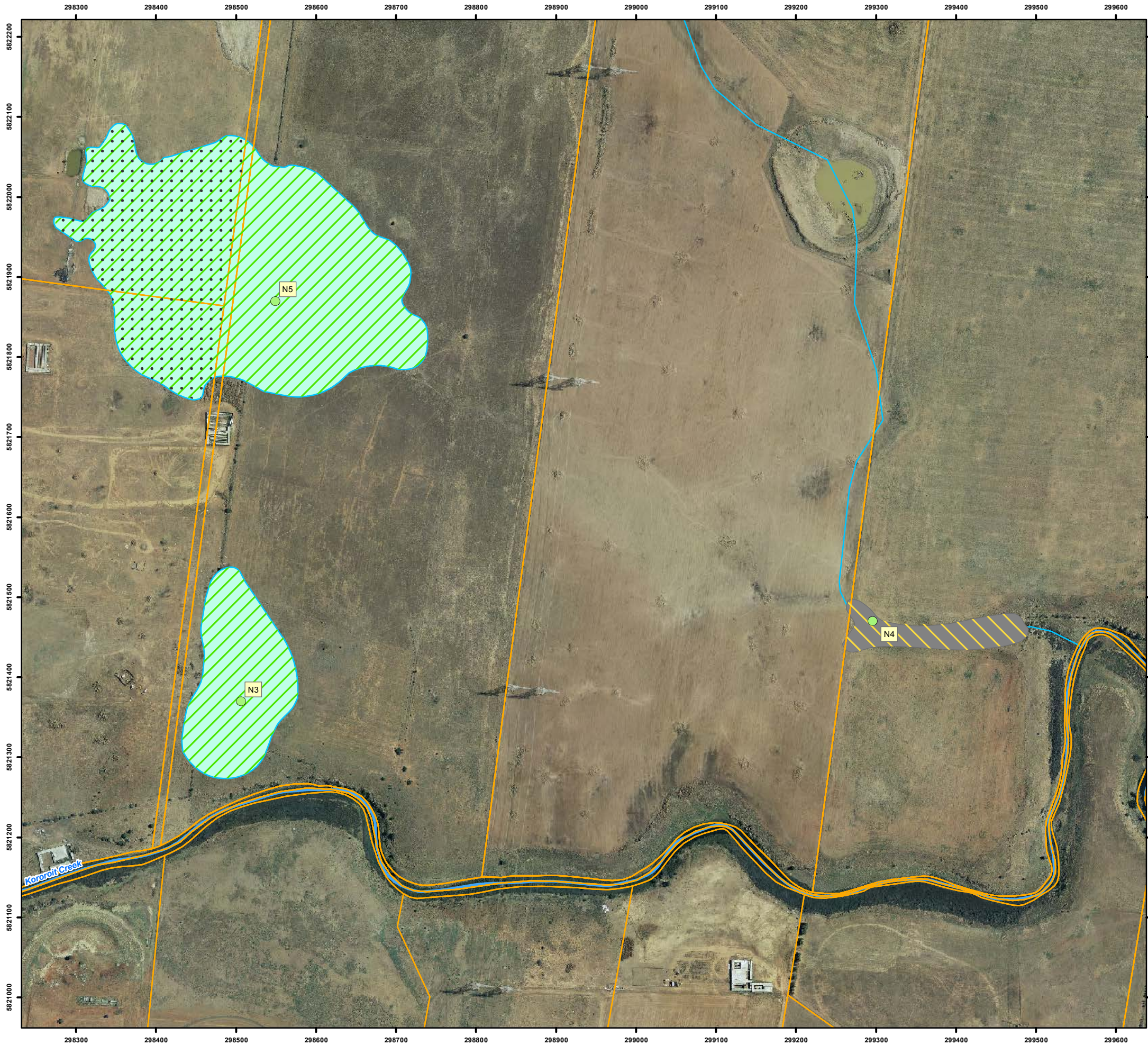
and Dylan Osler (Ecological Perspective)

Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 19: Wetland boundaries and Ecological Vegetation Classes North Side of Kororoit Creek DSS



Legend

EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lava Plain Ephemeral Wetland (EVC 974)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125) - Zone 1
- Plains Grassy Wetland (EVC 125) - Zone 2
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



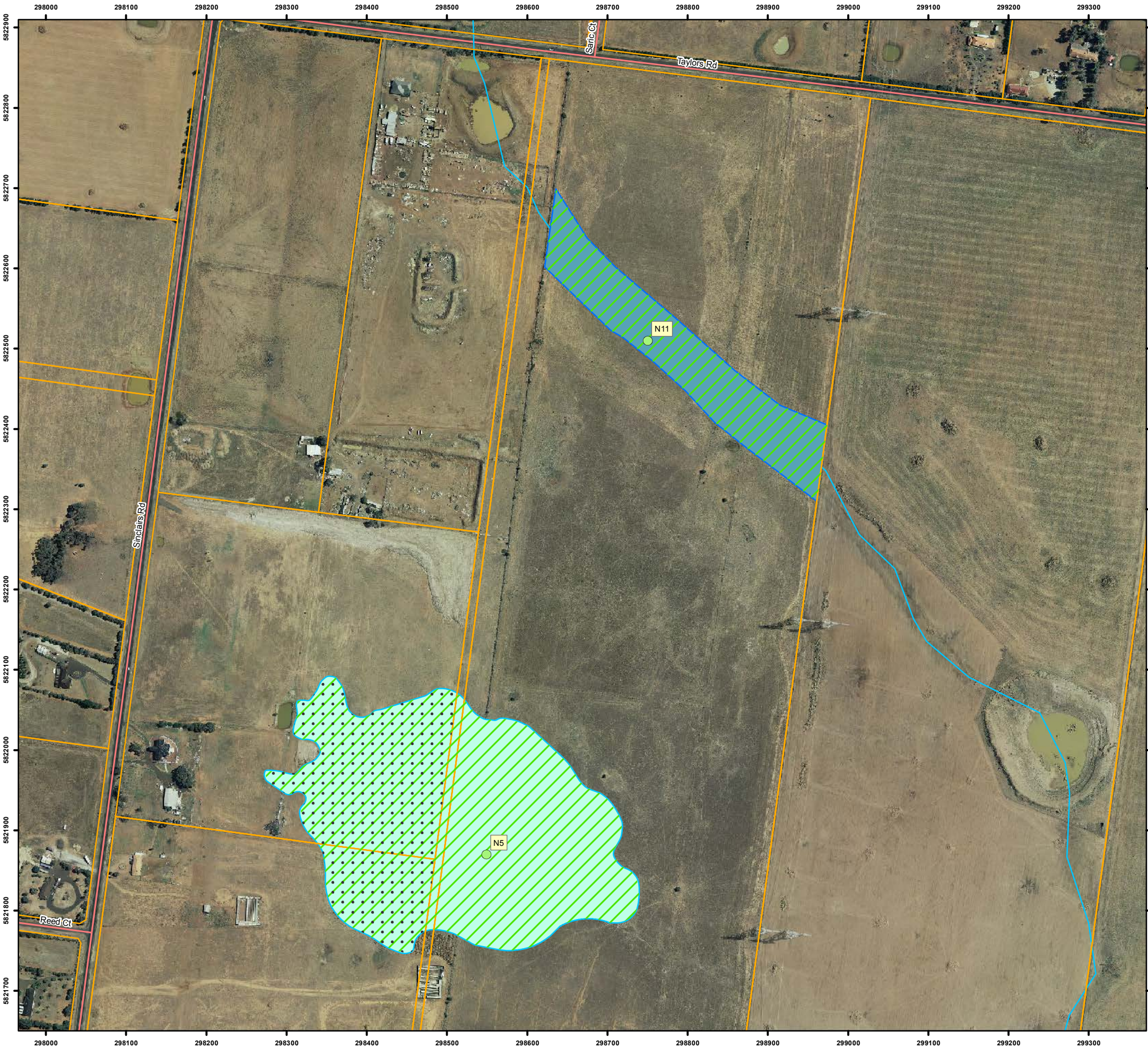
Aerial Imagery (January 2009 15cm) Copyright AUSIMAGE 2013

Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd) and Dylan Osler (Ecological Perspective)
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 21: Wetland boundaries and Ecological Vegetation Classes North Side of Kororoit Creek DSS



Legend

EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125) - Zone 1
- Plains Grassy Wetland (EVC 125) - Zone 2
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



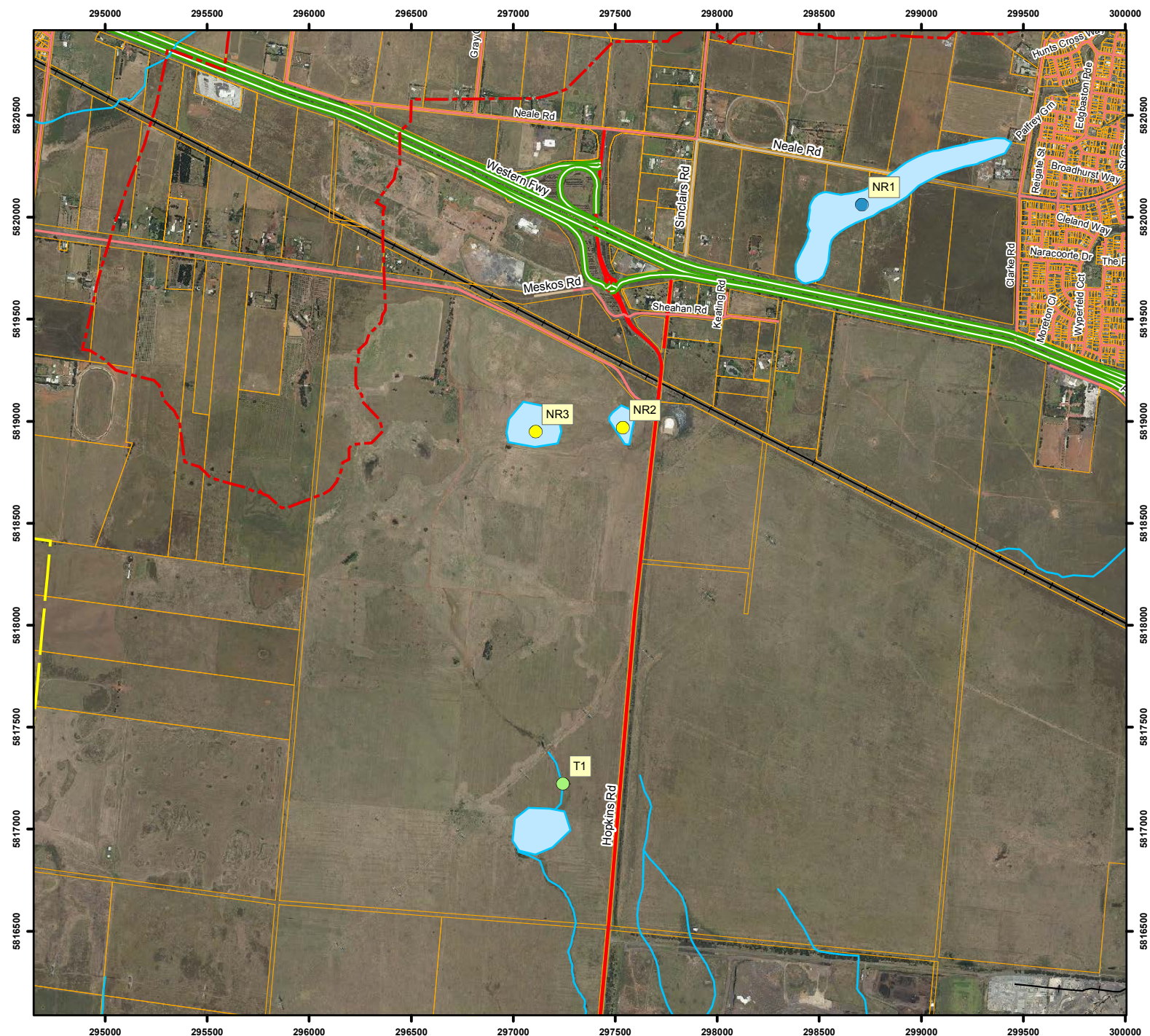
Aerial Imagery (January 2009 15cm) Copyright AUSIMAGE 2013

Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd)
and Dylan Osler (Ecological Perspective)
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 22: Wetlands surveyed within the Neale Road DSS and Truganina DSS February 2013



Legend

Study Area

- Proposed Wetland Survey Site

Survey Effort

- Wetland Assessed in situ
- Wetland Assessed in situ; part only
- Wetland Assessed partly from historical records
- Site Assessed in situ; potentially a wetland
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Sealed Road
- Unsealed Road
- Railway Line

Administration

- Property Boundary
- DSS Region
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th February 2013
Surveyors: Rakali Consulting Pty Ltd
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 23: Wetland boundaries and Ecological Vegetation Classes Neale Road DSS and Truganina DSS



Legend
EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)
- EVC not assigned

Other Feature

- Dam, dam wall or artificial levee

Hydrology

- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary

050100150200250300350metres

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

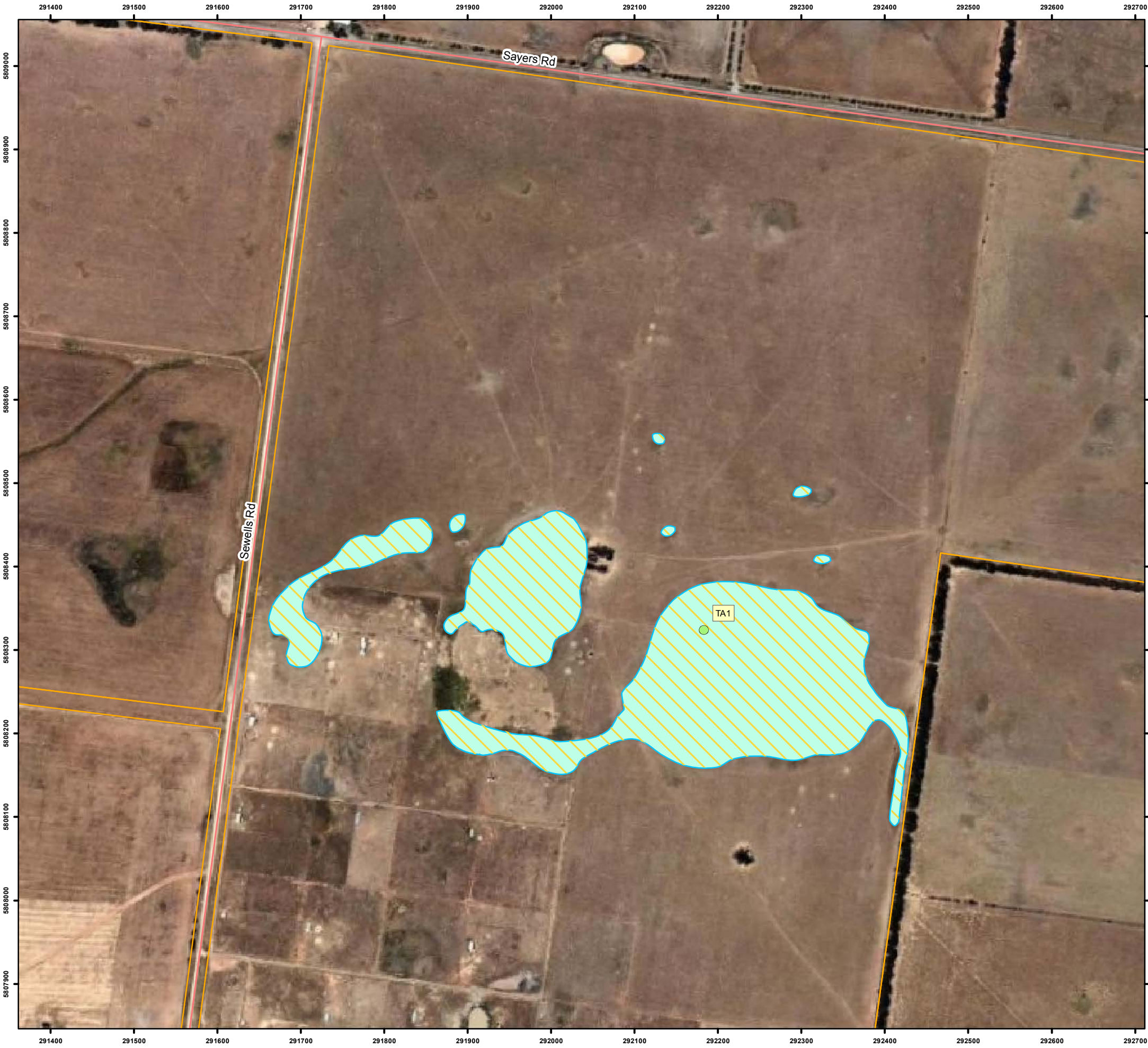
Aerial Imagery December 2011 10cm) Copyright AUSIMAGE 2013

Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd) and Dylan Osler (Ecological Perspective)
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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Map 25: Wetland boundaries and Ecological Vegetation Classes Tarneit



Legend

EPBC Act Listed Wetland

- Seasonal Herbaceous Wetland (Freshwater) of the Temperate Lowland Plains (SHW)
- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

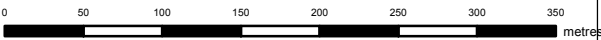
- Major River or Creek
- Minor River or Creek

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Administration

- Property Boundary
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994



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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 25th March 2013
Surveyors: Damien Cook, Elaine Bayes and Karl Just (Rakali Consulting Pty Ltd)
and Dylan Osler (Ecological Perspective)
Survey Dates: 8th - 22nd February 2013; 25th March 2013

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3.4 Fauna

3.4.1 Previous surveys

Fauna surveys previously conducted at wetland sites in the study area have already been discussed in section 3.1 of this report. These surveys have documented some important values including:

Mt Cottrell Road Swamp (MC5) - Anecdotal reports suggested that large numbers of waterbirds frequented the wetlands when filled after heavy and prolonged rains. A high diversity of uncommon woodland birds has been recorded including Jacky Winter, White-winged Triller, Rufous Songlark and Varied Sitella. Rare and threatened species recorded at this wetland include the nationally vulnerable EPBC Act listed Growling Grass Frog and the near threatened Diamond Firetail.

Paynes Road, North Swamp (MC1) - Anecdotal reports suggested that small numbers of water birds frequented the swamp when full. The large River Red Gums were described as important nesting and feeding habitat for non-passerine species such as Tawny Frogmouth, Eastern Rosella and Red-rumped Parrot. Rare and threatened species recorded in the wetland include the nationally vulnerable EPBC Act listed Growling Grass Frog, vulnerable Australasian Shoveler and Eastern Great Egret and near threatened Whiskered Tern and Latham's Snipe.

Paynes Road, South Swamp (MC2) - Few species were recorded at the site, however it was noted that its location close to Paynes Road, North Swamp and Rockbank Railway Swamp increased its significance. No threatened species have as yet been recorded at this site.

Rockbank Railway Swamp (not surveyed during the current assessment) - Anecdotal reports suggested low numbers of water birds visited the wetland when water was present.

Troups Road Swamp (L4) - Anecdotal reports suggested that large numbers of waterbirds frequented and bred within the swamp when substantial amounts of water were present after heavy rains. Rare and threatened species recorded in the wetland include the nationally vulnerable and EPBC Act listed Growling Grass Frog, the nationally endangered and EPBC Act listed Australasian Bittern, the vulnerable Australasian Shoveler and the near threatened Royal Spoonbill and Latham's Snipe.

Lignum Wetland north of Beatty's Road, Rockbank (K3) - Several hundred Growling Grass Frogs were recorded breeding in this wetland after it was filled by large rain events in 2010, and it was described as highly important for this nationally vulnerable and EPBC Act listed species (Gilmore et al 2011). The wetland was also considered important for the near threatened Latham's Snipe.



Photograph: 8 The Growling Grass Frog (*Litoria raniformis*) has been recorded in large numbers at site K3 (note: this species was not recorded during the current survey).

Lignum Wetland south of Beatty's Road, Rockbank (K6 and K4) - These wetlands had not been surveyed but were considered likely to support similar values as Site K3, particularly for Growling Grass Frog.

Sewells Road Swamp (Ta1) - Regarded to be of local significance to fauna by Beardsell et al. (1991).

3.4.2 Current survey period

The current survey period was not undertaken at an ideal time to record wetland fauna species, as all the wetlands were very dry. Most wetland birds are likely to have retreated to more permanent wetlands, while amphibians would have been sheltering or also would have retreated to wetter habitats, such as along Kororoit Creek.

Fauna species most frequently observed at the wetlands during the course of the investigation were the Singing Bushlark and Richard's Pipit, which are commonly found in grassy wetland habitats, and the Zebra Finch, which occurred in large flocks often amongst Tangled Lignum.



Photograph 9: The Zebra Finch (*Taeniopygia guttata*) was commonly observed at wetlands within the study area supporting Tangled Lignum (*Muehlenbeckia florulenta*).

4.0 DISCUSSION

The listing advice for SHW (SEWPaC 2012) provides criteria for assessing whether a site is of national environmental significance based on its size, weed cover and whether or not it supports a diversity of species considered to be sensitive to disturbance. Eleven of the sites examined within the study area are of a size and quality that qualify them to be considered of very high quality SHW, and are therefore matters of national environmental significance under the EPBC Act (Table 3). Any development proposal that will impact upon wetlands identified as very high quality remnants of SHW is referable to the Commonwealth government, who must then decide whether development should be permitted and under what circumstances or conditions.

Table 3: List of wetland sites surveyed in February and March 2013 that meet the criteria for Very High Quality Seasonally Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains

Site	Size (Ha)	Ecological Vegetation Class (EVC)	Number of indigenous flora	Very High Quality SHW (number of indicator species in parentheses)	IWC Score	Rare Fauna	Water Depth / Extent at time of survey
D6	4	Ephemeral Drainage-line Grassy Wetland	23	Yes (3)	5 (moderate)	None recorded	Dry
L1	8.6	Plains Grassy Wetland & Plains Swampy Woodland/Lignum Swamp Complex	24	Yes (3)	8 (good)	None recorded	Dry
L4	16.5	Plains Grassy Wetland & Freshwater Lignum Shrubland	24	Yes (4)	7 (good)	Australasian Bittern, Latham's Snipe, Royal Spoonbill, Australasian Shoveler, Growling Grass Frog ²	Dry
MC1	15.2	Plains Grassy Wetland, Plains Grassy Wetland/Lignum Swamp Complex & Plains Swampy Woodland/Lignum Swamp Complex	41	Yes (3)	8 (good)	Whiskered Tern, Latham's Snipe, Australasian Shoveler, Eastern Great Egret, Growling Grass Frog ²	Dry
MC3	3	Plains Grassy Wetland & Plains Swampy Woodland/Lignum Swamp Complex	35	Yes (3)	7 (good)	None recorded	Dry
N1	13	Plains Grassy Wetland/Lignum Swamp Complex	27	Yes (3)	7 (good)	None recorded	Dry
N2	5.6	Plains Grassy Wetland/Lignum Swamp Complex	24	Yes (4)	8 (good)	None recorded	Dry
N3	2.5	Plains Grassy Wetland	17	Yes (5)	9 (excellent)	None recorded	Dry

Site	Size (Ha)	Ecological Vegetation Class (EVC)	Number of indigenous flora	Very High Quality SHW (number of indicator species in parentheses)	IWC Score	Rare Fauna	Water Depth / Extent at time of survey
N5	10	Plains Grassy Wetland	32	Yes (10)	8 (good)	None recorded	Dry
N11	2.9	Ephemeral Drainage-line Grassy Wetland	18	Yes (3)	7 (good)	None recorded	Dry
NR1	10	Plains Grassy Wetland	13	Yes (10)	Could not be assessed	Latham's Snipe ³	Dry



Photograph 10: The Swamp Early Nancy (*Wurmbea dioica* subsp. *lacunaria*) (left) has been recorded at site NR1. There are very few records of this distinct taxa in Victoria, and they are mainly from the north and west of the state. Purple Bladderwort (*Utricularia beaugleholei*) (right) was recorded at site NR1 during a wet period in the past. A voucher specimen of this species collected at site NR1 is held at the National Herbarium of Victoria.

Using the precautionary principle all sites identified with the potential to be very high quality SHW should be treated as such until proven otherwise by a thorough floristic survey under appropriate conditions. These sites are D3, D4, K3, K4, L2, L3a, L6, MC2, MC5, N1, N4, N8, T1 and Ta1. Although not enough indicator species were located at sites D3, D4, K3, K4, L2, L3a, L6, MC2, MC5, N4, N8, T1 and Ta1 when surveyed in February and March 2013, these thirteen sites were relatively intact and may support sufficient indicator species if surveyed during an appropriate season.

In an urban context, natural wetlands within open space areas provide; aesthetic values, opportunities for passive recreation such as bird watching and nature study, a resource for environmental education, and ecological services such as insect pest control. For example, while site MC6 does not qualify as SHW (and therefore does not have statutory protection under the EPBC Act) it is still a significant wetland. As it is dominated by River Red Gums it provides important wildlife habitat, and as the trees are already mature would provide amenity and aesthetic value in a new suburb where any newly established trees would take time to establish. The vegetation of this site is a remnant of the bioregionally endangered EVC Plains Swampy Woodland and therefore worthy of protection. The other site not classified as SHW but still considered as significant is the Plains Swampy Woodland/Lignum Swamp Complex component of K6.

These sites should be considered for protection whenever possible on the grounds that they are remnants of bioregionally endangered ecosystems and have intrinsic value for the conservation of native flora and fauna. Under Victoria's Native Vegetation Framework any development proposal is supposed to consider the presence of native vegetation and avoid or minimise damage to it. Under this Framework any native vegetation that is to be cleared must be offset by the protection of similar native vegetation elsewhere at the cost of the developer.

It is considered unlikely that the remaining sites (D5, D7, K2a and N10) would support a sufficient number of indicator species to be considered high quality due to their relatively degraded condition, however these wetlands should also be surveyed during a more appropriate season to confirm this.

Wetlands that are to be conserved that occur within areas proposed for development require a buffer of native vegetation to assist in the protection of their environmental values. The necessary buffer width required around a wetland to effectively protect it is determined by the type of wetland, proposed land use intensity, and the functions of the wetland (WSDE 2005). The Water and Rivers

Commission of Western Australia recommends a minimum buffer width of 50 m around wetlands to protect their environmental values (WRC 2000).

In order to protect the environmental values of wetland sites natural physical form and hydrology must be maintained. Buffers of restored native vegetation around these areas will assist in maintaining the ecological health of these wetlands. The width of these buffers should be 30 metres either side of a drainage line from the top of its bank and 50 metres around a wetland (Price et al. 2004).

Sites supporting native woody vegetation within the study area, particularly River Red Gums, are likely to be groundwater dependent. This is because these trees would be unlikely to establish and survive under the low rainfall conditions (as low as 450 mm annually in the Mt Cottrell area) prevalent within the study area without additional water inputs from surface run-off or groundwater. This has implications for the survival and management of these wetlands if urbanisation is to occur within their groundwater catchments. Urbanisation reduces the recharge of local groundwater aquifers because all impervious areas such as roads and roofs intercept precipitation and direct it into the stormwater system, rather than allowing it to infiltrate into the ground. If groundwater dependent ecosystems are to survive the urbanisation of their catchments high quality, treated stormwater must either be directed into them, or allowed to infiltrate into the local groundwater table around them in a quantity commensurate with their natural requirements. Either too little or too much water will cause ecological degradation.

Lava Plain Ephemeral Wetland is a recently recognised Ecological Vegetation Class. Very limited data is available about the floristic composition, habitat, and distribution or conservation status of this vegetation type. From what is known it appears to have an extremely restricted distribution, occurring in minor drainage lines in low rainfall areas of the Victorian Volcanic Plain. This EVC has a unique floristic composition and provides important habitat for the endangered and FFG Act listed *Cullen parvum* (Small Scurf-pea). Very few intact examples are known, none of which are protected within the conservation reserve system.

Of the very few known sites almost all are at the eastern end of the VVP, within Melbourne's western growth corridor. Intact examples that have been recently destroyed or degraded by urban development occurred within the Caroline Springs and Eynesbury areas. At Caroline Springs Lava Plain Ephemeral Wetland occurred along section of Stony Hill Creek. As urban development has progressed in the catchment of this creek the frequency and volume of water flow has significantly

increased, resulting in the proliferation of weeds such as Water Couch (**Paspalum distichum*) and the ultimate displacement of Lava Plain Ephemeral Wetland as the hydrological regime became unsuitable for its component species.

If any examples of this extremely endangered vegetation type are to be retained within an urban context a natural hydrological regime must be maintained. This would involve bypassing most storm water flows around the drainage-lines where it occurs, and allowing only storm water that has been treated to a high quality to flow into this habitat at frequency and volume commensurate with natural flows.

Further research is required to gather more precise data on the floristic composition, habitat, distribution and conservation status of this EVC, with a focus on attempting to locate areas that could be protected that are outside of areas currently proposed for development (for example within the Western Grassland Reserve).

Previous attempts to document the extent and quality of wetlands on the Victorian Volcanic Plain in Melbourne's western growth area, such as Payze and Westcott (2011) and Sinclair (2012), are likely to have under-estimated the number, extent and quality of the wetlands of this region due to difficulties in identifying their likely distribution across the landscape, gaining access to the private property and surveying sites in a favourable season. Interrogation of suitable infrared satellite imagery taken during a wet period and LIDAR data may assist in future attempts to determine the likely location of wetlands across the landscape. Further ground surveys following wet conditions are required in areas that are identified as potentially supporting wetlands to gain a more complete understanding of the distribution, extent and quality of these endangered ecosystems.

5.0 RECOMMENDATIONS

1. Wetland sites D6, L1, L4, MC1, MC3, N1, N2, N3, N5, NR1 and N11 are very high quality SHW and therefore are matters of national environmental significance under the EPBC Act. These sites should be protected within the conservation reserve system and surrounded by adequate buffers. These wetlands will require appropriate amounts of high quality water run-off, and in the case of sites supporting River Red Gums ground water, to ensure their future survival.
2. Site MC6 and the Plains Swampy Woodland/Lignum Swamp Complex component of site K6 are not SHW but are still considered significant remnant vegetation. These should be retained within the landscape within appropriately managed open space reserves. They will require appropriate amounts of high quality water run-off and ground water to ensure their future survival
3. Sites D3, D4, K3, K4, L2, L3a, L6, MC2, MC5, N4, N8, T1, Ta1, D5, and D7 could not be confirmed as 'high quality' during the current project, and should be regarded as high quality until such time as they can be proven otherwise. They should be re-surveyed before planning permission is granted to disturb them or their catchments. Surveys should be completed under suitable conditions to determine if they support sufficient numbers of indicator species i.e. during late spring to early summer during a wet or draw-down phase. If found to be very high quality SHW these sites should be protected within the conservation reserve system and surrounded by adequate buffers. These wetlands will require appropriate amounts of high quality water run-off, and in the case of sites supporting River Red Gums ground water, to ensure their future survival. Note that of these sites K3 and MC5 support known breeding populations of the nationally vulnerable EPBC Act listed Growling Grass Frog and therefore may be considered to be matters of national environmental significance for that reason alone.
4. Further survey work should be conducted in the entire study area to detect wetlands that may have been previously overlooked. Infrared satellite imagery and Lidar data may be useful in determining where as yet undetected wetlands may be. A ground survey during wet conditions may also detect wetlands that are not identifiable from aerial photography. Note that all small creeks and minor drainages in this area have the potential to support either Lava Plain Ephemeral Wetland or Ephemeral Drainage-line Grassy Wetland

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5. Certain fauna species are only likely to be recorded when the wetlands contain more water, including wetland birds such as the Australian Painted Snipe and frog species including the Growling Grass Frog. Surveys for these species should be conducted within the study area the next time the wetlands contain water in early summer.
 6. For wetlands occurring in areas proposed for development, a buffer of native vegetation will be necessary to protect environmental values. In order to protect the environmental values of sites, the natural physical form and hydrology must be maintained. Therefore if the land around the wetland and drainage line is subject to urban development the storm water runoff from these areas must be directed downstream via an underground pipe, with natural flows to the wetland and drainage line from the upstream undeveloped catchment to be maintained. The width of these buffers should be 30 metres either side of the drainage line from the top of its bank and 50 metres around the wetland (Price et al. 2004).
 7. Native vegetation with buffers should be managed to reduce weed cover to less than 5%, with high threat weeds being kept at less than 1% cover. Where native vegetation is degraded these buffers should be revegetated with species appropriate to the landscape position and EVCs.
 8. The water requirements of all ground water dependent ecosystems should be investigated and methods devised to ensure all wetlands receive an appropriate amount of good quality water.
 9. Effective weed management will be essential to ensure the continued ecological integrity of wetlands within the proposed grassland reserve and any native vegetation to be retained within the urban growth boundary.

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Appendix 1 Survey Effort February and March 2013

Table 4: Location of potential and surveyed wetland sites Rockbank area February and March 2013

Site	Survey Effort – Wetland Determination	Surveyors	Survey Date	Number of Properties	Property Number(s)	Address	DSS Region	Datum	Easting	Northing
D1	Not surveyed - no permission to access	-	-	single	143321	60-158 Downing Street MOUNT COTTRELL VIC 3024	Dry Creek Upper DSS	GDA 94 MGA Zone 55	293273	5819000
D2	Site Not Assessed (dam or other feature)	Karl Just and Dylan Osler	22/02/2013	single	25650	246-344 Troups Road South MOUNT COTTRELL VIC 3024	Dry Creek Upper DSS	GDA 94 MGA Zone 55	293722	5818840
D3	Wetland Assessed in situ	Karl Just and Dylan Osler	22/02/2013	multiple	25650/25866	246-344 Troups Road South MOUNT COTTRELL VIC 3024; 327-359 Troups Road South MOUNT COTTRELL VIC 3024	Dry Creek Upper DSS	GDA 94 MGA Zone 55	294376	5818625
D4	Wetland Assessed in situ	Karl Just and Dylan Osler	22/02/2013	single	25908	431-533 Troups Road South MOUNT COTTRELL VIC 3024	Dry Creek Upper DSS	GDA 94 MGA Zone 55	294425	5817290
D5	Wetland Assessed from roadside	Karl Just and Dylan Osler	22/02/2013	multiple	119727	474-528 Troups Road South MOUNT COTTRELL VIC 3024	Dry Creek Upper DSS	GDA 94 MGA Zone 55	294080	5816980
D6	Wetland Assessed in situ	Karl Just and Dylan Osler	22/02/2013	single	329649	535-601 Troups Road South MOUNT COTTRELL VIC 3024	Dry Creek Upper DSS	GDA 94 MGA Zone 55	294475	5816350
D7	Wetland Assessed from roadside	Karl Just and Dylan Osler	22/02/2013	multiple	7682	580-598 Troups Road South MOUNT COTTRELL VIC 3024	Dry Creek Upper DSS	GDA 94 MGA Zone 55	294123	5816370
D8	Not surveyed - no permission to access	-	-	single	147298	298-368 Downing Street MOUNT COTTRELL VIC 3024	Dry Creek Upper DSS	GDA 94 MGA Zone 55	293108	5817210
D9	Site Not Assessed (dam or other feature)	Karl Just and Dylan Osler	21/02/2013	single	142612	367-435 Downing Street MOUNT COTTRELL VIC 3024	Dry Creek Upper DSS	GDA 94 MGA Zone 55	292551	5817050
K1	Wetland Assessed in situ	Karl Just and Dylan Osler	22/02/2013	single	65532	2120-2224 Melton Highway MELTON 3337	Kororoit Creek Upper DSS	GDA 94 MGA Zone 55	289905	5826780
K2a	Wetland Assessed in situ	Damien Cook and Elaine Bayes	19/02/2013	single	137851	10 Judd Court ROCKBANK 3335	Kororoit Creek Upper DSS	GDA 94 MGA Zone 55	291498	5825150
K2b	Site Not Assessed (dam or other feature)	Damien Cook and Elaine Bayes	19/02/2013	single	137851	10 Judd Court ROCKBANK 3335	Kororoit Creek Upper DSS	GDA 94 MGA Zone 55	291564	5825250
K3	Wetland Assessed in situ	Damien Cook and Elaine Bayes	19/02/2013	multiple	130708	1232-1290 Beattys Road ROCKBANK 3335	Kororoit Creek Upper DSS	GDA 94 MGA Zone 55	291211	5824580
K4	Wetland Assessed in situ	Karl Just and Dylan Osler	21/02/2013	multiple	19497	34-64 Paynes Road ROCKBANK VIC 3335	Kororoit Creek Upper DSS	GDA 94 MGA Zone 55	291833	5823860
K5	Site Not Assessed (dam or other feature)	Karl Just and Dylan Osler	21/02/2013	single	27359	2344-2412 Western Highway ROCKBANK VIC 3335	Kororoit Creek Upper DSS	GDA 94 MGA Zone 55	292597	5823700
K6	Wetland Assessed in situ	Damien Cook and Elaine Bayes	18/02/2013	multiple	3814	1031-1085 Beattys Road ROCKBANK 3335	Kororoit Creek Upper DSS	GDA 94 MGA Zone 55	292955	5823630
K7	Site Not Assessed (dam or other feature)	Karl Just and Dylan Osler	22/02/2013	multiple	12898	794-834 Leakes Road ROCKBANK 3335	Kororoit Creek Upper DSS	GDA 94 MGA Zone 55	293562	5824380
L1	Wetland Assessed part in situ; part not assessed	Damien Cook and Elaine Bayes	18/02/2013	single	147983	1212-1218 Leakes Road ROCKBANK 3335	Leakes Road DSS	GDA 94 MGA Zone 55	292494	5821210
L2	Wetland Assessed part in situ; part not assessed	Damien Cook and Elaine Bayes	20/02/2013	single	13102	1213-1257 Leakes Road ROCKBANK 3335	Leakes Road DSS	GDA 94 MGA Zone 55	293202	5821370
L3a	Wetland Assessed in situ	Damien Cook and Elaine Bayes	20/02/2013	single	13094	1211 Leakes Road ROCKBANK 3335	Leakes Road DSS	GDA 94 MGA Zone 55	293777	5821030
L3b	Site Not Assessed (dam or other feature)	Damien Cook and Elaine Bayes	20/02/2013	single	13102	1213-1257 Leakes Road ROCKBANK 3335	Leakes Road DSS	GDA 94 MGA Zone 55	293659	5821160
L4	Wetland Assessed in situ	Karl Just and Dylan Osler	21/02/2013	multiple	12286/28522	230-260 Greigs Road ROCKBANK VIC 3335; 11 Troups Road ROCKBANK 3335	Leakes Road DSS	GDA 94 MGA Zone 55	294793	5820560

Site	Survey Effort – Wetland Determination	Surveyors	Survey Date	Number of Properties	Property Number/(s)	Address	DSS Region	Datum	Easting	Northing
L5	Not surveyed - no permission to access	-	-	single	12245	322-412 Greigs Road ROCKBANK VIC 3335	Leakes Road DSS	GDA 94 MGA Zone 55	294074	5820100
L6	Wetland Assessed in situ	Damien Cook and Elaine Bayes	20/02/2013	multiple	12526/25635	457-533 Greigs Road MOUNT COTTRELL VIC 3024; 180-228 Troups Road South MOUNT COTTRELL VIC 3024	Leakes Road DSS	GDA 94 MGA Zone 55	294415	5819640
MC1	Wetland Assessed part in situ; part not assessed	Damien Cook and Elaine Bayes	18/02/2013	single	19380	259-305 Paynes Road ROCKBANK VIC 3335	Mt Cottrell Road DSS	GDA 94 MGA Zone 55	291790	5821930
MC2	Wetland Assessed in situ	Damien Cook and Elaine Bayes	18/02/2013	multiple	126763	399-429 Paynes Road ROCKBANK VIC 3335	Mt Cottrell Road DSS	GDA 94 MGA Zone 55	291406	5821040
MC3	Wetland Assessed in situ	Damien Cook and Elaine Bayes	18/02/2013	multiple	12773/12781/12799	3 Iramoo Circuit ROCKBANK VIC 3335; 4 Iramoo Circuit ROCKBANK VIC 3335; 5 Iramoo Circuit ROCKBANK VIC 3335	Mt Cottrell Road DSS	GDA 94 MGA Zone 55	290721	5821150
MC4	Not surveyed - no permission to access	-	-	multiple	363424	2/6 Iramoo Circuit ROCKBANK VIC 3335	Mt Cottrell Road DSS	GDA 94 MGA Zone 55	290472	5820900
MC5	Wetland Assessed part in situ; part assessed over fence	Damien Cook and Elaine Bayes	19/02/2013	multiple	17988	1247-1255 Mount Cottrell Road ROCKBANK VIC 3335	Mt Cottrell Road DSS	GDA 94 MGA Zone 55	290113	5820610
MC6	Wetland Assessed in situ	Damien Cook and Elaine Bayes	19/02/2013	single	12120	794-818 Greigs Road ROCKBANK VIC 3335	Mt Cottrell Road DSS	GDA 94 MGA Zone 55	290480	5820290
N1	Wetland Assessed in situ	Karl Just and Dylan Osler	21/02/2013	multiple	7278	2-44 Deanside Drive ROCKBANK VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	296211	5821010
N2	Wetland Assessed in situ	Karl Just and Dylan Osler	21/02/2013	multiple	7286/12021/12039	46-102 Deanside Drive ROCKBANK VIC 3335; 80-120 Gray Court ROCKBANK VIC 3335; 121-129 Gray Court ROCKBANK VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	296485	5821210
N3	Wetland Assessed in situ	Karl Just and Dylan Osler	22/02/2013	single	24844	961-1025 Taylors Road PLUMPTON VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	298506	5821370
N4	Wetland Assessed in situ	Karl Just and Dylan Osler	22/02/2013	multiple	24927	855-903 Taylors Road PLUMPTON VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	299187	5821530
N5	Wetland Assessed in situ	Karl Just and Dylan Osler	22/02/2013	multiple	24844/20610/20628	961-1025 Taylors Road PLUMPTON VIC 3335; 81-135 Sinclairs Road PLUMPTON VIC 3335; 137-235 Sinclairs Road PLUMPTON VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	298549	5821870
N6	Site Not Assessed (dam or other feature)	Karl Just and Dylan Osler	22/02/2013	multiple	25891	91-95 Vere Court PLUMPTON VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	296978	5822470
N7	Not surveyed - no permission to access	-	-	multiple	24885/24877	1205-1231 Taylors Road PLUMPTON VIC 3335; 1233-1287 Taylors Road PLUMPTON VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	296946	5822740
N8	Wetland Assessed in situ	Karl Just and Dylan Osler	21/02/2013	single	20578	22-66 Sinclairs Road PLUMPTON VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	297333	5822660
N9	Site Not Assessed (dam or other feature)	Karl Just and Elaine Bayes	25/03/2013	single	24893	1157-1203 Taylors Road PLUMPTON VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	297340	5822880
N10	Site Assessed in situ; potentially a wetland	Karl Just and Dylan Osler	21/02/2013	single	24661	1056-1150 Taylors Road PLUMPTON VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	297698	5823530
N11	Wetland Assessed in situ	Karl Just and Dylan Osler	22/02/2013	single	24844	961-1025 Taylors Road PLUMPTON VIC 3335	North side of Kororoit Creek Upper Catchment DSS	GDA 94 MGA Zone 55	298750	5822510
NR1	Wetland Assessed part in situ; part from historical records	Karl Just and Dylan Osler	22/02/2013	multiple	27664	1430-1454 Western Highway ROCKBANK VIC 3335	Neale Road DSS	GDA 94 MGA Zone 55	298709	5820064
NR2	Site Not Assessed (dam or other feature)	Karl Just and Elaine Bayes	25/03/2013	single	12716	121-179 Greigs Road TRUGANINA VIC 3029	Neale Road DSS	GDA 94 MGA Zone 55	297537	5818970
NR3	Site Not Assessed (dam or other feature)	Karl Just and Elaine Bayes	25/03/2013	single	12716	121-179 Greigs Road TRUGANINA VIC 3029	Neale Road DSS	GDA 94 MGA Zone 55	297109	5818950
T1	Wetland Assessed in situ	Karl Just and Elaine Bayes	25/03/2013	single	12716	121-179 Greigs Road TRUGANINA VIC 3029	Truganina DSS	GDA 94 MGA Zone 55	297243	5817224
TA1	Wetland Assessed in situ	Karl Just and Elaine Bayes	25/03/2013	single	124354	Sayers Road TARNEIT VIC 3029	Tarneit	GDA 94 MGA Zone 55	292183	5808324

Note: although permission was not gained to access site L5, a roadside inspection revealed that the site supported a dam and therefore didn't meet assessment criteria

Appendix 2 Wetland EVC descriptions

EVC 678 Ephemeral Drainage-line Grassy Wetland

Defining characteristics: Ephemeral wetlands in gilgai systems along poorly defined drainage lines within native grassland, with patchy local variation of the balance between wetland and dryland elements of flora. Localised and endangered, low rainfall volcanic plains to near west of Melbourne and possibly also Cressy and Skipton areas.

Indicator species: Relatively open *Themeda triandra* and/or *Rytidosperma duttonianum* grassland with *Eryngium vesiculosum*, *Helichrysum* sp. aff. *rutidolepis*, *Eleocharis acuta*, *Marsilea drummondii*, *Amphibromus nervosus* and *Lachnagrostis filiformis* var. 2, *Eleocharis pusilla* and *Haloragis heterophylla*, *Calotis* spp., *Calocephalus citreus*, *Eryngium ovinum*, *Minuria leptophylla*, *Walwhalleya proluta* and *Chloris truncata*.

EVC 657 Freshwater Lignum Shrubland

Defining characteristics: Open shrubland on fringes of wetlands (typically shallow lakes) on basalt, potentially in intermittently damp sites but above normal inundation levels and lacking obligate wetland flora. Highly restricted, scattered remnants in lower-rainfall areas of the western volcanic plain.

Indicator species: *Muehlenbeckia florulenta*, with associated species including *Rytidosperma duttonianum*, *Poa labillardierei*, *Haloragis aspera*, *Epilobium billardierianum*, *Juncus flavidus*, *Oxalis exilis* and *Rumex brownii*.

EVC 974 Lava Plain Ephemeral Wetland

Defining characteristic: Low herbland of ephemeral wetland on distinctive rocky plains substrate.

Structure: Herbland, mostly < 0.05 m height.

Habitat: Ephemeral wetlands within stony-swale on geologically Recent lava flows (in-filled creek valley with tumuli), at c. 70 m elevation, on shallow brown loamy soils.

Floristics: The main species are *Persicaria prostrata*, *Oxalis ?exilis* s.l., with *Isolepis fluitans* and *Agrostis avenacea* var. *avenacea*. The ephemeral component of the vegetation is inadequately known.

Distribution: Extremely restricted and localised, known only from near Byaduk on flows from Mt Napier in the further south-west of the State.

Vegetation Quality: Subject to grazing and presumably degraded by land-use history. The adjacent vegetation largely comprises introduced annuals.

Comments: Lava Plain Ephemeral Wetland represents small patches of ephemeral wetland occurring within a primarily dryland habitat.

EVC 125 Plains Grassy Wetland

Defining characteristics: Grassy-herbaceous shallow seasonal wetlands of lowland plains, characteristically species-rich (at least on verges) when relatively intact. Zones interpreted as representing complexes between Plains Grassy Wetlands and several other wetland EVCs are frequently present.

Indicator species: *Amphibromus* spp. (notably *A. nervosus*), *Austrodanthonia duttoniana*, *Glyceria australis*, *Poa labillardierei*, *Lachnagrostis filiformis* var. 2, *Eleocharis acuta*, *Eleocharis pusilla*. *Eragrostis infecunda* occurs as an associated (but not dominant) species in drier versions (e.g. Wimmera and rainshadow basalt plains west of Melbourne). Herbs of verge zones of relatively intact sites variously include *Eryngium vesiculosum*, *Neopaxia australasica*, *Brachyscome cardiocarpa*, *Craspedia paludicola*, *Microseris* sp. aff. *lanceolata*, *Potamogeton tricarinatus* s.l., *Helichrysum* aff. *rutidolepis* and *Villarsia reniformis*.

EVC A101 Plains Grassy Wetland/Lignum Swamp Complex

Defining characteristics: Open shrubland with grassy ground-layer including structural and floristic components (grasses and herbs) of Plains Grassy Wetland, occurring in association with Tangled Lignum. Scattered sites in the Riverina, where previously more extensive along ephemeral drainage-lines, also Victorian Volcanic Plains where very restricted in extent.

Indicator species (some or all of these species should be present):

Rytidosperma duttonianum, *Amphibromus nervosus*, *Walwhalleya proluta*, *Eragrostis infecunda*, *Lachnagrostis filiformis* var. 1, *Haloragis aspera*, *Goodenia* spp., *Juncus flavidus*, *Lobelia concolor*, *Senecio runcinifolius*, *Chloris truncata* and *Austrostipa* spp.

EVC 784 Plains Swampy Woodland/Lignum Swamp Complex

Defining characteristics: Vegetation including a mixture of structural components of Plains Swampy Woodland and Lignum Swamp (without floristic attributes of Red Gum Swamp). Extremely rare, drier volcanic plains, mainly in rainshadow area to the west of Melbourne.

Indicator species: *Eucalyptus camaldulensis*, *Muehlenbeckia florulenta*, *Poa labillardierei*, *Lachnagrostis filiformis* var. 1, *Ottelia ovalifolia*, *Schoenus apogon*, *Persicaria prostrata*, *Lythrum hyssopifolia*, *Amphibromus* spp., and *Rytidosperma* spp.

Appendix 3 List of vascular plant species recorded in the Study Area

Table 5: Flora species recorded within the study area, surveyed February and March 2013

EPBC	FFG	VROTS	Origin	Indicator Species	Scientific Name	Common Name
					<i>Acacia implexa</i>	Lightwood
					<i>Acacia paradoxa</i>	Hedge Wattle
					<i>Acaena echinata</i>	Sheep's Burr
					<i>Acaena ovina</i>	Australian Sheep's Burr
			*		<i>Acetosella vulgaris</i>	Sheep Sorrel
					<i>Adiantum aethiopicum</i>	Common Maidenhair
			*		<i>Aira spp.</i>	Hair Grass
					<i>Alisma plantago-aquatica</i>	Water Plantain
					<i>Alternanthera denticulata</i> s.s.	Lesser Joyweed
		k			<i>Alternanthera sp. 1 (Plains)</i>	Plains Joyweed
					<i>Amphibromus nervosus</i>	Common Swamp Wallaby-grass
			*		<i>Anagallis arvensis</i>	Pimpernel
					<i>Anthosachne scabra</i> s.l.	Common Wheatgrass
			*		<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
			*		<i>Arctotheca calendula</i>	Cape Weed
				Very High Quality	<i>Asperula conferta</i>	Common Woodruff
			*		<i>Aster subulatus</i>	Asterweed
			*		<i>Atriplex prostrata</i>	Hastate Orache
					<i>Atriplex semibaccata</i>	Berry Saltbush
					<i>Austrostipa aristiglumis</i>	Plump Spear-grass
					<i>Austrostipa bigeniculata</i>	Kneed Spear-grass
					<i>Austrostipa curticoma</i>	Short-crown Spear-grass
					<i>Austrostipa gibbosa</i>	Spurred Spear-grass
					<i>Austrostipa scabra</i>	Rough Spear-grass
					<i>Austrostipa spp.</i>	Spear Grass
			*		<i>Avena spp.</i>	Oat
			*		<i>Avena barbata</i>	Bearded Oat
					<i>Boraginaceae</i>	
					<i>Bothriochloa macra</i>	Red-leg Grass
				Very High Quality	<i>Brachyscome basaltica</i> var. <i>gracilis</i>	Woodland Swamp-daisy
			*		<i>Brassicaceae sp</i>	

EPBC	FFG	VROTS	Origin	Indicator Species	Scientific Name	Common Name
			*		<i>Brassica tournefortii</i>	Mediterranean Turnip
			*		<i>Bromus catharticus</i>	Prairie Grass
			*		<i>Bromus diandrus</i>	Great Brome
			*		<i>Bromus hordeaceus subsp. hordeaceus</i>	Soft Brome
					<i>Calocephalus citreus</i>	Lemon Beauty-heads
				Very High Quality	<i>Calotis anthemoides</i>	Cut-leaf Burr-daisy
				Very High Quality	<i>Calotis scapigera</i>	Tufted Burr-daisy
				Very High Quality	<i>Calotis scabiosifolia var. scabiosifolia</i>	Rough Burr-daisy
					<i>Carex inversa</i>	Knob Sedge
					<i>Carex tereticaulis</i>	Poong'ort
			*		<i>Carthamus lanatus</i>	Saffron Thistle
					<i>Cassinia arcuata</i>	Drooping Cassinia
			*		<i>Casuarina cunninghamiana subsp. cunninghamiana</i>	River Oak
			*		<i>Centaureum erythraea</i>	Common Centaury
			*		<i>Centaureum tenuiflorum</i>	Slender Centaury
					<i>Centipeda cunninghamii</i>	Common Sneezeweed
			#		<i>Chamaesyce drummondii</i>	Flat Spurge
			*		<i>Chenopodium album</i>	Fat Hen
			*		<i>Chenopodium murale</i>	Sowbane
			#		<i>Chenopodium pumilio</i>	Clammy Goosefoot
					<i>Chloris truncata</i>	Windmill Grass
			*		<i>Cirsium vulgare</i>	Spear Thistle
					<i>Convolvulus angustissimus subsp. angustissimus</i>	Blushing Bindweed
			*		<i>Conyza bonariensis</i>	Flaxleaf Fleabane
					<i>Crassula sieberiana s.s.</i>	Sieber Crassula
			*		<i>Cucumis myriocarpus subsp. leptodermis</i>	Paddy Melon
			*		<i>Cupressus macrocarpa</i>	Monterey Cypress
			*		<i>Cynara cardunculus subsp. flavesens</i>	Artichoke Thistle
			*		<i>Cynodon dactylon var. dactylon</i>	Couch
			*		<i>Cynosurus echinatus</i>	Rough Dog's-tail
			*		<i>Cyperus eragrostis</i>	Drain Flat-sedge
			*		<i>Dactylis glomerata</i>	Cocksfoot
					<i>Damasonium minus</i>	Star Fruit
					<i>Deyeuxia quadriseta</i>	Reed Bent-grass

EPBC	FFG	VROTS	Origin	Indicator Species	Scientific Name	Common Name
		v			<i>Dianella sp. aff. longifolia</i> (Benambra)	Arching Flax-lily
					<i>Dichondra repens</i>	Kidney-weed
			*		<i>Digitaria sanguinalis</i>	Summer Grass
			*		<i>Diploaxis tenuifolia</i>	Sand Rocket
			*		<i>Dittrichia graveolens</i>	Stinkwort
			*		<i>Echium plantagineum</i>	Paterson's Curse
			*		<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass
			*		<i>Ehrharta longiflora</i>	Annual Veldt-grass
					<i>Einadia nutans</i> subsp. <i>nutans</i>	Nodding Saltbush
					<i>Elatine gratioloides</i>	Waterwort
					<i>Eleocharis acuta</i>	Common Spike-sedge
		k		Very High Quality	<i>Eleocharis macbarronii</i>	Grey Spike-sedge ¹
		k			<i>Eleocharis pallens</i>	Pale Spike-sedge
					<i>Eleocharis pusilla</i>	Small Spike-sedge
					<i>Epilobium billardierianum</i>	Variable Willowherb
					<i>Epilobium hirtigerum</i>	Hairy Willowherb
					<i>Erodium crinitum</i>	Blue Heron's-bill
			*		<i>Erodium botrys</i>	Big Heron's-bill
					<i>Eryngium ovinum</i>	Blue Devil
				Very High Quality	<i>Eryngium vesiculosum</i>	Prickfoot
					<i>Eucalyptus camaldulensis</i>	River Red Gum
			*		<i>Eucalyptus cladocalyx</i>	Sugar Gum
					<i>Euchiton collinus</i> s.s.	Creeping Cudweed
					<i>Euchiton sphaericus</i>	Annual Cudweed
					<i>Euchiton</i> spp.	Cudweed
					<i>Euchiton sphaericus</i>	Annual Cudweed
					<i>Exocarpos strictus</i>	Pale-fruit Ballart
			*		<i>Foeniculum vulgare</i>	Fennel
			*		<i>Galenia pubescens</i> var. <i>pubescens</i>	Galenia
			*		<i>Gamochaeta purpurea</i> s.s.	Spiked Cudweed
				Very High Quality	<i>Goodenia gracilis</i>	Slender Goodenia
				Very High Quality	<i>Goodenia heteromera</i>	Spreading Goodenia
				Very High Quality	<i>Gratiola pubescens</i>	Glandular Brooklime ¹
					<i>Haloragis aspera</i>	Rough Raspwort

EPBC	FFG	VROTS	Origin	Indicator Species	Scientific Name	Common Name
			*		<i>Heliotropium europaeum</i>	Common Heliotrope
			*		<i>Heliotropium supinum</i>	Creeping Heliotrope
			*		<i>Helminthotheca echioides</i>	Oxtongue
			*		<i>Hirschfeldia incana</i>	Buchan Weed
			*		<i>Holcus lanatus</i>	Yorkshire Fog
			*		<i>Hordeum marinum</i>	Sea Barley-grass
					<i>Hydrocotyle sibthorpioides</i>	Shining Pennywort
					<i>Hypericum gramineum</i> spp. agg.	Small St John's Wort
			*		<i>Hypochaeris radicata</i>	Flatweed
				Very High Quality	<i>Isolepis muelleri</i>	Rock Quillwort ¹
					<i>Isolepis fluitans</i>	Floating Club-sedge
					<i>Isolepis hookeriana</i>	Grassy Club-sedge
					<i>Juncus</i> spp.	Rush
			*		<i>Juncus acutus</i> subsp. <i>acutus</i>	Spiny Rush
					<i>Juncus amabilis</i>	Pale Rush
					<i>Juncus bufonius</i>	Toad Rush
					<i>Juncus flavidus</i>	Gold Rush
					<i>Juncus holoschoenus</i>	Hollow Rush
					<i>Juncus radula</i>	Hoary Rush
					<i>Juncus subsecundus</i>	Finger Rush
			*		<i>Kickxia</i> spp.	Toadflax
					<i>Lachnagrostis filiformis</i> var. 1	Common Blown-grass
			*		<i>Lactuca serriola</i>	Prickly Lettuce
			*		<i>Leontodon taraxacoides</i> subsp. <i>taraxacoides</i>	Hairy Hawkbit
			*		<i>Lepidium africanum</i>	Common Peppercress
					<i>Linum marginale</i>	Native Flax
				Very High Quality	<i>Lobelia pratensis</i>	Poison Lobelia
			*		<i>Lolium rigidum</i>	Wimmera Ryegrass
			*		<i>Lophopyrum ponticum</i>	Tall Wheatgrass
			*		<i>Lycium ferocissimum</i>	African Boxthorn
					<i>Lythrum hyssopifolia</i>	Small Loosestrife
					<i>Maireana decalvans</i>	Black Cottonbush
			*		<i>Malva parviflora</i>	Small-flower Mallow
			*		<i>Marrubium vulgare</i>	Horehound

EPBC	FFG	VROTS	Origin	Indicator Species	Scientific Name	Common Name
				Very High Quality	<i>Marsilea costulifera</i>	Narrow-leaf Nardoo
				Very High Quality	<i>Marsilea drummondii</i>	Common Nardoo
				Very High Quality	<i>Marsilea hirsuta</i>	Short-fruit Nardoo
			*		<i>Marrubium vulgare</i>	Horehound
			*		<i>Medicago polymorpha</i>	Burr Medic
			#		<i>Melaleuca armillaris subsp. armillaris</i>	Giant Honey-myrtle
	L	v	#		<i>Melaleuca halmaturorum subsp. halmaturorum</i>	Salt Paperbark
					<i>Melicytus sp. aff. dentatus (Volcanic Plain variant)</i>	Tangled Shrub-violet
			*		<i>Modiola caroliniana</i>	Red-flower Mallow
					<i>Muehlenbeckia florulenta</i>	Tangled Lignum
					<i>Muellerina eucalyptoides</i>	Creeping Mistletoe
					<i>Myriophyllum verrucosum</i>	Red Water-milfoil
			*		<i>Nassella hyalina</i>	Cane Needle-grass
			*		<i>Nassella leucotricha</i>	Texas Needle-grass
			*		<i>Nassella neesiana</i>	Chilean Needle-grass
			*		<i>Nassella trichotoma</i>	Serrated Tussock
					<i>Nitella spp.</i>	Stonewort
			*		<i>Opuntia spp.</i>	Prickly Pear
				Very High Quality	<i>Ottelia ovalifolia subsp. ovalifolia</i>	Swamp Lily
					<i>Oxalis exilis</i>	Shady Woodsorrel
					<i>Oxalis perennans</i>	Grassland Woodsorrel
					<i>Ozothamnus ferrugineus</i>	Tree Everlasting
			*		<i>Panicum spp.</i>	Panic
					<i>Panicum effusum</i>	Hairy Panic
			*		<i>Paspalum dilatatum</i>	Paspalum
			*		<i>Paspalum distichum</i>	Water Couch
			*		<i>Pennisetum clandestinum</i>	Kikuyu
					<i>Persicaria prostrata</i>	Creeping Knotweed
			*		<i>Phalaris aquatica</i>	Toowoomba Canary-grass
			*		<i>Phalaris minor</i>	Lesser Canary-grass
			*		<i>Phalaris paradoxa</i>	Paradoxical Canary-grass
			*		<i>Physalis viscosa</i>	Sticky Ground-cherry
			*		<i>Phytolacca octandra</i>	Red Ink Weed
			*		<i>Plantago coronopus subsp. coronopus</i>	Buck's-horn Plantain

EPBC	FFG	VROTS	Origin	Indicator Species	Scientific Name	Common Name
		v			<i>Plantago aff. gaudichaudii</i> (Lowland Swamps)	Swamp Plantain
			*		<i>Plantago lanceolata</i>	Ribwort
		k			<i>Poa labillardierei</i> var. (Volcanic Plains)	Basalt Tussock-grass
			*		<i>Polygonum aviculare</i>	Prostrate Knotweed
				Very High Quality	<i>Potamogeton cheesemanii</i>	Red Pondweed
					<i>Potamogeton pectinatus</i>	Fennel Pondweed
					<i>Portulaca oleracea</i>	Common Purslane
			*		<i>Prunus</i> sp	
					<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed
			*		<i>Raphanus raphanistrum</i>	Wild Radish
			*		<i>Reseda luteola</i>	Weld
			#		<i>Rhagodia parabolica</i>	Fragrant Saltbush
			*		<i>Romulea rosea</i>	Onion Grass
			*		<i>Rosa rubiginosa</i>	Sweet Briar
			*		<i>Rostraria cristata</i>	Annual Cat's-tail
					<i>Rumex brownii</i>	Slender Dock
			*		<i>Rumex conglomeratus</i>	Clustered Dock
			*		<i>Rumex crispus</i>	Curled Dock
					<i>Rumex tenax</i>	Slender Dock
					<i>Rytidosperma auriculatum</i>	Lobed Wallaby-grass
					<i>Rytidosperma caespitosum</i>	Common Wallaby-grass
					<i>Rytidosperma duttonianum</i>	Brownback Wallabygrass
					<i>Rytidosperma fulvum</i>	Copper-awned Wallabygrass
					<i>Rytidosperma racemosum</i> var. <i>racemosum</i>	Slender Wallaby-grass
					<i>Rytidosperma setaceum</i>	Bristly Wallaby-grass
			*		<i>Salvia verbenaca</i>	Wild Sage
			*		<i>Schinus molle</i>	Pepper Tree
					<i>Sclerolaena muricata</i> var. <i>villosa</i>	Grey Rolypoly
					<i>Senecio quadridentatus</i>	Cotton Fireweed
				Very High Quality	<i>Senecio squarrosus</i> s.s.	Leafy Fireweed
			*		<i>Solanum elaeagnifolium</i>	Silverleaf Nightshade
			*		<i>Solanum nigrum</i> s.l.	Black Nightshade
			*		<i>Sonchus</i> spp.	Sow Thistle
			*		<i>Sonchus asper</i> s.l.	Rough Sow-thistle

EPBC	FFG	VROTS	Origin	Indicator Species	Scientific Name	Common Name
			*		<i>Sonchus oleraceus</i>	Common Sow-thistle
					<i>Stackhousia subterranea</i>	Plains Stackhousia
				Very High Quality	<i>Teucrium racemosum</i> s.s.	Grey Germander
					<i>Themeda triandra</i>	Kangaroo Grass
			*		<i>Tragopogon porrifolius</i> subsp. <i>porrifolius</i>	Salsify
			*		<i>Trifolium angustifolium</i> var. <i>angustifolium</i>	Narrow-leaf Clover
			*		<i>Trifolium arvense</i> var. <i>arvense</i>	Hare's-foot Clover
			*		<i>Trifolium fragiferum</i> var. <i>fragiferum</i>	Strawberry Clover
			*		<i>Trifolium glomeratum</i>	Cluster Clover
			*		<i>Trifolium repens</i> var. <i>repens</i>	White Clover
			*		<i>Trifolium striatum</i>	Knotted Clover
			*		<i>Trifolium subterraneum</i>	Subterranean Clover
					<i>Typha domingensis</i>	Narrow-leaf Cumbungi
				Very High Quality	<i>Utricularia beaugholei</i>	Purple Bladderwort ¹
			*		<i>Verbascum thapsus</i> subsp. <i>thapsus</i>	Great Mullein
			*		<i>Verbascum virgatum</i>	Twiggy Mullein
					<i>Vittadinia gracilis</i>	Woolly New Holland Daisy
			*		<i>Vulpia bromoides</i>	Squirrel-tail Fescue
			*		<i>Vulpia myuros</i>	Rat's-tail Fescue
					<i>Wahlenbergia gracilis</i>	Sprawling Bluebell
					<i>Wahlenbergia luteola</i>	Bronze Bluebell
					<i>Wahlenbergia multicaulis</i>	Tadgell's Bluebell
					<i>Walwhallea proluta</i>	Rigid Panic
		k		Very High Quality	<i>Wurmbea dioica</i> subsp. <i>lacunaria</i>	Swamp Early Nancy ¹
			*		<i>Xanthium spinosum</i>	Bathurst Burr

¹ Indicates record was supplied by Val Stajsic, National Herbarium, Birdwood Ave, South Yarra

Indicator species – Indicator of Very High Quality sites as per the EPBC Act listing for Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains

Conservation status (EPBC, FFG and VROTS) as per DSE (2005) Advisory List of Rare or Threatened Plants in Victoria - 2005. Victorian Department of Sustainability and Environment, East Melbourne, Victoria.

Note: a species list for each individual wetland site is provided in the accompanying excel workbook

Table 6: Summary of Very High Quality Indicator Species recorded at the Rockbank wetlands surveyed in February and March 2013 as per the EPBC Act listing for Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains

Scientific Name	Common Name	D3	D4	D6	K1	K2A	K3	K4	K6	K7	L1	L2	L3a	L4	L6	MC1	MC2	MC3	MC5	MC6	N1	N2	N3	N4	N5	N8	N11	NR1	NR2	T1	Ta1
<i>Asperula conferta</i>	Common Woodruff	x		x							x			x								x	x		x			x			
<i>Brachyscome basaltica</i> var. <i>gracilis</i>	Woodland Swamp-daisy																						x		x						
<i>Calotis anthemoides</i>	Cut-leaf Burr-daisy																							x			x				
<i>Calotis scapigera</i>	Tufted Burr-daisy																							x	x		x				
<i>Calotis scabiosifolia</i> var. <i>scabiosifolia</i>	Rough Burr-daisy																							x							
<i>Eleocharis macbarronii</i>	Grey Spike-sedge ¹																											x			
<i>Eryngium vesiculosum</i>	Prickfoot																					x	x		x						
<i>Goodenia gracilis</i>	Slender Goodenia																						x		x						
<i>Goodenia heteromera</i>	Spreading Goodenia																							x							
<i>Gratiola pubescens</i>	Glandular Brooklime ¹																											x			
<i>Isoetes muelleri</i>	Rock Quillwort ¹																											x			
<i>Lobelia pratioides</i>	Poison Lobelia		x	x							x					x		x			x							x	x		
<i>Marsilea costulifera</i>	Narrow-leaf Nardoo																				x	x						x			
<i>Marsilea drummondii</i>	Common Nardoo	x		x	x	x	x	x			x	x	x	x	x	x	x		x	x	x	x	x		x		x	x			x
<i>Marsilea hirsuta</i>	Short-fruit Nardoo		x											x				x													
<i>Ottelia ovalifolia</i> subsp. <i>ovalifolia</i>	Swamp Lily																	x													
<i>Potamogeton cheesemanii</i>	Red Pondweed													x			x														
<i>Senecio squarrosus</i> s.s.	Leafy Fireweed																											x			
<i>Teucrium racemosum</i> s.s.	Grey Germander															x								x							x
<i>Utricularia beaugleholei</i>	Purple Bladderwort ¹																											x			
<i>Wurmbea dioica</i> subsp. <i>lacunaria</i>	Swamp Early Nancy ¹																											x			
Total Species		2	2	3	1	1	1	1	0	0	3	1	1	4	1	3	2	3	1	1	3	4	5	1	10	0	3	10	1	0	2

¹ Indicates record was supplied by Val Stajsic, National Herbarium, Birdwood Ave, South Yarra

High Quality Indicator species as per SEWPAC (2012) Advice to the Minister for Sustainability, Environment, Water, Population and Communities from the Threatened Species Scientific Committee (the Committee) on an Amendment to the List of Threatened Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Note that species have been added to this list since it was first published in 2012.

Note: species lists were not compiled for wetland sites D5 and D7 as these sites were inspected from the roadside; K7 and NR2 were deemed not to be wetlands at the time of assessment

Appendix 4 Site Photographs February and March 2013

Dry Creek Upper DSS



D2 [non - wetland site] 22/02/2013



D3 [wetland site] 22/02/2013



D4 [wetland site] 22/02/2013



D4 [wetland site] 22/02/2013



D9 [non - wetland site] 21/02/2013

Kororoit Creek Upper DSS



K1 [wetland site] 22/02/2013



K2a [wetland site] 19/02/2013



K3 [wetland site] 19/02/2013 Plains Grassy Wetland / Lignum Swamp Complex



K3 [wetland site] 22/02/2013 Plains Grassy Woodland/ Lignum Swamp Complex



K4 [wetland site] 21/02/2013



K5 [non - wetland site] 21/02/2013 Ploughed



K5 [non - wetland site] 21/02/2013 Lignum with weeds



K6 [wetland site] 18/02/2013



K7 [non - wetland site] 22/02/2013

Leakes Road DSS



L1 [wetland site] 18/02/2013 Plains Grassy Wetland



L1 [wetland site] 18/02/2013 Plains Swampy Woodland / Lignum Swamp Complex



L2 [wetland site] 20/02/2013



L3a [wetland site] 20/02/2013



L4 [wetland site] 21/02/2013



L4 [wetland site] 21/02/2013



L6 [wetland site] 20/02/2013

Mt Cottrell Road DSS



MC1 [wetland site] 18/02/2013



MC2 [wetland site] 18/02/2013



MC3 [wetland site] 18/02/2013



MC3 [wetland site] 18/02/2013



MC5 [wetland site] 19/02/2013



MC5 [wetland site] 19/02/2013



MC5 [wetland site] 19/02/2013



MC6 [wetland site] 19/02/2013

Neale Road DSS



NR1 [site supports a wetland; although not discernible at time of survey] 22/02/2013

North side of Kororoit Creek Upper Catchment DSS



N1 [wetland site] 21/02/2013



N1 [wetland site] 21/02/2013



N1 [wetland site] 21/02/2013



N2 [wetland site] 21/02/2013



N2 [wetland site] 21/02/2013



N3 [wetland site] 22/02/2013



N4 [wetland site] 22/02/2013



N4 [wetland site] 22/02/2013



N5 [wetland site] 22/02/2013



N6 [non - wetland site] 22/02/2013



N8 [wetland site] 21/02/2013



N8 [wetland site] 21/02/2013



N10 [site potentially supports a wetland] 21/02/2013



N11 [wetland site] 22/02/2013

Truganina DSS



T1 [wetland site] 25/03/2013

Tarneit DSS



Ta1 [wetland site] 25/03/2013



Ta1 [wetland site] 25/03/2013



Ta1 [wetland site] 25/03/2013

Appendix 5 GDE Field Checklist

Physical Attributes	D3	D4	D5	D6	D7
Landscape setting	Wetland	Wetland	Wetland	Wetland	Wetland
Groundwater process	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater
Field evaluation					
Is the landscape different to surrounds?	Yes	Yes	Yes	Yes	Yes
How is it different?	Change in species type	Change in species type	Change in species type	Change in species type	Change in species type
Other	NA	NA		NA	
Dominant vegetation type in GDE area	Sedges and herbs	Sedges and herbs	Sedges and herbs	Sedges and herbs	Sedges and herbs
Dominant vegetation type in surrounding area	Grasses	Grasses	Grasses	Grasses	Grasses
Density of vegetation within GDE area	Sparse	Sparse	Sparse	Sparse	Sparse
Density of vegetation in surrounding area	Sparse	Sparse	Sparse	Sparse	Sparse
Waterbody surface area (Ha)	1.8	4	3.4	4	1.2
Waterbody depth (meters)	0.2	0.2	0.2	0.2	0.2
Vegetation on banks	Grasses	Grasses	Grasses	Grasses	Grasses
Vegetation in water body	Sedges and grasses	Sedges and grasses	Sedges and grasses	Sedges and grasses	Sedges and grasses
Does the vegetation look stable?	Yes	Yes	Yes	Yes	Yes
Is there evidence of bank erosion?	No	No	No	No	No
Any evidence of artificial water source?	No	No	No	No	No
Is the GDE within drainage-lines?	Yes	Yes	Yes	Yes	Yes
Is there evidence of surface water flow?	Yes	Yes	Yes	Yes	Yes
Evidence of additional source of water other than groundwater?	No	No	No	No	No
Vegetation health	Stable	Declining	Declining	Stable	Stable
Summary					
Is this ecosystem likely to use groundwater?	Yes	Yes	Yes	Yes	Yes

Physical Attributes	K1	K2A	K3	K4	K6
Landscape setting	Wetland	Wetland	Wetland	Wetland	Wetland
Groundwater process	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater, River Red Gums rely on groundwater for survival	Surface expression of groundwater	Surface expression of groundwater, River Red Gums rely on groundwater for survival
Field evaluation					
Is the landscape different to surrounds?	Yes	Yes	Yes	Yes	Yes
How is it different?	Change in species type	Change in species type	Change in species type	Change in species type	Change in species type
Other	NA	NA	NA	NA	NA
Dominant vegetation type in GDE area	Sedges and herbs	Sedges and herbs	River Red Gum, Lignum, Sedges and herbs	Sedges and herbs	River Red Gum, Lignum, Sedges and herbs
Dominant vegetation type in surrounding area	Grasses	Grasses	Grasses	Grasses	Grasses
Density of vegetation within GDE area	Sparse	Sparse	Sparse	Sparse	Sparse
Density of vegetation in surrounding area	Sparse	Sparse	Sparse	Sparse	Sparse
Waterbody surface area (Ha)	0.5	1.9	15	7	17
Waterbody depth (meters)	0.3	0.3	0.5	0.3	0.3
Vegetation on banks	Grasses	Grasses	Grasses	Grasses	Grasses
Vegetation in water body	Sedges and grasses	Sedges and grasses	River Red Gum, Lignum, Sedges and herbs	Lignum, Sedges and grasses	River Red Gum, Lignum, Sedges and herbs
Does the vegetation look stable?	Yes	Yes	Yes	Yes	Yes
Is there evidence of bank erosion?	No	No	No	No	No
Any evidence of artificial water source?	No	No	No	No	No
Is the GDE within drainage-lines?	No	No	No	No	No
Is there evidence of surface water flow?	Yes	Yes	Yes	Yes	Yes
Evidence of additional source of water other than groundwater?	No	No	No	No	No
Vegetation health	Stable	Declining	Stable	Stable	Declining
Summary					
Is this ecosystem likely to use groundwater?	Yes	Yes	Yes, highly dependent	Yes	Yes, highly dependent

Physical Attributes	L1	L2	L3a	L4	L6
Landscape setting	Wetland	Wetland	Wetland	Wetland	Wetland
Groundwater process	Surface expression of groundwater, River Red Gums rely on groundwater for survival	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater
Field evaluation					
Is the landscape different to surrounds?	Yes	Yes	Yes	Yes	Yes
How is it different?	Change in species type	Change in species type	Change in species type	Change in species type	Change in species type
Other	NA	NA	NA	NA	NA
Dominant vegetation type in GDE area	River Red Gum, Lignum, Sedges and herbs	Sedges and herbs	Sedges and herbs	Sedges and herbs	Sedges and herbs
Dominant vegetation type in surrounding area	Grasses	Grasses	Grasses	Grasses	Grasses
Density of vegetation within GDE area	Sparse	Sparse	Sparse	Sparse	Sparse
Density of vegetation in surrounding area	Sparse	Sparse	Sparse	Sparse	Sparse
Waterbody surface area (Ha)	8.6	3.1	1.2	16.5	2.1
Waterbody depth (meters)	0.3	0.3	0.3	0.5	0.3
Vegetation on banks	Grasses	Grasses	Grasses	Grasses	Grasses
Vegetation in water body	River Red Gum, Lignum, Sedges and herbs	Lignum, Sedges and grasses	Sedges and grasses	Lignum, Sedges and grasses	Sedges and grasses
Does the vegetation look stable?	Yes	Yes	Yes	Yes	Yes
Is there evidence of bank erosion?	No	No	No	No	No
Any evidence of artificial water source?	No	No	No	No	No
Is the GDE within drainage-lines?	No	No	No	No	No
Is there evidence of surface water flow?	Yes	Yes	Yes	Yes	Yes
Evidence of additional source of water other than groundwater?	No	No	No	No	No
Vegetation health	Stable	Stable	Stable	Stable	Stable
Summary					
Is this ecosystem likely to use groundwater?	Yes, highly dependent	Yes	Yes	Yes	Yes

Physical Attributes	MC1	MC2	MC3	MC5	MC6
Landscape setting	Wetland	Wetland	Wetland	Wetland	Wetland
Groundwater process	Surface expression of groundwater, River Red Gums rely on groundwater for survival	Surface expression of groundwater	Surface expression of groundwater, River Red Gums rely on groundwater for survival	Surface expression of groundwater, River Red Gums rely on groundwater for survival	Surface expression of groundwater, River Red Gums rely on groundwater for survival
Field evaluation					
Is the landscape different to surrounds?	Yes	Yes	Yes	Yes	Yes
How is it different?	Change in species type	Change in species type	Change in species type	Change in species type	Change in species type
Other	NA	NA	NA	NA	NA
Dominant vegetation type in GDE area	Sedges and herbs	Sedges and herbs	Sedges and herbs	Sedges and herbs	River Red Gums
Dominant vegetation type in surrounding area	Grasses	Grasses	Grasses	Grasses	Grasses
Density of vegetation within GDE area	Sparse	Sparse	Sparse	Sparse	Sparse
Density of vegetation in surrounding area	Sparse	Sparse	Sparse	Sparse	Sparse
Waterbody surface area (Ha)	15.2	3.6	3	6.2	2
Waterbody depth (meters)	0.3	0.3	0.3	0.3	0.3
Vegetation on banks	Grasses	Grasses	Grasses	Grasses	Grasses
Vegetation in water body	River Red Gum, Lignum, Sedges and herbs	Lignum, Sedges and grasses	River Red Gum, Lignum, Sedges and herbs	River Red Gum, Lignum,S edges and herbs	River Red Gum, Sedges and grasses
Does the vegetation look stable?	Yes	Yes	Yes	Yes	Yes
Is there evidence of bank erosion?	No	No	No	No	No
Any evidence of artificial water source?	No	No	No	No	No
Is the GDE within drainage-lines?	No	No	No	No	No
Is there evidence of surface water flow?	Yes	Yes	Yes	Yes	Yes
Evidence of additional source of water other than groundwater?	No	No	No	No	No
Vegetation health	Stable	Stable	Stable	Stable	Stable
Summary					
Is this ecosystem likely to use groundwater?	Yes, highly dependent	Yes	Yes, highly dependent	Yes, highly dependent	Yes, highly dependent

Physical Attributes	N1	N2	N3	N4	N5
Landscape setting	Wetland	Wetland	Wetland	Wetland	Wetland
Groundwater process	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater
Field evaluation					
Is the landscape different to surrounds?	Yes	Yes	Yes	Yes	Yes
How is it different?	Change in species type	Change in species type	Change in species type	Change in species type	Change in species type
Other	NA	NA	NA	NA	NA
Dominant vegetation type in GDE area	Sedges and herbs	Sedges and herbs	Sedges and herbs	Sedges and herbs	Sedges and herbs
Dominant vegetation type in surrounding area	Grasses	Grasses	Grasses	Grasses	Grasses
Density of vegetation within GDE area	Sparse	Sparse	Sparse	Sparse	Sparse
Density of vegetation in surrounding area	Sparse	Sparse	Sparse	Sparse	Sparse
Waterbody surface area (Ha)	13	5.6	2.5	0.8	10
Waterbody depth (meters)	0.3	0.3	0.3	0.3	0.3
Vegetation on banks	Grasses	Grasses	Grasses	Grasses	Grasses
Vegetation in water body	Lignum, Sedges and grasses	Sedges and grasses	Sedges and grasses	Sedges and grasses	Sedges and grasses
Does the vegetation look stable?	Yes	Yes	Yes	Yes	Yes
Is there evidence of bank erosion?	No	No	No	No	No
Any evidence of artificial water source?	No	No	No	No	No
Is the GDE within drainage-lines?	No	No	No	Yes	No
Is there evidence of surface water flow?	Yes	Yes	Yes	Yes	Yes
Evidence of additional source of water other than groundwater?	No	No	No	No	No
Vegetation health	Stable	Stable	Stable	Stable	Stable
Summary					
Is this ecosystem likely to use groundwater?	Yes	Yes	Yes	Yes	Yes

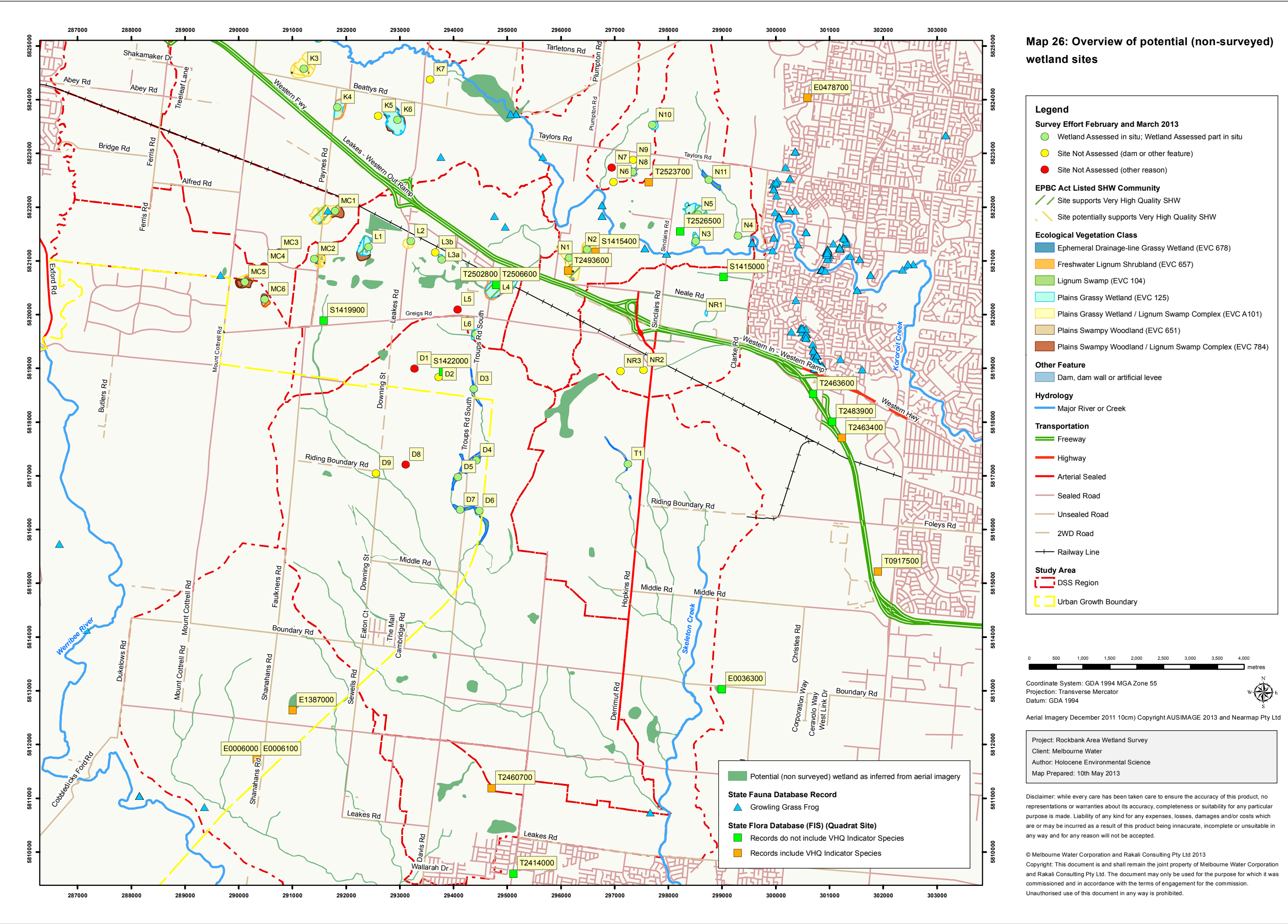
Physical Attributes	N8	N11	T1	Ta1
Landscape setting	Wetland	Wetland	Wetland	Wetland
Groundwater process	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater	Surface expression of groundwater
Field evaluation				
Is the landscape different to surrounds?	Yes	Yes	Yes	Yes
How is it different?	Change in species type	Change in species type	Change in species type	Change in species type
Other	NA	NA	NA	NA
Dominant vegetation type in GDE area	Sedges and herbs	Sedges and herbs	Sedges and herbs	Sedges and herbs
Dominant vegetation type in surrounding area	Grasses	Grasses	Grasses	Grasses
Density of vegetation within GDE area	Sparse	Sparse	Sparse	Sparse
Density of vegetation in surrounding area	Sparse	Sparse	Sparse	Sparse
Waterbody surface area (Ha)	0.1	2.9	1.3	9
Waterbody depth (meters)	0.3	0.2	0.2	0.3
Vegetation on banks	Grasses	Grasses	Grasses	Grasses
Vegetation in water body	Sedges and grasses	Sedges and grasses	Sedges and grasses	Sedges and grasses
Does the vegetation look stable?	Yes	Yes	Yes	Yes
Is there evidence of bank erosion?	No	No	No	No
Any evidence of artificial water source?	No	No	No	No
Is the GDE within drainage-lines?	No	Yes	Yes	No
Is there evidence of surface water flow?	Yes	Yes	Yes	Yes
Evidence of additional source of water other than groundwater?	No	No	No	No
Vegetation health	Stable	Stable	Stable	Stable
Summary				
Is this ecosystem likely to use groundwater?	Yes	Yes	Yes	Yes

Appendix 6 Additional Potential Wetland Sites

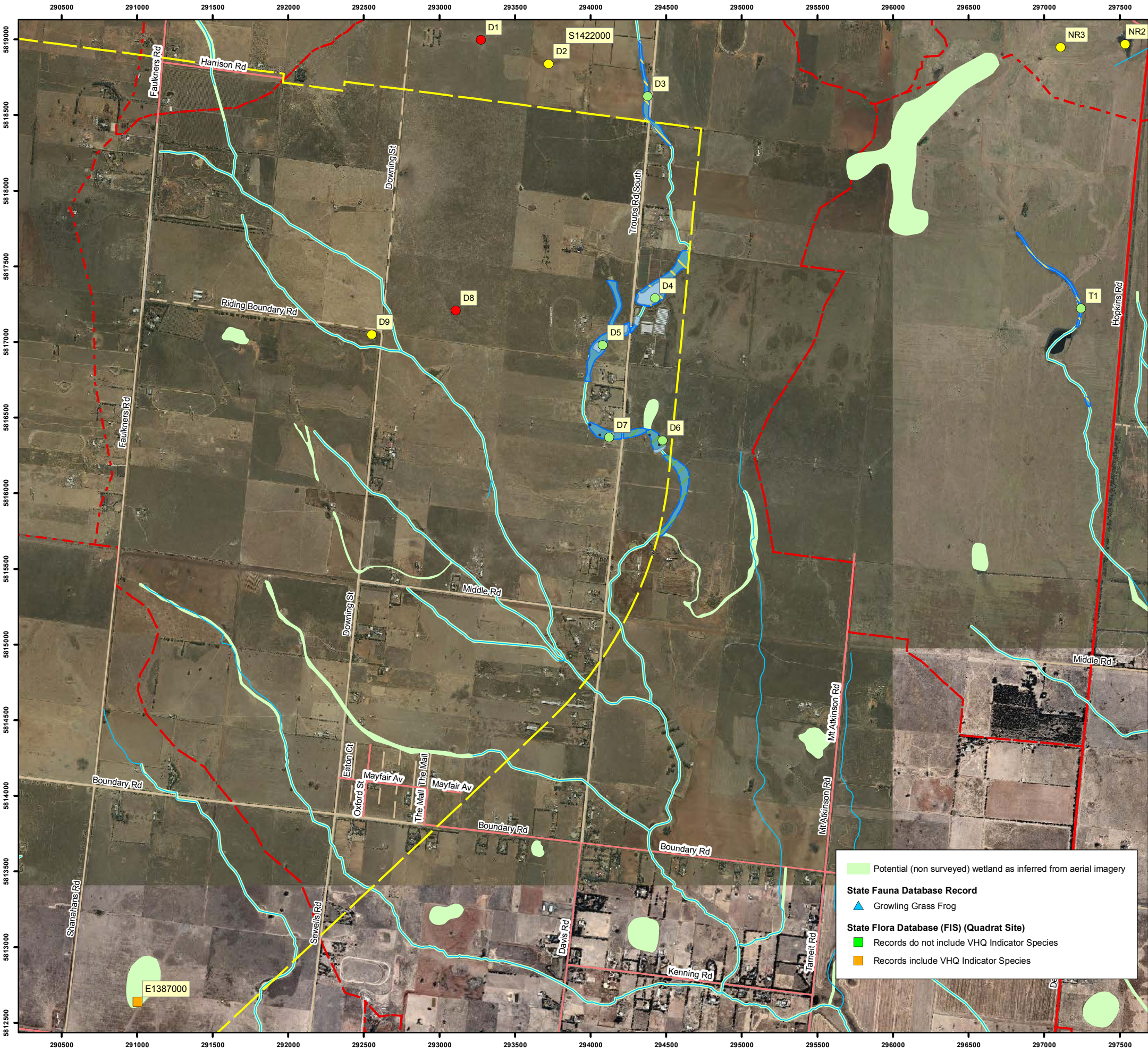
The following maps (Map 26 to Map 31) depict potential wetland sites within the study area as inferred from aerial imagery. All small creeks and minor drainages in the Rockbank area have the potential to support either Lava Plain Ephemeral Wetland or Ephemeral Drainage-line Grassy Wetland. To thoroughly check for SHW would involve walking the length of all of these drainage lines, and this exercise was not undertaken during the current survey.

Additionally the locations of records from the Flora Information System or FIS (DSE 2012c) are shown. The Flora Information System or FIS is a database which holds records of plants that have been detected by floristic surveys or collected and lodged at Herbaria. Sites within the study area with records on the FIS are shown in Appendix 6. Of these the following have records which indicate they may support very high quality examples of Seasonal Herbaceous Wetland; E0006000, E0006100, E0478700, E1387000, E1805700, S1415400, T0917500, T2460700, T2463400, T2464400, T2493600 and T2523700. Of these sites only E1805700 (L4 of this study), T2493600 (N1 of this study) and S1415400 (N2 of this study) were inspected during this investigation.

Map 26: Overview of potential (non-surveyed) wetland sites



Map 27: Potential (non-surveyed) wetland sites within the Dry Creek Upper DSS



Legend

Survey Effort February and March 2013

- Wetland Assessed in situ; Wetland Assessed part in situ
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

EPBC Act Listed SHW Community

- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

- Major River or Creek
- Minor River, Creek or Drainage Line

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Study Area

- DSS Region
- Urban Growth Boundary

0 200 400 600 800 1,000 1,200 1,400 1,600 1,800 metres

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

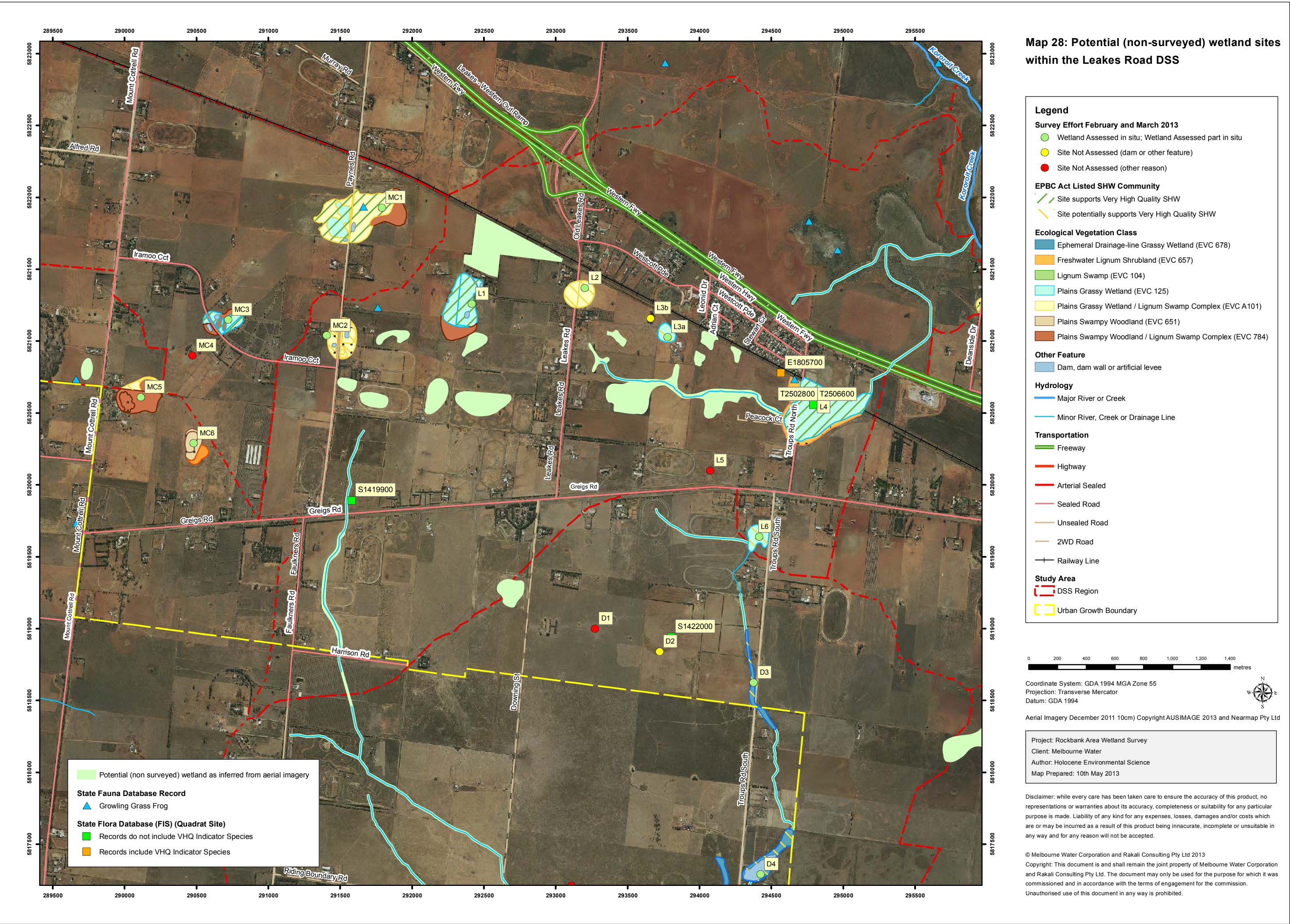
Aerial Imagery December 2011 (10cm) Copyright AUSIMAGE 2013 and Nearmap Pty Ltd

Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 10th May 2013

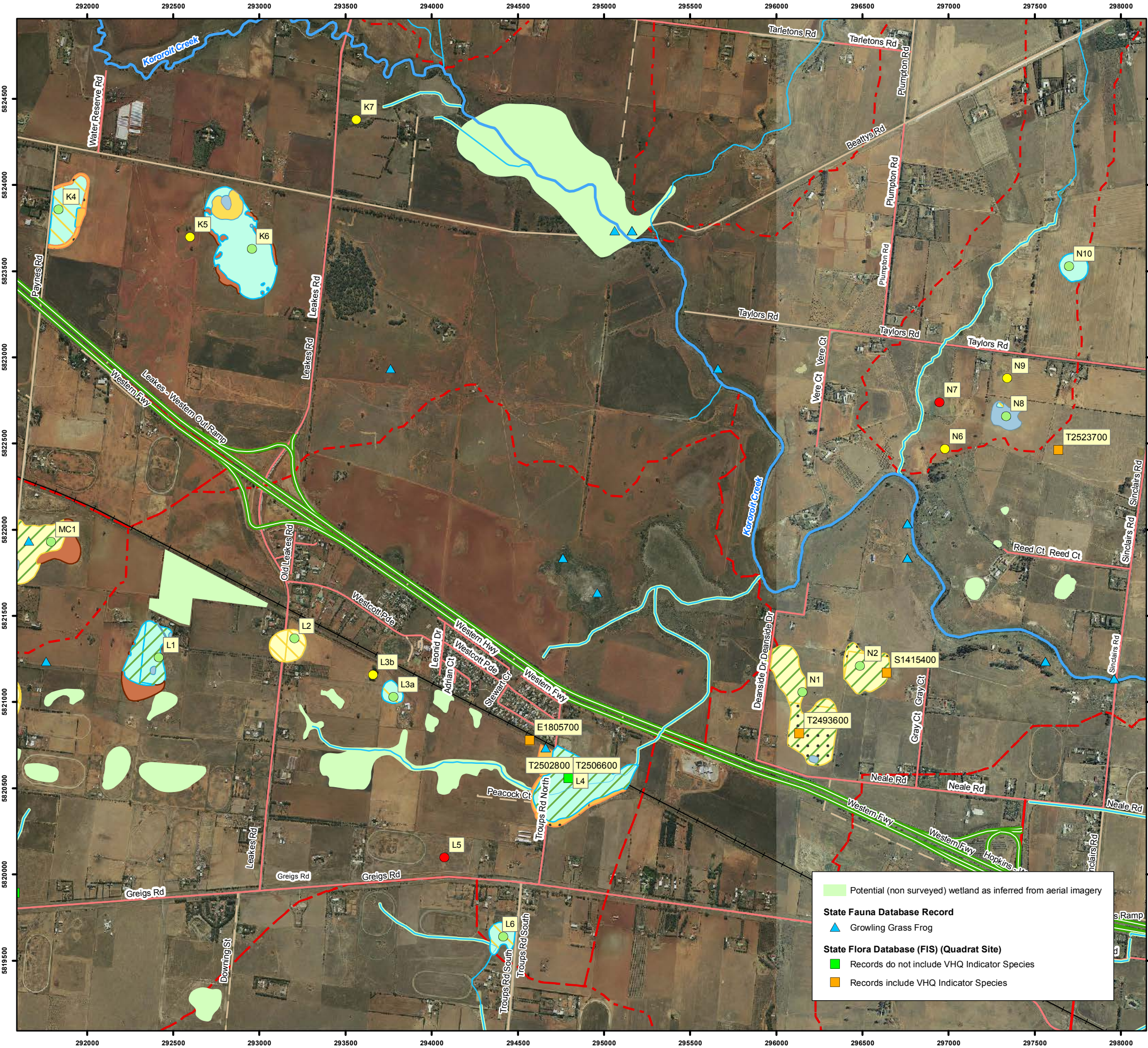
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Map 28: Potential (non-surveyed) wetland sites within the Leakes Road DSS



Map 29: Potential (non-surveyed) wetland sites within the North Side of Kororoit Creek DSS



Legend

Survey Effort February and March 2013

- Wetland Assessed in situ; Wetland Assessed part in situ
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

EPBC Act Listed SHW Community

- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

- Major River or Creek
- Minor River, Creek or Drainage Line

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Study Area

- DSS Region
- Urban Growth Boundary

0 200 400 600 800 1,000 1,200 1,400 metres

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

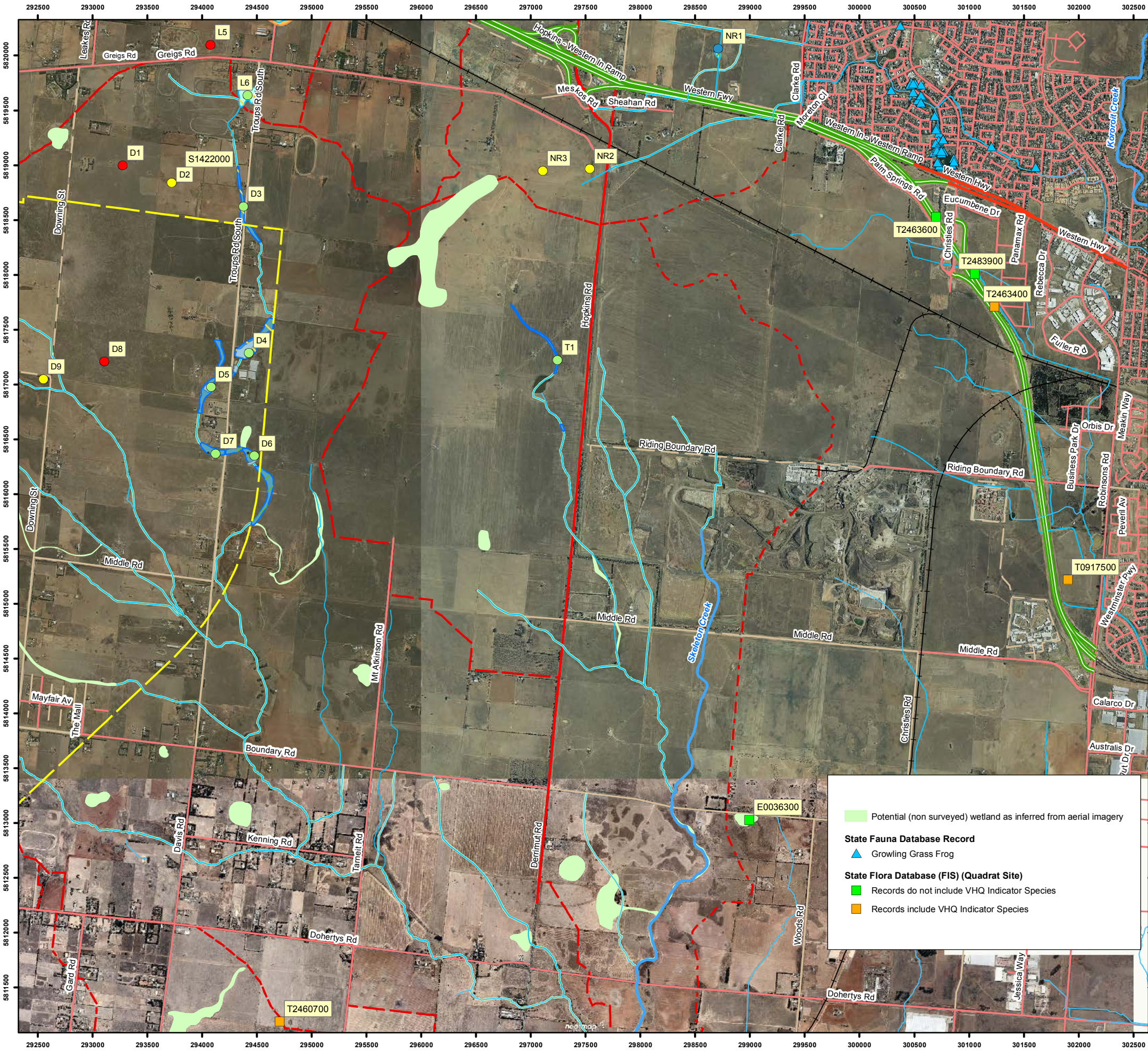
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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 10th May 2013

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Map 30: Potential (non-surveyed) wetland sites within the Neil Road DSS and Truganina DSS



Legend

Survey Effort February and March 2013

- Wetland Assessed in situ; Wetland Assessed part in situ
- Wetland Assessed in situ; part from historical records
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

EPBC Act Listed SHW Community

- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

- Major River or Creek
- Minor River, Creek or Drainage Line

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Study Area

- DSS Region
- Urban Growth Boundary

0 200 400 600 800 1,000 1,200 1,400 1,600 1,800 2,000 2,200 2,400 metres

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

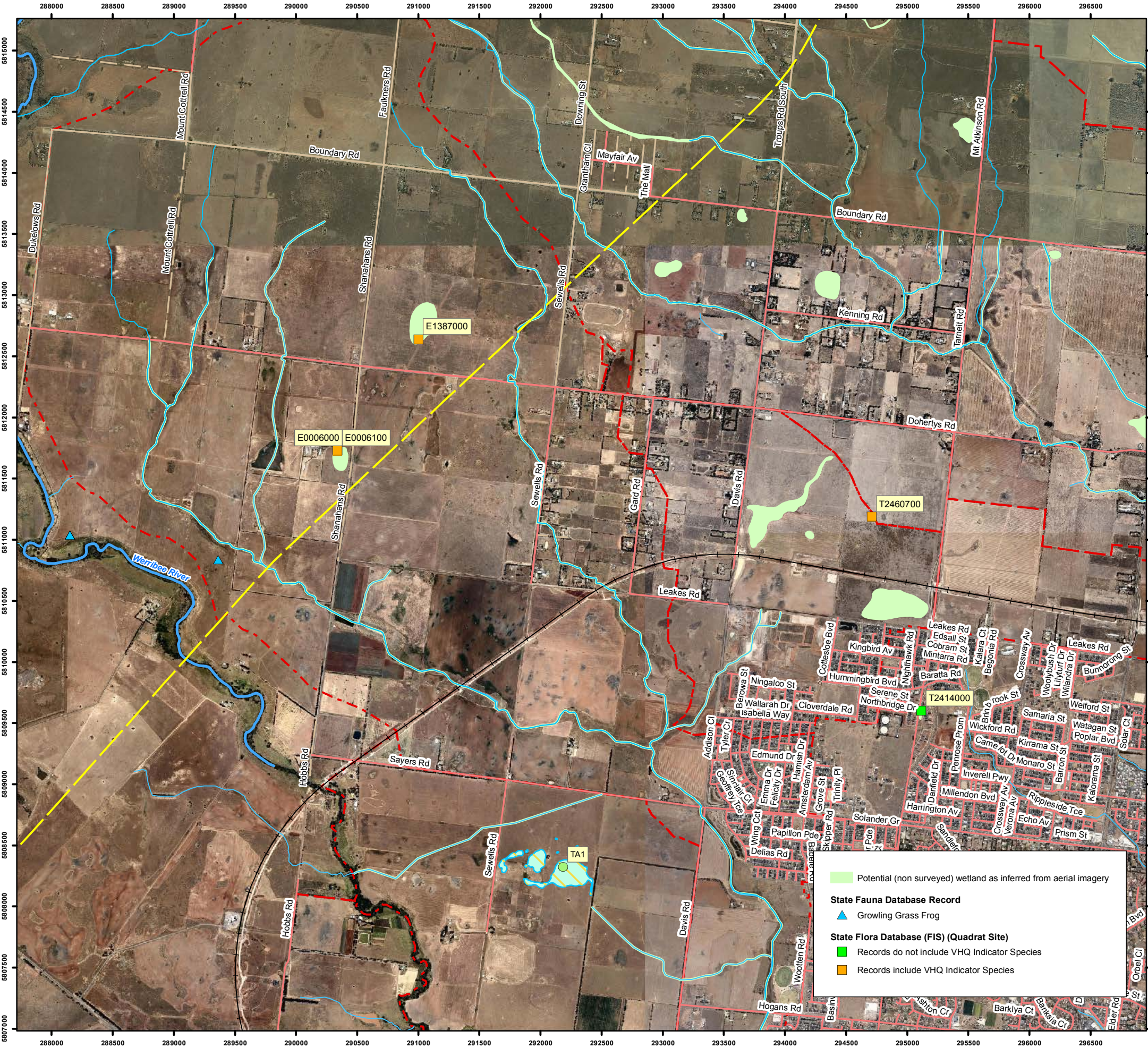
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Map 31: Potential (non-surveyed) wetland sites within the Davis Creek DSS and Davis Creek East DSS



Legend

Survey Effort February and March 2013

- Wetland Assessed in situ; Wetland Assessed part in situ
- Wetland Assessed in situ; part from historical records
- Site Not Assessed (dam or other feature)
- Site Not Assessed (other reason)

EPBC Act Listed SHW Community

- Site supports Very High Quality SHW
- Site potentially supports Very High Quality SHW

Ecological Vegetation Class

- Ephemeral Drainage-line Grassy Wetland (EVC 678)
- Freshwater Lignum Shrubland (EVC 657)
- Lignum Swamp (EVC 104)
- Plains Grassy Wetland (EVC 125)
- Plains Grassy Wetland / Lignum Swamp Complex (EVC A101)
- Plains Swampy Woodland (EVC 651)
- Plains Swampy Woodland / Lignum Swamp Complex (EVC 784)

Other Feature

- Dam, dam wall or artificial levee

Hydrology

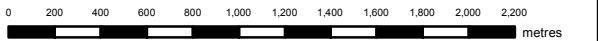
- Major River or Creek
- Minor River, Creek or Drainage Line

Transportation

- Freeway
- Highway
- Arterial Sealed
- Sealed Road
- Unsealed Road
- 2WD Road
- Railway Line

Study Area

- DSS Region
- Urban Growth Boundary



Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994

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Project: Rockbank Area Wetland Survey
Client: Melbourne Water
Author: Holocene Environmental Science
Map Prepared: 10th May 2013

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