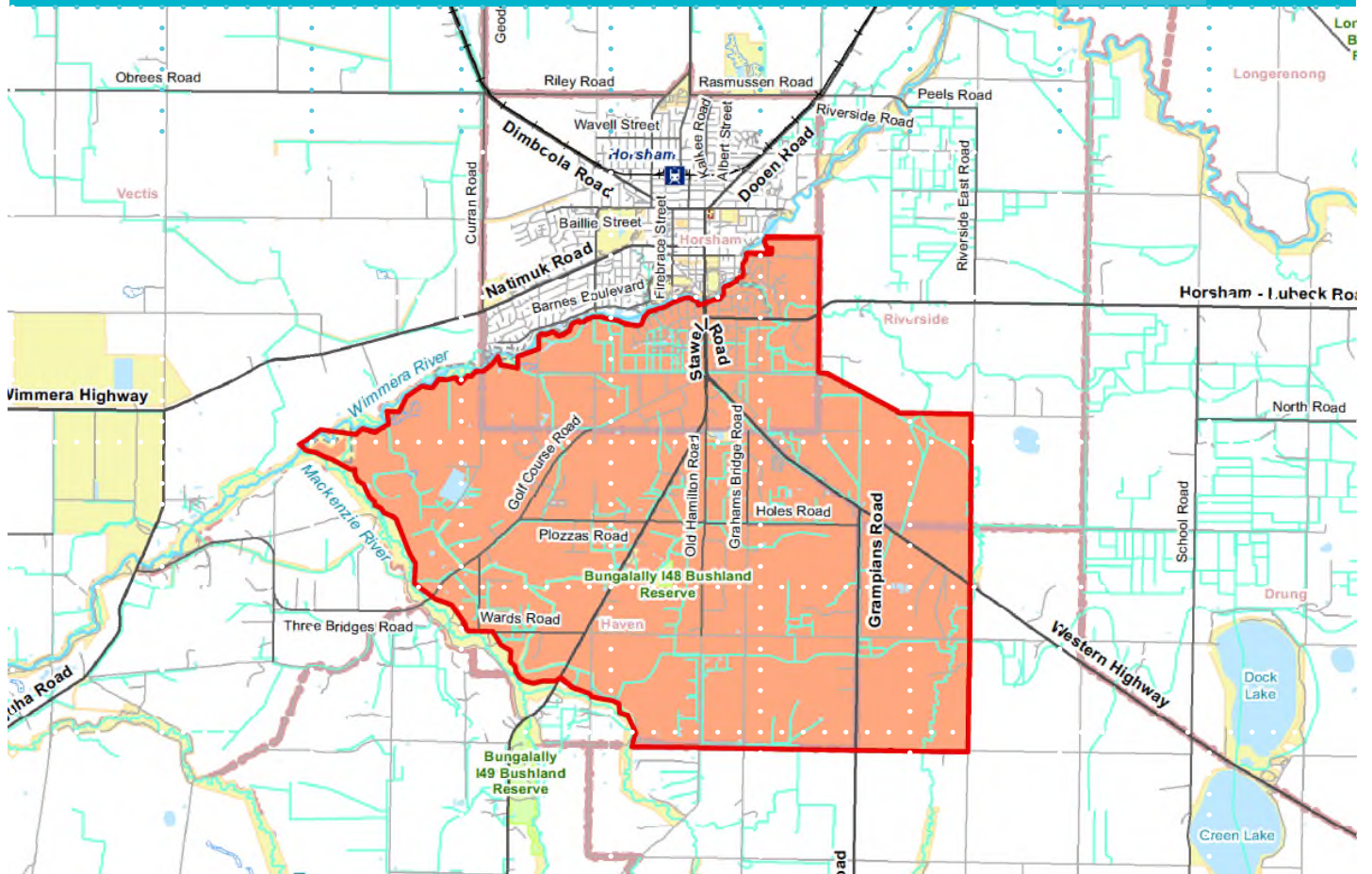


Final Report

Desktop Biodiversity Assessment for the Horsham South Structure Plan, Victoria

Prepared for
Mesh Planning

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Ecology and Heritage Partners Pty Ltd

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1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by Mesh Planning (Mesh) to undertake a Desktop Biodiversity Assessment for Horsham South Structure Plan, Victoria.

We understand that Horsham City Council (Council) has identified the precinct as a future growth area with the potential to support urban expansion in this area. The structure plan will consolidate existing development, guide the future development of all land yet-to-be-rezoned (existing zones may be appropriate, with no rezoning required in this instance), including the extent of infrastructure required to support this growth.

Based on available data, the purpose of this assessment was to identify the extent and type of native vegetation present within the study area and to determine the likely presence of significant flora and fauna species and/or ecological communities. This report presents the results of the assessment and discusses the potential ecological and legislative implications associated and high-level recommendations to assist in the development of the structure plan.

1.2 Study Area

The study area is located at Horsham, Victoria and is approximately 273 kilometres north-west of Melbourne's CBD (Figure 1). The study area covers approximately 4,540 hectares and is bound by the Wimmera River and Horsham Township to the north, Burnt Creek and agricultural land to the east, Clynes Road and Rodda Road to the south, and Mackenzie River to the west.

Based upon aerial photography, the study area consists of treed areas, as well as cleared areas, interspersed with scattered trees and woodland patches. Historic land uses within the study area appears to include grazing, cropping and livestock keeping. Several dams are present within the study area. The Wimmera River, Burnt Creek, Mackenzie River and Bungalally Creek are present within and immediately adjacent to the study area, with several associated tributaries also present within the study area.

According to the (former) Department of Environment, Land, Water and Planning (DELWP; now Department of Energy, Environment and Climate Action [DEECA]) NatureKit Map (DELWP 2022a), the study area is located within the Wimmera bioregions, Wimmera Catchment Management Authority (CMA) and Horsham City Council municipality.

2 METHODS

2.1 Desktop Assessment

Relevant literature, online-resources and databases were reviewed to provide an assessment of flora and fauna values associated with the study area. The following information sources were reviewed:

- The DELWP NatureKit Map (DELWP 2022a) and Native Vegetation Information Management (NVIM) Tool (DELWP 2022b) for:
 - Modelled data for location risk, native vegetation patches, scattered trees and habitat for rare or threatened species; and,
 - The extent of historic and current Ecological Vegetation Classes (EVCs).
- EVC benchmarks (DELWP 2022c) for descriptions of EVCs within the relevant bioregion;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DELWP 2022f);
- The Illustrated Flora Information System of Victoria (IFLISV) (Gullan 2022) and Atlas of Living Australia (ALA) (ALA 2022) for assistance with the distribution and identification of flora species;
- The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DCCEEW 2022);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened (DELWP 2022e) and Protected (DELWP 2019b) Lists;
- The online VicPlan Map (DELWP 2022d) to ascertain current zoning and environmental overlays in the study area; and,
- Aerial photography of the study area.

2.2 Removal, Destruction or Lopping of Native Vegetation (the Guidelines)

Under the *Planning and Environment Act 1987*, Clause 52.17 of the Horsham Planning Scheme requires a planning permit to remove, destroy or lop native vegetation. The assessment process for the clearing of vegetation follows the '*Guidelines for the removal, destruction or lopping of native vegetation*' (the Guidelines) (DELWP 2017). The '*Assessor's handbook: Applications to remove, destroy or lop native vegetation*' (Assessor's handbook) (DELWP 2018) provides clarification regarding the application of the Guidelines (DELWP 2017).

2.2.1 Assessment Pathway

The Guidelines manage the impacts on biodiversity from native vegetation removal using an assessment-based approach. Two factors – extent risk and location category – are used to determine the risk associated with an application for a permit to remove native vegetation. The location category (1, 2 or 3) has been determined

for all areas in Victoria and is available on DELWP’s NVIM Tool (DELWP 2022b). Determination of assessment pathway is summarised in Table 1.

Table 1. Assessment pathways for applications to remove, destroy or lop native vegetation (DELWP 2017).

Extent		Location		
		1	2	3
Native Vegetation	Less than 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
	Less than 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
	0.5 hectares or more	Detailed	Detailed	Detailed

Notes: For the purpose of determining the assessment pathway of an application to remove native vegetation the extent includes any other native vegetation that was permitted to be removed on the same contiguous parcel of land with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before an application to remove native vegetation is lodged.

2.2.2 Vegetation Assessment

Native vegetation (as defined in Table 2) is assessed using two key parameters: extent (in hectares) and condition. For the purposes of this assessment, both condition and extent were determined based on available data.

Table 2. Determination of a patch of native vegetation (DELWP 2017).

Category	Definition	Extent	Condition
Patch of native vegetation	An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; OR An area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy; OR any mapped wetland included in the <i>Current Wetlands map</i> , available in DEECA systems and tools.	Measured in hectares. Based on hectare area of the native patch.	Vegetation Quality Assessment Manual (DSE 2004). Modelled condition for <i>Current Wetlands</i> .
Scattered tree	A native canopy tree that does not form part of a native patch.	Measured in hectares. Each Large scattered tree is assigned an extent of 0.071 hectares (15m radius). Each Small scattered tree is assigned a default extent of 0.031 hectares (10 metre radius)	Scattered trees are assigned a default condition score of 0.2 (outside a patch).

Notes: Native vegetation is defined in the Victoria Planning Provisions as ‘plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses’.

2.2.3 *Impact Avoidance and Minimisation*

All applications to remove native vegetation must demonstrate the three-step approach of avoid, minimise and offset. This is a precautionary approach that aims to ensure that the removal of native vegetation is restricted to what is reasonably necessary, and that biodiversity is appropriately compensated for any native vegetation removal that is approved.

2.2.4 *Offsets*

Biodiversity offsets are required to compensate for the permitted removal of native vegetation. Offset obligations and offset site criteria are determined in accordance with the Guidelines (DELWP 2017) and are divided into two categories, being General Habitat Units and Species Habitat Units.

2.3 **Assessment Qualifications and Limitations**

This report has been written based on the quality and extent of the ecological values and habitat considered to be present or absent at the time of the desktop assessment being undertaken.

Information used to inform this Desktop Assessment was collated from the most recent information available from relevant online resources. It should be noted that online resources do not provide a comprehensive record of all flora and fauna values, and are often a reflection of sampling effort, rather than actual presence or absence of any particular species.

As no site assessments were undertaken as part of this desktop assessment, ground-truthing of information provided has not been confirmed, particularly in relation to the following:

- Assessing modelled data and aerial photo interpretation for remnant vegetation patches, scattered trees and habitat for significant flora and fauna species; and
 - Given the limitations of the desktop assessment, additional native vegetation and, in particular, scattered trees are likely to be present within the study area.
- Identifying potential habitat for species and ecological communities listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and *Flora and Fauna Guarantee Act 1988* (FFG Act).

Nevertheless, information obtained from relevant desktop sources is considered adequate to provide an initial assessment of the ecological values present within the study area.

3 RESULTS

3.1 Bioregion

The study area is located within the Wimmera bioregion.

3.2 Vegetation

3.2.1 Ecological Vegetation Classes (EVCs)

Extant vegetation mapping (2005), using the NatureKit Map (DELWP 2022a), identifies the study area is likely to support eight EVCs (DELWP 2022c; Figure 2):

- *Northern Wimmera* Riverine Chenopod Woodland (EVC 103_62)
 - *Northern Wimmera* Riverine Chenopod Woodland is described as a eucalypt woodland to 15 metres tall, with the canopy containing Black Box *Eucalyptus largiflorens* over a diverse shrubby and grassy understorey occurring on most elevated riverine terraces. This EVC occurs in areas with less than 500mm annual rainfall and is confined to heavy clay soils on higher level terraces within or on the margins of riverine floodplains (or former floodplains), naturally subject to only extremely infrequent incidental shallow flooding from major events if at all flooded.
- Sand Ridge Woodland (EVC 264)
 - Sand Ridge Woodland is described as an open woodland to 15 metres tall with a small or medium shrub layer of variable density and including a range of annual herbs, grasses and geophytes, in the dense ground layer. Typical canopy species include Yellow Box *Eucalyptus melliodora*, Yellow Gum *Eucalyptus leucoxylon* and Slender Cypress-pine *Callitris gracilis* subsp. *murrayensis*. This EVC occupies distinctive sandy rises (or sand mounds) adjacent to major rivers and wetlands on very sandy, deep, free draining, moderately fertile soil, developed on sand blown up by wind action from a prior or current stream or wetland bed.
- Creekline Sedgy Woodland (EVC 640)
 - Creekline Sedgy Woodland is a sedge and rush-dominated eucalypt woodland to 15 metres tall, with an understory containing amphibious herbs. River Red-gum *Eucalyptus camaldulensis* and Grey Box *Eucalyptus microcarpa* are typically the dominant canopy species of the EVC, occurring along banks and adjacent wet flats of smaller intermittent creeks on coarse sands and stony alluvial soils and on the floodplains of larger rivers, in areas where annual rainfall is less than 500 mm.
- Riparian Woodland (EVC 641)
 - Riparian Woodland is a woodland to 15 metres tall generally, dominated by River Red-gum over a tussock grass-dominated understorey. The understorey may also contain tall shrubs, and amphibious herbs may occur in occasional ponds and beside creeks. This EVC occurs beside permanent streams, typically on narrow alluvial deposits. While flooding may be common, sites are rarely inundated for lengthy periods.

- Riverine Grassy Woodland/Sedgy Riverine Forest/Aquatic Herbland Mosaic (EVC 658)
 - Mosaic EVCs indicate that one or more of the EVCs listed, or a similar riparian EVC, may be present; however, they cannot be separated at the mapping scale of the modelled EVCs.
- Black Box Lignum Woodland (EVC 663)
 - Black Box Lignum Woodland is a variable woodland EVC, with the structure varying from a eucalypt-dominated shrubby woodland to 12 metres tall, to an open-woodland or shrubland which can be rich in herbaceous species. This EVC occurs on inundation-prone heavy grey soils in depressions or floodways in low rainfall areas. Black Box is typically present within the canopy layer.
- Plains Woodland (EVC 803)
 - Plains Woodland is characterised as a eucalypt woodland to 15 metres tall, with an understorey of comprised of a diversity of grassy and herbaceous flora species. Typical canopy species include Grey Box, Yellow Box, Yellow Gum and Buloke *Allocasuarina luehmannii*. Plains Woodland occurs on a range of geologies, occupying fertile clays and clay loam soils on flat or gently undulating plains at low elevations in areas with an average annual rainfall of less than 600 millimetres.
- *Lower Rainfall* Shallow Sands Woodland (EVC 882_62)
 - *Lower Rainfall* Shallow Sands Woodland occurs in areas where annual rainfall is less than 500 mm and is described as a woodland or open-forest to 15 metres tall, with a sparse shrub layer of heathy, ericoid shrubs and a species-rich ground cover dominated by grasses and annual herbs. Typical canopy species include Yellow Gum, Slender Cypress-pine and Buloke. This EVC typically occurs between the heavier soils of the plains and the deep-sand aeolian dunefields which overlay these plains, but also occurs on broader areas of plains covered by shallow fluvial, outwash or aeolian sands overlaying drainage-impeding clays.

Native vegetation within the study area has been broadly mapped based on the extant vegetation mapping (2005), using the NatureKit Map (DELWP 2022a; Figure 2), and aerial imagery (Figure 3). Desktop mapping of native vegetation identified 251.24 hectares of native vegetation and 847 scattered trees within the study area.

3.2.2 *Introduced and Planted Vegetation*

Areas not modelled as supporting native vegetation are likely to be dominated by environmental weeds historically planted as pasture grasses such as Toowoomba Canary-grass *Phalaris aquatica*, Rye-grass *Lolium* spp., Barley Grass *Hordeum* spp. and Wild Oat *Avena fatua*. However, some areas where the tree canopy has been cleared, can be dominated by indigenous grasses, or at least consist of a mixture of indigenous and introduced flora species.

3.3 Fauna Habitat

Based on EVC modelling (DELWP 2022a) and aerial imagery, the study area is likely to contain areas of native woodland vegetation. Woodland within the study area is likely to provide suitable habitat for a variety of fauna,

including arboreal mammals, microbats, birds and reptiles. Hollows and fissures within mature eucalypts and stags (dead trees) provide roosting, nesting and sheltering habitat for hollow-dependent birds and mammals. Microbats are also likely to roost within hollows in these areas and forage within, over and around canopy vegetation. While the ground layer and mid-storey may also provide suitable habitat for a range of ground-dwelling fauna species.

The large areas of grassland (native and/or exotic) within the study are likely to be utilised by common mammal and bird species, including diurnal and nocturnal raptors that are likely to forage over these areas.

Farm dams (when inundated) within the study area are likely to support a range of common fauna species, including frogs.

3.4 Significance Assessment

3.4.1 Flora

The VBA contains records of seven nationally significant flora species and 26 State significant flora species previously recorded within 10 kilometres of the study area (Figure 4; DELWP 2022f). The PMST nominated an additional 13 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DCCEEW 2022).

Based on potential habitat present within the study area, landscape context and the proximity of previous records, the study area may contain suitable habitat for numerous nationally significant and State-significant flora species, including Hairy-pod Wattle *Acacia glandulicarpa*, Trailing Hop-bush *Dodonaea procumbens*, Wimmera Rice-flower *Pimelea spinescens* subsp. *pubiflora*, Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*, Lowly Greenhood *Pterostylis despectans*, Turnip Copperburr *Sclerolaena napiformis*, Buloke *Allocasuarina luehmannii*, Buloke Mistletoe *Amyema linophylla* subsp. *orientalis*, Yellow-tongue Daisy *Brachyscome chrysoglossa*, Small Milkwort *Comesperma polygaloides*, Thorny Bitter-pea *Daviesia pectinate* and Fuzzy New Holland Daisy *Vittadinia cuneata* var. *morrisii*.

3.4.2 Fauna

The VBA contains records of 12 nationally significant and 28 State significant fauna species previously recorded within 10 kilometres of the study area (Figure 5; DELWP 2022f). The PMST nominated an additional nine nationally significant species which have not been previously recorded but have the potential to occur in the locality (DCCEEW 2022).

Based on potential habitat present within the study area, landscape context and the proximity of previous records, the study area may contain suitable habitat for some nationally significant and State-significant fauna species, including Swift Parrot *Lathamus discolor*, Growling Grass Frog *Litoria raniformis*, Painted Honeyeater *Grantiella picta*, Diamond Firetail *Stagonopleura guttata*, Hooded Robin *Melanodryas cucullate*, Hardhead *Aythya australis*, Bush Stone-curlew *Burhinus grallarius*, Lace Monitor *Varanus varius*, Squirrel Glider *Petaurus norfolcensis*, Musk Duck *Biziura lobata*, Freckled Duck *Stictonetta naevosa*, Blue-billed Duck *Oxyura australis* and Square-tailed Kite *Lophoictinia isura*. The Wimmera River, Burnt Creek, Mackenzie River and Bungalally Creek may also provide potential habitat for aquatic species including Murray Cod *Maccullochella peelii*, Silver Perch *Bidyanus bidyanus*, Freshwater Catfish *Tandanus tandanus* and Platypus *Ornithorhynchus anatinus*.

3.4.3 Ecological Communities

Six nationally listed ecological communities are predicted to occur within 10 kilometres of the study area (DCCEEW 2022):

- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia;
- Natural Grasslands of the Murray Valley Plains;
- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions;
- Mallee Bird Community of the Murray Darling Depression Bioregion;
- Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions; and,
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

Of these ecological communities, the EPBC Act-listed communities Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia and Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions are considered the most likely to occur within the study area as the description of these communities correlates with the typical species composition of two EVCs modelled to occur within the study area: Plains Woodland (EVC 803) and Lower Rainfall Shallow Sands Woodland (EVC 882_62).

Based on the extant EVC modelling, vegetation within the study area may be consistent with two FFG Act-listed vegetation communities in the study area:

- Grey Box – Buloke Grassy Woodland; and,
- Victorian Temperate Woodland Bird Community.

The description for the FFG Act-listed community Grey Box – Buloke Grassy Woodland is consistent with the description and typical species composition of Plains Woodland (EVC 803) and Lower Rainfall Shallow Sands Woodland (EVC 882_62), modelled to occur within the study area. All treed areas of modelled native vegetation within the study area provide potential habitat for woodland birds associated with the FFG Act-listed Victorian Temperate Woodland Bird Community.

4 LEGISLATIVE AND POLICY IMPLICATIONS

4.1 *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

The EPBC Act establishes a Commonwealth process for the assessment of proposed actions likely to have a significant impact on any matters of National Environment Significance (NES). Any proposed action will need to be assessed for the potential of significant impact on any matter of NES and whether a referral to the Commonwealth Environment Minister may be required.

4.2 *Flora and Fauna Guarantee Act 1988* (Victoria)

The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' listed and/or protected flora species, listed vegetation communities and listed fish species in areas of public land (i.e. within road reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of listed and/or protected flora species and communities on private land.

4.3 *Planning and Environment Act 1987* (Victoria)

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17, which requires a planning permit from the relevant local Council to remove, destroy or lop native vegetation, unless an exemption at Clause 52.17-7 of the Victoria Planning Provisions applies.

As part of Clause 52.17, all native vegetation is considered lost as part of a subdivision development where the lots are 0.4 hectares or less in area, which must be offset at the time of subdivision.

4.3.1 *Local Planning Scheme*

The study area is located within the Horsham City Council. The following zoning and overlays apply (DELWP 2022d):

- General Residential Zone 1 (GRZ1);
- Low Density Residential Zone (LDRZ);
- Farming Zone (FZ);
- Rural Living Zone (RLZ);
- Public Conservation and Resource Zone (PCRZ);
- Commercial 2 Zone (C2Z);
- Industrial 1 Zone (I1Z);
- Industrial 3 Zone (I3Z);

- Road Zone 1 (RDZ1);
- Environmental Significance Overlay 3 (ESO3);
 - ESO3 aims to protect and enhance the water quality and environmental values of the Wimmera River.
- Environmental Significance Overlay 5 (ESO5);
 - ESO5 aims to maintain and enhance the quality and supply of irrigation and domestic water throughout the Wimmera region and to protect water reservoirs and channels from potential sources of pollution.
- Environmental Significance Overlay (ESO6);
 - ESO6 aims to ensure that the establishment of a sensitive use within proximity to the wastewater treatment plant will not have a detrimental impact on the ongoing operation of the plant.
- Bushfire Management Overlay (BMO);
- Public Acquisition Overlay 1 (PAO1);
- Floodway Overlay (FO);
- Land Subject to Inundation Overlay (LSIO);
- Environmental Audit Overlay (EAO);
- Development Plan Overlay 1 (DPO1);
- Development Plan Overlay 2 (DPO2);
- Development Plan Overlay 3 (DPO3);
- Development Plan Overlay 8 (DPO8);
- Design and Development Overlay 3 (DDO3);
- Design and Development Overlay 4 (DDO4); and;
- Incorporated Plan Overlay 1 (IPO1).

4.3.2 *The Guidelines*

The State Planning Policy Framework and the decision guidelines at Clause 12.01 Biodiversity and Clause 52.17 Native Vegetation require Planning and Responsible Authorities to have regard for the Guidelines (DELWP 2017).

4.3.3 *Implications*

A planning permit from the Horsham City Council is required to remove, destroy or lop any native vegetation under Clause 52.17 of the Planning Scheme.

Any native vegetation impacts associated with the proposed Horsham South Structure Plan may be offset by a third-party offset, via DEECA's Native Vegetation Credit Register. This must be within the local municipality

where the vegetation removal has occurred or is proposed to occur (i.e. in this instance Horsham City Council), or within the relevant Catchment Management Authority (in this instance the Wimmera CMA).

4.4 *Catchment and Land Protection Act 1994 (Victoria)*

The *Catchment and Land Protection Act 1994* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals. Landowners are responsible for the control of any infestation of noxious weeds and pest fauna species to minimise their spread and impact on ecological values. Field surveys would be required to identify the presence of weeds or pest animals listed as noxious under the CaLP Act and whether a Weed/Pest Management Plan may be required.

4.5 *Wildlife Act 1975 and Wildlife Regulations 2013 (Victoria)*

The *Wildlife Act 1975* (and associated *Wildlife Regulations 2013*) is the primary legislation in Victoria providing for protection and management of wildlife. Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*. Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*, issued by DEECA.

4.6 *Water Act 1989 (Victoria)*

The purposes of the *Water Act 1989* relate to the orderly, equitable, efficient and sustainable use of water resources including the provision of a formal means of protecting and enhancing environmental qualities of waterways and their in-stream uses as well as catchment conditions that may affect water quality and the ecological environments within them. A 'works on waterways' permit will be required if any action impacts on waterways, wetlands or aquatic habitat.

5 CONCLUSIONS AND RECOMMENDATIONS

The desktop assessment provides an initial assessment of the ecological values present within the study area. There are several limitations to this approach (see Section 2.3) including a reliance on online resources that do not provide a comprehensive record of all flora and fauna values, and are often a reflection of sampling effort, rather than actual presence or absence of any particular species. It is recommended that a general flora and fauna site assessment be undertaken to confirm the quality and extent of native vegetation and flora and fauna habitat within the study area.

As outlined in both Commonwealth and State policy, a project should be designed to take into consideration the three-step approach, which is:

- Avoid environmental impacts;
- Minimise impacts; and,
- Where impacts cannot be avoided or minimised, compensate for the residual impacts using other mitigation measures such as offsets.

Any native vegetation impacts associated with the proposed Horsham South Structure Plan may be offset by a third-party offset, via DEECA's Native Vegetation Credit Register. This must be within the local municipality where the vegetation removal has occurred or is proposed to occur (i.e. in this instance Horsham City Council), or within the relevant Catchment Management Authority (in this instance the Wimmera CMA).

5.1 Precinct Design Principles

At a broad scale, the following measures should be considered as part of the detailed design process for the Horsham South Structure Plan:

- Retain areas of high conservation value;
 - Consider implementation of statutory overlays to protect areas of ecological significance, such as an ESO or VPO;
 - Consider a Significant Tree Register associated with an ESO or VPO for high-value scattered trees within the Structure Plan area; and,
 - An ESO or VPO may also be implemented over significant patches of native vegetation (eg. high quality native remnants, large isolated patches and/or contiguous patches of native vegetation associated with habitat corridors, including Wimmera River and associated tributaries) to be retained and protected within the Structure Plan area.
- Large areas of native vegetation should be protected in habitat nodes;
- Provide a variety of flora and fauna habitats to promote and retain biodiversity;
- Undertake habitat creation (i.e. waterways, drainage lines and designated revegetation areas);
- Provide linear corridors of vegetation along walking/cycling tracks;

- Create linear habitat corridors along waterways/drainage lines/tributaries whilst implementing Water Sensitive Urban Design whilst ensuring no off-site impacts;
- Incorporating drainage lines into habitat corridors and open public spaces;
- Interpret/educate residents about values of grasslands through signage;
- Undertaken feral pest animal and plant control;
- Retain native trees in urban active and passive open space areas;
- Feature waterways/landscaping combination of a series of smaller connected basins rather than one large isolated basin.
- Investigate methods to interconnect spaces through Open Space Links to create more complete habitat;
- Rehabilitate and protect significant native vegetation;
- Ensure stormwater treatment is designed to provide habitat(s) for significant flora and fauna species;
- Investigate options to achieve high canopy coverage on public and private land (for example 40-50%); and,
- Connect biodiversity sites with parks/open spaces so they are separated from development.

5.2 Next steps

It is recommended that a general flora and fauna site assessment be undertaken to confirm the quality and extent of native vegetation and flora and fauna habitat within the study area, including the presence, or lack thereof, of suitable habitat for threatened flora and fauna species and ecological communities.

5.3 Best Practice Mitigation Measures

Recommended measures to mitigate impacts upon terrestrial and aquatic values present within the study area may include:

- Control of noxious weeds within the study area should be an immediate priority to reduce further degrading impacts to the existing remnant ecological values present within the study area and surrounds;
- Consideration of Water Sensitive Urban Design techniques such as stormwater treatment wetlands, bio-retention systems, porous paving or swales;
- Minimise impacts to native vegetation and habitats through construction and micro-siting techniques, including fencing retained areas of native vegetation. If indeed necessary, trees should be lopped or trimmed rather than removed. Similarly, soil disturbance and sedimentation within wetlands should be avoided or kept to a minimum, to avoid, or minimise impacts to fauna habitats;

- Tree Retention Zones (TRZs) should be implemented to prevent indirect losses of native vegetation during construction activities (DSE 2011). A TRZ applies to a tree and is a specific area above and below the ground, with a radius 12 x the DBH. At a minimum standard a TRZ should consider the following:
 - A TRZ of trees should be a radius no less than two metres or greater than 15 metres;
 - Construction, related activities and encroachment (i.e. earthworks such as trenching that disturb the root zone) should be excluded from the TRZ;
 - Where encroachment exceeds 10% of the total area of the TRZ, the tree should be considered as lost and offset accordingly;
 - Directional drilling may be used for works within the TRZ without being considered encroachment. The directional bore should be at least 600 millimetres deep;
 - The above guidelines may be varied if a qualified arborist confirms the works will not significantly damage the tree (including stags / dead trees). In this case the tree would be retained, and no offset would be required; and,
 - Where the minimum standard for a TRZ has not been met an offset may be required.
- Ensure that best practice sedimentation and pollution control measures are undertaken at all times, in accordance with Environment Protection Agency guidelines (EPA 1991; EPA 1996; Victorian Stormwater Committee 1999) to prevent offsite impacts to waterways and wetlands; and,
- As indigenous flora provides valuable habitat for indigenous fauna, it is recommended that any landscape plantings that are undertaken as part of the proposed works are conducted using indigenous species sourced from a local provenance, rather than exotic deciduous trees and shrubs.

In addition to these measures, the following documents should be prepared and implemented prior to any construction activities:

- Construction Environmental Management Plan (CEMP). The CEMP should include specific species/vegetation conservation strategies, daily monitoring, sedimentation management, site specific rehabilitation plans, weed and pathogen management measures, etc.;
- A Kangaroo Management Plan (KMP). The KMP provides a long-term, adaptable strategy for the management of Eastern Grey Kangaroos, and may be required to be prepared to the satisfaction of DELWP;
- Significant Species Conservation Management Plan (CMP). One or more CMP's may be required to detail how areas of retained high value biodiversity are protected, managed and enhanced as part of the PSP process. The CMP should specify management actions and timeframes associated with the protection and enhancement of the retained values. Where more than one matter of NES is present within a conservation area, the management actions proposed must be complementary to all relevant matters.

5.4 Protection of Retained Ecological Values

Retained ecological values should be enhanced and managed to assist in creating a more diverse, connected and resilient natural environment through improving ecosystem health, and develop a more ecologically connected urban landscape. It is important that the enhancement of ecological values within the study area are not undermined through unrestricted and uncontrolled public access throughout retained areas.

Public access should be restricted to clearly defined shared community facilities (i.e. BBQ areas, play equipment etc) that are accessible via a connected network of shared paths (walking and cycling shared paths). Access to all other areas of retained high value native vegetation, revegetated areas and/or wetlands should be discouraged, and demarcated with informal signage and/or fencing where practical.

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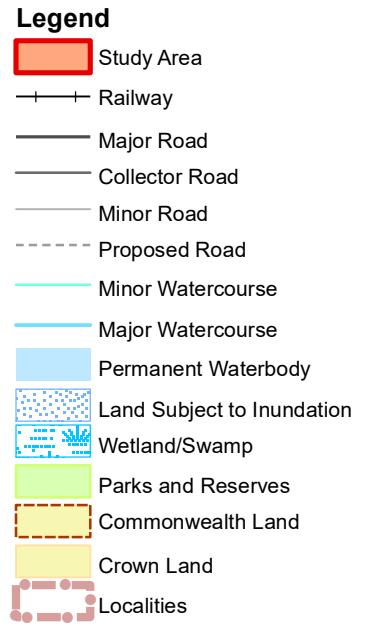
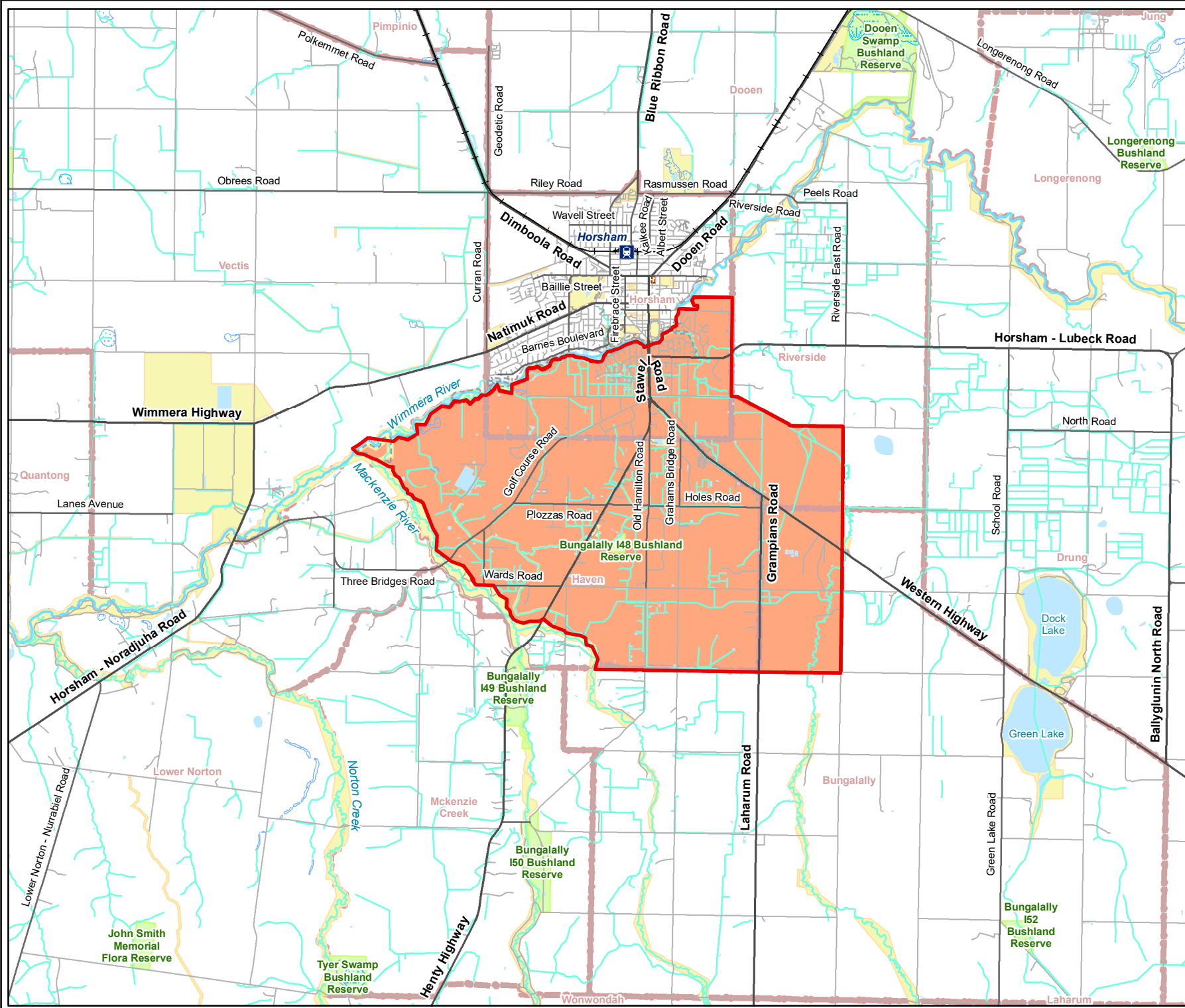
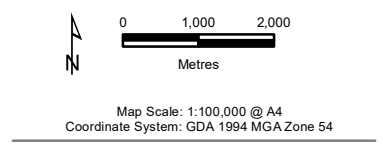


Figure 1
Location of the study area
Horsham South Structure Plan (HSSP)



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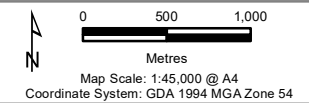
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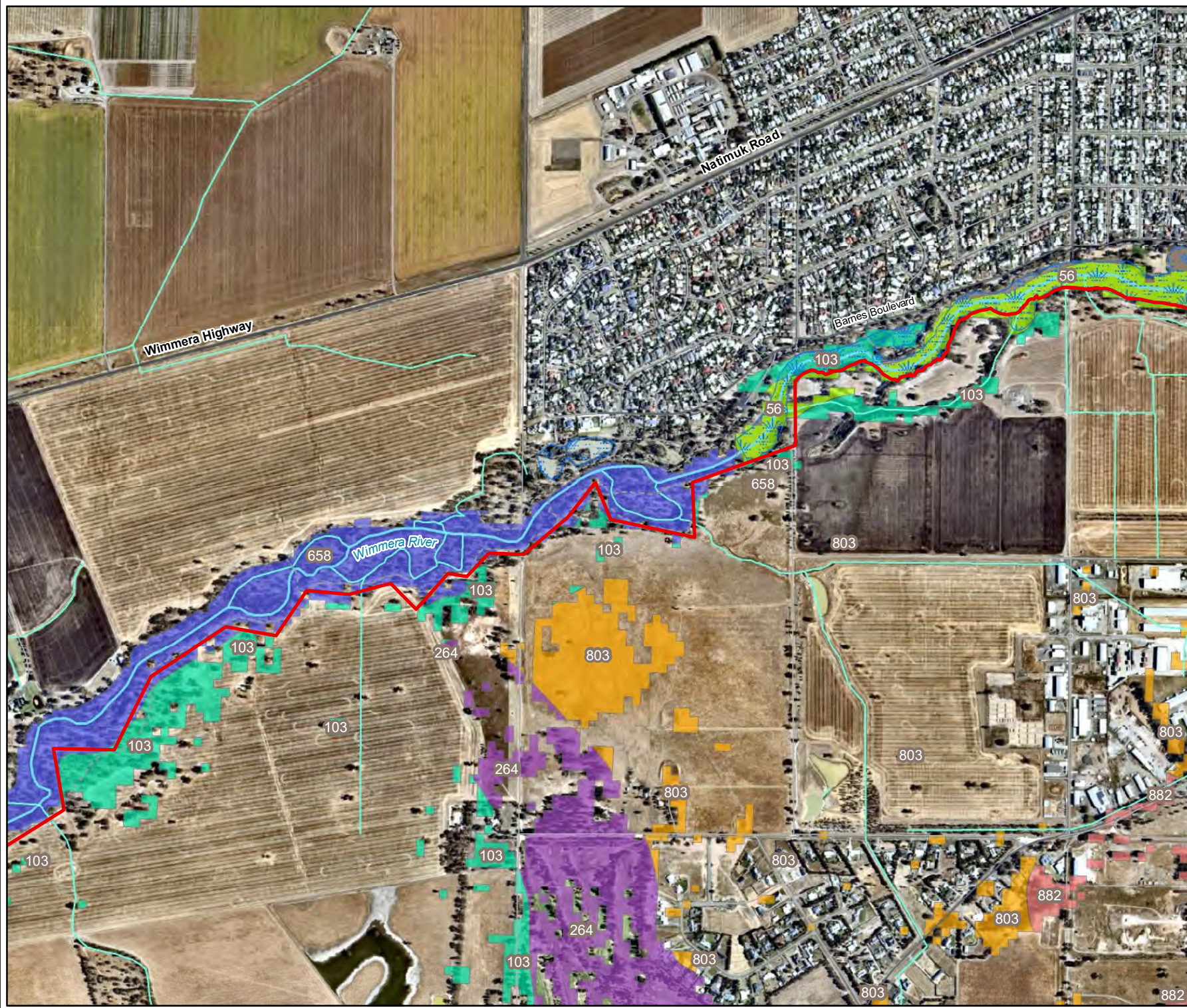
Legend

- Study Area
- Current Wetlands
- Ecological Vegetation Classes (DELWP 2005)**
- Floodplain Riparian Woodland (EVC 56)
- Riverine Chenopod Woodland (EVC 103)
- Sand Ridge Woodland (EVC 264)
- Creekline Sedy Woodland (EVC 640)
- Riparian Woodland (EVC 641)
- Riverine Grassy Woodland/Sedy Riverine Forest/Aquatic Hermland Mosaic (EVC 658)
- Plains Riparian Shrubby Woodland (EVC 659)
- Black Box Lignum Woodland (EVC 663)
- Sand Ridge Woodland/Damp Sands Herb-rich Woodland Mosaic (EVC 729)
- Plains Woodland (EVC 803)
- Shallow Sands Woodland (EVC 882)

Figure 2 Overview
Modelled Ecological Vegetation Classes
 Horsham South Structure Plan (HSSP)



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 16277_Fig02_ModVeg_OV 16/08/2022 melsjv



- Legend**
- Study Area
 - Current Wetlands
- Ecological Vegetation Classes (DELWP 2005)**
- Floodplain Riparian Woodland (EVC 56)
 - Riverine Chenopod Woodland (EVC 103)
 - Sand Ridge Woodland (EVC 264)
 - Riverine Grassy Woodland/Sedgy Riverine Forest/Aquatic Herbland Mosaic (EVC 658)
 - Plains Woodland (EVC 803)
 - Shallow Sands Woodland (EVC 882)

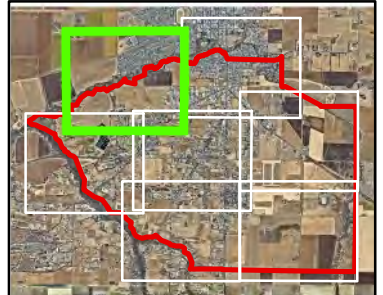
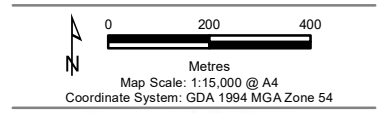
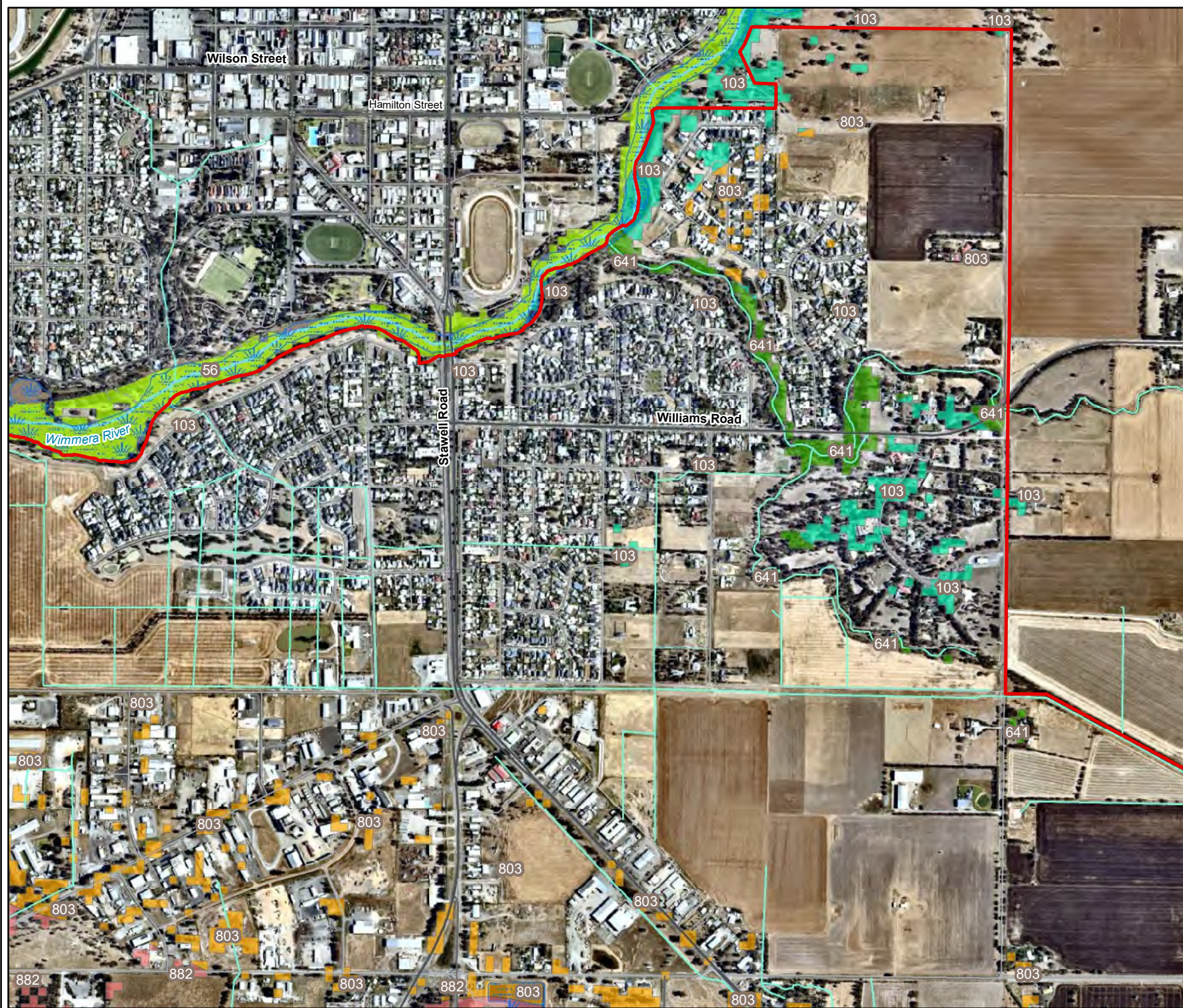


Figure 2a
Modelled Ecological Vegetation Classes
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- Current Wetlands
- Ecological Vegetation Classes (DELWP 2005)**
- Floodplain Riparian Woodland (EVC 56)
- Riverine Chenopod Woodland (EVC 103)
- Riparian Woodland (EVC 641)
- Plains Woodland (EVC 803)
- Shallow Sands Woodland (EVC 882)

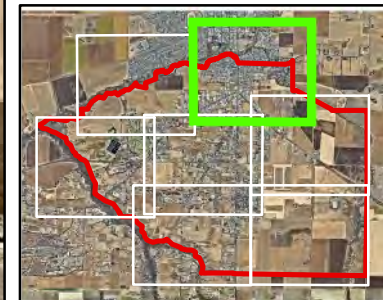
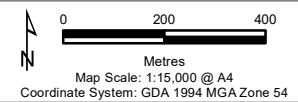
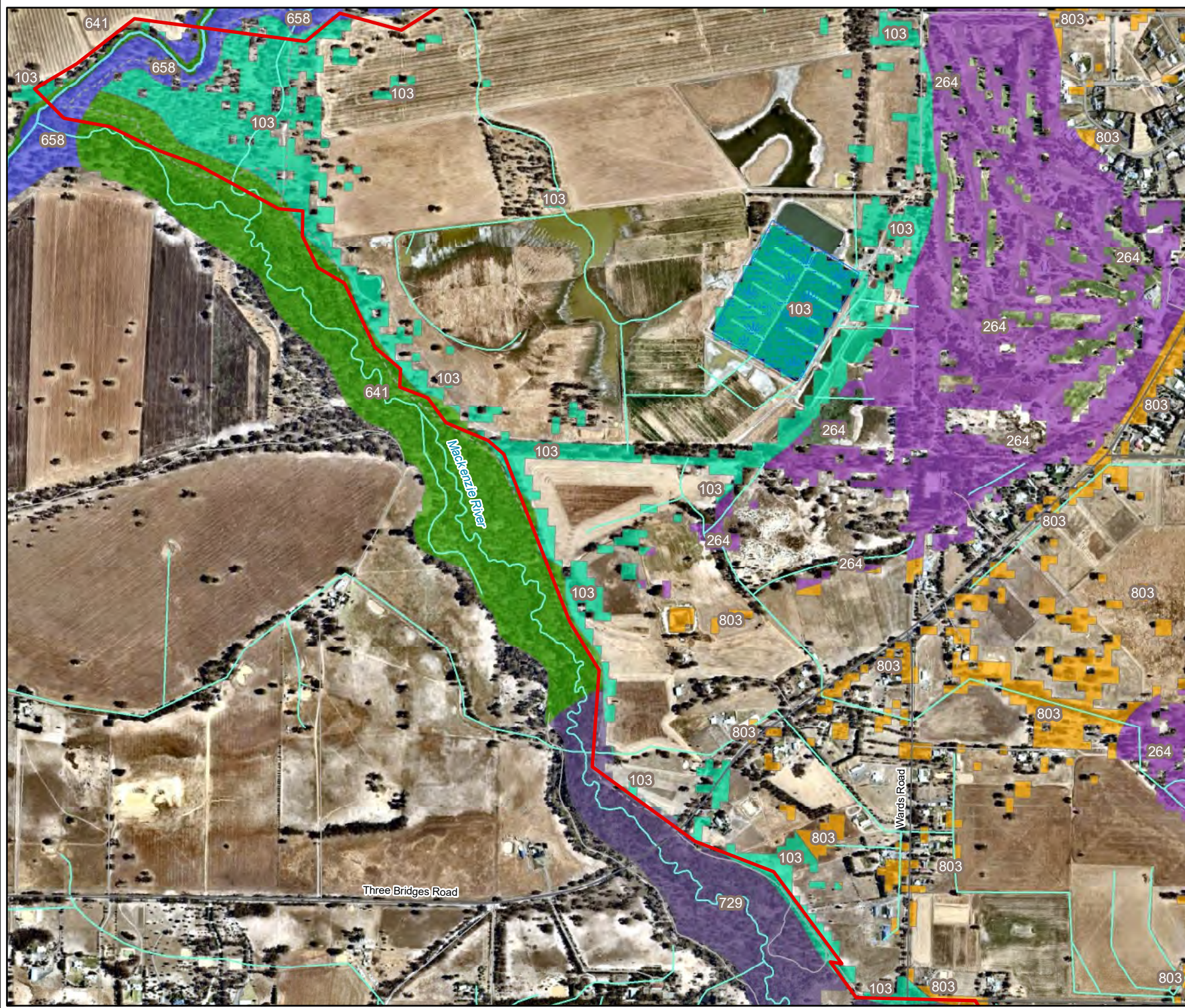


Figure 2b
Modelled Ecological Vegetation Classes
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- Current Wetlands
- Ecological Vegetation Classes (DELWP 2005)**
- Riverine Chenopod Woodland (EVC 103)
- Sand Ridge Woodland (EVC 264)
- Riparian Woodland (EVC 641)
- Riverine Grassy Woodland/Sedgy Riverine Forest/Aquatic Herbland Mosaic (EVC 658)
- Sand Ridge Woodland/Damp Sands Herb-rich Woodland Mosaic (EVC 729)
- Plains Woodland (EVC 803)

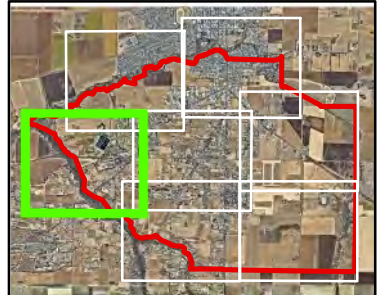
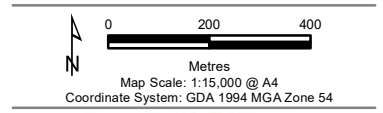
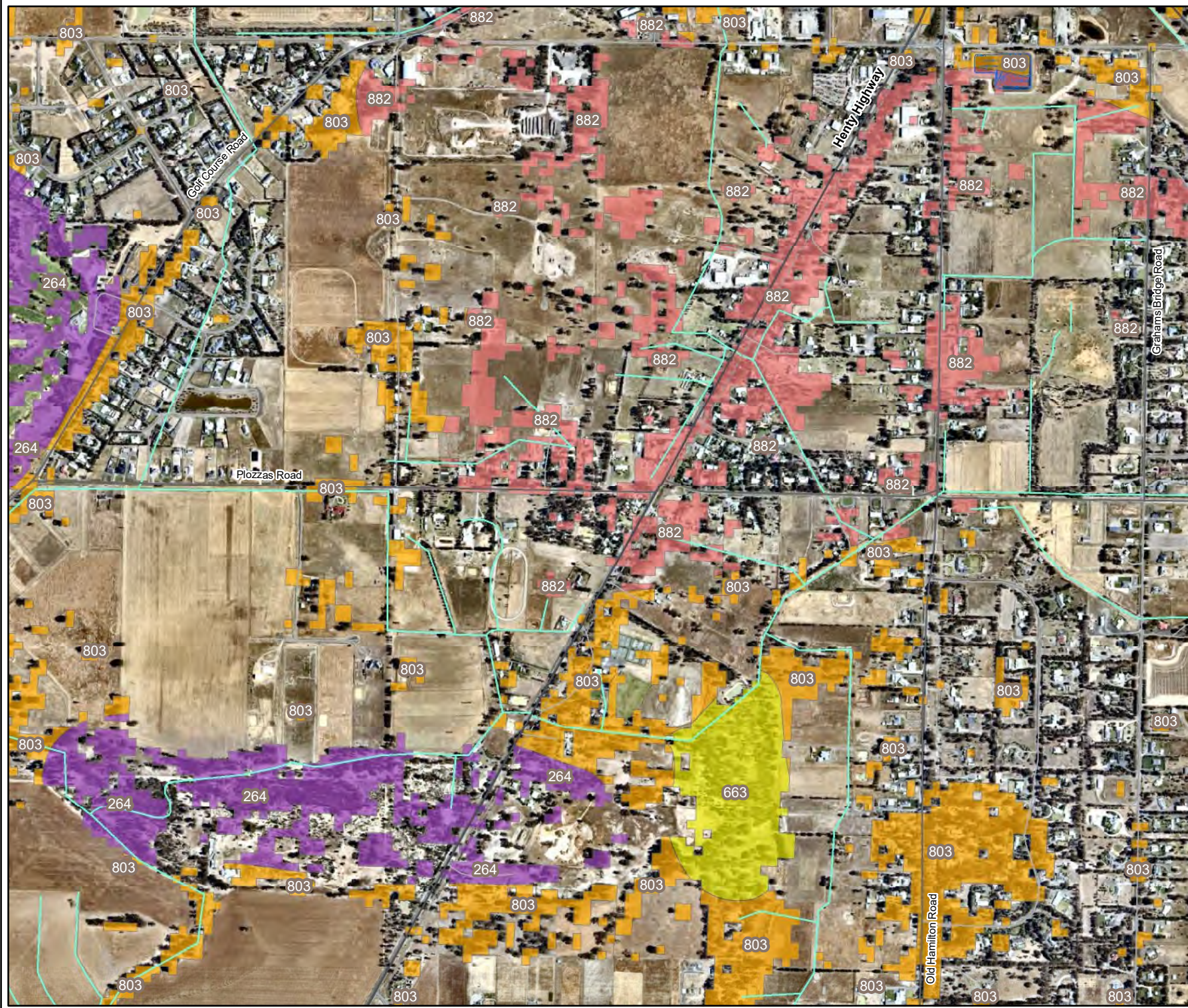


Figure 2c
Modelled Ecological Vegetation Classes
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- Current Wetlands
- Ecological Vegetation Classes (DELWP 2005)**
- Sand Ridge Woodland (EVC 264)
- Black Box Lignum Woodland (EVC 663)
- Plains Woodland (EVC 803)
- Shallow Sands Woodland (EVC 882)

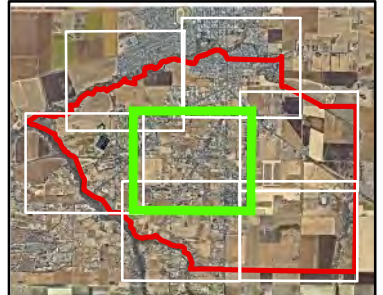
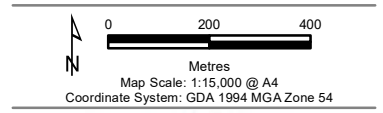


Figure 2d
Modelled Ecological Vegetation Classes
Horsham South Structure Plan (HSSP)



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Legend

Study Area

Ecological Vegetation Classes (DELWP 2005)

- Riverine Chenopod Woodland (EVC 103)
- Riparian Woodland (EVC 641)
- Plains Woodland (EVC 803)
- Shallow Sands Woodland (EVC 882)

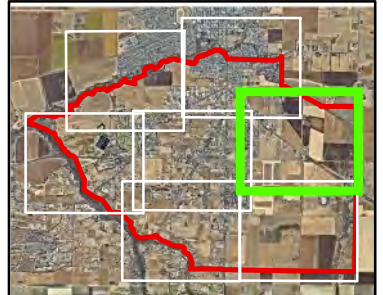
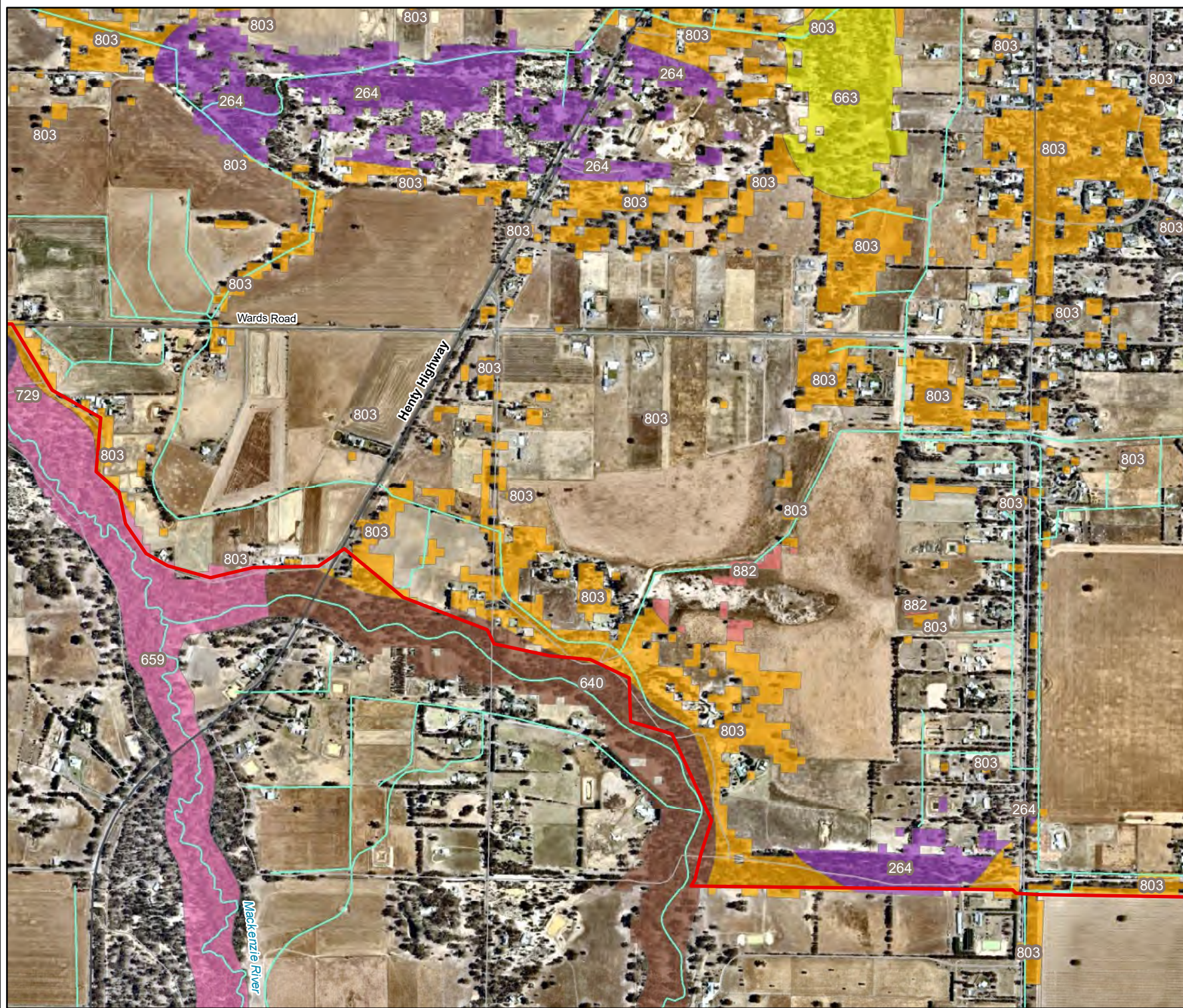


Figure 2e
Modelled Ecological Vegetation Classes
Horsham South Structure Plan (HSSP)

0 200 400
 Metres
 Map Scale: 1:15,000 @ A4
 Coordinate System: GDA 1994 MGA Zone 54



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- Legend**
- Study Area
 - Ecological Vegetation Classes (DELWP 2005)**
 - Sand Ridge Woodland (EVC 264)
 - Creekline Sedge Woodland (EVC 640)
 - Plains Riparian Shrubby Woodland (EVC 659)
 - Black Box Lignum Woodland (EVC 663)
 - Sand Ridge Woodland/Damp Sands Herb-rich Woodland Mosaic (EVC 729)
 - Plains Woodland (EVC 803)
 - Shallow Sands Woodland (EVC 882)

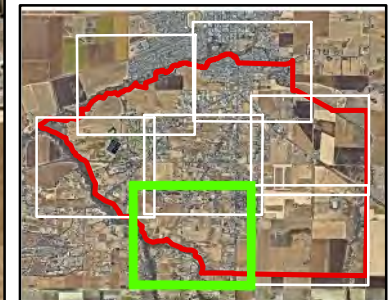
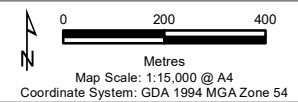


Figure 2f
Modelled Ecological Vegetation Classes
Horsham South Structure Plan (HSSP)



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Legend

Study Area

Ecological Vegetation Classes (DELWP 2005)

- Riverine Chenopod Woodland (EVC 103)
- Riparian Woodland (EVC 641)
- Plains Woodland (EVC 803)

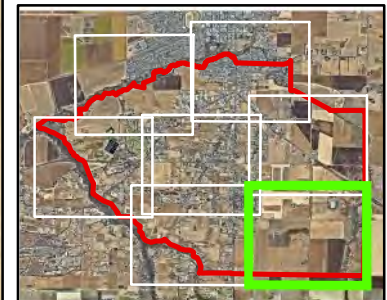
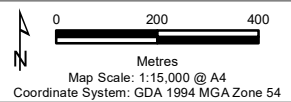
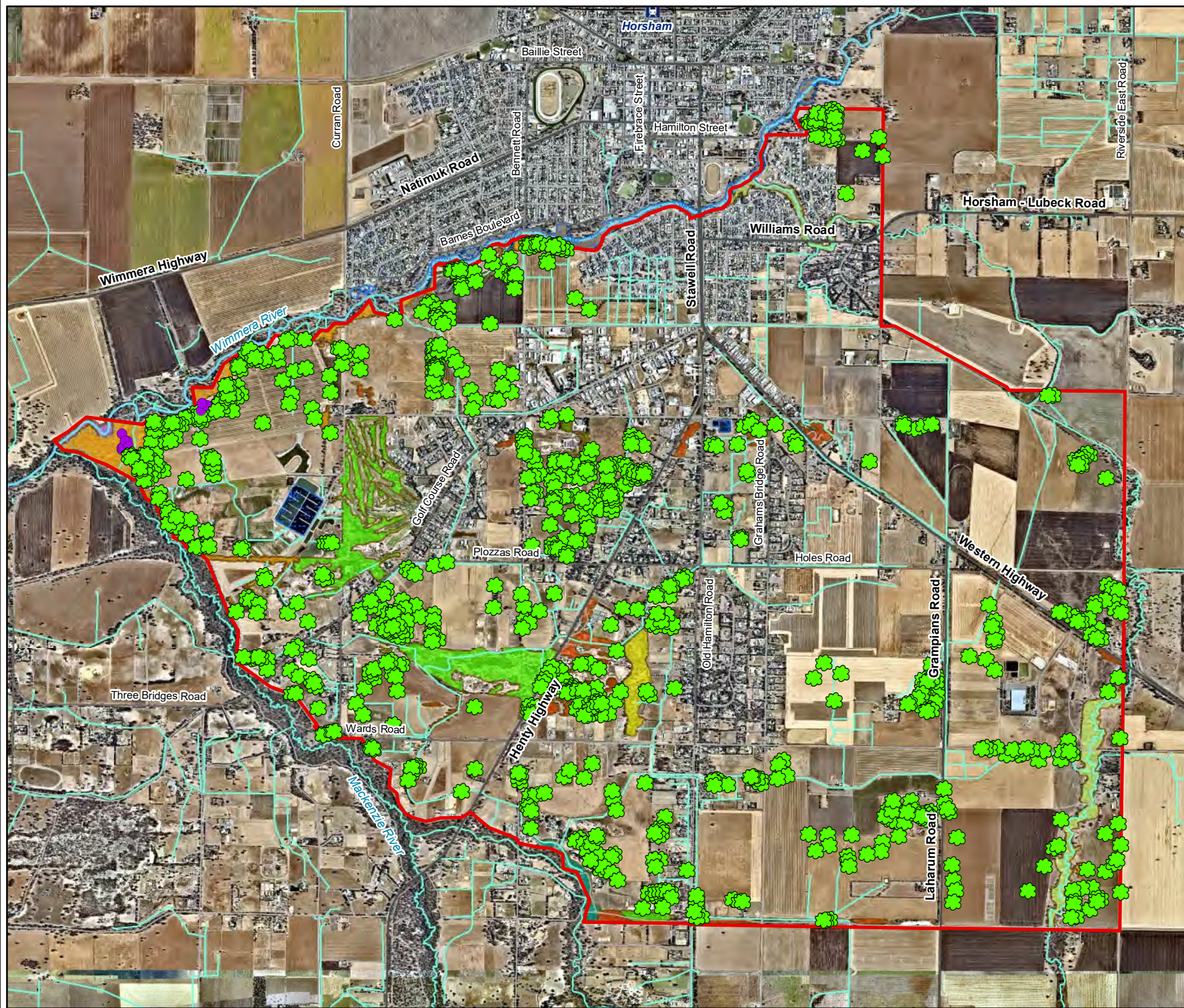


Figure 2g
Modelled Ecological Vegetation Classes
Horsham South Structure Plan (HSSP)



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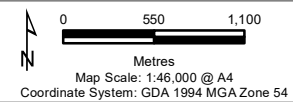


Legend

- Study Area
 - Current Wetlands
 - Scattered tree
 - Tree in patch
- Native vegetation**
- Black Box Lignum Woodland (EVC 663)
 - Creekline Sedgey Woodland (EVC 640)
 - Plains Woodland (EVC 803)
 - Riparian Woodland (EVC 641)
 - Riverine Chenopod Woodland (EVC 103)
 - Sand Ridge Woodland (EVC 264)
 - Shallow Sands Woodland (EVC 882)
 - Woodland/Sedgey Riverine Forest/Aquatic Herbrland Mosaic (EVC 658)



Figure 3 Overview
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



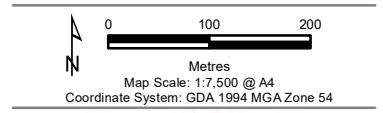
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- Legend**
- Study Area
 - Current Wetlands
 - ☘ Scattered tree
 - Native vegetation**
 - Riparian Woodland (EVC 641)



Figure 3a
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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 16277, Fig03, NatVeg, MB 18/08/2022 melsley



Legend

- Study Area
- Current Wetlands
- 🌳 Scattered tree
- Native vegetation**
- Riverine Chenopod Woodland (EVC 103)

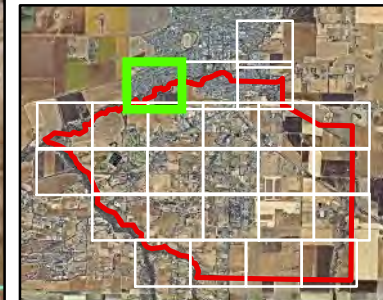
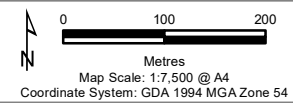
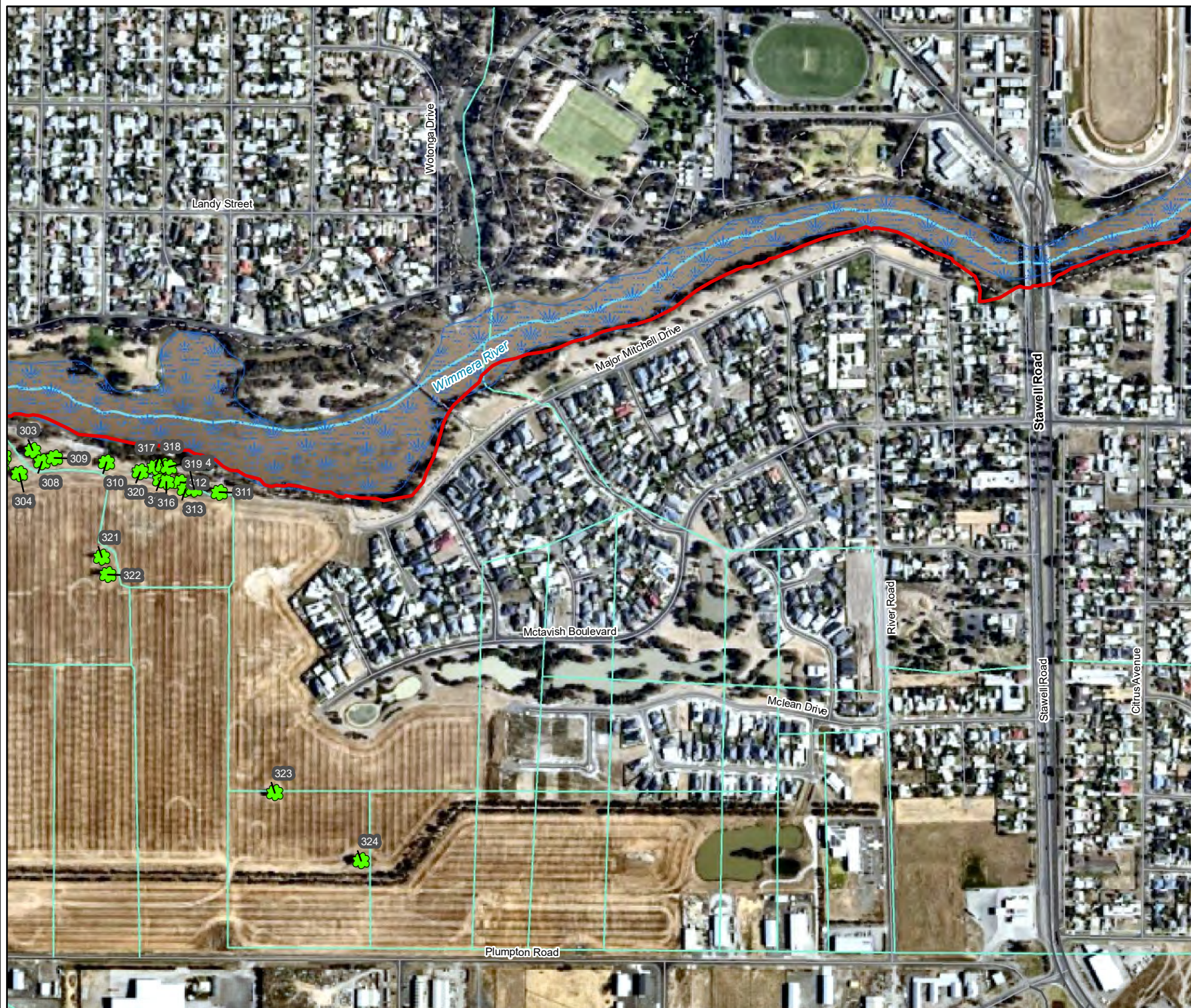


Figure 3b
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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- Legend**
- Study Area
 - Current Wetlands
 - ☘ Scattered tree

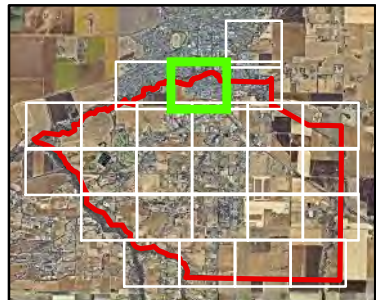
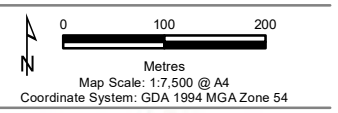


Figure 3c
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- Current Wetlands
- 🌳 Scattered tree
- Native vegetation**
- Riparian Woodland (EVC 641)

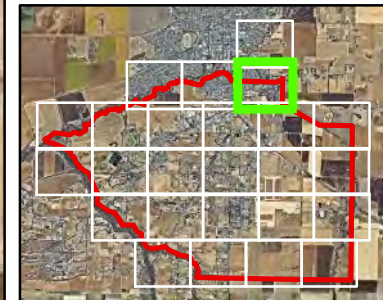
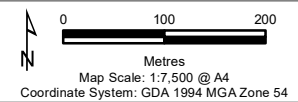
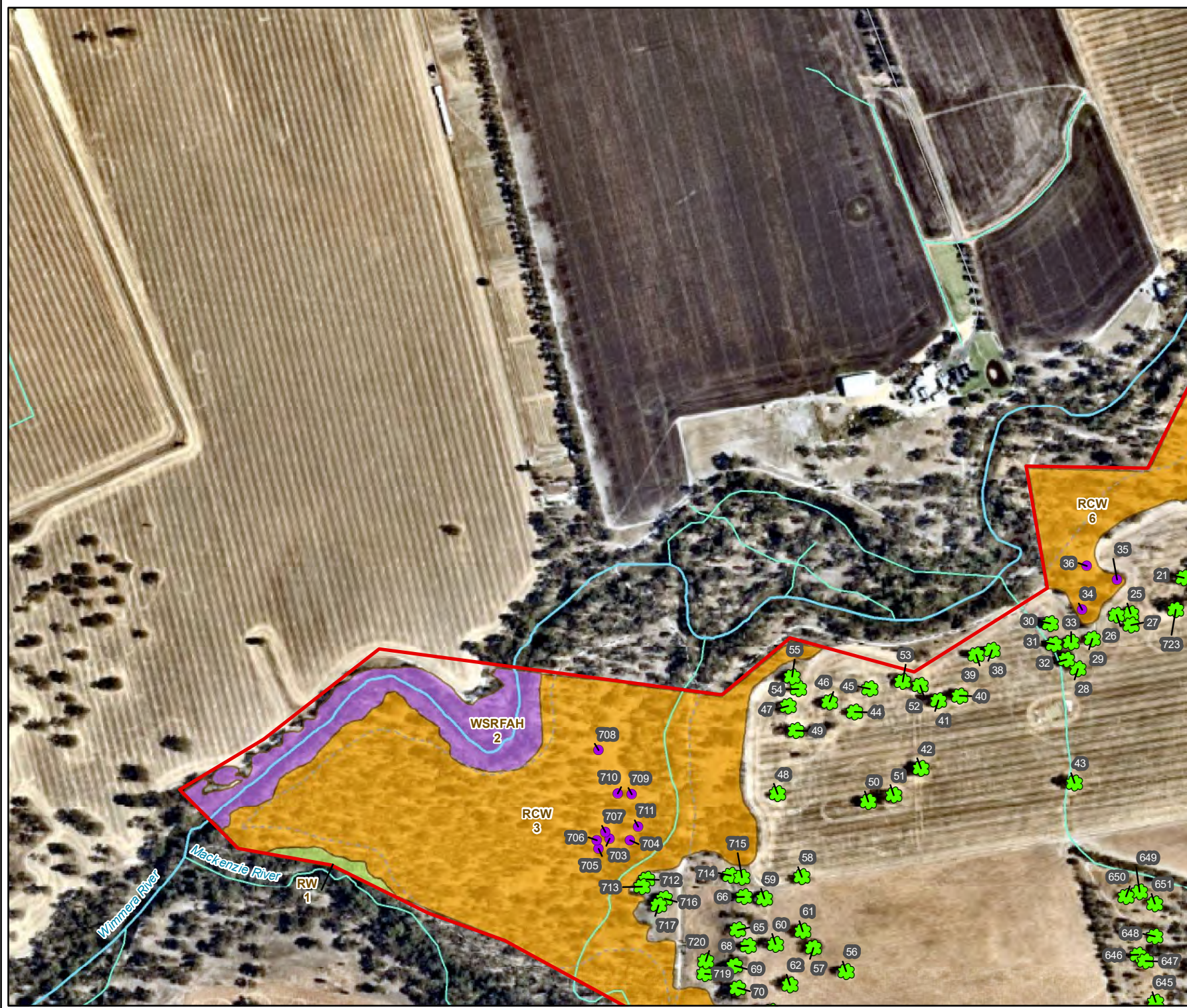


Figure 3d
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



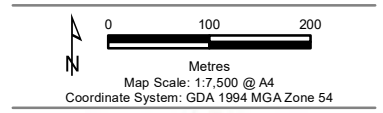
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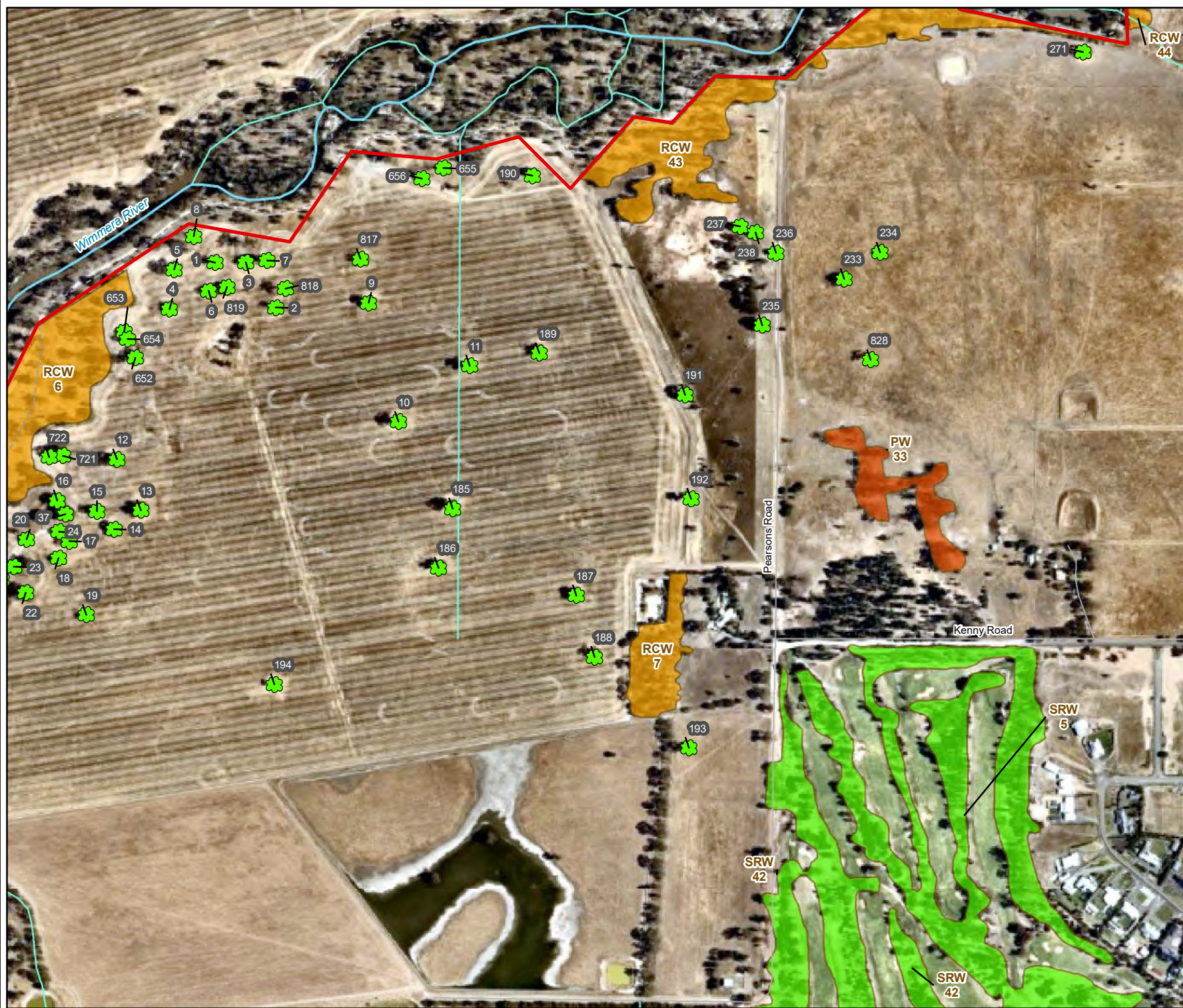
- Legend**
- Study Area
 - ☘ Scattered tree
 - Tree in patch
- Native vegetation**
- Riparian Woodland (EVC 641)
 - Riverine Chenopod Woodland (EVC 103)
 - Woodland/Sedgey Riverine Forest/Aquatic Herbland Mosaic (EVC 658)



Figure 3e
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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- Legend**
- Study Area
 - ✻ Scattered tree
- Native vegetation**
- Plains Woodland (EVC 803)
 - Riverine Chenopod Woodland (EVC 103)
 - Sand Ridge Woodland (EVC 264)

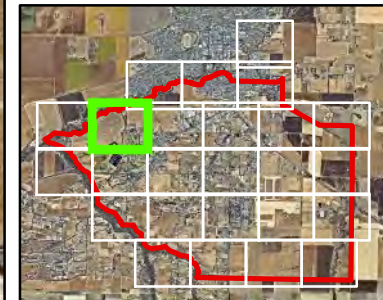
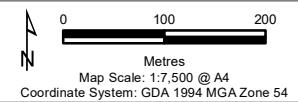
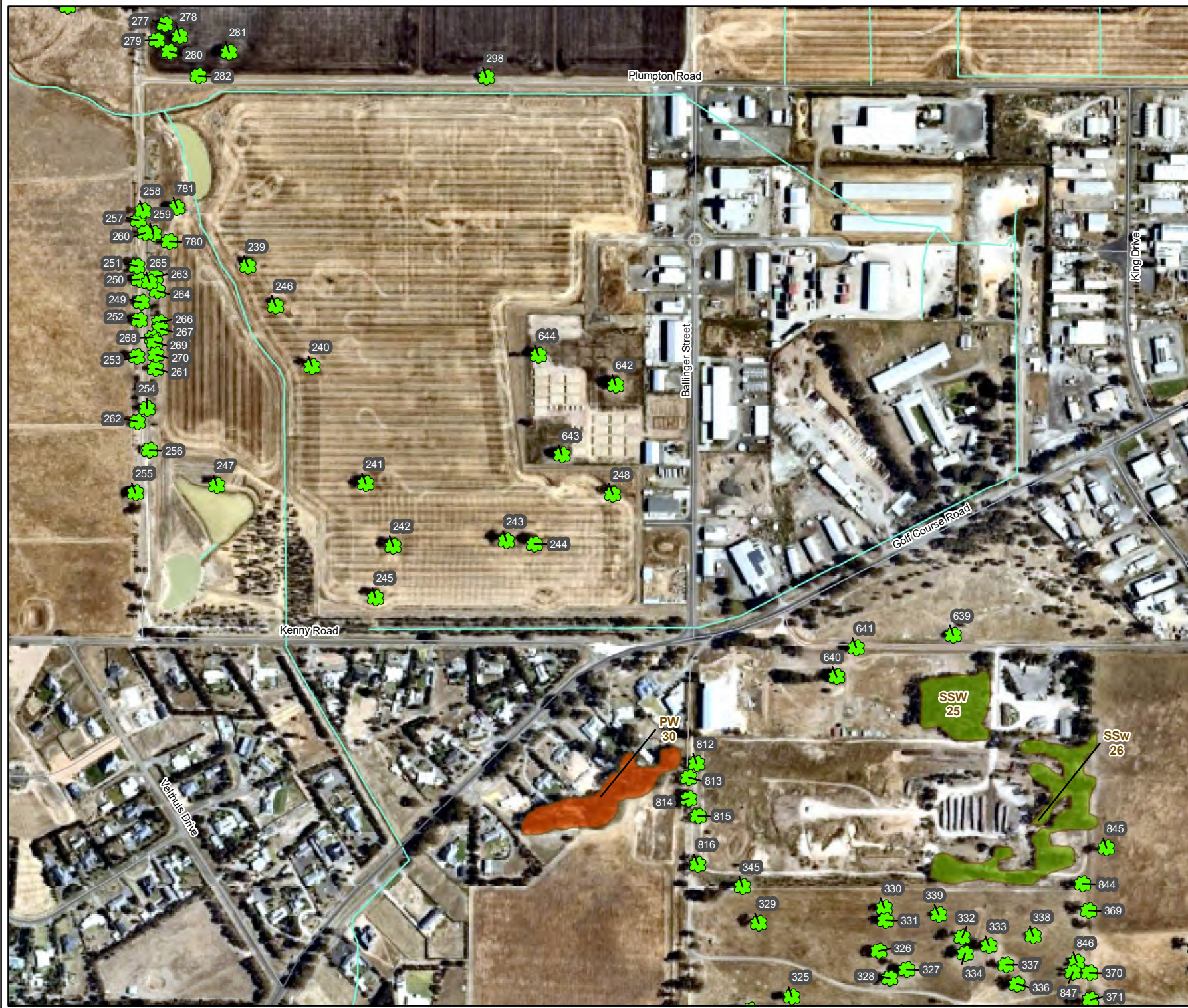


Figure 3f
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- ✿ Scattered tree

Native vegetation

- Plains Woodland (EVC 803)
- Shallow Sands Woodland (EVC 882)

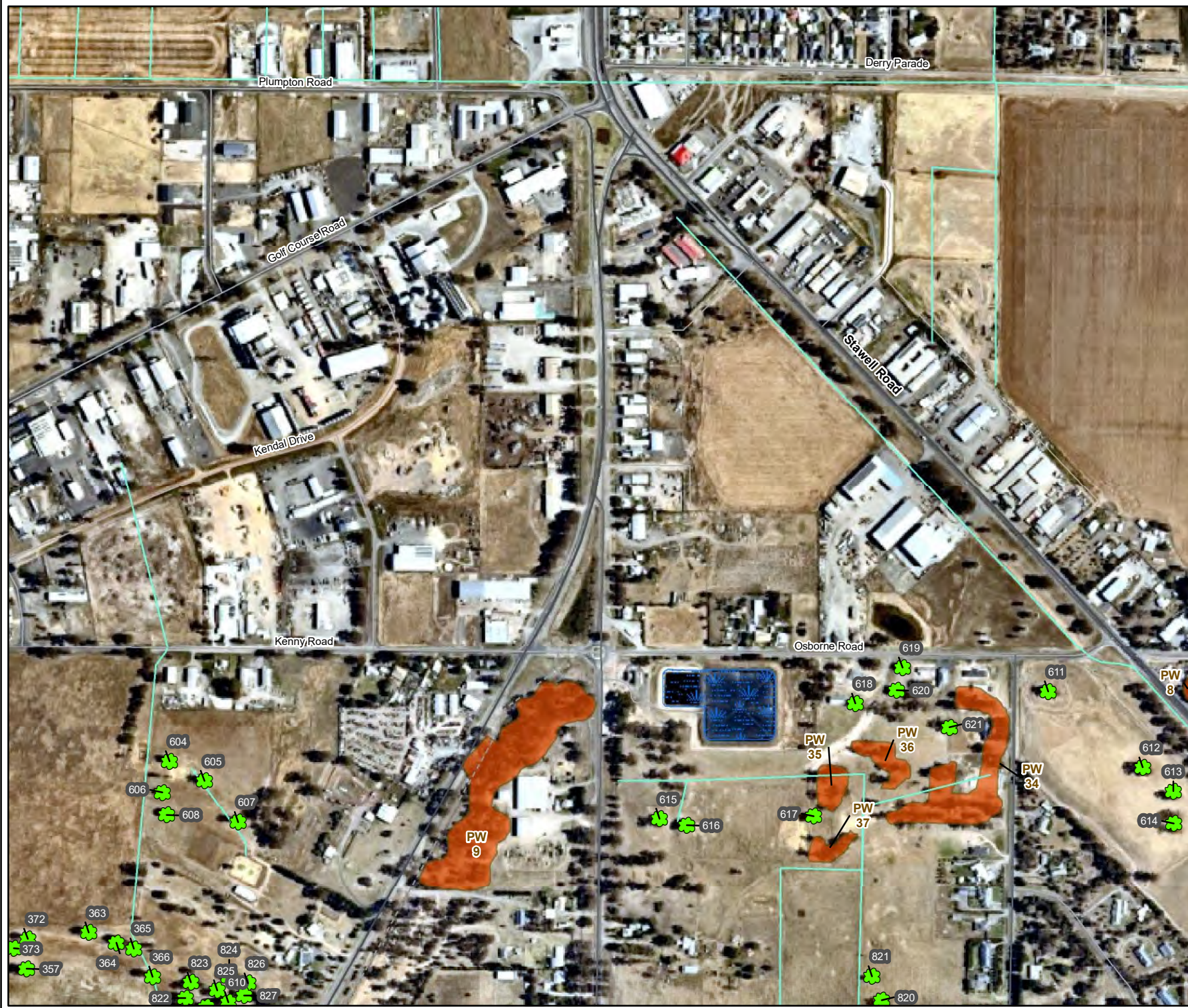


Figure 3g
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)

0 100 200
 Metres
 Map Scale: 1:7,500 @ A4
 Coordinate System: GDA 1994 MGA Zone 54



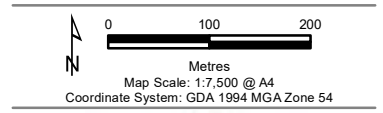
VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.
 16277, Fig03, NatVeg, MB 18/08/2022 melsley



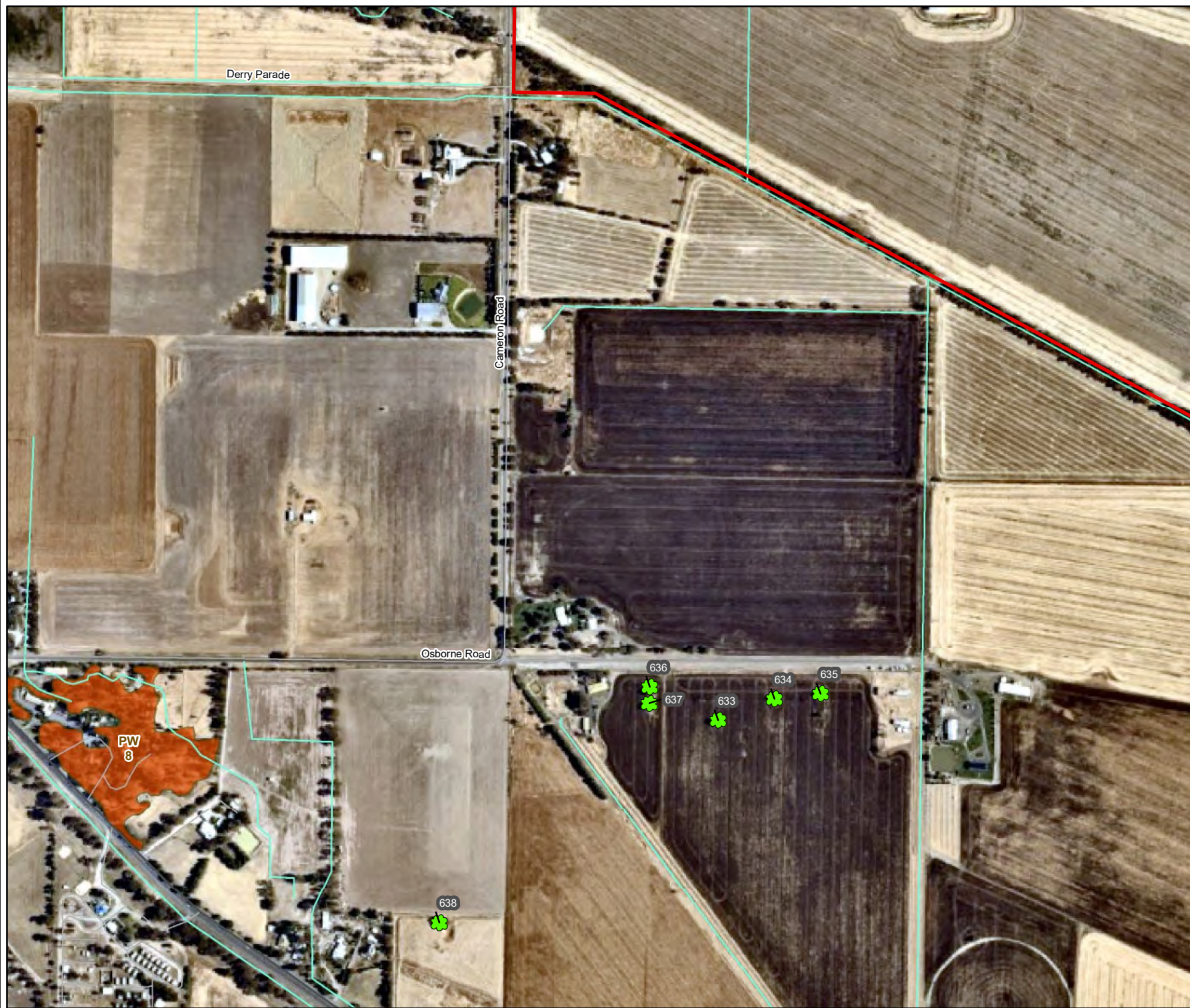
- Legend**
- Study Area
 - Current Wetlands
 - ☘ Scattered tree
 - Native vegetation**
 - Plains Woodland (EVC 803)



Figure 3h
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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 16277_Fig03_NatVeg_MB_18/08/2022_melsley



- Legend**
- Study Area
 - ♣ Scattered tree
 - Native vegetation**
 - Plains Woodland (EVC 803)

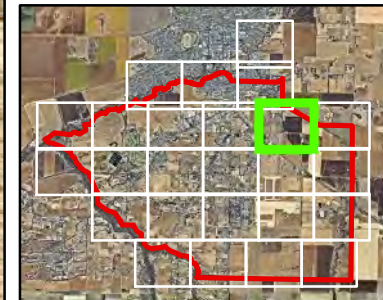
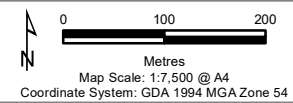


Figure 3i
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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 16277_Fig03_NatVeg_MB 18/08/2022_melsley



- Legend**
- Study Area
 - ♣ Scattered tree

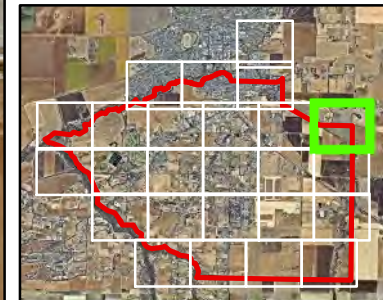
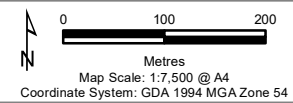
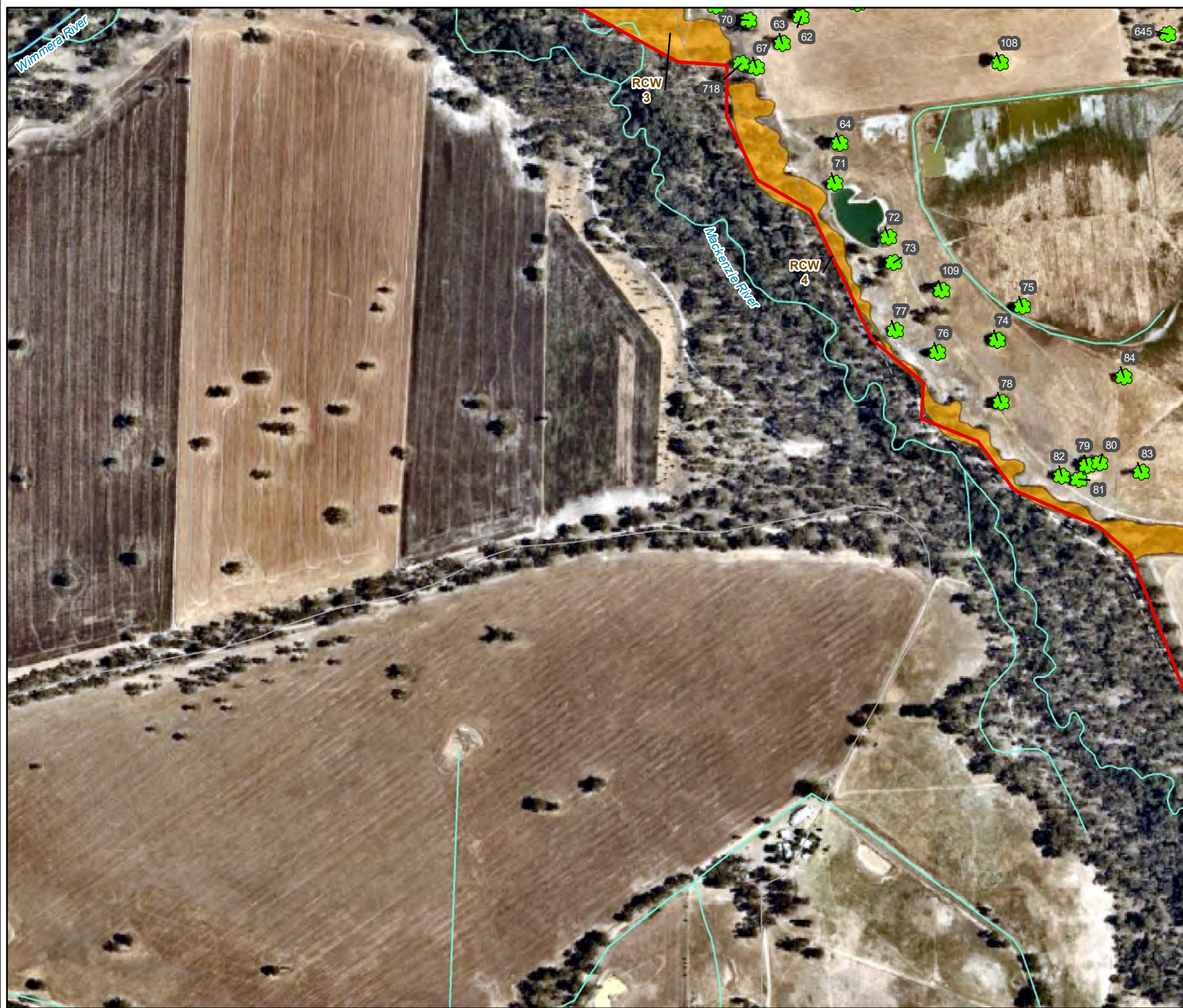


Figure 3j
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- ✻ Scattered tree
- Native vegetation**
- Riverine Chenopod Woodland (EVC 103)

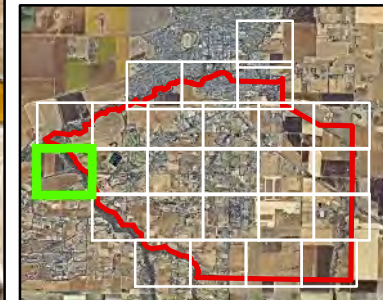
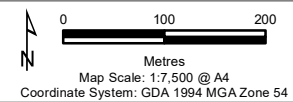
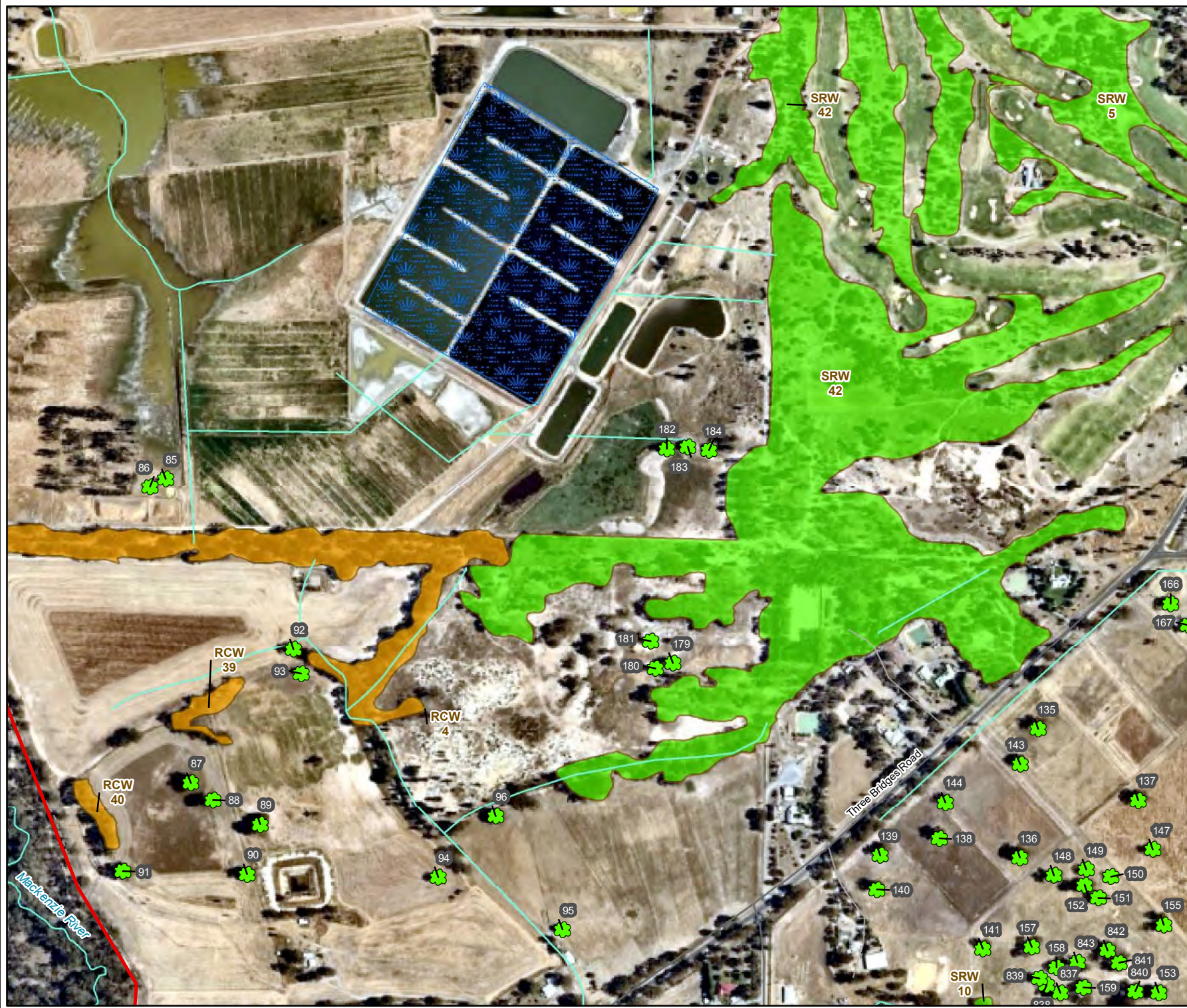


Figure 3k
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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 16277_Fig03_NatVeg_MB 18/08/2022_melsley



- Legend**
- Study Area
 - Current Wetlands
 - ✪ Scattered tree
- Native vegetation**
- Riverine Chenopod Woodland (EVC 103)
 - Sand Ridge Woodland (EVC 264)

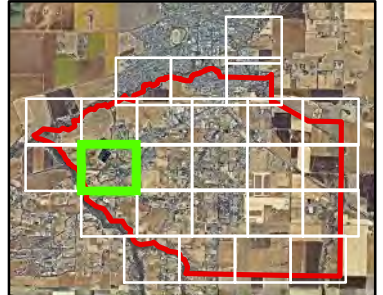
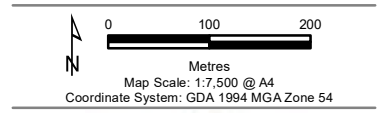
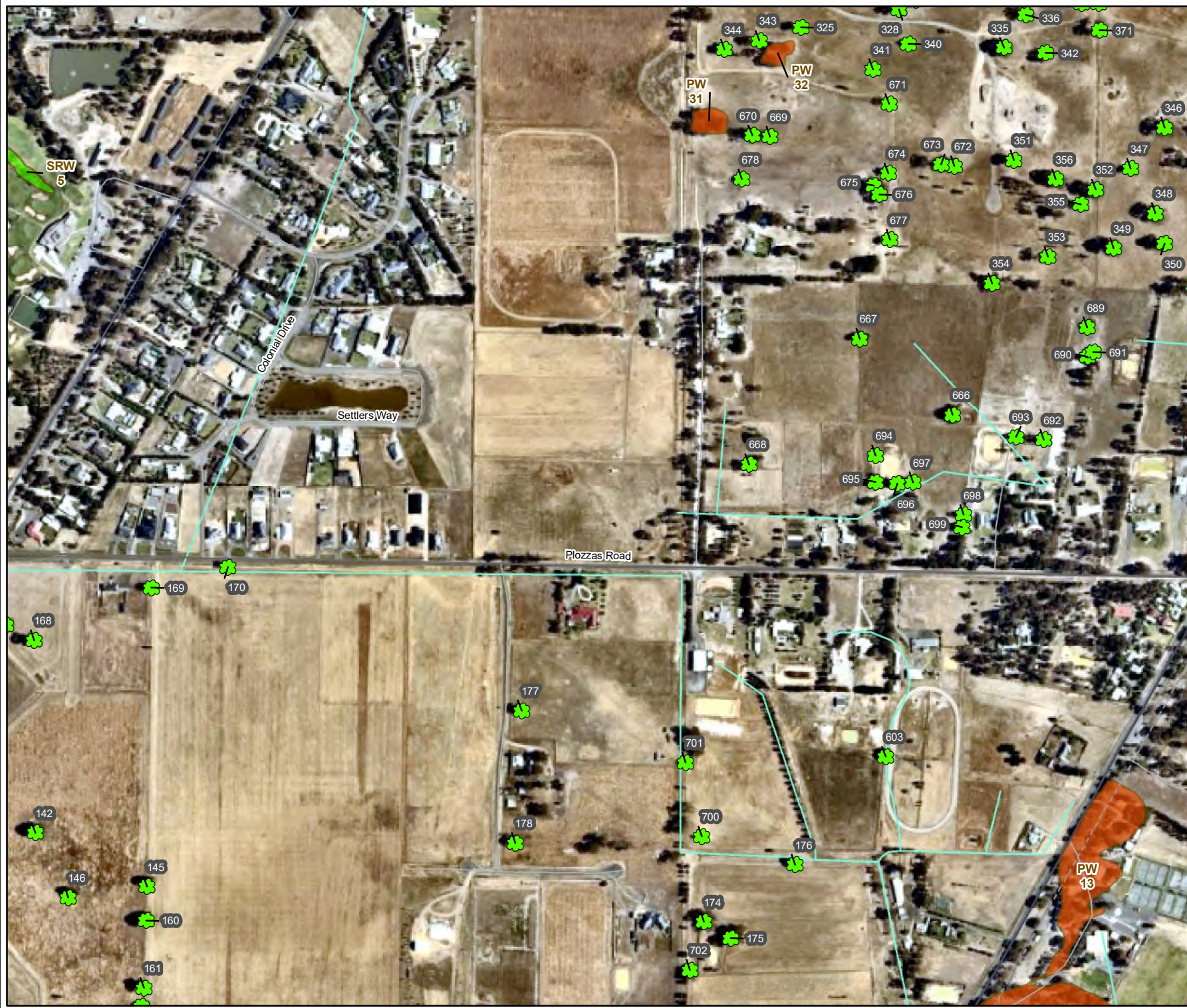


Figure 31
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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 16277, Fig03, NatVeg, MB 18/08/2022 melsley



Legend

- Study Area
- 🌿 Scattered tree

Native vegetation

- Plains Woodland (EVC 803)
- Sand Ridge Woodland (EVC 264)

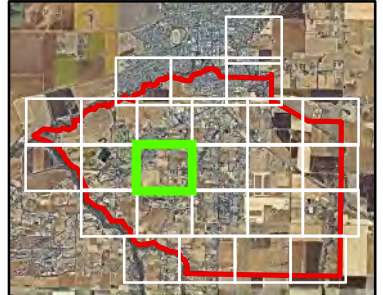
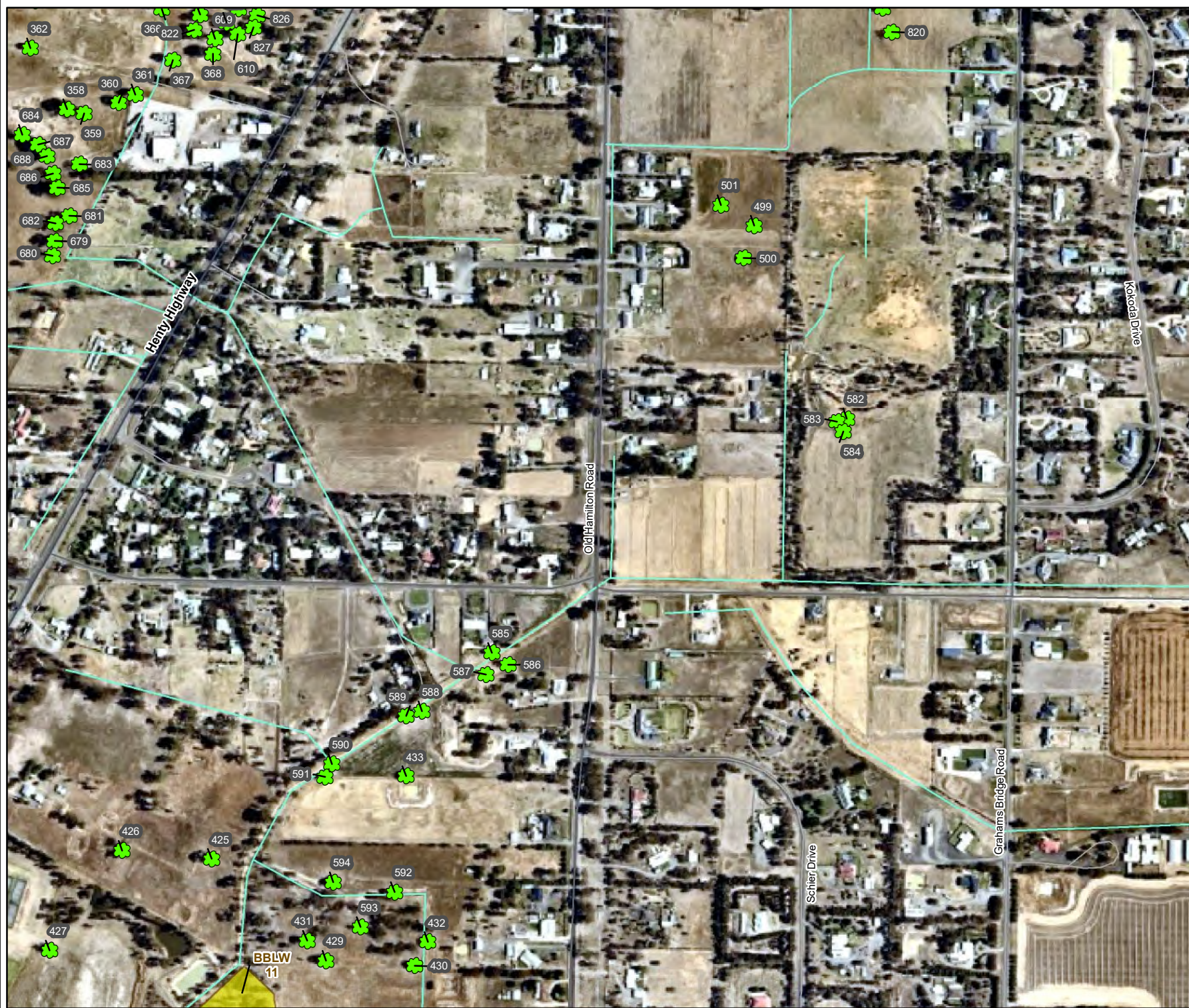


Figure 3m
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)

0 100 200
 Metres
 Map Scale: 1:7,500 @ A4
 Coordinate System: GDA 1994 MGA Zone 54



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 16277, Fig03, NatVeg, MB 18/08/2022 melsjv



- Legend**
- Study Area
 - ✿ Scattered tree
 - Native vegetation**
 - Black Box Lignum Woodland (EVC 663)

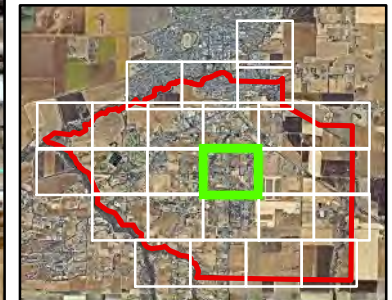
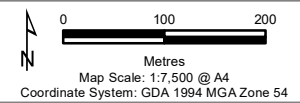


Figure 3n
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- ♣ Scattered tree

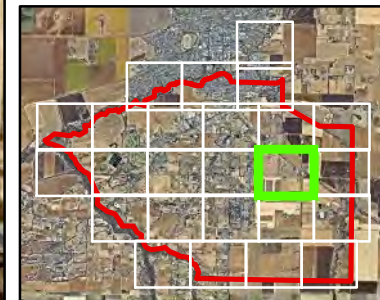
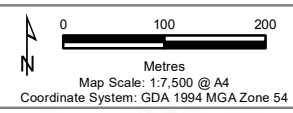


Figure 30
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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 16277_Fig03_NatVeg_MB 18/08/2022 melsley



- Legend**
- Study Area
 - ♣ Scattered tree

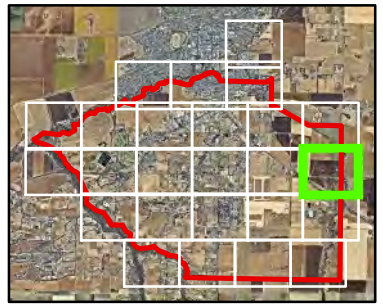
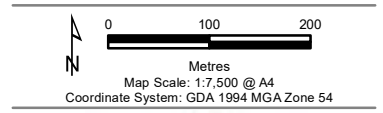
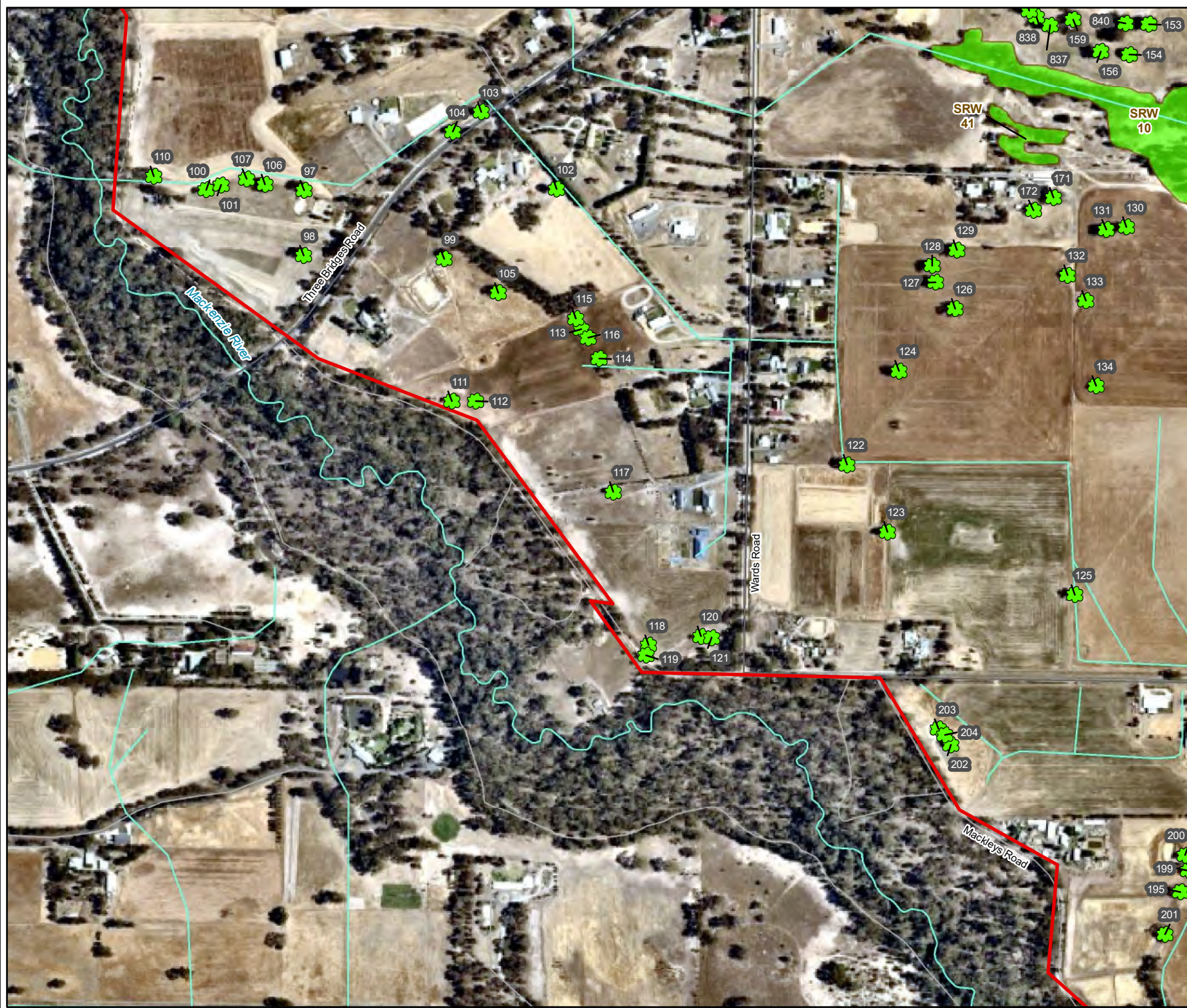


Figure 3p
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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Legend

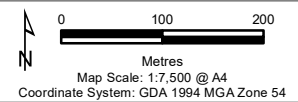
- Study Area
- ✻ Scattered tree

Native vegetation

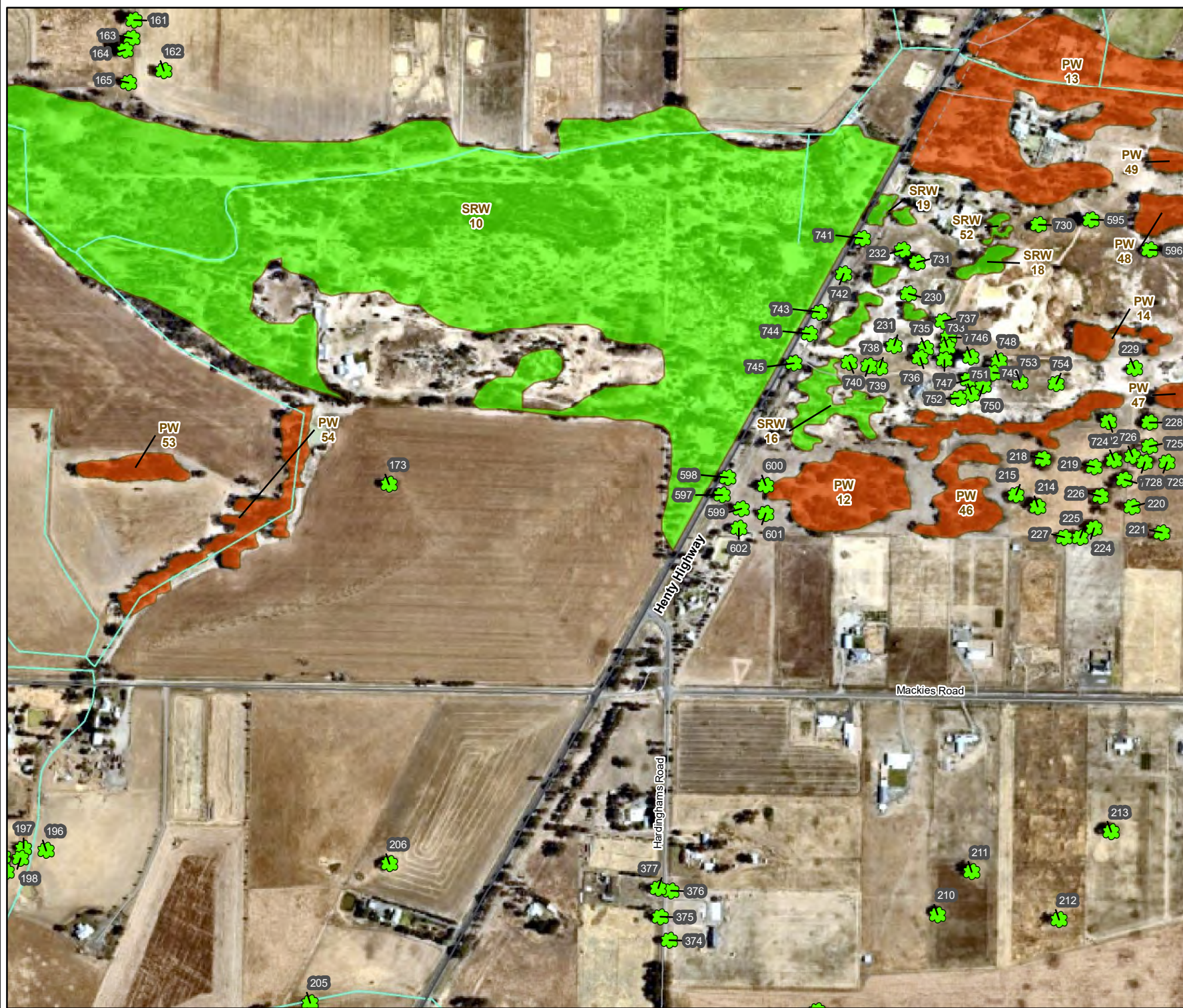
- Sand Ridge Woodland (EVC 264)



Figure 3q
Desktop mapped native vegetation
 Horsham South Structure Plan (HSSP)



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 16277_Fig03_NatVeg_MB 18/08/2022 melsley



Legend

- Study Area
- ✪ Scattered tree

Native vegetation

- Plains Woodland (EVC 803)
- Sand Ridge Woodland (EVC 264)

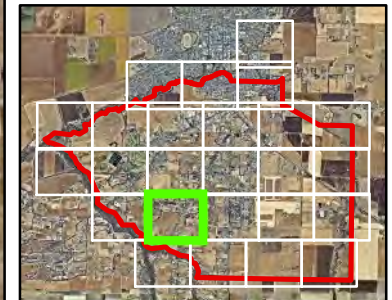
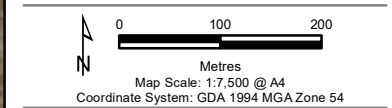
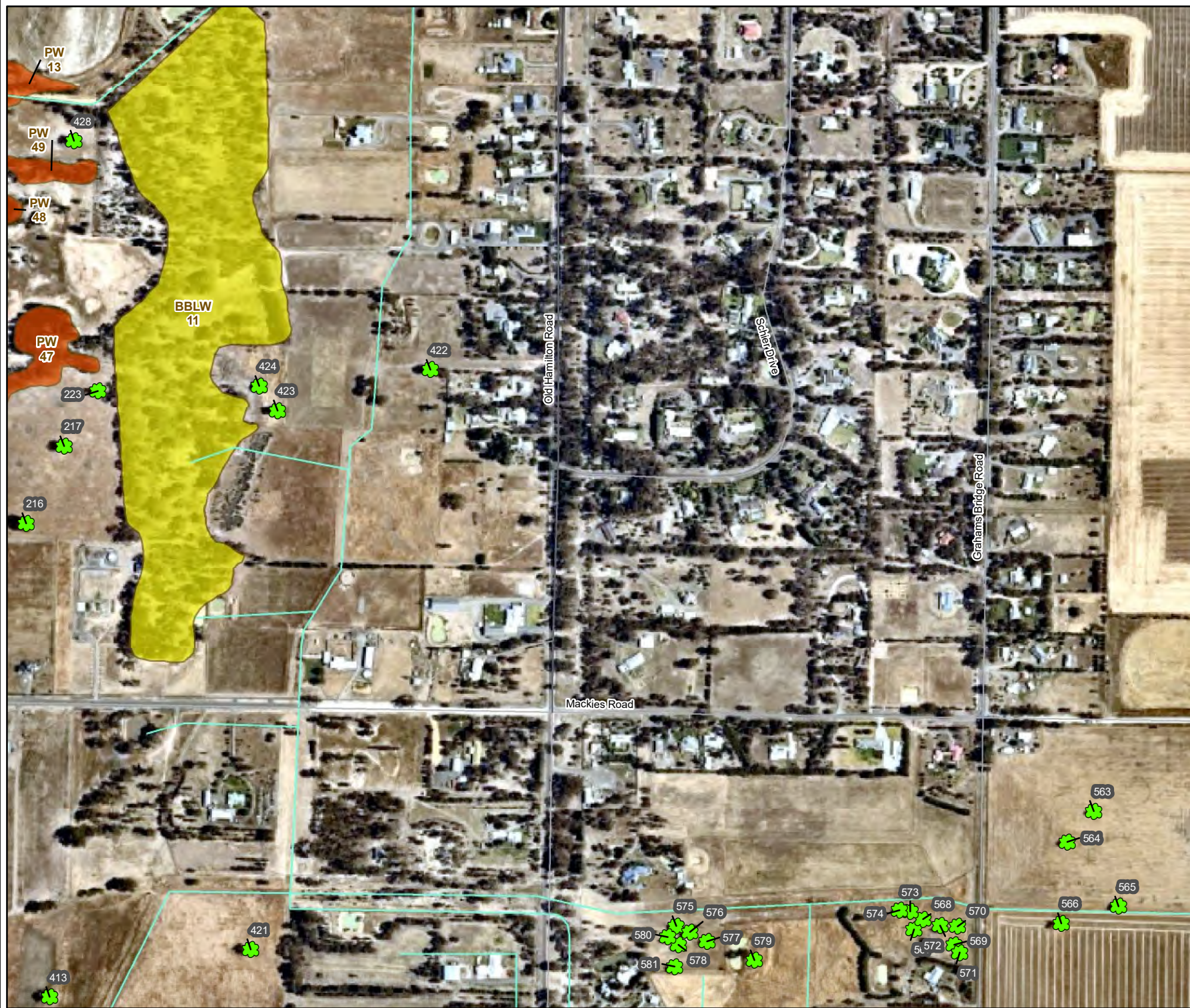


Figure 3r
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- 🌳 Scattered tree

Native vegetation

- Black Box Lignum Woodland (EVC 663)
- Plains Woodland (EVC 803)

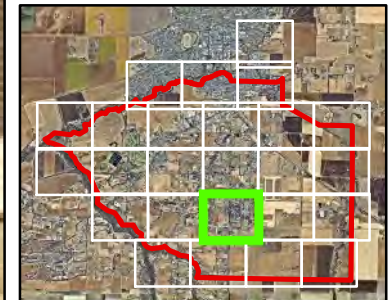
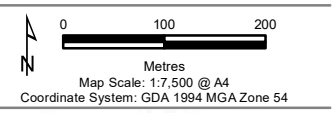


Figure 3s
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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- Legend**
- Study Area
 - 🌳 Scattered tree

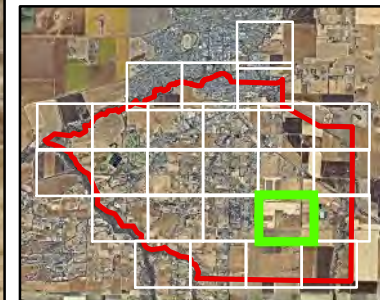
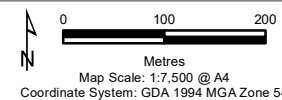


Figure 3t
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- ✪ Scattered tree

Native vegetation

- Plains Woodland (EVC 803)
- Riparian Woodland (EVC 641)

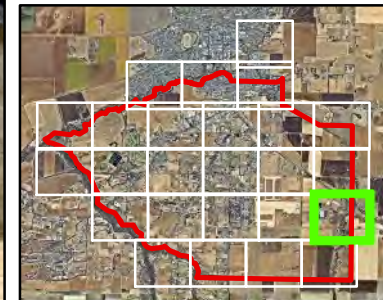
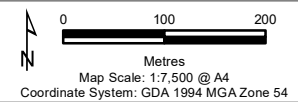


Figure 3u
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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Legend

- Study Area
- 🌳 Scattered tree
- Native vegetation**
- Creekline Sedge Woodland (EVC 640)

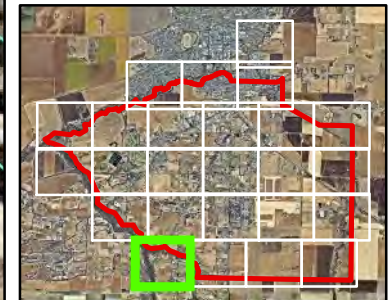
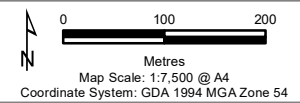
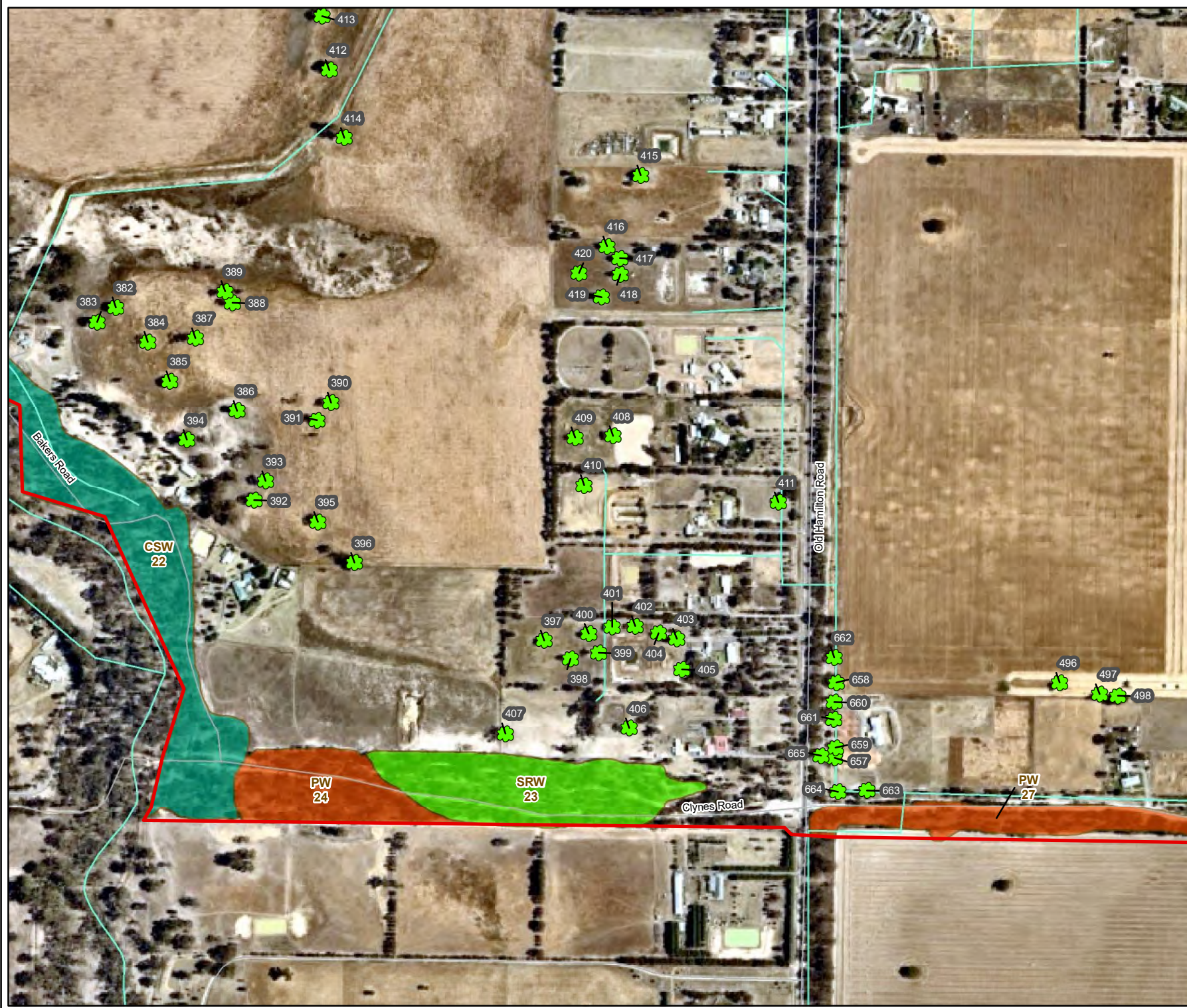


Figure 3v
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



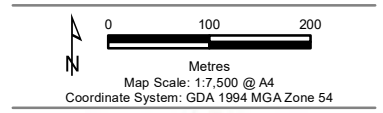
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 16277_Fig03_NatVeg_MB 18/08/2022 melsley



- Legend**
- Study Area
 - ♣ Scattered tree
- Native vegetation**
- Creekline Sedgey Woodland (EVC 640)
 - Plains Woodland (EVC 803)
 - Sand Ridge Woodland (EVC 264)



Figure 3w
Desktop mapped native vegetation
 Horsham South Structure Plan (HSSP)



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- Legend**
- Study Area
 - ✪ Scattered tree
 - Native vegetation**
 - Plains Woodland (EVC 803)

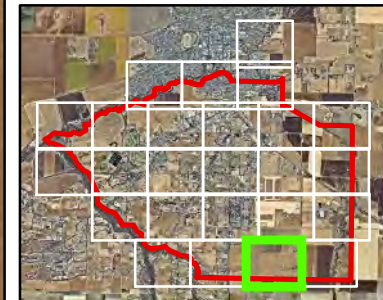
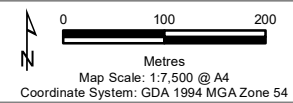


Figure 3x
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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 16277_Fig03_NatVeg_MB 18/08/2022_melsley



- Legend**
- Study Area
 - ♣ Scattered tree
 - Native vegetation**
 - Riparian Woodland (EVC 641)
 - Riverine Chenopod Woodland (EVC 103)

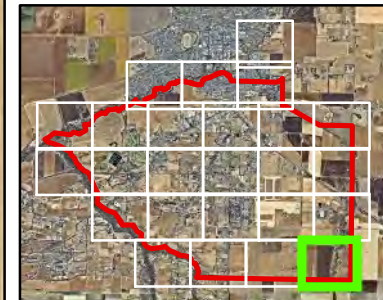
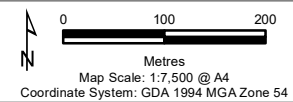
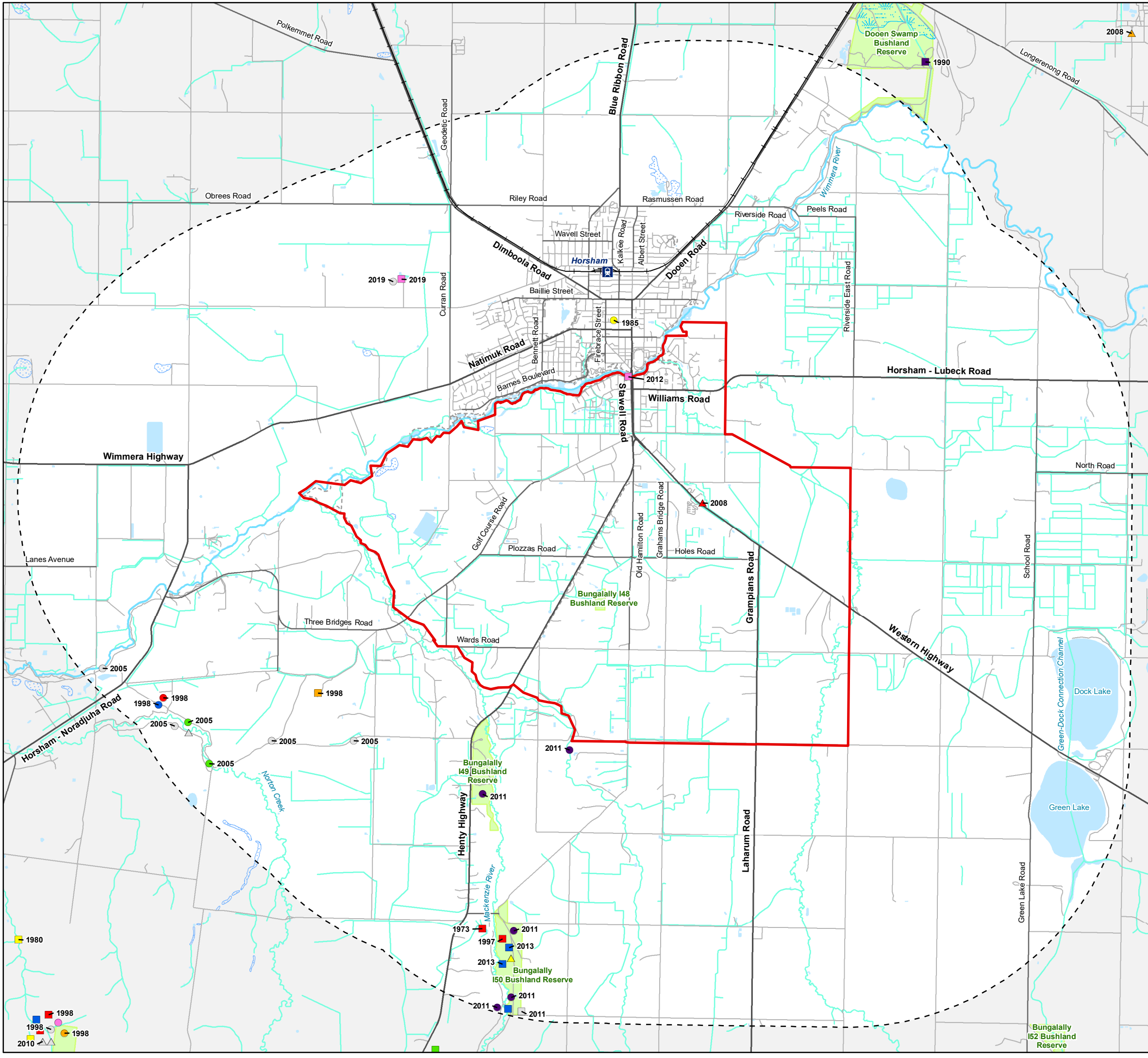


Figure 3y
Desktop mapped native vegetation
Horsham South Structure Plan (HSSP)



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Legend

Study Area

Significant flora

- Buloke
- Club-hair New Holland Daisy
- Coccid Emu-bush
- Deniliquin Box
- Diosma Rice-flower
- Downy Swainson-pea
- Dwarf Cup-flower
- Fuzzy New Holland Daisy
- Hairy Tails
- Hairy-pod Wattle
- Hoary Bush-pea
- Kamarooka Mallee
- Silky Golden-tip
- Small Milkwort
- Spotted Gum
- Swamp Buttercup
- Thorny Bitter-pea
- Trailing Hop-bush
- Weeping Myall
- Yellow-tongue Daisy

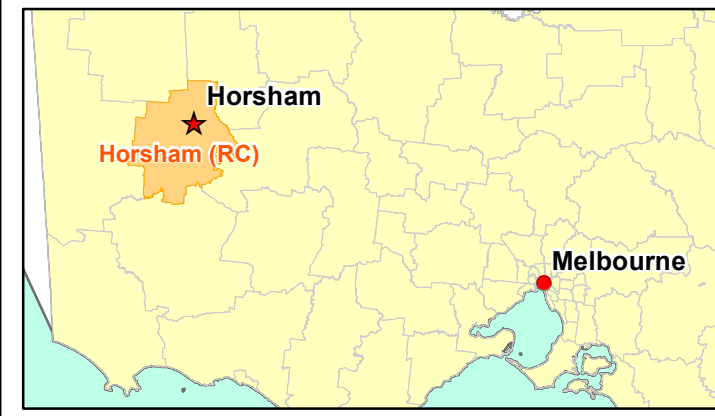
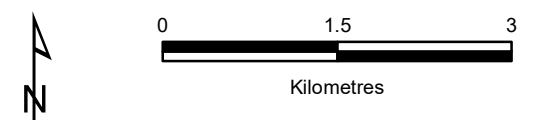


Figure 4
 Previously documented significant flora within 5km of the study area
 Horsham South Structure Plan (HSSP)

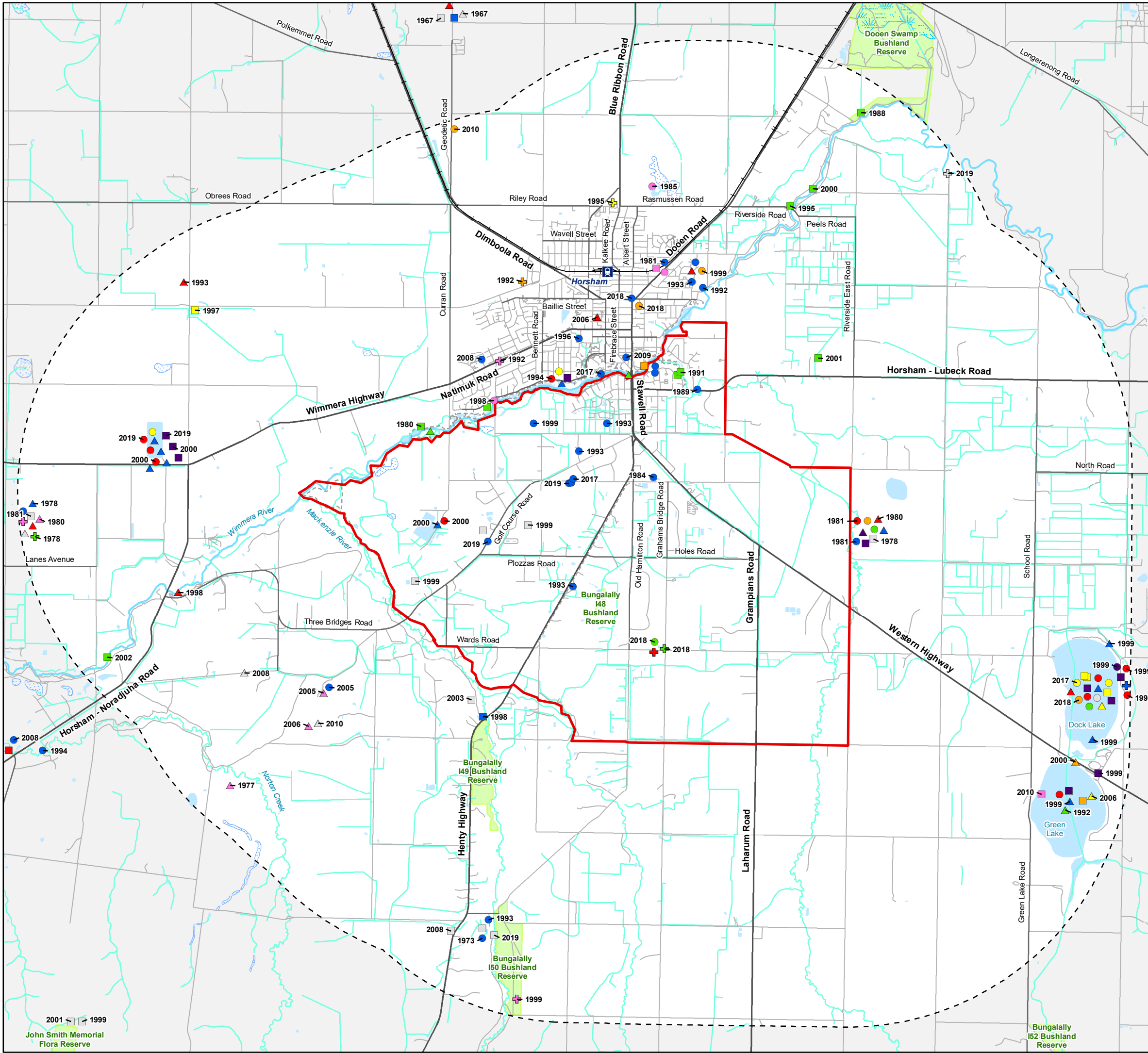


Map Scale: 1:65,000 @ A3
 Coordinate System: GDA 1994 MGA Zone 54



Victorian Biodiversity Atlas (VBA) // Sourced from: 'VBA_FLORA25', 'VBA_FLORA100', 'VBA_FAUNA25' and 'VBA_FAUNA100'. Updated May 2022 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown.

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- Legend**
- Study Area
- Significant fauna**
- | | |
|-------------------------|-----------------------------|
| ○ Australasian Bittern | ■ Hardhead |
| ● Australasian Shoveler | △ Hooded Robin |
| ● Black Falcon | ▲ Little Eagle |
| ● Blue-billed Duck | ▲ Little Egret |
| ● Brolga | ▲ Magpie Goose |
| ● Bush Stone-curlew | ▲ Murray Cod |
| ● Caspian Tern | ▲ Musk Duck |
| ● Common Greenshank | ▲ Painted Honeyeater |
| ■ Diamond Firetail | ▲ Plumed Egret |
| ■ Eastern Curlew | ⊕ Silver Perch |
| ■ Eastern Great Egret | ⊕ Square-tailed Kite |
| ■ Freckled Duck | ⊕ Squirrel Glider |
| ■ Freshwater Catfish | ⊕ Striped Legless Lizard |
| ■ Grey-crowned Babbler | ⊕ Swift Parrot |
| ■ Growling Grass Frog | ⊕ White-bellied Sea-Eagle |
| | ⊕ White-throated Needletail |

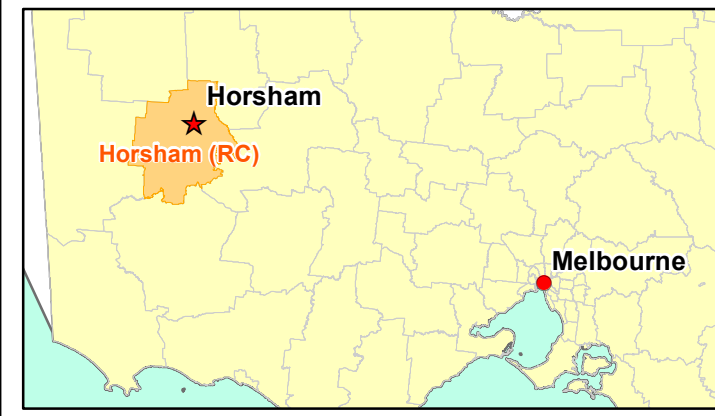
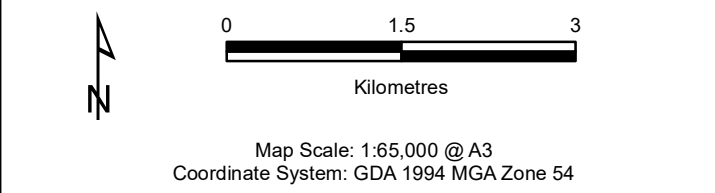


Figure 5
Previously documented significant fauna within 5km of the study area
Horsham South Structure Plan (HSSP)



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16277 Fig05 SigFauna 16/08/2022 mslv