A Detailed and Targeted Flora and Vegetation survey at Kingston Drive, Australind

Prepared for the Shire of Harvey
November 2018

Ecoedge

PO Box 1180 Bunbury WA 6231
enquiries@ecoedge.com.au

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Executive Summary

Ecoedge was engaged by the Shire of Harvey (SoH) in August 2018 to undertake a Flora and Vegetation Survey along the western boundary of Reserve 35061 within a section of that reserve intended for the extension of Kingston Drive. The site (henceforth referred to as the Survey Area) is 745 m long by 30 m wide and covers approximately 2.1 ha.

The proposed extension will require the clearing of up to 2.1 ha of native bushland which potentially includes the Federally listed Threatened Ecological Community (TEC) "*Banksia* Woodlands of the Swan Coastal Plain" as well as Threatened or Priority flora.

The survey was conducted over three days in September and October or 2018 in accordance with State and Commonwealth requirements for the bioregion and species and communities present, and the Environmental Protection Authority (EPA) Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016).

One hundred and eight vascular flora taxa were identified within the Survey Area, of which 30 (c.a. 28%) were introduced species. The high proportion of introduced species reflects a relatively high level of disturbance within the Survey Area over many years.

No Threatened flora was located during the survey. One species of priority flora, *Acacia semitrullata* (P4), was identified, with 26 plants recorded across the survey area.

No weeds declared as Pest Plants under the *Biosecurity and Agriculture Management Act 2007* or Weeds of National Significance were identified within the Survey Area. However, the locally significant environmental weed **Acacia longifolia* infests approximately 0.71 hectares, or about one third of the survey area

Five vegetation units were mapped for the Survey Area. Three of the five described vegetation units present within the survey are inferred to be Gibson *et al.* (1996) Floristic Community Type (FCT) 21a. FCT 21a is not a State-listed Threatened or Priority ecological community, but does however form part of the Federally-listed '*Banksia* Woodlands of the Swan Coastal Plain' Threatened ecological community, which has the threat category of "Endangered" (DotEE, 2016). Of the approximately 1.71 ha of remnant native vegetation within the Survey Area, 1.1 ha is considered to meet the criteria for the TEC.

In regards to vegetation complexes, vegetation in the Survey Area is mapped by Webb *et al.* (2016) as the Bassendean Complex – Central and South, of which less than 30% remains. This is below the Commonwealth retention target of 30% (Environment Australia, 2001).

Most of the vegetation within the survey area has been affected by degrading influences including historic clearing, grazing, proximity to developed areas and *Phytophthora* dieback. This has significantly altered vegetation structure and species composition over most of the

site. Fifty-five percent of the Survey Area vegetation was rated as Very Good or Good condition, with the remainder being in Degraded condition.

Vegetation within the Survey Area forms part of an identified regional ecological linkage and is also an important 'stepping stone' of relatively intact native vegetation in a highly cleared and fragmented landscape.

The Survey Area is not part of an Environmentally Sensitive Area.

Clearing of vegetation associated with the proposed extension of Kingston Drive may impact on vegetation that meets the criteria for the Commonwealth-listed *Banksia* woodland TEC and as such a referral under the EPBC Act may be required. No Priority ecological communities are present within the Survey Area.

No Threatened flora were located during the survey, however the Priority 4 listed taxa *Acacia semitrullata* is common throughout. Advice must be sought from DWER regarding the management of any potential impact to this population as a result of the proposed road construction.

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Statement of Limitations

Reliance on Data

In the preparation of this report, Ecoedge has relied on data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report. Unless stated otherwise in the report, Ecoedge has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report are based in whole or in part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Ecoedge will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, unavailable, misrepresented or otherwise not fully disclosed to Ecoedge.

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1 Introduction and Desktop Assessment

Ecoedge was engaged by the Shire of Harvey (SoH) in August 2018 to undertake a Flora and Vegetation Survey along the western boundary of Reserve 35061 within a section of that reserve intended for the extension of Kingston Drive. The site (henceforth referred to as the Survey Area) is 745 m long by 30 m wide and covers approximately 2.1 ha.

The proposed extension will require the clearing of up to 2.1 ha of native bushland which potentially includes the Federally listed Threatened Ecological Community (TEC) "*Banksia* Woodlands of the Swan Coastal Plain" as well as Threatened or Priority flora.

The purpose of the survey was to delineate key flora and vegetation values and their potential sensitivity to impact. Both Reconnaissance and Targeted surveys were required as part of the scope, in accordance with the Environmental Protection Authority's 'Technical Guidance' (Environmental Protection Authority, 2016).

The survey was conducted over three days in September and October or 2018 in accordance with State and Commonwealth requirements for the bioregion and species and communities present, and the Environmental Protection Authority (EPA) Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016).

This report compiles findings of the field survey.

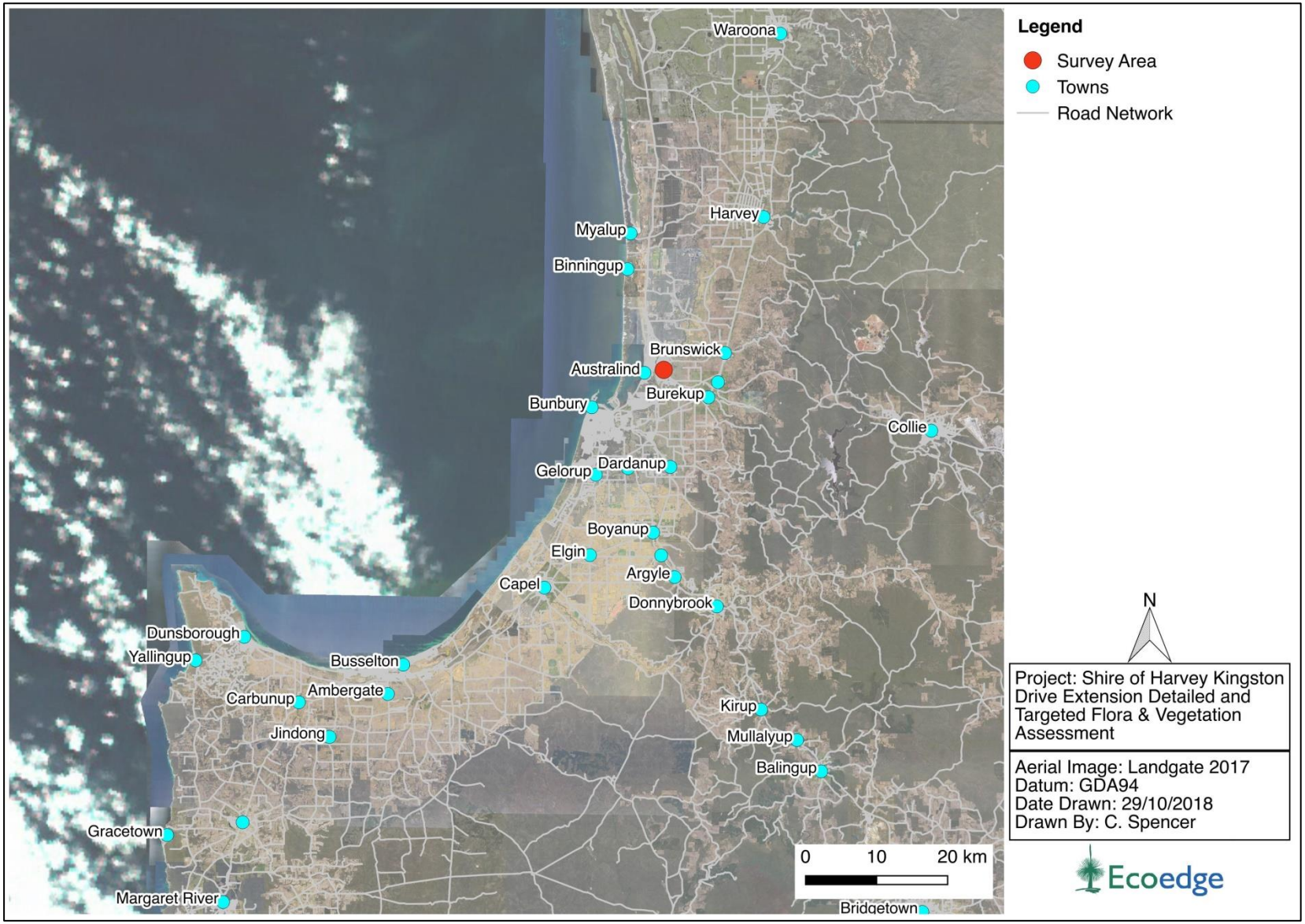

Figure 1. Aerial photograph showing location of Survey Area.

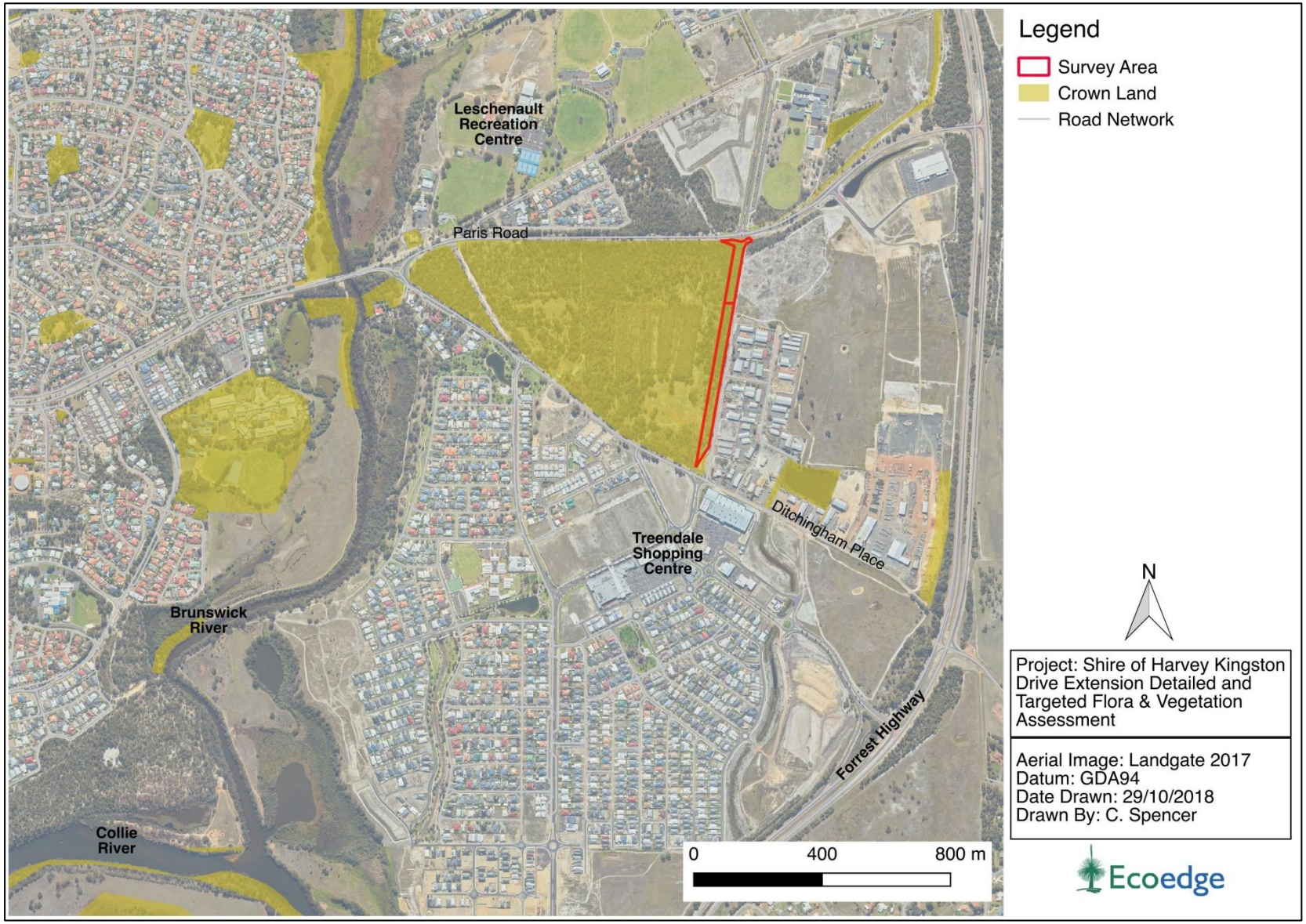

Figure 2. The Survey Area is located between Paris Rd and Ditchingham Place at the west boundary of the Australind Light industrial precinct.

1.1 Scope and Objectives

The scope of the survey was to carry out a Flora and Vegetation survey, incorporating both Detailed and Targeted rare flora surveys, in accordance with EPA Technical Guidance (EPA, 2016) and other relevant State and Commonwealth guidelines. The request document supplied by the Shire also specified the following:

Desktop survey

- Identify all vegetation and flora features and constraints, which may be in, or nearby the project area, including presentation and review of data from the Department of the Environment and Energy's (DotEE's) Protected Matters Search Tool, the Department of Biodiversity, Conservation and Attractions' (DCBA's) NatureMap and FloraBase, and a paid database search (flora) from DBCA's Species & Communities Branch;
- Identify significant flora, vegetation/ecological communities values and potential sensitivity to impact;
- Identify broad pre-European vegetation type(s) (Beard various); and Heddle *et al* (1980) as updated by Webb *et al.*, 2018 vegetation complexes for southwest and Swan Coastal Plain areas.

Field survey

Carry out a Level 2 (Detailed, quadrat-based, and Targeted) flora and vegetation survey over approximately 2.1 ha of vegetation at Kingston Drive, Australind as per the map supplied by the Shire of Harvey. Specifically;

- verify / groundtruth the desktop assessment findings through field surveys;
- undertake vegetation community/type mapping to a scale appropriate for the bioregion and described according to the National Vegetation Information System (NVIS) structure and floristics;
- assess the survey area's plant species diversity, density, composition, structure and weed cover;
- undertake vegetation condition mapping using EPA (2016) condition scale;
- undertake a targeted survey for rare and priority flora based on desktop likelihood of occurrence and habitat availability. When populations are identified, survey and map extent of populations to determine number and habitat area for each population. Shapefiles shall be provided with point data indicating the number of plants identified at each point. If more than 100, the edges of the population boundary will be mapped and provided as a shapefile. If the population extends outside the survey area, the survey will map the extent of the population. All Threatened flora will be mapped with a GPS; and
- identify the location of any Weeds of National Significance or Declared Pests.

Report

A concise report detailing the methodology used in and findings of the biological survey will be provided. The report will include:

- the number of individual plants and total number of populations in Western Australia, where such data is available, for any Threatened and Priority flora;
- environmental constraints mapping using GIS mapping software for flora, ecological communities, wetlands, ESAs and regional ecological linkages;
- assessment of all flora and vegetation aspects likely to require referral of the project to the Environmental Protection Authority (EPA);
- assessment of Matters of National Environmental Significance (MNES) and indicate whether potential impacts on MNES as protected under the EPBC Act are likely to require referral of the project to the Commonwealth Department of the Environment and Energy (DotEE); and
- justification of decision as to whether referral to DotEE is likely to be required.

1.2 Biogeographic Region and Location

The Survey Area is situated within SWA02 Southern Swan Coastal Plain sub-region of the Swan Coastal Plain biogeographic region, as defined in the Interim Biogeographical Regionalisation for Australia (IBRA) (Commonwealth of Australia, 2016). It is located approximately 0.25 kilometres (km) north of the Treendale shopping centre, between Paris Road in the north and Lot 522 Historic Water Corporation Waste Water Treatment site and vegetated Reserve 35061 to the west. To the south and east are Ditchingham Place the Australind Industrial Estate, respectively (**Figure 2**). It is primarily comprised of remnant vegetation.

1.3 Geology

The survey area occurs on the Swan Coastal Plain (SCP), which is bounded by the Darling Scarp to the east, Indian Ocean to the west, Moore River to the north and Dunsborough to the south. The Swan Coastal Plain is built up of two belts of sediments that differ in origin: aeolian sediments in the west and alluvial sediments in the east. The aeolian sediments comprise of three major dune systems: The Bassendean Dune System is the most easterly and oldest system, the Quindalup System is the most westerly and youngest system with the Spearwood system located in between. These wind deposited dunes press up against the Pinjarra plain, which is built up of alluvium deposited by streams from the Darling Plateau. Its alluvial soils are predominantly clays and silts; in places, low dunes of aeolian sands from the west may overlay the alluvial soils (Government of Western Australia, 2000).

The survey area occurs within the Bassendean System which is characterised by deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan from one to two metres (Barnesby and Proulx-Nixon, 2000).

Soil-landscape systems have been further divided into subsystems, and within these into soil phases or mapping units (Barnesby and Proulx-Nixon, 2000). Three soil mapping units are mapped in proximity to the Survey Area and are described in

Table 1 and mapped in Error! Reference source not found.**.** The Survey Area is mapped as the 212Bs_B2 unit.

Table 1. Soil mapping units occurring within the Survey Area (Barnesby and Proulx-Nixon, 2000).

Soil Mapping Unit	Description
212Bs_B2	Flat to very gently undulating sandplain with well to moderately well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 1-2 m.

1.4 Vegetation Description according to pre-European Mapping Datasets

The Survey Area covers approximately 2.1 ha and contains approximately 1.715 ha of remnant native vegetation.

1.4.1 Vegetation Complexes

Vegetation complexes of the Swan Coastal Plain were mapped by Heddle *et al*. 1980 and the complexes of the South West Forest Region (Darling Scarp and plateau) were mapped by Mattiske and Havel 1998. These assessments were based on the broad patterning of vegetation at a 1:250,000 scale reflected by regional land form units, soil and climate.

These datasets were revised in 2016 by the Department of Parks and Wildlife in order to fill data gaps and improve their alignment and correlation (Webb, *et al*. 2016).

According to the updated 2016 data sets, remnant vegetation within the Survey Area is mapped as the Bassendean – Central and South Complex. This complex is described in **Table 2** and shown in Error! Reference source not found.**.**

Table 2. Vegetation complex mapped for the Survey Area (Webb *et al*., 2016).

Vegetation Complex	Description
Bassendean Complex – Central and South	Vegetation ranges from woodland of *Eucalyptus marginata* (Jarrah) - *Allocasuarina fraseriana* (Sheoak) - Banksia species to low woodland of Melaleuca species, and sedgelands on the moister sites. This area includes the transition of *Eucalyptus marginata* (Jarrah) to *Eucalyptus*

	todtiana (Pricklybark) in the vicinity of Perth.

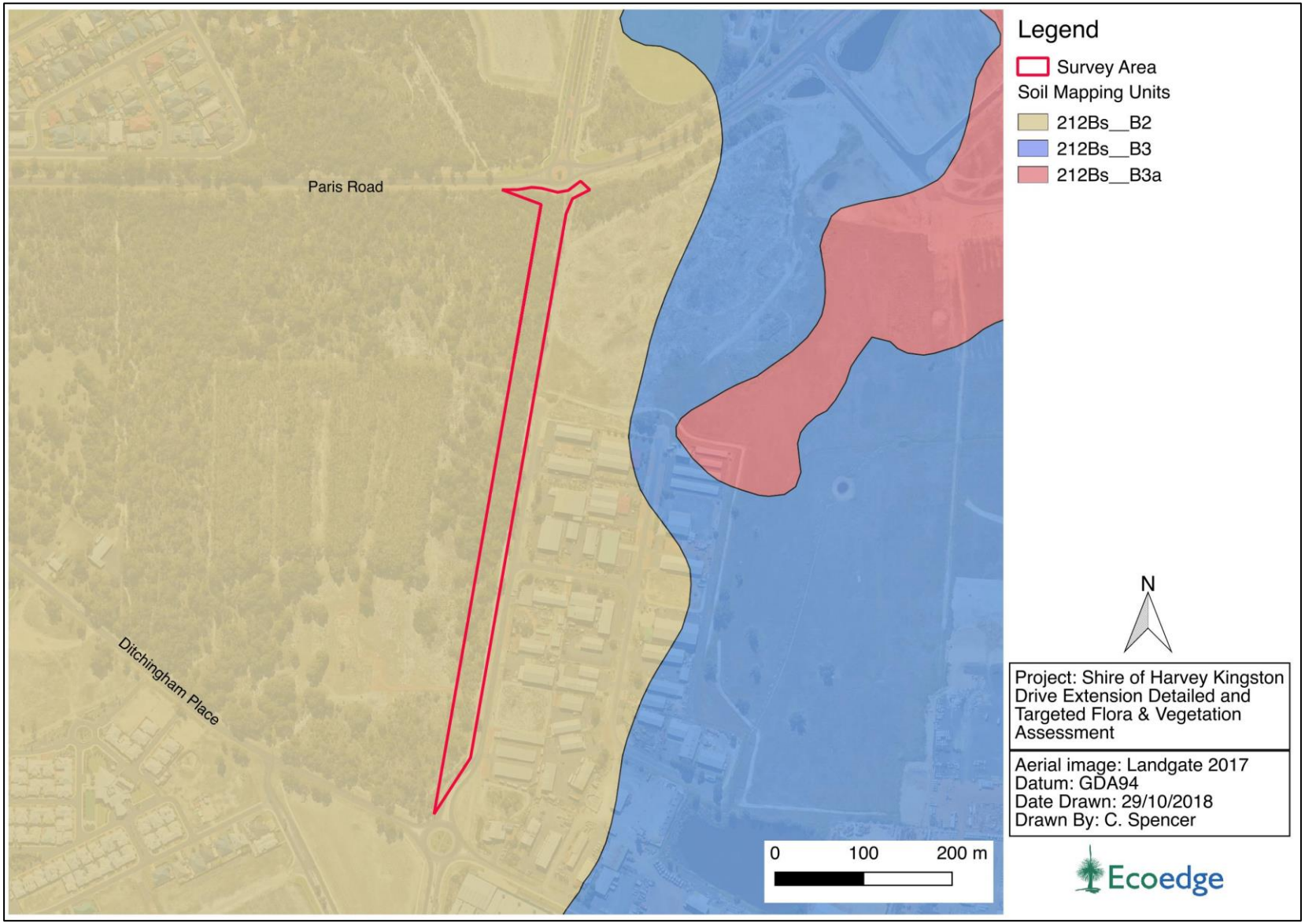

Figure 3. Soil mapping units mapped for the Survey Area (Barnesby and Proulx-Nixon, 2000).

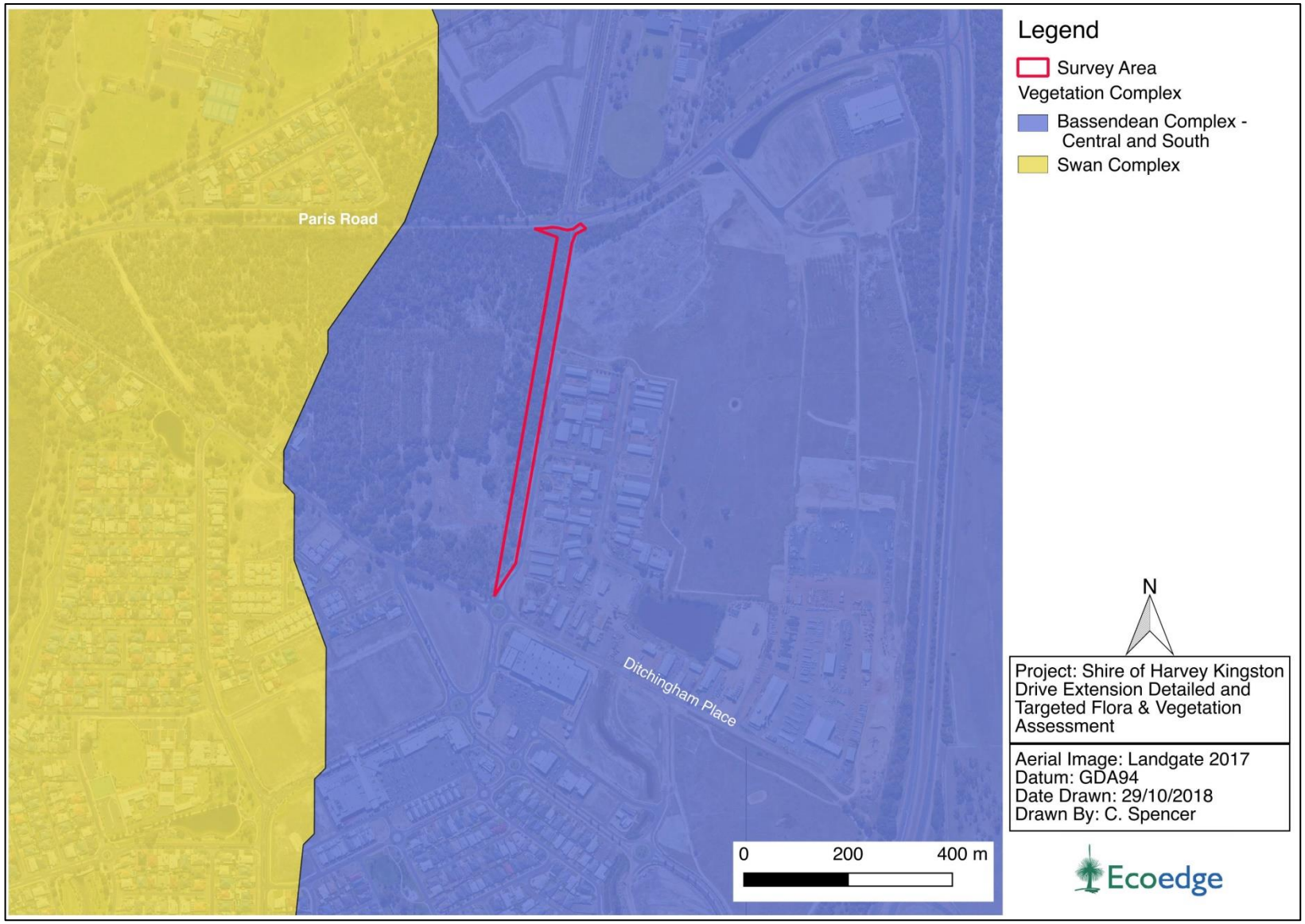

Figure 4. Vegetation complexes mapped in proximity to the survey area (Webb *et al*., 2016).

1.4.2 Assessment of Remaining Extent against Pre-European Extent

In 2001, the Commonwealth of Australia stated National Targets and Objectives for Biodiversity Conservation, which recognised that the retention of 30%, or more, of the pre-clearing extent of each ecological community was necessary if Australia's biological diversity was to be protected (Environment Australia, 2001).

In its report on the Statewide Vegetation Statistics incorporating the CAR Reserve Analysis, the Government of Western Australia provides information on the pre-European and current extent of the ecological communities of Western Australia and reports on the status of the Comprehensive, Adequate and Representative (CAR) reserve system for WA (Government of Western Australia, 2017). This system is also based on the National retention targets of 30% overall. Only reserves managed by DBCA under the *Conservation and Land Management Act 1984* are considered for inclusion in the "CAR Reserve Analysis".

Table 3 lists the percentage remaining of each vegetation complex and indicates whether the Commonwealth 30% retention target is met. None of the vegetation complexes mapped for the Survey Area meet the 30% retention target.

Table 3. Vegetation Complexes mapped within the Survey Area with regard to the Commonwealth retention target (Government of Western Australia, 2017).

Vegetation Complex	% Remaining of pre-European	Is the 30% Target Met?	% in DBCA Managed Lands*
Bassendean Complex – Central and South	26.90	No	4.99

* Excludes Crown Freehold Department Interest Lands that are managed under Section 8(a) of the CALM Act.

1.5 Threatened and Priority Ecological Communities

Ecological communities are defined by Western Australia's DBCA (previously DPaW and the Department of Environment and Conservation (DEC)) as "...naturally occurring biological assemblages that occur in a particular type of habitat. They are the sum of species within an ecosystem and, as a whole, they provide many of the processes which support specific ecosystems and provide ecological services." (DEC, 2013).

Through a non-statutory process, the Minister for Environment (Western Australia) may list communities that are considered to be at threat as either Threatened or Priority Ecological Communities. A Threatened Ecological Community (TEC) is one which is found to fit into one of the following categories; Presumed Totally Destroyed (PD), Critically Endangered (CE), Endangered (E) or Vulnerable (V) (DEC, 2013). Possible TECs that do not meet survey criteria are added to DPaW's Priority ecological community Lists under Priorities 1, 2 and 3 (referred to as P1, P2, P3). Ecological communities that are adequately known, are rare but not

threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4 (P4). These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5 (P5) (DEC, 2013).

The current listing of TECs and PECs is specified in DPaW (2016) and DBCA (2017a).

TECs can also be listed under the Commonwealth EPBC Act 1999 and protected as Matters of National Environmental Significance (MNES). There are three categories of TEC under the EPBC Act: Critically Endangered (CE), Endangered (E) and Vulnerable (V). These are defined in **Appendix 1** (DotEE, 2018a).

A Protected Matters Search report was generated on the 27 August 2018 to provide information regarding MNES known or potentially occurring within five km of the Survey Area (DotEE, 2018b, see **Appendix 2**), and the current DPaW and DBCA TEC and PEC listings were consulted (DPaW, 2016 and DBCA 2017a). Outcomes of these investigations are presented in **Table 4**.

Table 4. Threatened and Priority ecological communities occurring within 5 km of the Survey Area (Gibson *et al*., 1994; DPaW, 2016; DBCA, 2017a; DotEE, 2018b).

Community Name	Status (WA)	Status (EPBC Act)
'*Banksia* Woodlands of the Swan Coastal Plain' a Federally listed TEC consisting of numerous State-listed communities.	Priority 3	EN
Subtropical and Temperate Coastal Saltmarsh	Priority 3	VU
SCP 25 Southern Swan Coastal Plain *Eucalyptus gomphocephala* - *Agonis flexuosa* woodlands	Priority 3	*EN (part)
Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain	Priority 3	*EN (part)

Note: This table only includes formally recognised TECs that are known of and mapped by DBCA and are included in their database. *EN for TEC Banksia Woodland communities identified within these communities.

1.6 Threatened and Priority Flora

Species of flora and fauna are defined as having Threatened or Priority conservation status where their populations are restricted geographically or threatened by local processes. The Department of Water and Environment Regulation recognises these threats of extinction and consequently applies regulations towards population and species protection.

Threatened Flora species are gazetted under Subsection 2 of Section 23F of the *Wildlife Conservation Act 1950* (WC Act)[1] and therefore it is an offence to "take" or damage rare flora without Ministerial approval. Section 6 of the WC Act defines "to take" as "… to gather, pick, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means."

Priority flora are under consideration for future declaration as "rare flora", dependent on more information. Species classified as Priority One to Three (referred to as P1, P2 and P3) are in need of further survey to determine their status, while Priority Four (P4) species require monitoring every 5-10 years. Under the WC Act, Threatened flora are ranked according to their level of threat using IUCN Red List categories and criteria of Extinct (EX), Critically Endangered (CE), Endangered (EN) or Vulnerable (VU). **Appendix 3** presents the categories of Threatened and Priority Flora as defined by the WC Act (DBCA, 2017b).

Under the EPBC Act*,* a species may be listed in one of six categories; the definitions of these categories are summarised in **Appendix 4** (DotEE, 2018c).

Threatened or Priority flora occurring up to five kilometres from the Survey Area generated from an extract from the DBCA databases) (DBCA, 2018a), a NatureMap search (DBCA, 2018b) and the EPBC Act Protected Matters Search (DotEE, 2018b), are listed in **Table 5**. The results of the DBCA datasearch are mapped in

[1] Transition to the *Biodiversity Conservation Act 2016* will commence in the near future. At the time of preparing this report, the WC Act 1950 was current in regards to the conservation of Threatened and Priority flora.

Figure 5.

Based on an assessment of their preferred habitats a number of the species listed in **Table 5** could potentially occur within the Survey Area. All species listed with a moderate or higher likelihood probability of occurring within the Survey Area would have either been flowering at the time of survey or could be identified in the field without flowers.

Table 5. Threatened and Priority flora known to occur within ten km of the Survey Area (DBCA, 2018a, 2018b; DotEE, 2018b).

Species	Cons Status*	Flowering	Description and Habitat	Likelihood of Occurrence
Acacia flagelliformis	P4	May-Sep	Rush-like, erect or sprawling shrub, 0.3-0.75(-1.6) m high. Fl. yellow. Sandy soils. Winter-wet areas.	Moderate
Acacia semitrullata	P4	May-Oct	Slender, erect, pungent shrub, (0.1-)0.2-0.7(-1.5) m high. Fl. cream, white. White/grey sand, sometimes over laterite, clay. Sandplains, swampy areas.	High
Andersonia gracilis	T (EN)	Sep-Nov	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple. White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Low
Aponogeton hexatepalus	P4	Jul-Oct	Rhizomatous or cormous, aquatic perennial, herb, leaves floating. Fl. green, white. Mud. Freshwater: ponds, rivers, claypans.	None
Banksia nivea subsp. *uliginosa*	T (EN)	July-Sep	Dense, erect, non-lignotuberous shrub, 0.2–1.5 m high. Fl. yellow, brown. Sandy clay, gravel.	None
Banksia squarrosa subsp. *argillacea*	T (VU)	Jun-Nov	Erect, open, non-lignotuberous shrub, 1.2–4 m high. Fl. yellow, Jun–Nov. White/grey sand, gravelly clay or loam. Winter-wet flats, clay flats.	Low
Brachyscias verecundus	T (CE)	Nov	Annual (or ephemeral), herb, 0.012-0.022 m high, entirely glabrous. Fl. white/cream. In a moss sward. On a granite outcrop.	None
Caladenia huegelii	T (EN)	Sep-Oct	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green, cream, red. Grey or brown sand, clay loam.	Moderate
Caladenia speciosa	P4	Sep-Oct	Tuberous, perennial, herb, 0.35-0.6 m high. Fl. white, pink. White, grey or black sand.	Moderate
Carex tereticaulis	P1	Sep-Oct	Monoecious, rhizomatous, tufted perennial, grass-like or herb (sedge), 0.7 m high. Fl. brown. Black peaty sand.	Low
Chamaescilla gibsonii	P3	Sep	Clumped tuberous, herb. Fl. blue. Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	Low
Chamelaucium sp. S Coastal Plain (R.D. Royce 4872)	T (VU)	Oct-Dec	Winter-wet areas, loams and ironstone.	None

Species	Cons Status*	Flowering	Description and Habitat	Likelihood of Occurrence
Craspedia sp. Waterloo (G.J. Keighery 13724)	P2	Aug-Sep or Oct	Completely glabrous. Fl. Bright yellow. Growing in water on seasonally inundated heavy soils of the Pinjarra plain near Waterloo.	None
Dillwynia dillwynioides	P3	Aug-Dec	Decumbent or erect, slender shrub, 0.3–1.2 m high. Fl. red, yellow, orange,. Sandy soils. Winter-wet depressions, inundated flats generally alongside rivers or deeper swamps.	Low
Diuris drummondii	T (VU)	Nov-Jan	Tuberous, perennial, herb, 0.5-1.05 m high. Fl. yellow. Low-lying depressions, swamps.	Low
Diuris micrantha	T (VU)	Sep-Oct	Tuberous, perennial, herb, 0.3–0.6 m high. Fl. yellow, brown. Brown loamy clay. Winter-wet swamps, in shallow water.	Low
Diuris purdiei	T (EN)	Sep-Oct	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow. Grey-black sand, moist. Winter-wet swamps.	Low
Drakaea elastica	T (EN)	Oct-Nov	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red, green, yellow. White or grey sand. Low-lying situations adjoining winter-wet swamps.	Low
Drakaea micrantha	T (VU)	Sep-Oct	Tuberous, perennial, herb, 0.15–0.3 m high. Fl. red, yellow. White-grey sand.	Moderate
Eleocharis keigheryi	T (VU)	Aug-Nov	Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. green. Clay, sandy loam. Emergent in freshwater: creeks, claypans	Low
Grevillea rosieri	P2	Jul-Sep	Shrubs, 0.5 m high. Flowers red or brown. Gravelly soil, or sand; sandplains; gravel pits.	Low
Lambertia echinata subsp. *occidentalis*	T (EN)	Feb/May-Jun/Oct	Prickly, much-branched, non-lignotuberous shrub, to 3 m high. Fl. yellow. White sandy soils over laterite, orange/brown-red clay over ironstone.	None
Lasiopetalum membranaceum	P3	Sep-Dec	Multi-stemmed shrub, 0.2-1 m high. Fl. pink, blue, purple. Sand over limestone.	Moderate
Ornduffia submersa	P4	Sep-Oct	Tuberous emergent aquatic perennial dwarf shrub, height to 35 cm; flowers white; leaves floating on surface of water. Clay-based ponds and swamps (semi-aquatic)	None

Species	Cons Status*	Flowering	Description and Habitat	Likelihood of Occurrence
Pterostylis frenchii	P2	Nov-Dec	Tuberous, herb, to 0.35 m high, with rosette leaves. Fl. white. Calcareous sand with limestone, laterite. Flatlands and gentle slopes.	Moderate
Puccinellia vassica	P1	Sep-Nov	Caespitose annual or perennial, grass-like or herb, 0.41–0.55 m high. Saline soils. On the outer margins of coastal saltmarshes	None
Pultenaea skinneri	P4	Jul-Sep	Slender shrub, 1-2 m high. Fl. yellow, orange, red. Sandy or clayey soils. Winter-wet depressions.	Moderate
Rumex drummondii	P4		Erect perennial, herb, 0.6-0.9 m high. Winter-wet disturbed areas.	Low
Schoenus capillifolius	P3	Oct-Nov	Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Fl. green. Brown mud. Claypans.	None
Stylidium paludicola	P3	Oct-Dec	Reed-like perennial, herb, 0.35-1 m high, Leaves tufted, linear or subulate or narrowly oblanceolate, 0.5-4 cm long, 0.5-1.5 mm wide, apex acute, margin entire, glabrous. Scape mostly glabrous, inflorescence axis glandular. Inflorescence racemose. Fl. pink. Peaty sand over clay. Winter wet habitats. Marri and Melaleuca woodland, Melaleuca shrubland.	Low
Synaphea odocoileops	P1	Aug-Oct	Tufted, compact shrub, 0.2–0.5 m high. Fl. yellow. Brown-orange loam & sandy clay, granite. Swamps, winter-wet areas.	None
Synaphea sp. Fairbridge Farm (D. Papenfus 696)	T	Oct	Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. Yellow. Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	None
Synaphea sp. Serpentine	T	Sep-Oct	Shrublands and woodlands on loamy soils	None
Synaphea stenoloba	T (EN)	Aug-Oct	Caespitose shrub, 0.3–0.45 m high. Fl. Yellow. Sandy or sandy clay soils. Winter-wet flats, granite. Shrublands and woodlands on loamy soils. Considered endemic to	None
Verticordia attenuata	P3	Dec-May	Shrub, 0.4–1 m high. Fl. pink. White or grey sand. Winter-wet depressions	Moderate

Note: The WC Act Conservation Status is shown, EPBC Act status, where relevant, is in brackets.

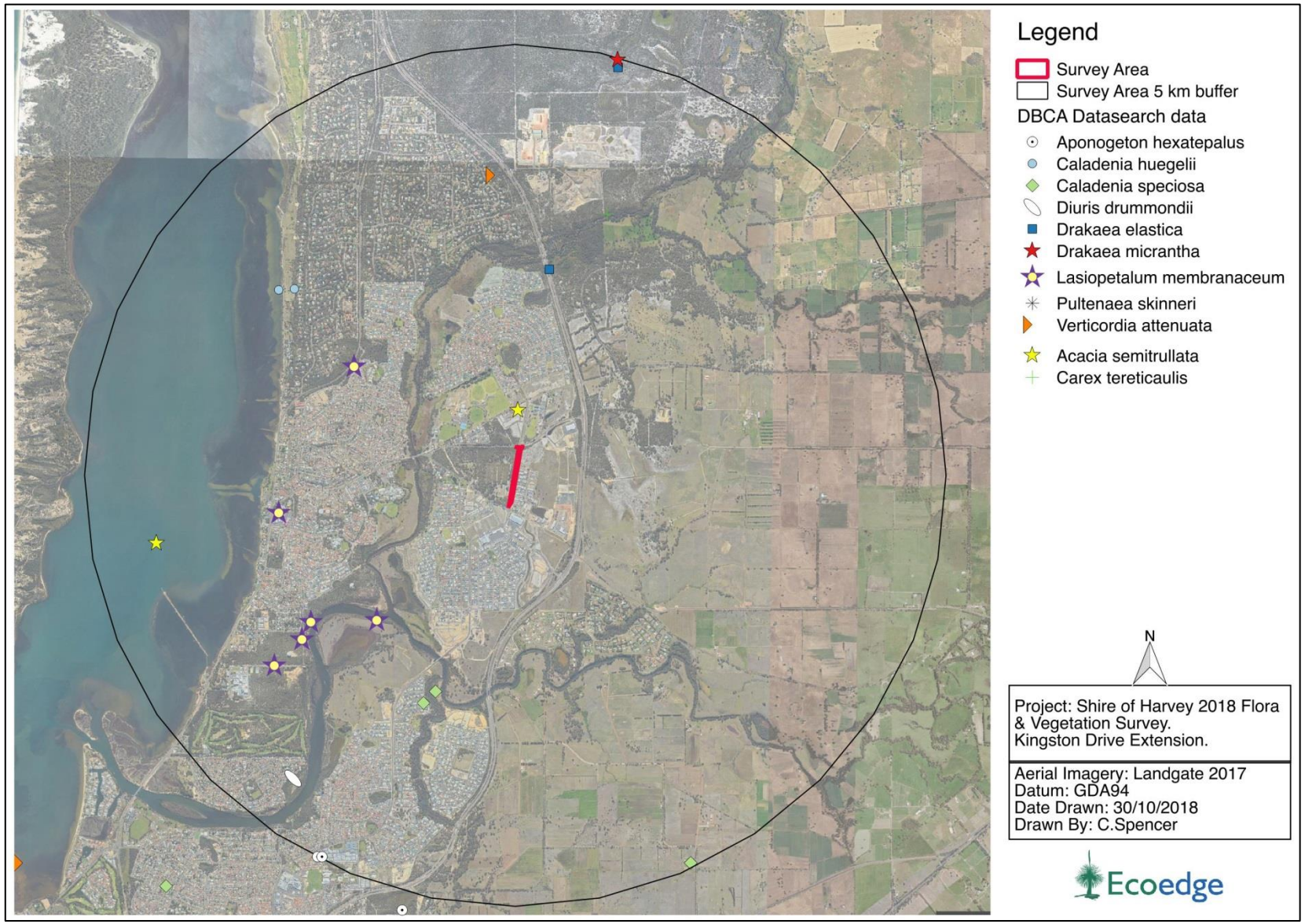

Figure 5. Known occurrences of Threatened and Priority flora within five km of the Survey Area (DBCA, 2018a).

1.7 Regional Ecological Linkages

Information for this section is taken from Molloy *et al*. (2009) and their report on the South West Regional Ecological Linkages (SWREL) Project.

Ecological linkages are defined as:

"*A series of (both contiguous and non-contiguous) patches which, by virtue of their proximity to each other, act as stepping stones of habitat which facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape*."

Regional ecological linkages link protected patches of regional significance by retaining the best (condition) patches available as stepping stones for flora and fauna between regionally significant areas. This increases the long-term viability of all the constituent areas.

The SWREL report is the result of collaboration between the Western Australian Local Government Association's *South West Biodiversity Project* and the then Department of Environment and Conservation's *Swan Bioplan* to provide a tool for the identification of ecological linkages and guidance for the protection of linkages through planning policy documents.

Molloy *et al.* (2009) assessed and assigned "proximity value ratings" to all patches of remnant native vegetation as a way of indicating their distance from the nearest regional ecological linkage axis line. These values are defined in **Figure 6.** It should be noted however, that the proximity value of a patch of remnant vegetation to an ecological linkage is not intended to replace the need to consider the other biodiversity conservation values of that patch of remnant vegetation.

A linkage axis line has been mapped within 50 m of the north western boundary of the Survey Area and the Survey Area vegetation is contiguous with a mapped ecological linkage. As a result the Survey Area is assigned proximity ratings of "1a", which is the highest rating, and indicates that the vegetation directly forms part of a regional ecological linkage (

Figure 7).

While there is no statutory basis for regional ecological linkages identified through the SWREL project, the importance of ecological linkages have been recognised as an environmental policy consideration in EPA and Planning policy over the last decade (EPA, 2009 and references therein). In its statement regarding the SWREL Project, the EPA stated that even though Ecological Linkages are just one measure of the conservation values of a patch of remnant vegetation it expected that:

> *In preparing plans and proposals for development, consideration will be given to both the site-specific biodiversity conservation values of patches of native vegetation, as well as the landscape function and core linkage significance of a patch in supporting the maintenance of ecological linkage* (EPA, 2009).

Figure 6. Linkage proximity rating values assigned to patches of remnant vegetation within a landscape (from Molloy et al., 2009).

1a: with an edge touching or <100m from a linkage

1b: with an edge touching or <100m from a natural area selected in 1a

1c: with an edge touching or <100m from a natural area selected in 1b

2a: with an edge touching or <500m from a linkage

2b: with an edge touching or <500m from a natural area selected in 2a

2c: with an edge touching or <500m from a natural area selected in 2b

3a: with an edge touching or <1000m from a linkage

3b: with an edge touching or <1000m from a natural area selected in 3a

3c: with an edge touching or <1000m from a natural area selected in 3b

1.8 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are protected under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 and are selected for their environmental values at state or national levels (Government of Western Australia, 2005). They include;

- Defined wetlands and riparian vegetation within 50 m;
- Areas covered by Threatened Ecological Communities;
- Area of vegetation within 50 m of Threatened flora;
- Bush Forever sites; and
- Declared World Heritage property sites.

The most recent Department of Environment Regulation (DER) mapping dataset (DER, 2016) identifies a Conservation category wetland about 1 km west of the Survey Area, as shown in **Figure 12.** This ESA is associated with the Brunswick River.

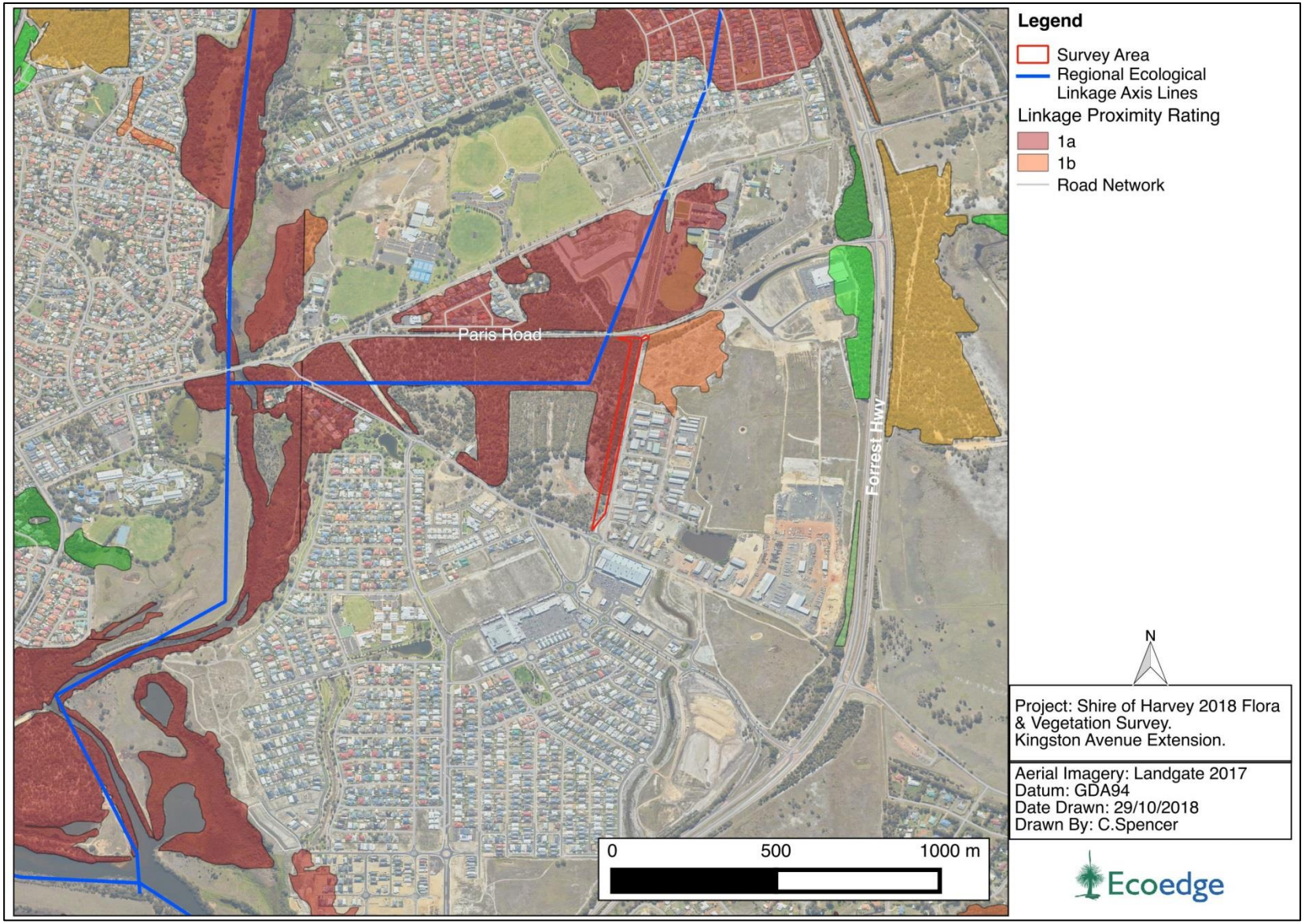

Figure 7. The Survey Area in relation to regional ecological linkages (Molloy *et al*., 2009).

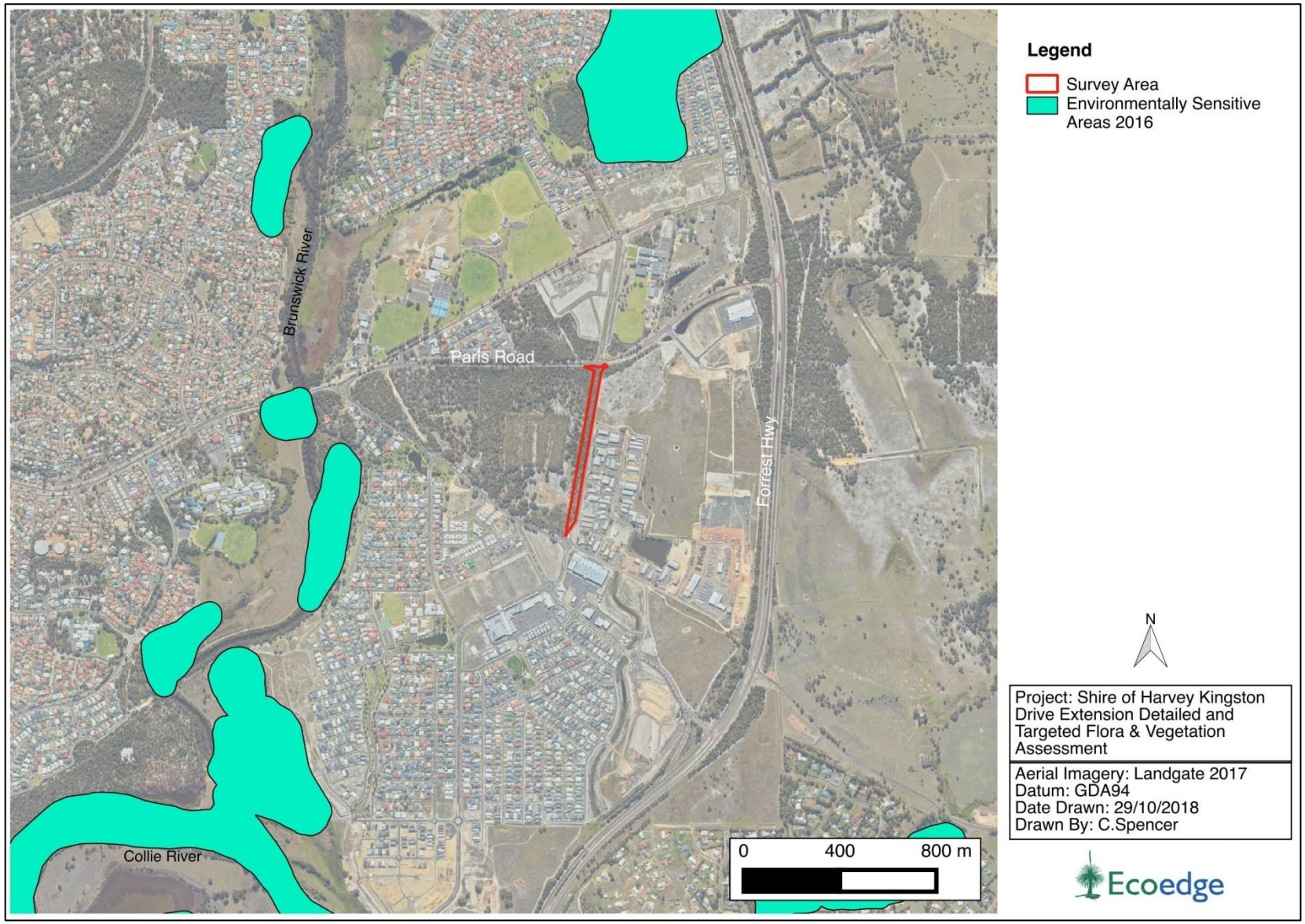

Figure 8. ESAs are mapped near to the Survey Area, associated with Conservation category wetlands (DER, 2016).

2 Methods

2.1 Desktop Assessment

Prior to the field survey, a "desktop assessment" was carried out by downloading from the Threatened and Priority flora (TPFL) and W.A. Herbarium databases of records occurring within 10 km of the Survey Area was also provided by DBCA (DBCA, 2018a). A NatureMap report was generated listing of all flora (including Threatened flora) occurring within 5 km of the Survey Area (DBCA, 2018b) (**Appendix 2**). A Protected Matters Search report was generated to provide information regarding Matters of National Environmental Significance (MNES) know or potentially occurring within 5 km of the Survey Area (DotEE, 2018b) (**Appendix 2**). This data was used to establish the list of Threatened and Priority flora to target during the survey, as well as providing a list of what other plant taxa might be encountered during the survey.

2.2 Field Survey

The field survey was undertaken by Colin Spencer (SL flora permit 012460) on 1 and 3 September and 5 October 2018. The vegetation patches were searched on foot, where accessible, and a comprehensive list of vascular flora species was compiled. Flora species that were not identified in the field were collected or photographed for later identification. Taxonomy and conservation status was checked against DBCA databases (DBCA, 2018c, 2018d).

Three 100 m^2 floristic quadrats were installed within the best condition vegetation in the Survey Area to enable a comparison with the floristic community types described in Keighery *et al.* (2008) (**Figure 9**). All species within quadrats were recorded along with an estimate of cover. Notes on flora composition were taken at 6 relevés and vegetation condition was recorded at numerous other assessment points to assist with mapping of the vegetation.

Vegetation condition was assessed against the method of the EPA (2016) (**Appendix 5**), and mapped using a combination of field observations and recent aerial photography.

The total area surveyed was approximately 2.1 ha. Of this, 1.715 ha comprised native vegetation with the remainder being access tracks.

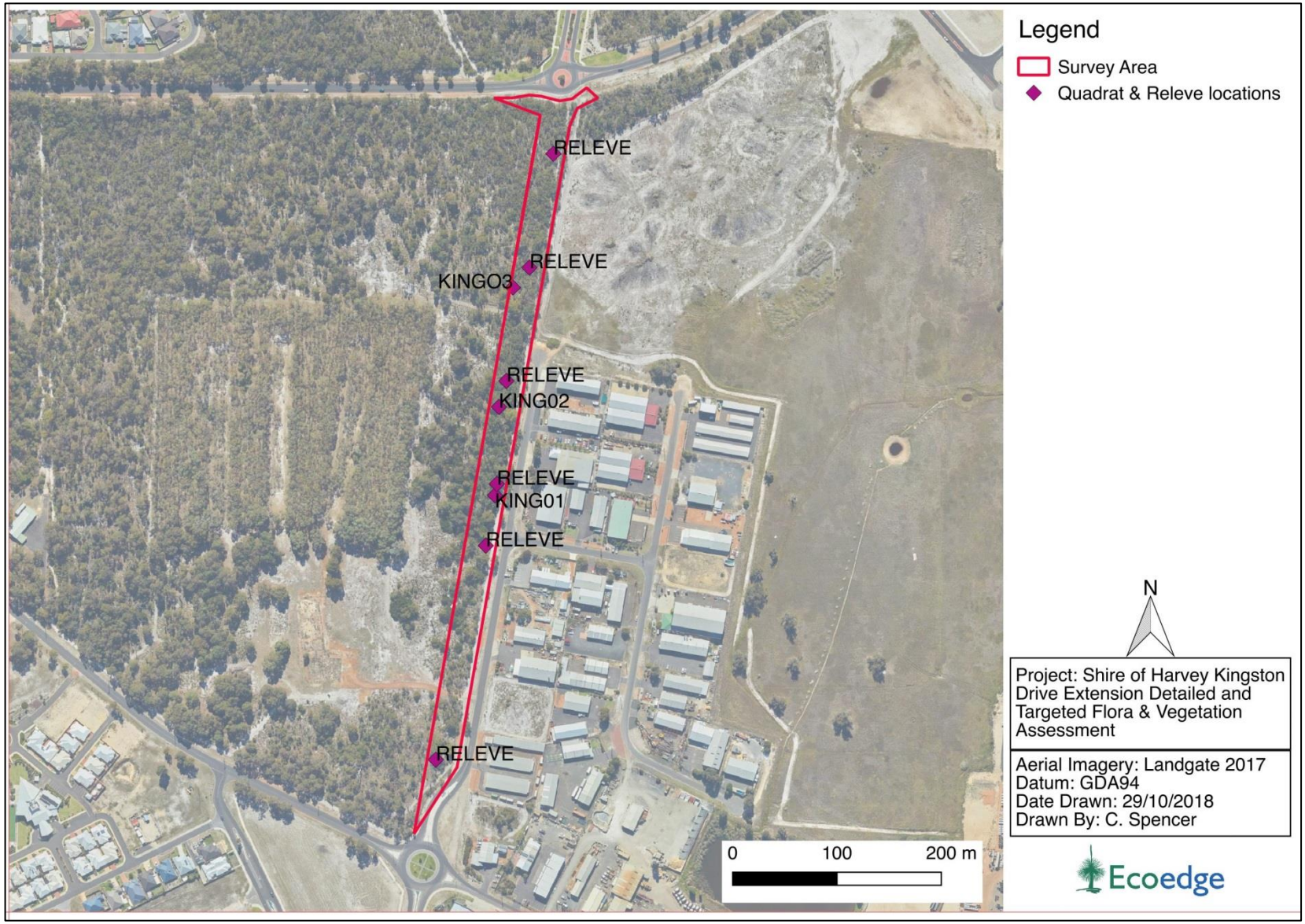

Figure 9. Location of floristic quadrats and relevés installed for the flora and vegetation survey.

2.3 Survey Limitations

Potential limitations with regard to the assessment are addressed in **Table 6**.

Table 6. Limitations with regard to assessment adequacy and accuracy.

Aspect	Constraint	Comment
Scope	No	The survey scope was prepared in consultation with the client and was designed to comply with EPA requirements.
Proportion of flora identified	Negligible	The survey was carried out between in early-September and early October, within the time period during which the great majority of South West species flower. It is estimated that at least 95% of species in the remnant vegetation were identified.
Climatic and seasonal effects	Moderate	Rainfall for the wet season in the South West (1st April – 30th September) was about average. This would have resulted in a satisfactory germination of annual and annually-renewed taxa.
Availability of contextual information	Negligible	Comprehensive regional surveys of remnant vegetation, as well as more localised surveys, have been carried out on the southern Swan Coastal Plain.
Completeness of the survey	Negligible	Vegetation within the Survey Area was thoroughly searched on foot. Further assessments outside the spring season would add to the completeness of the species list but probably only marginally affect the conclusions presented.
Skill and knowledge of the botanists	Negligible	The botanist conducting the survey has a thorough knowledge of the flora within the region and was supervised by a senior botanist with over 25 years' experience in botanical surveys in south west Australia.

3 Results

3.1 Flora

One hundred and eight vascular flora taxa were identified within the Survey Area, of which 30 (c.a. 28%) were introduced species. The high proportion of introduced species reflects a relatively high level of disturbance within the Survey Area over many years. The most represented genera were Fabaceae (15 taxa), Orchidaceae (8) and Poaceae (6).

A list of vascular flora recorded during the field survey is presented in **Appendix 6**.

3.2 Threatened and Priority Flora

No Threatened flora was located during the survey. One species of priority flora, *Acacia semitrullata* (P4), was identified (**Figure 10**), with 26 plants recorded across the survey area. The location of these plants is shown in **Figure 11**. This population is not included on DBCA databases, indicating that it is a new population. A completed Threatened and Priority Flora Reporting Form is included in **Appendix 7**.

Acacia semitrullata is found on white grey sand the Swan Coastal Plain generally south of Myalup around to Dunsborough with records onto the Darling plateaux to just east of Collie and Nannup. It grows in white/grey sand, sometimes over laterite and clay across sandplains and swampy areas. It is represented by 115 records in the DBCA database.

Figure 10. *Acacia semitrullata.*

3.3 Declared Pest Plants and Environmental Weeds

No weeds declared as Pest Plants under the *Biosecurity and Agriculture Management Act 2007* or Weeds of National Significance were identified within the Survey Area.

The locally significant environmental weed **Acacia longifolia* infests approximately 0.71 hectares, or about one third of the survey area (**Figure 12**).

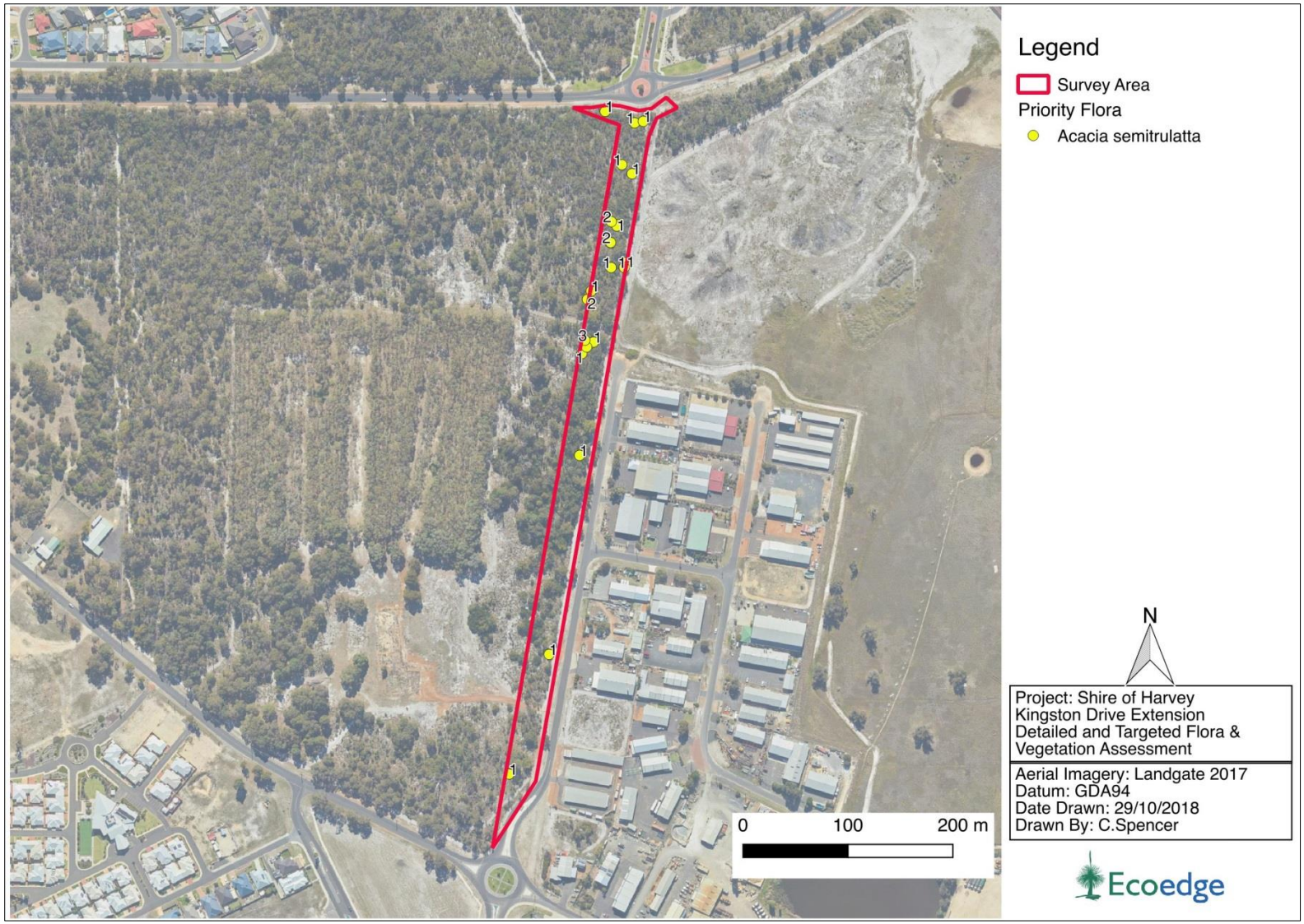

Figure 11. The priority four species *Acacia semitrullata* commonly occurs throughout the survey area.

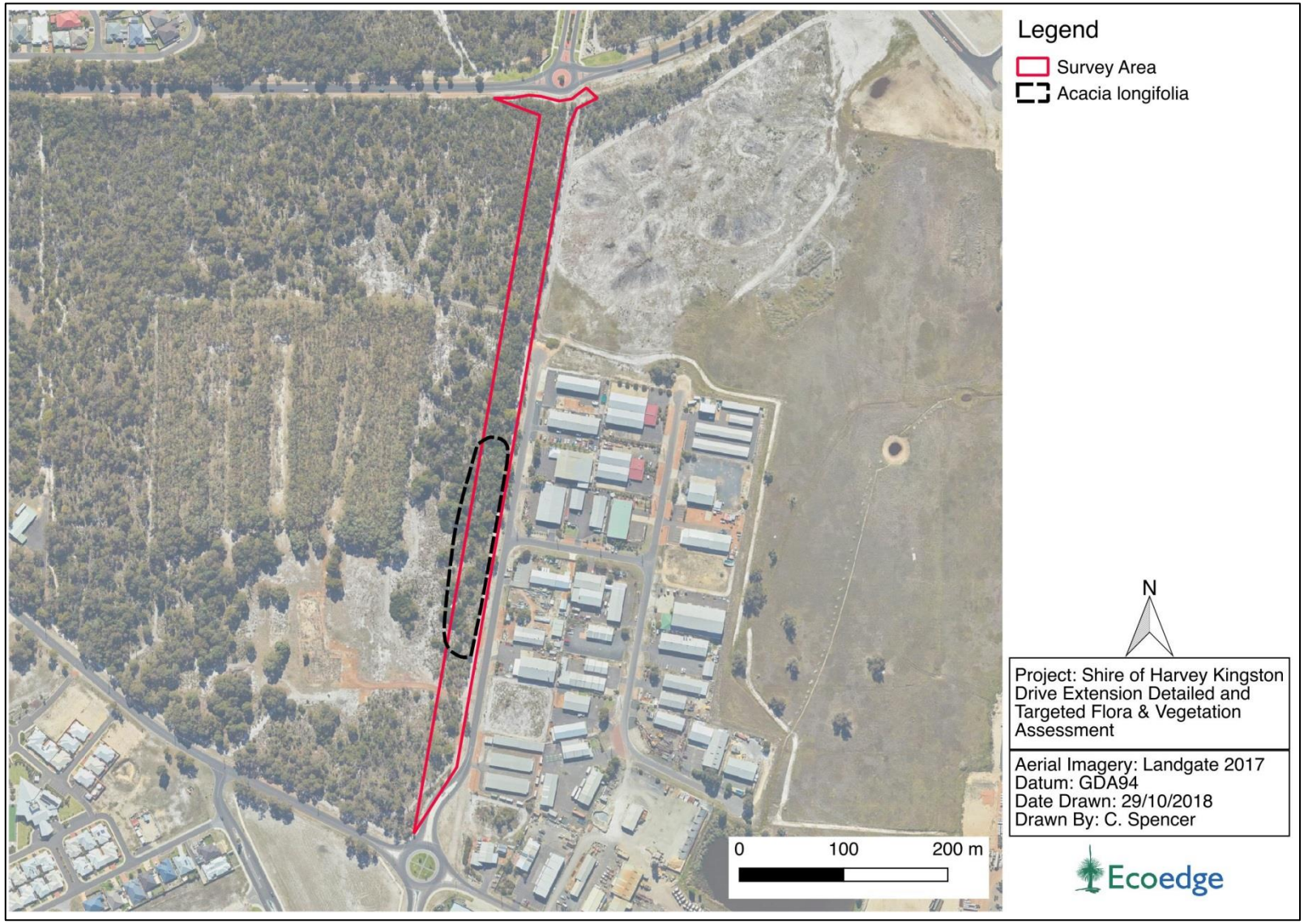

Figure 12. General location of **Acacia longifolia* within the survey area.

3.4 Vegetation Units

There are five vegetation units mapped for the Survey Area. These are described below and mapped in **Figure 13**. A description and photos of the vegetation units is provided in **Appendix 8**.

Originally the survey area vegetation would have consisted of a woodland of Jarrah and/or Marri over *Banksia attenuata*, *Banksia ilicifolia*. The bushland now presents a more complex mosaic due to the effects of historic grazing, *Phytophthora* dieback, clearing activities and weed invasion. It is also likely that the area has been long unburned (20+ years), because there are few observable fire scars on trees and there is a heavy leaf litter under dense canopy. The heavy leaf litter appears to be suppressing understorey growth especially of annual herbs.

1. Em\Bi\Kg\XbMtDb

Eucalyptus marginata Open Woodland (10 - 30m) over *Banksia ilicifolia* Low Woodland over *Kunzea glabrescens* Open Heath to Tall Open Scrub over *Xanthorrhoea brunonis, Melaleuca thymoides, Dasypogon bromeliifolius* Low Shrubland over *Lyginia imberbis, Phlebocarya ciliata* Open Herb/Sedgeland.

2. Em\BiBa\Kg\XbHaMt

Eucalyptus marginata Open Woodland over *Banksia ilicifolia, Banksia attenuata* Low Open Forest over *Kunzea glabrescens* Open Heath to Tall Open Scrub over *Xanthorrhoea brunonis, Hypocalymma angustifolia, Melaleuca thymoides, Hibbertia hypericoides* Shrubland to Open Low Heath over *Billardierii variifolia, Phlebocarya ciliata* Very Open Herbland.

3. Em\BiAl\Kg\XbDb

Eucalyptus marginata Low Woodland to Woodland over *Banksia ilicifolia, Acacia longifolia* Low Open Forest over *Kunzea glabrescens* Shrubland to Tall Shrubland over *Xanthorrhoea brunonis, Dasypogon bromeliifolius* over *Lepidosperma squamatum* Very Open Sedgeland over *Dampiera linearis* over *Billardiera variifolia* Very Open Herbland. In degraded areas and at the margins of the association the understorey is dominated by **Ursinia anthemoides* and **Briza maxima*.

This unit comprises degraded to very good areas and is distinguished by **Acacia longifolia* in the canopy and mid-storey and an absence of *Banksia attenuata* likely due to *Phytophthora* dieback. *Banksia ilicifolia* persists in this community and it is suggested, based on field observations in similar circumstances, that it may be more resilient to *Phytophthora* dieback than *B. attenuata*.

4. Em\Kg\XbDb

Eucalyptus marginata Low Open Woodland over *Kunzea glabrescens* Shrubland to Tall Shrubland over *Xanthorrhoea brunonis, Dasypogon bromeliifolius* Low Shrubland over **Ursinia anthemoides*, **Briza maxima* Herb/Grass land.

This community is distinguished from Community 1 Em\Bi\Kg\XbMtDb by its absence of *Banksia ilicifolia* and its mostly degraded understory.

5. EmCc\Kg\XbDb

Isolated *Eucalyptus marginata* and *Corymbia calophylla* over *Kunzea glabrescens* Open Shrubland to Tall Open Shrubland over *Xanthorrhoea brunonis, Dasypogon bromeliifolius, Melaleuca thymoides, Hibbertia hypericoides* Low Shrubland over *Phlebocarya ciliata* Open Herbland

The extent (in hectares) of each vegetation unit within the Survey Area is provided in **Table 7**.

Table 7. Area of each vegetation unit within the Survey Area.

Vegetation Unit	Area (ha)	% total area
Em\Bi\Kg\XbMtDb	0.219	10.4
Em\BiBa\Kg\XbHaMt	0.676	24.1
Em\BiAl\Kg\XbDb	0.506	32.2
Em\Kg\XbDb	0.240	11.4
EmCc\Kg\XbDb	0.074	3.5
Road	0.013	0.6
Access Tracks	0.369	1.8
Total	**2.10**	**100**

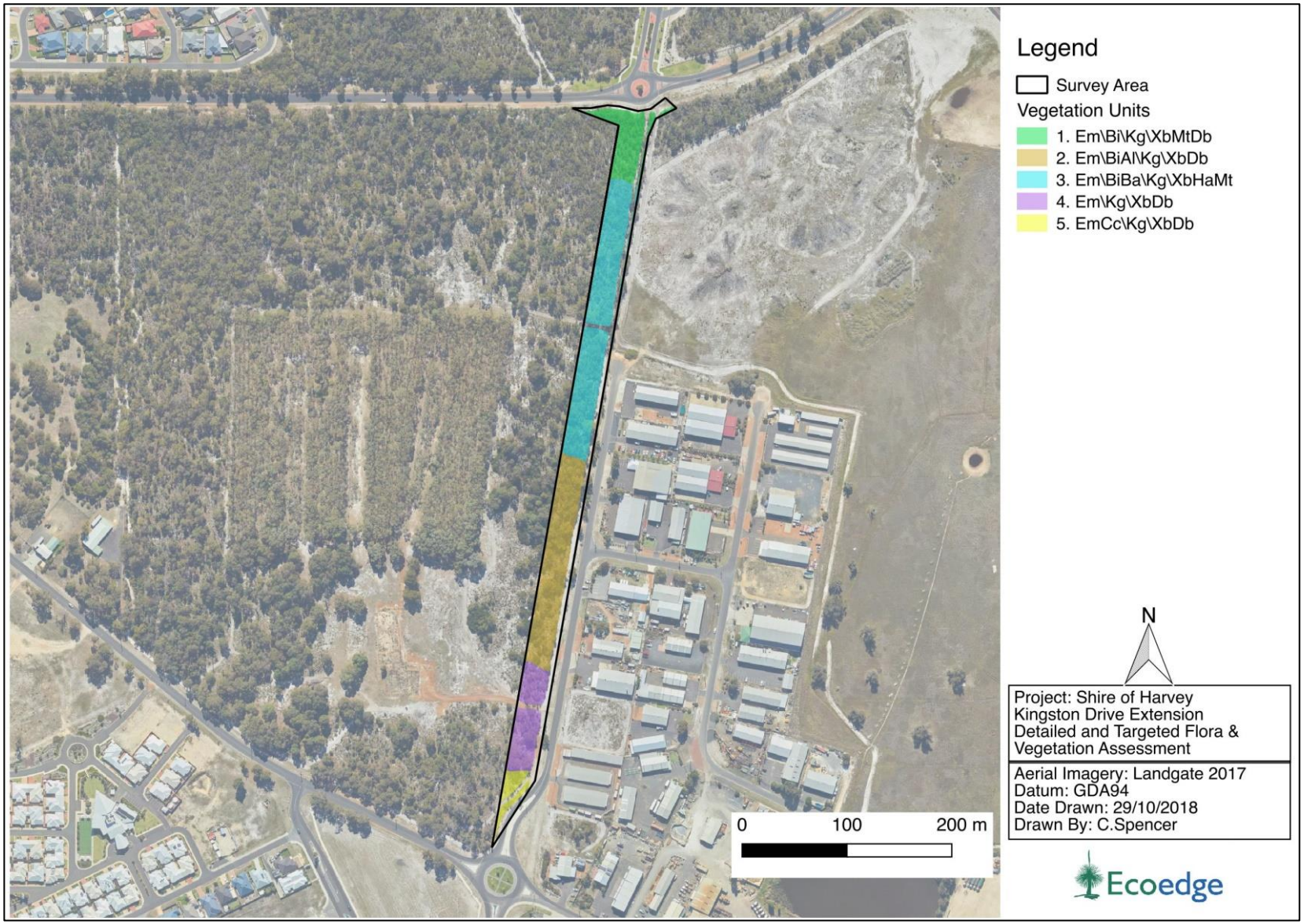

Figure 13. Vegetation units mapped during the field survey.

3.5 Floristic Community Types

Vegetation within parts of the Survey Area has similarities with two Swan Coastal Plain Floristic Community Types (FCTs) identified by Gibson *et al.,* (1994). These are Swan Coastal Plain 21a 'Central *Banksia attenuata* – *Eucalyptus marginata* woodlands' and Swan Coastal Plain 21c 'Low lying *Banksia attenuata* woodlands or shrublands'. Both of these communities are State listed Priority 3 ecological communities which are recognised as part of the Federally listed '*Banksia* Woodlands of the Swan Coastal Plain' TEC.

In order to match the surveyed flora with these FCTS, the Survey Area quadrat data was compared against the 'typical' species (those with >75% frequency) and 'common' species (those with 50%-75% frequency) of both these communities. The results of this matching exercise are presented in **Table 8** and **Table 9**.

Table 8. Floristic Unit comparison.

Quadrat	21a	21c
KING01	10	9
KING02	14	6
KING03	16	11
Average	**13.3**	**8.7**

According to the comparison, the Survey Area vegetation clearly is best matched to FCT 21a because quadrats placed within the vegetation have a higher number of "typical" and other common species characteristic of that FCT.

Table 9. Inferred FCT for described vegetation units.

Vegetation Unit	Area (ha)	Inferred FCT
Em\Bi\Kg\XbMtDb	0.219	21a
Em\BiBa\Kg\XbHaMt	0.676	21a
Em\BiAl\Kg\XbDb	0.506	21a
Em\Kg\XbDb	0.240	
EmCc\Kg\XbDb	0.074	
Area bushland	**1.715**	
Road	0.013	0.6
Access Tracks	0.369	1.8
Total	**2.10**	**100**

Note: vegetation units **Em\Kg\XbDb** and **EmCc\Kg\XbDb** were small in area, in a Degraded Good to condition and did not have sufficient diagnostic species, such as *Banksia attenuata* or *Banksia ilicifolia,* for them to be inferred a FCT.

3.6 Vegetation Condition

Most of the vegetation within the survey area has been affected by degrading influences including historic clearing, grazing, proximity to developed areas and *Phytophthora* dieback. These influences have significantly altered the vegetation structure and species composition over most of the site. Only 14.9 % of the site was regarded as being in Very Good condition with the remainder of the area having poorer condition ratings. Vegetation condition is mapped in **Figure 14** and the extent of vegetation within each condition class is shown in **Table 10**.

Previously cleared and grazed areas are largely absent of typical canopy species, Jarrah, Marri and *Banksia* species and dominated by colonising native species such as *Kunzea glabrescens* and exotic herbaceous and grass weeds such as **Briza maxima* and **Ursinia anthemoides. Phytophthora* dieback appears to have been present for a reasonable period of time with the noticeable absence of *Phytophthora* susceptible species, in particular *Banksia attenuata*, in badly affected areas. The aggressive environmental weed **Acacia longifolia* has also affected a significant portion of the site suppressing the growth of native species.

Table 10. Summary of vegetation condition classes within the Survey Area.

Vegetation Condition	Area (Ha)	%
Very Good	0.312	14.9
Good	0.842	40.1
Degraded	0.56	26.7
*Completely Degraded Road Access tracks	0.386	18.4
Total	**2.1**	**100**

An assessment of the condition class of each inferred FCT is presented in **Table 11**.

Table 11. Assessment of the condition class of each inferred FCT.

Vegetation Unit	Area (ha)	Unit Condition ha	Inferred FCT	Inferred FCT condition
Em\Bi\Kg\XbMtDb	0.219	G: 0.219	21a	VG: 0.3106 G: 0.6792 D: 0.4062
Em\BiBa\Kg\XbHaMt	0.676	VG: 0.264		
		G: 0.389		
		D: 0.0186		
Em\BiAl\Kg\XbDb	0.506	VG: 0.0469		
		G: 0.0713		
		D: 0.3876		
Em\Kg\XbDb	0.240	G: 0.140		
		D: 0.0999		
EmCc\Kg\XbDb	0.074	G: 0.0218		
		D: 0.0517		
Road	0.013	CD: 0.013		
Access Tracks	0.369	CD: 0.369		
Total	**2.10**			

Key - VG: Very Good, G: Good, D: Degraded, CD: Completely Degraded.

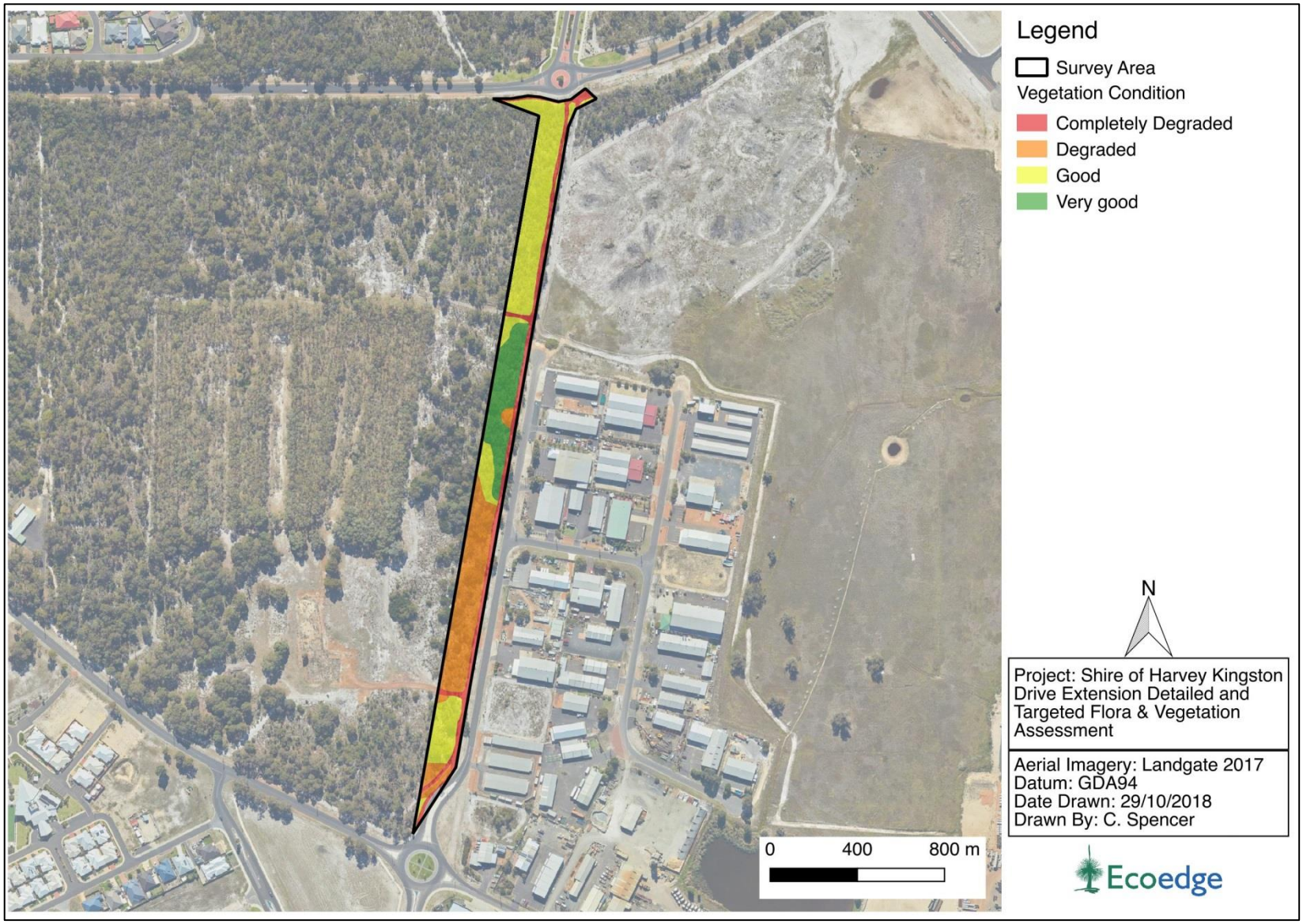

Figure 14. Condition of vegetation within the survey area.

4 Discussion

A spring flora and vegetation survey was conducted over approximately 2.1 ha of land west of Piggot Road and running between Paris Road and Ditchingham Place, Australind. The Survey Area comprised approximately 1.71 ha of remnant native vegetation in which 108 species of vascular flora were identified. Almost a third of these were introduced species.

A population of the Priority 4 listed *Acacia semitrullata* was found during the survey. Twenty-six plants were observed in total, scattered across the length of the survey area. DBCA records show that this species is relatively widely distributed across the Swan Coastal Plain generally south of Myalup, with populations also extending into the Darling Plateau east of Collie and at Nannup. Observations by Ecoedge botanists of this species show that it is relatively common in its preferred habit within bushland in the Greater Bunbury Region, with reasonable populations occurring across hundreds of hectares of native bushland near Kemerton and Myalup. The potential loss of this population is unlikely to have a significant impact on the overall population of the species.

No other flora of conservation significance including those listed under the *EPBC Act* was observed.

No weeds classified as Pest Plants under the under the *Biosecurity and Agriculture Management Act 2007* were found within the Survey Area. The locally significant environmental woody weed *Acacia longifolia* was found to infest about one third of the area. **Acacia longifolia* can invade and substantially change native ecosystems by growing in dense thickets and smothering out native vegetation. It produces prolific seed which persists in the soil (10+ years) and will re-sprout vigorously after fire (DBCA, 2018e). The plants are best managed as seedlings and while infestations are small as it can be expensive and logistically difficult to control large, mature populations.

4.1 Conservation values of the vegetation

4.1.1 Threatened and Priority Ecological Communities

Three of the five described vegetation units present within the survey are inferred to be FCT21a (Gibson *et al*., 1994), comprising a total area of 1.396 ha. This vegetation type is included within the Commonwealth-listed TEC '*Banksia* Woodlands of the Swan Coastal Plain', which has the threat category of "Endangered" (DotEE, 2016).

In order to be classed as a TEC under the EPBC Act, area and condition thresholds apply. These thresholds are presented in **Table 12**. It must be noted that boundaries for a patch may extend beyond a site boundary or potential area of impact for a proposed action.

Table 12. Condition and patch minimum sizes for the "Banksia Woodlands of the Swan Coastal Plain" TEC (DotEE, 2016).

Condition Category	Minimum Patch Sizes
'Pristine'	No minimum patch size applies
'Excellent'	0.5 ha or 5,000 m^2 (e.g. 50 m x 100 m)
'Very Good'	1 ha or 10,000 m^2 (e.g. 100 m x 100 m)
'Good'	2 ha or 20,000 m^2 (e.g. 200 m x 100 m)
To be considered as part of the EPBC Act ecological community a patch should meet at least the 'Good' condition category.	

It is recognised that the proposed impact area itself does not meet the minimum thresholds to be recognised as a TEC. However, because the proposed impact area is contiguous with at least 30 ha of bushland of similar vegetation type it is highly likely that minimum patch size and condition thresholds will be met, and as such that the Survey Area vegetation will be to be considered part of the *Banksia* Woodlands of the Swan Coastal Plain TEC. The Survey Area alone comprising approximately 2.1 ha contains almost one hectare of good condition FCT 21a *Banksia* woodlands. Based on observations in the field and of current aerial photography, it is reasonable to estimate that within the immediately adjacent 2-3 hectares of bushland that minimum thresholds will be achieved.

Therefore, the portion of vegetation in the Survey Area which was assessed as being in Good, or better, condition (approx. 1.1 ha) that is inferred to belong to FCT 21a ('Central *Banksia attenuata* – *Eucalyptus marginata* woodlands') is also considered to constitute the '*Banksia* Woodlands of the Swan Coastal Plain' TEC. Consequently, it is protected as a Matter of National Environmental Significance.

Neither of the other two vegetation units is a Threatened or Priority ecological community.

4.1.2 Vegetation Complexes

Vegetation in the Survey Area is mapped by Webb *et al.* (2016) as the Bassendean Complex – Central and South, of which less than 30% remains. This is below the Commonwealth retention target of 30% (Environment Australia, 2001).

4.1.3 Regional Ecological Linkages

Vegetation within the Survey Area forms part of a regional ecological linkage and is also an important 'stepping stone' of relatively intact native vegetation in a highly cleared and fragmented landscape.

4.1.4 Environmentally Sensitive Areas

All ESAs within 5 km of the Survey Area are Conservation category wetlands associated with the Brunswick and Collie rivers.

4.2 Significance of the Vegetation

5 Conclusions

A spring flora and vegetation assessment was conducted in accordance with EPA Technical Guidance (EPA, 2016) in a 2.1 ha site within Res. 35061 in the Shire of Harvey that is proposed to be used for an extension of Kingston Drive. One hundred and eight vascular flora taxa were identified, of which a high proportion (28%) were introduced species. One species of priority flora, *Acacia semitrullata* (P4), was identified, with 26 plants recorded within the Survey Area. This appears to be a previously unknown population of the species. DBCA records and the observations of Ecoedge botanists indicate that this species is widespread on the coastal plain between Myalup and Dunsborough, and adjacent parts of the Darling Plateau and Blackwood Plateau. Many of these occurrences are in land set aside for Conservation purposes and the species does not appear to be significantly threatened.

No weeds declared as Pest Plants under the *Biosecurity and Agriculture Management Act 2007* or Weeds of National Significance were identified within the Survey Area. However, the locally significant environmental weed **Acacia longifolia* infests approximately 0.71 hectares, or about one third of the survey area.

Three floristic quadrats were installed in the Survey Area and a complete species-list was compiled for each. The quadrats plus six floristic relevés were used to characterise the vegetation for description and mapping. Five vegetation units were described and mapped for the Survey Area. Essentially these vegetation units represent one original vegetation type of a woodland of Jarrah and Marri over *Banksia attenuata*, *Banksia ilicifolia* that has been subjected to various degrees of degradation as a result of *Phytophthora* dieback infestation, grazing and other physical disturbances.

Comparison of the Survey Area quadrat data with the 'typical' species and 'common' species of the most likely FCTs (21a or 21c) derived from the Swan Coastal Plain floristic survey (Gibson *et al*., 1994) shows that the Survey Area vegetation is much closer to FCT 21a. However, only the vegetation in the Survey Area in Good, or better condition, is inferred to belong to FCT 21a. This FCT is included within the Commonwealth-listed TEC '*Banksia* Woodlands of the Swan Coastal Plain', which has the threat category of "Endangered" (DotEE, 2016).

Fifty-five percent of the Survey Area vegetation was rated as Very Good or Good condition, with the remainder being in Degraded condition. A combination of *Phytophthora* dieback and grazing, and invasion by non-native species has had a severe impact in these areas.

6 Recommendations

Where possible, the proposed road design should avoid areas of intact *Banksia* Woodlands TEC.

So far as is practicable, damage to or loss of the *Banksia* woodland TEC should be minimised during any preparation for construction of the extension of Kingston Drive.

7 Requirement for Referral

Clearing of vegetation associated with the proposed extension of Kingston Drive may impact on vegetation that meets the criteria for the Commonwealth-listed *Banksia* woodland TEC and as such a referral under the EPBC Act may be required (DotEE, 2016). No Priority ecological communities are present within the Survey Area.

No Threatened flora were located during the survey, however the Priority 4 listed taxa *Acacia semitrullata* is common throughout. Advice must be sought from DWER regarding the management of any potential impact to this population as a result of the proposed road construction.

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Appendix 1. Categories of Threatened Ecological Communities under the EPBC Act (DotEE, 2017a).

Appendix 2. Protected Matters Search Tool and NatureMap reports.

Appendix 3. Definitions of Threatened and Priority List flora (DBCA, 2017b).

Appendix 4. Categories of Threatened Species under the EPBC Act (DotEE, 2017c).

Appendix 5. Vegetation Condition Scale (EPA, 2016).

Appendix 6. List of Vascular Flora found within the Survey Area.

Appendix 7. Threatened and Priority Flora Reporting Form

Appendix 8. Photographs of Vegetation Units mapped within the Survey Area.