Targeted Flora (*Verticordia attenuata*) Survey

Bussell Highway

between Hutton Road and Sabina River

Prepared for Main Roads WA
March 2021

Ecoedge

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Executive Summary

Ecoedge was engaged by Main Roads in February 2021 to undertake a targeted survey for the Priority 3 listed *Verticordia attenuata* within and adjacent to the Bussell Highway Duplication Stage 2 project area.

The results of this survey together with a review other known records of *V. attenuata* in the area will assist Main Roads to get a better understanding of the local *V. attenuata* population, providing a more informed context to the impacts of the potential clearing of the species within the project area.

The desktop assessment of State Threatened and Priority flora extracts from DBCA, the Western Australian Museum's (WAM's) Threatened and Priority flora databases and the SW regional DBCA office database combined with data from previous flora and vegetation survey conducted in the local area identified approximately 6,400 records of *V. attenuata* within a five-kilometre radius of the project area.

The survey was carried out on 17 February 2021. Searching was carried out in three areas:

1. Along the Bussell Highway road reserve where the species had previously been recorded.
2. on private property south of the known Bussell Highway road reserve populations.
3. within the Capel Wetlands section of Coolilup State Forest.

The numbers of plants were estimated in multiples of five and ten and their locations recorded on GPS or mobile phone application.

The estimate of the total number of plants located within the Bussell Highway road reserve was approximately one third less than previously estimated by Ecoedge in 2017 (1,966 plants vs. 2,822).

A total of approximately 15,900 plants were found in the search sites outside of the road reserve, with 4,597 plants recorded from the private property and 11,308 plants within the Coolilup State Forest (formerly known as the Capel Wetlands Centre). These populations were previously unrecorded in DBCA databases.

These new populations represent significant increases to the known numbers for the *V. attenuata* population. The combined total recorded population based on the desktop assessment results and field survey is approximately 21,300 plants, approximately three times that of the presurvey population records, and seven times that on DBCA databases.

Given the observed nature of its distribution, especially within Coolilup State Forest (much of which remains unsurveyed), it is likely that this figure of approximately 21,300 plants is also a underestimate of the overall population.

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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

Ecoedge was engaged by Main Roads Western Australia (Main Roads) in February 2021 to undertake a targeted flora survey for the Priority three (P3) listed *Verticordia attenuata* as part of the Bussell Highway duplication Stage 2 project which is located between Hutton Road (44.0 straight line kilometres (SLK) and Sabina River (31.15 SLK), in the City of Busselton and Shire of Capel (the project area) (**Figure 1**).

The survey entailed a re-assessment of a previously identified populations of *V. attenuata* within the project area (Ecoedge 2017), and areas outside of this within the species' known distribution that were considered to contain potential habitat (**Figure 1**). These areas were private land located adjacent to the known populations along Bussell Highway and within the Department of Biodiversity, Conservation and Attractions (DBCA) managed Coolilup State Forest north of the project area. The potential habitat areas were divided into High and Moderate potential.

The results of this survey, together with a review other known records of *V. attenuata* in the area, will assist Main Roads to get a better understanding of the local *V. attenuata* population which will provide a more informed context to the impacts of the potential clearing of the species for this project.

The field survey was undertaken in accordance with the Environmental Protection Authority's (EPA) Technical Guidance (EPA, 2016), and the project brief supplied by Main Roads. This report compiles findings of the field survey.

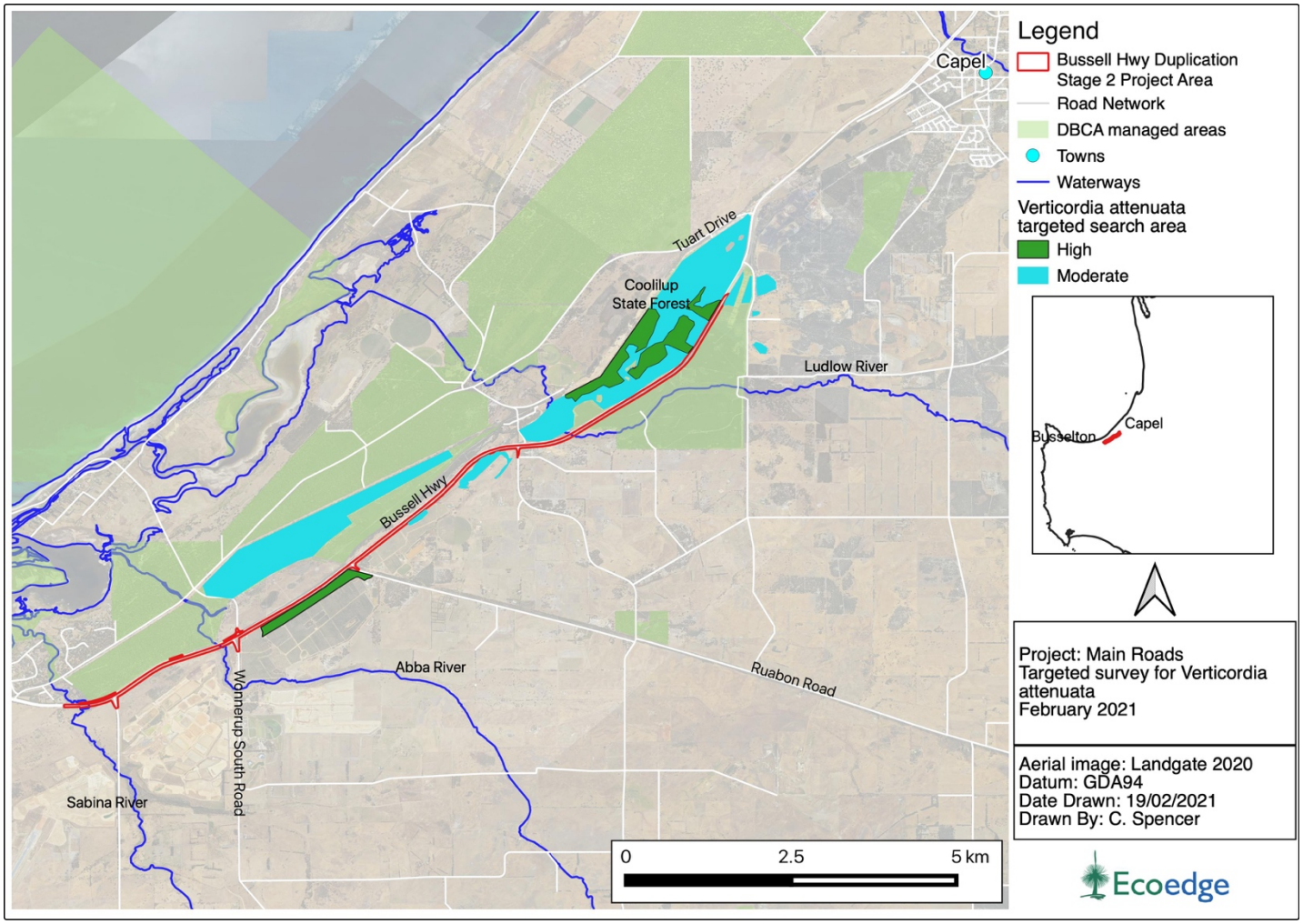

Figure 1. Potential locations of *Verticordia attenuata*, adjacent Bussell Hwy.

2 Scope of works

The scope of the work was to:

- Map the areal extent of the known populations of *V. attenuata* within the project area.
- Review DBCA and Western Australian Museum (WAM) databases and other information sources to determine how many *V. attenuata* are currently recorded.
- Discuss with DBCA to get 'up to date data' on numbers and locations of DBCA mapped individuals.
- Search for *V. attenuata* in areas adjacent to the project area prioritising those immediately south of the known populations (south of Ruabon Rd) on private property.

3 Methods

3.1 Desktop Assessment

Prior to the field survey, a desktop study was undertaken to provide contextual information on the local *V. attenuata* population. The desktop study included a review of the following information:

- Internet based search of flora and vegetation surveys recording *V. attenuata*.
- Review of Ecoedge flora and vegetation survey database.
- Review of extracts from DBCA and WAM Threatened and Priority flora databases (DBCA 2020) provided by Main Roads[1].
- Review of *V. attenuata* records supplied by the SW regional DBCA office (DBCA 2021b).

This information was also used to assist in identifying and prioritising areas to target for *V. attenuata.* Potential search areas were rated as being either high or moderate potential habitat based on the desktop study and local knowledge of where the species has previously been observed (**Figure 1**).

[1] The DBCA and WAM extracts were for a 5 km buffer of the project area.

3.2 Field Survey

The fieldwork was carried on 17 February 2021 by Russell Smith (SL flora permit FT61000473) and Colin Spencer (SL flora permit FB62000169) in accordance with the Environmental Protection Authority's (EPA) Technical Guidance (EPA, 2016).

The survey was conducted in three parts:

1. A survey for new populations of *V. attenuata* in high potential areas on private property south of Bussell Highway and east of Wonnerup South Road (adjacent to the largest population identified by Ecoedge (2017)).
2. A search in high potential areas within the Coolilup State Forest located off Tuart Drive.
3. A re-assessment of the populations in the road reserve along the south side of Bussell Highway identified by Ecoedge (2017).

The locations of groups of *V. attenuata* plants were recorded either on a Garmin GPS unit or using the phone application 'Fulcrum'. Generally, numbers were estimated and recorded in multiples of five (e.g., 5, 10, 20, 50, 100 etc.). Occasionally, precise numbers were recorded.

3.3 Survey Limitations

Potential limitations with regard to the survey are addressed in **Table 1.**

Table 1. Limitations of the field survey with regard to assessment adequacy and accuracy.

Aspect	Constraint	Comment
Scope	Negligible	The survey scope was prepared in consultation with the Client and was designed to comply with EPA requirements.
Accuracy of count	Minor	*V. attenuata* plants were still in flower at the time of the survey so were easy to identify. Because of the high numbers involved, providing counts of individuals was impractical, therefore the assessment was based on an estimate of individuals.
Climatic and seasonal effects	Negligible	The general location of the search areas recorded about average rainfall and temperatures in the lead up to the survey (BOM 2021).
Availability of contextual information	Minor	Data on locations and numbers of previously identified populations from various sources was available, but counts were sometimes missing from these records.
Completeness of the survey	Minor	All of the survey area vegetation was easily accessible. Survey time was restricted to 8 hours by 2 botanists. Additional survey time would likely have resulted in the detection of more plants, particularly in the Coolilup State Forest.
Skill and knowledge of the botanists	Minor	The senior botanist undertaking the survey has over 27 years' experience in the identification and survey of flora native to the Swan Coastal Plain (SWA02) sub-region.
Disturbance (fire, grazing, clearing etc.)	Minor	There was no recent disturbance to the vegetation that compromised the survey, for example, from fire or recent clearing activities.

4 Desktop Assessment Results

4.1 *Verticordia attenuata* species profile

Verticordia attenuata is a small woody shrub, 0.4 - 1 metre high. Its pink flowers are usually present between December or January to May. Its preferred habitat is white or grey sand winter-wet depressions on the southern Swan Coastal Plain between Australind and Fish Road reserve south of Busselton. It is represented by 53 records in the NatureMap database (DBCA 2021a).

4.1.1 Conservation status

V. attenuata is listed by the DBCA as Priority Three (P3) species. Species listed under this conservation category are either known from several locations and do not appear to be under imminent threat, or are know from few but widespread locations with either large population sizes or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey (DBCA, 2019a).

The locations of *V. attenuata* occurring within a five km radius of the project area were generated from the Main Roads supplied DBCA and WA Herbarium data downloads (DBCA 2020) together with data supplied from the DBCA South West Regional office (DBCA 2021b) are shown in **Figure 2**. A summary of this information with a tally of the known abundance of *V. attenuata* according to these records is provided in **Table 2**, where known.

Figure 3 shows the regional distribution of all *V. attenuata* provided by the DBCA SW regional office. This distribution generally reflects the NatureMap distribution (DBCA, 2021a). One population, located near the foothills of the Whicher Scarp, is recognised as an outlier of the main distribution of the species.

4.2 Previous surveys

Three previous surveys conducted in the vicinity of the project area recorded occurrences of *V. attenuata* that are not recorded in the WA herbarium and DBCA data downloads (DBCA 2020). The outcomes of these surveys are briefly described below. Where possible, the locations of these populations identified in the survey are also shown in **Figure 2** with a tally of abundance provided in **Table 2**.

1. Endemic (2013). South Capel Flora and Vegetation Assessment, prepared for Iluka Pty Ltd. *Verticordia attenuata* was recorded on the *Melaleuca preissiana* seasonal dampland at three sites in the south-east corner of section B of their survey area and also observed to be widely distributed in the revegetation areas of Section A, where it was recorded at 19 locations **Figure 2**. The abundance of populations was not provided in the survey report.

2. Ecoedge (2019). Reconnaissance and Targeted Flora and Vegetation survey at Capel South Wetlands: Area 4. This survey recorded approximately 430 plants of *V. attenuata* within the survey area, **Figure 2**.
3. Ecoedge (2017). Report of a Targeted Rare Flora Survey for *Verticordia attenuata* along Bussell Highway between Capel and the Sabina River. This survey recorded approximately 2,879 *V. attenuata* individuals from nine populations. The largest population comprised of approximately 2,500 individuals, located within road reserve east of Wonnerup South Road. This report noted that *V. attenuata* appears to be a disturbance opportunist that thrives in areas previously mined for mineral sands, particularly where clay lenses allow the surface soil to remain damp.

Table 2 shows that approximately 6,400 (6,426) *V. attenuata* plants were recorded over a 49-year period (1971 – 2020) within a 5 km radius of the project area, with the majority of the observations made between 1996 and 2020. The DBCA regional office records (DBCA 2021b) include approximately 5,500 of these plants.

Table 3 shows DBCA regional office records (DBCA 2021b) for the area outside of the 5 km buffer of the project area. This comprised of ten records and 360 plants (**Figure 3**).

Population sizes within the various records range from one to 3,000 individuals. The majority of records show populations sizes below 50 plants. The largest occurrence known prior to the current survey is within the project area in the road reserve east of Wonnerup South Road and was recorded by Ecoedge 2017. This occurrence is not recorded in DBCA or WAM databases (DBCA 2020), but is included in the DBCA regional office records (DBCA 2021b).

Table 2. Population data from within five km of the project area (DBCA 2020, DBCA 2021b, Ecoedge 2017, Ecoedge 2019, Endemic 2013).

Data source	Year of records	No. Plants	Records	Comments
Endemic 2013	2010 - 2012	Not provided	Recorded at 22 sites, 19 sites in area A and 3 sites in Area B.	Population sizes were not recorded.
Ecoedge 2017	2016	2,879	9 populations	New records, population size ranged from 1 to 2,500 plants.
Ecoedge 2020	2019	430	One population	New record.
DBCA Threatened and Priority Flora database	1996	2,450	7 records	4 records are the same area as the WA Herbarium records. Populations ranged from 4 to 1,000 plants.
WA Herbarium	1971 - 2007	500+(550)	17 records most of which did not record abundance	The latest record in 2007 was for ~500 specimens. This was a new occurrence, i.e., not recorded in 1996 by DBCA. Population size ranged from 2 to 500 plants.
DBCA regional office	1996 - 2020	5,496	14 records	This dataset includes the results of Ecoedge 2017 survey (2,879 plants) and the results of the 1996 DBCA records, noting however that population no. 5 was updated in 2020, in 1996 it had 1,000 plants but (0) plants in 2020. It did not include the WA Herbarium 2007 record of 500 plants.
	Total	~6,426		For the purposes of local population estimation, the Ecoedge 2017 records and DBCA 1996, were removed as these were included in the DBCA regional office records.

Table 3. DBCA regional office population data for greater than 5 km from the project area (DBCA 2021b).

Data source	Year of records	No. Plants	Records	Comments
DBCA regional office	1993-2020	360	10 records	Populations ranged from 3 to 100 individuals. One outlier population recorded with 30 individuals.

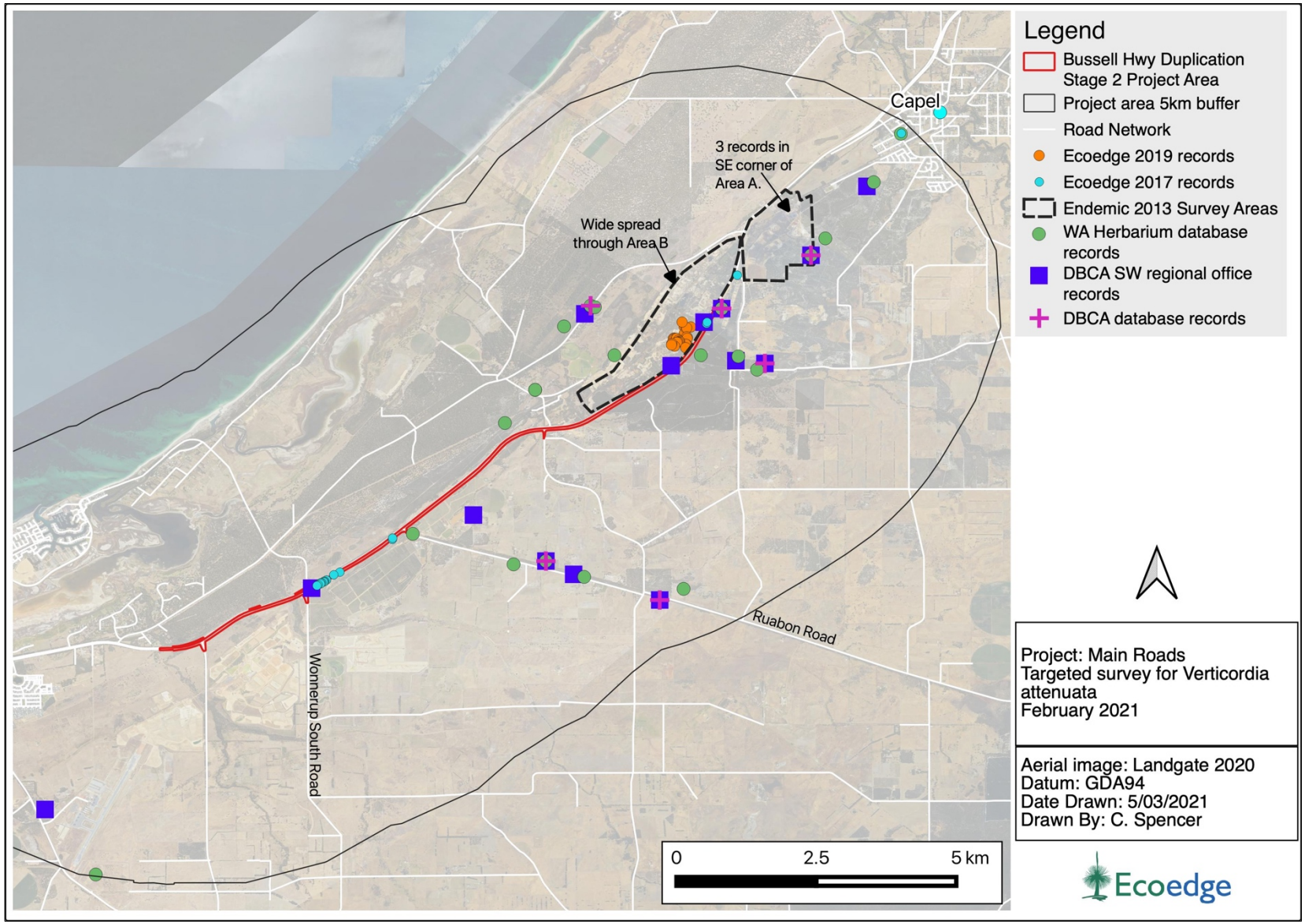

Figure 2. Location of *V. attenuata* within 5 km of the project area (DBCA 2020, DBCA 2021b, Ecoedge 2017, Ecoedge 2019, Endemic 2013).

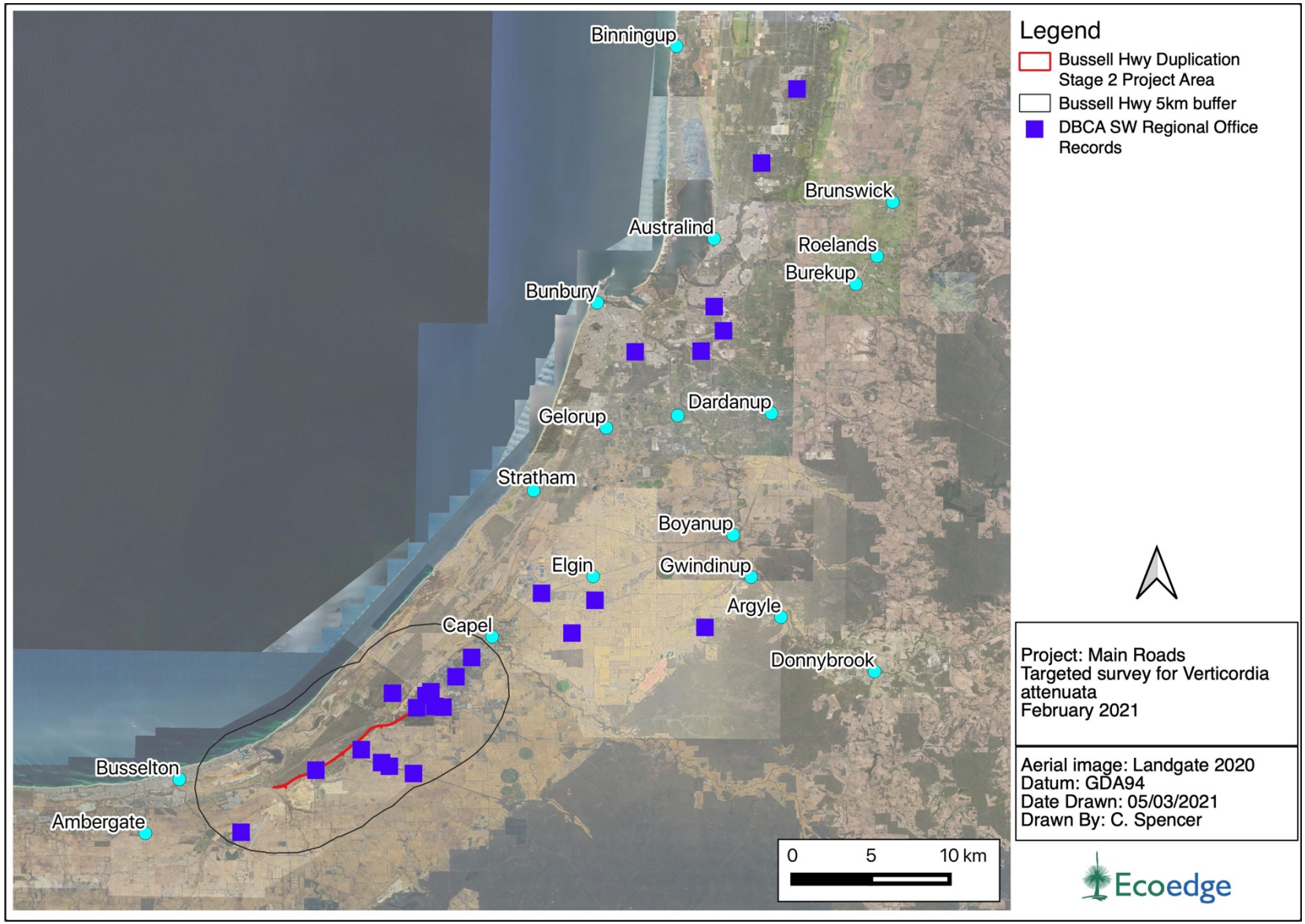

Figure 3. Location of *V. attenuata* based on SW regional office DBCA records (DBCA 2021b).

5 Field Survey Results

The locations of the three search areas are shown in **Figure 4**. This is demarcated by survey track files.

The estimated number of plants in each search area are listed below:

- Bussell Highway road reserve: 1,966 plants (reduced from the 2016 estimate of 2,822[2]).
- Private property: 4,597 plants.
- Coolilup State Forest (formerly known as Capel Wetlands reserve): 11,308 plants.

Point locations of *V. attenuata* recorded populations and sub-populations within the search areas are shown in **Figure 5** and **Figure 6**, along with polygons indicating the species' spatial distribution.

The combined results of the desktop assessment (previous records) and field survey (new records) are presented in **Table 4**.

Table 4. Combined population estimates for *V. attenuata* based on 2021 field survey and desktop assessment results.

Records	Number of plants	Comments
Bussell Highway road reserve population	1,966	
Private property population	4,597	
Coolilup State Forest populations	11,308	
Desktop assessment records	5,366 (6,400)	The desktop assessment total of 6,400 is reduced to reflect the results of the 2021 field survey at the Bussell Highway road reserve. Approximately 3,000 plants were previously recorded at this location whereas the 2021 survey recorded only 1,966 plants.
Combined estimate:	**21,271**	

[2] Populations C1, C2, D2, E, F and G from Ecoedge (2017).

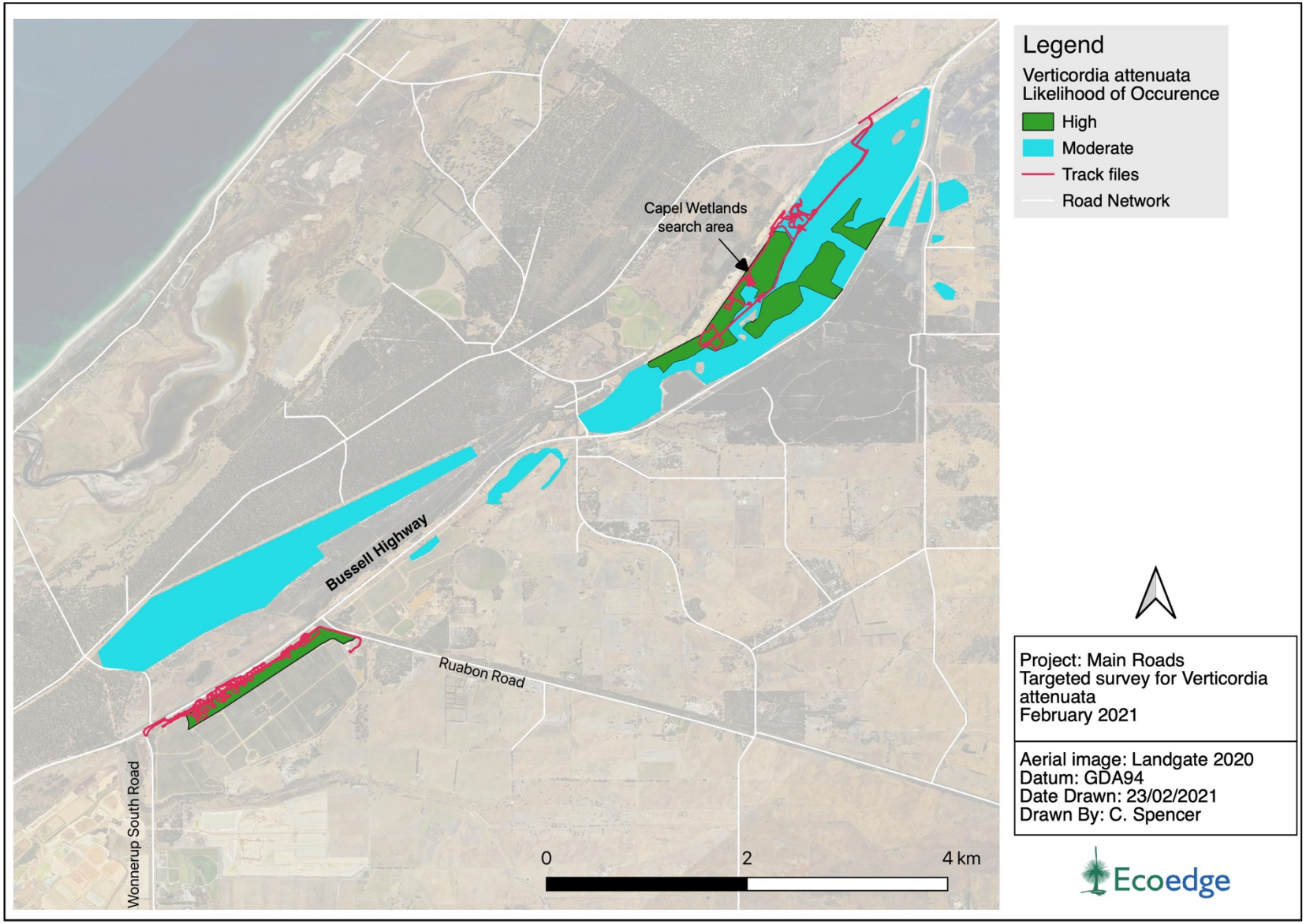

Figure 4. 2021 targeted *V. attenuata* search areas.

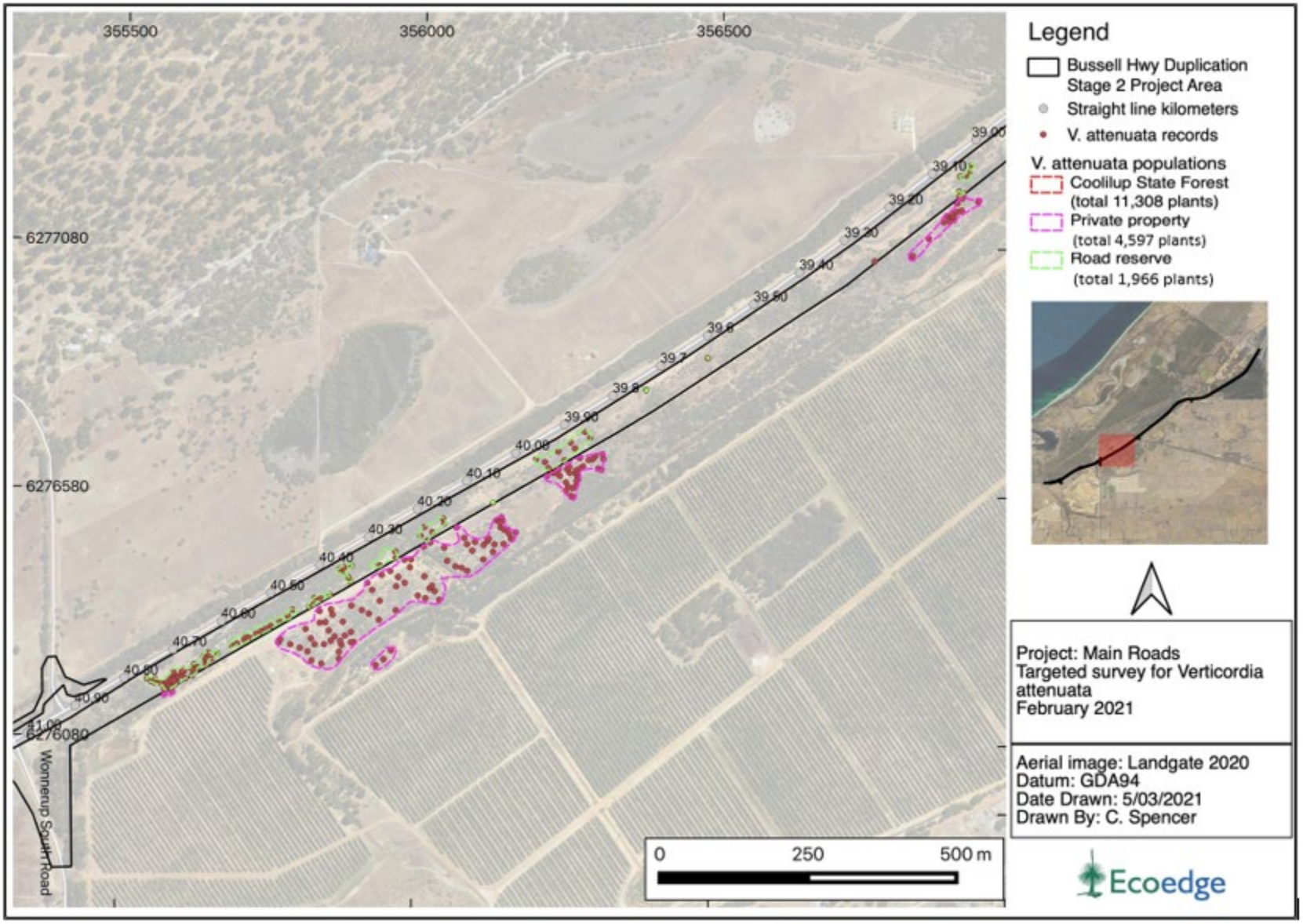

Figure 5. *V. attenuata* populations in Bussell Highway road reserve and private property.

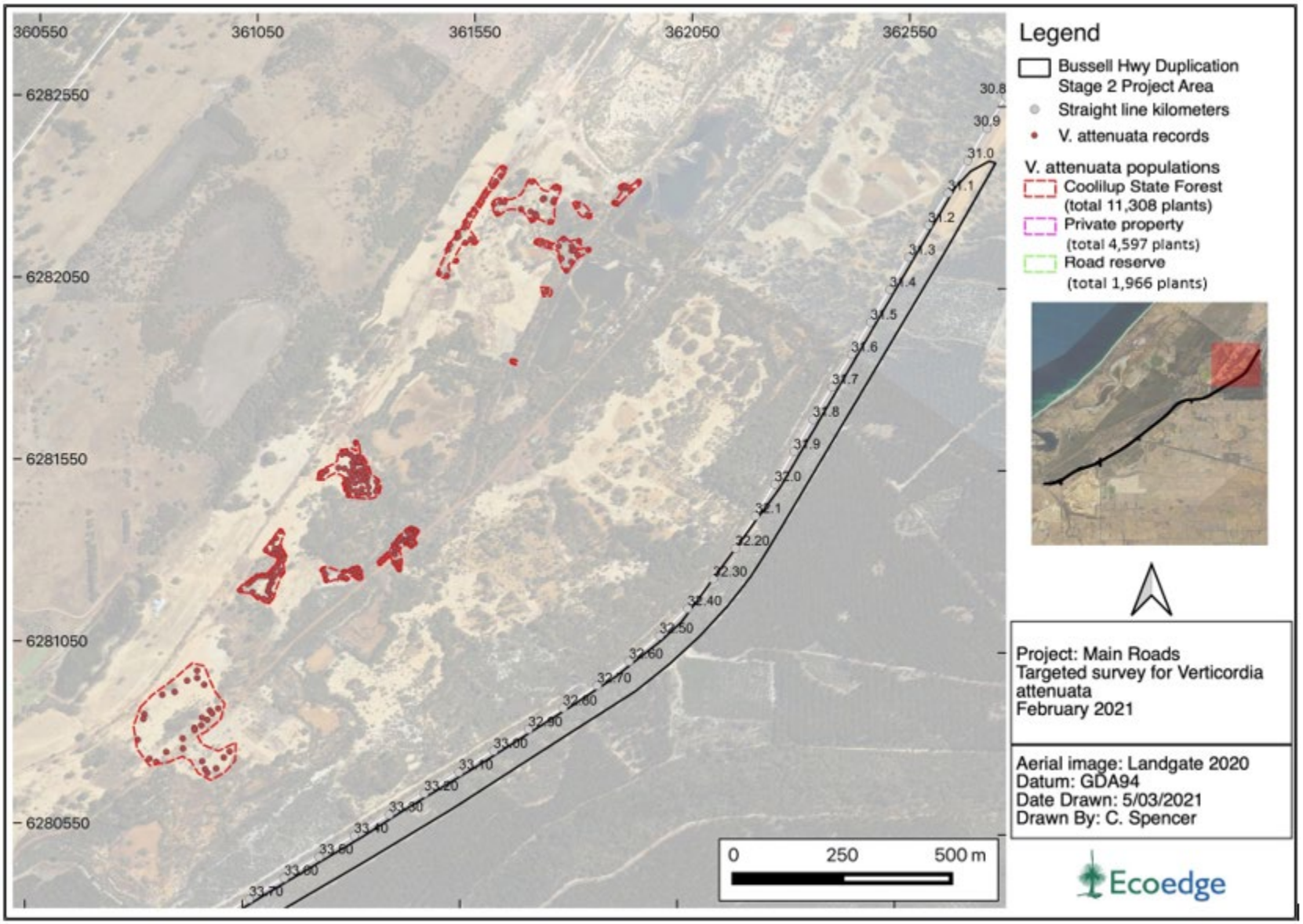

Figure 6. *V. attenuata* population with the Coolilup State Forest central revegetation area.

6 Discussion

6.1 Desktop Assessment

The desktop assessment of presurvey records including extracts of DBCA Threatened and Priority flora database downloads, the WA Herbarium database and SW regional DBCA office data set, together with data within reviewed flora surveys showed that there was approximately 6,400 *V. attenuata* plants recorded within a five km radius of the project area. This area appears to contain the highest concentration of *V. attenuata* plants across its natural distribution, as the regional data set records only 360 plants outside of the 5 km radius of the project area. The largest population of approximately 3,000 occurs within the project area in the road reserve east of Wonnerup South Road.

The results of the 2021 survey, as discussed below, indicate that this population estimate is a significant underestimate of the total population.

6.2 Coolilup State Forest

An estimated 11,308 plants were recorded within the Coolilup State Forest in six larger groups, including three with more than 1,500 plants and one with more than 3,000 plants. The distribution of the populations suggests that the species was associated with revegetation of the mined areas.

The above figure for the Coolilup State Forest is believed to be only a portion of the total number of *V. attenuata* plants considered likely to occur in this area. This is based on the fact that a total of 430 plants were recorded by Ecoedge (2019) in another part of the State Forest. Moreover, observations on the distribution of plants during the present survey indicate that the taxon is likely to be present over much of the remaining rehabilitated area in the State Forest that, due to time constraints, were not able to be visited during this survey. *V. attenuata* appears to be particularly common on deep sand or areas of exposed laterite where there is sparse or no tree canopy, factors which are characteristic of the majority of the rehabilitated areas.

6.3 Private Property

The *V. attenuata* plants recorded on private property 'mirrored' the distribution of known populations on the adjacent Bussell Highway road reserve. They were in two main groups, the southern one containing around 4,250 plants and the remainder in a small northern group containing approximately 347 plants.

6.4 Bussell Highway road reserve

Approximately 1,966 plants were found within the road reserve of Bussell Highway southbound, in two main groups. The southern group stretched from 39.62-40.76 SLK and the northern from 39.07-39.10 SLK. The approximate total for the encompassed populations from Ecoedge (2017)

(C1, C2, D2, E, F and G) was 2,822 plants. The reason for the discrepancy could be because of natural attrition of plants over the intervening four years, together with the fact that both 'counts' were estimates.

7 Conclusions

The survey for *V. attenuata* conducted on 17 February 2021 established an updated total for plants within the Hutton-Sabina footprint. An estimated 1,966 plants now occur within the footprint within the areas visited during this survey. The northernmost of the populations identified by Ecoedge (2017) (referred to as population A in that report, and containing 50 plants) has already been removed as part of Stage 1 the highway upgrade. Two populations not revisited during the current survey (B, D1) totaled 7 plants in 2017. Therefore, a revised total for the footprint as a whole is about 1,980 plants.

A combined total of about 15,900 previously unrecorded *V. attenuata* plants were recorded from the private property and Coolilup State Forest search areas. Due to time constraints, only about 20% of potential habitat within the Capel Wetlands part of the Coolilup State Forest was able to be searched. But given the association between *V. attenuata* occurrence and the more open disturbed areas, it is expected that there are many more unrecorded plants within the Capel Wetlands section of the Coolilup State Forest.

The new populations recorded during the 2021 survey represent significant increases to the known abundance of *V. attenuata*. The total recorded population based on this desktop assessment and field survey is approximately 21,300 plants.

8 References

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Department of Biodiversity, Conservation and Attractions (2020). *Extract from the Department's Threatened and Priority Flora and the Western Australian Herbarium databases*. DBCA Species and Communities Branch 2020.

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