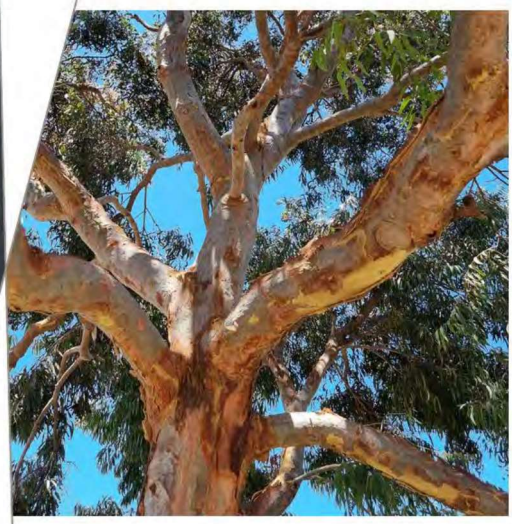
Surrounds of East Perth Power Station (EPPS)

Vegetation Condition Survey

CW1200027



Prepared for
Development WA

13 January 2022

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Document Information

Prepared for	Development WA
Project Name	Vegetation Condition Survey
File Reference	CW1200027_RP_ENV_ VegetationConditionSurvey_ B
Job Reference	CW1200027
Date	13 January 2022
Version Number	B

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Effective Date 14/01/2022

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Date Approved 14/01/2022

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
A	10/11/2021	For Issue	SH	CG
B	13/01/202	Updated Affected Trees	SH	CG

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1 Introduction

Cardno was engaged by Development WA ("the Client") to conduct a vegetation condition survey ("the assessment") of an area of land labelled as Veg Survey Area. This area contains several land parcels with multiple owners ("the Site") and presented in ***Figure 1, Appendix A***.

This report provides a description of the vegetation identified within the survey area and the possible impacts of the upcoming Western Power and ATCO works, as presented in ***Figure 1.1-1.6, Appendix B - G***.

The report has been compiled by Simon Hurley, Cardno Environmental Scientist. The field survey was conducted by Simon Hurley, Cardno Environmental Scientist between the 2nd and 5th of November 2021.

1.1 Scope of Works

A vegetation assessment was carried out on the site to document the location, species and health of vegetation situated within the area, prior to the proposed Western Power and ATCO ground works.

With upcoming work plans provided to Cardno by Development WA, the effect of the Western Power and ATCO works were included in this assessment and their possible impacts on individual vegetation populations.

The assessment area is presented in ***Appendix A***.

1.2 Standard of Assessment & Limitations

This assessment has been undertaken in general accordance with the current industry standards for an assessment of this type and purpose, objectives and scope identified in this report.

This assessment report is not any of the following:

- An Environmental Impact Assessment (EIA).
- A Preliminary Site Investigation (PSI) or Detailed Site Investigation (DSI).
- A Flora and Vegetation Assessment in accordance with the EPBC Act 1999.

2 Environmental Setting

Key details defining the Site as provided in the DSI (Cardno, 2019) is provided in **Table 2-1**.

Table 2-1 Environmental settings

Parameter	Location Specific
Climate	East Perth has a dry climate with hot summers and cool winters. The lEast amount of rainfall occurs in February with average of 13.6 mm. Most of the precipitation falls in July, averaging 144.5 mm. February is the hottest month with maximum and minimum temperatures being 31.6°C and 18.3°C respectively. By contrast, winters are cool with July average maximum and minimum temperatures being 18.4°C and 7.7°C respectively.
Topography	A detailed survey of the site (McMullen Nolan, 2009) indicates that the elevation ranges from 0 metres Australian Height Datum (mAHD) (retention basin in the centre) to 11 mAHD (freeway embankments South of site) across the site.
Geology	**Regional Geology** Regional geology at the site comprises the Quaternary Unit *Qa* which is described as 'Channel and flood plain alluvium; gravel, sand, silt, clay'. The superficial formations expected beneath the site are described (Davidson, 1995) as: Kings Park Formation (flat-lying, shallow-marine to estuarine deposit) overlain by Tamala Limestone (leached yellow sand/eolian calcarenite). **Site Specific Geology** Surface geology at the site is described by the *1:50,000 Geological series map – Perth* of the Geological Survey of Western Australia (GSWA) as pale and olive yellow SAND of residual origin. Directly North of the site the surface geology is described by the *1:50,000 Geological series map – Perth* as yellow, brown CLAYEY SILT of alluvial origin. It is likely that this surface geology extends further South into the study site resulting in the discrepancies between the observed and mapped geological attributes.
Acid Sulfate Soil	The DWER Acid Sulfate Soil (ASS) risk mapping does not indicate that the majority of the site is in an area of known ASS disturbance risk within 3 m of the natural soil surface. However, the area north of Summers Rd, directly east of the Western Power Substation is recognised as high to moderate risk area.
Hydrology	The site contains two retention basins (MRWA) and associated piped drainage from Graham Farmer Freeway and East Parade. The nearest surface water body is the Swan River located directly East of the site. Surface water is expected to infiltrate through sandy soils on-site, where unsealed ground exists, evaporate at the site surface, and/or be taken up by vegetation (root uptake). Surface water runoff may occur; however, this will generally follow the surface topography of the site towards the retention basins.
Wetlands	No Conservation Category wetlands occur on site. The nearest Conservation Category wetland (Swan River Estuary, ID96640) occurs directly East of site and a 'Multiple Use' Category wetland (Berringa Park/Swan River Peripheral Estuary, ID15025) is located within the Northern Area of the site.
Environmentally Sensitive Area (ESA)	The entire eastern boundary of the site is within an Environmentally Sensitive area, and encroaches around 50m into the Eastern portion of the Survey area.

2.2 Priority and Threatened Flora and Fauna

A preliminary search for priority and threatened flora and fauna was performed for a 1.0 km radius of the centre of the Site using the Department of Parks and Wildlife (DBCA) NatureMap online database (accessed 8 November 2021). Eighty-eight (88) species (flora and fauna) were identified as possibly being located within a 1.0 km radius of the centre of Site. Of these, eight (8) species are considered for Conservation Status and two (2) were found to be endemic to the Query area:

- *Actitis hypoleucos (Common Sandpiper)* – Protected under International Agreement.
- *Calyptorhynchus latirostris* (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo) – Threatened (Endemic).
- *Calidris ruficollis (Red-necked Stint)* – Protected under International Agreement.
- *Falco peregrinus subsp. macropus* (Australian Peregrine Falcon) – Specially protected fauna.
- *Hydroprogne caspia* (Caspian Tern) - Protected under International Agreement.
- *Isoodon fusciventer* (Quenda/ South Western brown bandicoot) - Priority 4 (Endemic).
- *Oxyura australis* (Blue-billed Duck) – Priority 4.
- *Thalasseus bergii* Crested Tern – Protected under International Agreement.

A search of the National Map identified this site as being within the DBCA's Threatened Ecological Communities (TEC) within Boundary ID 3298. For further advice, regarding TEC sites please contact DBCA - Species and Communities Branch - 9219 9157 - communities.data@dbca.wa.gov.au.

2.3 Environmental Sensitive Areas

The Department of Water and Environmental Regulation (DWER) maintains a dataset of Environmentally Sensitive Areas (ESA). ESAs are areas of land deemed to support conservation, heritage or ecological value, or an area protected through existing State Policy. A review of the National Map database (accessed 08 November 2021) indicated that the Eastern portion of the site is located within an Environmentally Sensitive Area (ESA) that encroaches 50m into the Survey site.

3 Site Assessment

3.1 Vegetation Mapping

The scope and methodology for the vegetation mapping was generally conducted in accordance as detailed in **Table 3-1**. The assessment locations are presented in ***Figure 1, Appendix A***.

Table 3-1 Survey Methodology

Item	Detail
Date of Field Activity	02 - 05 November 2021
Survey Area	Surround of East Perth Power Station (EPPS) - approximately 52,000 m^2
Method	Vegetation mapping was undertaken throughout the survey area. Vegetation species, location, visual health, height and the Diameter at Breast Height (DBH) were recorded using a hand-held tablet though Field Maps and Survey123 database software. ATCO and Western Power predicted work areas where constructed using ArcPRO and displayed infield through the Field maps for ArcGIS application. A Minimum of two Representative photos of each surveyed tree were recorded using the Survey123 software.

4 Discussion of Results

4.1 Survey Summary

A visual assessment of vegetation species, location, number, health, height and DBH were recorded and are presented in tabular form in ***Table B1, Appendix H***.

A summary of species and number surveyed is presented in **Table 4-1**.

Table 4-1 Vegetation Identified during Survey

Plant Species	Number of Individuals
Eucalyptus camaldulensis (River Gum)	93
Melaleuca quinquenervia (Broad Leafed Paperbark)	38
Acacia saligna (Golden Wreath Wattle)	17
Casuarina equisetifolia (Sheoak)	17
Casuarina obesa (Swamp Sheoak)	11
Angophora costata (Smooth Barked Apple)	10
Eucalyptus rudis (Flooded Gum)	10
Lophostemon confertus (Box Tree)	9
Melaleuca viminalis (Weeping Bottlebrush)	8
Tipuana tipu (Pride of Bolivia)	7
Melaleuca nesophila (Showy Honey Myrtle)	6
Corymbia calophylla (Marri)	5
Eucalyptus patens (Yarri)	5
Agonis flexuosa (Peppermint Tree)	3
Eucalyptus eremophila (Tall Sand Mallee)	3
Eucalyptus lehmannii (Bushy Yate)	3
Eucalyptus sp	3
Platanus acerifolia (London Plane)	3
Allocasuarina fraseriana (Sheoak)	2
Banksia serrata (Saw Banksia)	2
Corymbia maculata (Spotted Gum)	2
Jacaranda mimosifolia (Jacaranda)	2
Melaleuca alternifolia (Tea Tree)	2
Morus alba (Black Mulberry)	2
Nerium oleander (Oleander)	2
Callistemon citrinus (Bottlebrush)	1
Chamelaucium uncinatum (Geraldton Wax)	1
Corymbia aparrerinja (Ghost Gum)	1
Eucalyptus diversicolor (Karri)	1
Hardenbergia violacea (Native Wisteria)	1
Olea europaea (Olive)	1
Ricinus communis (Caster Oil)	1
Scaevola plumieri,Calothamnus quadrifidus, Artemisia abrotanum etc.	1
Triadica sebifera (Chinese Tallow)	1
Typha domingensis (Southern Cattail)	1

Morus alba (Black Mulberry)	2
Nerium oleander (Oleander)	2

A summary of the entire Survey results is presented in **Table 4-2**.

Table 4-2 Summary of Survey Information

Item	2021 Vegetation Survey
Number of Surveys	281
Number of Individual Plants	>281
Maximum Height of Vegetation (m)	31
Average Height (m)	9.30
Species Prevalence	*Eucalyptus camaldulensis (River Gum),* *Melaleuca quinquenervia (Broad Leafed Paperbark)* and *Casuarina equisetifolia (Sheoak).*
Vegetation Health	Healthy
Average Diameter at BrEast Height (mm)	200-300mm

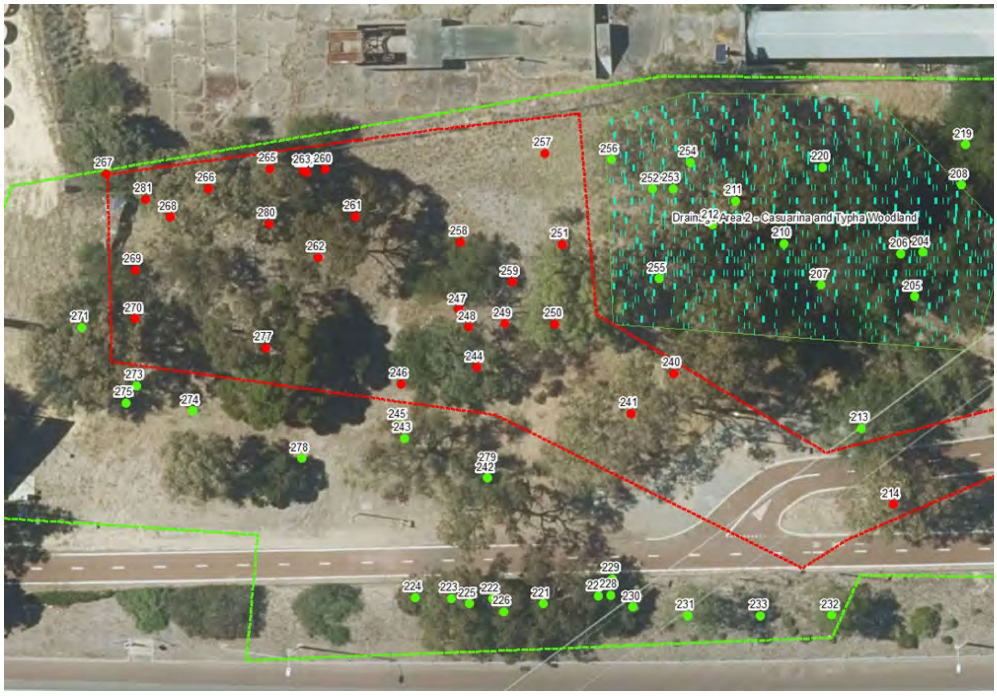
The survey Area has been broken down into 5 zones to provide better clarity of results. These zones are South West, South East, Central, Northern and Western. The below **Figure 4-1** and ***Figure 1.1 Appendix B*** outlines the zone breakup.

Figure 4-1 Zone Breakdown

4.2 South West Area (Lot 602)

The South West zone (Lot 602) is bordered on the South by the Graham Farmer freeway, East by a series of drainage channels, West by a current construction and storage yard and North by the East Perth Power Station. A more detailed map can be found at ***Appendix G Figure 1.6***.

Figure 4-2 South West Area



The South Western area (Lot 602) surveyed showed a high degree of disturbance from human sources such as land clearing, foot traffic and rubbish disposal, as such, the majority of the natural undergrowth has been replaced with invasive weed species such as *Oxalis pes-caprae, Gladiolus sp*, non-natural grasses (*Melinis repens*) and *Lupinus cosentinii.*

Pic 1 - *Gladiolus sp.*

Pic 2 - *Oxalis pes-caprae*

Pic 3 *Lupinus cosentinii*

The main trees species captured in the survey were *Eucalyptus camaldulensis* (River Red Gum), *Acacia saligna* (Western Australian golden wattle), *Eucalyptus rudis* (Flooded Gum), *Casuarina equisetifolia* (She-Oak). *E. camaldulensis* and *A. saligna* where the most dominant species and the majority of the trees surveyed where in moderate to good health (>90%). This site encompassed a drainage basin which was predominately made up of Casuarina sp. and Eucalyptus sp. While the main drainage section was home to a large population of *Typha domingensis* (Southern Cattail).

4.2.1 Predicted Western Power Impact on SW Area

On review of predicted works to this area, the main impact would occur to the central part of this zone. The new 132kV underground line is expected to follow the footpath from the East of site and then head north through the vegetated area, and eventually be received by two new overhead line steel transition poles, the lines will then return over this area as overhead lines toward Graham Farmer Freeway. Depending on the width of double trench there may be minimal disturbance to the larger species. Once the lines reach the tower and transition to overhead lines there may be a larger impact on the species in the overhead

easement. The first Tx bay is presumed to be around 40-50m between poles which would require a minimum vegetation regrowth zone around the lines of 4m horizontally and 5m vertically below. There would be no allowance for any overhang of vegetation within the horizonal 4m regrowth zone. In conjunction with the parameters outlined above, areas will need to be cleared to accommodate the crane for the installation and a laydown area for equipment. These factors in addition to the construction works will impact the vegetation outlined below in **Table 4-3**:

Table 4-3 SW Zone WP Impacted Vegetation

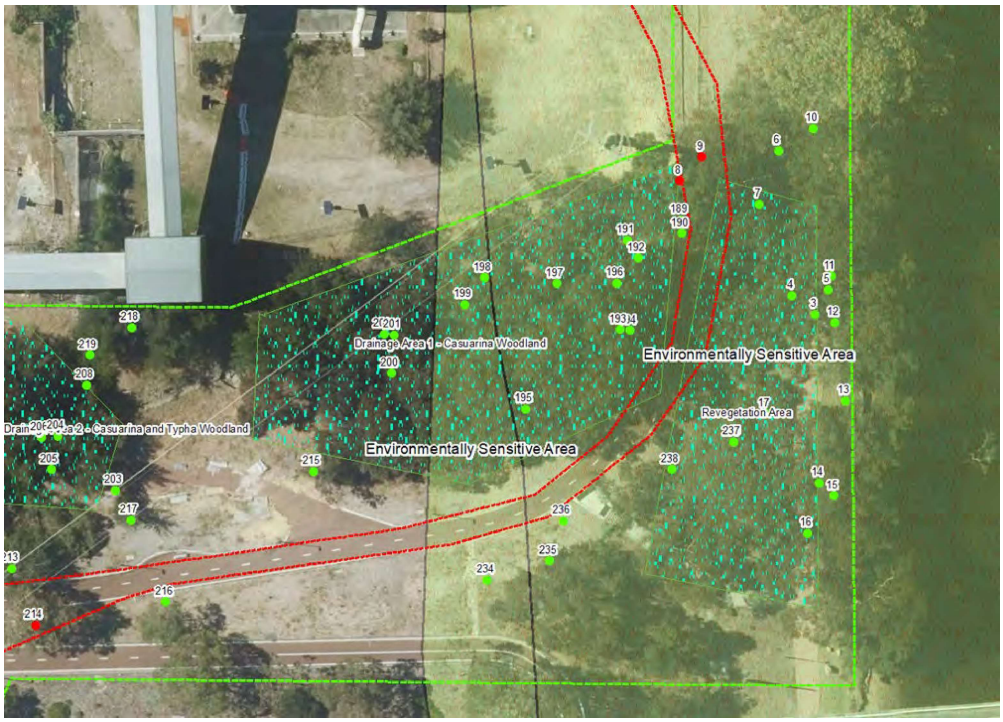
Survey ID	Species	Within ESA	Health	Height	DBH
214	Eucalyptus camaldulensis (River Gum)	No	Healthy	12	300_400mm
240	Eucalyptus camaldulensis (River Gum)	No	Healthy	19.6	>500mm
241	Eucalyptus camaldulensis (River Gum)	No	Healthy	11.2	400_500mm
244	Corymbia calophylla (Marri)	No	Healthy	9.4	300_400mm
246	Acacia saligna (Golden Wreath Wattle)	No	Healthy	6	100_200mm
247	Acacia saligna (Golden Wreath Wattle)	No	Signs_of_Disease	3	<100mm
248	Acacia saligna (Golden Wreath Wattle)	No	Stressed	2	<100mm
249	Corymbia calophylla (Marri)	No	Dead	0	400_500mm
250	Eucalyptus rudis (Flooded Gum)	No	Stressed	6.8	200_300mm
251	Acacia saligna (Golden Wreath Wattle)	No	Healthy	2.5	<100mm
257	Natel grass, lupin, clove and veldt grass ground cover	No	Healthy	1	<100mm
258	Acacia saligna (Golden Wreath Wattle)	No	Stressed	7.2	100_200mm
259	Acacia saligna (Golden Wreath Wattle)	No	Healthy	3.5	100_200mm
260	Corymbia aparrerinja (Ghost Gum)	No	Healthy	9	100_200mm
261	Acacia saligna (Golden Wreath Wattle)	No	Healthy	1.8	<100mm
262	Eucalyptus camaldulensis (River Gum)	No	Healthy	13.2	400_500mm
263	Acacia saligna (Golden Wreath Wattle)	No	Healthy	3	100_200mm
264	Acacia saligna (Golden Wreath Wattle)	No	Healthy	3.5	100_200mm
265	Eucalyptus camaldulensis (River Gum)	No	Healthy	15.4	300_400mm
266	Eucalyptus camaldulensis (River Gum)	No	Healthy	15.4	
267	Agonis flexuosa (Peppermint Tree)	No	Healthy	7.5	>500mm
268	Acacia saligna (Golden Wreath Wattle)	No	Healthy	4	100_200mm
269	Eucalyptus rudis (Flooded Gum)	No	Stressed	9.2	200_300mm
270	Acacia saligna (Golden Wreath Wattle)	No	Healthy	4.5	<100mm
272	Acacia saligna (Golden Wreath Wattle)	No	Healthy	4.5	<100mm

277	Eucalyptus eremophila (Tall Sand Mallee)	No	Healthy	10.4	>500mm
280	Eucalyptus camaldulensis (River Gum)	No	Healthy	11.4	300_400mm
281	Acacia saligna (Golden Wreath Wattle)	No	Healthy	3.5	<100mm

4.3 South East Area

The South East zone is bordered by the Graham Farmer freeway to the South, the South West zone to the West, Swan River to the East and the Central Zone to the North. A more detailed map can be found at ***Appendix C Fig 1.2***.

Figure 4-3 South East Area



The South Eastern area contained a large drainage basin central to the site. This basin was predominately dominated by *Casuarina equisetifolia* (sheoak) species but had large populations of both *Eucalyptus camaldulensis* (River Gum) and a multitude of additional species. The Eastern side of this zone included a revegetated area predominately made up on younger and more established *Eucalypt*s and *Casuarina sp., Scavola p, Calothamnus q.* and *Artemisia a*. shrubs. On the river's edge there were more established Casuarina and Eucalyptus trees. A footpath traversed this site form North to South as well as branching West to eventually run parallel with Graham Farmer freeway. The North of this site was predominately made up of manicured shire lawns with scattered remnant and planted native tree species.

Figure 4-4 Predicted WP Impact tree – Survey 8

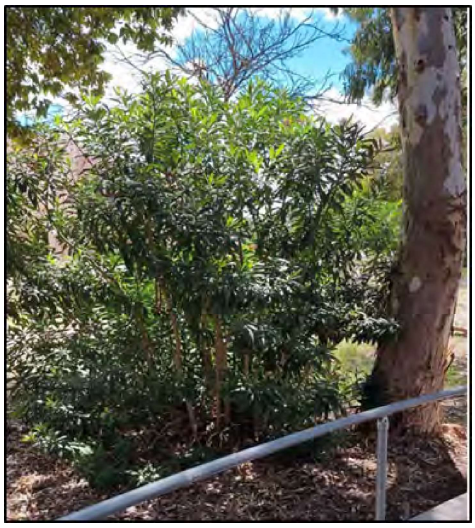
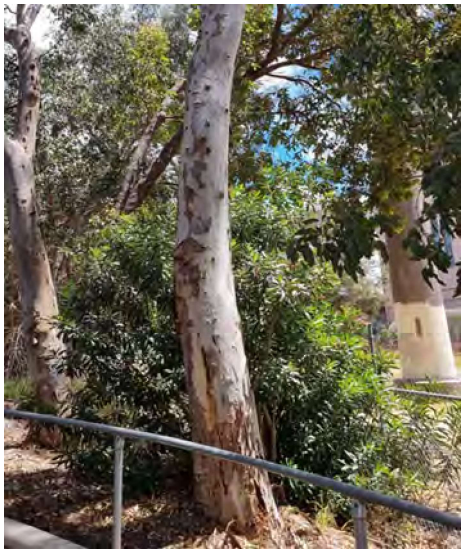


Figure 4-5 Predicted WP Impact tree – Survey 9



4.3.1 Predicted Western Power Impact on SE Area

On review of predicted works to this area, the main impact would occur to the northern part of this zone. Half of the SE area falls within the ESA, with the ESA encompassing the area from the Swan River West until survey point 234. The double trench for the 132kV underground line is planned to enter this zone from the North and directly impacting the vegetation adjacent to the footpath. The trench is proposed to continue along the existing footpath parallel to the revegetated area before turning West and following the line of the footpath towards Lot 602. The below table (Table 4-4) outlines the vegetation that will be affected by this planned construction.

Table 4-4 SE Zone WP Impacted Vegetation

Survey ID	Species	Within ESA	Health	Height (m)	DBH
8	Nerium oleander (Oleander)	Yes	Healthy	3	100_200mm
9	Eucalyptus camaldulensis (River Gum)	Yes	Healthy	17	300_400mm

4.4 Central Area

The Central Area is Bordered to the North by the Northern Area and Western Power Sub Station, South by the South Eastern Area and EPPS, West by the Western Area and East by the Swan River. A more detailed map can be found at ***Appendix D Fig 1.3***.

Figure 4-6 Central Area

The Survey area for this zone incorporated both the North and South sides of Summers St and also the Eastern side of Summers St once it heads North. The Swan River Buffer vegetation was audited right to the edge of the river between an area 50m North up Summers St and down to the existing jetty near Survey ID 67. The remaining surveys were conducted on the scattered vegetation throughout the shire managed foreshore outside the direct Swan River buffer zone.

The Survey area running North/South along the Swan River was predominately made up of remnant and planted native vegetation (*Eucalyptus sp, Casuarina sp, Acasia sp*). The section of fenced area just North of the Summer St corner has been revegetated and contains larger established Eucalypts and Casuarinas, with also a large population of smaller native shrubs including; *Melaleuca armillaris, Acasia pulchella (Prickely Moses) and Melaleuca alternifolia (Tea Tree)*.

The area running East and West along Summers St, was void of remnant vegetation and had been shire planted with predominately *Melaleuca quinquenervia (Broad Leafed Paperbark)* and *Lophostemon confertus* (Box Tree). There was a small area within the NE corner of EPPS where there were some self-seeded native species of Casuarina and Eucalypts at their sapling stage.

4.4.1 Predicted Western Power impact on Central Area

On review of predicted works to this area, the main impact would occur to the central part of this zone. There are proposed Western Power and ATCO ground works throughout the North and East of the EPPS compound. The new proposed 132kV underground line is intended to travel South down Summers St and then enter the EPPS compound in the NE corner. The two cleared areas are to be utilised to minimise the effect on the surrounding vegetation. The below table (**Table 4-5**) outlines the possible impact the Western Power works will have to individual vegetation within this area.

Table 4-5 Central Zone WP Impacted Vegetation

Survey ID	Species	Within ESA	Health	Height (m)	DBH
32	Nerium oleander (Oleander)	Yes	Healthy	7	>500mm
33	Eucalyptus camaldulensis (River Gum)	Yes	Healthy	7	300_400mm
40	Casuarina obesa (Swamp Sheoak)	Yes	Healthy	8	<100mm

4.4.2 Predicted ATCO impact on Central Area

From review of the ATCO proposed PRS relocation and alteration works, the new HP gas pipeline being installed at the Northern boundary of the EPPS may impact on some of the existing vegetation surveyed. The plan shows that the groundwork will be carried out in a section of cleared land North within the EPPS compound directly South on an existing line of planted *Melaleuca quinquenervia (Broad Leafed Paperbark)* trees. Between the survey 74 – 87 the works will be conducted via horizontal boring at a depth of 900mm, there may be some affect to the root structure but these trees are expected to survive. Trees located at survey locations 88 and 90 will be directly affected by ground works and may need to be removed. The tables below (**Table 4-6 and Table 4-7**) outline which surveyed vegetation has the potential to be impacted by the proposed ATCO gas works:

Table 4-6 Central Zone - ATCO Directly Impacted Vegetation

Survey ID	Species	Within ESA	Health	Height (m)	DBH
88	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	6	200_300mm
90	Zanthoxylum piperitum (Japanese Pepper)	No	Healthy	6	200_300mm

Table 4-7 Central Zone – ATCO Borderline affected vegetation

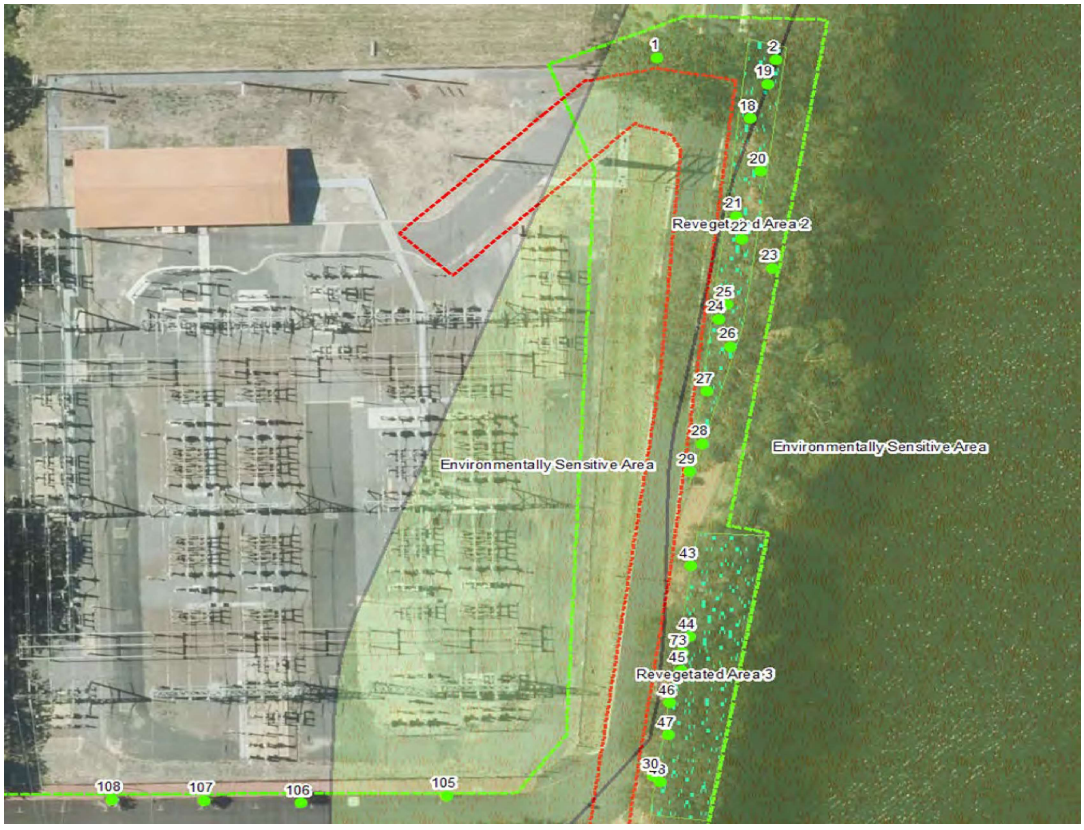
Survey ID	Species	Within ESA	Health	Height (m)	DBH
74	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	8	300_400mm

75	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	6	200_300mm
76	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	6	200_300mm
77	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	11	200_300mm
78	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	11	200_300mm
79	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	7	200_300mm
80	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	5	200_300mm
81	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	5	200_300mm
82	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	11	200_300mm
83	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	9	200_300mm
84	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	6	200_300mm
85	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	7	200_300mm
86	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	11	200_300mm
87	Melaleuca quinquenervia (Broad Leafed Paperbark)	No	Healthy	10	200_300mm

4.5 Northern Area

The Northern Area is bordered to the North by Banks Reserve, East by Swan River, South by the Central Area and West by a Western Power Sub Station. A more detailed map of this area can be viewed at ***Appendix E Fig 1.4***.

Figure 4-7 Northern Area



The survey area for this zone encompasses the scattered vegetation on the Eastern side of Summers St. This survey did not capture the immediate buffer zone adjacent to the Swan River, North of the Central Area. The East of this zone was predominately made up of re-vegetated native verge side and species such as *Eucalyptus camaldulensis (River Gum), Melaleuca alternifolia (Tea Tree) and Casuarina equisetifolia (sheoak).* At the Northern boundary of this site the largest surveyed tree was identified, this was a Eucalyptus *diversicolor (Karri)* and had a maximum height of 31m. There were a number of remnant native trees recorded throughout this area and can be reviewed in ***Appendix I***. The remainder of this site was taken up by Summers Rd and a maintained grass verge containing the ATCO underground easement.

4.5.1 Predicted Western Power impact to Northern Zone

On review of the proposed 132kV underground line easement, the impact seems to be minimal to the surrounding vegetation within the area. The plan for the ground works looks to follow the existing driveway out of the Western Power Substation and then continue down Summers rd. This path would provide the smallest impact on the surrounding vegetation. Although unlikely, depending on the groundworks exiting the Substation there may be an impact to the Karri tree identified in Survey 1.

4.6 Western Area

The Western Area is the largest of the 5 zones and runs the remainder of Summers St on the Eastern boundary, crosses East Parade and continues down Summers St and concludes adjacent to Norwood Park on the West. This area encompasses around 5000m^2 of the East Perth Train Station carpark to the North and ceases at the TransWA coach depot to the South. A more detailed map can be viewed in ***Appendix F Figure 1.5***.

Figure 4-8 Western Area

This area was predominately populated with shire planted non-endemic and endemic WA species such as *Angophora costata (Smooth Barked Apple) and Melaleuca viminalis (Weeping Bottlebrush).* Remnant *Eucalyptus camaldulensis (River Gum)* where identified scattered throughout the shire areas. Summers St on the East contained planted *Lophostemon confertus (Box Tree)* along its Northern border. Additional Species were identified throughout the area and can be viewed in ***Appendix I***.

4.6.1 Predicted Western Power Impact to Western Zone

Currently there is no planned Western Power work occurring in this area. No Impact predicted.

4.6.2 Predicted ATCO Impact to Western Zone

Currently there is no planned ATCO works within the Western area. No Impact predicted.

5 Conclusions

The entire survey site covered an area of approximately 50,000m2, it displayed a mix of remnant native WA vegetation species, endemic planted and non-endemic planted species. The site showed deteriorated undergrowth with a large number of invasive groundcover species. Portions of the site were manicured shire lawn areas and revegetated Swan River buffer zones. The larger trees surveyed were in moderate to good health and were generally assumed to be self-seeded or remnant vegetation with the exception of some. The species recorded were assessed against the DBCA threatened or endangered species list. No species identified during this survey were found to exist on this threatened or endangered list for this area.

The proposed earthworks for the new ATCO and Western Power infrastructure have been planned to minimise impact to all existing vegetation and if undertaken correctly should only impact a very small population of native endemic habitats. The populations that are predicted to be mostly impacted are the areas within the SW, SE and Central zones. In the South Eastern area, the plan is to follow the existing footpath and hence would only impact the 2 trees outlined in survey 8 and 9 within the ESA. Survey 8 recorded a Nerium *oleander* species which is alien to WA and would be beneficial to remove. Therefore, the only Native vegetation likely to be impacted throughout construction in the South East area would be the Eucalyptus *camaldulensis* (River Gum) outlined in survey 9. In addition to this care should be taken to minimise impact to the revegetated area directly east of the footpath, which may be affected by the adjacent earthworks.

The South Western Area (Lot602) has been heavily disturbed and predominantly made up of introduced non-natural groundcover and both established non-remnant native and non-native tree species. The proposed works will require clearing to accommodate the new Transmission towers, crane and laydown areas. When entering LOT602, the double trench should transect the Western portion in the most unobtrusive route to help minimise disruptions to surrounding vegetation. Considering that the overhead portion of this line with require an annually maintained Clearance and Regrowth zones around the lines, considerations should be taken to remove vegetation that may impact on future Clearance and Regrowth zones. The removal of this vegetation will minimise the need to access this easement on an annual basis for vegetation works, and hence reduce the risk of damage via ongoing machinery access while also reducing the potential for weed and disease dispersal into the surrounding areas.

In relation to the impacts occurring within the Central Area by both Western Power and ATCO works, the effect to the vegetation looks to be minimal and if undertaken correctly should only impact on a small portion of non-remnant vegetation, particularly the population of Melaleuca *quinquenervia* (Broad Leafed Paperbark) trees that line the Southern edge of Summers road. The non-remnant vegetation surveyed within the ESA at points 32, 33 and 40 will all need to be removed to accommodation the new underground network, these are not thoroughly established and include another Nerium *oleander* (Survey 32) which would be beneficial to remove.

The Northern area has no predicted clearing required. The only potential disruption to vegetation is the tree. within the ESA, at survey site 1 (Eucalyptus *diversicolor*) that is unlikely to be impacted by Western Powers single trench construction coming out of the Sub Station. This individual is well established and has a maximum height of 31m, the plan is to protect this tree and extra precautions should be taken to avoid trenching too close to this tree to minimise impacts to its root and foliage structures.

As a result, it is recommended that the findings of this assessment are considered during construction earthworks, such that disturbance to the ecological values of the Site and locality may be avoided wherever practical. Where disturbance is unavoidable, impact mitigation measures are to be implemented in accordance with regulatory approval conditions.

6 References

1. Detailed Site Investigation (DSI) Lot 602 East Perth WA, Cardno, October 2019. Metropolitan Redevelopment Authority.
2. National Map, 2017, National Online Database, (https://nationalmap.gov.au/#wa).
3. Department of Biodiversity, Conservation and Attractions, NatureMap (https://naturemap.dbca.wa.gov.au/)

APPENDIX

A

Figure 1 – Vegetation Survey Locations

DevelopmentWA

2021 Vegetation Survey

2021 EPPS VEGETATION SURVEY AREA - ENTIRE

FIGURE 1

Legend

2021 - Survey locations

- ATCO Impacted Vegetation
- Possibly Impacted Vegetation
- Not expected to be Impacted
- Western Power Impacted Vegetation
- Densely Vegetated Area
- Proposed WP_132kV_Trench
- Proposed ATCO Groundworks
- 2021_VegSurveyArea

N

1:2,10Scale at A3

m

0 50 100

Cardno

Map Produced by <Division> (<BU>)
Date: 2021-11-09
Coordinate System: GDA 1994 MGA Zone 50
Project: CW200027
Map: EPPS_Veg Survey Map.mxd 01

APPENDIX

B

Figure 1.1 – Zone Breakdown

DevelopmentWA

2021 Vegetation Survey

2021 EPPS VEGETATION SURVEY AREA - ZONES

FIGURE 1.1

Legend

2021_VegSurveyArea

Name

- Central Area
- Northern Area
- South East Area
- South West Area
- West Area

N

1:2,10Scale at A3

m

0 50 100

Cardno

Map Produced by <Division> (<BU>)
Date: 2021-11-09
Coordinate System: GDA 1994 MGA Zone 50
Project: CW200027
Map: EPPS_Veg Survey Map.mxd 01

APPENDIX

C

Figure 1.2 – Survey Area – South East

DevelopmentWA

2021 Vegetation Survey

2021 EPPS VEGETATION SURVEY AREA - SOUTH EAST AREA

FIGURE 1.2

Legend

2021 - Survey locations

- Not expected to be Impacted
- Western Power Impacted Vegetation
- 2021_VegSurveyArea
- Densely Vegetated Area
- ESA
- Proposed WP_132kV_Trench

N

1:473 Scale at A3

Cardno

Map Produced by <Division> (<BU>)
Date: 2022-01-13
Coordinate System: GDA 1994 MGA Zone 50
Project: CW200027
Map: EPPS_Veg Survey Map.mxd 01

APPENDIX

D

Figure 1.3 – Survey Area - Central

DevelopmentWA

2021 Vegetation Survey

2021 EPPS VEGETATION SURVEY AREA - CENTRAL AREA

FIGURE 1.3

Legend

2021 - Survey locations

- ATCO Impacted Vegetation
- Possibly Impacted Vegetation
- Not expected to be Impacted
- Western Power Impacted Vegetation
- 2021_VegSurveyArea
- Densely Vegetated Area
- ESA
- Proposed ATCO Groundworks
- Proposed WP_132kV_Trench

N

1:710Scale at A3

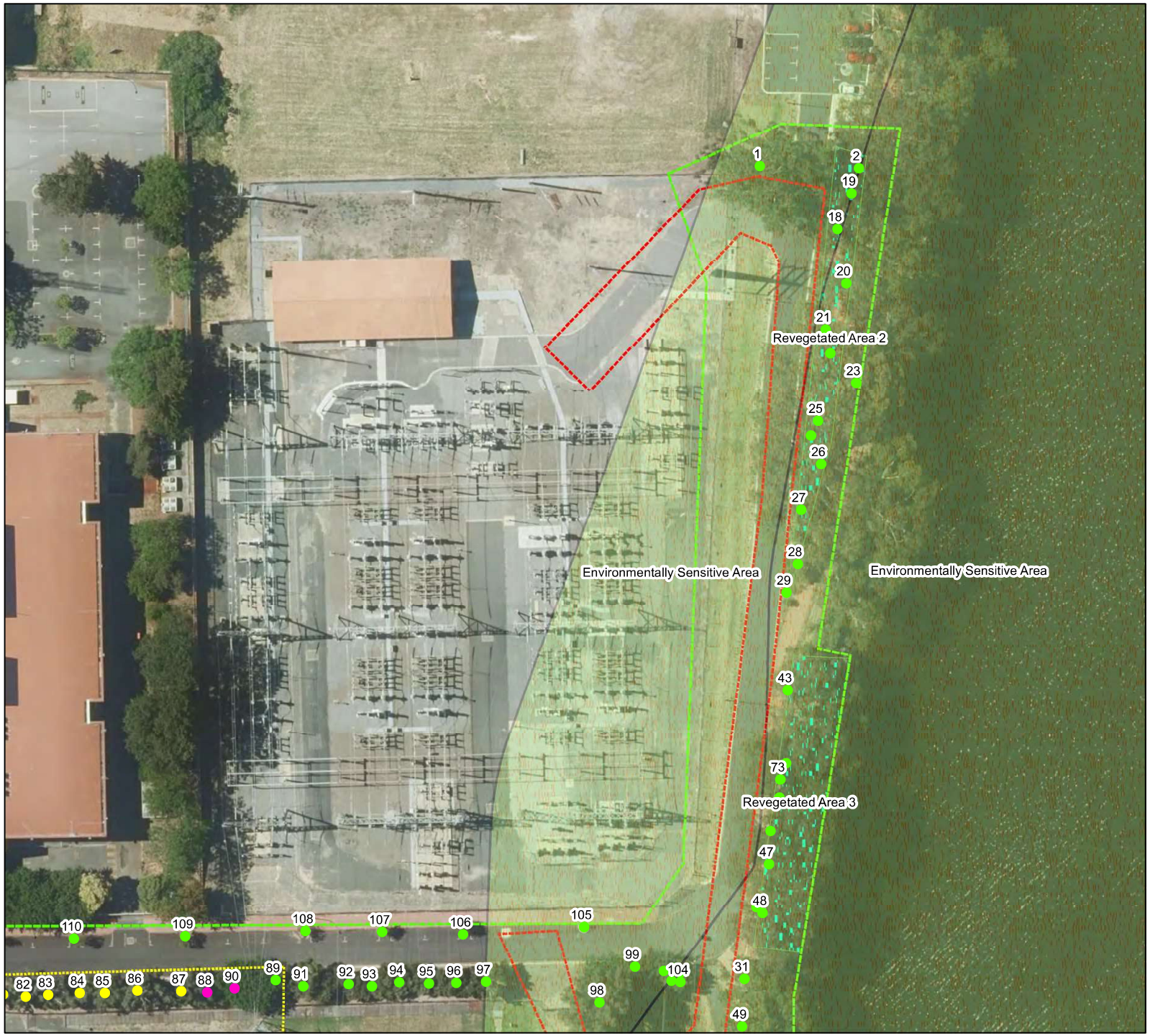
Cardno

Map Produced by <Division> (<BU>)
Date: 2022-01-13
Coordinate System: GDA 1994 MGA Zone 50
Project: CW200027
Map: EPPS_Veg Survey Map.mxd 01

APPENDIX

E

Figure 1.4 – Survey Area - North



DevelopmentWA

2021 Vegetation Survey

2021 EPPS VEGETATION SURVEY AREA - NORTHERN AREA

FIGURE 1.4

Legend

2021 - Survey locations

- ATCO Impacted Vegetation
- Possibly Impacted Vegetation
- Not expected to be Impacted
- 2021_VegSurveyArea
- Densely Vegetated Area
- ESA
- Proposed ATCO Groundworks
- Proposed WP_132kV_Trench

N

1:591 Scale at A3

Cardno

Map Produced by <Division> (<BU>)
Date: 2022-01-13
Coordinate System: GDA 1994 MGA Zone 50
Project: CW200027
Map: EPPS_Veg Survey Map.mxd 01

APPENDIX

F

Figure 1.5 – Survey Area - West

DevelopmentWA

2021 Vegetation Survey

2021 EPPS VEGETATION SURVEY AREA - WESTERN AREA

FIGURE 1

Legend

2021 - Survey locations

- Not expected to be Impacted
- 2021_VegSurveyArea

N

1:1,273 Scale at A3

m

0 50

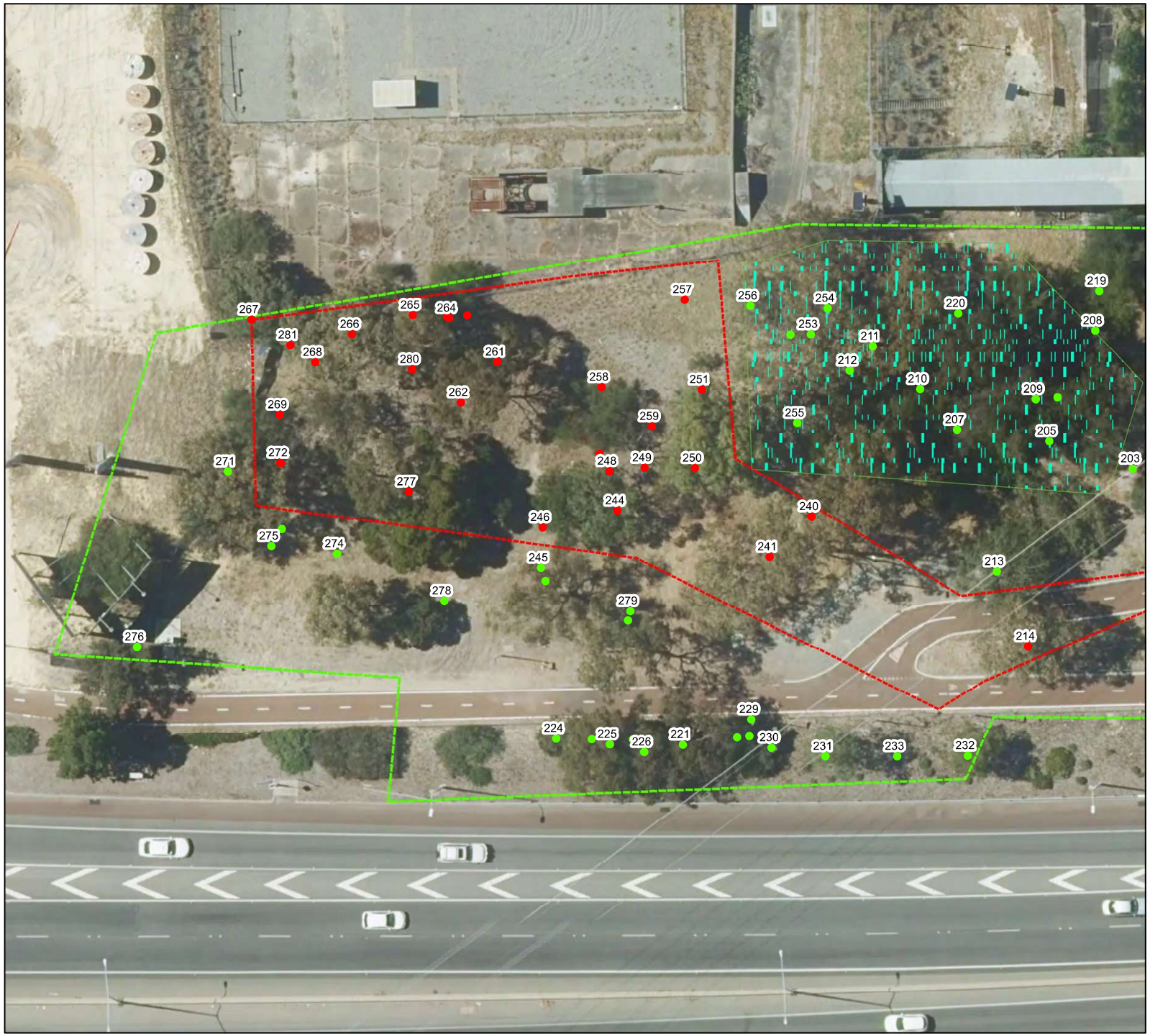
Cardno

Map Produced by <Division> (<BU>)
Date: 2022-01-13
Coordinate System: GDA 1994 MGA Zone 50
Project: CW200027
Map: EPPS_Veg Survey Map.mxd 01

APPENDIX

G

Figure 1.6 – Survey Area – South West (Lot 602)



2021 Vegetation Survey

2021 EPPS VEGETATION SURVEY AREA - SOUTH WEST AREA

FIGURE 1.6

Legend

2021 - Survey locations

- Not expected to be Impacted
- Western Power Impacted Vegetation
- 2021_VegSurveyArea
- Densely Vegetated Area
- Proposed WP_132kV_Trench

N

1:355 Scale at A3

Map Produced by <Division> (<BU>)
Date: 2022-01-13
Coordinate System: GDA 1994 MGA Zone 50
Project: CW200027
Map: EPPS_Veg Survey Map.mxd 01

APPENDIX

H

Table B1 – Vegetation Survey Data

Survey ID	Eastings	Northings	Latitude	Longitude	Veg_specie	Health of Vegetation	Max Height (m)	DBH (mm)	Impacted	Comments?
1	394257	6465239	-31.9438	115.8813	Eucalyptus diversicolor (Karri)	Healthy	31	>500mm	No	Mature Karri - possibly affected by WP earthworks
2	394275	6465241	-31.9438	115.8815	Eucalyptus camaldulensis (River Gum)	Signs_of_Disease	16	400_500mm	No	Tree on Western side of footpath - minor signs of stress.
3	394260	6464889	-31.947	115.8812	Eucalyptus rudis (Flooded Gum)	Healthy	13	400_500mm	No	Within planned WP earthworks area.
4	394257	6464892	-31.947	115.8812	Eucalyptus patens (Yarri)	Stressed	19	400_500mm	No	
5	394262	6464893	-31.947	115.8812	Casuarina obesa (Swamp Sheoak)	Stressed	15	400_500mm	No	
6	394255	6464911	-31.9468	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	15	300_400mm	No	Immature Rivergum - Northern edge of path.
7	394251	6464906	-31.9469	115.8811	Eucalyptus rudis (Flooded Gum)	Stressed	12	400_500mm	No	
8	394243	6464907	-31.9469	115.881	Nerium oleander (Oleander)	Healthy	3	100_200mm	Western_Power	
9	394245	6464910	-31.9468	115.8811	Eucalyptus camaldulensis (River Gum)	Healthy	17	300_400mm	Western_Power	
10	394260	6464913	-31.9468	115.8812	Casuarina obesa (Swamp Sheoak)	Healthy	14	300_400mm	No	
11	394262	6464894	-31.947	115.8812	Eucalyptus camaldulensis (River Gum)	Stressed	13	>500mm	No	
12	394263	6464888	-31.947	115.8812	Casuarina equisetifolia (Sheoak)	Stressed	10	300_400mm	No	At risk of falling into river due to erosion
13	394264	6464878	-31.9471	115.8812	Casuarina equisetifolia (Sheoak)	Stressed	16	400_500mm	No	At risk of falling into river due to erosion
14	394260	6464868	-31.9472	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	12	>500mm	No	At risk of falling into river due to erosion
15	394262	6464866	-31.9472	115.8812	Eucalyptus rudis (Flooded Gum)	Healthy	15	400_500mm	No	Eastern side of path
16	394259	6464861	-31.9473	115.8812	Casuarina equisetifolia (Sheoak)	Stressed	13	>500mm	No	Eastern side of path
17	394254	6464877	-31.9471	115.8811	Eucalyptus rudis (Flooded Gum)	Other	4	300_400mm	No	Tree roots have been cut to assist with a controlled failure. Tree continues to grow from collapsed position.
18	394276	6465234	-31.9439	115.8814	Eucalyptus camaldulensis (River Gum)	Healthy	11	200_300mm	No	East of path
19	394279	6465239	-31.9439	115.8814	Eucalyptus sp	Healthy	9	300_400mm	No	
20	394278	6465225	-31.944	115.8814	Eucalyptus camaldulensis (River Gum)	Healthy	7	200_300mm	No	
21	394274	6465217	-31.9441	115.8814	Eucalyptus camaldulensis (River Gum)	Healthy	11	400_500mm	No	

22	394275	6465213	-31.9441	115.8814	Eucalyptus camaldulensis (River Gum)	Healthy	20	400_500mm	No	
23	394279	6465208	-31.9441	115.8814	Eucalyptus camaldulensis (River Gum)	Healthy	21	>500mm	No	
24	394272	6465200	-31.9442	115.8814	Eucalyptus camaldulensis (River Gum)	Healthy	11	200_300mm	No	
25	394273	6465202	-31.9442	115.8814	Melaleuka sp,Acacia sp,Eucalyptus camaldulensis,Unidentified Native sp,Other	Other	2	<100mm	No	Revegetated undergrowth containing multiple species
26	394274	6465195	-31.9443	115.8814	Eucalyptus camaldulensis (River Gum)	Healthy	12	>500mm	No	
27	394270	6465188	-31.9443	115.8814	Eucalyptus camaldulensis (River Gum)	Healthy	13	400_500mm	No	
28	394270	6465179	-31.9444	115.8813	Melaleuca alternifolia (Tea Tree)	Healthy	6	200_300mm	No	
29	394267	6465176	-31.9445	115.8813	Melaleuca alternifolia (Tea Tree)	Healthy	2	<100mm	No	X 2 - saplings
30	394263	6465123	-31.9449	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	17	>500mm	No	
31	394261	6465111	-31.945	115.8812	Casuarina equisetifolia (sheoak)	Stressed	11	400_500mm	No	
32	394252	6465100	-31.9452	115.8811	Nerium oleander (Oleander)	Healthy	7	>500mm	Western_Power	
33	394248	6465089	-31.9452	115.8811	Eucalyptus camaldulensis (River Gum)	Healthy	7	300_400mm	Western_Power	Within EPPS compound - currently being cut to WP clearance specifications
34	394252	6465071	-31.9454	115.8811	Casuarina obesa (Swamp Sheoak)	Healthy	6	200_300mm	No	
35	394252	6465060	-31.9455	115.8811	Eucalyptus eremophila (Tall Sand Mallee)	Healthy	6	400_500mm	No	
36	394255	6465058	-31.9455	115.8812	Casuarina equisetifolia (sheoak)	Healthy	2.5	<100mm	No	Sapling
37	394252	6465034	-31.9457	115.8811	Casuarina obesa (Swamp Sheoak)	Healthy	8	100_200mm	No	Currently being pruned by WP to maintain Tx clearance zones.
38	394254	6465024	-31.9458	115.8811	Casuarina obesa (Swamp Sheoak)	Healthy	10	100_200mm	No	
39	394252	6465017	-31.9459	115.8811	Eucalyptus lehmannii (Bushy Yate)	Healthy	10	400_500mm	No	
40	394235	6465019	-31.9459	115.881	Casuarina obesa (Swamp Sheoak)	Healthy	8	<100mm	Western_Power	8 x immature trees within EPPS compound
41	394251	6464976	-31.9462	115.8811	Eucalyptus camaldulensis (River Gum)	Healthy	18	>500mm	No	
42	394251	6464972	-31.9463	115.8811	Eucalyptus eremophila (Tall Sand Mallee)	Healthy	6	200_300mm	No	
43	394268	6465158	-31.9446	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	14	>500mm	No	
44	394264	6465146	-31.9447	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	15	>500mm	No	

45	394262	6465143	-31.9448	115.8813	Casuarina equisetifolia (sheoak)	Healthy	8	300_400mm	No	
46	394265	6465135	-31.9448	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	19	>500mm	No	
47	394265	6465130	-31.9449	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	12	>500mm	No	
48	394264	6465122	-31.9449	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	19	>500mm	No	
49	394261	6465103	-31.9451	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	13	>500mm	No	
50	394267	6465096	-31.9452	115.8813	Acacia saligna (Golden Wreath Wattle)	Stressed	6	300_400mm	No	Tree very close to falling into river.
51	394268	6465095	-31.9452	115.8813	Eucalyptus camaldulensis (River Gum)	Stressed	9	100_200mm	No	Immature sapling - Tree very close to falling in river
52	394265	6465096	-31.9452	115.8813	Eucalyptus lehmannii (Bushy Yate)	Healthy	8	300_400mm	No	
53	394259	6465084	-31.9453	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	15	>500mm	No	
54	394267	6465075	-31.9454	115.8813	Casuarina obesa (Swamp Sheoak)	Healthy	9	>500mm	No	Close to river edge
55	394264	6465068	-31.9454	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	17	400_500mm	No	
56	394261	6465064	-31.9455	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	15	400_500mm	No	
57	394258	6465061	-31.9455	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	18	>500mm	No	
58	394268	6465058	-31.9455	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	7	100_200mm	No	Tree has failed and fallen into swan river.
59	394265	6465051	-31.9456	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	14	>500mm	No	
60	394263	6465047	-31.9456	115.8813	Eucalyptus lehmannii (Bushy Yate)	Dead	8	100_200mm	No	DEAD TREE
61	394264	6465042	-31.9457	115.8813	Eucalyptus patens (Yarri)	Healthy	15	400_500mm	No	
62	394266	6465038	-31.9457	115.8813	Casuarina equisetifolia (sheoak)	Stressed	8	300_400mm	No	
63	394264	6465026	-31.9458	115.8813	Eucalyptus patens (Yarri)	Healthy	17	>500mm	No	
64	394269	6465027	-31.9458	115.8813	Eucalyptus camaldulensis (River Gum)	Other	15	400_500mm	No	
65	394266	6465015	-31.9459	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	9	400_500mm	No	
66	394258	6465003	-31.946	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	16	>500mm	No	
67	394268	6464994	-31.9461	115.8813	Eucalyptus camaldulensis (River Gum)	Healthy	19	>500mm	No	
68	394258	6464992	-31.9461	115.8812	Eucalyptus patens (Yarri)	Healthy	14	400_500mm	No	
69	394261	6464977	-31.9462	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	14	400_500mm	No	
70	394259	6464963	-31.9464	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	19	>500mm	No	

71	394257	6464958	-31.9464	115.8812	Eucalyptus rudis (Flooded Gum)	Healthy	17	400_500mm	No	
72	394258	6464943	-31.9465	115.8812	Eucalyptus camaldulensis (River Gum)	Healthy	20	>500mm	No	
73	394263	6465145	-31.9447	115.8813	Melaleuca armillaris, Acasia pulchella (Prickely Moses), Melaleuca alternifolia (Tea Tree)	Healthy	2	<100mm	No	revegetated area containing immature saplings and shrubs
74	394105	6465110	-31.9451	115.8796	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	8	300_400mm	Borderline	
75	394109	6465111	-31.945	115.8796	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	6	200_300mm	Borderline	
76	394115	6465112	-31.945	115.8797	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	6	200_300mm	Borderline	
77	394118	6465113	-31.945	115.8797	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	11	200_300mm	Borderline	
78	394122	6465113	-31.945	115.8798	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	11	200_300mm	Borderline	
79	394129	6465113	-31.945	115.8798	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	7	200_300mm	Borderline	
80	394135	6465112	-31.945	115.8799	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	5	200_300mm	Borderline	
81	394141	6465113	-31.945	115.88	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	5	200_300mm	Borderline	
82	394149	6465114	-31.945	115.88	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	11	200_300mm	Borderline	
83	394150	6465114	-31.945	115.88	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	9	200_300mm	Borderline	
84	394157	6465116	-31.945	115.8801	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	6	200_300mm	Borderline	
85	394159	6465114	-31.945	115.8801	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	7	200_300mm	Borderline	
86	394164	6465116	-31.945	115.8802	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	11	200_300mm	Borderline	
87	394170	6465114	-31.945	115.8803	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	10	200_300mm	Borderline	
88	394175	6465116	-31.945	115.8803	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	6	200_300mm	ATCO	
89	394180	6465115	-31.945	115.8804	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	6	200_300mm	No	
90	394181	6465120	-31.945	115.8804	Zanthoxylum piperitum (Japanese Pepper)	Healthy	6	200_300mm	ATCO	
91	394188	6465117	-31.945	115.8805	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	6	200_300mm	No	
92	394197	6465119	-31.945	115.8806	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	9	200_300mm	No	
93	394202	6465116	-31.945	115.8806	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	5	200_300mm	No	
94	394206	6465119	-31.945	115.8806	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	5	200_300mm	No	

95	394210	6465118	-31.945	115.8807	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	5	200_300mm	No	
96	394215	6465118	-31.945	115.8807	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	5	200_300mm	No	
97	394221	6465117	-31.945	115.8808	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	7	200_300mm	No	
98	394236	6465113	-31.9451	115.881	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	11	200_300mm	No	Within EPPS compound
99	394234	6465118	-31.945	115.8811	Morus alba (Black Mulberry)	Healthy	6	>500mm	No	
100	394246	6465120	-31.945	115.8811	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	5	200_300mm	No	
101	394247	6465122	-31.945	115.8811	Eucalyptus camaldulensis (River Gum)	Signs_of_Disease	4	<100mm	No	2 x Saplings
102	394250	6465122	-31.945	115.8811	Casuarina obesa (Swamp Sheoak)	Healthy	7	300_400mm	No	
103	394255	6465121	-31.945	115.8811	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	8	300_400mm	No	
104	394256	6465115	-31.945	115.8811	Casuarina obesa (Swamp Sheoak)	Healthy	2	<100mm	No	
105	394236	6465122	-31.9449	115.881	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	2	<100mm	No	Planted Shire Tree
106	394215	6465118	-31.945	115.8808	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	3	<100mm	No	Planted Shire Tree
107	394204	6465121	-31.9449	115.8806	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	3	<100mm	No	Planted Shire Tree
108	394194	6465120	-31.9449	115.8805	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	3	<100mm	No	Planted Shire Tree
109	394174	6465121	-31.945	115.8803	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	3	<100mm	No	Planted Shire Tree
110	394152	6465117	-31.945	115.8801	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	3	<100mm	No	Planted Shire Tree
111	394140	6465116	-31.945	115.8799	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	3	<100mm	No	Planted Shire Tree
112	394128	6465118	-31.945	115.8798	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	3	<100mm	No	Planted Shire Tree
113	394114	6465116	-31.945	115.8797	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	3	<100mm	No	Planted Shire Tree
114	394055	6465113	-31.9449	115.8791	Lophostemon confertus (Box Tree)	Healthy	6	300_400mm	No	Planted shire tree
115	394043	6465115	-31.945	115.8789	Lophostemon confertus (Box Tree)	Healthy	6	300_400mm	No	Planted shire tree
116	394026	6465116	-31.945	115.8788	Jacaranda mimosifolia (Jacaranda)	Stressed	5	<100mm	No	Planted shire tree
117	394009	6465113	-31.9449	115.8785	Lophostemon confertus (Box Tree)	Healthy	6	300_400mm	No	Planted shire tree
118	393999	6465119	-31.945	115.8784	Lophostemon confertus (Box Tree)	Healthy	6	300_400mm	No	Planted shire tree
119	393980	6465113	-31.945	115.8782	Lophostemon confertus (Box Tree)	Healthy	7	300_400mm	No	Planted shire tree

120	393966	6465114	-31.945	115.8781	Lophostemon confertus (Box Tree)	Healthy	7	300_400mm	No	Planted shire tree
121	393957	6465115	-31.945	115.878	Lophostemon confertus (Box Tree)	Healthy	7	300_400mm	No	Planted shire tree
122	393947	6465115	-31.945	115.8779	Lophostemon confertus (Box Tree)	Healthy	5	300_400mm	No	Planted shire tree
123	393940	6465114	-31.945	115.8778	Lophostemon confertus (Box Tree)	Healthy	5	300_400mm	No	Planted shire tree
124	393999	6465092	-31.9452	115.8785	Eucalyptus camaldulensis (River Gum)	Healthy	11	400_500mm	No	
125	393987	6465096	-31.9451	115.8783	Eucalyptus camaldulensis (River Gum)	Healthy	11	400_500mm	No	
126	393983	6465090	-31.9452	115.8783	Eucalyptus camaldulensis (River Gum)	Healthy	11	400_500mm	No	
127	393985	6465087	-31.9452	115.8783	Eucalyptus camaldulensis (River Gum)	Healthy	11	400_500mm	No	
128	393985	6465089	-31.9452	115.8783	Eucalyptus camaldulensis (River Gum)	Healthy	11	400_500mm	No	
129	393984	6465081	-31.9453	115.8783	Eucalyptus camaldulensis (River Gum)	Healthy	12	>500mm	No	
130	393984	6465078	-31.9453	115.8783	Eucalyptus camaldulensis (River Gum)	Healthy	12	>500mm	No	
131	393993	6465068	-31.9454	115.8784	Casuarina obesa (Swamp Sheoak)	Healthy	3	<100mm	No	
132	393996	6465080	-31.9453	115.8784	Eucalyptus camaldulensis (River Gum)	Stressed	4	<100mm	No	Multiple saplings self seeded in this area
133	393774	6465134	-31.9448	115.8761	Eucalyptus camaldulensis (River Gum)	Healthy	13	>500mm	No	
134	393779	6465147	-31.9447	115.8762	Eucalyptus camaldulensis (River Gum)	Healthy	13	>500mm	No	
135	393751	6465110	-31.945	115.8758	Melaleuca viminalis (Weeping Bottlebrush)	Healthy	7	100_200mm	No	
136	393752	6465115	-31.9449	115.8759	Melaleuca viminalis (Weeping Bottlebrush)	Healthy	7	100_200mm	No	
137	393752	6465121	-31.9449	115.8759	Melaleuca viminalis (Weeping Bottlebrush)	Healthy	6	100_200mm	No	
138	393755	6465124	-31.9449	115.8759	Eucalyptus camaldulensis (River Gum)	Healthy	5	100_200mm	No	
139	393751	6465120	-31.9449	115.8758	Platanus acerifolia (London Plane)	>50%_Death	5	<100mm	No	
140	393756	6465130	-31.9448	115.8759	Callistemon citrinus (Bottlebrush)	Healthy	6	200_300mm	No	
141	393758	6465135	-31.9448	115.8759	Melaleuca viminalis (Weeping Bottlebrush)	Healthy	7	200_300mm	No	
142	393759	6465140	-31.9447	115.8759	Melaleuca viminalis (Weeping Bottlebrush)	Healthy	7	200_300mm	No	
143	393757	6465142	-31.9447	115.8759	Platanus acerifolia (London Plane)	>50%_Death	5	<100mm	No	
144	393762	6465149	-31.9446	115.876	Melaleuca viminalis (Weeping Bottlebrush)	Healthy	7	200_300mm	No	

145	393763	6465151	-31.9446	115.876	Melaleuca viminalis (Weeping Bottlebrush)	Healthy	5	<100mm	No	
146	393765	6465155	-31.9446	115.876	Eucalyptus camaldulensis (River Gum)	Healthy	7	100_200mm	No	
147	393762	6465156	-31.9446	115.876	Platanus acerifolia (London Plane)	>50%_Death	4	<100mm	No	
148	393752	6465154	-31.9446	115.8758	Triadica sebifera (Chinese Tallow)	Healthy	4	<100mm	No	
149	393742	6465106	-31.945	115.8757	Eucalyptus camaldulensis (River Gum)	Healthy	20	>500mm	No	
150	393746	6465105	-31.945	115.8758	Eucalyptus camaldulensis (River Gum)	Healthy	15	>500mm	No	
151	393769	6465149	-31.9446	115.876	Eucalyptus sp	Healthy	11	100_200mm	No	
152	393796	6465133	-31.9448	115.8763	Corymbia calophylla (Marri)	Healthy	10	400_500mm	No	
153	393816	6465132	-31.9448	115.8765	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	11	400_500mm	No	
154	393816	6465119	-31.9449	115.8765	Eucalyptus camaldulensis (River Gum)	Healthy	10	300_400mm	No	
155	393810	6465112	-31.945	115.8765	Allocasuarina fraseriana (Sheoak)	Healthy	13	200_300mm	No	
156	393807	6465105	-31.945	115.8764	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	8	300_400mm	No	
157	393792	6465119	-31.9449	115.8763	Allocasuarina fraseriana (Sheoak)	Healthy	11	300_400mm	No	
158	393778	6465089	-31.9452	115.8761	Tipuana tipu (Pride of Bolivia)	Healthy	2	<100mm	No	
159	393777	6465086	-31.9452	115.8761	Angophora costata (Smooth Barked Apple)	Healthy	9	300_400mm	No	
160	393770	6465086	-31.9452	115.8761	Angophora costata (Smooth Barked Apple)	Healthy	7	100_200mm	No	
161	393765	6465086	-31.9452	115.876	Angophora costata (Smooth Barked Apple)	Healthy	8	200_300mm	No	
162	393759	6465085	-31.9452	115.8759	Angophora costata (Smooth Barked Apple)	Healthy	4	<100mm	No	
163	393752	6465085	-31.9452	115.8759	Angophora costata (Smooth Barked Apple)	Healthy	8	200_300mm	No	
164	393747	6465086	-31.9452	115.8758	Angophora costata (Smooth Barked Apple)	Healthy	8	200_300mm	No	
165	393754	6465091	-31.9452	115.8759	Tipuana tipu (Pride of Bolivia)	Healthy	2	<100mm	No	
166	393744	6465089	-31.9452	115.8758	Tipuana tipu (Pride of Bolivia)	Healthy	4	<100mm	No	
167	393744	6465087	-31.9452	115.8758	Angophora costata (Smooth Barked Apple)	Healthy	8	200_300mm	No	
168	393727	6465085	-31.9452	115.8756	Eucalyptus camaldulensis (River Gum)	Healthy	10	400_500mm	No	
169	393722	6465087	-31.9452	115.8755	Tipuana tipu (Pride of Bolivia)	Healthy	4	<100mm	No	
170	393713	6465085	-31.9452	115.8754	Eucalyptus patens (Yarri)	Healthy	17	400_500mm	No	

171	393717	6465078	-31.9453	115.8755	Angophora costata (Smooth Barked Apple)	Healthy	10	200_300mm	No	
172	393722	6465082	-31.9452	115.8755	Angophora costata (Smooth Barked Apple)	Healthy	8	200_300mm	No	
173	393726	6465080	-31.9453	115.8756	Angophora costata (Smooth Barked Apple)	Healthy	8	200_300mm	No	
174	393727	6465070	-31.9453	115.8756	Eucalyptus camaldulensis (River Gum)	Healthy	15	>500mm	No	
175	393698	6465089	-31.9452	115.8753	Tipuana tipu (Pride of Bolivia)	Healthy	9	200_300mm	No	
176	393713	6465100	-31.9451	115.8754	Tipuana tipu (Pride of Bolivia)	Healthy	9	200_300mm	No	
177	393727	6465099	-31.9451	115.8756	Tipuana tipu (Pride of Bolivia)	Healthy	7	200_300mm	No	
178	393728	6465099	-31.9451	115.8756	Morus alba (Black Mulberry)	Healthy	8	200_300mm	No	
179	393909	6465089	-31.9452	115.8775	Melaleuca nesophila (Showy Honey Myrtle)	Healthy	5		No	
180	393899	6465070	-31.9454	115.8774	Corymbia maculata (Spotted Gum)	Healthy	21	400_500mm	No	
181	393897	6465059	-31.9454	115.8774	Corymbia maculata (Spotted Gum)	Healthy	16	400_500mm	No	
182	393899	6465058	-31.9455	115.8774	Melaleuca nesophila (Showy Honey Myrtle)	Healthy	4	100_200mm	No	
183	393897	6465052	-31.9455	115.8774	Agonis flexuosa (Peppermint Tree)	Healthy	6	>500mm	No	
184	393893	6465040	-31.9456	115.8773	Acacia saligna (Golden Wreath Wattle)	Healthy	5	>500mm	No	
185	393866	6465066	-31.9454	115.8771	Eucalyptus sp,Other	Healthy	8	400_500mm	No	
186	393865	6465079	-31.9453	115.8771	Eucalyptus camaldulensis (River Gum)	Healthy	14	400_500mm	No	
187	393871	6465089	-31.9452	115.8771	Eucalyptus camaldulensis (River Gum)	Healthy	14	400_500mm	No	
188	393933	6465148	-31.9446	115.8778	Jacaranda mimosifolia (Jacaranda)	Healthy	6	300_400mm	No	
189	394243	6464902	-31.9469	115.881	Corymbia calophylla (Marri)	Healthy	12	400_500mm	No	
190	394243	6464900	-31.9469	115.881	Eucalyptus camaldulensis (River Gum)	Signs_of_Disease	10	200_300mm	No	2 x saplings
191	394236	6464899	-31.9469	115.881	Eucalyptus camaldulensis (River Gum)	Signs_of_Disease	15	400_500mm	No	2 x saplings
192	394237	6464897	-31.947	115.881	Eucalyptus camaldulensis (River Gum)	Healthy	20	>500mm	No	
193	394240	6464887	-31.947	115.8809	Eucalyptus camaldulensis (River Gum)	Signs_of_Disease	20	>500mm	No	
194	394240	6464886	-31.947	115.881	Eucalyptus camaldulensis (River Gum)	Healthy	20	>500mm	No	
195	394223	6464877	-31.9471	115.8808	Eucalyptus camaldulensis (River Gum)	Healthy	20	>500mm	No	
196	394234	6464893	-31.947	115.8809	Other	Healthy	15	100_200mm	No	Multiple established and young saplings

197	394227	6464893	-31.947	115.8809	Eucalyptus camaldulensis (River Gum)	Healthy	14	>500mm	No	
198	394217	6464894	-31.947	115.8808	Eucalyptus camaldulensis (River Gum)	Healthy	16	>500mm	No	
199	394215	6464891	-31.947	115.8807	Eucalyptus camaldulensis (River Gum)	Healthy	16	>500mm	No	
200	394205	6464882	-31.9471	115.8806	Melaleuca viminalis (Weeping Bottlebrush)	Healthy	6	200_300mm	No	
201	394206	6464887	-31.947	115.8806	Eucalyptus camaldulensis (River Gum)	Healthy	16	300_400mm	No	Group of 2
202	394204	6464887	-31.947	115.8806	Casuarina equisetifolia (sheoak)	Healthy	18	300_400mm	No	Group of 20 or more
203	394170	6464867	-31.9472	115.8803	Casuarina equisetifolia (sheoak)	Healthy	18	300_400mm	No	Group of 20 or more
204	394163	6464874	-31.9472	115.8802	Melaleuca quinquenervia (Broad Leafed Paperbark)	Healthy	14		No	Group of 2
205	394162	6464870	-31.9472	115.8802	Eucalyptus camaldulensis (River Gum)	Stressed	5	>500mm	No	Tree has fallen but continues to grow.
206	394160	6464874	-31.9472	115.8802	Eucalyptus camaldulensis (River Gum)	Healthy	18	>500mm	No	
207	394158	6464876	-31.9472	115.8801	Typha domingensis (Southern Cattail)	Healthy	2	<100mm	No	Large population of typha grass. possible combination of native and non native
208	394157	6464876	-31.9471	115.8802	Chamelaucium uncinatum (Geraldton Wax)	>50%_Death	2	200_300mm	No	
209	394160	6464874	-31.9472	115.8802	Eucalyptus camaldulensis (River Gum)	Healthy	17	400_500mm	No	Group of 2
210	394149	6464875	-31.9471	115.88	Eucalyptus camaldulensis (River Gum)	Healthy	12	400_500mm	No	Group of 2
211	394144	6464879	-31.9471	115.88	Eucalyptus camaldulensis (River Gum)	Healthy	17	>500mm	No	
212	394142	6464876	-31.9471	115.88	Eucalyptus camaldulensis (River Gum)	Healthy	17	>500mm	No	
213	394161	6464855	-31.9473	115.8801	Agonis flexuosa (Peppermint Tree)	Healthy	10	400_500mm	No	
214	394160	6464849	-31.9474	115.8801	Eucalyptus camaldulensis (River Gum)	Healthy	12	300_400mm	Western_Power	
215	394195	6464869	-31.9472	115.8805	Casuarina obesa (Swamp Sheoak)	Healthy	8	300_400mm	No	
216	394176	6464852	-31.9473	115.8803	Eucalyptus camaldulensis (River Gum)	Healthy	9	300_400mm	No	
217	394172	6464863	-31.9473	115.8803	Casuarina equisetifolia (sheoak)	Healthy	8	100_200mm	No	Group of 2
218	394172	6464888	-31.947	115.8803	Casuarina equisetifolia (sheoak)	Healthy	14	200_300mm	No	Group of 10 or more
219	394167	6464884	-31.9471	115.8802	Ricinus communis (Caster Oil)	Stressed	2	<100mm	No	Group of small trees
220	394153	6464882	-31.9471	115.8801	Casuarina equisetifolia (sheoak)	Healthy	14	300_400mm	No	Group of mote than 20 trees

221	394126	6464842	-31.9475	115.8798	Eucalyptus camaldulensis (River Gum)	Healthy	10	400_500mm	No	
222	394122	6464842	-31.9475	115.8797	Melaleuca nesophila (Showy Honey Myrtle)	Healthy	2.5	200_300mm	No	
223	394117	6464842	-31.9475	115.8797	Melaleuca nesophila (Showy Honey Myrtle)	Healthy	2.5	200_300mm	No	
224	394114	6464843	-31.9475	115.8797	Melaleuca nesophila (Showy Honey Myrtle)	Healthy	2.5	200_300mm	No	
225	394120	6464843	-31.9475	115.8797	Eucalyptus camaldulensis (River Gum)	Healthy	12	400_500mm	No	
226	394123	6464842	-31.9475	115.8797	Eucalyptus camaldulensis (River Gum)	Healthy	10	400_500mm	No	
227	394131	6464844	-31.9475	115.8798	Banksia serrata (Saw Banksia)	Healthy	1	400_500mm	No	
228	394131	6464844	-31.9475	115.8799	Melaleuca nesophila (Showy Honey Myrtle)	Healthy	3	200_300mm	No	
229	394131	6464846	-31.9474	115.8799	Olea europaea (Olive)	Healthy	2	<100mm	No	
230	394137	6464843	-31.9475	115.8799	Banksia serrata (Saw Banksia)	Healthy	2.5	200_300mm	No	
231	394143	6464844	-31.9475	115.8799	Eucalyptus camaldulensis (River Gum)	Healthy	10	400_500mm	No	
232	394155	6464845	-31.9475	115.8801	Eucalyptus camaldulensis (River Gum)	Healthy	8	200_300mm	No	
233	394145	6464845	-31.9475	115.88	Scaevola plumieri,Calothamnus quadrifidus, Artemisia abrotanum etc.	Healthy	0.5	<100mm	No	Groundcover made up of multiple planted species.
234	394218	6464855	-31.9473	115.8808	Casuarina equisetifolia (Sheoak)	Healthy	8	100_200mm	No	Group of 2
235	394226	6464858	-31.9473	115.8808	Eucalyptus camaldulensis (River Gum)	Healthy	13	200_300mm	No	
236	394228	6464863	-31.9473	115.8809	Casuarina equisetifolia (Sheoak)	Healthy	7	100_200mm	No	
237	394249	6464873	-31.9472	115.8811	Eucalyptus rudis (Flooded Gum)	Healthy	13	300_400mm	No	
238	394242	6464870	-31.9472	115.881	Eucalyptus camaldulensis (River Gum)	Healthy	13	200_300mm	No	
239	394249	6464873	-31.9472	115.8811	Eucalyptus rudis (Flooded Gum)	Healthy	12	>500mm	No	
240	394138	6464862	-31.9473	115.8799	Eucalyptus camaldulensis (River Gum)	Healthy	19.6	>500mm	Western_Power	
241	394134	6464858	-31.9473	115.8799	Eucalyptus camaldulensis (River Gum)	Healthy	11.2	400_500mm	Western_Power	
242	394120	6464852	-31.9473	115.8797	Eucalyptus camaldulensis (River Gum)	Healthy	15.8	400_500mm	No	
243	394116	6464856	-31.9473	115.8796	Eucalyptus camaldulensis (River Gum)	Signs_of_Disease	12.4	400_500mm	No	
244	394119	6464863	-31.9473	115.8797	Corymbia calophylla (Marri)	Healthy	9.4	300_400mm	Western_Power	

245	394112	6464861	-31.9473	115.8796	Acacia saligna (Golden Wreath Wattle)	Healthy	1.3	<100mm	No	2 x saplings
246	394112	6464861	-31.9473	115.8796	Acacia saligna (Golden Wreath Wattle)	Healthy	6	100_200mm	Western_Power	
247	394118	6464868	-31.9472	115.8797	Acacia saligna (Golden Wreath Wattle)	Signs_of_Disease	3	<100mm	Western_Power	
248	394119	6464867	-31.9472	115.8797	Acacia saligna (Golden Wreath Wattle)	Stressed	2	<100mm	Western_Power	
249	394122	6464867	-31.9472	115.8797	Corymbia calophylla (Marri)	Dead	0	400_500mm	Western_Power	
250	394127	6464867	-31.9472	115.8798	Eucalyptus rudis (Flooded Gum)	Stressed	6.8	200_300mm	Western_Power	
251	394128	6464875	-31.9471	115.8798	Acacia saligna (Golden Wreath Wattle)	Healthy	2.5	<100mm	Western_Power	Group of 5 saplings
252	394136	6464880	-31.9471	115.8799	Acacia saligna (Golden Wreath Wattle)	Signs_of_Disease	1	<100mm	No	
253	394138	6464880	-31.9471	115.8799	Eucalyptus camaldulensis (River Gum)	Healthy	13.4	400_500mm	No	
254	394140	6464883	-31.9471	115.8799	Eucalyptus camaldulensis (River Gum)	Healthy	14.4	>500mm	No	
255	394137	6464871	-31.9472	115.8799	Casuarina equisetifolia (Sheoak)	Healthy	1.1	<100mm	No	
256	394132	6464883	-31.9471	115.8799	Eucalyptus rudis (Flooded Gum)	Healthy	3.2	<100mm	No	
257	394126	6464883	-31.9471	115.8798	Natel grass, lupin, clove and veldt grass ground cover	Healthy	1	<100mm	Western_Power	Areas of non native grass and other introduced species ground cover
258	394118	6464875	-31.9471	115.8797	Acacia saligna (Golden Wreath Wattle)	Stressed	7.2	100_200mm	Western_Power	
259	394123	6464871	-31.9472	115.8798	Acacia saligna (Golden Wreath Wattle)	Healthy	3.5	100_200mm	Western_Power	3 x saplings
260	394105	6464882	-31.9471	115.8796	Corymbia aparrerinja (Ghost Gum)	Healthy	9	100_200mm	Western_Power	
261	394108	6464877	-31.9471	115.8796	Acacia saligna (Golden Wreath Wattle)	Healthy	1.8	<100mm	Western_Power	
262	394104	6464873	-31.9472	115.8796	Eucalyptus camaldulensis (River Gum)	Healthy	13.2	400_500mm	Western_Power	
263	394103	6464882	-31.9471	115.8795	Acacia saligna (Golden Wreath Wattle)	Healthy	3	100_200mm	Western_Power	
264	394103	6464882	-31.9471	115.8795	Acacia saligna (Golden Wreath Wattle)	Healthy	3.5	100_200mm	Western_Power	
265	394099	6464882	-31.9471	115.8795	Eucalyptus camaldulensis (River Gum)	Healthy	15.4	300_400mm	Western_Power	
266	394093	6464880	-31.9471	115.8794	Eucalyptus camaldulensis (River Gum)	Healthy	15.4		Western_Power	
267	394084	6464881	-31.9471	115.8793	Agonis flexuosa (Peppermint Tree)	Healthy	7.5	>500mm	Western_Power	
268	394090	6464877	-31.9471	115.8794	Acacia saligna (Golden Wreath Wattle)	Healthy	4	100_200mm	Western_Power	Group of 10 Saplings
269	394086	6464872	-31.9472	115.8794	Eucalyptus rudis (Flooded Gum)	Stressed	9.2	200_300mm	Western_Power	

270	394086	6464867	-31.9472	115.8794	Acacia saligna (Golden Wreath Wattle)	Healthy	4.5	<100mm	Western_Power	Group of 5 saplings
271	394081	6464867	-31.9472	115.8793	Eucalyptus camaldulensis (River Gum)	Healthy	11.4	400_500mm	No	
272	394086	6464867	-31.9472	115.8794	Acacia saligna (Golden Wreath Wattle)	Healthy	4.5	<100mm	Western_Power	Group of 5 saplings
273	394087	6464861	-31.9473	115.8794	Casuarina equisetifolia (Sheoak)	Healthy	9.6	300_400mm	No	
274	394092	6464859	-31.9473	115.8794	Eucalyptus camaldulensis (River Gum)	Healthy	11.2	300_400mm	No	
275	394086	6464859	-31.9473	115.8794	Area of small euc and acacia saplings and grasses	Healthy	1	<100mm	No	Area of small euc and acacia saplings and grasses
276	394072	6464849	-31.9474	115.8792	Casuarina equisetifolia (Sheoak)	Healthy	9.6	400_500mm	No	
277	394099	6464865	-31.9472	115.8795	Eucalyptus eremophila (Tall Sand Mallee)	Healthy	10.4	>500mm	Western_Power	
278	394102	6464854	-31.9473	115.8795	Corymbia calophylla (Marri)	Healthy	5	200_300mm	No	
279	394121	6464853	-31.9473	115.8797	Hardenbergia violacea	Healthy	0.5	<100mm	No	Climber at base of tree
280	394099	6464877	-31.9471	115.8795	Eucalyptus camaldulensis (River Gum)	Healthy	11.4	300_400mm	Western_Power	
281	394087	6464879	-31.9471	115.8794	Acacia saligna (Golden Wreath Wattle)	Stressed	3	<100mm	Western_Power	

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

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