

WHEATBELT WOODLANDS THREATENED ECOLOGICAL COMMUNITY MAPPING REVIEW



CBH Dowerin Receival Site

Dowerin, WA 6461

Final v.2

18/10/2024



DOCUMENT CONTROL

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Job No.: CBH0018-005

Client: Cooperative Bulk Handling (CBH)

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| Draft v.1 | Internal Approval Review | A. Tucker | K. Kinnear | 3/10/2024 |
| Draft v.1 | Submitted to client for review | A. Tucker | C. Paunich | 7/10/2024 |
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1 Introduction, Scope and Background Information

Cooperative Bulk Handling (CBH), herein referred to as “the client” commissioned Bio Diverse Solutions as Environmental Consultants to undertake a desktop review of previously mapped native vegetation boundaries specifically within the 0.9 ha ‘area of investigation’ as defined by the client, using supplied high resolution spatial imagery at the Dowerin Receiving Site. The review of the mapped dataset is to reassess the extent of native vegetation and the Critically Endangered (CR) / Priority 3 (P3) Eucalypt Woodlands of the Western Australian Wheatbelt (Wheatbelt Woodlands) Threatened / Priority Ecological Community (TEC/PEC). The TEC/PEC has previously been mapped as part of surveys undertaken by Bio Diverse Solutions being an out of season reconnaissance flora, vegetation and basic fauna survey (BDS, 2022) herein referred to as the out of season survey; a spring reconnaissance flora, vegetation and basic fauna survey (BDS, 2024a), herein referred to as the spring survey and a targeted flora and vegetation survey (BDS, 2024b), herein referred to as the targeted survey.

The scope of works include:

- Assessment of spatial data provided by Bio Diverse Solutions (BDS) in the Dowerin Targeted Flora and Vegetation Survey Report finalised in 2024, using high resolution spatial imagery provided by CBH;
- Provide a revised mapped extent of native vegetation present within the ‘Area of Investigation’ (Figure 1) to a higher resolution than that provided in the 2024 BDS report;
- Provide a brief report outlining the native vegetation within the ‘Development Area’ and the ‘Area of Investigation’ provided by CBH; and
- Provide the client with the IBSA Data package (as required to be submitted by the client).

1.1 Location and Development Proposal

The survey area for this report is defined as the 0.9 ha ‘area of investigation’ as identified and provided by the client (Figure 1). The survey area is within the larger development area earmarked by CBH for the future expansion of the existing Dowerin Receiving Site and contains parts of the existing CBH lot, Irvine Road reserve and the existing railway infrastructure. This desktop review provides an updated mapped dataset of the areas previously identified as Wheatbelt Woodland TEC/PEC in the targeted survey (BDS, 2024b) to assist in the environmental approvals required for the clearing and development of these areas.

1.2 Eucalypt Woodlands of the Western Australian Wheatbelt (Wheatbelt Woodlands)

The previous surveys undertaken by Bio Diverse Solutions resulted in the identification of the Eucalypt Woodlands of the Western Australian Wheatbelt (Wheatbelt Woodlands) which is listed as a Priority 3 (P3) Ecological Community (PEC) under the BC Act and an Endangered TEC under the EPBC Act. The survey area lies within the Merredin Avon Wheatbelt IBRA subregion, within the boundaries of the location criteria of the Wheatbelt Woodlands. The Wheatbelt Woodlands are comprised of Eucalypt woodlands that formerly were the most common type of vegetation across the wheatbelt landscape of south-western WA, inland between the Darling Range and western edge of the Goldfields. The woodlands are dominated by a complex mosaic of eucalypt species with a tree or mallee form over an understorey that is highly variable in structure and composition. Woodlands dominated by mallee forms or vegetation with a very sparse eucalypt tree canopy are not considered part of the ecological community (DoEE, 2015).

The Wheatbelt Woodlands are recognised by the below key diagnostic features and minimum condition thresholds outlined in approved conservation advice guidelines (DoEE, 2015):

- 1) Occurs within the IBRA Avon Wheatbelt subregions Merredin (AVW01) and Katanning (AVW02), Western Mallee subregion (MAL02) and jarrah forest subregions Northern Jarrah Forest (JAF01) and Jarrah Forest (JAF02) when adjacent to the Avon Wheatbelt.
- 2) Structure of the ecological community is a woodland, with minimum crown cover of tree canopy of mature woodland being 10% (crowns measured as if opaque).
- 3) Key species of the tree canopy are species of *Eucalyptus* identified in Table 2a of the approved conservation guidelines (DoEE, 2015). These are species that typically have a single trunk. One or more tree species are dominant or co-dominant within the patch of the ecological community. If other species are present in the tree canopy, then these do not occur as dominants in the tree canopy.

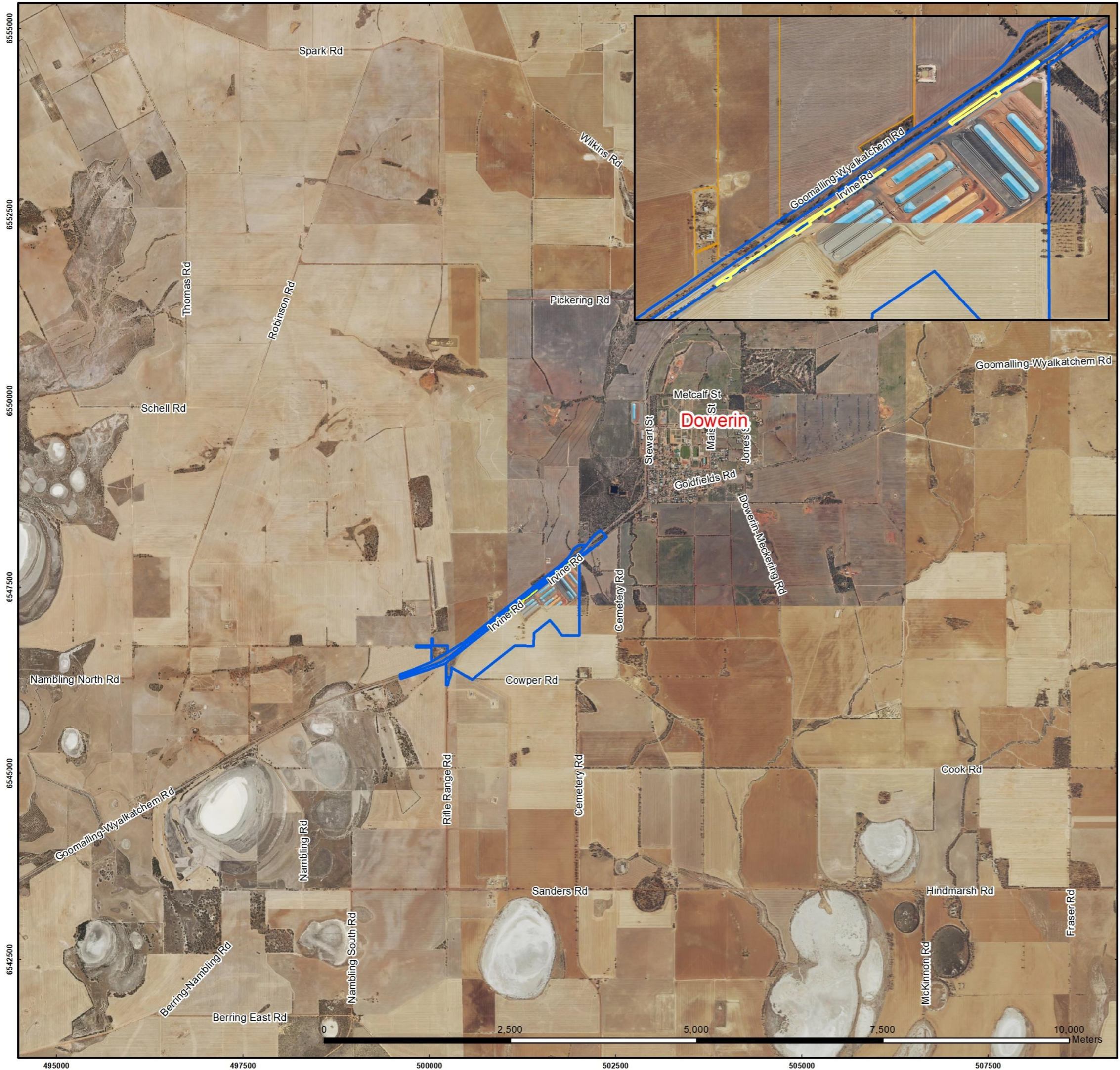
- 4) Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs, as specified in Table A1 of Appendix A (DoEE, 2015).

Condition thresholds for the ecological community are described in Table 1 and recognise that patches of an ecological community can differ significantly in their quality. Patches that do not meet the minimum condition thresholds are excluded from full national protection, however it is recognised that these patches of the ecological community can still retain some important natural values that may be crucial for certain species or habitats and they must be assessed in a landscape context. General notes on the condition thresholds of the ecological community are outlined in the Approved Conservation Guidelines for Wheatbelt Woodlands (DoEE, 2015). Most notably in relation to the study area, this includes “It is intended that the condition thresholds will exclude degraded patches from any requirement for protection, for instance: isolated paddock trees on farms, or small or narrow stands of trees that serve as windbreaks or shelterbelts on farms and other properties”.

Table 1: Condition thresholds for Wheatbelt Woodlands TEC diagnostic criteria.

| Category and comment | Cover of exotic plants (weeds) | Mature trees | Minimum patch size (non-roadside patches) | Minimum patch width (roadsides only) |
|---|---|---|---|--------------------------------------|
| A: patches likely to correspond to condition of Pristine / Excellent / Very Good or a High RCV | Exotic plants account for 0 to 30% of total vegetation cover in the understorey layers i.e., below the tree canopy | Mature trees may be present or absent | >2 ha | >5 m |
| B: Patches likely to correspond to a condition of Good or a Medium-High RCV AND retains important habitat features | Exotic plant species account for 30-50% of total vegetation cover in the understorey layers i.e., below the tree canopy | Mature trees are present, >5 trees/ha | >2 ha | >5 m |
| C: Patches likely to correspond to a condition of Good or a Medium-High RCV | Exotic plant species account for 30-50% of total vegetation cover in the understorey layers i.e., below the tree canopy | Mature trees either absent or <5 trees/ha | >5 ha | >5 m |
| D: Patches likely to correspond to a condition of Degraded to Good or medium-low RCV BUT retains important habitat features | Exotic plant species account for 50-70% of total vegetation cover in the understorey layers i.e., below the tree canopy | Mature trees present at >5 trees/0.5 ha | >5 ha | >5 m |

* Nt. Condition is referenced to Keighery (1994) and Relative Conservation Value (RCV) is related to Roadside Conservation Committee (2014).



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Overview Map Scale 1:5,000,000

Legend

- Survey Area (BDS, 2022; 2024a; 2024b)
- Area of Investigation



Scale
1:50,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastral, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Figure 1: Survey Area Locality

| | | |
|-------------------------------|-----------------------------------|----------------------------------|
| | QA Check BT | Drawn by AT |
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2 Methodology

This report reviews the previously mapped boundaries of native vegetation, as defined in the previous out of season survey (BDS, 2022), spring survey and targeted survey (BDS, 2024a; 2024b). The high-resolution imagery provided by CBH was used to more accurately map the boundaries of the vegetation units mapped in previous reports within the new area of investigation only.

3 Results

3.1 Vegetation Condition

Vegetation condition throughout the development area was previously mapped using the condition rating scale (adapted from Keighery, 1994) outlined in *EPA Flora and Vegetation Survey Technical Guidance* (2016) as a part of the out of season and spring survey (BDS, 2022; 2024a) and ranged from 'Completely Degraded' to 'Very Good' (see Appendix C). The vegetation condition ratings have not been altered as a part of this mapping review.

3.2 Threatened and Priority Ecological Communities

A total of 4.28 ha of 'TEC/PEC Wheatbelt Woodlands' was previously identified in the spring survey (BDS, 2024b), as further described in Appendix D. Assessment of the TEC/PEC Wheatbelt Woodlands boundaries within the 0.9 ha area of investigation using the high-resolution imagery confirmed the presence of 0.475 ha of Wheatbelt Woodlands' TEC/PEC is present within the area of investigation and specifically relates to Vegetation Unit 2 [EucW] (BDS, 2022) and Vegetation Unit 3 [EucsaW] (BDS, 2022). Of this 0.475 ha, 0.408 ha was identified as meeting the Category D diagnostic condition threshold for Wheatbelt Woodlands, whilst 0.067 ha was identified to be in a completely degraded condition and so fell outside of the Category D condition threshold (refer to Table 1). Analysis, results and discussion of the quadrat sampling undertaken as a part of the targeted survey (BDS, 2024b) within each of these vegetation units are outlined below. Quadrats 4, 5 and 6 were used as the sample sites for analysis of quantitative and qualitative requirements to meet Wheatbelt Woodlands TEC/PEC (Tables 2-4 and Figures 2-5).

Table 2: Analysis of Vegetation Unit 2: Mixed Eucalyptus Woodland [EucW] (BDS, 2022) and the threshold criteria of TEC/PEC 'Eucalyptus Woodlands of the Western Australian Wheatbelt within the area of investigation.

| Criteria | Analysis of Vegetation Unit 2: Mixed Eucalyptus Woodland [EucW] | Meet Criteria (Y/N) |
|--|---|---------------------|
| | | Q4 |
| 1: Distribution and IBRA subregions. | The survey area is located within the Avon Wheatbelt 1 (AW01) – Merredin subregion. | Y |
| 2: Structure of the ecological community is a woodland, with minimum crown cover of tree canopy of mature woodland being 10%. | Quadrat analysis shows that <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> (Quadrat 4) overstorey ranged between 10-30%, which is above the minimum 10% crown cover required in Criterion 2. | Y |
| 3: Key species of the tree canopy are species of Eucalyptus identified in Table 2a of approved conservation guidelines (DoEE, 2015; RCC, 2014). | <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> is the dominant species in the NVIS L5 overstorey description, which are listed as a key species in Table 2a (DoEE, 2015). | Y |
| 4: Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs, as specified in Table A1 of Appendix A (DoEE, 2015; RCC, 2014). | Variable understorey of grasses, herbs and shrubs is present. | Y |

Table 2 continued.

| Criteria | Analysis of Vegetation Unit 2: Mixed Eucalyptus Woodland [EucW] | Meet Criteria (Y/N) | |
|--------------------------------------|--|---------------------|--|
| | | Q4 | |
| 5: Patch Size and Condition Criteria | <p>Table 1 identifies the specific condition and patch thresholds of Wheatbelt Woodlands TEC/PEC, with specific focus applied to the roadside minimum patch width required. The size of all the “patches” meets the condition thresholds, as they are roadside patches and a minimum width of 5 m is required.</p> <p>Referring to the category of condition thresholds, the vegetation present relates best to Category “D” with Degraded to Good condition present and weeds accounting for 50-70% of total cover across the quadrats sampled.</p> | Y | |

Table 3: Analysis of Vegetation Unit 3: *Eucalyptus salmonophloia* Woodland [EucaIW] (BDS, 2022) and the threshold criteria of TEC/PEC ‘Eucalyptus Woodlands of the Western Australian Wheatbelt within the area of investigation.

| Criteria | Analysis of Vegetation Unit 3: <i>Eucalyptus salmonophloia</i> Woodland [EucaIW] | Meet Criteria (Y/N) | |
|--|--|---------------------|----|
| | | Q5 | Q6 |
| 1: Distribution and IBRA subregions. | The survey area is located within the Avon Wheatbelt 1 (AW01) - Merredin subregion. | Y | Y |
| 2: Structure of the ecological community is a woodland, with minimum crown cover of tree canopy of mature woodland being 10%. | Quadrat analysis shows that <i>Eucalyptus salmonophloia</i> (Quadrats 5 & 6) overstorey ranged between 10-30%, which is above the minimum 10% crown cover required in Criterion 2. | Y | Y |
| 3: Key species of the tree canopy are species of Eucalyptus identified in Table 2a of approved conservation guidelines (DoEE, 2015; RCC, 2014). | <i>Eucalyptus salmonophloia</i> is the dominant species in the NVIS L5 overstorey description, which is listed as a key species in Table 2a (DoEE, 2015). | Y | Y |
| 4: Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs, as specified in Table A1 of Appendix A (DoEE, 2015; RCC, 2014). | Variable understorey of grasses, herbs and shrubs is present. | Y | Y |
| 5: Patch Size and Condition Criteria | <p>Table 1 identifies the specific condition and patch thresholds of Wheatbelt Woodlands TEC/PEC, with specific focus applied to the roadside minimum patch width required. The size of all the “patches” meets the condition thresholds, as they are roadside patches and a minimum width of 5 m is required.</p> <p>Referring to the category of condition thresholds, the vegetation present relates best to Category “D” with Degraded to Good condition present and weeds accounting for 50-70% of total cover across the quadrats sampled.</p> | Y | Y |

Table 4: Revised areas (ha) of Wheatbelt Woodlands TEC/PEC present within vegetation units across the new area of investigation.

| Vegetation Unit | Vegetation Condition | Condition Threshold for Wheatbelt Woodlands TEC met (Y/N; Refer to Table 1) | TEC Condition Category (Refer to Table 1) | Area within 'area of investigation' (ha) |
|--|----------------------|---|---|--|
| Vegetation Unit 2: EucW (BDS, 2022) | Degraded | Y | Meets Category D* | 0.104 |
| | Degraded | Y | Meets Category D* | 0.304 |
| Vegetation Unit 3: EucsalW (BDS, 2022) | Completely Degraded | N | Does not meet Category D | 0.067 |
| Total | | | | 0.475 |

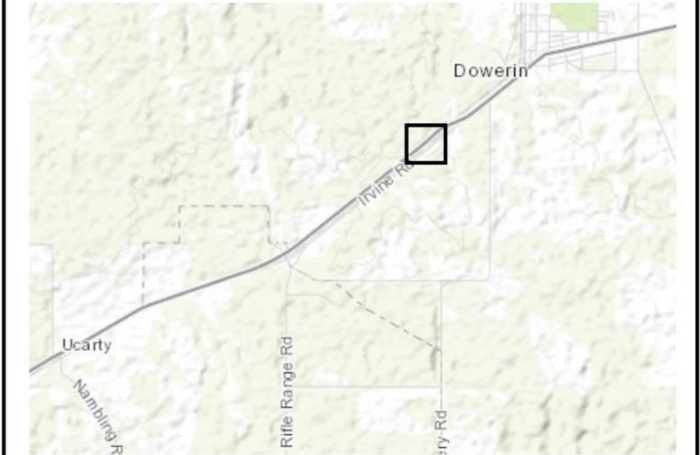
*Category D Patches likely to correspond to a condition of Degraded to Good or medium – low RCV BUT retains important habitat features.



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Overview Map Scale 1:100 000

Legend

- Survey Area (BDS, 2024b)
- Cadastre
- Area of Investigation
- Eucalyptus Woodlands of the Western Australian Woodlands (BDS, 2024b)**
- Mixed Eucalypts Woodland [EucW] 0.1 ha
- Sample Sites (BDS, 2024)**
- Quadrat
- Vegetation Units (2022 Mapping)**
- 1: MSL (2022)
- 2: EucW (2022)
- 3: EucsalW (2022)
- Planted Eucalypts (updated from 2022)
- Cleared
- Vegetation Condition (BDS, 2022; 2024a)**
- Completely Degraded
- Degraded
- Good
- Very Good

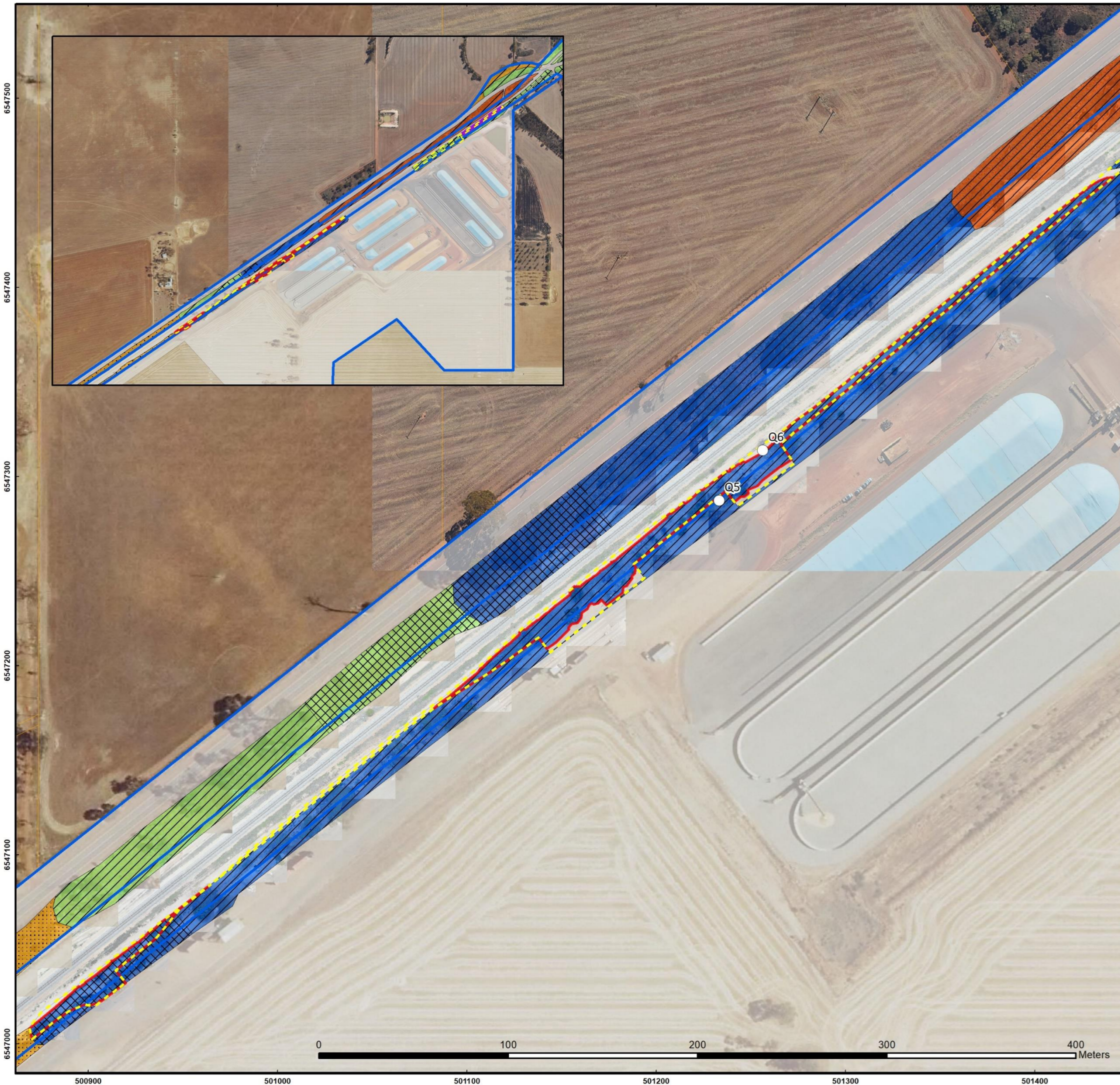
Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:1,500 @ A3
GDA MGA 2020 Zone 50

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Figure 2: Vegetation and TEC/PEC Findings - North

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Overview Map Scale 1:100 000

Legend

- Survey Area (BDS, 2024b)
- Cadastre
- Area of Investigation
- Quadrat
- Eucalyptus Woodlands of the Western Australian Woodlands (BDS, 2024b)**
- Eucalyptus salmonophloia Woodland [EucsalW]
0.37 ha
- Sample Sites (BDS, 2024b)**
- Quadrat
- Vegetation Units (2022 Mapping)**
- 1: MSL (2022)
- 2: EucW (2022)
- 3: EucsalW (2022)
- Planted Eucalypts (updated from 2022)
- Cleared
- Vegetation Condition (BDS, 2022; 2024a)**
- Completely Degraded
- Degraded
- Good
- Very Good

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

Scale
1:2,000 @ A3
GDA MGA 2020 Zone 50



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Figure 3: Vegetation and TEC/PEC Findings - South

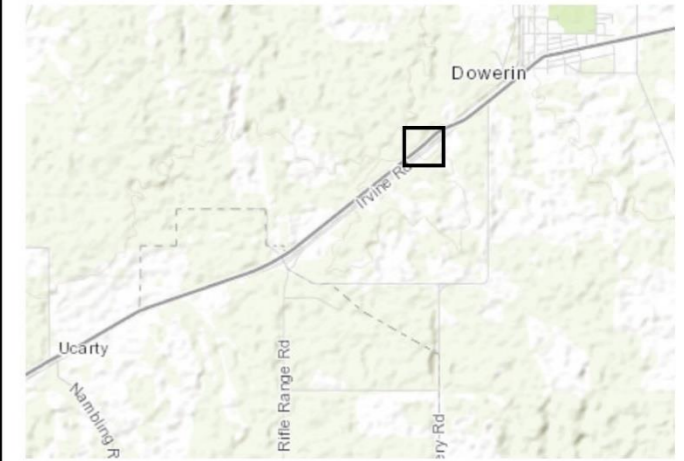
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Legend

- Survey Area (BDS, 2024b)
- Cadastre
- Area of Investigation
- Eucalyptus Woodlands of the Western Australian Woodlands (BDS, 2024b)**
- Mixed Eucalypts Woodland [EucW] 0.1 ha
- Sample Sites (BDS, 2024)**
- Quadrat

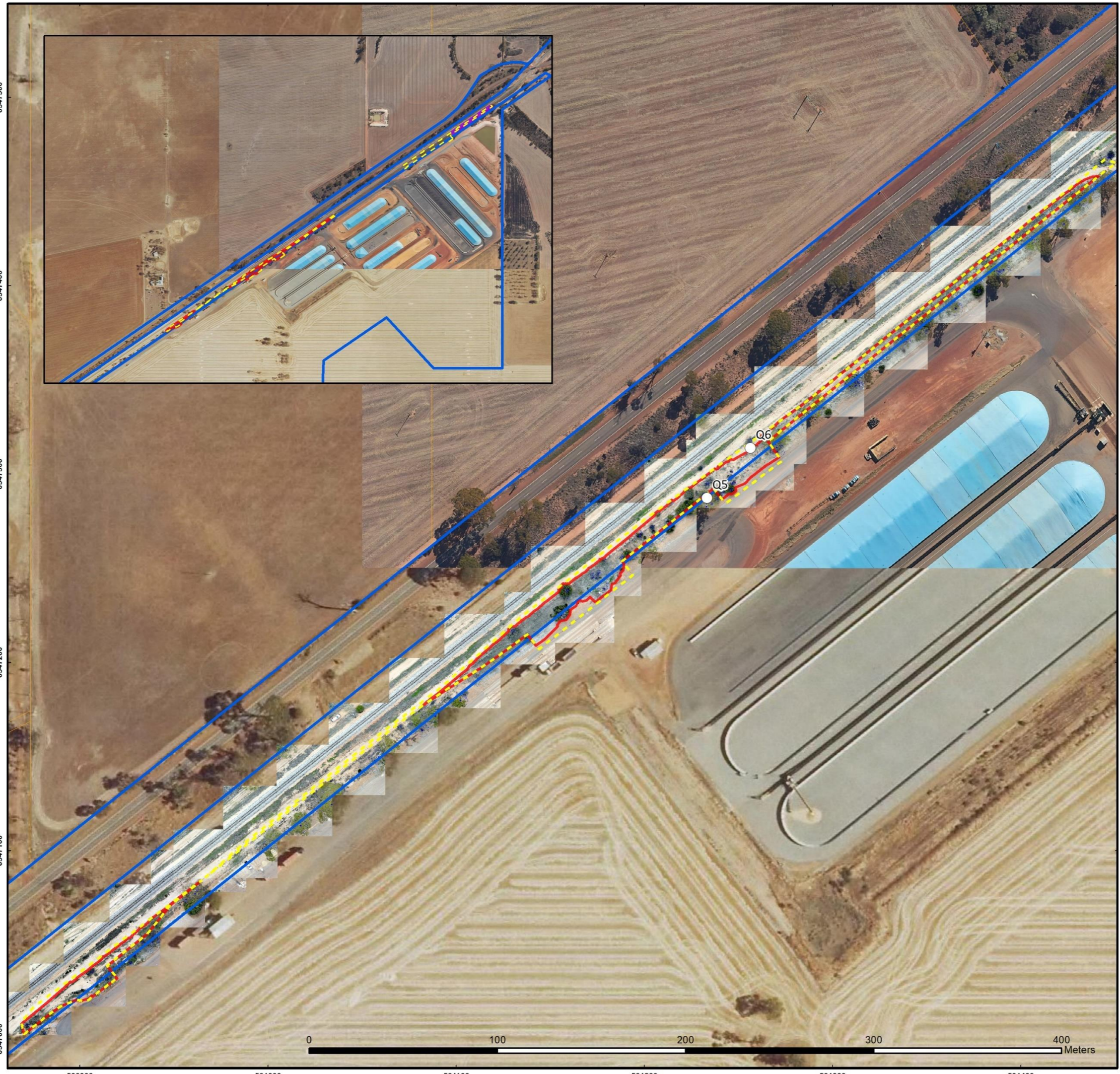
Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
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Scale
1:1,500 @ A3
GDA MGA 2020 Zone 50

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Figure 4: TEC/PEC Findings - North

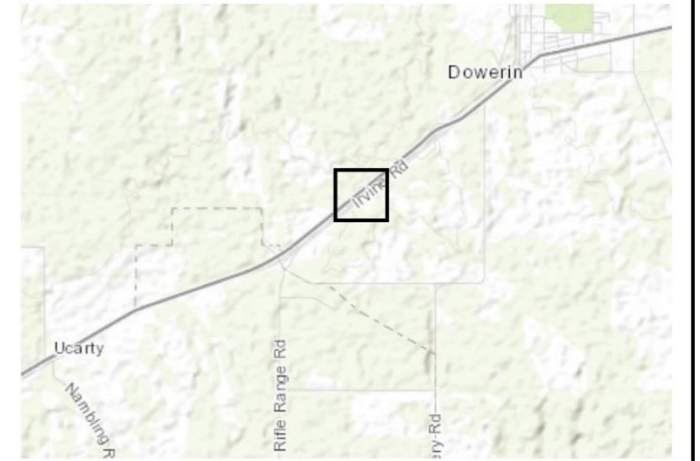
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Overview Map Scale 1:100 000

Legend

- Survey Area (BDS, 2024b)
 - Cadastre
 - Area of Investigation
 - Quadrat
- Eucalyptus Woodlands of the Western Australian Woodlands (BDS, 2024b)**
- Eucalyptus salmonophloia Woodland [EucaSalW] 0.37 ha
- Sample Sites (BDS, 2024b)**
- Quadrat

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
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Overview Map: World Topographic map service, ESRI 2012

Scale
1:2,000 @ A3
GDA MGA 2020 Zone 50

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Figure 5: TEC/PEC Findings - South

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|------------------------|----------------------------|---------------------------|
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| STATUS FINAL | FILE CBH0018-005 | DATE 26/09/2024 |

4 Discussion

The scope for this report was to provide the client with revised information on areas of Wheatbelt Woodlands TEC/PEC within the area of investigation for environmental approvals for the proposed expansion of the CBH Dowerin receiving site. Upon review of high-resolution imagery within the 0.9 ha area of investigation a total of 0.475 ha of Wheatbelt Woodlands PEC/TEC is confirmed to be present, across two vegetation units, namely, Vegetation Unit 2 [EucW] (BDS, 2022), and Vegetation Unit 3 [EucsalW] (BDS, 2022). The vegetation units considered to be TEC within the area of investigation are in 'Degraded' and 'Completely Degraded' condition. As per the Approved Conservation Guidelines for Wheatbelt Woodlands (DoEE, 2015), very degraded and modified patches, whilst still important remnant vegetation, may not be protected under the EPBC Act.

The aerial imagery indicates that there are some areas within the area of investigation that appear to be devoid of native vegetation. However, upon this review and during the preparation of previous reports these areas were determined to be an extension of the TEC as there is no evidence of clearing, and the trees present within these areas result in the mature trees present at >5 trees/0.5 ha meeting the criteria for Category D patches (Table 1). These areas appear to have become degraded over time due to activities of the rail line, CBH grain receiving site and access / firebreaks.

5 References

BDS, Bio Diverse Solutions (2022). *Reconnaissance Flora, Vegetation and Basic Fauna Survey Report – CBH Dowerin Receiving Site*. Unpublished report prepared for Cooperative Bulk Handling.

BDS, Bio Diverse Solutions (2024a). *Reconnaissance Flora, Vegetation and Basic Fauna Survey Report – CBH Dowerin Receiving Site*. Unpublished report prepared for Cooperative Bulk Handling.

BDS, Bio Diverse Solutions (2024b). *Targeted Flora and Vegetation Survey Report – CBH Dowerin Receiving Site*. Unpublished report prepared for Cooperative Bulk Handling.

CoA, Commonwealth of Australia. (2013). *Draft Survey Guidelines for Australia's Threatened Orchids*, Commonwealth of Australia. URL: <https://www.agriculture.gov.au/sites/default/files/documents/draft-guidelines-threatened-orchids.pdf>

DoEE, Department of the Environment and Energy. (2015). Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt. Canberra, Department of the Environment. URL: <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/128-conservation-advice.pdf>.

EPA, Environmental Protection Authority (2016). *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment*, EPA, Western Australia.

Keighery, B. (1994). *Bushland Plant Survey, A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc.) Nedlands, WA.

RCC; Roadside Conservation Committee (2014). Roadside conservation mapping program. Data from surveyed shires.

6 Appendices

Appendix A – Threatened and Priority Ecological Community Description

Appendix B – Conservation Status Definitions and Condition Scale

Appendix C – Vegetation Units defined in the Reconnaissance Flora and Vegetation and Basic Fauna survey (BDS, 2022; 2024a)

Appendix D – Quadrat Data (BDS, 2024b)

Appendix A

Threatened and Priority Ecological Community Description

Table 5: Threatened and Priority Ecological Communities targeted as part of the targeted survey (BDS, 2024b)

| Community Name | Status | Description | Survey Outcome |
|--|-----------------------------|---|---------------------------|
| Eucalyptus Woodlands of the Western Australian Wheatbelt | Priority 3 CR (EPBC Act) | The ecological community defined and assessed as TEC/PEC 'Eucalyptus Woodland of the Western Australian Wheatbelt' is comprised of eucalypt woodlands that formerly were the most common type of vegetation across the wheatbelt landscape of south-western WA, inland between the Darling Range and western edge of the goldfields. The woodlands are dominated by a complex mosaic of eucalypt species with a tree or mallee form over an understorey that is highly variable in structure and composition. Woodlands dominated by mallee forms or vegetation with a very sparse Eucalypt tree canopy are not part of the ecological community (DoEE 2015). | Present - detected |

Appendix B

Conservation Status Definitions and Condition Scale

Table 6: Conservation code definitions for flora listed as threatened or specially protected.

Threatened, Extinct and Specially Protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

| Threat Category | Definition |
|--|---|
| Threatened - Critically endangered species (CR) | Facing an extremely high risk of extinction in the wild in the immediate future. |
| Threatened - Endangered species (EN) | Facing a very high risk of extinction in the wild in the near future. |
| Threatened - Vulnerable species (VU) | Facing a high risk of extinction in the wild in the medium-term future. |
| Threatened - Extinct (EX) | There is no reasonable doubt that the last member of the species has died. |
| Threatened – Extinct in the wild (EW) | Species is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form. |
| Specially protected species - Migratory species (MI) | Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. |
| Specially protected species – Conservation Dependent (CD) | Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened. |
| Specially protected species – Other specially protected species (OS) | Fauna otherwise in need of special protection to ensure their conservation. |

Table 7: Conservation code definitions for flora listed as Priority.

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3.

| Threat Category | Definition |
|---|---|
| Priority 1: Poorly-known species | Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. |
| Priority 2: Poorly-known species | Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. |
| Priority 3: Poorly-known species | Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. |
| Priority 4: Rare, Near Threatened and other species in need of monitoring | (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy. |

Table 8: Conservation code definitions for ecological communities listed as threatened (TEC).

| Threat Category | Definition |
|---------------------------------|--|
| Presumed Totally Destroyed (PD) | An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. |
| Critically Endangered (CR) | An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. |
| Endangered (EN) | An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. |
| Vulnerable (VU) | An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. |

Table 9: Conservation code definitions for ecological communities listed as priority (PEC).

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3.

| Threat Category | Definition |
|---------------------|---|
| Priority One (P1) | Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤ 5 occurrences or a total area of ≤ 100 ha), and appear to be under immediate threat. |
| Priority Two (P2) | Communities that are known from few occurrences with a restricted distribution (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. |
| Priority Three (P3) | (i)Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii)communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or; (iii)communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc. |
| Priority Four (P4) | Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. |
| Priority Five (P5) | Conservation Dependent ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years. |

Appendix C

Vegetation Units defined in the Reconnaissance Flora and Vegetation and Basic Fauna survey (BDS, 2022; 2024a)

2023 Spring Survey Vegetation Units (BDS, 2024a)

Vegetation Unit 1: Unclassifiable vegetation unit

Vegetation Unit 1 consists of a shrubland characterised by *Acacia* sp. and an understorey dominated by invasive species. This vegetation unit is represented by R1 which is situated in an isolated patch along Rifle Range Road. This vegetation is in a Degraded state with a high number of non-native species; based on the species observed it is composed of 42% native species. Due to this state of degradation and disturbance the vegetation unit is unable to be classified.

Vegetation Description (NVIS; DoEE, 2017): M *Acacia assimilis*, *Acacia dielsii*, *Acacia multispicata* \shrub\3;c; G *Eragrostis curvula*, *Bromus diandrus*, *Avena barbata* \tussock grass\1;c

Vegetation Description (Muir, 1977): *Acacia assimilis* Scrub, over *Acacia dielsii*, *Acacia multispicata* Heath, over *Arctotheca calendula* Open Herbs, over *Eragrostis curvula*, *Bromus diandrus*, *Avena barbata* Low Grass.

Area: 0.17 ha

Site description: Gently sloping site with light brown, clay loam soil, with good drainage.

Condition: Degraded.



Figure 6: Unclassifiable vegetation unit vegetation type present within the survey area.

Vegetation Unit 2: Allocasuarina/Acacia Shrubland [AASh]

Vegetation Unit 2 consists of a shrubland characterised by *Allocasuarina acutivalvis*, *Allocasuarina campestris* and *Acacia multispicata*, with an understorey composed of native and non-native species. This vegetation unit is represented by R2 which is situated in a block of remnant vegetation. A total of 51 species were found, of which 76% were native. Poaceae was the most common family recorded with eight species. See Table 9 for a summary of this vegetation unit.

Vegetation Description (NVIS; DoEE, 2017): U *Allocasuarina acutivalvis* \shrub\6;i; M *Grevillea hookeriana*, *Allocasuarina campestris*, *Acacia multispicata* \shrub\3;c; G *Dampiera lavandulacea*, *Bromus diandrus*, *Dianella revoluta* \forb, grass\1;d.

Vegetation Description (Muir, 1977): *Allocasuarina acutivalvis* Scrub, over *Grevillea hookeriana*, *Allocasuarina campestris* Low Scrub, over *Ecdeiocolea monostachya* Very Open Tall Sedges, over *Dampiera lavandulacea* Dense Herbs, over *Bromus diandrus*, *Avena barbata*, *Austrostipa elegantissima* Very Open Low Grass.

Area: 0.86 ha

Site description: Flat with light brown, clay loam soil, with good drainage.

Condition: Very Good and Good



Figure 7: Allocasuarina/Acacia Shrubland [AASh] vegetation type present within the survey area.

Vegetation Unit 3: Mallee Shrubland [MSL]

Vegetation Unit 3 consists of a shrubland characterised by *Eucalyptus subangusta* subsp. *subangusta*., *Allocasuarina campestris* and *Acacia acuminata*. R3 is situated in a block of remnant vegetation, within a section of vegetation in Very Good condition. Vegetation condition within other sections of this vegetation unit ranges from Degraded to Completely Degraded. Eighteen species were found, with no non-native species present within the sample site. Fabaceae was the most common family recorded with five species. See Table 10 for a summary of this vegetation unit.

Vegetation Description (NVIS; DoEE, 2017): U ^*Eucalyptus subangusta* subsp. *subangusta*^mallee\6\i:M ^*Acacia acuminata*,^*Allocasuarina campestris*^shrub\3\c;G ^*Ecdeiocolea monostachya*,*Austrostipa elegantissima*^sedge,grass\2\c.

Vegetation Description (Muir, 1977): *Eucalyptus subangusta* subsp. *subangusta* Open Tree Mallee, over *Acacia acuminata* Thicket, over *Allocasuarina campestris* Heath, over *Ecdeiocolea monostachya* Tall Sedges, over *Panaetia lessonii*, *Waitzia acuminata*, *Diuris suffusa* Very Open Herbs, over *Austrostipa elegantissima* Very Open Low Grass.

Area: 1.45 ha

Site description: Flat site with light brown, clay loam soil, with good drainage.

Condition: Very Good, Degraded, Completely Degraded



Figure 8: Mixed Shrubland [MSL] vegetation type present within the survey area.

Vegetation Unit 4: *Eucalyptus loxophleba* subsp. *loxophleba* Woodland [EucloxW]

Vegetation Unit 4 consists of a woodland characterised by a *E. loxophleba* subsp. *loxophleba*. R4 is situated in a block of remnant vegetation. Seven species were found, one species is non-native. Poaceae was the most common family recorded with three species. See Table 11 for a summary of this vegetation unit.

Vegetation Description (NVIS; DoEE, 2017): U ^*Eucalyptus loxophleba* subsp. *loxophleba*^tree\6\d;G ^^*Ehrharta longiflora*,*Amphipogon caricinus*,*Austrostipa elegantissima*^^grass\1\d.

Vegetation Description (Muir, 1977): *Eucalyptus loxophleba* subsp. *loxophleba* Dense Low Forest, over *Dodonaea bursariifolia*, *Rhagodia drummondii* Open Dwarf Scrub, over *Enchylaena lanata* Open Dwarf Scrub, over *Dianella revoluta* over Open Herbs, over *Ehrharta longiflora*, *Amphipogon caricinus*, *Austrostipa elegantissima* Very Open Low Grass

Area: 0.29 ha

Site description: Flat site with dark brown, clay loam soil, with good drainage.

Condition: Good, Degraded.



Figure 9: *Eucalyptus loxophleba* subsp. *loxophleba* Woodland [EucloxW] vegetation type present within the survey area.

Vegetation Unit 5: *Eucalyptus wandoo* [Eucwan]

Vegetation Unit 5 consists of *Eucalyptus wandoo*. This is defined as a vegetation unit as it is distinct from the surrounding vegetation, consists of one tree species, covers a small area and is in a Completely Degraded condition. No relevé was recorded within the vegetation unit

2022 Original Survey Vegetation Units (BDS, 2022)

Vegetation Unit 1: Mixed Shrubland [MSL]

Vegetation Unit 1 consisted of a mixed native shrubland characterised by dominant shrubs of *Allocasuarina acutivalvis*, *Grevillea hookeriana* and *Grevillea teretifolia* over the sedge, *Ecdeiocolea monostachya*, and other mixed native shrubs with an understorey comprising of introduced herbs and grasses including *Romulea rosea*, *Arctotheca calendula* and *Ehrharta longiflora*.

Vegetation Description (NVIS): S [^]*Allocasuarina acutivalvis*, *Grevillea hookeriana*, *Grevillea teretifolia* [^]*Shrub*\1\i;V [^]*Ecdeiocolea monostachya* [^]*Rush*\2\bc), H [^] *Romulea rosea*, *Arctotheca calendula* [^]*herb*\1\bc).G [^] *Eragrostis curvula*, *Ehrharta longiflora* and *Austrostipa elegantissima* [^]*grass*\1\w.

Vegetation Description (Muir): Mixed Native Shrubland dominated by *Allocasuarina acutivalvis*, *Grevillea hookeriana* and *Grevillea teretifolia* Scrub, over *Ecdeiocolea monostachya*, over *Romulea rosea*, *Arctotheca calendula*, *Eragrostis curvula*, *Ehrharta longiflora* and *Austrostipa elegantissima*.

Area: 7.24 ha.

Site description: Gently sloping situated mid slope, with light brown clay, loamy and sandy soil which is well drained.

Condition: Very Good, Good, Degraded and Completely Degraded.



Figure 10: Mixed Shrubland [MSL] vegetation type present within the survey area.

Vegetation Unit 2: Mixed Eucalyptus Woodland [EucW]

Vegetation Unit 2 comprised of an open woodland dominated by *Eucalyptus camaldulensis*, *Eucalyptus loxophleba* subsp. *supralaevis*, *Eucalyptus loxophleba* subsp. *loxophleba* over *Rhagodia drummondii* and *Enchylaena tomentosa* with an understorey comprising of introduced species. Limited diversity was observed with numerous weed species present within the site and areas lacking vegetation.

Vegetation Description (NVIS): U [^] *Eucalyptus camaldulensis*, *Eucalyptus loxophleba* subsp. *supralaevis*, *Eucalyptus loxophleba* subsp. *loxophleba* [^]*tree*\6\i;M [^] *Rhagodia drummondii* and *Enchylaena tomentosa* [^]*shrub*\r;W *Ehrharta longiflora* [^]*grass*\1\bc F *Romulea rosea*, *Romulea rosea* var. *australis* \1\bc.

Vegetation Description (Muir): Mixed Eucalyptus open woodland (*Eucalyptus camaldulensis*, *Eucalyptus loxophleba* subsp. *supralaevis*, *Eucalyptus loxophleba* subsp. *loxophleba*), over and open shrubland of *Rhagodia drummondii* and *Enchylaena tomentosa*, over introduced grasses and herbs, *Romulea rosea*, *Romulea rosea* var. *australis* and *Ehrharta longiflora*.

Area: 4.52 ha.

Site description: Gently sloping situated mid slope, with light brown clay, loamy and sandy soil which is well drained.

Condition: Good, Degraded and Completely Degraded.



Figure 11: Mixed Eucalyptus Woodland [EucW] vegetation type present within the survey area.

Vegetation Unit 3: *Eucalyptus salmonophloia* Woodland [EucaSW]

Vegetation Unit 3 consisted of an open woodland dominated by *Eucalyptus salmonophloia*, over a shrubland dominated by *Rhagodia preissii* over an understorey of *Austrostipa elegantissima* and *Ehrharta longiflora*. Limited diversity was observed with numerous weed species present within the site and areas lacking vegetation.

Vegetation Description (NVIS): U ^ *Eucalyptus salmonophloia* \^tree\8r;M ^*Rhagodia preissii*\^shrub\2i;G ^^*Austrostipa elegantissima* *Ehrharta longiflora* \^grass\1r.

Vegetation Description (Muir): *Eucalyptus salmonophloia* Open Woodland over *Rhagodia preissii* open scrub over *Austrostipa elegantissima* and *Ehrharta longiflora*.

Area: 2.25 ha.

Site description: Hill crest (flat) with light brown clay, loamy and sandy soil which is well drained.

Condition: Degraded and Completely Degraded.



Figure 12: *Eucalyptus salmonophloia* Woodland [EucaSW] vegetation type present within the survey area.

Vegetation Unit 4: *Eucalyptus loxophleba* subsp. *loxophleba* Woodland [EucloxW]

Vegetation Unit 4 consists of a woodland characterised by a *E. loxophleba* subsp. *loxophleba*. R4 is situated in a block of remnant vegetation. Seven species were found, one species is non-native. Poaceae was the most common family recorded with three species.

Vegetation Description (NVIS): U ^*Eucalyptus loxophleba* subsp. *loxophleba*^tree\6\d;G ^^*Ehrharta longiflora*,*Amphipogon caricinus*,*Austrostipa elegantissima*^^grass\1\d.

Vegetation Description (Muir): *Eucalyptus loxophleba* subsp. *loxophleba* Dense Low Forest, over *Dodonaea bursariifolia*, *Rhagodia drummondii* Open Dwarf Scrub, over *Enchylaena lanata* Open Dwarf Scrub, over *Dianella revoluta* over Open Herbs, over *Ehrharta longiflora*, *Amphipogon caricinus*, *Austrostipa elegantissima* Very Open Low Grass.

Area: 0.29 ha.

Site description: Flat site with dark brown, clay loam soil, with good drainage.

Condition: Good, Degraded.



Figure 13: *Eucalyptus loxophleba* subsp. *loxophleba* Woodland [EucloxW] vegetation type present within the survey area.

Appendix D

Quadrat Data (BDS, 2024b)

| | | | | | |
|------------------------------------|---|-----------------|------------------------|----------------------|------------|
| Quadrat | Q1 | Veg Code | Veg Type 4: EucloxW | Date Surveyed | 12/09/2023 |
| Location | Towards the southwest of the subject site, approximately 162.21 m from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.215073, 117.000418 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | <p>(NVIS): U ^Eucalyptus loxophleba subsp. loxophleba^tree\6d;G ^^Ehrharta longiflora,Amphipogon caricinus,Austrostipa elegantissima^^grass\1d.</p> <p>(Muir): Eucalyptus loxophleba subsp. loxophleba Dense Low Forest, over Dodonaea bursariifolia, Rhagodia drummondii Open Dwarf Scrub, over Enchylaena lanata Open Dwarf Scrub, over Dianella revoluta over Open Herbs, over Ehrharta longiflora, Amphipogon caricinus, Austrostipa elegantissima Very Open Low Grass.</p> | | | | |
| Condition | Good | | | | |
| Comments | | | | | |

| Species Name | Form | Height | Cover (%) | Flowering/Fruiting |
|---|---------|---------|-----------|--------------------|
| <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> | T-tree | 8m | d > 70% | FL/FR |
| <i>Maireana brevifolia</i> | S-shrub | 70-80cm | r <10% | |
| <i>Rhagodia preissii</i> | S-shrub | 30cm | r <10% | |
| <i>Enchylaena lanata</i> | S-shrub | 15cm | r <10% | Fruiting |
| <i>Atriplex semibaccata</i> | S-shrub | 5cm | r <10% | |
| <i>Dodonaea bursariifolia</i> | S-shrub | 1m | r <10% | Fruiting |
| <i>Carpobrotus modestus</i> | S-shrub | 10cm | r <10% | Fl/Fr |
| <i>Enchylaena tomentosa</i> | S-shrub | 15cm | r <10% | |
| <i>Austrostipa elegantissima</i> | G-grass | 50cm | r <10% | Flowering |
| <i>Ehrharta longiflora</i> | G-grass | 40cm | d > 70% | Flowering |
| <i>Rytidosperma caespitosum</i> | G-grass | 50cm | r <10% | Flowering |
| <i>Dianella revoluta</i> | H-herb | 50cm | r <10% | |
| <i>Mesembryanthemum crystallinum</i> | H-herb | 5cm | r <10% | Fruiting |



| | | | | | |
|------------------------------------|---|-----------------|---------------------|----------------------|------------|
| Quadrat | Q2 | Veg Code | Veg Type 2: EucW | Date Surveyed | 12/09/2023 |
| Location | Towards the centre of the subject site, approximately 980.93 m from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.209743, 117.010377 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Light Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | <p>(NVIS): U ^{^^} <i>Eucalyptus camaldulensis</i>, <i>Eucalyptus loxophleba</i> subsp. <i>supralaevis</i>, <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> ^{^^}tree; M ^{^^} <i>Rhagodia drummondii</i>, <i>Enchylaena tomentosa</i> ^{^^}shrub; W <i>Ehrharta longiflora</i> ^{^^}grass; F <i>Romulea rosea</i>, <i>Romulea rosea</i> var. <i>australis</i> ^{^^}bc.</p> <p>(Muir): Mixed Eucalyptus open woodland (<i>Eucalyptus camaldulensis</i>, <i>Eucalyptus loxophleba</i> subsp. <i>supralaevis</i>, <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>), over an open shrubland of <i>Rhagodia drummondii</i> and <i>Enchylaena tomentosa</i>, over introduced grasses and herbs, <i>Romulea rosea</i>, <i>Romulea rosea</i> var. <i>australis</i> and <i>Ehrharta longiflora</i>.</p> | | | | |
| Condition | Good | | | | |
| Comments | | | | | |

| Species Name | Form | Height | Cover (%) | Flowering/Fruiting |
|--------------------------------------|---------|--------|-----------|--------------------|
| <i>Eucalyptus salmonophloia</i> | T-tree | 20m | i 10-30% | Fruiting |
| <i>Atriplex stipitata</i> | S-shrub | 70cm | i 10-30% | Flowering |
| <i>Enchylaena tomentosa</i> | S-shrub | 10cm | r <10% | |
| <i>Enchylaena lanata</i> | S-shrub | 10cm | r <10% | Fruiting |
| <i>Sclerolaena diacantha</i> | S-shrub | 10cm | r <10% | Fruiting |
| <i>Austrostipa elegantissima</i> | G-grass | 50cm | r <10% | Flowering |
| <i>Avena barbata</i> | G-grass | 80cm | r <10% | Flowering |
| <i>Ehrharta longiflora</i> | G-grass | 50cm | c 30-70% | Flowering |
| <i>Lolium rigidum</i> | G-grass | 30cm | i 10-30% | Flowering |
| <i>Hordeum leporinum</i> | G-grass | 15cm | r <10% | Flowering |
| <i>Eremophila drummondii</i> | S-shrub | 40cm | r <10% | Flowering |
| <i>Mesembryanthemum crystallinum</i> | H-herb | 3cm | r <10% | Fruiting |
| <i>Arctotheca calendula</i> | H-herb | 3cm | r <10% | |
| <i>Crassula colorata</i> | H-herb | 2cm | r <10% | |



| | | | | | |
|------------------------------------|--|-----------------|----------------------|----------------------|------------|
| Quadrat | Q3 | Veg Code | Veg Type 3: EucaW | Date Surveyed | 12/09/2023 |
| Location | Towards the centre of the subject site, approximately 1.28 km from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.208015, 117.012925 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Orange/Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | (NVIS): U ^ <i>Eucalyptus salmonophloia</i> ^tree\8r;M ^ <i>Rhagodia preissii</i> ^shrub\2i;G ^^ <i>Austrostipa elegantissima</i> , <i>Ehrharta longiflora</i> ^grass\1r. (Muir): <i>Eucalyptus salmonophloia</i> Open Woodland over <i>Rhagodia preissii</i> open scrub over <i>Austrostipa elegantissima</i> and <i>Ehrharta longiflora</i> . | | | | |
| Condition | Very Good | | | | |
| Comments | | | | | |

| Species Name | Form | Height | Cover (%) | Flowering/Fruiting |
|----------------------------------|---------|--------|-----------|--------------------|
| <i>Eucalyptus salmonophloia</i> | T-tree | 20cm | i 10-30% | |
| <i>Leptomeria preissiana</i> | S-shrub | 80cm | r <10% | |
| <i>Eremophila drummondii</i> | S-shrub | 30cm | r <10% | |
| <i>Acacia erinacea</i> | S-shrub | 40cm | r <10% | |
| <i>Atriplex stipitata</i> | S-shrub | 40cm | i 10-30% | |
| <i>Enchylaena lanata</i> | S-shrub | 25cm | r <10% | |
| <i>Sclerolaena diacantha</i> | S-shrub | 20cm | r <10% | |
| <i>Enchylaena tomentosa</i> | S-shrub | 20cm | r <10% | |
| <i>Austrostipa elegantissima</i> | G-grass | 30cm | r <10% | |
| <i>Rytidosperma caespitosa</i> | G-grass | 15cm | r <10% | |



| | | | | | |
|------------------------------------|---|-----------------|---------------------|----------------------|------------|
| Quadrat | Q4 | Veg Code | Veg Type 2: EucW | Date Surveyed | 04/12/2023 |
| Location | Towards the northeast of the subject site, approximately 2.17 km from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.203333, 117.020538 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | <p>NVIS): U ^ Eucalyptus camaldulensis, Eucalyptus loxophleba subsp. supralaevis, Eucalyptus loxophleba subsp. loxophleba; M ^ Rhagodia drummondii, Enchylaena tomentosa; W Ehrharta longiflora; F Romulea rosea, Romulea rosea var. australis.</p> <p>(Muir): Mixed Eucalyptus open woodland (Eucalyptus camaldulensis, Eucalyptus loxophleba subsp. supralaevis, Eucalyptus loxophleba subsp. loxophleba), over and open shrubland of Rhagodia drummondii and Enchylaena tomentosa, over introduced grasses and herbs, Romulea rosea, Romulea rosea var. australis and Ehrharta longiflora.</p> | | | | |
| Condition | Good | | | | |
| Comments | | | | | |

| Species Name | Form | Height | Cover (%) | Flowering/Fruiting |
|-------------------------------|---------|--------|-----------|--------------------|
| <i>Eucalyptus loxophleba</i> | T-tree | 25m | i 10-30% | FL/FR |
| <i>Rhagodia drummondii</i> | S-shrub | 80cm | i 10-30% | Fruiting |
| <i>Atriplex stipitata</i> (F) | S-shrub | 50cm | i 10-30% | Fruiting |
| <i>Enchylaena tomentosa</i> | S-shrub | 20cm | r <10% | |
| <i>Amphipogon caricinus</i> | G-grass | 25cm | r <10% | |
| <i>Lolium rigidum</i> | G-grass | 25cm | r <10% | |
| <i>Atriplex stipitata</i> (M) | S-shrub | 30cm | i 10-30% | Flowering |
| <i>Templetonia sulcata</i> | S-shrub | 10cm | bi ≈0 | |
| <i>Eucalyptus longicornis</i> | T-tree | 25m | r <10% | FL/FR |



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|------------------------------------|---|-----------------|-----------------------|----------------------|------------|
| Quadrat | Q5 | Veg Code | Veg Type 3: EucsaW | Date Surveyed | 04/12/2023 |
| Location | Towards the centre of the subject site, approximately 1.25 km from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.208530, 117.012947 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | (NVIS): U ^ <i>Eucalyptus salmonophloia</i> \^tree\8r;M ^ <i>Rhagodia preissii</i> \^shrub\2i;G ^^ <i>Austrostipa elegantissima</i> , <i>Ehrharta longiflora</i> \^grass\1r. (Muir): <i>Eucalyptus salmonophloia</i> Open Woodland over <i>Rhagodia preissii</i> open scrub over <i>Austrostipa elegantissima</i> and <i>Ehrharta longiflora</i> . | | | | |
| Condition | Good | | | | |
| Comments | | | | | |

| Species Name | Form | Height | Cover (%) | Flowering/Fruiting |
|----------------------------------|---------|--------|-----------|--------------------|
| <i>Eucalyptus salmonophloia</i> | T-tree | 25m | r <10% | |
| <i>Acacia merrallii</i> | S-shrub | 2.5m | i 10-30% | |
| <i>Eremophila drummondii</i> | S-shrub | 50cm | i 10-30% | |
| <i>Leptomeria preissiana</i> | S-shrub | 1m | i 10-30% | |
| <i>Atriplex stipitata</i> (M) | S-shrub | 40cm | i 10-30% | Flowering |
| <i>Atriplex stipitata</i> (F) | S-shrub | 60cm | i 10-30% | Fruiting |
| <i>Austrostipa elegantissima</i> | G-grass | 40cm | i 10-30% | |
| <i>Sclerolaena diacantha</i> | S-shrub | 15cm | r <10% | |
| <i>Daviesia nematophylla</i> | S-shrub | 80cm | r <10% | Fruiting |



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|------------------------------------|---|-----------------|-----------------------|----------------------|------------|
| Quadrat | Q6 | Veg Code | Veg Type 3: EucsaW | Date Surveyed | 04/12/2023 |
| Location | Towards the centre of the subject site, approximately 1.29 km from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.20829, 117.013188 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | (NVIS): U ^ Eucalyptus salmonophloia ^tree\8r;M ^Rhagodia preissii^shrub\2i;G ^^ Austrostipa elegantissima,Ehrharta longiflora ^grass\1r. (Muir): Eucalyptus salmonophloia Open Woodland over Rhagodia preissii open scrub over Austrostipa elegantissima and Ehrharta longiflora. | | | | |
| Condition | Good | | | | |
| Comments | | | | | |


| Species Name | Form | Height | Cover (%) | Flowering/Fruiting |
|----------------------------------|---------|--------|-----------|--------------------|
| <i>Eucalyptus salmonophloia</i> | T-tree | 30m | i 10-30% | |
| <i>Atriplex stipitata</i> (M) | S-shrub | 80cm | r <10% | Flowering |
| <i>Sclerolaena diacantha</i> | S-shrub | 30cm | i 10-30% | |
| <i>Enchylaena tomentosa</i> | S-shrub | 15cm | i 10-30% | Fruiting |
| <i>Salsola australis</i> | S-shrub | 15cm | r <10% | |
| <i>Austrostipa elegantissima</i> | G-grass | 25cm | r <10% | |
| <i>Rhagodia baccata</i> | S-shrub | 80cm | r <10% | |
| <i>Amphipogon caricinus</i> | S-shrub | 30cm | r <10% | Fruiting |
| <i>Enchylaena lanata</i> | S-shrub | 30cm | r <10% | |
| <i>Dianella revoluta</i> | S-shrub | 30cm | r <10% | |
| <i>Atriplex semibaccata</i> | S-shrub | 10cm | r <10% | |



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|------------------------------------|---|-----------------|---------------------|----------------------|------------|
| Quadrat | Q7 | Veg Code | Veg Type 2: EucW | Date Surveyed | 04/12/2023 |
| Location | Towards the southwest of the subject site, approximately 251.90 m from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.216464, 117.000146 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | <p>NVIS): U ^{^^} <i>Eucalyptus camaldulensis</i>, <i>Eucalyptus loxophleba</i> subsp. <i>supralaevis</i>, <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> ^{^^}tree\6\; M ^{^^} <i>Rhagodia drummondii</i>, <i>Enchylaena tomentosa</i> ^{^^}shrub\; W <i>Ehrharta longiflora</i> ^{^^}grass\1\bc F <i>Romulea rosea</i>, <i>Romulea rosea</i> var. <i>australis</i> ^{^^}bc.</p> <p>(Muir): Mixed Eucalyptus open woodland (<i>Eucalyptus camaldulensis</i>, <i>Eucalyptus loxophleba</i> subsp. <i>supralaevis</i>, <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>), over and open shrubland of <i>Rhagodia drummondii</i> and <i>Enchylaena tomentosa</i>, over introduced grasses and herbs, <i>Romulea rosea</i>, <i>Romulea rosea</i> var. <i>australis</i> and <i>Ehrharta longiflora</i>.</p> | | | | |
| Condition | Good | | | | |
| Comments | | | | | |

| Species Name | Form | Height | Cover (%) | Flowering/Fruiting |
|----------------------------------|-------------|---------------|------------------|---------------------------|
| <i>Eucalyptus loxophleba</i> | T-tree | 15m | i 10-30% | Fruiting |
| <i>Maireana brevifolia</i> | S-shrub | 50cm | i 10-30% | Fruiting |
| <i>Enchylaena tomentosa</i> | S-shrub | 25cm | r <10% | |
| <i>Atriplex semibaccata</i> | S-shrub | 10cm | r <10% | |
| <i>Rhagodia drummondii</i> | S-shrub | 50cm | i 10-30% | Fruiting |
| <i>Austrostipa elegantissima</i> | G-grass | 50cm | r <10% | |
| <i>Avena barbata</i> | G-grass | 30cm | r <10% | |
| <i>Ehrharta calycina</i> | G-grass | 25cm | r <10% | |
| <i>Amphipogon caricinus</i> | G-grass | 25cm | r <10% | Fruiting |



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|---|---|-----------------|---------------------|---------------------------|------------|
| Quadrat | Q8 | Veg Code | Veg Type 2: EucW | Date Surveyed | 04/12/2023 |
| Location | Towards the southwest of the subject site, approximately 299.78 m from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.216361, 116.999555 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | <p>NVIS): U ^ Eucalyptus camaldulensis, Eucalyptus loxophleba subsp. supralaevis, Eucalyptus loxophleba subsp. loxophleba ^tree\6\; M ^ Rhagodia drummondii, Enchylaena tomentosa \shrub\; W Ehrharta longiflora \grass\1\bc F Romulea rosea, Romulea rosea var. australis \1\bc.</p> <p>(Muir): Mixed Eucalyptus open woodland (Eucalyptus camaldulensis, Eucalyptus loxophleba subsp. supralaevis, Eucalyptus loxophleba subsp. loxophleba), over and open shrubland of Rhagodia drummondii and Enchylaena tomentosa, over introduced grasses and herbs, Romulea rosea, Romulea rosea var. australis and Ehrharta longiflora.</p> | | | | |
| Condition | Good | | | | |
| Comments | | | | | |
| Species Name | Form | Height | Cover (%) | Flowering/Fruiting | |
| <i>Eucalyptus loxophleba</i> | T-tree | 15m | i 10-30% | Fruiting | |
| <i>Amphipogon caricinus</i> | G-grass | 25cm | r <10% | | |
| <i>Eragrostis curvula</i> | G-grass | 40cm | r <10% | | |
| <i>Avena barbata</i> | G-grass | 20cm | r <10% | | |
| <i>Dianella revoluta</i> | H-herb | 40cm | r <10% | | |
| (Dead) | V-sedge | | | | |
|  | | | | | |

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|------------------------------------|---|-----------------|---------------------|----------------------|------------|
| Quadrat | Q9 | Veg Code | Veg Type 2: EucW | Date Surveyed | 04/12/2023 |
| Location | Towards the northeast of the subject site, approximately 2.99 km from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.200307, 117.024453 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | <p>NVIS): U ^ Eucalyptus camaldulensis, Eucalyptus loxophleba subsp. supralaevis, Eucalyptus loxophleba subsp. loxophleba ^tree\6r; M ^ Rhagodia drummondii, Enchylaena tomentosa \shrub\; W Ehrharta longiflora \grass\1\bc F Romulea rosea, Romulea rosea var. australis \1\bc.</p> <p>(Muir): Mixed Eucalyptus open woodland (Eucalyptus camaldulensis, Eucalyptus loxophleba subsp. supralaevis, Eucalyptus loxophleba subsp. loxophleba), over and open shrubland of Rhagodia drummondii and Enchylaena tomentosa, over introduced grasses and herbs, Romulea rosea, Romulea rosea var. australis and Ehrharta longiflora.</p> | | | | |
| Condition | Very Good | | | | |
| Comments | | | | | |

| Species Name | Form | Height | Cover (%) | Flowering/Fruiting |
|--|---------|--------|-----------|--------------------|
| <i>Eucalyptus loxophleba</i> | T-tree | 18m | c 30-70% | Fruiting |
| <i>Leptomeria preissiana</i> | S-shrub | 2.5m | c 30-70% | Flowering |
| <i>Rhagodia drummondii</i> | S-shrub | 50cm | i 10-30% | |
| <i>Enchylaena tomentosa</i> | S-shrub | 30cm | r <10% | |
| <i>Senna artemisioides</i> subsp. <i>filifolia</i> | S-shrub | 2m | r <10% | |
| <i>Austrostipa elegantissima</i> | G-grass | 50cm | r <10% | |
| <i>Lepidosperma tenue</i> | V-sedge | 25cm | r <10% | Fruiting |
| <i>Amphipogon caricinus</i> | G-grass | 20cm | r <10% | Fruiting |
| <i>Avena barbata</i> | G-grass | 30cm | r <10% | |



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|------------------------------------|---|-----------------|---------------------|----------------------|------------|
| Quadrat | Q10 | Veg Code | Veg Type 2: EucW | Date Surveyed | 04/12/2023 |
| Location | Towards the northeast of the subject site, approximately 2.83 km from the intersection of Goomalling-Wyalkatchem Road and Rifle Range Road. | | | | |
| GPS (Lat, Long) | -31.200622, 117.023045 | | | | |
| Landform and Slope | Flat slope on plain | | | | |
| Soils | Brown | | | | |
| Hydrology | Good drainage | | | | |
| Vegetation Unit description | <p>NVIS): U ^ Eucalyptus camaldulensis, Eucalyptus loxophleba subsp. supralaevis, Eucalyptus loxophleba subsp. loxophleba; M ^ Rhagodia drummondii, Enchylaena tomentosa; W Ehrharta longiflora; F Romulea rosea, Romulea rosea var. australis.</p> <p>(Muir): Mixed Eucalyptus open woodland (Eucalyptus camaldulensis, Eucalyptus loxophleba subsp. supralaevis, Eucalyptus loxophleba subsp. loxophleba), over and open shrubland of Rhagodia drummondii and Enchylaena tomentosa, over introduced grasses and herbs, Romulea rosea, Romulea rosea var. australis and Ehrharta longiflora.</p> | | | | |
| Condition | Very Good | | | | |
| Comments | | | | | |

| Species Name | Form | Height | Cover (%) | Flowering/Fruiting |
|----------------------------------|---------|--------|-----------|--------------------|
| <i>Amphipogon carcinus</i> | T-tree | 20m | c 30-70% | Fruiting |
| <i>Alyxia buxifolia</i> | S-shrub | 80cm | r <10% | |
| <i>Rhagodia drummondii</i> | S-shrub | 30cm | i 10-30% | |
| <i>Juncus kraussii</i> | V-sedge | 1m | r <10% | |
| <i>Avena barbata</i> | G-grass | 30cm | c 30-70% | |
| <i>Enchylaena tomentosa</i> | S-shrub | 15m | r <10% | |
| <i>Bromus rubens</i> | G-grass | 10cm | i 10-30% | |
| <i>Austrostipa elegantissima</i> | G-grass | 15cm | i 10-30% | |

