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Clearing Assessment Report CPS 818

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Brand Highway Passing Lane
Brand Highway (H004) – SLK 166
Midwest Gascoyne
EOS: 3438

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1 PROPOSAL

1.1 Purpose and Justification

Main Roads is proposing to construct a northbound passing lane along Brand Highway between SLK 166.65 – 168.75. The proposal will require the clearing of up to 1.89 hectares (ha) of native vegetation. The road alignment follows a steep grade along this section with horizontal curves, which provides inadequate sight distance for traffic to overtake large freight and slow-moving vehicles. At these steep grade locations, heavy vehicle speeds fall below 90 km/h causing driver frustration and prompting unsafe overtaking manoeuvres.

Constructing a new northbound overtaking lane at this location will improve safety and increase the efficiency of heavy vehicles by reducing travel time.

1.1.1 Main Roads Approach to Road Safety and the Environment

Main Roads is committed to minimising the environmental impacts of all of its activities and manages the State road network to achieve balanced economic, social, safety and environmental benefits for the community. Main Roads recognises that Western Australia's environment is significant from a global perspective and the unique conservation values that are contained within its road reserve. Main Roads road network often adjoins natural areas and, in some locations, the reserve itself hosts remnant vegetation with high environmental values. Although the reserves were not established for this purpose, Main Roads recognises that it has a responsibility to conserve the environmental values that occur within the State's road network and minimise the impact its proposals have on the environment. In addition to providing a safe and efficient road network for all people using the roads under its control, Main Roads is also committed to protecting the natural environment.

In accordance with National and State Government road safety policies, Main Roads is also committed to substantially reducing road trauma on the road network through Safe System principles. The Safe System approach acknowledges that more than two thirds of all serious crashes are due to human error rather than deliberate risk taking (e.g. speeding or drink driving) and seeks to improve behaviour through education and enforcement while managing the safety of vehicles, speeds and the road and road infrastructure. It is shown that improving sub-optimal road formation will substantially reduce the likelihood and severity of road crashes. For example, according to the Road Safety Management Guideline, increasing the sealed shoulder from 0.5 m to 2 m will reduce Killed and Seriously Injured numbers by more than 50%.

As the statutory authority responsible for providing and managing a safe and efficient main road network in Western Australia, Main Roads focuses on improving road safety by thoroughly considering all environmental, economic and community benefits and impacts. It operates on a hierarchy of avoiding, minimising, reducing and then, if required, offsetting our environmental impacts. This has been achieved through changes in proposal scope and design. Main Roads regularly reduces its clearing footprint by restricting earthworks limits for proposals, steepening batters, installing barriers, establishing borrow pits in cleared paddocks and avoiding temporary clearing for storage, stockpiles and turn around bays to avoid and minimise its impacts.

Further details on measures to avoid, minimise and reduce are provided in Section 1.5.

1.2 Proposal Scope

The Proposal will involve widening of existing road and the construction of new foundation, table drains, sub-grade, base course, bitumen seal, and audible edge lines, using road graders, large excavators, loaders, trucks, rollers, and stabiliser.

1.3 Proposal Location

The project is located along Brand Highway (SLK 166.65 – 168.75) within the Shire of Dandaragan., The site is approximately 52 km south of Eneabba and 15 km northwest of Badgingarra (Figure 1, Appendix 1).

The central coordinate of the proposal is

Latitude: - 30.2556769

Longitude: 115.4572033

The location and boundaries of the study area (20 km radius) for the project (Figure 2)

1.4 Clearing Details

Proposed Clearing to be undertaken using CPS 818: 1.89 ha

Areas of Native Vegetation Clearing:

The proposal requires total clearing of 1.89 ha of native vegetation within the Development Envelope (DE).

Type of Native Vegetation:

The DE is comprised of five native Vegetation Types

(Table 1, Figure 3 and Figure 4)

Table 1: Development Envelope Vegetation Types

Vegetation Type	Description	Development Envelope (ha) and (%)
VT01	<i>Eucalyptus todtiana</i> low isolated mallee trees to open mallee woodland over <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> , <i>Eremaea pauciflora</i> var. <i>pauciflora</i> , <i>Hakea trifurcata</i> mid to tall open to sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> ,	0.74 ha (39.15%)
VT02	<i>Hakea auriculata</i> , <i>Lambertia multiflora</i> var. <i>multiflora</i> , <i>Xanthorrhoea drummondii</i> , <i>Styphelia tortifolia</i> , <i>Hakea smilacifolia</i> , <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> low shrubland.	0.32 ha (16.93%)
VT03	<i>Eremaea pauciflora</i> var. <i>calyptra</i> , <i>Allocasuarina humilis</i> , <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> mid sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Beaufortia elegans</i> , <i>Synaphea spinulosa</i> subsp. <i>spinulosa</i> low open shrubland	0.28 ha (14.81%)
VT04	<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> , <i>Banksia candolleana</i> , <i>Allocasuarina humilis</i> , <i>Eremaea pauciflora</i> var. <i>pauciflora</i> tall to mid shrubland with occasional <i>Eucalyptus conveniens</i> low scattered mallee trees over <i>Melaleuca seriata</i> , <i>Jacksonia floribunda</i> .	0.19 ha (10.05%)
VT06	<i>Banksia prionotes</i> , <i>Eucalyptus todtiana</i> low open woodland over <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> , <i>Leptospermopsis oligandra</i> , <i>Allocasuarina humilis</i> mid open shrubland over	0.36 ha (19.06%)
Total Clearing Area		1.89 ha (100%)

1.5 Alternatives to Native Vegetation Clearing Considered During Proposal Development

The following alternatives to clearing were considered during the development of the proposal:

- Upgrading other alternative routes that are less vegetated and environmentally constrained, however these are not suitable due to longer travel times, sensitive local receptors (such as residences) or other planning issues.
- Do not upgrade the road, however this will potentially result in a poorer safety outcome and may result in future fatalities or serious injuries and further degradation of the State road asset.
- Main Roads retains frangible vegetation where a clear zone is to be established for road projects. For this project, however, clearing will only be required to accommodate the road formation, with no clear zone being established. Accordingly, the retention of frangible vegetation does not apply to this proposal.
- Reducing the speed limit to minimise clearing requirements, while still balancing safety (driver fatigue) and freight efficiency. Speed Limits are an essential mechanism to ensure the safe and efficient operation of road networks. The application of appropriate speed limits and other traffic management measures is a key mechanism in managing vehicle speeds to achieve desired safety, mobility, traffic management, local amenity, and road user expectations. There are several factors involved in road safety, including road conditions, driver behaviour and overall road design. Except in special situations, reducing speed limits below national standards on state and national roads is not typically supported as it has the potential to contribute to driver frustration, impatience, tiredness and recklessness. The environmental values protected by reducing the speed limit, do not justify the impacts on freight efficiencies nor road user safety. Accordingly, the reduction of the speed limits to avoid clearing of native vegetation for this proposal is not proposed.

1.6 Measures to Avoid, Minimise, Reduce and Manage Proposal Clearing Impacts

The design and management measures implemented to avoid and minimise the potential clearing impacts of the Proposal are provided in Table 2.

Three (3) design options were developed for the passing lane to assess their overall impact on the adjacent vegetation:

Option 1: Widening to the west of Brand Highway to create two northbound lanes, requiring 1.89 ha of clearing.

Option 2: Widening to the east of Brand Highway to create two northbound lanes, requiring 2.24 ha of clearing.

Option 3: A minor correction to the road alignment, widening on both sides to create two northbound lanes with a 100 mm overlay. Requiring 2.5 ha of clearing.

The option with the least clearing area (Option 1) has been selected for detailed design. Given the hilly terrain in the DE, a varied batter slope was used instead of a uniform 1:6 batter slope, which helps minimise the project footprint and reduces the total clearing area.

Additionally, the following items have been incorporated in the design and will be implemented to minimise impacts to the adjacent vegetation:

- A safety barrier will be installed between SLK 167.26 and 167.72 to further reduce the area needing clearance. Steeper batters reduce the overall construction footprint, which in turn, reduces clearing requirements.
- The passing lane was shortened at its southern end to avoid interfering with the existing culvert on the curve. This minimises disruption to the surface flow pattern and reduces the need for artificial drainage channels, ultimately decreasing the area that needs to be cleared.
- The existing super elevation on the short curve at the northern end has been reduced from 7.5% to 3% with minor alignment adjustments. Maintaining the original super elevation would have significantly increased embankment fill depth, requiring extensive vegetation clearing. Reducing the batter height by 0.5 m decreases the work on the pavement batter by 2 m.
- Shorten the climbing lane at the northern end (allowing sufficient grade for trucks to climb uphill safely). This adjustment reduces the construction area, ultimately minimising the clearing required.

Table 2. Measures Undertaken to Avoid, Minimise, Reduce and Manage the Proposal Clearing Impacts

Design or Management Measure	Applied to Current Design	Discussion and Justification
Steepen batter slopes	Yes	Given the hilly terrain in the Development Envelope, a varied batter slope was used instead of a uniform 1:6 batter slope, which helps minimize the project footprint and reduces the total clearing area.
Installation of safety barriers	Yes	A safety barrier will be installed between SLK 167.26 and 167.72 to further reduce the area needing clearance.
Alignment to one side of existing road	Yes	The alignment follows the existing road, with the inclusion of an extended overtaking lane. The Development Envelope includes the existing road maintenance zone, which is completely degraded. The majority of the Development Envelope is on the western side of the existing Brand Highway.
Alternative alignment to follow existing road (or) to preferentially locate within pasture or a degraded area	No	The alignment follows the existing road, with the inclusion of an extended overtaking lane. The Development Envelope includes the existing road maintenance zone, which is completely degraded. Alternative alignment would require an increased Development Envelope and clearing area.
Installation of kerbing	N/A	The installation of kerbing is not required within the design and integration would not reduce the Development Envelope or clearing impacts as additional surface water management design aspects would need to be incorporated into the Proposal.
Simplification of design to reduce number of lanes and/or complexity of intersections	Yes	Design of the overtaking lane will be consistent with the existing design. See three (3) design consideration options above, to ascertain which option would be the least impacting to the adjacent native vegetation.
Preferential use of existing cleared areas for access tracks, construction storage and stockpiling	Yes	Previously disturbed areas (maintenance zone) have been considered in the design and are included in the alignment.
Drainage modification	No	Road surface water drainage will be maintained and will be in keeping with the existing drainage.

1.7 Approved Policies and Planning Instruments

The clearing of native vegetation in Western Australia is regulated under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act, Main Roads has also had regard to the below instruments where relevant.

Other Legislation potentially relevant for assessment of clearing and planning/other matters:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Conservation and Land Management Act 1984* (WA) (CALM Act)
- *Country Areas Water Supply Act 1947* (WA) (CAWS Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Planning and Development Act 2005* (WA) (P and D Act)
- *Soil and Land Conservation Act 1945* (WA)
- *Rights in Water and Irrigation Act 1914*
- *Aboriginal Heritage Act 1972* (WA).

Environmental Protection Policies:

- Environmental Protection (Peel Inlet - Harvey Estuary) Policy 1992
- Environmental Protection (Western Swamp Tortoise Habitat) Policy 2011.

Other relevant policies and guidance documents:

- Environmental Offsets Policy (The Government of Western Australia, 2011)
- A guide to the assessment of applications to clear native vegetation (DER, 2014)
- Procedure: Native vegetation clearing permits (DWER, 2021)
- Environmental Offsets Guidelines (EPA, 2014)
- Technical guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016)
- Technical guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2020)
- Approved conservation advice under section 266B of the EPBC Act for threatened flora/fauna/vegetation communities.

2 SCOPE AND METHODOLOGY ASSESSMENT OF CLEARING

Native vegetation will be cleared to accommodate this Proposal. This clearing will be undertaken using the Main Roads Statewide Clearing Permit CPS 818.

To comply with CPS 818, Main Roads must prepare a Clearing Assessment Report (CAR).

The CAR outlines the key activities associated with the Proposal, the existing environment and an assessment of native vegetation clearing. This assessment provides an evaluation of the vegetation clearing impacts associated with the Proposal using the ten Clearing Principles listed under s51 of the *Environmental Protection Act 1986* (EP Act) and strategies used to manage vegetation clearing.

2.1 Report Terminology and Sources

The following terms are used in this Clearing Report

- **Biological Survey:** Fauna and Flora field survey of the Survey Area to obtain onsite environmental information of the area.
- **Clearing Area** – The maximum amount of native vegetation to be cleared for the Proposal (1.89 ha) under CPS818/17. The Native Vegetation Clearing Area will accommodate the designed earthworks and, typically, a nominal buffer to allow for the safe movement of machinery during construction.
- **Development Envelope (DE)** – The maximum extent within which the Clearing Area (1.89 ha) will be located.
- **Survey Area** – The area covered by the Biological Survey. This included works for the Brand Hwy passing lane and culverts extension at SLK 165.95 to SLK 170.05. The total Survey Area covers 44.115 ha in area.
- **Study Area** – Area covered by the Desktop Assessment. The Study Area for the Proposal is confined to a local area of a 20km radius.

2.2 Desktop Assessment

A desktop assessment of the DE was undertaken by viewing internal datasets and other government agency managed databases, and consulting with relevant stakeholders where necessary.

GIS layer viewing and mapping is done using ArcMap and/or Main Roads corporate mapping system known as iMaps. Referencing of the GIS layers accessed is done under the relevant methodology section of each clearing principle. Government managed databases were searched to locate additional information, which are found under References in Section 10.

2.3 Surveys and Assessments

The following surveys/assessments were undertaken to inform this CAR:

- Detailed and targeted flora and vegetation survey (Biologic, 2024)
- Basic Fauna survey (Biologic, 2024)
- Targeted Black Cockatoo habitat assessment (Biologic, 2024).

Biological and targeted surveys conducted for the proposal are outlined in Table 3 and a summary of the findings in these reports are presented in Sections 4.1 to 3.5.

Table 3. Summary of Biological and Targeted Surveys Relevant to the Proposal

Consultant and Survey Name	Survey Details
Biologic Environmental Survey (2024) Brand Highway Passing Lane Extension – Biological Survey	<p>Survey Area: The Survey Area covers 44.115 hectare (ha). This included Brand Hwy passing lanes and culverts between 154.50 and SLK 195.25.</p> <p>Type: The assessments undertaken for the proposal included:</p> <ul style="list-style-type: none"> • A desktop assessment. • Flora and Vegetation surveys – This included a combination of Detailed, Targeted, and Opportunistic sampling techniques. Including the assessment of vegetation types, vegetation condition and a significant ecological communities’ assessment. Assessments were undertaken in accordance with the Environmental Protection Authority (EPA) Guidelines (2016). • Basic Fauna Survey – This included opportunistic fauna searches and fauna habitat assessment documenting the type, value and connectivity). Mapping was produced based upon vegetation units in accordance with EPA (EPA, 2020). • Black Cockatoo Assessment – This included a foraging habitat assessment, which was assessed post-survey for each foraging habitat site. The scoring guides are an adaptation of: <ul style="list-style-type: none"> ○ The habitat quality calculation guide (2 C) in the EPBC Act Offset Guidelines (EPA, 2014), ○ Main Roads WA black cockatoo Environmental Factsheet (Main Roads, 2023) ○ Aspects of the habitat quality scoring tool outlined in the black cockatoo EPBC referral guidelines (Department of Agriculture, Water and the Environment (DAWE), 2022); and ○ peer-reviewed scientific literature. <p>Timing: The detailed, targeted and vegetation surveys consisted of two single phase detailed assessments and on targets flora survey</p> <ul style="list-style-type: none"> • Trip 1 (Detailed Single Phase); 11-14 October 2023;

Consultant and Survey Name	Survey Details
	<ul style="list-style-type: none"><li data-bbox="612 230 1315 264">• Trip 2 (Detailed Single Phase); 19-20 October 2023; and<li data-bbox="612 271 1150 304">• Trip 3 (Targeted); :22-23 November 2023. <p data-bbox="564 349 1294 416">The Basic Fauna and targets Black Cockatoo Assessment were undertaken in a single trip (3–4 October 2023)</p> <p data-bbox="564 427 1161 461">Survey Results Shapefile TRIM Ref: D24#700030</p> <p data-bbox="564 468 986 501">Document TRIM Ref: D24#904930</p>

3 DESKTOP ASSESSMENT OF VEGETATION

3.1 Desktop Vegetation Description

The DE is located within the Geraldton Sandplain Interim Biogeographic Regionalisation of Australia (IBRA) region and the Lesueur Sandplain subregion (GS02) (DCCEEW, 2023).

Geraldton Sandplains is described as 'mainly proteaceous scrub-heaths, rich in endemics, on the sandy earths of an extensive, undulating, lateritic sandplain mantling Permian to Cretaceous strata. Extensive York Gum and Jam woodlands occur on outwash plains associated drainage. The climate is regarded as 'semi-arid (dry) warm Mediterranean' (Desmond & Chant, 2002).

The Lesueur Sandplain comprises coastal Aeolian and limestones, Jurassic siltstones and sandstones of central Perth Basin. There are extensive yellow sandplains in south-eastern parts, especially where the subregions overlap the western edge of the Pilbara Craton. Shrub-heaths are rich in endemics and occur on a mosaic of lateritic mesas, sandplains, coastal sands and limestones (Desmond & Chant, 2003). There are many distinct, species rich and geographically restricted communities that occur within the Lesueur Sandplain. The subregion also exhibits extremely high floristic endemism, with over 250 species of sandplain flora endemic to the area, for which it is known Australia-wide and internationally (Desmond & Chant, 2002).

There is one Vegetation Association (VA 1031) within the DE. Table 4 provides details of the Vegetation Association and the remaining extent of this Association. Within the local area (20km radius) of the DE 33.29% of the pre-European extent of Vegetation Association Lesueur 1031 remains

Table 4. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre-European Extent (ha)	Current Extent (ha)	% Remaining	% Current Extent in DBCA Managed Land (proportion of pre-European Extent)
Veg Assoc No. 1031	Statewide WA	269 490.91	88 668.30	32.90	42.66
	IBRA Bioregion Geraldton Sandplains	241 349.97	83 217.27	34.48	44.52
	IBRA Sub-region Lesueur Sandplain	241 349.97	83 217.27	34.48	44.52
	Local Area (20km radius)	115 690.25	38 510.94	33.29	

4 SURVEY RESULTS

In accordance with CPS 818 condition 8 (e) (iii), a copy of the relevant sections of the executive summary and report conclusions from the biological survey and/or field assessments are provided in Appendix 2.

4.1 Summary and Analysis of Flora and Vegetation Surveys

The following survey has been completed for the Proposal.

Biological Survey (Biologic 2024)

Biologic undertook a biological survey from the 11-14 and 19–20 October and 22–23 November 2023. The 2023 survey extent covered approximately 44.115 ha, inclusive of the 1.89 ha DE for this Proposal.

Flora

Sixty flora sampling sites were completed across the Survey Area: thirteen quadrats, eight relevés and 39 vegetation mapping notes. The field survey identified 360 confirmed vascular flora taxa within the Survey Area, representing 165 genera from 53 families; and comprised 325 native flora taxa and 35 introduced taxa.

One Threatened flora taxon was recorded from the Survey Area during the current detailed survey; *Thelymitra stellata* (T), three individuals were recorded from one point-location (Not within the DE).

Thirteen confirmed Priority flora taxon were recorded:

- Priority 2: *Lyginia excelsa*
- Priority 3: *Austrostipa nunaginensis*, *Banksia nana*, *Beaufortia bicolor*, *Hensmania stoniella*, *Lepidobolus quadratus*, *Styphelia filamentosa*; and
- Priority 4: *Banksia chamaephyton*, *Desmocladius elongatus*, *Eucalyptus macrocarpa* subsp. *elachantha*, *Grevillea saccate*, *Schoenus griffinianus*, *Thysanotus glaucus*).

Of the 13 confirmed Priority flora species, one (*Desmocladius elongatus* (P4)) was identified within the DE. A post survey likelihood of occurrence within the DE was conducted on flora species identified in the wider Survey area (Appendix 4). No additional species were considered likely to occur within the DE.

Introduced Flora

Thirty-Five introduced taxa, representing 33 genera from 13 families, were recorded in the Survey Area. None of these taxa are listed as WoNS under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). One introduced taxon, **Echium plantagineum* (Patterson's Curse), is listed as a declared pest under the BAM Act. However, **Echium plantagineum* was not identified within the DE.

Vegetation Types

Twenty-one vegetation types and eight mapping units were described in the Survey Area and context area. They included:

Vegetation types:

- Hillslope, crest and undulating hill: VT01, VT02, VT03, VT04, VT06, VT08, VT10, VT12, VT15, VT16, VT01 (Astron), VT02 (Astron);
- Sand plain and stony plain: VT05, VT09, VT11, VT13, VT14, VT17; and
- Pastoral: VT07, VT18, VT19

Mapping units:

- Sand plain and stony plain: LR, NS;
- Drainage: D;
- Pastoral: Pa, R; and
- Highways and sealed roads: Cl, Rd, Hwy

Vegetation ranged from Pristine to Completely Degraded and covered 67.2% of the Survey Area and 30.6% of the context area. Primary disturbances were roads, tracks, and other infrastructure/ pastoral related disturbances or roadside vegetation.

No vegetation types recorded from the Study Area were found to be representative of Threatened or Priority Ecological Communities. Twelve vegetation are considered potential habitat of significant flora. One of these, VT02, was significant as refuge/habitat for the Threatened taxa *Thelymitra stellata*.

The total area of native vegetation mapped within the DE was 1.89 ha (26.21%). This includes five native vegetation types (Table 5).

The most dominant native vegetation type within the DE was VT01 (*Eucalyptus todtiana* low isolated mallee trees to open mallee woodland over mid to tall open to sparse shrubland).

The disturbances impacting the native vegetation in the DE include edge effects from the existing road and weed infestation (Biologic, 2024). A summary of the vegetation types within the DE and the associated vegetation types within the overall Survey Area is found in Table 5.

Table 5. Summary of Vegetation Types within DE

Vegetation Type	Extent (ha) and proportion of DE (%)	Total Extent Mapped (ha) within Survey Area. SLK 166.65 to 168.75
VT01 <i>Eucalyptus todtiana</i> low isolated mallee trees to open mallee woodland over <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> , <i>Eremaea pauciflora</i> var. <i>pauciflora</i> , <i>Hakea trifurcata</i> mid to tall open to sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Daviesia nudiflora</i> subsp. <i>nudiflora</i> , <i>Xanthorrhoea drummondii</i> , <i>Melaleuca clavifolia</i> low open to sparse shrubland over <i>Caustis dioica</i> , <i>Mesomelaena pseudostygia</i> , <i>Lyginia imberbis</i> , <i>Schoenus pedicellatus</i> low sparse sedgeland/rushland.	0.74 ha (39.15%)	6.02 ha (17.87%)
VT02 <i>Hakea auriculata</i> , <i>Lambertia multiflora</i> var. <i>multiflora</i> , <i>Xanthorrhoea drummondii</i> , <i>Styphelia tortifolia</i> , <i>Hakea smilacifolia</i> , <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> low shrubland over <i>Mesomelaena tetragona</i> , <i>Lepidobolus quadratus</i> , <i>Morelotia microcarpa</i> low open sedgeland over <i>Conostylis androstemma</i> low isolated herbs.	0.32 ha (16.96%)	2.34 ha (6.95%)
VT03 <i>Eremaea pauciflora</i> var. <i>calyptra</i> , <i>Allocasuarina humilis</i> , <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> mid sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Beaufortia elegans</i> , <i>Synaphea spinulosa</i> subsp. <i>spinulosa</i> low open shrubland over <i>Mesomelaena pseudostygia</i> , <i>Lyginia barbata</i> , <i>Mesomelaena tetragona</i> low open sedgeland.	0.28 ha (14.81%)	2.51 ha (7.44%)
VT04	0.19 ha (10.05%)	5.96 ha (17.69%)

Vegetation Type	Extent (ha) and proportion of DE (%)	Total Extent Mapped (ha) within Survey Area. SLK 166.65 to 168.75
<i>Adenanthoa cygnorum</i> subsp. <i>cygnorum</i> , <i>Banksia candolleana</i> , <i>Allocasuarina humilis</i> , <i>Eremaea pauciflora</i> var. <i>pauciflora</i> tall to mid shrubland with occasional <i>Eucalyptus conveniens</i> low scattered mallee trees over <i>Melaleuca seriata</i> , <i>Jacksonia floribunda</i> , <i>Banksia sphaerocarpa</i> var. <i>pumilio</i> , <i>Stirlingia latifolia</i> , <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> low sparse to open shrubland over <i>Alexgeorgea nitens</i> , <i>Hypolaena exsulca</i> , <i>Mesomelaena pseudostygia</i> low sparse rushland/sedgeland.		
VT06 <i>Banksia prionotes</i> , <i>Eucalyptus todtiana</i> low open woodland over <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> , <i>Leptospermopsis oligandra</i> , <i>Allocasuarina humilis</i> mid open shrubland over <i>Eremaea pauciflora</i> var. <i>pauciflora</i> , <i>Beaufortia elegans</i> , <i>Jacksonia floribunda</i> low sparse shrubland over <i>Mesomelaena pseudostygia</i> , <i>Lepidosperma scabrum</i> , <i>Schoenus insolitus</i> low sparse sedgeland.	0.36 ha (19.05%)	3.91 ha (11.61%)
Total Clearing Area	1.89 ha (100%)	20.75 ha (100%)

The condition of the remnant vegetation in the DE ranged from Degraded to Excellent. The majority of this remnant vegetation has been mapped in Excellent Condition (1.57 ha / 82.42%), with only a small portion, 0.06 ha (3.19%), was Degraded Condition (Table 6, Figure 5 and Figure 6).

Table 6: Vegetation Condition and extents in hectares and percentage cover (Biologic, 2024)

Vegetation Condition	DE (ha) and (%)
Excellent	1.57 ha (83.07%)
Very Good	0.22 ha (11.64%)
Good	0.03 ha (1.59%)
Degraded	0.07 ha (3.70%)
Total Clearing Area	1.89 ha (100%)

4.2 Summary and Analysis of Fauna Surveys

Six broad fauna habitats were mapped within the Survey Area, comprising Coastal Heath (15.17 ha, 34.40%), Banksia Shrubland (10.66 ha, 24.17%), Proteaceous Heath (3.21 ha, 7.28%), Degraded (3.00 ha, 6.81%), Mixed Shrubland (0.21 ha, 0.48%), and Paddock/ Farmland (0.14 ha, 0.33%). The remaining 11.70 ha (26.53%) of the Survey Area was cleared of vegetation. Many of the mapped fauna habitats extend into the context area and regional surrounds.

Three Fauna Habitat types was mapped within the DE (Biologic, 2024) (Table 7), which extend into the Survey Area and regional surrounds, and may represent foraging, breeding and dispersal habitat for significant species (Biologic, 2024).

Table 7: Fauna Habitat and Descriptions and extents in hectares and percentage cover (Biologic, 2024)

Habitat Type	Description	Development Envelope (ha) and (%)
Banksia shrubland	Banksia Shrubland habitat has a greater coverage and diversity of Banksia species compared to the heath habitats, including <i>Banksia prionotes</i> , <i>B. sphaerocarpa</i> var. <i>pumilio</i> , <i>B. carlinoides</i> , <i>B. dallanneyi</i> subsp. <i>media</i> and <i>B. shuttleworthiana</i> , <i>B. attenuata</i> and <i>B. candolleana</i> , some isolated patches of mallee (<i>E. todtiana</i> and <i>E. conveniens</i>) occur within this habitat type. <i>Allocasuarina humilis</i> and <i>Adenanthos cynorum</i> is also present in some areas.	0.36 ha (19.05%)
Coastal heath	Coastal Heath habitat is characterized by sandy soils and laterite with low vegetation (<1.5 m), is diverse, consisting of flora species from a range of families, including Proteaceae, Myrtaceae and Fabaceae	1.06 ha (56.08%)
Proteaceous heath	Like Coastal Heath in vegetation structure and sandy soils but with greater diversity of plant species dominated by Proteaceous species, particularly from Banksia, Hakea and Grevillea genera. Many of the species present are foraging resources for Carnaby's cockatoo, including, <i>Hakea auriculata</i> , <i>Hakea gilbertii</i> , <i>Hakea incrassata</i> , and <i>Lambertia multiflora</i> .	0.47 ha (24.87%)
Total Clearing Area		1.89 ha (100%)

With the exception of Paddock/ Farmland and cleared land, these habitats may provide value to vertebrate fauna. Two additional habitat types, Minor Drainage (47.32 ha) and Revegetation (22.59 ha), were observed and mapped within the context area.

Eighteen vertebrate fauna species were recorded during the field survey, including three mammal species (including one introduced species) and 17 bird species, however, no significant species were recorded. Following an assessment of occurrence for the 38 significant vertebrate fauna species (those listed under the EPBC Act, BC Act and/or by the DBCA) identified in the desktop assessment, one species was considered Highly Likely to occur, namely, Carnaby's cockatoo (*Zanda latirostris* – Endangered EPBC Act and BC Act). A further six species were considered Possible to occur, namely, southern whiteface (*Aphelocephala leucopsis* – Vulnerable EPBC Act), Pacific swift (*Apus pacificus* – Migratory EPBC and BC Act); peregrine falcon (*Falco peregrinus* – Specially Protected BC Act); black-striped snake (*Neelaps calonotos* – DBCA Priority 3); jewelled south-west ctenotus (*Ctenotus gemmula* – DBCA Priority 3); and gilled slender bluetongue (*Cyclodomorphus branchialis* – Vulnerable BC Act).

A post survey likelihood of occurrence assessment of significant species within the DE has been conducted and is presented in Appendix 4. With the exception of Carnaby's Cockatoo which was considered 'Likely' to occur, the remaining species were 'Unlikely' to occur within the DE.

A total of 65.85% (29.04 ha) of the Survey Area was categorised as Very High to High Quality foraging habitat for Carnaby's Cockatoo within the Banksia Shrubland, Coastal Heath, and Proteaceous Heath. No night roosts were identified within the Survey Area, and potential night roosting habitat is unlikely to occur. However, eight white-tailed black cockatoo roosts occur within 12 km of the Survey Area, one of which (CARENNR002) occurs within 200 m of SLK 195.25 (>20km from the DE). Only four potential breeding trees, as defined by DAWE, were recorded within the Survey Area; however, no hollows were recorded; overall, the Survey Area does not provide nesting habitat.

The Biological survey conducted black cockatoo foraging habitat quality assessment combining aspects from several different methodologies (Biologic, 2024). Using this methodology, native vegetation (1.89 ha) within the DE was considered Very High to High quality foraging habitat, consisting of Coastal Heath (1.06 ha) and Proteaceous Heath (0.47 ha) and Banksia Woodland (0.36 ha).

The methodology applied by Biologic (2024) is novel, and to ensure consistency across projects, Main Roads employs the Bamford Scoring System (BCE, 2020) to determine a numerical value that can be used to reflect the significance of foraging habitat for Black Cockatoos. This methodology has been previously accepted by Commonwealth regulators as a robust, replicable way to produce a qualitative value for black cockatoo foraging habitat. This result of this scoring system can be subsequently utilised to inform offset calculations. The Bamford Scoring System has been applied to this Proposal, and its application with justification has been presented in Section 4.3.

4.3 Analysis of Black Cockatoo Habitat

4.3.1 Black Cockatoo Foraging Species and Cover within the Clearing Area

Main Roads has commissioned Australia Black Cockatoo Specialists (ABCS) to provide a species list for plant species utilised by Black Cockatoos: "*Plants used by Black Cockatoos in the South-West of Western Australia*" (Australian Black Cockatoo Specialists, 2025).

The resultant list has been comprised from a variety of sources, including 18 referenced publications (including but not limited to Bamford (undated), Groom (2011) and Kissane et al (2024)) and the professional expertise of the author. The comprehensive list of flora species utilised by Black Cockatoo identifies a High, Medium or Low value to each of three Black Cockatoo species for the factors of foraging, roosting and nesting.

Utilising this species list, Main Roads has undertaken a detailed analysis of the foraging value of species present within vegetation types which occur in the DE. This information can then be used in the determination of a site condition score to inform a foraging assessment model which also incorporates site context and stocking rate.

Main Roads has analysed survey data from all quadrats located within each of the vegetation types and averaged the percentage cover for each species noted as providing cockatoo foraging value.

Notably, this method includes a value for species if they were located in the vegetation type even if they were not located in the DE, providing a conservatively higher cover of forage species impacted by the proposal.

A full analysis of Black Cockatoo forage species within each vegetation type located within the DE and an averaged foliage cover with each vegetation type is presented in Appendix 3.

The multiplication of the area of vegetation clearing within each vegetation type by the average percentage cover of forage species enables a conservative calculation of area of Black Cockatoo forage species impacted by the project.

Notably, the maximum recorded cover of 'High' value foraging vegetation species (as identified by ABCS 2025) in any quadrat across the survey area was 3% cover of *Banksia prionotes* at quadrat BHY - 12. No other quadrats recorded any 'High' value forage species at greater than 0.1%, representing scattered individuals.

The majority of flora species exhibited:

- Low foraging value - Average % cover 0.1 – 11.52%
- Moderate foraging value - Average % cover 0.9 – 9.4%

4.3.2 Calculation of Black Cockatoo Foraging Value

Site Condition

Main Roads utilises the *Bamford Scoring System for the Assessment of foraging value of vegetation for Black Cockatoos* as it presents several advantages over other models, primarily that it appropriately puts emphasis on presence of foraging species, the differing values these species provide and the cover of these species within the clearing area to determine the site condition score. This allows the site condition score to be ranked comparatively to other vegetation types which may be of more or less value to the species. For example, for Carnaby's Cockatoos to achieve a maximum score out of six for site condition the highest value foraging habitat must be present, namely Banksia low forest of key known foraging species with >60% cover in good condition. Analysis of site context value for each of the vegetation associations is presented in Table 9.

Site Context

Site context is a function of the site size (clearing area), availability of nearby habitat and location of nearby breeding areas. The Bamford Scoring System recognises that small areas of vegetation have increased value where limited other suitable foraging habitat is available. Conversely, where ample areas of vegetation are available in the local area the loss of vegetation will have a reduced impact on both an individual and species level. It further considers the proximity to known breeding areas and amplifies significance of loss of vegetation in these areas.

This appropriate assessment of the context of the clearing within the local area builds an assessment of significance into the calculation of foraging value. Other models, such as the Foraging Quality Scoring Tool presented in DAWE 2022, rely on a separate application of the Significant Impact Guidelines to assess the significance of clearing. As this secondary process is absent under State legislation it is appropriate to include this step in the assessment of foraging value.

Table 8 outlines key contextual information used in analysis of foraging value of vegetation in the DE.

Table 8: Key Contextual information for Black Cockatoo Foraging Assessment

Nearest roost site	10.07 km
Nearest breeding site	8.2 km
Remnant veg within 12km (DPIRD-005)	11,385.86 ha
Remnant veg within 15km (DPIRD-005)	18,724.04 ha

One, 500 mm Diameter Breast Height Marri (*Corymbia calophylla*) lies within the DE and is likely to be removed; however, the individual does not contain hollows and being situated next to a major highway is not a preferred breeding location (Biologic, 2024).

No Black Cockatoo roosting sites were recorded within the survey area.

When breeding, Black Cockatoos will generally forage for food and water within a 6 km radius of their nesting site (Environmental Protection Authority (EPA), 2019)). According to Black Cockatoo breeding tree data (hollows), no confirmed (trees which contain hollows where Black Cockatoos have been recorded or evidence of breeding) or potential (Trees that have a suitable DBH to develop a nest hollow, but do not currently have hollows) breeding locations are present within this 6 km radial area to the DE (Department of Agriculture, Water and the Environment (DAWE), 2012). The closest known Black Cockatoo breeding trees are located 8 km from the DE. These breeding trees lie approximately 3 km from Alexander Morrison National Park. (DBCA, 2017b). Additionally, the closest water source to the breeding area is located 2.30 km from the furthest confirmed breeding tree (DWER, 2018b), compared to 8.20 km to the nearest water source to the DE.

Therefore, given the DE lies outside the likely food and water foraging radius (6 km), to the Breeding Sites, including no mapped confirmed or potential breeding trees, it is unlikely that the clearing activity will impact the Black Cockatoo breeding area and associated foraging area.

The species is known to travel from 6 km and up to 12 km from Night Roost locations to food and water sources (EPA, 2019). Night Roosts are classified as trees known to be used for night roosting, usually close to an important water source and within an area of Moderate-quality foraging habitat) (DAWE, 2012). Based on the Black Cockatoo Night Roost spatial data, the closest night roosts occur within the Coomallo Nature Reserve, approximately 9.50 km from the DE. Coomallo Nature Reserve contains both food and water foraging habitat.

Although, Coomallo Nature Reserve contains both food and water foraging sources, the DE lies within the 12 km foraging area, therefore, there is a potential for the Black Cockatoo species to use the DE as a source of food if suitable foraging species occur.

Species Density (Stocking Rate)

The final component of the Bamford Scoring System accounts for the usage or density of the species within the clearing area. This calculation of abundance is assigned by evidence of foraging, regular sightings of the species, or through professional judgement interpreting the landscape and context. As this component represents presence / absence a score of 1 or 0 is applied.

Final Foraging Value Score

Analysis of each of the five vegetation types within the DE has been provided based on the foraging value to relevant species of Black Cockatoo as presented in Table 9.

Table 9: An assessment of proposed CPS 818 clearing against Bamford Consulting Ecologists (2020) Scoring System for the Assessment of Foraging Value of Vegetation for Black Cockatoos

Aspect	Description of proposed clearing	
Site condition (out of 6)		
<p>Description of clearing VT01 (Coastal Heath) – <i>Eucalyptus tottiana</i> low isolated mallee trees to open mallee woodland over <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>, <i>Eremaea pauciflora</i> var. <i>pauciflora</i>, <i>Hakea trifurcata</i> mid to tall open to sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>, <i>Daviesia nudiflora</i> subsp. <i>nudiflora</i>, <i>Xanthorrhoea drummondii</i>, <i>Melaleuca clavifolia</i> low open to sparse shrubland over <i>Caustis dioica</i>, <i>Mesomelaena pseudostygia</i>, <i>Lyginia imberbis</i>, <i>Schoenus pedicellatus</i> low sparse sedgeland/rushland (0.74 ha).</p>	<p>Analysis According to the Biological Survey analytical data (Table 12 and Table 13), Black Cockatoo foraging species within the vegetation type consist of:</p> <ul style="list-style-type: none"> • three Low-value; • four Moderate-value, and • one High-value foraging flora species (<i>Hakea trifurcata</i>). <p>Combined, these species have an average cover area of approximately 0.95% (0.007 ha) of a 0.74 ha Clearing Area.</p> <p>Guided by the Bamford Scoring system (BCE, 2020), the VT01 vegetation type is reflective of a Negligible to low foraging value due to the scattered species of known food plants and a projected foliage which covers <2% of the Clearing Area.</p>	<p>Score: 1</p>
<p>Description of clearing VT02 (Coastal Heath) – <i>Hakea auriculata</i>, <i>Lambertia multiflora</i> var. <i>multiflora</i>, <i>Xanthorrhoea drummondii</i>, <i>Styphelia tortifolia</i>, <i>Hakea smilacifolia</i>, <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> low shrubland over <i>Mesomelaena tetragona</i>, <i>Lepidobolus quadratus</i>, <i>Morelotia microcarpa</i> low open sedgeland over <i>Conostylis androstemma</i> low isolated herbs. (0.32 ha).</p>	<p>Analysis According to the Biological Survey analytical data (Table 14 and Table 15), Black Cockatoo foraging species within the vegetation type consist of:</p> <ul style="list-style-type: none"> • one Low-value, • ten Moderate, and • one High-value foraging flora species (<i>Corymbia calophylla</i>). <p>Combined, these species cover an average of 9.75% (0.0302 ha) of the total 0.32 ha Clearing Area. This average has conservatively been rounded up to 10%.</p> <p>The Bamford Scoring system (BCE, 2020), outlines vegetation types with a Shrubland in which species of foraging value, have 10-20% projected foliage cover are of Low to Moderate foraging value.</p>	<p>Score: 3</p>
<p>Description of clearing VT03 (Proteaceous heath) - <i>Eremaea pauciflora</i> var. <i>calyptra</i>, <i>Allocasuarina humilis</i>, <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i> mid sparse shrubland over <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>, <i>Beaufortia elegans</i>, <i>Synaphea spinulosa</i> subsp. <i>spinulosa</i> low open shrubland over <i>Mesomelaena pseudostygia</i>, <i>Lyginia barbata</i>, <i>Mesomelaena tetragona</i> low open sedgeland (0.28 ha)</p>	<p>Analysis According to Biological Survey analytical data (Table 16 and Table 17), Black Cockatoo foraging species within the vegetation type consist of:</p> <ul style="list-style-type: none"> • three Low-value and; • three moderate-value foraging flora species. <p>Combined, these species have an average cover of 4.40%, equivalent to 0.012 hectares of species exhibiting foraging value within the 0.28 ha Clearing Area.</p>	<p>Score: 2</p>

	<p>The Bamford scoring system (BCE, 2020) indicates that vegetation classified as shrubland with species having a projected foliage cover of less than 10% is categorised as having Low Foraging Value.</p>	
<p>Description of clearing VT04 (Proteaceous heath) - <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>, <i>Banksia candolleana</i>, <i>Allocasuarina humilis</i>, <i>Eremaea pauciflora</i> var. <i>pauciflora</i> tall to mid shrubland with occasional <i>Eucalyptus conveniens</i> low scattered mallee trees over <i>Melaleuca seriata</i>, <i>Jacksonia floribunda</i>, <i>Banksia sphaerocarpa</i> var. <i>pumilio</i>, <i>Stirlingia latifolia</i>, <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> low sparse to open shrubland over <i>Alexgeorgea nitens</i>, <i>Hypolaena exsulca</i>, <i>Mesomelaena pseudostygia</i> low sparse rushland/sedgeland. (0.19 ha).</p>	<p>Analysis According to Biological Survey analytical data (Table 18 and Table 19), Black Cockatoo foraging species within the vegetation type consist of:</p> <ul style="list-style-type: none"> • four Low-value; and • two Moderate-value foraging flora species. <p>Combined, these species contribute an average foliage cover of 15.68%, comprising 11.52% Low-value and 4.13% Moderate-value species. This corresponds to an estimated 0.030 ha of species with foraging value within the 0.19 ha Clearing Area.</p> <p>The Bamford Scoring system (BCE, 2020), outlines vegetation types with a Shrubland in which species of foraging value, have 10-20% projected foliage cover are of Low to Moderate foraging value.</p>	<p>Score: 3</p>
<p>Description of clearing VT06 (Low Banksia Woodland) - <i>Banksia prionotes</i>, <i>Eucalyptus todtiana</i> low open woodland over <i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>, <i>Leptospermopsis oligandra</i>, <i>Allocasuarina humilis</i> mid open shrubland over <i>Eremaea pauciflora</i> var. <i>pauciflora</i>, <i>Beaufortia elegans</i>, <i>Jacksonia floribunda</i> low sparse shrubland over <i>Mesomelaena pseudostygia</i>, <i>Lepidosperma scabrum</i>, <i>Schoenus insolitus</i> low sparse sedgeland (0.36 ha)</p>	<p>Analysis According to Biological Survey analytical data (Table 20 and Table 21), Black Cockatoo foraging species within the vegetation type consist of:</p> <ul style="list-style-type: none"> • one Low-value; • three Moderate-value; and • one High-value foraging flora species (<i>Banksia prionotes</i>). <p>Combined, these species contribute to an average foliage area of 4.70% (0.017 ha) of the total 0.36 ha Clearing Area, with the High-value species being the most dominant at 3% (0.0108 ha).</p> <p>The Bamford scoring system (BCE, 2020) suggests woodlands with tree banksias displaying a 2-5% projected foliage cover are reflective of a Low foraging value indicator.</p>	<p>Score: 2</p>

Weighted Score				
Vegetation Type	Site Context Score	Area Impacted (ha)	% of total (1.89ha)	Weighted score
VT01	1	0.74	39	0.39
VT02	3	0.32	17	0.51
VT03	2	0.28	15	0.30
VT04	3	0.19	10	0.30
VT06	2	0.36	19	0.38
Total		1.89	100	1.88

Final Site Context Score (rounded up)		2
Site context (out of 3)		
Description of clearing Within the local area (15 km radius of the Clearing Area), exists 18,740 ha of vegetation which may be available foraging habitat for Black Cockatoo species. Total clearing of vegetation that represents suitable foraging habitat for Black Cockatoo species is approximately 0.10 ha (5.31%) of the 1.89 ha Clearing Area. The closest known breeding site is approximately 8.0 km to the northeast of the Clearing Area, and thus the Development Envelope is within an area where breeding is known/likely.	Analysis Vegetation proposed to be cleared represents 0.01 % of existing native vegetation within the local area, where breeding is likely to occur.	Score 0
Species stocking rate (out of 1)		
Description of clearing Carnaby's Black Cockatoo species seen or reported regularly and/or there is abundant foraging evidence.	Analysis According to Biologic (2024), no Carnaby's or White-tailed Cockatoo species were identified during the Biological Survey period and no foraging evidence was recorded. Main Roads consulted with Professor Kris Warren of Murdoch University to gain spatial tracking data of black cockatoo movements within the locality and the broader region (pers comm). The provided information suggests that Black Cockatoos are present in the area; however, very few records are present within the road reserve and specifically within the DE. Black Cockatoo movements in the area demonstrate a preference for locations away from the road corridor and concentrate in larger areas of intact vegetation. Accordingly, a score of 1 was assigned.	Score 1
Total Score (out of 10)		3

The vegetation quality within the DE has been assigned a final Bamford foraging value of 3. The habitat quality score is reflective of "Low to Moderate" Quality vegetation. The habitat foraging score, obtained using an objective, replicable method has been applied throughout the remainder of this assessment.

5 ASSESSMENT AGAINST THE TEN CLEARING PRINCIPLES

In assessing whether the Proposal's proposed clearing is likely to have a significant impact on the environment, the Proposal was assessed against the ten Clearing Principles (EP Act, Schedule 5).

Each principle has been assessed in accordance with the former Department of Environment Regulation (now Department of Water and Environmental Regulation (DWER) '*A Guide to the Assessment of Applications to Clear Native Vegetation*' (Department of Environment Regulation, 2014) and other relevant clearing permit application decision reports prepared by DWER.

Clearing is **likely to be** at variance with Principle (b) and **not at** or **not likely at** variance to the other Principles.

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Proposed clearing not likely at variance to this Principle.

Vegetation Type

The native vegetation Clearing Area within the DE for the proposal is 1.89 ha.

The DE is located in the Lesueur Sandplains (GES02) subregion of the Geraldton Sandplain Bioregion (GES). This Bioregion has been identified as one of the eight Biodiversity Hotspots located in Western Australia for priority action (Department of Environmental Regulation (DER), 2014). The Lesueur Sandplains subregion contains a high percentage of rare and endemic plants with over 250 plants endemic to the Lesueur Sandplain (Department of Conservation and Land Management (CALM), 2003).

One broad-scale pre-European vegetation association (VA 1031) is mapped within the DE (Table 4). VA 1031 is defined as *Hakea* and *Dryandra* scrub-heath. *Dryandra* is a former flora genus that has now amalgamated with *Banksia*. Vegetation complexes with less than 30% pre-European extent remaining are of regional significance (Environmental Protection Authority (EPA), 2000). The Vegetation Association, on a regional scale, shows a 34.48% remaining. However, at a local and regional level, only 29.32% of the pre-European extents remain intact (DBCA, 2019c).

According to the Biological Survey (Biologic, 2024) the DE (1.89 ha) comprises of five vegetation types (VT01, VT02, VT03, VT04 and VT06), a description of the Vegetation Types is outlined in Table 5 above.

Vegetation Condition

During the Biological Survey, Biologic (2024) conducted a vegetation condition assessment. The findings revealed that the vegetation in Excellent condition (1.57 ha 21.75%) was the most prominent in the DE Table 6, Figure 5 and Figure 6.

Threatened or Priority Ecological Communities

According to the Threatened and Priority Ecological Community database (DBCA, 2017f), no communities are present within the 20 km Search Area. The Protected Matters Search Tool (PMST) results displayed one Threatened Ecological Community (TEC) within the 20 km Study Area (Banksia Woodlands of the Swan Coastal Plain Ecological Community). However, following the Biological Survey undertaken by Biologic (2024), the report confirmed that no vegetation types recorded in the Survey Area were representative of any Threatened or Priority Ecological Communities.

Significant Flora

The potential presence of 150 Threatened and Priority flora taxa were identified from a desktop search (DBCA, 2017e; WAH, 1998 -) within the 20 km Study Area. These included 24 Threatened, eight Priority 1, 32 Priority 2, 60 Priority 3 and 26 Priority 4 species.

No Threatened species were recorded within the DE; however, one DBCA Priority 4 species (*Desmocladus elongatus*) was recorded as being present (Biologic, 2024) (Table 10).

Table 10: Significant species present (Flora)

Species	Information
<i>Desmocladius elongatus</i> (P4)	<i>Desmocladius elongatus</i> has a widespread distribution of ~120 km, encompassing, two Bioregions (Geraldton Sandplains and Swan Coastal Plain) and two Subregions (Dandaragan Plateau, and Lesueur Sandplain). Six species have been recorded within the DE. Seventy-four individuals were recorded within the Survey Area, this represents a loss of 8.10% of individuals known in the immediate surveyed area (Biologic, 2024). Additionally, according to the Main Roads flora records, 438 individuals have been identified in the species known distribution range, the removal of these six individuals equates to a loss of 1.40% of the total known species population. Therefore, given the low proportion of individuals to be removed the clearing is not considered likely to significantly impact this species.

A post survey likelihood of occurrence assessment determined that no other Threatened or Priority species are likely to occur (Appendix 4).

Weeds (Weeds of National Significance and Declared Pests)

According to the biological survey, Biologic (2024) thirty-five introduced taxa were identified, none of which were classified as a Weed of National Interest (WoNS) according to the Commonwealth government. One species was listed as a Declared Pest in WA under the *Biosecurity and Agriculture Management Act 2007*: **Echium plantagineum* (Patterson’s Curse).

Significant Fauna

A desktop search identified the potential presence of seven Threatened and Priority fauna taxa within the 20 km Study Area (DBCA, 2017d). These included one Endangered, one Vulnerable, one Priority 1, one Priority 4, two Migratory, and one species with a conservation listing of “Other Specially Protected”, requiring need of special protection to ensure the species conservation.

Biologic (2024) recorded no Threatened or Priority species within the Survey Area during the field survey; however, based on species’ distribution, ecology, and previous records, one species is considered ‘Highly Likely’ to occur (Carnaby’s cockatoo), and six were deemed Possible to occur; however, further analysis suggests that the remaining five species are unlikely to occur Appendix 4. Carnaby’s Cockatoo habitat is further discussed in Principle b. **Fauna Habitats**

Although the DE is located in the Geraldton Sandplain Bioregion, the proposed clearing of 1.89 hectares is unlikely to have a significant impact on the biodiversity values of the area. The clearing will result in the removal of only six individuals of the Priority 4 species *Desmocladius elongatus*, representing approximately 1.4% of its known regional population, which is widely distributed across two bioregions (Geraldton Sandplains and Swan Coastal Plain).

Additionally, no Threatened or Priority Ecological Communities were recorded within the Development Envelope and the vegetation proposed to be cleared is of comparatively low ecological value when assessed against the broader landscape, with approximately 45,349 hectares of remnant vegetation remaining within a 20-kilometre radius, of which ~20,412 hectares (40%) are secured within DBCA-managed lands.

While the site does provide foraging habitat for Carnaby’s Black Cockatoo, this habitat has been assessed as low to moderate in quality, is limited in extent and represents only 0.004% of the remnant vegetation within the 20 km Local Area. Furthermore, no confirmed or potential breeding or roosting sites for Black Cockatoos occur within 6 kilometres of the Development Envelope and the closest night roost (Coomallo Nature Reserve) is located approximately 10.07 kilometres away. The presence of low to moderate quality foraging habitat that is widespread in the region is not an indicator of a high level of biodiversity.

The DE contains few environmental values which suggests it comprises a high level of biodiversity and exhibits a lower level of biodiversity than vegetation within the surrounding Geraldton Sandplains Region, known for a high level of occurrence of Threatened and Priority Flora species.

The small scale of clearing adjacent to a busy State Highway and subject to edge effects including 35 introduced flora taxa, is **not likely to be** at variance to Principle a.

Methodology

- Biological Survey (Biologic Environmental Survey Pty Ltd, 2024)
- Scoring system of the assessment of foraging value of vegetation for Black Cockatoos (BCE, 2020)
- Government GIS Shapefiles:
 - DBCA Threatened and Priority Ecological Community database search (Accessed September 2024)
 - DBCA Threatened and Priority flora database search (Accessed September 2024)
 - DBCA Threatened and Priority fauna database search (Accessed September 2024)
 - WA Herbarium Threatened and Priority flora (Accessed September 2024)
- Protected matters Search Tool (DCCEEW, 2024)
- Statewide Vegetation Statistics (Government of Western Australia)

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna .

Proposed clearing is at variance to this Principle.

The proposal will result in the direct loss of fauna habitat via the clearing of up to 1.89 ha of native vegetation.

Significant Fauna

A desktop search identified the potential presence of seven Threatened and Priority fauna taxa within the 20 km Study Area (DBCA, 2017d). These included one Endangered, one Vulnerable, one Priority 1, one Priority 4, two Migratory, and one species with a conservation listing of "Other Specially Protected", requiring need of special protection to ensure the species conservation.

Biologic (2024) recorded no Threatened or Priority species within the Survey Area during the field survey; however, based on species' distribution, ecology, and previous records, one species is considered 'Highly Likely' to occur (Carnaby's cockatoo), and six were deemed Possible to occur; however, further analysis suggests that the remaining five species are unlikely to occur (Appendix 4).

Fauna Habitats

Four Fauna Habitat types was mapped within the DE (Biologic, 2024) (Table 7). Three of the mapped fauna habitats (Banksia Shrubland, Coastal Heath, Proteaceous Heath), which extend into the Survey Area and regional surrounds, may represent foraging, breeding and dispersal habitat for significant species (Biologic, 2024).

Based on the likelihood of occurrence assessment (Appendix 4), the Carnaby Back Cockatoo is the only significant species to likely utilise the habitat within the DE. The other fauna species identified in the desktop assessment were assessed as unlikely to occur within the DE.

Main Roads employs the Bamford Scoring System (BCE, 2020) to determine a numerical value that can be used to reflect the significance of foraging habitat for Black Cockatoos. The Bamford Scoring System has been applied to this Proposal and is outlined with justification in Section 4.3.

The vegetation quality within the development area has been assigned a final Bamford score of 3 reflective of "Low to Moderate" Quality vegetation.

The clearing of 1.89 ha of 'Low to Moderate' value Carnaby's Cockatoo habitat represents a 1.58% reduction in the 118.66 ha area of potential foraging and breeding habitat which was mapped within the Survey Area (Biologic, 2024).

In addition, according to the remnant vegetation spatial layer (DPIRD 005), approximately 45,349 ha of remnant vegetation is presumed uncleared within the 20 km local area (DPIRD, 2023). Thus, the clearing of 1.89 ha of vegetation equates approximate 0.004% of the overall remnant vegetation within a 20 km radius.

Furthermore, eight DBCA managed lands lie within the 20 km local area, this equates to ~20,412 ha (40%) of the calculated remnant vegetation within the local area being protected (DBCA, 2017b).

Given the approximate of remnant vegetation remaining within a 20 km local area, which includes ~20,412 ha of protected vegetation, contained within eight DBCA managed Lands, it is unlikely the clearing of 1.89 ha will have a significant impact on availability of foraging habitat within the region.

Although the impact of clearing 1.89ha of 'Low to Moderate' quality foraging habitat is unlikely to have a significant impact on Carnaby's Cockatoo, in line with current DWER assessment of Principle b) the proposed clearing **is at variance** with this principle.

Methodology

- Biological Survey (Biologic Environmental Survey Pty Ltd, 2024)
- Scoring system of the assessment of foraging value of vegetation for Black Cockatoos (BCE, 2020)
- Government GIS Shapefiles:
 - DBCA Threatened and Priority fauna database search (Accessed September 2024)
- Protected matters Search Tool (DCCEEW, 2024)

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.**Proposal is not at variance to this Principle.**

Biologic (2024) undertook a desktop assessment, identifying 32 Threatened flora taxa within the 20 km radius of the Survey Area. One Threatened flora species protected under the *Biodiversity Conservation Act 2016* was recorded in the Survey Area (*Thelymitra stellata*); however, was not located in the DE. The species was not detected during the species optimal flowering season and given the survey was undertaken in accordance to the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016) it is unlikely the species will be present within the DE. Considering no Threatened flora species were identified within the DE the proposed clearing **is not** at variance with this principle.

Methodology

- Biological Survey (Biologic Environmental Survey Pty Ltd, 2024)
- Protected Matters Search Tool (DCCEEW, 2024)
- Government GIS Shapefiles:
 - DBCA Threatened and Priority flora database search (Accessed September 2024)
 - WA Herbarium Threatened and Priority flora (Accessed September 2024)

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.**Proposed clearing is not at variance to this Principle****Assessment**

According to the Threatened Ecological Community database (DBCA, 2017f), no communities are present within the 20 km Study Area. The PMST search results displayed one TEC within the 20 km Study Area (Banksia Woodlands of the Swan Coastal Plain Ecological Community). However, following the Biological Survey undertaken by Biologic (2024), the report confirmed that no vegetation types recorded in the Survey Area were representative of any Threatened Ecological Communities.

Given that no Threatened Ecological Communities have been identified within the DE, the proposed clearing **is not** at variance to this principle.

Methodology

- Biological Survey (Biologic Environmental Survey Pty Ltd, 2024)
- Protected Matters Search Tool (DCCEEW, 2024)
- Government GIS Shapefiles:
 - DBCA Threatened and Priority Ecological Community database search (Accessed September 2024)

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Proposed clearing is not at variance to this Principle.

Assessment

The DE is located within the Geraldton Sandplains IBRA region and the Lesueur Sandplain subregion (GES02). The vegetation within the DE has been broadly mapped as Vegetation Association 1031 described as Mosaic: Shrublands; hakea scrub-heath / Shrublands; dryandra heath. Table 4 summarises the extent or pre-European Vegetation Association 1031 within the DE.

The National Objectives and Targets for Biodiversity Conservation Australia have been set to prevent clearance of ecological communities with less than 30% of their pre-European extent, below which species loss appears to accelerate exponentially (Commonwealth of Australia, 2001). Given that the Proposal is not within the constrained Swan Coastal Plain area, the retention objective of 30% applies (EPA, 2016).

The current extent of Vegetation Association 1031 is higher than 30% for pre-European extent at all scales (Statewide, IBRA Bioregion, IBRA Subregion).

Within the local area (20km radius) of the DE 33.29% of the pre-European extent of Vegetation Association Lesueur 1031 remains

Given the clearing area is relatively minor and the Vegetation Association (1031) is above the delegated 30% retention level at all scales, it is unlikely the clearing of 1.89 ha will have a significant impact on the overall current vegetation extents at a State, Bioregion or Sub-region level.

The proposed clearing **is not at** variance to this Principle.

Methodology

- Commonwealth of Australia (2001)
- EPA (2016)
- DBCA (Department of Biodiversity, Conservation and Attractions (DBCA), 2019c)
- Government GIS shapefiles:
 - Pre-European vegetation (Accessed September 2024)
- Statewide Vegetation Statistics (Government of Western Australia 2025)

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Proposed clearing is not at variance to this Principle.

Assessment

The DE is not located within and does not intersect:

- a Geomorphic Wetland (DBCA, 2017a);
- an Internationally Important Wetland (RAMSAR) (DBCA, 2017c);
- a surface water area that is proclaimed under the RIWI Act ((DWER, 2018d)
- a Nationally Important Wetland (DBCA, 2018b); or
- any minor or major watercourse areas (DWER, 2018b)

No clearing of riparian vegetation is proposed. Vegetation to be cleared is not associated with a watercourse or wetland.

The proposed clearing **is not at** variance to this Principle.

Methodology

- Government GIS Shapefiles:
 - Geomorphic wetlands database search (Accessed September 2024)
 - RAMSAR Sites database search (Accessed September 2024)
 - Surface water area - RIWI database search (Accessed September 2024)
 - A Nationally Important Wetland database search (Accessed September 2024)
 - Hydrography, Linear (Hierarchy) watercourse database search (Accessed September 2024)

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.**Proposed clearing is not at variance to this Principle.****Assessment**

The underlying soil type is primarily deep sand. Review of the CSIRO database indicates the DE is located within an area that has an extremely low possibility of ASS occurrence (CSIRO, 2013) and clearing will not involve disturbance of soil below the water table.

Standard erosion management control measures will be implemented during construction to reduce the incidence of erosion, sedimentation, flooding, and the potential for land degradation.

It is highly unlikely the clearing of a small area of vegetation immediately adjacent to the existing road, within a thin linear strip, will increase the potential for erosion resulting in appreciable land degradation.

The proposed clearing **is not at** variance to this Principle.

Methodology

- CSIRO ASS database (CSIRO, 2013)

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.**Proposed clearing is not at variance to this Principle.****Assessment**

The DE does not intersect a conservation area. The DE does not contain any ESAs as declared under the *Environmental Protection Act 1986* (DBCA, 2017b; DWER, 2018a).

The closest conservation area is Coomallo Nature Reserve, located approximately 3.50 km north of the DE (DBCA, 2017b). No clearing will be undertaken within this conservation area. The scale and location of the proposed clearing will not impact the environmental values of Coomallo Nature Reserve.

The proposed clearing **is not at** variance to this Principle.

Methodology

- Government GIS Shapefiles:
 - DBCA Legislated Lands and Water database search (Accessed September 2024)
 - Environmentally Sensitive Areas database search (Accessed September 2024)

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.**Proposed clearing is not at variance to this Principle.****Assessment**

The DE is located within a groundwater area (Jurien) and a surface water area (Hill River and Tributaries Catchment) that are both proclaimed under the RIWI Act.

There are no RAMSAR or Nationally Important Wetlands within the DE. Additionally, no major watercourses or rivers intersect the DE (DBCA, 2017c; DBCA, 2018b; DWER, 2018b).

No practices of dewatering or alteration of watercourses are to occur based on clearing of 1.89 ha of a thin linear strip of vegetation, adjacent to Brand Highway. Therefore, the proposed clearing will not cause deterioration in the quality of surface or groundwater.

The proposed clearing **is not at** variance to this Principle.

Methodology

- Government GIS Shapefiles:
 - Groundwater area - RIWI database search (Accessed September 2024)
 - Surface water area - RIWI database search (Accessed September 2024)
 - RAMSAR Sites database search (Accessed September 2024)
 - A Nationally Important Wetland database search (Accessed September 2024)
 - Hydrography, Linear (Hierarchy) watercourse database search (Accessed September 2024)

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.**Proposed clearing is not at variance to this Principle.****Assessment**

The underlying soil in the DE is typically sandy acidic yellow mottled soils (Biologic, 2024).

The area receives an average rainfall of 533.40 mm per year (Badgingarra weather station, site number: 009037) (Bureau of Meteorology (BoM), 2024)

During a rainfall event, the cleared area may result in the collection and temporary retention of storm water; however, in the climatic context, these impacts are short lived and similar localised water accumulation will occur across the region.

Localised flooding from rainfall events will be managed by onsite construction practices to ensure adequate drainage of surface water takes place. Given the sandy soils present in the DE, surface water should effectively infiltrate while drainage diversion infrastructure is established.

The proposed clearing **is not** at variance to this Principle.

Methodology

- Biologic (2024)
- Bureau of Meteorology (2024)

6 VEGETATION MANAGEMENT

Main Roads will avoid clearing native vegetation where possible. Where clearing cannot be avoided, the clearing will be kept to a minimum. A Vegetation Management Plan (VMP) has been developed to manage and minimise vegetation clearing for the Proposal (refer to Appendix 4).

7 REHABILITATION, REVEGETATION AND OFFSETS

7.1 Revegetation and Rehabilitation

No temporary clearing will be undertaken as part of the Proposal activities and therefore no revegetation or rehabilitation will be conducted under CPS 818.

7.2 Offset Proposal

In accordance with CPS 818 condition 11(a), to offset the residual impacts from clearing 1.89 ha of Moderate quality foraging habitat for Carnaby's Black Cockatoo, Main Roads has developed an offset proposal in accordance the current WA environmental offsets Policy. The offset entails the land acquisition of 4.73 ha within Lot 1, 1395 Banovich Road, Hill River with vegetation that comprises significant foraging habitat for Carnaby's Black Cockatoo in the Mid West – Gascoyne Region.

8 STAKEHOLDER CONSULTATION

Main Roads will undertake stakeholder consultation in accordance with CPS 818 Condition 8.

9 COMPLIANCE WITH CPS 818

Table 11 summarises what further pre-clearing impact assessment is required in accordance with CPS 818.

Table 11. Summary of Additional Management Actions Required by CPS 818

Impact of Clearing	Yes/No or NA	Further Action Required
1. The CAR indicates that the clearing is 'At Variance' or 'May be at Variance' with one or more of the Clearing Principles.	Yes	<ol style="list-style-type: none"> 1. Clearing Report to be published on website and submissions sought for 21 days. 2. Submissions invited from relevant parties, including the LGA, the owner or occupier of the land and other stakeholders in accordance with Condition 8 of CPS 818. 3. VMP has been completed, refer to Appendix 4. 4. An offset proposal for approval by DWER will be prepared. 5. Summary of submissions and a statement addressing each of those submissions to be published on website.
2. Clearing is at variance or may be at variance with Clearing Principle (g) land degradation, (i) surface or underground water quality <u>or</u> (j) the incidence of flooding.	No	No further action required.
3. Clearing is at variance with Clearing Principle (g) land degradation, (i) surface or underground water quality <u>and</u> (j) the incidence of flooding.	No	No further action required.
4. The Proposal involves clearing for temporary works (as defined by CPS 818).	No	No further action required.
<p>5a. Proposal is within a Region that:</p> <ul style="list-style-type: none"> • has rainfall greater than 400mm; and, • is South of the 26th parallel; and, • works are necessary in 'Other than dry conditions'; and, • works have potential for uninfested areas to be impacted. 	No	Standard Vehicle and Plant management actions from Annexure 204B (TABLE 204B.9.1), <u>Hygiene Checklists</u> and <u>Vehicle, Plant and Machinery Hygiene Register Template</u> will be applied.
5b. Do the proposed works require clearing within or adjacent to DBCA managed lands in non-dry conditions?	No	No further action required.

Impact of Clearing	Yes/No or NA	Further Action Required
6. Main Roads has been notified by DWER or an environmental specialist that the area to be cleared is susceptible to a pathogen other than dieback.	No	No further action required.
7. Weeds are likely to spread to and result in environmental harm to adjacent areas of native vegetation that are in good or better condition.	No	No further action required.
8. Did an environmental specialist conduct the survey or field assessment?	Yes	The Environmental Specialist undertaking the biological assessments was suitably qualified and had more than three years' experience.
9. Did an environmental specialist prepare the Assessment Report and any other associated documentation including the VMP, Dieback Management Plan or Offset Proposal?	Yes	The Environmental Specialist preparing the Assessment Report and any other associated documentation including the VMP, Dieback Management Plan or Offset Proposal was suitably qualified and had more than three years' experience.

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11 APPENDICES

Appendix 1: Figures

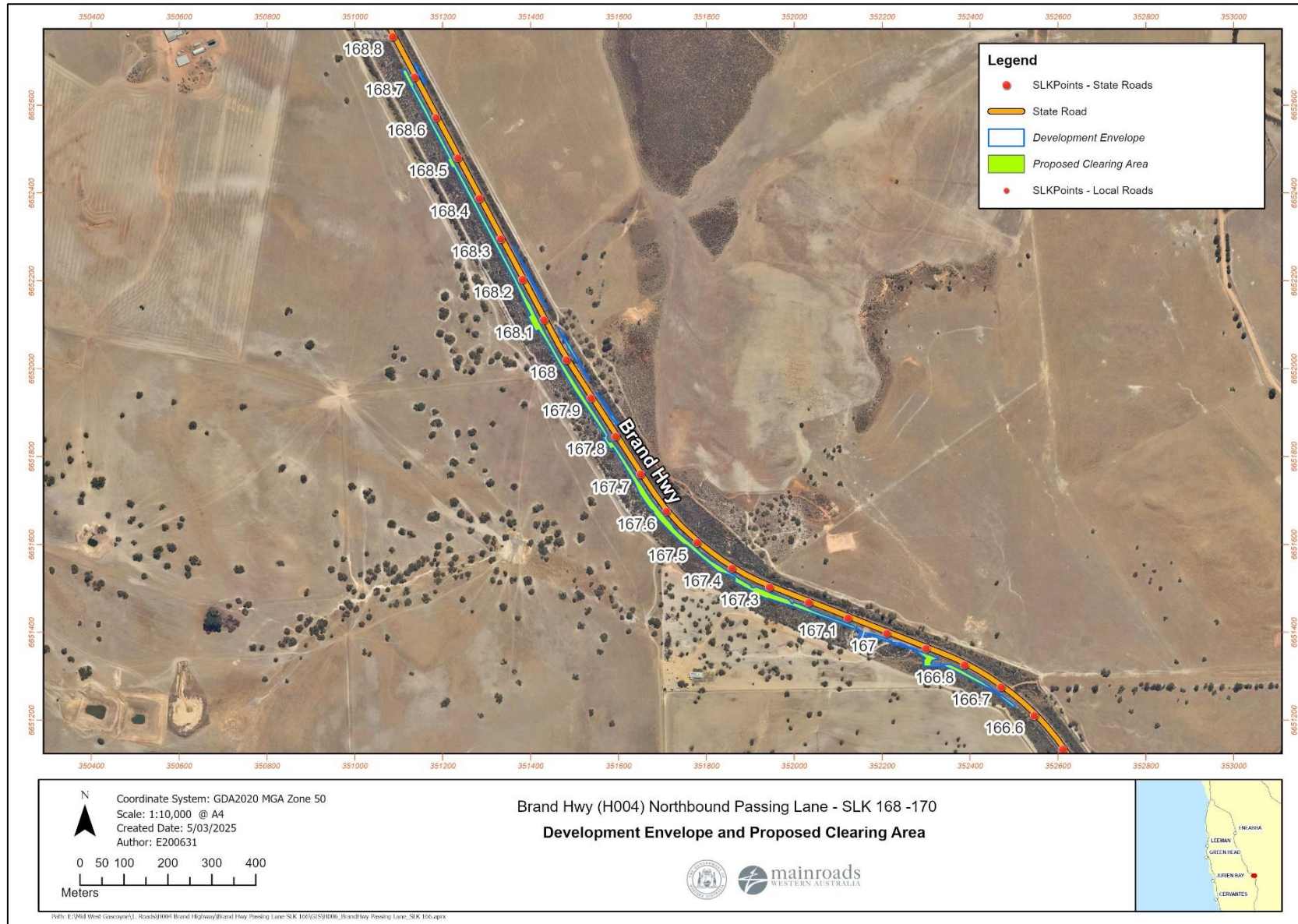


Figure 1: Development Envelope and Proposed Clearing Area

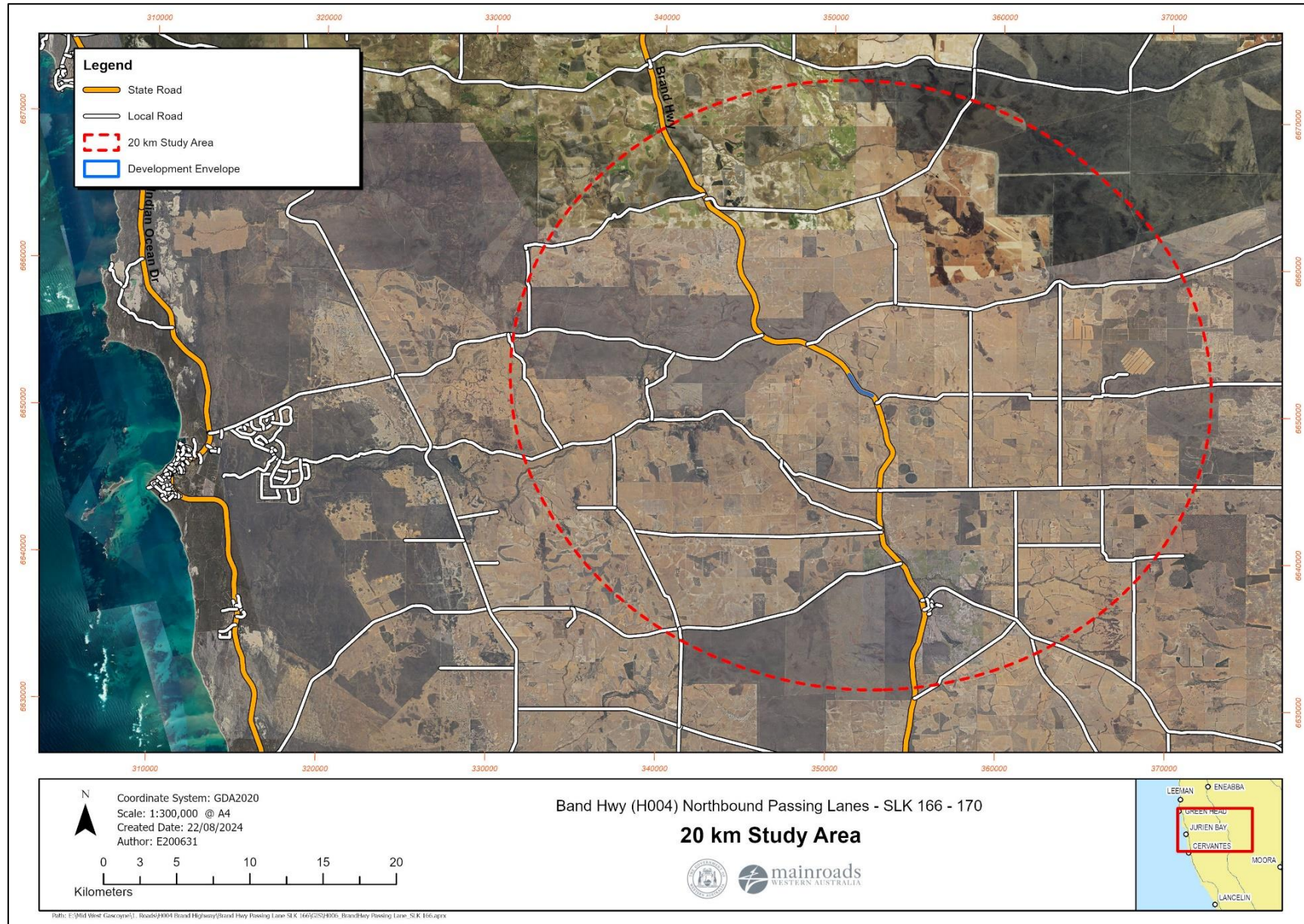


Figure 2: Development Envelope in reference to the 20 km Study Area

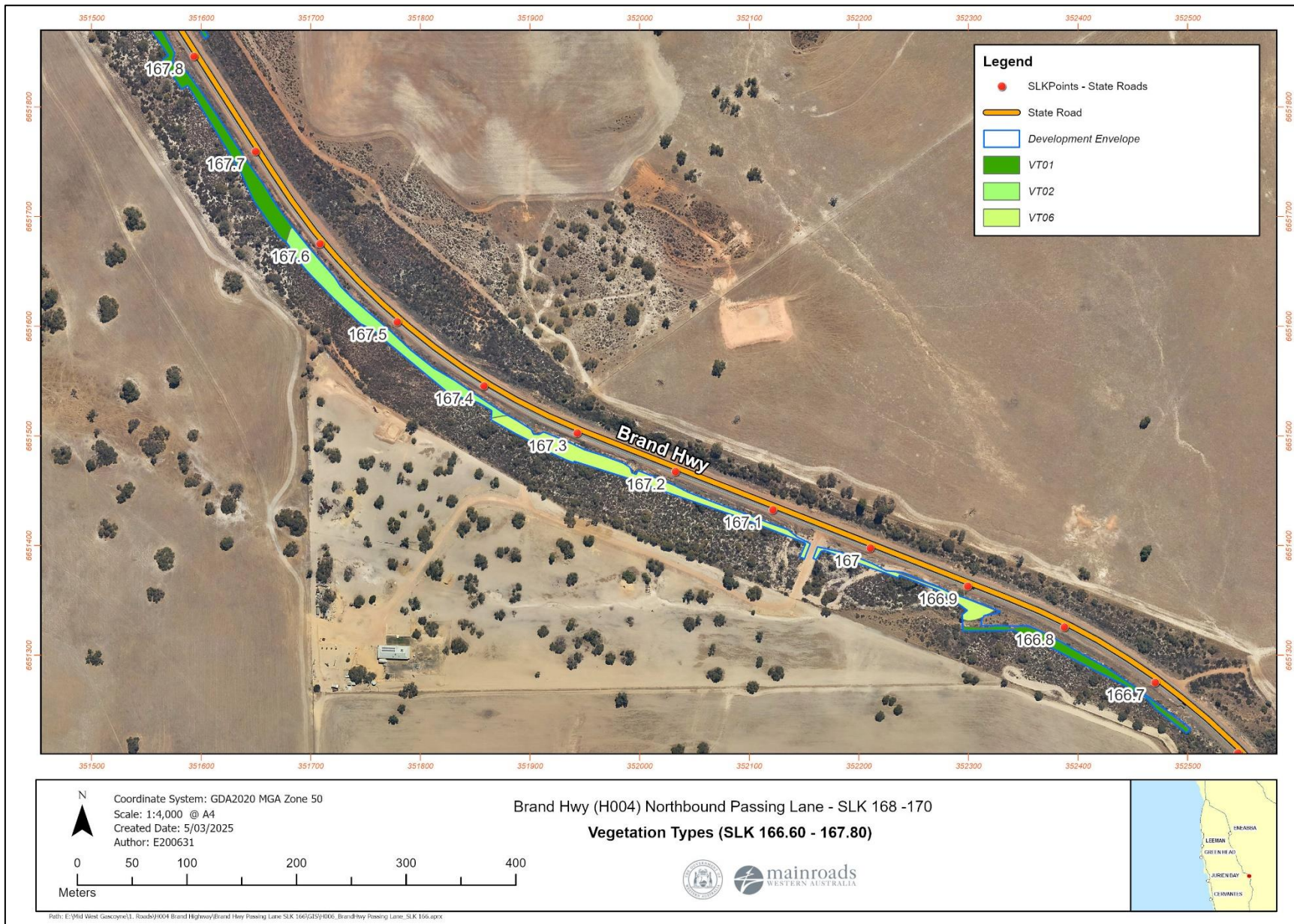


Figure 3: Vegetation Types within the Development Envelope (SLK 166.60 - 167.80)

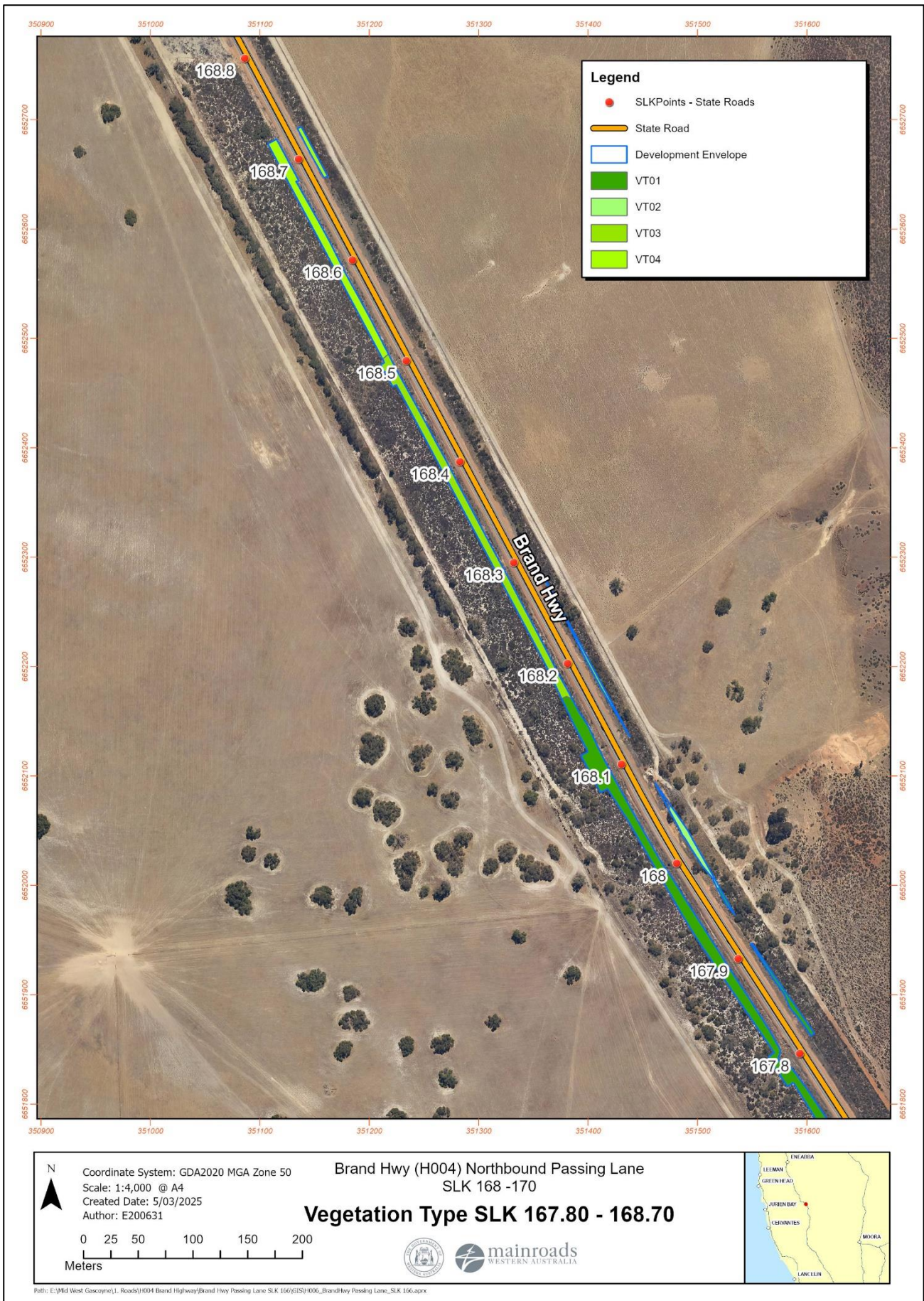


Figure 4: Vegetation Types within the Development Envelope (SLK 167.80 - 168.70)

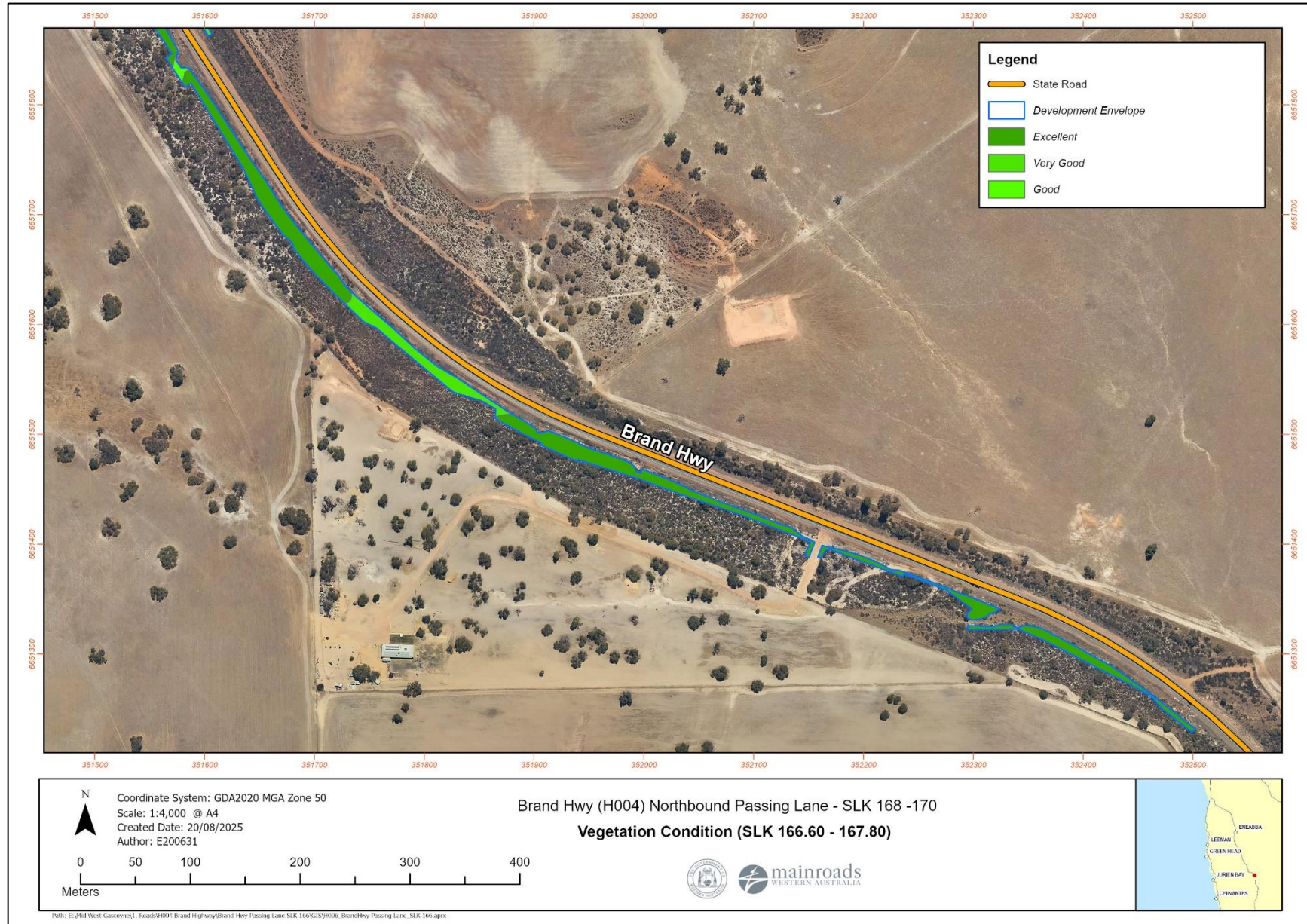


Figure 5: Vegetation Condition within the Development Envelope (SLK 166.60 - 167.80)

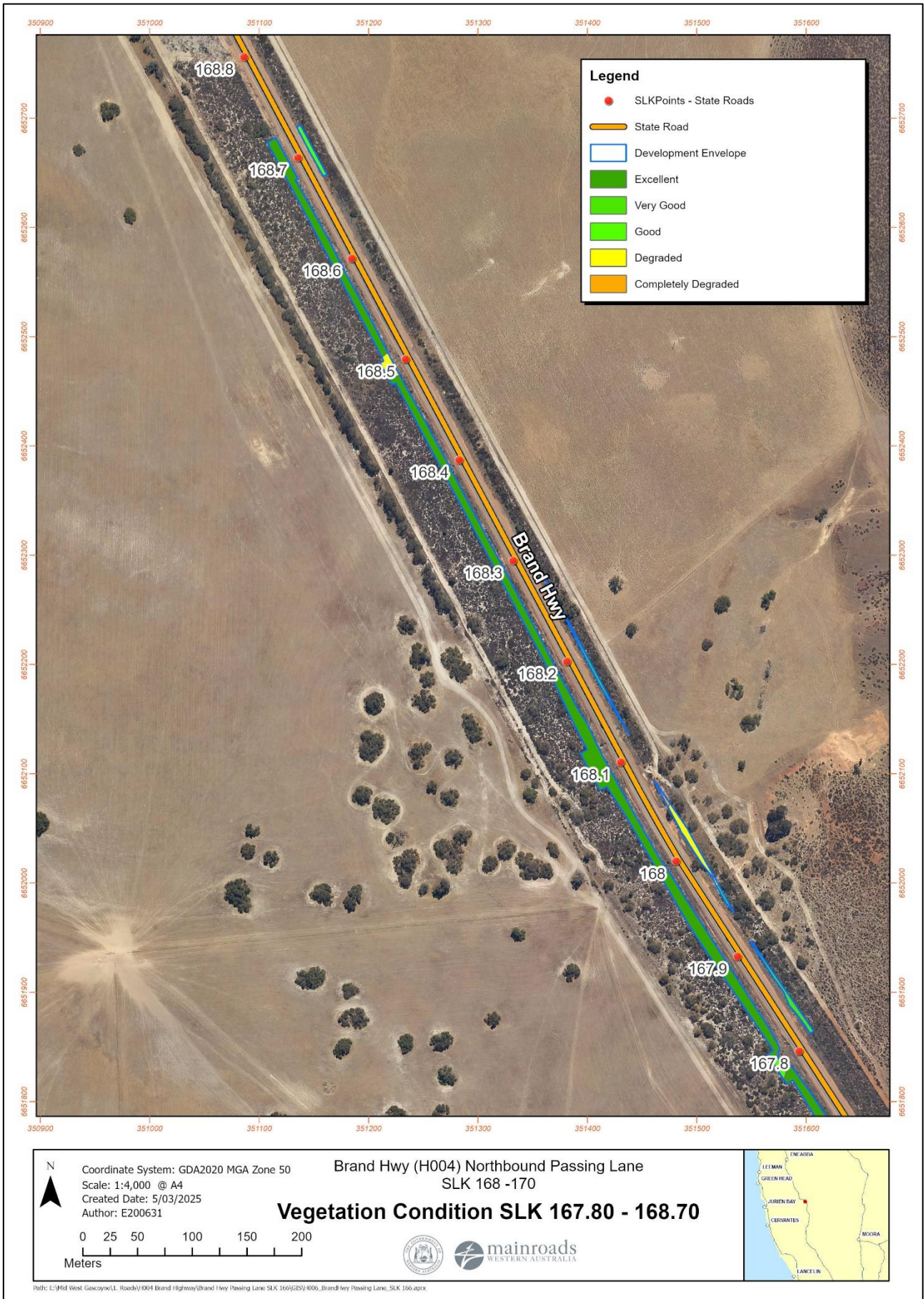


Figure 6: Vegetation Condition within the Development Envelope (SLK 167.80 - 168.70)

Appendix 2: CPS 818 condition 8 (e) (iii) Biological Surveys and Field Assessment Executive Summary and Report Conclusions

Flora and Vegetation Surveys

Executive summary

Main Roads is undertaking works for Brand Hwy passing lane and culverts extension at SLK 165.95 to SLK 170.05. Several existing culverts on Brand Hwy between SLK 154.50 and SLK 195.25 require widening and need to be extended further into road reserve. Other additional areas have been identified to accommodate potential vehicle turn around areas. The Survey Area is located approximately 14 km north of Badgingarra (55 km south of Eneabba) in the Shire of Coorow and Shire of Dandaragan. The Survey Area covers 44.115 ha in area. Biologic undertook a single-season detailed flora and vegetation survey, targeted flora survey, basic fauna survey, and black cockatoo habitat assessment.

The field survey identified 360 confirmed vascular flora taxa within the Survey Area, representing 165 genera from 53 families; and comprised 325 native flora taxa and 35 introduced taxa.

One Threatened flora taxon was recorded from the Survey Area during the current detailed survey; *Thelymitra stellata* (T), three individuals were recorded from one point-location. Thirteen confirmed Priority flora taxon were recorded:

- Priority 2: *Lyginia excelsa*
- Priority 3: *Austrostipa nunaginensis*, *Banksia nana*, *Beaufortia bicolor*, *Hensmania stoniella*, *Lepidobolus quadratus*, *Styphelia filamentosa*; and
- Priority 4: *Banksia chamaephyton*, *Desmocladus elongatus*, *Eucalyptus macrocarpa* subsp. *elachantha*, *Grevillea saccate*, *Schoenus griffinianus*, *Thysanotus glaucus*).

One potential priority 3 was recorded from the Survey Area: *Jacksonia ?anthoclada*.

Thirty-five introduced taxa, representing 33 genera from 13 families, were recorded in the Survey Area. None of these taxa are listed as WoNS under the BAM Act. One introduced taxon, **Echium plantagineum* (Patterson's Curse), is listed as a declared pest under the BAM Act..

Twenty-one vegetation types and eight mapping units were described in the Survey Area and context area. No vegetation types recorded from the study area were found to be representative of threatened or priority ecological communities. Twelve vegetation are considered significant as refuge for or habitat of significant flora. One of these, VT02, was significant as refuge/habitat for the Threatened taxa *Thelymitra stellata*.

Vegetation ranged from Pristine to Completely Degraded and covered 67.2% of the Survey Area and 30.6% of the context area. Primary disturbances were roads, tracks, and other infrastructure/ pastoral related disturbances or roadside vegetation.

Thirteen vegetation types and one mapping unit are considered locally and regionally significant due to being representative of restricted vegetation association Lesueur 1031.

Six broad fauna habitats were mapped within the Survey Area, comprising Coastal Heath (15.17 ha, 34.40%), Banksia Shrubland (10.66 ha, 24.17%), Proteaceous Heath (3.21 ha, 7.28%), Degraded (3.00 ha, 6.81%), Mixed Shrubland (0.21 ha, 0.48%), and Paddock/ Farmland (0.14 ha, 0.33%). The remaining 11.70 ha (26.53%) of the Survey Area was cleared of vegetation.

The Survey Area contributes to the local vegetation network and creates connectivity to other habitats of value to vertebrate fauna, such as the Coomallo Creek Nature Reserve, Lesueur National

Park, South Eneabba Nature Reserve, and Badgingarra National Park, all of which include habitats of similar characteristics. This connectivity is significant in consideration of the fragmented local landscape created by agricultural land-use.

Eighteen vertebrate fauna species were recorded during the field survey, including three mammal species (including one introduced species) and 17 bird species, however, no significant species were recorded. Following an assessment of occurrence for the 38 significant vertebrate fauna species (those listed under the EPBC Act, BC Act and/or by the DBCA) identified in the desktop assessment, one species was considered Highly Likely to occur, namely, Carnaby's cockatoo (*Zanda latirostris* – Endangered EPBC Act and BC Act). A further six species were considered Possible to occur, namely, southern whiteface (*Aphelocephala leucopsis* – Vulnerable EPBC Act), Pacific swift (*Apus pacificus* – Migratory EPBC and BC Act); peregrine falcon (*Falco peregrinus* – Specially Protected BC Act); black-striped snake (*Neelaps calonotos* – DBCA Priority 3); jewelled south-west ctenotus (*Ctenotus gemmula* – DBCA Priority 3); and gilled slender bluetongue (*Cyclodomorphus branchialis* – Vulnerable BC Act).

Critical and/ or supporting habitats for all significant species occurring, or potentially occurring, in the Survey Area are in the natural habitat types comprising, Banksia Shrubland, Coastal Heath, and Proteaceous Heath.

A total of 65.85% (29.04 ha) of the Survey Area was categorised as Very High to High Quality foraging habitat for Carnaby's cockatoo within the Banksia Shrubland, Coastal Heath, and Proteaceous Heath. These habitats are likely valued for transient individuals or flocks in providing connectivity for migration between breeding and non-breeding regions and supporting breeding and night roosting individuals known to occur in the desktop study area. No night roosts were identified within the Survey Area, and potential night roosting habitat is unlikely to occur. However, eight white-tailed black cockatoo roosts occur within 12 km of the Survey Area, one of which (CARENNR002) occurs within 200 m, supporting the foraging value of the Survey Area. Only four potential breeding trees, as defined by DAWE, were recorded within the Survey Area; however, no hollows were recorded; overall, the Survey Area does not provide nesting habitat at the time of survey.

Appendix 3: Analysis of Black Cockatoo Forage Species Cover within Vegetation Types in the Development Envelope

The Biologic 2024 vegetation survey identified five native vegetation types within the DE. Quadrat data was analysed to determine average percentage cover of flora species which provide Carnaby's cockatoo forage value within each vegetation type.

VT01 (Coastal Heath) - *Eucalyptus todtiana* low isolated mallee trees to open mallee woodland over *Adenanthos cygnorum* subsp. *cygnorum*, *Eremaea pauciflora* var. *pauciflora*, *Hakea trifurcata* mid to tall open to sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Daviesia nudiflora* subsp. *nudiflora*, *Xanthorrhoea drummondii*, *Melaleuca clavifolia* low open to sparse shrubland over *Caustis dioica*, *Mesomelaena pseudostygia*, *Lyginia imberbis*, *Schoenus pedicellatus* low sparse sedgeland/rushland (**0.74 ha**).

Table 12: Black Cockatoo Forage Species within VT01, the average cover across each quadrat and forage species value

Species Name	BHY-04	BHY-08	Average % cover	Value (ABCS 2025)
<i>Anigozanthos humilis</i>	-	0.10	0.05	Low
<i>Banksia dallaneyi</i> subsp. <i>media</i>	0.1	-	0.05	
<i>Callitris acuminata</i>	0.1	-	0.05	
<i>Eucalyptus todtiana</i>	0.5	0.1	0.30	Moderate
<i>Lambertia multiflora</i> var. <i>multiflora</i>	0.1	-	0.05	
<i>Mesomelaena pseudostygia</i>	-	0.5	0.25	
<i>Mesomelaena tetragona</i>	0.2	0.1	0.15	
<i>Hakea trifurcata</i>	-	0.1	0.05	High
Total Cover of BC Forage Species	1%	0.9%	0.95%	

Table 13: Total % cover and area of species with forage value to Black Cockatoo present within the Clearing area intersection of VT01 (0.74 ha)

Value	Total % Cover	Area of forage species within VT01 clearing area (ha)
Low	0.30	0.0011
Moderate	0.90	0.0056
High	0.10	0.0004
Total	0.95%	0.007 ha

VT02 (Coastal Heath) – *Hakea auriculata*, *Lambertia multiflora* var. *multiflora*, *Xanthorrhoea drummondii*, *Styphelia tortifolia*, *Hakea smilacifolia*, *Hibbertia hypericoides* subsp. *hypericoides* low shrubland over *Mesomelaena tetragona*, *Lepidobolus quadratus*, *Morelotia microcarpa* low open sedgeland over *Conostylis androstemma* low isolated herbs. (**0.32 ha**).

Table 14: Black Cockatoo Forage Species within VT02, the average cover across each quadrat and forage species value

Species Name	BHY-09	BHY-13	Average % cover	Value (ABCS 2025)
<i>Callitris arenaria</i>	0.5	0.1	0.30	Low
<i>Allocasuarina humilis</i>	1	-	0.50	Moderate
<i>Allocasuarina microstachya</i>	0.1	-	0.05	
<i>Banksia carlinoides</i>	1	0.1	0.55	
<i>Banksia sphaerocarpa</i> var. <i>pumilio</i>	6	-	3.00	
<i>Hakea auriculata</i>	0.1	1	0.55	
<i>Hakea incrassata</i>	0.1	0.1	0.10	
<i>Hakea smilacifolia</i>	0.1	1	0.55	
<i>Lambertia multiflora</i> var. <i>multiflora</i>	1	0.1	0.55	
<i>Mesomelaena pseudostygia</i>	5	-	2.50	
<i>Mesomelaena tetragona</i>	0.1	2	1.05	
<i>Corymbia calophylla</i>			0.1*	High
Total Cover of BC Forage Species	15%	4.4%	9.8%	

*Recorded outside quadrat in veg type

Table 15: Total % cover and area of species with forage value to Black Cockatoo present within the Clearing area intersection of VT02 (0.32 ha)

Value	Total % Cover	Area of forage species within VT02 clearing area (ha)
Low	0.30	0.001
Moderate	9.4	0.030
High	0.1	0.0003
Total	9.8 %	0.031 ha

VT03 (Proteaceous heath) - *Eremaea pauciflora* var. *calyptra*, *Allocasuarina humilis*, *Adenanthos cygnorum* subsp. *cygnorum* mid sparse shrubland over *Hibbertia hypericoides* subsp. *hypericoides*, *Beaufortia elegans*, *Synaphea spinulosa* subsp. *spinulosa* low open shrubland over *Mesomelaena pseudostygia*, *Lyginia barbata*, *Mesomelaena tetragona* low open sedgeland (**0.28 ha**)

Table 16: Black Cockatoo Forage Species within VT03, the average cover across each quadrat and forage species value

Species Name	BHY-05	Average % cover	Value (ABCS 2025)
<i>Banksia dallanneyi</i> subsp. <i>media</i>	0.1	0.1	Low
<i>Banksia sphaerocarpa</i> var. <i>pumilio</i>	0.1	0.1	
<i>Callitris acuminata</i>	0.1	0.1	
<i>Allocasuarina humilis</i>	1.0	1.0	Moderate
<i>Allocasuarina microstachya</i>	0.1	0.1	
<i>Mesomelaena pseudostygia</i>	3	3.0	
Total Cover of BC Forage Species	4.4	4.4	

Table 17: Total % cover and area of species with forage value to Black Cockatoo present within the Clearing area intersection of VT03 (0.28 ha)

Value	Total % Cover	Area of forage species within VT03 clearing area (ha)
Low	0.300	0.0008
Moderate	4.100	0.0115
High	0.000	0.0000
Total	4.40 %	0.0123 ha

VT04 (Proteaceous heath) - *Adenanthoa cygnorum* subsp. *cygnorum*, *Banksia candolleana*, *Allocasuarina humilis*, *Eremaea pauciflora* var. *pauciflora* tall to mid shrubland with occasional *Eucalyptus conveniens* low scattered mallee trees over *Melaleuca seriata*, *Jacksonia floribunda*, *Banksia sphaerocarpa* var. *pumilio*, *Stirlingia latifolia*, *Hibbertia hypericoides* subsp. *hypericoides* low sparse to open shrubland over *Alexgeorgea nitens*, *Hypolaena exsulca*, *Mesomelaena pseudostygia* low sparse rushland/sedgeland. (0.19 ha).

Table 18: Black Cockatoo Forage Species within VT04, the average cover across each quadrat and forage species value

Species Name	BHY-03	BHY-06	BHY-07	Average % cover	Value (ABCS 2025)
<i>Anigozanthos</i> sp. Indet	-	0.1	-	0.03	Low
<i>Banksia candolleana</i>	1.5	-	25	8.83	
<i>Banksia dallanneyi</i> subsp. <i>media</i>	1	-	-	0.33	
<i>Banksia sphaerocarpa</i> var. <i>pumilio</i>	-	-	6	2.00	
<i>Callitris arenaria</i>	-	1	-	0.33	
<i>Allocasuarina humilis</i>	0.5	0.1	8	2.87	Moderate
<i>Allocasuarina microstachya</i>	-	0.1	0	0.03	
<i>Hakea costata</i>	0.1	0	0	0.03	
<i>Hakea flabellifolia</i>	0	0.1	0	0.03	
<i>Mesomelaena pseudostygia</i>	2	1	0.5	1.17	
<i>Banksia attenuata</i>	0	0	0.1	0.03	High
Total Cover of BC Forage Species	5.1%	2.4%	39.6%	15.7%	

Table 19: Total % cover and area of species with forage value to Black Cockatoo present within the Clearing area intersection of VT04 (0.19 ha)

Value	Total % Cover	Area of forage species within VT04 clearing area (ha)
Low	11.52	0.0219
Moderate	4.13	0.0078
High	0.03	0.0001
Total	15.68 %	0.0298 ha

VT06 (Low Banksia woodland) - *Banksia prionotes*, *Eucalyptus todtiana* low open woodland over *Adenanthos cygnorum* subsp. *cygnorum*, *Leptospermopsis oligandra*, *Allocasuarina humilis* mid open shrubland over *Eremaea pauciflora* var. *pauciflora*, *Beaufortia elegans*, *Jacksonia floribunda* low sparse shrubland over *Mesomelaena pseudostygia*, *Lepidosperma scabrum*, *Schoenus insolitus* low sparse sedgeland (**0.36 ha**)

Table 20: Black Cockatoo Forage Species within VT06, the average cover across each quadrat and forage species value

Species Name		Average % cover	Value (ABCS 2025)
<i>Banksia dallanneyi</i> subsp. <i>media</i>	0.1	0.1	Low
<i>Allocasuarina humilis</i>	0.5	0.5	Moderate
<i>Eucalyptus todtiana</i>	0.1	0.1	
<i>Mesomelaena pseudostygia</i>	1	1.0	
<i>Banksia prionotes</i>	3	3.0	High
Total Cover of BC Forage Species	4.7%	4.7%	

Table 21: Total % cover and area of species with forage value to Black Cockatoo present within the Clearing area intersection of VT06 (0.19 ha)

Value	Total % Cover	Area of forage species within VT06 clearing area (ha)
Low	0.100	0.0058
Moderate	1.600	0.0004
High	3.000	0.0108
Total	4.70 %	0.017 ha

Appendix 4: Likelihood of Occurrence Assessment

Likelihood of Occurrence (Flora)

Species	Information
<i>Banksia nana</i> (P3)	<p><i>Banksia nana</i> has been recorded as growing in white-grey sand and gravel over laterite on hills (WAH, 1998 -). This species is known to occur within the Geraldton Sandplains and Swan Coastal Plain between Coorow and Dandaragan (WAH, 1998 -)</p> <p>According to Biologic the species is was recorded in the broader Survey Area within VT02 vegetation type. There are currently 24 records for this species recorded by the WA Herbarium (WAH, 1998 -). The one species was identified during the Biological Survey and was recorded 5 m southwest of the DE. The species was not recorded within the DE during the survey period (Biologic, 2024).</p> <p>Although the DE contains the vegetation and soil type associated with the species, the species was not identified during the detailed flora survey (Biologic, 2024), it is unlikely the species will be present within the DE.</p>
<i>Drosera allantostigma</i> (P1)	<p>This species is an inconspicuous small herb, flowering between November and December. The preferred habitat type for this species is loam, silica sand, or peaty soils located in the margins of winter-wet depressions. The closest known record of the species was identified 4.50 km south of the DE in a clump of approximately 150 individuals on Brand Highway in a slightly moist depression, sandy clay (2021) (WAH, 1998 -).</p> <p>Although suitable vegetation type may exist for this species in the DE; however, given the distance of the closest known species (4.50 km), survey timing aligning with the optimal flowering time of the species, and the species not being identified during the detailed flora survey (Biologic, 2024), it is unlikely the species will be present within the DE.</p>
<i>Drosera prophylla</i> (P3)	<p>This species is an inconspicuous herb, growing approximately 30cm in height. Little information is known on the species preferred habitat type. According to DBCA records. The closest known recorded species identified in the last 20 years was located approximately 17.85 km east of the DE in dry sand/gravel on hill rise on open heath vegetation (2021) (WAH, 1998 -).</p> <p>Although suitable vegetation type for this species may exist in the DE; however, given the distance of the closest known species in the last 20 years (17.85km) and the species not being identified during the detailed flora survey (Biologic 2024), it is unlikely the species will be present within the DE.</p>
<i>Eucalyptus macrocarpa</i> subsp. <i>elachantha</i> (P4)	<p>This taxon is a sprawling mallee species and has been recorded from white or grey sand over laterite on hillslopes, ridges and sandplains (WAH, 1998 -). This species is known to occur within the Geraldton Sandplains and Swan Coastal Plain between Geraldton and Regans Ford (WAH, 1998 -). The flowering time for this species is between August and September or November and December.</p> <p>According to Biologic (2024), the species was recorded in the broader Survey Area within VT04 and VT07 vegetation types. There are currently 58 records for this species (WAH, 1998 -). Two species were recorded during the Biological Survey; the closest species was located 614 m north of the DE (Biologic, 2024).</p> <p>Despite the DE containing two vegetation types associated with this species, Biologic (2024), did not identify the species during its optimal flowering time, and therefore, it is unlikely the species will be present within the DE. Additionally, the species is a conspicuous mallee, which would also make it recognisable by that feature.</p>
<i>Grevillea saccata</i> (P4)	<p><i>Grevillea saccata</i> is a scrambling shrub species with an optimal flowering time between April to November. The species has been recorded growing in yellow or brown sand, often with lateritic gravel (WAH, 1998 -).. This species is known to occur within the Geraldton Sandplains and Swan Coastal Plain between Jurien Bay and Gingin (WAH, 1998 -).</p> <p>According to Biologic (2024), the species was recorded in the broader Survey Area within VT03, VT04, VT06 and VT07 vegetation types. There are currently 64 records for this species (WAH, 1998 -). Sixty-four species counts were recorded during the Biological Survey, the closest species was located 5 m east of the DE.</p> <p>Despite the DE containing four vegetation types associated with this species, Biologic (2024), did not identify the species during its optimal flowering time, and therefore, it is unlikely the species will be present within the DE.</p>

<p><i>Lepidobolus quadratus</i> (P3)</p>	<p><i>Lepidobolus quadratus</i> is a Rhizomatous, caespitose perennial, herb, with an optimal flowering time between August to September. The species has been previously recorded growing from white-grey sand or lateritic gravel in dry Kwongan (WAH, 1998 -). This species is endemic to the Geraldton Sandplains between Eneabba and Regans Ford (WAH, 1998 -).</p> <p>According to Biologic (2024), the species were identified in the broader Survey Area within VT02 vegetation type. There are currently 47 records for this species (WAH, 1998 -). Ten species were identified during the Biological Survey, the closest of the species was located 5 m west of the DE.</p> <p>Despite the DE containing the VT02 vegetation type associated with this species, Biologic (2024), did not identify the species during its optimal flowering time, and therefore, it is unlikely the species will be present within the DE.</p>
<p><i>Schoenus griffinianus</i> (P4)</p>	<p><i>Schoenus griffinianus</i> is a small, tufted perennial sedge. The species is known to be recorded in white sand on gently undulating low plains and sandplains (WAH, 1998 -) This species is known to occur within the Geraldton Sandplains, Avon Wheatbelt, Mallee and Swan Coastal Plain between Geraldton and Lake Grace (WAH, 1998 -)</p> <p>According to Biologic (2024), the species was recorded in the broader Survey Area within VT04 vegetation type. There are currently 44 records for this species on record (WAH, 1998 -). Eleven species were identified during the Biological Survey, the closest of the species was located 13 m west of the DE.</p> <p>Despite the DE containing the VT04 vegetation type associated with this species, Biologic (2024), did not identify the species, and therefore, it is unlikely the species will be present within the DE.</p>
<p><i>Stylidium aeonioides</i> (P4)</p>	<p>This taxon is a small rosette perennial herb with a flowering time between September to November. The species' preferred habitat is Sandy clay loam over laterite and is often located along Hillsides and breakaways in low heath, open woodland vegetation types. The closest known species located in the last 20 years in relation to the DE is 16 km northwest, within a Lateritic heath vegetation type (2011) (WAH, 1998 -).</p> <p>Although suitable vegetation type for this species may exist in the DE; however, given the distance of the closest recorded species in the last 20 years and the species not being identified during the survey period in the optimal flowering time, it is unlikely the species will be present within the DE.</p>
<p><i>Stylidium inversiflorum</i> (P4)</p>	<p>This taxon is a small rosette perennial herb with a flowering time between September to November. The species' preferred habitat is white or grey sand over laterite, located on sandplains, hillslopes and gullies in a heath or open woodland environment. The closest known species recorded in the last 20 years was approximately 11.50 km south of the DE, within white sand and amongst a Banksia heath with Eucalyptus and <i>Stylidium</i> spp. vegetation description (WAH, 1998 -).</p> <p>Although suitable vegetation type for this species may exist in the DE; however, given the distance of the closest recorded species in the last 20 years and the fact that the species was not identified even during its optimal flowering time, it is unlikely the species will be present within the DE.</p>
<p><i>Stylidium torticarpum</i> (P3)</p>	<p>The taxa are a small inconspicuous herb, flowering between September to November. The preferred habitat type for the species is Sandy clay and clay loam over laterite. <i>Stylidium torticarpum</i> is often found adjacent to creek lines, depressions, and beneath breakaways. Heath or mallee shrubland. The closest known species was located approximately 6.00 km northwest of the DE within the Coomallo Nature Reserve in a mallee shrubland in a creek line and with yellow-grey sandy clay soil type (WAH, 1998 -).</p> <p>Although suitable vegetation type for this species may exist in the DE and the species flowering time aligns with the optimal survey period to identify the species. However, during the detailed flora survey, the species was not recorded within the DE or the Survey Area. Therefore, it is unlikely the species will be present within the DE.</p>
<p><i>Styphelia filamentosa</i> (P3)</p>	<p><i>Styphelia filamentosa</i> is a low, compact, spreading shrub, with an optimal flowering time between August to October (WAH, 1998 -). The species has been recorded from white-grey sandy soils or lateritic gravel on hillslopes or breakaways (WAH, 1998 -). This species is endemic to the Geraldton Sandplains between Eneabba and Badgingarra (WAH, 1998 -).</p> <p>According to Biologic (2024), the species was recorded in the broader Survey Area within two vegetation types (VT01 and VT04). There are currently 16 records for this species on record (WAH, 1998 -). Two species were identified during the Biological Survey, the closest of the species was located 9 m west of the DE.</p>

	<p>Despite the DE containing the VT01 and VT04 vegetation type associated with this species, Biologic (2024), did not identify the species during its optimal flowering time, and therefore, it is unlikely the species will be present within the DE.</p>
<p><i>Thelymitra stellata</i> (T)</p>	<p>This taxa is a tuberous perennial herb (Orchid), with an optimal flowering time between October to November (WAH, 1998 -). The species has been recorded in sand, gravel and lateritic loam (WAH, 1998 -) and is known to occur within the Geraldton Sandplains, Jarrah Forest and Swan Coastal Plains in isolated populations between Geraldton and Byford (WAH, 1998 -).</p> <p>According Biologic (2024), the species was recorded in the broader Survey Area and is associated within the VT02 vegetation type. There are currently 20 records for this species where it occurs between Three Springs in the north to near Darkan in the south (WAH, 1998 -). One individual species was identified during the Biological Survey, located 18 m west of the DE.</p> <p>Despite the DE containing the VT02 vegetation type associated with this species, Biologic (2024), did not identify the species during its optimal flowering time, and therefore, it is unlikely the species will be present within the DE.</p>
<p><i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234) (P4)</p>	<p>This taxon is a perennial herb. The species preferred habitat is grey, black or peaty sand winter-wet flats. The closest known recorded species occurs outside the 20 km Study Area (WAH, 1998 -). The optimal flowering time for the species is recognised as between October to February (WAH, 1998 -)</p> <p>Although suitable vegetation type for this species may exist in the DE and the survey was undertaken during the optimal flowering time; based on the spatial data and the species not being identified or recorded within a 20 km study area, it is unlikely the species will be present within the DE.</p>

Likelihood of Occurrence (Fauna)

Species	Information
Pacific swift Migratory (EPBC Act and BC Act) Peregrine falcon Specially Protected (BC Act) Southern Whiteface) – Vulnerable EPBC Act	All three species: Pacific swift (<i>Apus pacificus</i>), Peregrine falcon (<i>Falco peregrinus</i>) and Southern Whiteface (<i>Aphelocephala leucopsis</i>) are highly mobile avian species with the ability to easily egress from areas of disturbance. If present in the DE, they are likely to only occur as transient or overfly visitors. No evidence of these species' occurrence was recorded within the Survey Area during the field survey (Biologic, 2024). According to the DBCA rare fauna database, none of these species have been recorded in the 20km Study Area for 20 years (DBCA, 2017d). Given the nature of each species and absence of recent recordings of all three species it is unlikely these species will occur within the DE.
Carnaby's cockatoo (<i>Calyptorhynchus latirostris</i>) – Endangered (EPBC Act and BC Act)	Carnaby's cockatoo is endemic to southwest Western Australia, and is distributed from the Murchison River to Esperance, and inland to Coorow, Kellerberrin and Lake Cronin. The DE area occurs within the modelled breeding range for Carnaby's cockatoo. No Carnaby's cockatoo individuals or evidence of the species' occurrence was recorded within the survey area during the field survey. Main Roads consulted with Professor Kris Warren of Murdoch University to gain spatial tracking data of black cockatoo movements within the locality and the broader region (pers comm). The provided information suggests that Black Cockatoos are present in the area; however, very few records are present within the road reserve and specifically within the DE. Due to presence in the region, it is likely that the species will be an occasional forage visitor utilising the 'Low to Moderate' foraging value habitat in the DE.
Jewelled south-west Ctenotus (<i>Ctenotus gemmula</i>) – Priority 3 (DBCA)	The species inhabits open Eucalypt woodland over <i>Banksia</i> and low vegetation on sandy coastal plain and coastal dune. This species has been known to utilise rehabilitated mine sites, which may suggest it is at least somewhat adaptable to an altered habitat. The Jewelled south-west Ctenotus was not recorded within the Survey Area (Biologic, 2024). According to the DBCA rare fauna database (DBCA-037), this species has not been identified within the 20 km Study Area (DBCA, 2017d). Given the species has not been identified at the time of the field survey and no historical data has identified the species presence within 20 km of the proposed works, it is unlikely this species will be present within the DE.
Gilled slender bluetongue (<i>Cyclodomorphus branchialis</i>) – Vulnerable (BC Act)	Gilled slender bluetongue has a current known distribution from the Murchison River to Geraldton and inland to Yalgoo. The species prefers deep leaf litter on sandy beaches vegetated mainly with coastal spinifex, sheltering during the day in hummock grass, leaf litter, including Acacia, and under fallen logs and stumps. According to the DBCA rare fauna database (DBCA-037), this species has no historical records within 20 km of the DE (DBCA, 2017d). Additionally, no <i>Cyclodomorphus branchialis</i> species were identified in the Survey Area (Biologic, 2024). The fauna habitat preference for the species does not occur within the DE, and therefore it is unlikely the species will be present due to the species preferred habitat being available. Additionally, the species was not identified during the field survey and there have been no historic records of the species being present within the 20 km Study Area.
Black-striped snake (<i>Neelaps calonotos</i>) – Priority 3 (DBCA)	The Black-striped snake is restricted to coastal areas in the south-west of Western Australia around Perth between Port Kennedy and the Dongara region. The species inhabits sand dunes and sand plains vegetated with heaths, <i>Banksia</i> and Eucalypt woodlands with a distinct preference for habitats on the Quindalup and Spearwood dune systems that are also the preferred habitats of the fossorial lizards on which it feeds. According to the DBCA rare fauna database (DBCA-037), this species has no historical records within 20 km of the DE (DBCA, 2017d). Additionally, no <i>Neelaps calonotos</i> species were identified in the Survey Area (Biologic, 2024). Although the fauna habitat preference for the species may occur within the DE, it is unlikely the species will be present due to the species not being identified during the field survey and there have been no historic records of the species being present within the 20 km Study Area.

Appendix 5: Vegetation Management Plan

BRAND HIGHWAY PASSING LANE SLK 166

Purpose and Scope

This Vegetation Management Plan (VMP) has been prepared by Main Roads for the purpose of managing native vegetation clearing impacts associated with the Brand Highway Passing Lane SLK 166

The proposal involves the creation of a northbound passing lane along Brand Highway and the clearing of up to 1.89 hectares (ha) of native vegetation. This portion of Brand Highway is a single-lane road and is insufficient for a high-efficiency freight route between Perth and Geraldton. Therefore, the long positive grade along this section (SLK 166.65 – 168.75) warrants the new overtaking lane for the vehicles travelling northbound and to enhance driver safety. In specified circumstances, Main Roads VMP is required to be approved by Department of Water and Environmental Regulation (DWER) as a condition of the Main Roads Statewide Clearing Permit CPS 818.

Actions, and their relevant timeframes, from this VMP will be documented within the relevant Tender Documentation (Specifications), such as:

- Specification 204 Environmental Management
- Specification 301 Vegetation Clearing and Demolition
- Specification 303 Materials and Water
- Specification 304 Revegetation
- Specification 304 Rehabilitation of Disturbed Areas.

Once the Contract has been awarded, the Superintendent's Contract Management Team (or equivalent roles) are to ensure that the requirements are implemented by the Contractor.

Avoiding, Mitigating and Managing the Impacts of Clearing

A number of measures were undertaken to during the development and design of the proposal to reduce its impact the environment.

For further information on the alternatives that were considered during the proposal development, please go to Section 1.5 of the Clearing Assessment Report for the proposal.

For further information on the measures undertaken to avoid, minimise, reduce and manage the proposal's clearing impacts, please go to Section 1.6 of the Clearing Assessment Report for the proposal.

VMP Actions

General vegetation management actions to be undertaken is shown in Appendix 4.1: General Vegetation Management Actions for Clearing.

Appendix 4.1: General vegetation management actions for clearing

Management Action	Responsibility	Timing
The Contractor must ensure plant, machinery and equipment, is cleaned down prior to arrival to the site.	Superintendent	During construction
Vehicle hygiene inspection checklists will be utilised to manage potential weed/dieback spread on earth-moving machinery.	Superintendent	During construction
No known dieback infested soil, mulch, fill or other material will be permitted into the works area.	Superintendent	During construction
All Clearing must be undertaken in such a way to allow fauna to move out of the Clearing area.	Superintendent	During construction
The Limits of Vegetation Clearing will be demarcated on site prior to the commencement of clearing to prevent entry into areas of native vegetation.	Superintendent	During construction
Natural drainage pathways will not be obstructed from stockpile gravel, crushed rock and excavated material.	Superintendent	During construction
All recently cleared, exposed and loose surface areas shall be protected from wind, water and soil erosion.	Superintendent	During construction
The Contractor will ensure that clearing of native vegetation is only undertaken in dry conditions, unless otherwise approved and / or directed by the Superintendent.	Superintendent	During construction
All Special Environmental Areas will be pegged in accordance with Main Roads' Drawing 201928-0001-1 Construction Peg Colour Code (https://www.mainroads.wa.gov.au/globalassets/technical-commercial/technical-library/standard-contract-drawings/vegetation/construction-environmental-management/201928-0001-construction-peg-colour-code-drawing.pdf?v=49bd3b).	Superintendent	During construction
The Contractor must develop and detail a Site induction training program as part of the CEMP that includes as a minimum, the significant environmental impacts, actual or potential, of work activities associated with the Contract	Superintendent	During construction

The above actions will be documented within Specifications 204 and 301.

Main Roads' preclearing **Hold Point** applies to all projects that require vegetation clearing, as documented within Specification 301 (301.12 PRE-CLEARING PROCESS). Accordingly, all Hold Point actions must be signed off prior to clearing commencing. This Hold Point comprises the following actions:

1. Prior to the commencement of any clearing operations, the Contractor must certify for the Superintendent's verification and approval that the following activities have been completed in accordance with the relevant specification:
 - a) The pegging of limits of vegetation clearing has been undertaken.
 - b) The pegged vegetation clearing area does not exceed the Limits of Vegetation Clearing.
 - c) Mature trees have been conserved as far as practicable.
 - d) The pegging of special environmental areas has been undertaken.
 - e) All pre-clearing weed control has been undertaken.
 - f) All pre-clearing fauna operational controls have been undertaken.
 - g) All pre-clearing dieback operational controls have been undertaken.
 - h) Suitable and unsuitable topsoil zones have been identified.
 - i) Vegetation and topsoil stockpile locations have been identified.
 - j) All clearing machinery is compliant with controls.