Clearing Desktop Report
CPS 818

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Thomas Road Duplication (West)
Tonkin Highway to Kargotich Road

EOS#3150

D24#1550436
April 2025

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Document Control

Report Compilation & Review	Name and Position	Document Revision	Date
Author:	GHD Pty Ltd	Draft v1	March 2025
Author:	MR Environment Contractor	Rev 0	April 2025
Reviewer:	Main Road Environment Contractor	Rev 0	April 2024

1 PROPOSAL

1.1 Purpose and Justification

Main Roads Western Australia (Main Roads) is proposing to reconstruct approximately 1.2 km of Thomas Road as a four-lane dual carriageway from Kargotich Road to Tonkin Highway. A shared user path on the southern side of the road will also be constructed, with the current Western Power Transmission infrastructure relocated to the southern road reserve boundary.

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 and enhancing 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 involves reconstructing approximately 1.2km of Thomas Road as a four-lane dual carriageway from Kargotich Road to Tonkin Highway. These works will comprise:

- Preliminary works (e.g. geotechnical investigations)
- Vegetation clearing

- Ground disturbance
- Construction of sealed road

1.3 Proposal Location

The 7.02 ha Development Envelope is located on Thomas Road from Kargotich Road to Tonkin Highway within the Shire of Serpentine Jarrahdale, as shown in Figure 1. The central coordinate of the proposal is:

- Latitude: -32.2073°
- Longitude: 115.9581°

The location and boundaries of the Proposal Development Envelope (DE) are shown in Figure 2.

1.4 Clearing Details

Proposed Clearing to be undertaken using CPS 818:
Up to 0.48 ha of native vegetation is required to be cleared. No temporary clearing will be required for the Proposal.

Areas of Native Vegetation Clearing:
The areas of native vegetation to be cleared are shown in Figure 2.

Type of Native Vegetation:
The type of vegetation to be cleared under this Proposal is (GHD 2024):

- Highly modified individual or stands of *Casuarina obesa* over pasture weeds on grey sands on cleared palusplains and in roadside drains – 0.48 ha.

Although the native vegetation occurs within the under-represented Vegetation Association 968 and Beermullah complex, it is not considered significant as a remnant due to the small area proposed to be cleared, comprising highly modified, Completely Degraded vegetation consisting primarily of native trees over highly modified ground cover strata dominated by weed species, significantly changing the structure of the vegetation. Subsequently, the vegetation within the Development Envelope is not considered to represent the description of the Beermullah Complex due to condition and extensive impacts.

This vegetation is also located immediately adjacent to the existing road within a roadside drain in a thin linear strip. The native vegetation is within the mapped 'Multiple Use' palusplain wetland, covering an area of 7,266.41 ha. Multiple Use wetlands are considered to have few remaining important attributes and functions, with the protection of these wetlands the lowest priority (DBCA 2017).

Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 PCG2020

N

GHD

Main Roads WA
Tonkin Extension - Thomas Rd West

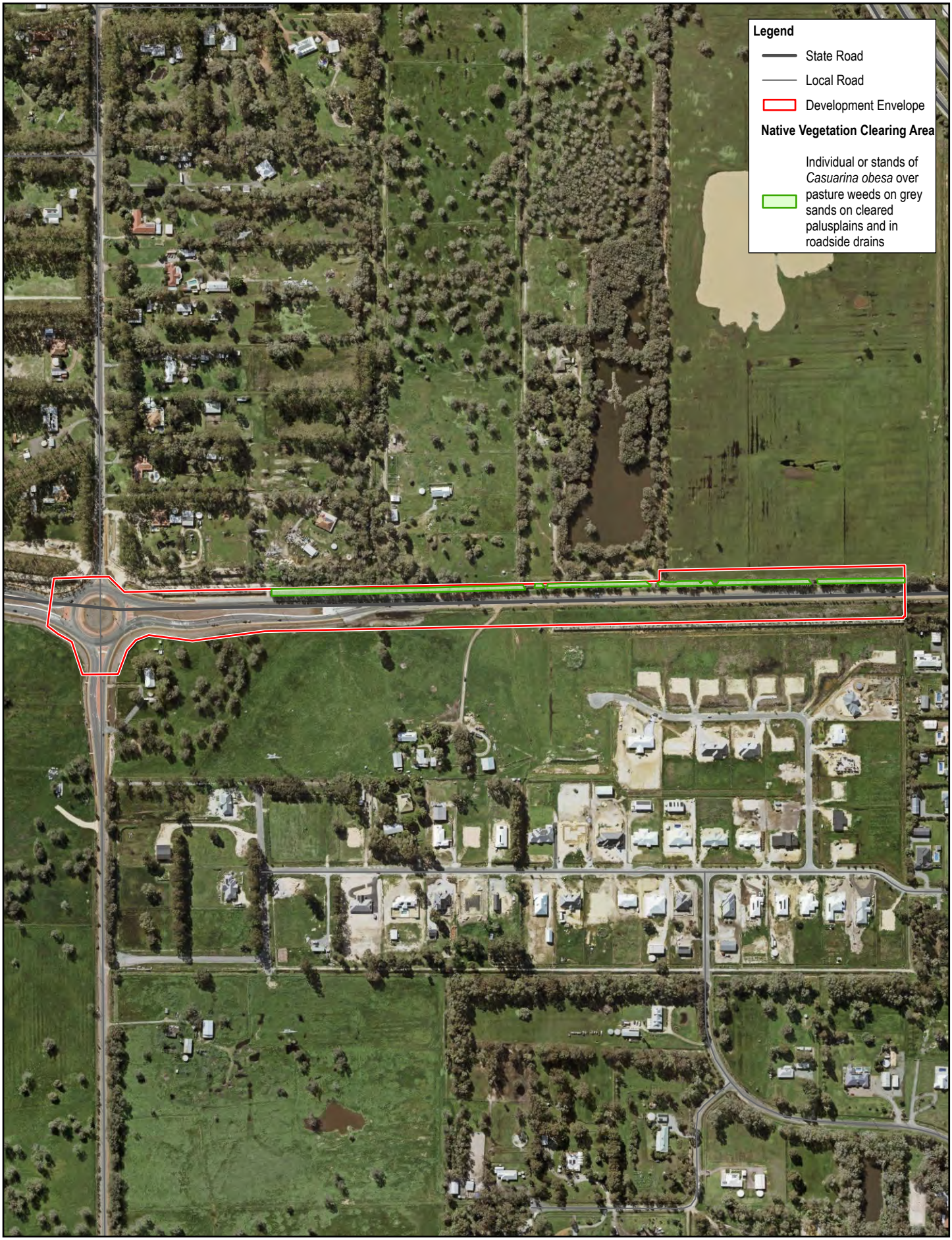
Project No. **12616477**
Revision No. **0**
Date **31/03/2025**

Development Envelope

FIGURE 1

G:\61\12616477\GIS\Maps\Working\12616477_Figures_ThomasRdWest\12616477_Figures_ThomasRdWest.aprx
Print date: 31 Mar 2025 - 14:27

Data source: Light Gray Base: Esri, TomTom, Garmin, FAO, NOAA, USGS
WANow:
World Imagery: Earthstar Geographics. Created by: mmikkonen



Paper Size ISO A4

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 PCG2020

N

GHD

Main Roads WA
Tonkin Extension - Thomas Rd West

Project No. **12616477**
Revision No. **0**
Date **31/03/2025**

Native Vegetation

FIGURE 2

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Print date: 31 Mar 2025 - 15:19

Data source: WANow: World Imagery: Maxar. Created by: mmikkonen

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; however, these are not suitable due to inter-relationships with more significant regional road planning Proposals, longer travel times, sensitive local receptors, more environmental impacts or other planning issues
- 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 1.

Table 1. Measures Undertaken to Avoid, Minimise, Reduce and Manage the Proposal Clearing Impacts

Design or Management Measure	Applied to Current Design	Discussion and Justification
Alignment to one side of existing road	Yes	The alignment connects to a roundabout constructed at Kargotich Road, with the alignment at the western extent of the DE located to the north of the existing Thomas road. The DE extends to the south of the existing Thomas Road, which is cleared.
Alternative alignment located within pasture or degraded areas	Yes	Previously disturbed areas have been considered in the design and are included in the alignment. The DE mostly comprises cleared land, with the native vegetation present in the DE being highly modified and in Completely Degraded condition.
Simplification of design to reduce number of lanes and/or complexity of intersections	Yes	Design of reconstructed road will be consistent with the existing design.
Steepen batter slopes	N/A	The alignment is associated with relatively flat ground, where batters are unlikely to be utilised in the design.
Installation of barriers	N/A	The installation of safety barriers is not required within the design and integration would not reduce the DE or clearing impacts.
Installation of kerbing	Yes	Kerbing has been designed where possible but will have limited impact on the construction footprint (and thus clearing footprint).
Use of existing cleared areas for access tracks, construction storage and stockpiling	Yes	Stockpile locations and access tracks will utilise cleared areas. No additional clearing is proposed or required for these purposes.
Drainage modification	N/A	Road surface water drainage will be maintained and will be in keeping with the existing drainage. Surface drainage has been incorporated into the works associated with the roundabout constructed at Kargotich Road, on the north side of the road at the western extent of the DE.

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&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 (Government of Western Australia, 2011)
- A guide to the assessment of applications to clear native vegetation (Government of WA, December 2014)
- Procedure: Native vegetation clearing permits (Government of WA, October 2019)
- Environmental Offsets Guidelines (Government of Western Australia, 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
- Referral guideline for 3 WA threatened black cockatoo species (DAWE 2022).

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 818/17.

To comply with CPS 818/17, Main Roads must prepare a Clearing Desktop Report (CDR).

The CDR 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:

- **Native Vegetation Clearing Area** – The maximum amount of native vegetation to be cleared for the Proposal that 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 will be located. This envelope is larger than the Clearing Area to allow for minor changes to the Proposal footprint as the design process continues, and to account for minor and unexpected changes that may occur during construction, such as working to avoid a large tree or encountering buried boulders or services. This flexibility allows the site personnel to make modifications to the Proposal to avoid areas that may contain better environmental values. The CDR has assessed all environmental values within the DE as though all of these values will be impacted, up to the amount specified within the Clearing Area.
- **Study Area** – Area covered by the Desktop Assessment. The Study Area for the Proposal is confined to a local area of a 10km radius for spatial data.
- **Survey Area** – Area covered by the Biological Survey, which is typically larger than the Development Envelope.

2.2 Desktop Assessment

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

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 8.

2.3 Surveys and Assessments

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

- Tonkin Highway Extension (Thomas Road to South Western Highway) Flora and Vegetation Assessment (Umwelt 2021)
- Westport Freight Road Additional Biological Survey (Biota 2023)
- Tonkin Highway Extension Flora, Fauna and Black Cockatoo Memorandum (GHD 2024)

Biological and targeted surveys conducted for the proposal are outlined in Table 2 and a summary of the findings in these reports are presented in Sections 3.1 to 3.3.

Table 2. Summary of Biological and Targeted Surveys Relevant to the Proposal

Consultant & Survey Name	Survey Details
Umwelt (2021) Tonkin Highway Extension (Thomas Road to South Western Highway) Flora and Vegetation Assessment	**Survey Area:** The survey area covered 369.7 ha, including 0.58 ha (8.23%) of the DE for this Proposal **Type:** The survey initially involved a reconnaissance vegetation survey, followed by a detailed survey, as well as targeted survey for significant flora and vegetation. **Timing:** The survey was undertaken on various dates, between May 2019 and October 2020. **Survey Results Shapefile TRIM Ref:** D24#567473 **Document TRIM Ref:** D24#333478
Biota (2023) Westport Freight Road Additional Biological Survey	**Survey Area:** The survey area covered 561.5 ha, including 7.02 ha (100%) of the DE for this Proposal **Type:** A detailed flora and vegetation survey and targeted flora survey. The survey assessed the vegetation (native and non-native) values of the DE including the type, condition and extent. **Timing:** The survey was undertaken on various dates. The fauna survey was undertaken across three visits; September 2020, October 2020 and September 2022. The current flora and vegetation field survey was conducted during multiple visits between September 5 and 21, 2022. Thomas Road Biological Study was undertaken from 25 August to 24 November 2020. Anketell Road Biological Study was undertaken from 6 October 2020 to 28 July 2021. **Survey Results Shapefile TRIM Ref:** D23#1286993 **Document TRIM Ref:** D23#638963
GHD (2024) Tonkin Highway Extension Flora, Fauna and Black Cockatoo Memorandum	**Survey Area:** The survey area covered 34.37 ha, including 4.17 ha (59.40%) of the DE for this Proposal, including 0.85 ha (88.54%) of vegetated area within the DE **Type:** Reconnaissance flora and vegetation survey, Basic fauna and Black Cockatoo habitat assessment **Timing:** The field survey was undertaken from 17 to 18 May 2023 **Survey Results Shapefile TRIM Ref:** D24#544082 **Document TRIM Ref:** D24#544075

3 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 1.

3.1 Summary of Tonkin Highway Extension (Thomas Road to South Western Highway) Flora and Vegetation Assessment (Umwelt 2021)

Main Roads commissioned Woodman Environmental Consulting Pty Ltd (Umwelt) to conduct a flora and vegetation assessment of the remaining undeveloped portion of the Tonkin Highway extension from Thomas Road in Oakford to South Western Highway in Mundijong.

Twelve vegetation types were defined and mapped within the survey area. Five of these were defined via floristic composition classification, using the results of a classification analysis of quadrat data from the survey area. The remaining vegetation types were defined via structural vegetation classification. Additionally, a number of types of highly modified and revegetated areas were mapped.

Four significant vegetation types were identified and mapped in the Study Area by this survey, including three W.A. listed Threatened Ecological Communities (TECs) (all of which are also listed, either individually or as a component of an umbrella community, as TECs by the Commonwealth), and one Study Area VT that may represent a listed W.A. TEC, with more data required to confirm its status. These are:

- SCP3a - *Corymbia calophylla -Kingia australis* woodlands on heavy soils, Swan Coastal Plain (WA – Critically Endangered; Commonwealth - Endangered);
- SCP3c - *Corymbia calophylla -Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (WA – Critically Endangered; Commonwealth - Endangered);
- SCP08 - Herb rich shrublands in clay pans (WA – Vulnerable; Commonwealth – Critically Endangered, as a component of the Clay Pans of the Swan Coastal Plain); and
- Study Area VT 5.

The vegetation mapped in the DE was described as highly modified individual or stands of *Casuarina obesa* over pasture weeds on grey sands on cleared palusplains and in roadside drains. This vegetation did not represent a TEC or PEC, and was mapped as being in Completely Degraded condition.

A total of 281 discrete vascular flora taxa were recorded in the survey area, representing 54 families and 156 genera. Fifty-five of the total taxa recorded are introduced taxa. Nine significant flora were recorded in the survey area, including three Threatened taxa, five Priority flora taxa and one taxon considered significant for other reasons. These are:

- *Acacia lasiocarpa* var. bracteolata long peduncle variant (G.J. Keighery 5026) (P1)
- *Babingtonia urbana* (P3)
- *Calectasia grandiflora* (P2)
- *Jacksonia gracillima* (P3)
- *Leucopogon* aff. sp. Busselton (D. Cooper 243) (potentially undescribed)
- *Stylidium aceratum* (P3)
- *Synaphea* sp. Pinjarra Plain (A.S. George 17182) (Threatened)
- Synaphea sp. Serpentine (G.R. Brand 103) (Threatened)
- *Tetraria australiensis* (Threatened)

No EPBC Act or BC Act listed Threatened flora or Priority listed flora by DBCA were recorded within the DE by the survey.

3.2 Summary of Westport Freight Road Additional Biological Survey (Biota 2023)

Biota Environmental Sciences (Biota) was commissioned to undertake an additional biological survey in Spring 2022 of the proposed area (561.5 ha), specifically within parcels of private land tenure that were unable to be accessed during the baseline ecological studies previously conducted for Anketell Road and Thomas Road in 2020-2021. This report consolidates the previous 2020-2021 survey results and the spring 2022 survey results to provide a comprehensive biological survey report for the entire survey area.

Nineteen intact vegetation units were identified within the survey area and inferred within the contextual area, with eight additional categories of land deemed to be modified and/or disturbed to some extent. Cleared areas devoid of native vegetation accounted for 96.81 ha (17.24%) of the survey area.

The native vegetation in the DE is described as '*Casuarina obesa* (C. glauca) open woodland to closed forest with emergent Eucalyptus and Corymbia species over **Avena barabta*, **Bromus diandrus*, **Ehrharta longiflora*, **E. calycina* bunched to very open grassland. This vegetation was mapped as Completely Degraded condition.

A total of nine patches of the Commonwealth-listed 'Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' TEC occurred either wholly or partially within the survey area, whilst another nine patches that were assessed did not meet the diagnostic criteria in order to be recognised as the TEC. A total of 14 patches of the Commonwealth-listed 'Banksia Woodlands of the Swan Coastal Plain ecological community' TEC occurred either wholly or partially within the survey area. One state-listed TEC was identified to occur within the survey area, the Endangered '*Melaleuca huegelii – Melaleuca systena* shrublands on limestone ridges (Gibson et al. 1994; type 26a)'. This TEC occurred as roadside strips at one location and was generally in Degraded condition with a relatively intact upper stratum and an understorey dominated by introduced species.

Four State-level PECs were identified within the survey area:

- Priority 3 'Low lying *Banksia attenuata* woodlands or shrublands (FCT 21c)'
- Priority 3 'Banksia woodlands of the Swan Coastal Plain'
- Priority 3 'Northern Spearwood shrublands and woodlands (FCT 24)'
- Priority 3 'Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' (FCT 30b)

No TEC or PECs were recorded from or adjacent to the DE.

A total of 376 native vascular flora taxa from 183 genera and 59 families were recorded from the survey area. No Threatened flora species were recorded within the survey area during the current study; however, four State-listed Priority species were recorded:

- *Poranthera moorokatta* (Priority 2): five individuals
- *Eryngium pinnatifidum* subsp. *Palustre* (G.J. Keighery 13459) (Priority 3): one individual
- *Caladenia speciosa* (Priority 4): three individuals
- *Calothamnus quadrifidus* subsp. *teretifolius* (Priority 4): two records

A total of 150 introduced species were recorded. Five of the species recorded within the survey area are listed as Declared Pests under the Biosecurity and Agriculture Management Act 2007 (*Asparagus asparagoides, **Echium plantagineum*, **Gomphocarpus fruticosus*, **Moraea flaccida* and **Zantedeschia aethiopica*), with **Asparagus asparagoides* also listed as a WoNS.

No significant flora, Declared Pests or WoNS were recorded from the DE.

Within the 561.5 ha survey area, 107.2 ha (19.1%) was mapped as Cleared/degraded and an additional 237.5 ha (42.3%) was mapped as Modified Areas (which were largely cleared but included small areas of vegetation). Across the remaining 216.8 ha native vegetation, eight fauna habitats were identified as listed below from most common to least:

- *Banksia* woodland (89.4 ha, 15.9%);
- Eucalypt woodland/forest (54.6 ha, 9.7%);
- *Acacia* shrubland (21.3 ha, 3.8%);
- Damplands (15.6 ha, 2.8%);
- *Banksia* rehabilitation (14.6 ha, 2.6%);
- Jarrah/*Banksia* woodland (13.6 ha, 2.4%);
- *Casuarina* Forest (5.0 ha, 0.9%); and
- Emergent Flooded Gum and Marri (2.8 ha, 0.5%).

Seven of the eight habitats occurring within the survey area were well represented within the contextual area; however, Eucalypt Woodland/Forest habitat type was better represented in the survey area than the surrounding contextual area. The fauna habitats mapped by Biota (2023) within the DE included:

- Casuarina Forest
- Cleared/degraded areas
- Modified areas

Four fauna species of significance were recorded within the survey area, but not from the DE:

- Carnaby's Black Cockatoo
- Forest Red-tailed Black Cockatoo
- Quenda, Isoodon fusciventer
- Western Brush Wallaby

3.3 Summary of Tonkin Highway Extension Flora, Fauna and Black Cockatoo Memorandum (GHD 2024)

GHD were commissioned by Main Roads to undertake a Reconnaissance flora and vegetation survey, Basic fauna survey and Black Cockatoo habitat assessment. The survey area consisted of 29 polygons that ranged in size from 0.01 ha to 10.81 hectares (ha). The total combined survey extent (i.e. all polygons combined) was 34.37 ha, including 4.17 ha (59.40%) of the DE.

This survey studied gap areas of the larger Tonkin Extension project that had not been included in previous surveys.

Ten Highly Modified Areas and five Revegetated Areas were mapped within the survey area. Most of the survey area was considered Cleared and was represented by either roads or tracks, infrastructure, or pasture (26.28 ha, 76.46 %). Highly modified areas covered 4.71 ha (13.69 %), revegetated areas covered 1.85 ha (5.37 %), and vegetation types made up 1.28 ha (3.71%). The vegetation in the survey area ranged from Good to Completely Degraded condition.

One highly modified vegetation type was recorded in the DE, not including Cleared areas. This vegetation was in Completely Degraded condition.

No TECs listed under the EPBC Act or BC Act or PECs listed by DBCA were identified within the survey area, and therefore the DE, during the field survey.

Seventy-nine flora taxa (including subspecies and varieties) representing 29 families and 55 genera were recorded from the survey area during the field survey. This total comprised 34 native taxa and 45 introduced/non-endemic planted flora taxa.

No EPBC Act or BC Act listed flora were recorded within the survey area. One DBCA Priority four (P4) listed species *Grevillea olivacea* was recorded at several locations within the survey area. Although *Grevillea olivacea* is listed as a Priority flora species by DBCA, it is considered to be planted within the survey area and is well outside its natural range. This species was not recorded from the DE.

Three species are listed as a Declared Pests under the BAM Act were found:

- **Gomphocarpus fruticosus* (Narrow leaf Cottonbush)
- **Zantedeschia aethiopica* (Arum Lily)
- **Asparagus asparagoides* (Bridal Creeper)

**Asparagus asparagoides* is also listed as a Weed of National Significance (WoNS).

No WoNS were located within the DE; however, **Gomphocarpus fruticosus* was recorded from the DE.

Three fauna habitat types were identified and mapped and include Farmland/Cleared areas (26.28 ha), Remnant and re-planted native vegetation (6.19 ha), and Creeklines with native vegetation (1.50 ha). Farmland/Cleared was most predominant in the DE, with Native Vegetation habitat aligning with the vegetation present.

Forty-eight fauna taxa representing 35 birds, six mammals, five reptiles and two frogs were recorded from the survey area during the field survey. This total comprised 41 native taxa and seven introduced/non-endemic fauna taxa.

During the field survey, four significant fauna species were recorded including Quenda, Forest Red-tailed Black Cockatoo, Carnaby's Cockatoo and Baudin's Cockatoo. One Quenda was observed and sightings of scats, digs, and tunnels were recorded. Foraging evidence of all three Black Cockatoo species was observed on Marri nuts, and FRTBC was recorded flying overhead the vicinity.

No significant fauna species were recorded from the DE.

In this assessment, it was determined that 26.44 ha (76.91%) of the survey area was valued as having 'no foraging value' for the three species of Black Cockatoos. In isolated areas throughout the survey area, it was determined that 1.38 ha (4.02%) had 'moderate to high foraging value'. These isolated patches of 'moderate to high foraging value' consisted predominantly of DBH-suitable *Corymbia calophylla* trees which provide potential Black Cockatoo breeding habitat. Moderate foraging value consisted of 0.85 ha (2.46%), Low to Moderate foraging value of 1.37 ha (3.99%) and low foraging value of 4.34 ha (12.62%).

A total of 236 suitable DBH trees for Black Cockatoo breeding were located within the survey area. Nine hollows were recorded within five trees, consisting of Flooded Gum and Jarrah. Of these, one hollow (in Jarrah) was considered potentially suitable for Black Cockatoo nesting but showed no signs of previous use.

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

Foraging habitat was mapped as 'Low' (quality score 2) within the DE, with no suitable DBH trees recoded.

4 VEGETATION DETAILS

4.1 Proposal Site Vegetation Description

For vegetation mapping, description and condition, GHD (2024) and Umwelt (2021) data has been used due to GHD data being more recent and having a more refined representation of the extent. The GHD report supplemented the Umwelt (2021) survey. Post completion of the biological surveys and reporting, clearing has occurred within the DE as part of the Thomas Road and Kargotich Road Intersection project, which was the subject of environmental assessment and approval under CPS 818 in 2021 (D21#553531). The vegetation extent has been modified based on aerial imagery accordingly.

The native vegetation type identified within the DE is summarised in Table 3. The total area of native vegetation within the DE is 0.48 ha, while the remainder of the DE is Cleared land (6.54 ha). Native vegetation within the DE is in Completely Degraded condition (GHD 2024; Umwelt 2021). The Biota (2023) survey is consistent with these surveys.

Table 3. Summary of Vegetation Types within Development Envelope

Vegetation Type	Extent within Development Envelope (ha)	Total Extent Mapped (ha) within Survey Area (GHD 2024; Umwelt 2021)
Highly modified individual or stands of *Casuarina obesa* over pasture weeds on grey sands on cleared palusplains and in roadside drains	0.48	3.08

The DE is located within the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) region and the Perth Subregion (SWA2) (GoWA 2024). There is one pre-European Vegetation Association within the DE– 968, which is described as – Medium woodland: *Eucalyptus marginata*, *Corymbia calophylla*, and *Eucalyptus wandoo*. Table 4 provides details of the Vegetation Association and the remaining extent of this association.

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. 968	**Statewide** WA	296,877.84	95,048.82	32.02	18.45
	IBRA Bioregion Swan Coastal Plain	136,188.20	9,017	6.62	1.43
	IBRA Sub-region Perth	136,188.20	9,017.32	6.62	1.43
	LGA Shire of Serpentine Jarrahdale	24,351.49	1,121.13	4.60	0.57

4.2 Vegetation Complexes and Representation

Vegetation Complexes within the Clearing Area have been defined by Heddle et al. (1980) and are based on vegetation in association with landforms and underlying geology. One native vegetation complex as described by Heddle et al. (1980) occurs within the Development Envelope:

- **Beermullah Complex –** Mixture of low open forest of *Casuarina obesa* (Swamp Sheoak) and open woodland of *Corymbia calophylla* (Marri) - *Eucalyptus wandoo* (Wandoo) - *Eucalyptus marginata* (Jarrah). Minor components include closed scrub of Melaleuca species and occurrence of *Actinostrobus pyramidalis* (Swamp Cypress).

The current remaining extent of this vegetation complex is detailed in Table 5. The remaining extent of the Beermullah complex is below the minimum threshold of 10% that is the target for retention in constrained areas (DER 2014).

Table 5. Vegetation Complexes (Heddle/Mattiske) within the Development Envelope

Heddle/Mattiske Veg Complex	Pre-European Extent (ha)	Current Extent (ha)	% Remaining
Beermullah Complex	6707	447.21	6.67

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.

The proposed clearing may be at variance with one or more of the ten Clearing Principles.

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

Proposed clearing is not likely to be at variance to this Principle.

Assessment

Vegetation

The native vegetation in the DE is highly modified individual or stands of *Casuarina obesa* over pasture weeds on grey sands on cleared palusplains and in roadside drains. This vegetation occurs as a thin strip, north of Thomas Road. The western extent of this vegetation is present in aerial imagery from 1953 and considered remnant. The eastern extent of the vegetation appears to have regrown over time from induvial trees in the 1970s and 1980s, to more continuous vegetation by 2004. The extent of the native vegetation in the DE, based on GHD (2024) and Umwelt (2021) mapping is 0.48 ha. The native vegetation mapped within the DE is not considered diverse, with the condition mapped as Completely Degraded and impacted by high abundance of common weed species (Umwelt 2021; Biota 2023; GHD 2024).

Threatened and Priority Ecological Communities

Desktop searches indicated the potential presence of 16 listed communities previously recorded or likely to occur within the study area (DBCA, PMST):

- Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain (EPBC Endangered, DBCA Critically Endangered)
- Banksia Woodlands of the Swan Coastal Plain (EPBC Endangered, DBCA Priority 3)
- *Casuarina obesa* Association (DBCA P1)
- Clay Pans of the Swan Coastal Plain (EPBC Critically Endangered, DBCA Vulnerable)
- Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) (EPBC Endangered, DBCA Critically Endangered)
- Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain (EPBC Endangered, DBCA Endangered)
- Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain (EPBC Critically Endangered, DBCA Priority 3)
- SCP3a: *Corymbia calophylla – Kingia australis* woodlands on heavy soils of the Swan Coastal Plain (EPBC Endangered, DBCA Critically Endangered)
- SCP3b: *Corymbia calophylla – Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (DBCA Endangered)
- SCP3c: *Corymbia calophylla – Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (EPBC Endangered, DBCA Endangered)
- SCP8: Herb rich shrublands in clay pans (EPBC Critically Endangered, DBCA Endangered)
- SCP9: Dense shrublands on clay flats (EPBC Critically Endangered, DBCA Endangered)
- SCP10a: Shrublands on dry clay flats (EPBC Critically Endangered, DBCA Endangered)

- SCP20b: Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (EPBC Endangered, DBCA Critically Endangered)
- SCP21c: Low lying Banksia attenuata woodlands or shrublands (EPBC Endangered, DBCA Priority 3)
- SCP22: *Banksia ilicifolia* woodlands (EPBC Endangered, DBCA Priority 3)

No Threatened Ecological Communities listed under the EPBC Act or BC Act or Priority Ecological Communities listed by DBCA were identified within the DE during the field surveys (Umwelt 2021; Biota 2023; GHD 2024).

Significant flora

Desktop searches indicated the potential presence of 54 significant flora taxa within the study area (DBCA, PMST, WAHERB). This included:

- The PMST search identified the known or likely presence of three Critically Endangered, eight Endangered, and five Vulnerable species under the EPBC Act.
- The DBCA database search identified the potential presence of 14 Threatened species under the BC Act and three Priority 1 (P1), five P2, 18 P3, and nine P4 by the DBCA.

No flora species listed as Threatened under the EPBC Act or the BC Act, or Priority flora species listed by DBCA have been recorded from or adjacent to the DE during the field surveys (Umwelt 2021; Biota 2023; GHD 2024). Given almost all the native vegetation recorded in the DE is highly modified with no intact mid or understory, it is unlikely to support significant flora.

Fauna habitat

The fauna habitats mapped by GHD (2024) and Umwelt (2021) within the DE included:

- VSA1 - Farmland/Cleared Areas
- VSA2 - Native Vegetation

The extent of the VSA2 fauna habitat in the DE, based on GHD (2024) and Umwelt (2021) vegetation mapping is 0.48 ha. Given the small area of the clearing required for the Proposal and the proximity of the Proposal to existing roads, it is considered the DE is unlikely to represent key habitat for any significant fauna species. The DE is located amid agricultural and residential lands, rendering the surrounding landscape fragmented.

The clearing is not likely to significantly impact any significant flora or fauna species. The native vegetation is not considered to comprise a high level of biological diversity compared to the surrounding area neither does it form part of a Bush Forever site or ecological linkage. Therefore, it is considered the proposed clearing is not likely to be at variance to this Principle.

Methodology

- Biological Survey (umwelt 2021; Biota 2023; GHD 2024)
- DCCEEW Protected Matters Search Tool Report
- Government GIS Shapefiles:
  - DBCA Threatened and Priority Ecological Community database search (Accessed 05/09/2024)
  - DBCA Threatened and Priority flora database search (Accessed 05/09/2024)
  - Region Scheme - Special Areas (DPLH-022) (Accessed 05/09/2024)
  - Ecological Linkages (Accessed 05/09/2024)
- 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 indigenous to Western Australia.

Proposed clearing is not likely to be at variance to this Principle.

Assessment

The Proposal will result in the direct loss of fauna habitat via the clearing of up to 0.48 ha of native vegetation.

Fauna habitat

The fauna habitats mapped by GHD (2024) and Umwelt (2021) within the DE included:

- VSA1 - Farmland/Cleared Areas
- VSA2 - Native Vegetation

Given the thin nature of the clearing required for the Proposal and the proximity of the Native Vegetation Clearing Area to the existing road, it is considered the DE is unlikely to represent key habitat for any significant fauna species; however, may provide sufficient density of leaf litter favoured by fossorial reptiles and some mygalomorph spider species (Biota 2023). The DE is located amid agricultural and residential lands, rendering the surrounding landscape fragmented with limited connectivity.

This area was also identified as foraging habitat for Black Cockatoos; however, was scored as 'Negligible to Low' (quality score 1) for Baudin's Black Cockatoo and Carnaby's Black Cockatoo, and 'Low' (quality score 2) for the Forest Red-tailed Black Cockatoo. (Biota 2023). GHD (2024) and Umwelt (2021) mapped the foraging habitat within the DE as 'Low' (quality score 2).

Three fauna habitat trees were historically recorded within the DE and an additional tree is noted as being very close to the boundary (Biota 2023); however, the trees within the DE were cleared as part of the construction of the roundabout at Kargotich Road. The remaining isolated tree adjacent to the southern extent of the DE was recorded by Biota (2023) as a suitable diameter at breast height (DBH) to develop hollows for Black Cockatoo species, though does not currently have any suitable hollows. No hollows or roosting sites occur within or adjacent to the Native Vegetation Clearing Area. Therefore, vegetation is not considered significant habitat for Black Cockatoos.

The PMST report suggests that breeding for Carnaby's Black Cockatoo is likely to occur within the Development Envelope and that roosting for Baudin's Black Cockatoo is known to occur within the DE. However, DBCA datasets (DBCA-063; DBCA-064) show the nearest breeding site for Black Cockatoos is over 38km away and that the nearest roosting site is over 2.35km away. No evidence of roosting was recorded within the survey area, nor did the BirdLife Australia database of Great Cocky Count roost data return any roosts within the Development Envelope (Biota 2023; GHD 2024). Therefore, as no hollows are present in the DE or evidence of roosting, the clearing will not impact on any known breeding or roosting sites.

Fauna

Desktop searches identified the potential presence of 68 significant fauna species within the study area (DBCA and PMST) Listed marine species that are not Threatened have been removed from the PMST due to a lack of suitable habitat within the DE. This included:

- The PMST search identified the known or likely presence of five Critically Endangered, seven Endangered, and nine Vulnerable species under the EPBC Act
- The DBCA database search identified the potential presence of one Priority 2 species, six Priority 3, seven Priority 4, 15 Threatened and 17 specially protected species.

No EPBC Act or BC Act listed fauna were recorded within the survey area during the field surveys (Umwelt 2021; Biota 2023; GHD 2024).

The proposed clearing will impact on potentially suitable native habitat for fauna indigenous to WA. However, significant fauna species are unlikely to be solely reliant on the native habitats within the DE. The area does not form part of an ecological linkage. Given the small, linear nature of the clearing required for the Proposal and the proximity of the Proposal to existing road and existing cleared area, it is considered unlikely the DE represents key habitat for any significant fauna species. The scale of the proposed clearing is also small on a regional and local level when compared to the available habitat in the surrounding area. Based on the above information, the vegetation proposed to be cleared is not likely to be necessary for the maintenance of native fauna species.

The proposed clearing is not likely to be at variance to this Principle.

Methodology

- Biological Survey (Umwelt 2021; Biota 2023; GHD 2024)
- DCCEEW Protected Matters Search Tool Report
- Government GIS Shapefiles:
  - DBCA Threatened and Priority fauna database search (Accessed 05/09/2024)
  - Ecological Linkages (Accessed 05/09/2024)
  - Black Cockatoo Breeding Sites (DBCA-063) (Accessed 05/09/2024)
  - Black Cockatoo Roosting Sites (DBCA-064) (Accessed 05/09/2024)
- Referral guideline for 3 WA threatening Black Cockatoo species (DAWE 2022)
- Species specific conservation listing advice and recovery plans

(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.

Assessment

Desktop searches indicated the potential presence of 54 significant flora taxa within the study area (DBCA, WAHERB). The DBCA database search identified the potential presence of 14 Threatened species under the BC Act.

No EPBC Act or BC Act listed flora were recorded within the survey area during the field surveys (Umwelt 2021; Biota 2023; GHD 2024). Given all the native vegetation recorded in the DE is highly modified with no intact mid- or understory, it is unlikely to support significant flora.

Clearing of vegetation for this Proposal will not impact on any known rare or Threatened flora. Clearing is not at variance to this principle.

Methodology

- Biological Survey (Umwelt 2021; Biota 2023; GHD 2024)
- DCCEEW Protected Matters Search Tool Report
- Government GIS shapefiles:
  - DBCA Threatened flora database search (Accessed 05/09/2024)

(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

Desktop searches indicated the potential presence of 16 listed communities previously recorded or likely to occur within the study area (DBCA, PMST):

- Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain (EPBC Endangered, DBCA Critically Endangered)
- Banksia Woodlands of the Swan Coastal Plain (EPBC Endangered, DBCA Priority 3)
- *Casuarina obesa* Association (DBCA P1)
- Clay Pans of the Swan Coastal Plain (EPBC Critically Endangered, DBCA Vulnerable)
- Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) (EPBC Endangered, DBCA Critically Endangered)
- Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain (EPBC Endangered, DBCA Endangered)
- Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain (EPBC Critically Endangered, DBCA Priority 3)
- SCP3a: *Corymbia calophylla – Kingia australis* woodlands on heavy soils of the Swan Coastal Plain (EPBC Endangered, DBCA Critically Endangered)
- SCP3b: *Corymbia calophylla – Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain (DBCA Endangered)
- SCP3c: *Corymbia calophylla – Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (EPBC Endangered, DBCA Endangered)
- SCP8: Herb rich shrublands in clay pans (EPBC Critically Endangered, DBCA Endangered)
- SCP9: Dense shrublands on clay flats (EPBC Critically Endangered, DBCA Endangered)
- SCP10a: Shrublands on dry clay flats (EPBC Critically Endangered, DBCA Endangered)
- SCP20b: Banksia attenuata and/or Eucalyptus marginata woodlands of the eastern side of the Swan Coastal Plain (EPBC Endangered, DBCA Critically Endangered)
- SCP21c: Low lying Banksia attenuata woodlands or shrublands (EPBC Endangered, DBCA Priority 3)
- SCP22: *Banksia ilicifolia* woodlands (EPBC Endangered, DBCA Priority 3)

One remnant native vegetation type was recorded in the DE, which had no intact mid- or understory and was in Completely Degraded condition. No Threatened Ecological Communities listed under the EPBC Act or BC Act or Priority Ecological Communities listed by DBCA were identified within the survey area during the field surveys (Umwelt 2021; Biota 2023; GHD 2024).

The proposed clearing is not at variance to this Principle.

Methodology

- Biological Survey (Umwelt 2021; Biota 2023; GHD 2024)
- DCCEEW Protected Matters Search Tool Report
- Government GIS shapefiles:
  - DBCA Threatened Ecological Community database search (Accessed 05/09/2024)

(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 likely to be at variance to this Principle.

Assessment

The DE is located within the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) region and the Perth Subregion (SWA2) (GoWA 2024). Pre-European Vegetation Association and Vegetation Complex (Havel and Mattiske 2000) mapping within the DE is as below.

Summary of Project Area's Mapped Pre-European Vegetation Associations

Pre-European Vegetation Associations	Clearing Description	Vegetation Condition	Comments
Vegetation Association 968 described as a Medium woodland; jarrah, marri & wandoo (GoWA 2017)	Clearing of up to 0.48 ha for Thomas Road Duplication between Kargotich Road and Tonkin Highway	Completely degraded condition	Vegetation description and condition determined from Flora and Vegetation Survey (Umwelt 2021; Biota 2023; GHD 2024)

The Development Envelope is located on the Swan Coastal Plain, an area that has been cleared primarily for urban and rural development. There is approximately 6.67% of the Beermullah complex remaining and 4.60% of Vegetation Association 968 within the Shire of Serpentine Jarrahdale. Statewide there is 32.02% of Vegetation Association 968 remaining, 18.45% of which is located in the DBCA reserve system.

Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre–European Extent (ha)	Current Extent (ha)	% Remaining	% Current Extent in DBCA Managed Land
Veg Assoc No. 968	**Statewide** WA	296,877.84	95,048.82	32.02	18.45
	IBRA Bioregion Swan Coastal Plain	136,188.20	9,017.32	6.62	1.43
	IBRA Sub-region Perth	136,188.20	9,017.32	6.62	1.43
	LGA Shire of Serpentine Jarrahdale	24,351.49	1,121.13	4.60	0.57

Vegetation Complex (Heddle/Mattiske) Representation

Heddle/Mattiske Veg Complex	Pre-European Extent (ha)	Current Extent (ha)	% Remaining
Beermullah	6,707.27	447.21	6.67

The National Objectives and Targets for Biodiversity Conservation Australia have been set to prevent the clearance of ecological communities with low proportions of their pre-European extent (Commonwealth of Australia 2001). Given that the Proposal is within the constrained Swan Coastal Plain area, the retention objective of 10% applies (EPA 2016).

The vegetation within the DE contains overstory species associated with the Beermullah vegetation complex; however, is in a Completely Degraded condition, mapped as highly modified individual or stands of *Casuarina obesa* over pasture weeds on grey sands on cleared palusplains and in roadside drains (GHD 2024).

The percentage of vegetation remaining does fall below the regional threshold of 10% (in a constrained and fragmented area) however it is not considered significant as a remnant due to:

- The small area proposed to be cleared, lack of biological diversity and being located in and immediately adjacent to existing roads
- The Completely Degraded nature of the vegetation, consisting primarily of trees over highly modified ground cover strata dominated by weed species to the exclusion of native species, significantly changing the structure of the vegetation.

Subsequently, the vegetation within the Development Envelope is not considered to represent the description of the Beermullah Complex due to condition and extensive impacts.

Given the above, the vegetation within the DE is not considered significant as a remnant in an area that has been extensively cleared and therefore the proposed works are not likely to be at variance with this Principle.

Methodology

- Biological Survey (Umwelt 2021; Biota 2023; GHD 2024)
- Government GIS shapefiles:
  - Pre-European vegetation (Accessed 05/09/2024)
  - Vegetation complexes (Accessed 05/09/2024)
- Statewide Vegetation Statistics (Government of Western Australia)

(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 may be at variance to this Principle.

Assessment

The DE is not located within and does not intersect:

- An Internationally Important Wetland (Ramsar)
  - Within 10km of the Forrestdale & Thomsons Lakes
  - 40-50km upstream of the Peel-Yalgorup System
- A Nationally Important Wetland
- A surface water area that is proclaimed under the RiWI Act

The DE is located within the Armadale Palusplain (UFI 15797, covering an area of 7,266.41 ha), which is characterised as a multiple use wetland according to the Geomorphic Wetlands Swan Coastal Plain dataset. Multiple Use Wetlands are characterised as wetlands with few remaining important attributes and functions. The Palusplain within which the Proposal is located is highly modified from the long history of agricultural and residential activities. The Thomas Road Duplication from Tonkin Highway to Kargotich Road will not change any natural wetland functions.

The nearest Conservation Category Wetland (UFI 14536) is approximately 900 m south of the DE. The area has been developed for residential housing; however, the wetland appears to have been retained. This wetland will not be detrimentally impacted by the Proposal.

Although the native vegetation in the DE is Completely Degraded in condition and clearing this will not have a significant impact on the environmental values of the palusplain, there are native species which will be cleared. Given the relatively small extent of clearing, the impact to the highly modified individual or stands of *Casuarina obesa* over pasture weeds on grey sands on cleared palusplains and in roadside drains is not expected to be significant; however, the clearing of this vegetation may be considered at variance to this principle due to the proposal being located in a mapped multiple use wetland.

Methodology

- Biological Survey (Umwelt 2021; Biota 2023; GHD 2024)
- Government GIS shapefiles:
  - Geomorphic Wetlands (DBCA-019) (Accessed 06/09/2024)
  - Ramsar Wetlands (DBCA-010) (Accessed 06/09/2024)
  - Important Wetlands (DBCA-045) (Accessed 06/09/2024)
  - Hydrography Linear (DWER-031) (Accessed 06/09/2024)
  - RIWI Act Rivers (DWER-036) (Accessed 06/09/2024)
  - RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037) (Accessed 06/09/2024)
  - RIWI Act, Groundwater Areas (DWER-034) (Accessed 06/09/2024)

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Proposed clearing is not likely to be at variance to this Principle.

Assessment

The soil within the DE is mapped as (DPIRD-027):

- Pinjarra P1d phase – Flat to very gently undulating plain with deep acidic mottled yellow duplex (or ieffective duplexe) soils. Shallow pale sand to sandy loam over clay; imperfect to poorly drained and moderately susceptible to salinity
- Pinjarra P7 phase – Seasonally inundated swamps and depressions with very poorly drained variable acidic mottled yellow and grey sandy duplex and effective duplex soils

The DE intersects an area that is mapped as having and moderate to high flood risk (DPIRD-007), high to extreme water erosion risk (DPIRD-013) and high water repellence risk (DPIRD-015). The clearing at this location will be minor. Drainage management will be incorporated into the road design at this location to maintain surface flows and manage erosion and runoff.

Given the minor removal of up to 0.48 ha of vegetation and the existing cleared agricultural land presented for much of the DE, the proposed clearing is unlikely to significantly increase the intensity or frequency of waterlogging or water erosion. Whilst the proposed clearing may increase the risk of wind erosion, the scale of this is small and temporary due to the construction of the road upgrade.

According to risk mapping the DE is within a moderate to low risk area for acid sulfate soil (ASS) occurrence (DWER-055). Works are unlikely to require any dewatering, or excavations below the water table. The removal of 0.48 ha of native vegetation will not result in acidification of the Development Envelope or surrounding local environment. Should ASS be present, management measures in place during the construction phase will avoid potential soil acidification.

The Narrow-leaved Cottonbush (**Gomphocarpus fruticosus*), a Declared Pest (DP) in Western Australia under the *Biosecurity and Management Act 2007* was recorded from the DE (GHD 2024). No WoNS were located within the DE (Biota 2023; GHD 2024). While the weed species specific to the DE were not identified by either Biota (2023) or GHD (2024), 45 introduced flora species (including *Gomphocarpus fruticosus*) were recorded by GHD (2024). Photos of the area (GHD 2024) show dense weed coverage adjacent to the existing road. It is expected these areas will contain common weeds such as *Oxalis* spp., *Ehrharta* spp. (Veldt grasses), *Avena barbata* (Wild Oat), *Bromus diandrus* (Great Brome) and *Briza maxima* (Blowfly Grass). Given the DE is located in a highly degraded and fragmented environment, the risk that these records may cause degradation of the environment is low. Appropriate management actions will be included to manage weeds, including these Declared Pests and to ensure they do not spread and result in environmental harm to adjacent areas of native vegetation.

The clearing will occur in a previously disturbed, roadside environment, with the proposed clearing to be minor in scale. Appreciable land degradation is not likely due to the works occurring in a highly modified environment with only minor clearing proposed. Given this the proposed clearing of native vegetation is not likely to be at variance with this Clearing Principle.

Methodology

- Biological Survey (Umwelt 2021; Biota 2023; GHD 2024)
- Government GIS Shapefiles:
  - Soil Landscape Mapping (DPIRD-027) (Accessed 06/09/2024)
  - Acid Sulphate Soil Risk Map (DWER-055) (Accessed 06/09/2024)
  - Soil landscape land quality – Water Erosion Risk (DPIRD-013) (Accessed 06/09/2024)
  - Soil landscape land quality – Waterlogging Risk (DPIRD-015) (Accessed 06/09/2024)
  - Soil landscape land quality – Flood Risk (DPIRD-007) (Accessed 06/09/2024)

(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

No conservation reserves or environmentally sensitive areas intersect with the DE or are in the immediate vicinity of the area to be cleared. The closest conservation area is Jandakot Regional Park (Bush Forever Site 347), more than 2.5 km to the west. A search of the Perth Regional Ecological Linkages data shows the DE does not intersect any ecological linkages.

The removal of vegetation within the DE is considered unlikely to impact on nature reserves or conservation areas as:

- Native vegetation clearing will be limited to 0.48 ha
- Appropriate hygiene measures and construction timing will manage the potential introduction and spread of weeds and dieback to adjacent vegetation
- The nearest conservation area is more than 2.5km to the west

Noting the above assessment and management, the proposed clearing of native vegetation is not at variance with this Clearing Principle.

Methodology

- Biological Survey (Umwelt 2021; Biota 2023; GHD 2024)
- Government GIS Shapefiles:
  - DBCA Legislated Lands and Waters & Lands of Interest (DBCA-011) (Accessed 06/09/2024)
  - Environmentally Sensitive Areas (DWER-046) (Accessed 06/09/2024)
  - Perth Regional Ecological Linkages (Accessed 09/10/2024)

(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 not located within a public drinking water source area or surface water area that is proclaimed under the RiWI Act. However, the DE is located within the Serpentine Groundwater Area (Proclaimed) and within the Murray River basin of the South West catchment division.

There are no Ramsar or Nationally Important Wetlands within the DE.

Given that the wetland areas within and adjacent to the DE have been significantly altered due to urban and agricultural development and the proposed clearing is relatively small in relation to the size of the palusplain wetlands (7,266.41 ha), the proposed clearing is unlikely to cause deterioration in the quality of surface or underground water. The clearing is not of a scale that would cause the water table to rise, increasing waterlogging and mobilising salts within the soil.

The proposed clearing is not at variance to this principle.

Methodology

- Biological Survey (Umwelt 2021; Biota 2023; GHD 2024)
- Government GIS Shapefiles:
  - RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037) (Accessed 06/09/2024)
  - CAWSA Part 2A Clearing Control Catchments (DWER-004) (Accessed 06/09/2024)
  - RIWI Act, Groundwater Areas (DWER-034) (Accessed 06/09/2024)
  - Soil landscape land quality - Salinity Risk (DPIRD-009) (Accessed 06/09/2024)
  - Soil Landscape Mapping (DPIRD-027) (Accessed 06/09/2024)
  - Acid Sulphate Soil risk mapping (DWER-005) (Accessed 06/09/2024)
  - Water Erosion Risk (DPIRD-013) (Accessed 06/09/2024)
  - Public Drinking Water Source Areas (DWER-033) (Accessed 06/09/2024)

(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 proposal will require the removal of up to 0.48 ha of Completely Degraded native vegetation, with vegetation having limited understory intact. The additional area of sealed road is unlikely to make a notable difference to the quantity of runoff entering the environment, particularly given the extent of previously cleared areas within the DE associated with agriculture and existing roads.

The annual total rainfall recorded at nearby BoM stations are as follows:

Station (number)	2021	2022	2023
Forrestdale (9257)	940.4mm	776.6mm	632.0mm
Anketell (9258)	994.0mm	782.8mm	683.1mm
Jarrahdale (9023)	1231.8mm	980.6mm	884.2mm
Serpentine (9039)	n.a	735.8mm	644.6mm

The soil within the DE is mapped as Pinjarra P1d phase and Pinjarra P7 phase. Pinjarra phase soils are generally described as poorly draining. The DE is not mapped within an area or soils which are at risk of flooding, with only <3% of the map unit having a moderate to high flood risk (DPIRD-007). The *Casuarina* with emergent *Eucalyptus* and *Corymbia* vegetation type currently exists in a Completely Degraded condition with much of the natural flood buffering capacity already removed. The removal of a relatively small area of vegetation is unlikely to change the existing surface water flow rates or paths and is unlikely to increase the incidence or intensity of flooding in the surrounding area. Road runoff and stormwater will be maintained via standard construction controls. The nearest watercourse from the DE is the Oaklands Drain, located 585.85m to the southwest.

It is unlikely the clearing will result in any significant changes to the local incidence or intensity of flooding. Therefore, the proposed clearing is not at variance to this principle.

Methodology

- Biological Survey (Umwelt 2021; Biota 2023; GHD 2024)
- BoM Website (Accessed 06/09/2024)
- Government GIS Shapefiles:
  - Soil Landscape Mapping (DPIRD-027) (Accessed 06/09/2024)
  - Soil landscape land quality - Waterlogging Risk (DPIRD-015) (Accessed 06/09/2024)
  - Soil landscape land quality - Flood Risk (DPIRD-007) (Accessed 06/09/2024)

6 REHABILITATION, REVEGETATION & OFFSETS

6.1 Revegetation and Rehabilitation

No temporary clearing will be undertaken as part of the Proposal activities.

6.2 Offset Proposal

In accordance with condition 11(c) of CPS818/17 although the clearing may be at variance to clearing principal (f) the clearing is less than 0.5ha and the impacts relate to clearing within an undefined wetland therefore an offset proposal is not required.

7 COMPLIANCE WITH CPS 818

Table 6 summarises what further pre-clearing impact assessment is required in accordance with CPS 818.

Table 6. 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**	The clearing is 'may be at variance' to Clearing Principle (f) and no other Clearing Principle, and the area of the proposed clearing is less than 0.5 hectares in size and the Clearing Principle (f) impacts only relate to a wetland that is not a defined wetland. No further action required.
2. Clearing is at variance or may be at variance with Clearing Principle (g) land degradation, (i) surface or underground water quality **or** (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 **and** (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.
5a. Proposal is within a Region that: • 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), Hygiene Checklists (D17#859669) and Vehicle, Plant and Machinery Hygiene Register Template (D23#179551) 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.
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.

Impact of Clearing	Yes/No or NA	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 Desktop Report and any other associated documentation?	**Yes**	The Environmental Specialist preparing the Assessment Report and any other associated documentation was suitably qualified and had more than three years' experience.

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9 APPENDICES

Appendix 1: CPS 818 condition 8 (e) (iii) Biological Surveys and Field Assessment Executive Summary and Report Conclusions

Tonkin Highway Extension (Thomas Road to South Western Highway) Flora and Vegetation Assessment (Umwelt 2021)

Executive Summary

Main Roads Western Australia (Main Roads) is proposing to extend Tonkin Highway from Thomas Road in Oakford to South Western Highway in Mundijong (The Project). The Project forms the second portion of the "Construction and use of the Tonkin Highway Extension from Mills Road West, Gosnells to South Western Highway, Mundijong" Project. Referred to the EPA and assessed at PER level, works were approved under Ministerial Statement 595 on the 12th of June 2002. Main Roads commissioned Woodman Environmental Consulting Pty Ltd (Woodman Environmental) to conduct a flora and vegetation assessment of the remaining undeveloped portion of the Project area to inform further environmental assessment and approvals applications.

Field survey was undertaken over eight visits as listed below:

- 24th May 2019;
- 23rd – 26th September 2019;
- 17th October 2019;
- 23rd October 2019;
- 21st November;
- 7th April 2020;
- 17th September 2020; and
- 14th October 2020.

The initial visit involved a reconnaissance survey, with inspection of vegetated areas within the Study Area undertaken, and preliminary descriptions of the plant communities developed. The remaining visits comprised a detailed survey, as well as targeted survey for significant flora and vegetation. The detailed survey involved the survey of 12 non-permanent flora survey quadrats measuring 10 m x 10 m, with 19 relevés surveyed in areas where limited extent or condition of vegetation precluded quadrat establishment. As much of the Study Area is located in cleared or highly modified farmland, areas that were clearly highly modified were sampled via a brief inspection, either on foot or from a vehicle, with notes and photographs taken.

A total of 281 discrete vascular flora taxa were recorded in the Study Area during this survey, representing 54 families and 156 genera. Fifty-five of the total taxa recorded are introduced taxa. Nine significant flora were recorded in the Study Area by this survey, including three Threatened taxa, five Priority flora taxa and one taxon considered significant for other reasons. These are:

- *Acacia lasiocarpa* var. bracteolata long peduncle variant (G.J. Keighery 5026) (P1);
- *Babingtonia urbana* (P3);
- *Calectasia grandiflora* (P2);
- *Jacksonia gracillima* (P3);
- *Leucopogon* aff. sp. Busselton (D. Cooper 243) (potentially undescribed);
- *Stylidium aceratum* (P3);
- *Synaphea* sp. Pinjarra Plain (A.S. George 17182) (Threatened);
- Synaphea sp. Serpentine (G.R. Brand 103) (Threatened); and

- *Tetraria australiensis* (Threatened).

Twelve VTs were defined and mapped within the Study Area. Five of these were defined via floristic composition classification, using the results of a classification analysis of quadrat data from the Study Area. The remaining VTs were defined via structural vegetation classification. Additionally, a number of types of highly modified and revegetated areas were mapped.

Four significant vegetation types were identified and mapped in the Study Area by this survey, including three W.A. listed Threatened Ecological Communities (TECs) (all of which are also listed, either individually or as a component of an umbrella community, as TECs by the Commonwealth), and one Study Area VT that may represent a listed W.A. TEC, with more data required to confirm its status. These are:

- SCP3a - *Corymbia calophylla -Kingia australis* woodlands on heavy soils, Swan Coastal Plain (WA – Critically Endangered; Commonwealth - Endangered);
- SCP3c - *Corymbia calophylla -Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (WA – Critically Endangered; Commonwealth - Endangered);
- SCP08 - Herb rich shrublands in clay pans (WA – Vulnerable; Commonwealth – Critically Endangered, as a component of the Clay Pans of the Swan Coastal Plain); and
- Study Area VT 5.

Report Conclusions

The floristic diversity of the Study Area (281 discrete vascular flora taxa recorded by this survey) is considered to be relatively high given the limited area of intact vegetation in the Study Area, with most areas of intact vegetation located in narrow road reserves. The below-average rainfall experienced during the winter and spring months leading up to survey however has potentially reduced the number of annual taxa recorded.

Nine significant flora taxa, including three listed as Threatened under both the EPBC Act and BC Act, were recorded in the Study Area by this survey including:

- *Acacia lasiocarpa* var. *bracteolata* long peduncle variant (G.J. Keighery 5026) (P1) – one individual recorded, located within the Study Area representing one new population;
- *Babingtonia urbana* (P3) – 1501 individuals recorded, 430 of which are inside the Study Area, representing three populations in the Study Area, one of which is a new population;
- *Calectasia grandiflora* (P2) - 76 individuals recorded, 75 of which are inside the Study Area, representing one population (previously recorded population);
- *Jacksonia gracillima* (P3) - 112 individuals recorded, 104 of which are inside the Study Area, representing three new populations;
- *Leucopogon* aff. sp. Busselton (D. Cooper 243) (potentially undescribed) - four individuals recorded, all within the Study Area (representing a previously recorded population);
- *Stylidium aceratum* (P3) - 13 individuals recorded, all within the Study Area, representing one new population;
- *Synaphea* sp. Pinjarra Plain (A.S. George 17182) (Threatened – Endangered under both EPBC Act and BC Act) - 69 individuals recorded, 26 of which are inside the Study Area, representing one population (previously recorded population);
- *Synaphea* sp. Serpentine (G.R. Brand 103) (Threatened – Critically Endangered under both EPBC Act and BC Act) - 551 individuals recorded, all within the Study Area, representing one population (previously recorded population); and

- *Tetraria australiensis* (Threatened – Vulnerable under both EPBC Act and BC Act) - 1214 individuals recorded, 1208 of which are inside the Study Area, representing two populations; one of which is a new population.

The majority of locations of significant flora taxa are associated with areas of intact vegetation associated with road reserves intersecting the Tonkin Hwy road reserve, including Mundijong Road (majority of Threatened flora locations), and Abernethy and Bishop Roads. The majority of records of significant flora taxa were taken within the Study Area, however some populations were recorded as extending in intact vegetation outside of the Study Area, predominantly *Babingtonia urbana* (P3) and *Synaphea* sp. Pinjarra Plain (A.S. George 17182) (Threatened).

As a result of the methods used to conduct the targeted survey, including survey intensity and timing, it is considered unlikely that any further locations of any of these significant flora taxa occur in the Study Area. In addition, it is considered unlikely that any additional significant *Main Roads WA Tonkin Highway Extension Flora and Vegetation Assessment*
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flora taxa that were identified during the desktop assessment would occur within the Study Area, based on both extent of survey and habitat types present.

As noted above, there was little intact native vegetation in the Study Area, with the majority of the Study Area mapped as Cleared, Highly Modified or Revegetated. The condition of all these areas was mapped as Cleared or Completely Degraded (total 3496 ha, 94.5% of the Study Area).

A total of 12 VTs were otherwise mapped in the Study Area (20.1 ha; 5.4% of the Study Area). The condition of more than half (57.1%) of mapped VTs in the Study Area was mapped as Degraded or Completely Degraded, with significant evidence of historical impact to vegetation composition and structure as a result of human activities. The condition of the remainder of the intact vegetation (8.63 ha; 2.3 % of the Study Area) was rated as 'Good' or 'Very Good', with no areas mapped as 'Excellent' or 'Pristine', which is typical of the location of the Study Area within a region which has experienced historically high levels of clearing and weed invasion.

A total of four significant communities were identified and mapped in the Study Area as presented below.

SCP3a - *Corymbia calophylla -Kingia australis* woodlands on heavy soils, Swan Coastal Plain (WA – Critically Endangered; Commonwealth - Endangered) is considered to be represented by VTs 2 and 3 within the Study Area. All analyses conducted indicated that quadrats from these VTs represented FCT 3a, and this was further supported by comparison of quadrat taxon lists, species richness, topography, soils and hydrology. One occurrence of this TEC was mapped over approximately 2.1 ha within the Study Area, on the Mundijong Road reserve, with the vegetation condition mapped as either Very Good or Degraded (Appendix V Sheet 6). As no condition thresholds have been applied to this EPBC-listed TEC (DAWE 2017a), all areas meeting the description of the TEC are considered habitat critical to its survival.

SCP3c - *Corymbia calophylla -Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (WA – Critically Endangered; Commonwealth - Endangered) is considered to be represented by VTs 4 and 6 within the Study Area. The majority of analyses conducted indicated that quadrats from VT 4 represented SCP FCT 3c, and this was also supported by comparison of quadrat/relevé taxon lists,

species richness, topography, soils and hydrology to the species composition and habitat characteristics of this community. Eight occurrences of this TEC were mapped over approximately 8.9 ha within the Study Area, with the vegetation condition ranging from Very Good to Completely Degraded. Areas where the SCP3c vegetation was mapped as either Very Good or Good included representation just south of the Thomas Road intersection, south-west of the Abernethy Road intersection, and on Mundijong Road Reserve; otherwise, all other occurrences were either in Degraded or Completely Degraded condition. However, as no condition thresholds have been applied to this EPBC-listed TEC (DAWE 2017b), all areas meeting the description of the TEC are considered habitat critical to its survival.
SCP08 - Herb rich shrublands in clay pans (WA – Vulnerable; Commonwealth – Critically Endangered, as a component of the Clay Pans of the Swan Coastal Plain) is considered to be *Main Roads WA Tonkin Highway Extension Flora and Vegetation Assessment*
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represented by VT 1 within the Study Area. All analyses conducted indicated that the quadrat from VT 1 represented FCT 8, and this was also supported by comparison of quadrat taxon lists, species richness and vegetation structure, topography, soils and hydrology with relevant lists and habitat descriptions. One occurrence of this TEC was mapped over approximately 0.2 ha within the Study Area, with an area of 0.05ha mapped as being in Very Good condition, with the remaining 0.2 ha mapped as Degraded.

The listing advice for the EPBC-listed 'Clay Pans of the Swan Coastal Plain', which includes SCP08 (Herb rich shrublands in claypans [Community Type 8 (SCP08)]) provides advice with regards to condition and patch size thresholds for this TEC (TSSC 2012), with no minimum patch sizes, and vegetation to be in 'Good' condition or better. However, it is considered that areas of the TEC which have vegetation condition less than Good may still retain important natural values and they should not be excluded from recovery and other management actions. As such, it is considered that the entire mapped polygon, including the portion mapped as Degraded, should be considered to represent the 'Clay Pans of the Swan Coastal Plain', as the Degraded portion is still important in the context of the overall functionality of the occurrence, including maintenance of the hydrology of the site. This occurrence is also considered to be an important occurrence due to its inclusion within a Bush Forever site (Site No. 360) (DBCA 2015).

Study Area VT 5 has affinities to SCP FCT 3b (based on comparison of quadrat taxon lists) and FCT 3c (based on the results of the analyses), however, it is not especially closely related to any SCP quadrat. The occurrence of VT 5 is on the very eastern margin of the Swan Coastal Plain, an area which was noted as being under-sampled by the SCP study (Gibson *et al.* 1994); in addition, no quadrats from the amended SCP dataset were established within the general vicinity of the occurrence of VT 5. It is therefore considered possible that this site may represent an FCT not sampled by quadrats within the amended SCP dataset. The composition of the VT 5 appears to be more similar to Jarrah Forest bioregion vegetation than vegetation on the Swan Coastal Plain, with many typical Jarrah Forest species present; it is possible that VT 5 occurs in nearby areas of this bioregion.

One occurrence of Study Area VT 5 was mapped over approximately 2 ha within the Study Area, with this vegetation continuing to the south along the road reserve of South Western Highway. Further sampling in similar vegetation in nearby areas outside the Study Area would be required to provide greater certainty as to the affinities of this vegetation to SCP FCTs, however, it is possible that no similar areas exist. However, regardless of the outcome of further sampling, the vegetation mapped as VT 5 would be significant vegetation, as per EPA (2016a). The composition of the VT 5 appears to

be more similar to Jarrah Forest bioregion vegetation than vegetation on the Swan Coastal Plain, with many typical Jarrah Forest species present; it is possible that VT 5 occurs in nearby areas of this bioregion.

Although the vegetation of the Study Area has been widely cleared and otherwise disturbed, Threatened flora and ecological communities listed under both the BC Act and EPBC Act are present within the Study Area.

Westport Freight Road Additional Biological Survey (Biota 2023)

Executive Summary

Main Roads Western Australia (Main Roads) Metropolitan Region is undertaking a road planning study of the outer harbour transport corridor (Anketell Road / Thomas Road) from Tonkin Hwy to Rockingham Road. The purpose of the study is to identify the ultimate layout of the Westport Freight Road corridor, including preliminary design concepts, and the necessary land requirements for inclusion in the Metropolitan Region Scheme (MRS). Biota Environmental Sciences (Biota) was commissioned to undertake an additional biological survey in Spring 2022 of the proposed area (561.5 ha), specifically within parcels of private land tenure that were unable to be accessed during the baseline ecological studies previously conducted for Anketell Road and Thomas Road in 2020-2021.

An additional Planning Control Area (PCA) boundary was provided by Main Roads for the eastern half of the survey area which outlines the footprint area designated for future works.

This report consolidates the previous 2020-2021 survey results and the spring 2022 survey results to provide a comprehensive biological survey report for the entire survey area.

Vegetation and Flora

A detailed vegetation survey was completed previously for both the Anketell Road and Thomas Road Biological Studies in 2020-2021, with an additional single-phase detailed survey completed in September/October 2022, which included quadrat and relevé sampling, and mapping of vegetation types and vegetation condition (based on sampling within the survey area, and extrapolation out to a 500 m buffer contextual area). Vegetation types considered to be representative of Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) were assessed against relevant Commonwealth and State information. Targeted searches for significant flora were completed, during which significant weeds (declared pests and Weeds of National Significance) were also recorded.

Nineteen intact vegetation units were identified within the survey area and inferred within the contextual area, with eight additional categories of land deemed to be modified and/or disturbed to some extent.

Cleared areas devoid of native vegetation accounted for 34.25 ha (22%) of the PCA and 96.81 ha (17.24%) of the survey area.

A total of nine patches of the Commonwealth-listed 'Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' TEC occurred either wholly or partially within the survey area, whilst another nine patches that were assessed did not meet the diagnostic criteria in order to be recognised as the TEC. The extent of this TEC within the current PCA comprised 3.28 ha, or 2.86% of

the total extent mapped within the broader contextual and study area, with 63.34 ha (55.23%) of the locally occurring TEC situated within the survey area.

A total of 14 patches of the Commonwealth-listed 'Banksia Woodlands of the Swan Coastal Plain ecological community' TEC occurred either wholly or partially within the survey area. The extent of this TEC within the current PCA comprised 13.29 ha, or 1.45% of the total extent mapped within the broader contextual and study area, with 103.31 ha (11.30%) of the locally occurring TEC situated within the survey area (based on known occurrences of this community, remaining unchanged since the previous results seen in the Anketell Road Biological Study (2022)).

One state-listed TEC was identified to occur within the survey area, the Endangered '*Melaleuca huegelii – Melaleuca systena* shrublands on limestone ridges (Gibson et al. 1994; type 26a)'. This TEC occurred as roadside strips at one location and was generally in Degraded condition with a relatively intact upper stratum and an understorey dominated by introduced species. A total of 1.17 ha of this TEC was mapped within the survey area.

Four State-level PECs were identified within the survey area:

- Priority 3 'Low lying *Banksia attenuata* woodlands or shrublands (FCT 21c)' – 3.42 ha;
- Priority 3 'Banksia woodlands of the Swan Coastal Plain' – 99.25 ha;
- Priority 3 'Northern Spearwood shrublands and woodlands (FCT 24)' – 67.94 ha; and
- Priority 3 'Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' (FCT 30b) – 0.28 ha.

A total of 376 native vascular flora taxa from 183 genera and 59 families were recorded from the survey area.

No Threatened flora species were recorded within the survey area during the current study, however four State-listed Priority species were recorded:

- *Poranthera moorokatta* (Priority 2): single individuals were recorded within five quadrats in the EB1 and B1 vegetation units;
- *Eryngium pinnatifidum* subsp. Palustre (G.J. Keighery 13459) (Priority 3): one individual was recorded within a quadrat in the B2 vegetation unit;
- *Caladenia speciosa* (Priority 4): three individuals were recorded from two opportunistic locations in the B1 vegetation unit; and
- *Calothamnus quadrifidus* subsp. *teretifolius* (Priority 4): two records within quadrats ANK34 and ANK35 are highly likely to be a result of revegetation efforts along the borders of the Kwinana Freeway ramps.

A total of 150 introduced species were recorded. Five of the species recorded within the survey area are listed as declared pests under the *Biosecurity and Agriculture Management Act 2007* (**Asparagus asparagoides*, **Echium plantagineum*, **Gomphocarpus fruticosus, *Moraea flaccida* and **Zantedeschia aethiopica*), with **Asparagus asparagoides* also listed as a Weed of National Significance.

Geomorphic Wetlands

Eleven geomorphic wetlands intersected the survey area, comprising four Conservation, four Resource Enhancement, and four Multiple Use wetlands, totalling 29.8 ha. An additional 20 wetlands occurred entirely within the contextual area.

Three wetlands (UFI 6379, 6944, and 6945) currently assigned as 'Resource Enhancement' are recommended to be upgraded to 'Conservation' category based on their elevated ecological function, vegetation values, and location within known ecological linkages. It is also recommended that geomorphic wetland unit 6799 be re-classified from 'Conservation' to 'Multiple Use', and wetland unit 15616 be re-classified from 'Resource Enhancement' to 'Multiple Use' based on extensive land clearing, and modification of the soil and hydrological systems from vegetation loss and repeated agricultural activity.

Fauna

The basic and targeted fauna survey was conducted across three visits: September 2020, October 2020 and September 2022. The field survey comprised habitat description, black cockatoo habitat assessment and targeted sampling via foot traverses, together with active searching for individuals and/or their secondary evidence. Motion-sensitive cameras were deployed within favourable habitat types for Quenda, Western Brush Wallaby and Chuditch (318 camera-nights in total).

Within the 561.5 ha survey area, 107.2 ha (19.1%) was mapped as Cleared/degraded and an additional 237.5 ha (42.3%) was mapped as Modified Areas (which were largely cleared but included small areas of vegetation). Across the remaining 216.8 ha native vegetation, 8 fauna habitats were identified as listed below from most common to least:

- *Banksia* woodland (89.4 ha, 15.9%);
- Eucalypt woodland/forest (54.6 ha, 9.7%);
- *Acacia* shrubland (21.3 ha, 3.8%);
- Damplands (15.6 ha, 2.8%);
- *Banksia* rehabilitation (14.6 ha, 2.6%);
- Jarrah/*Banksia* woodland (13.6 ha, 2.4%);
- *Casuarina* Forest (5.0 ha, 0.9%); and
- Emergent Flooded Gum and Marri (2.8 ha, 0.5%).

Seven of the eight habitats occurring within the survey area were well represented within the contextual area, however, Eucalypt Woodland/Forest habitat type was better represented in the survey area than the surrounding contextual area.

Four fauna species of significance were recorded within the survey area during the current study;

- Carnaby's Black Cockatoo, *Zanda latirostris* (Endangered under the WA *Biodiversity Conservation Act 2016* (BC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act));
- Forest Red-tailed Black Cockatoo, *Calyptorhynchus banksii naso* (Vulnerable under BC Act and EPBC Act);
- Quenda, *Isoodon fusciventer* (Priority 4 listing by the Department of Biodiversity Conservation and Attractions (DBCA)); and
- Western Brush Wallaby, *Notamacropus irma* (Priority 4 DBCA listing).

Two fauna species of significance have previously been recorded within the survey area:

- *Lerista lineata*, Perth Lined Slider (Priority 3 DBCA listing); and
- *Synemon gratiosa,* Graceful Sunmoth (Priority 4 DBCA listing).

The following species were not recorded, however, were considered likely to occur based on availability of suitable habitat and records from the local area:

- *Dasyurus geoffroii*, Chuditch (Vulnerable under BC Act and EPBC Act) (as foraging visitor);

- *Falco peregrinus*, Peregrine Falcon (Specially Protected under BC Act) (as foraging visitor); and
- *Neelaps calonotus*, Black-striped Snake (Priority 3 DBCA listing) (likely resident).

Discussion

Vegetation

Commonwealth TEC

A total of 14 patches of the Commonwealth-listed 'Banksia Woodlands of the Swan Coastal Plain ecological community' TEC occurred either wholly or partially within the survey area, with 13.3 ha intersecting the current Planning Control Area. The extent of this TEC has declined significantly on the Swan Coastal Plain, with an approximate 60% reduction in area. The remaining patches are heavily fragmented, with a median patch size estimated at 1.6 hectares. The remaining patches of the ecological community are typically small over much of its range but especially around the Perth metro area. Small sizes make remnants more vulnerable to disturbances and the separation between the patches also causes problems for ecological processes that support the overall health of the ecological community.

A total of nine patches of the Commonwealth-listed 'Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' TEC occurred either wholly or partially within the survey area, with 63 ha occurring within the western half of the survey area. The Tuart woodlands and forests ecological community encompasses considerable natural variation across its range and has been either heavily cleared and/or degraded. Remnants are small and isolated, while others are larger and yet have been heavily modified. Given the high rates and loss of the ecological community across its range, all remnants contribute, but not all are protected, as Matters of National Environmental Significance.

Improving the conservation of this TEC is a priority, and large patches that are not yet reserved are likely to be of particular importance. Across some parts of the range, for example, in the Perth metropolitan area, clearing and fragmentation has been particularly severe, and retaining connectivity here is important (Gardner 1979; Coates et al 2002). Similarly, actions beyond the boundary of any patch may have a significant impact (for example, through changes in hydrology). For this reason, when considering actions likely to have impacts on this ecological community, it is important to also consider retaining other nearby native vegetation as it is also important to the overall integrity of the ecological community.

Current threats to both of the ecological communities include land clearing for development and associated fragmentation, dieback diseases (e.g. *Phytophthora*), invasive weeds, changes to fire regimes, and hydrological degradation (including changes to groundwater). Given the great extent of past damage to these two ecological communities, these threats are likely to lead to the loss of many species and ecosystem functions.

State PEC

As of December 2022, 390 ecological communities considered rare (but not currently threatened), with insufficient information to be considered a TEC, are referred to as priority ecological communities. It is considered highly important to identify, maintain, and manage whole ecosystems, their processes, and the species assemblages within them.

Within the survey four State-level PECs were identified, three of which are also representative of the Commonwealth-listed 'Banksia Woodlands of the Swan Coastal Plain ecological community' TEC,

and one that is also representative of Commonwealth-listed 'Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain' TEC.

Flora

A significant amount temporal and spatial survey effort was assigned to targeted systematic searches for Threatened and Priority taxa throughout the entirety of the Westport Freight Road, Anketell Road, and Thomas Road survey areas, and even more so within suitable habitat pertaining to orchid species in the genera *Caladenia*, *Diuris*, and *Drakaea*.

Of those Threatened orchids considered as potentially occurring, the most likely to occur within the survey area is *Caladenia huegelii* (Grand Spider Orchid). *Caladenia huegelii* is currently known from 33 extant populations from surveys conducted since 1999, recording 1,614 mature plants. Twenty-two percent of these individuals occurred within Nature Reserves, with an additional 12% occurring on land that has been, or is currently in the process of becoming, reserved for conservation (DEC 2009b). Although it appears that there are a high number of populations of this species, most are very small and occur in small disjunct remnants of natural vegetation on the Swan Coastal Plain. Many are subject to development pressures including urban development, degraded habitat, weed invasion, and roadworks.

These orchid taxa are known to potentially remain dormant, and undetectable, for many seasons. Currently, additional targeted surveys for *Caladenia huegelii* have been requested by Main Roads for spring of 2023.

Geomorphic Wetlands

Following the subsequent field assessment of the geomorphic wetlands intersecting the survey area, three wetlands (UFI 6379, 6944, and 6945) currently assigned as 'Resource Enhancement' are recommended to be upgraded to 'Conservation' category based on their elevated ecological function, vegetation values, and location within known ecological linkages.

Importantly, these three wetlands all belong to the Southern River soil association, and Jandakot and Nicholson micro-classification, within the South-East Corridor (Tingay and Tingay 1976), which has to date been severely impacted by urban development, provision for housing, and agriculture, all leading to catastrophic changes in water, soil, and vegetation status (Tingay and Tingay 1976). The continued reduction in wetland areas through direct clearing and alteration of surrounding water regimes, highlights the urgency of utilising the 'precautionary principle' when potentially interfering with geomorphic wetlands, and proactively setting aside 'wetland buffers' for effective conservation.

Fauna

For significant species potentially occurring, additional consideration of habitat availability and types within the survey area was considered against the definitions below:

- "core"- equivalent to "habitat critical to the survival of the species" as per Department of the Environment (2013b). This comprised habitat considered to potentially contain roosting, denning or breeding sites, primary foraging areas, or refugia during drought, fire or other stress; or
- "secondary" – habitats which may be used on a transitory, dispersing or occasional basis and for secondary foraging but does not represent core habitat.

Table 9.1 details the categorisation of habitat as core or secondary for the significant species either recorded (in this study or previous studies), or assessed as having some potential to occur (May Occur or Likely to Occur) within the survey area.

The survey area included 217 ha of native vegetation, which was mapped as including eight fauna habitat types. Three of these fauna habitats; *Banksia* Woodland, Jarrah/*Banksia* Woodland and Eucalypt Woodland/Forest, together accounted for 157.5 ha or 73% of this native vegetation and represented core potential breeding as well as foraging habitat for black cockatoo species. While the survey area does not appear to support breeding based on the results of the field survey and the known breeding distribution of the three species (DAWE 2022), it is likely to represent an important foraging resource, particularly for Carnaby's Black Cockatoo. Evidence of foraging by white-tailed black-cockatoos (most likely Carnaby's Black Cockatoo) and Forest Red-tailed Black Cockatoo was recorded within the survey area. Wandi Nature Reserve and Modong Nature Reserve (continuous with the survey area) are listed as important habitat sites on the Swan Coastal Plain for black cockatoos by Johnstone and Kirkby (2011).

The continuity of the survey area with large remnants outside the survey area means that the relative proportion of habitats occurring within the survey area compared to the wider area is low (see Table 7.6 for a comparison of the occurrence of vegetation types within the survey area with that within a 12 km radius). However, it also increases the likelihood of species occurring that would otherwise not be expected in developed urban settings. The Chuditch is one such example, this species has a very patchy distribution on the Swan Coastal Plain, where it is essentially recorded from a few widely spaced larger reserves including The Spectacles (2013) and Wandi Nature Reserve (2009) adjoining the survey area. As the survey area is located between a number of nature reserves there is potential for the habitat within the survey area to represent a linkage between these reserves in areas where they are otherwise separated by modified/cleared areas.

The Western Brush Wallaby, *Notamacropus irma*, (DBCA listed Priority 4), was recorded within the survey area via motion camera within the Jandakot Regional Park within *Banksia* woodland. This species is another example where relatively large areas of habitat are required to support a population and it is likely that this species would be restricted to the larger portions of remnant bushland adjoining the survey area.

The Quenda, *Isoodon fusciventer* (DBCA listed Priority 4), was recorded via motion camera, diggings, tracks and scats throughout the survey area. Although Quenda inhabit a variety of habitats (Section 7.4.1.3), most records occurred in areas of *Banksia* woodland, including many records within the Jandakot Regional Park. This is likely to be related to the relatively large size of the bushland, which offers the largest contiguous remnant bushland in proximity to the survey area and is likely to support a relatively large and robust Quenda population.

Fossorial reptile species such as the Perth Lined Slider, *Lerista lineata* and the Black-striped Snake, *Neelaps calonotus* (both DBCA listed Priority 3) are cryptic and difficult to record. Both species have limited distributions on the Swan Coastal Plain significantly overlapping with urban expansion. *Lerista lineata* has a particularly restricted distribution between the Swan River and Mandurah and is known from several records that fall within the survey area, while also having been recorded within the adjacent Modong Nature Reserve.

Tonkin Highway Extension Flora, Fauna and Black Cockatoo Memorandum (GHD 2024)

Executive Summary

No executive summary due to memorandum style of report. The purpose and survey area description is provided below for context in leu of an executive summary.

GHD Pty Ltd (GHD) were engaged by Main Roads to undertake a Reconnaissance flora and vegetation survey, Basic fauna survey and Black Cockatoo habitat assessment of the additional areas (survey area). The purpose of the survey was to assess the flora, vegetation and fauna values within the survey area. The outcome of the survey and information supplied in this memorandum will be used to inform the environmental assessment and approvals process.

The project is located near Byford and Mundijong, in the Shire of Serpentine Jarrahdale. The survey area consists of 29 polygons that range in size. The polygons extend from Thomas Road in Oakford to Jarrahdale Road in Serpentine/ Mundijong. The largest polygon is number 4 (10.81 hectares (ha)) and the smallest were polygon numbers 8 and 16 (0.01 ha). The survey area (i.e. all polygons combined) total 34.37 ha.

Discussion and conclusions

Due to a change in the design of the project Main Roads engaged GHD to conduct a Reconnaissance flora and vegetation survey, Basic fauna survey and Black Cockatoo habitat assessment of the survey area. Existing data and reports for the project were used in conjunction with field data from this survey to assess and map the survey area for this memorandum report.

<u>Vegetation</u>

The vegetation types mapped within the survey area do not represent any EPBC Act or BC Act listed TECs or DBCA listed PECs. In Umwelt (2021) vegetation type 4 was identified as SCP3c - *Corymbia calophylla Xanthorrhoea preissii* woodlands and shrublands, SCP (listed as Endangered under the BC Act and Endangered under the EPBC Act). This vegetation type was mapped within polygons 2, 4 and 7. The remnant vegetation within these polygons was in thin linear strips that occurred adjacent to roads with a vegetation condition of Degraded. DBCA has previously advised that thin linear areas of TEC SCP3c within the project that were in poorer than Good condition were not considered to be extant examples of the TEC SCP 3c (Main Roads 2020). Therefore, the
vegetation mapped as 4 within the survey area is not considered to be representative of TEC SCP3c.

The vegetation condition in the survey area ranged from Good to Completely Degraded condition, 76.46 % of the survey area was mapped as Cleared as it consisted of roads and tracks, infrastructure or pastures. The disturbances within the survey area were associated with existing infrastructure and consisted of cleared areas and significant weeds. Vegetation rated as Good in condition was dominated by native species in the upper and middle strata, the lower stratum was generally dominated by herbaceous and grassy weeds. Vegetation rated as Degraded or Completely Degraded condition contained a number of significant weeds.

<u>Flora</u>

Seventy-nine flora taxa (including subspecies and varieties) representing 29 families and 55 genera were recorded from the survey area during the field survey. This total comprised of 34 native taxa and 45 introduced/non-endemic planted flora taxa.

No EPBC Act or BC Act listed flora were recorded within the survey area. One DBCA Priority 4 listed species Grevillea olivacea was recorded at several locations within the survey area. Although Grevillea olivacea P4 is listed as a priority flora species by DBCA it is considered to be planted within the survey area, and well outside its natural range.

Forty-five introduced/ non endemic planted flora taxa were recorded in the survey area. Of these, three species are listed as a Declared Pests under the BAM Act, with one also listed as a WoNS.

Fauna

Three fauna habitat types were identified and mapped. These include VSA 1 (farmland/cleared areas), VSA 2 (remnant and re-planted native vegetation), and VSA 3 (creek lines with native vegetation).

Forty-eight fauna taxa were identified within the three fauna habitat types. They represented 35 birds, six mammals, five reptiles and two frogs were recorded from the survey area during the field survey. Of these, 4 are of significant species:

- Baudin's Cockatoo (*Zanda baudinii*)
- Carnaby's Cockatoo *(Zanda latirostris*)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*)
- Quenda (*Isoodon fusciventer*).

Fauna value and connectivity

The fauna value and connectivity are considered important to the area (Strategen 2021) due to the high amount of clearing that has occurred within the greater survey area. Therefore the importance of existing remnant vegetation is given greater significance, particularly for conservation significant species like Black Cockatoos and Quenda. The areas that demonstrated the highest fauna value predominantly consisted of the vegetation comprised of 'a mixture of open forest to tall open forest of *Corymbia calophylla*, *Eucalyptus wandoo*, *Eucalyptus marginata*' and 'woodland of *Eucalyptus wandoo* with minor components including *Eucalyptus rudis* and *Eucalyptus camaldulensis*'. The value to Black Cockatoo is described in greater detail below.

Black Cockatoo

Forest Red-tailed Black Cockatoo were observed flying overhead and/or foraging during the survey period, within and around the survey areas. The Forest Red-tailed Black Cockatoo is listed as Vulnerable under the EPBC and BC Acts. Foraging evidence from Baudin's Cockatoo and Carnaby's Cockatoo was observed throughout the survey area. Baudin's Cockatoo and Carnaby's Cockatoo are listed as Endangered under the EPBC and BC Acts.

The Black Cockatoo foraging vegetation value ranged from no foraging value to moderate to high foraging value. A total of 26.44 ha (76.91%) was classified as 'no foraging value' using the scoring system developed by Bamford and utilised by Strategen (2021). This was the result of the majority of the survey area being comprised of cleared or highly degraded vegetation, with only scattered foraging species. This reflects the fragmented nature of habitat within the survey area, which is intersected by roads as well as cleared rural and urban areas. The remaining 7.93 ha ranged from low to high foraging value, with 1.38 ha (4.02%) of 'moderate to high' value foraging habitat present within the survey area.

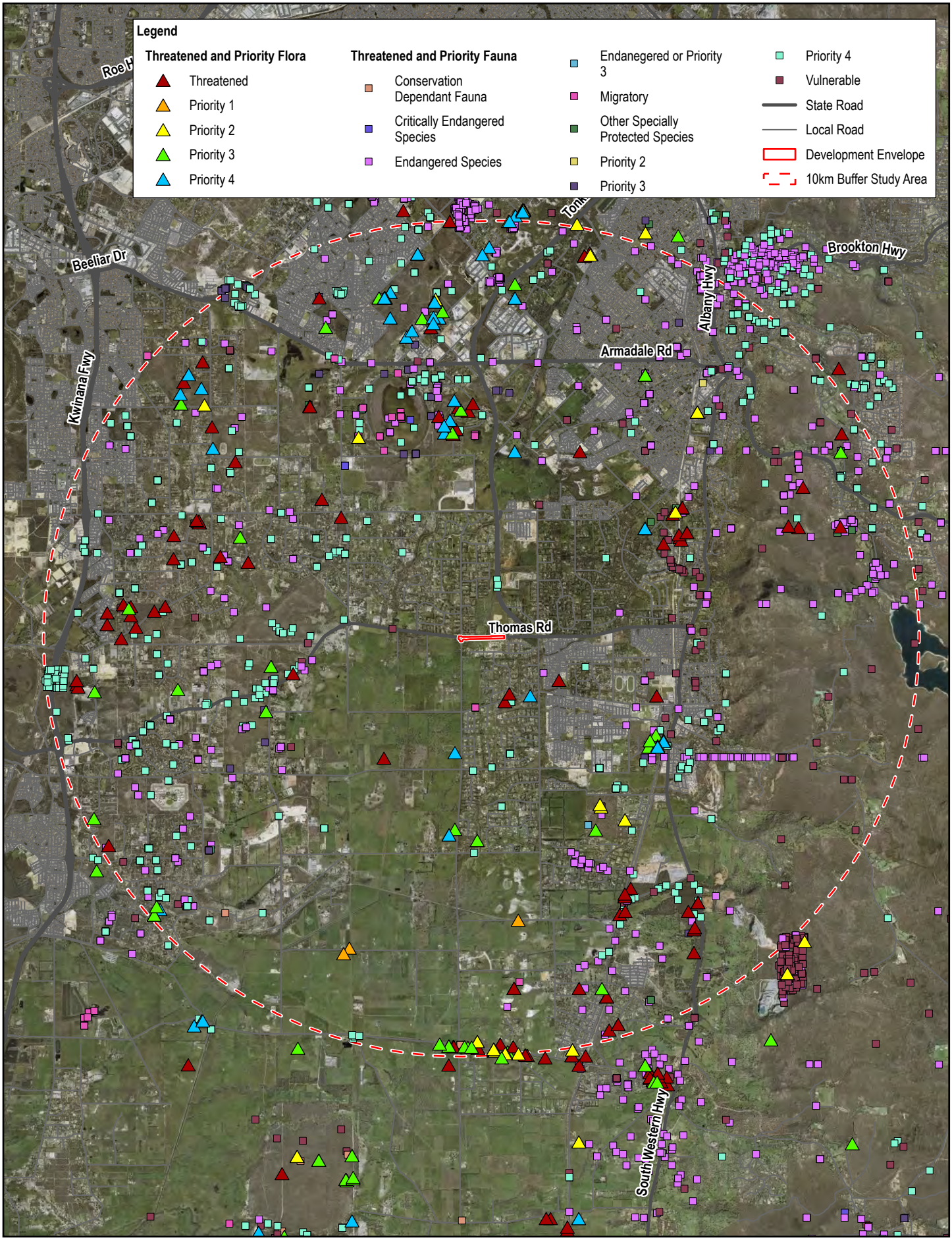
A total of 236 suitable DBH trees were identified and mapped within the survey area. Ninety-three (93) Marri trees with a DBH of or greater than 500 mm were recorded within the survey area. The importance of conserving Marri with sufficient age and size to produce hollows has been highlighted

by Johnstone et al. (2013) for the purpose of conserving Forest Red-tailed Black Cockatoo populations. In the Jarrah/Marri Forest, Marri trees are considered to provide over 90% of breeding hollows suitable for use by Black Cockatoos (Johnstone & Kirkby 2011). Within the survey area, Marri is considered the most important source of breeding habitat (Kirkby 2019). Flooded Gum also constituted a substantial portion of potential breeding habitat within the survey area, with 67 trees recorded, and 9 Jarrah trees. These species are not considered as important for Black Cockatoos as they seem to provide far fewer potential breeding hollows (Kirkby 2019). However, within the survey area, 9 hollows were recorded within five trees consisting of a Flooded Gum and Jarrah. Only one (hollow in Jarrah) was considered potentially suitable for Black Cockatoo nesting but showed no signs of previous use.

Considering the local and regional context of the survey area, the closest known breeding record of Carnaby's Cockatoo is located 10 km east of the survey area in the Wungong Catchment, while for Baudin's Cockatoo the closest sites are 10 km east in the Serpentine Hills area and 16 km east in the Wungong Catchment. (Kirkby 2019). Forest Red-tailed Black Cockatoo are known to breed 8 km east in the Wungong Catchment and have also been observed prospecting and chewing at hollow entrances at the nearby Cardup Nature Reserve which is 1.5 km east of the survey area (Kirkby 2019). It is evident that habitat connectivity and the availability of nearby foraging resources are necessary to support these breeding sites and local Black Cockatoo populations (White et al. 2014). No current breeding was observed for any species of Black Cockatoos during the survey period.

Whilst there were no observed roost sites located within the survey area, and no active roosting was observed during the survey period, the survey area is expected to contain suitable roosting habitat for Black Cockatoos. Within the local area (6 km radius) of the survey area there are 15 confirmed Black Cockatoo roost sites (Peck et al. 2019). Of those, eight are confirmed to be used by white-tailed Black Cockatoos, five by Forest Red-Tailed Black Cockatoo and three are joint roosts (Peck et al. 2019). Given the proximity of roost sites to the survey area, the area is considered to provide roosting value for the three species of Black Cockatoos.

Although no water sources are documented within the Survey Area, it is expected that suitable drinking sites would be available throughout the year from gardens, farm dams and stock troughs. There are also seasonal natural water bodies throughout the Byford/Mundijong areas such as Beenyup Brook, Cardup Brook, Manjedal Brook and Medulla Brook.



Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 PCG2020

N

GHD

Main Roads WA
Tonkin Extension - Thomas Rd West

DBCA Threatened Flora and Fauna Database Search

Project No. **12616477**
Revision No. **0**
Date **31/03/2025**

FIGURE 4

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Appendix 3: Vegetation Management Plan

THOMAS ROAD DUPLICATION (WEST)
TONKIN HIGHWAY TO KARGOTICH ROAD

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 Thomas Road Duplication (West) Tonkin Highway to Kargotich Road.

The proposal involves reconstructing approximately 1.2km of Thomas Road as a four-lane dual carriageway from Kargotich Road to Tonkin Highway. These works will comprise off:

- Preliminary works (e.g. geotechnical investigations)
- Vegetation clearing
- Ground disturbance
- Construction of sealed road

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 3.1: General Vegetation Management Actions for Clearing.

Appendix 3.1: 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

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.

Monitoring and Maintenance Program

The Superintendent's Contract Management Team shall monitor the implementation of management actions that are a **Hold Point**. **Hold Point** actions must be signed off by the Superintendent's Representative to confirm it has occurred and recorded within the Superintendent's Contract Management Plan.

Non-Compliance

Non-compliance with management actions will trigger corrective actions, preventative actions and/or an incident investigation. Non-compliances will be recorded with Main Roads incident management system and reviewed by Main Roads Manager Environment.

The need for reporting non-compliances with VMP management actions to DWER will be determined as part of an incident investigation.

Revegetation

Revegetation will be undertaken in accordance with Condition 9 of CPS 818. Relevant requirements from Condition 9 have been incorporated into Project Revegetation Plan Template. The elements to be implemented by the Contractor will be incorporated into the relevant Specification 304.