Clearing Assessment Report – CPS 818

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Duncan Road Upgrade Project SLK 6 – 80 (2022 & 2023 Works Program) Part Project under 'Duncan Road and Gordon Downs Road Upgrade'

March 2022

EOS Number 2319

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Contents

Amendments

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1 PURPOSE

The purpose of this Clearing Assessment Report (CAR) is to provide a report detailing the assessment of native vegetation clearing that is proposed to be undertaken using the Statewide Clearing Permit CPS 818 issued to Main Roads Western Australia (Main Roads).

The CAR outlines the key activities associated with the project, the existing environment and an assessment of native vegetation clearing. This assessment provides an evaluation of the vegetation clearing impacts associated with the project using the ten Clearing Principles, and the strategies used to manage vegetation clearing.

2 SCOPE

2.1 Project Scope

Project Name: Duncan Road Upgrade Project SLK 6 – 80 (2022 & 2023 Works Program) - Part project under 'Duncan Road and Gordon Downs Road Upgrade'

Project Purpose / Components: The Duncan Road commences at Halls Creek town site and continues south-east to Gordon Down Road finishing at Ringer Soak (Kundat Djaru Community), south east of Halls Creek. During prolonged rainfall periods, the community of Ringer Soak is often cut off by road from Halls Creek for several weeks over the wet season. The Duncan - Gordon Downs Road is the only road into the community. This is of particular concern for the wellbeing of the community if the road is not urgently upgraded.

In addition, Northern Minerals are developing a rare earths mine south-east of Ringer Soak and plan to truck supplies to the mine and rare earth products from the mine to the Great Northern Highway via Duncan and Gordon Downs Roads. The current roads are unsealed and will require upgrade works to support the planned traffic.

This project is a part of Duncan - Gordon Downs Road Upgrade Project which is 166 km in length and is staged over a 3-4-year period. The proposed works program will involve works between SLK 6 - 80 on the Duncan Road. The works include general widening and re-sheeting of the existing road with typically minor horizontal and vertical geometric improvements along with installation of culverts and construction of stabilised floodway. Additional works include development of 7 new material areas, expansion of 7 existing pits, construction of 8 new water bores & associated turkey's nest, and installation of access tracks to support the project.

The proposed clearing undertaking using CPS 818 is: A total of 275 ha in a 1,097 ha Project Development Envelope which includes:

- Clearing for Road widening, existing drainage upgrade works and construct new offshoot drains where required: 177 ha
- Clearing for existing and proposed new Material Areas and associated access tracks: 77ha
- Clearing for Bores, Turkey's Nest and associated access tracks: 21 ha

The proposed temporary clearing undertaking using CPS 818 is: Nil

Project Location(s): The project area is located east of Halls Creek on Duncan Road (0020062) between SLK 6 – 80 in the Shire of Halls Creek.

- Latitude: -18.258947 Longitude: 127.714510

- Latitude: -18.418046 Longitude: 128.266409

14 material areas to support the road upgrade works at SLK [Redacted]. The Turkey's Nest Dams are proposed at 8 new bores at SLK [Redacted].

The area of potential disturbance that includes the proposed road realignment sections is a 140m wide corridor consisting of a 70 m buffer on either side of the road centreline, material areas and water sourcing areas have been termed as a "Project Development Envelope" within which all disturbance will occur. The Project Development Envelope covers an area of 1,097 ha within which 275 ha is required to be cleared under CPS 818.

The location of the project is at Figure 1.

2.2 Assessment Report Scope

The assessment area, see Figure 2, is confined to a local area of a 40 km radius.

Figure 1a. Project Area

Figure 1b. Project Area

Figure 1c. Project Area

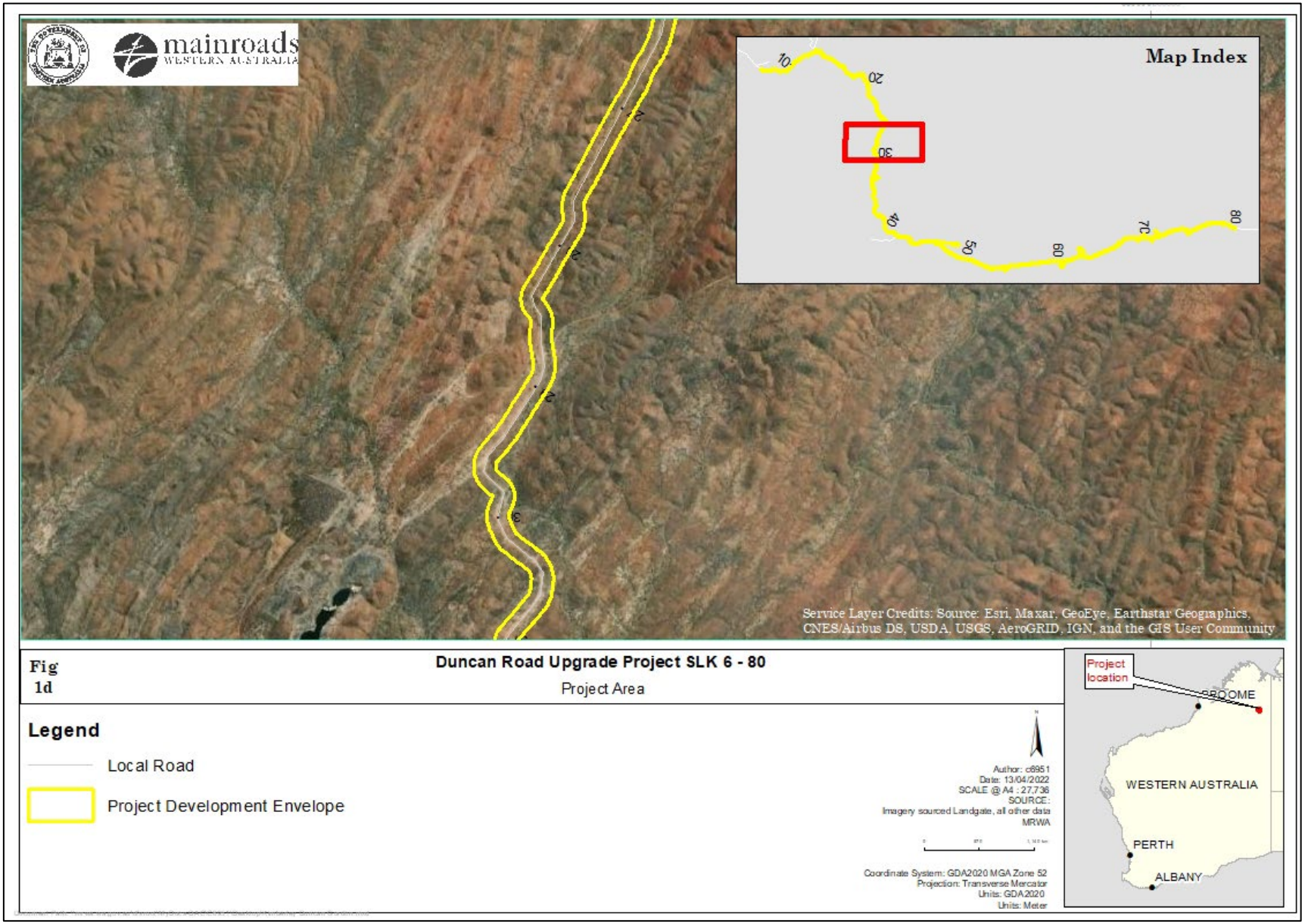

Figure 1d. Project Area

Figure 1e. Project Area

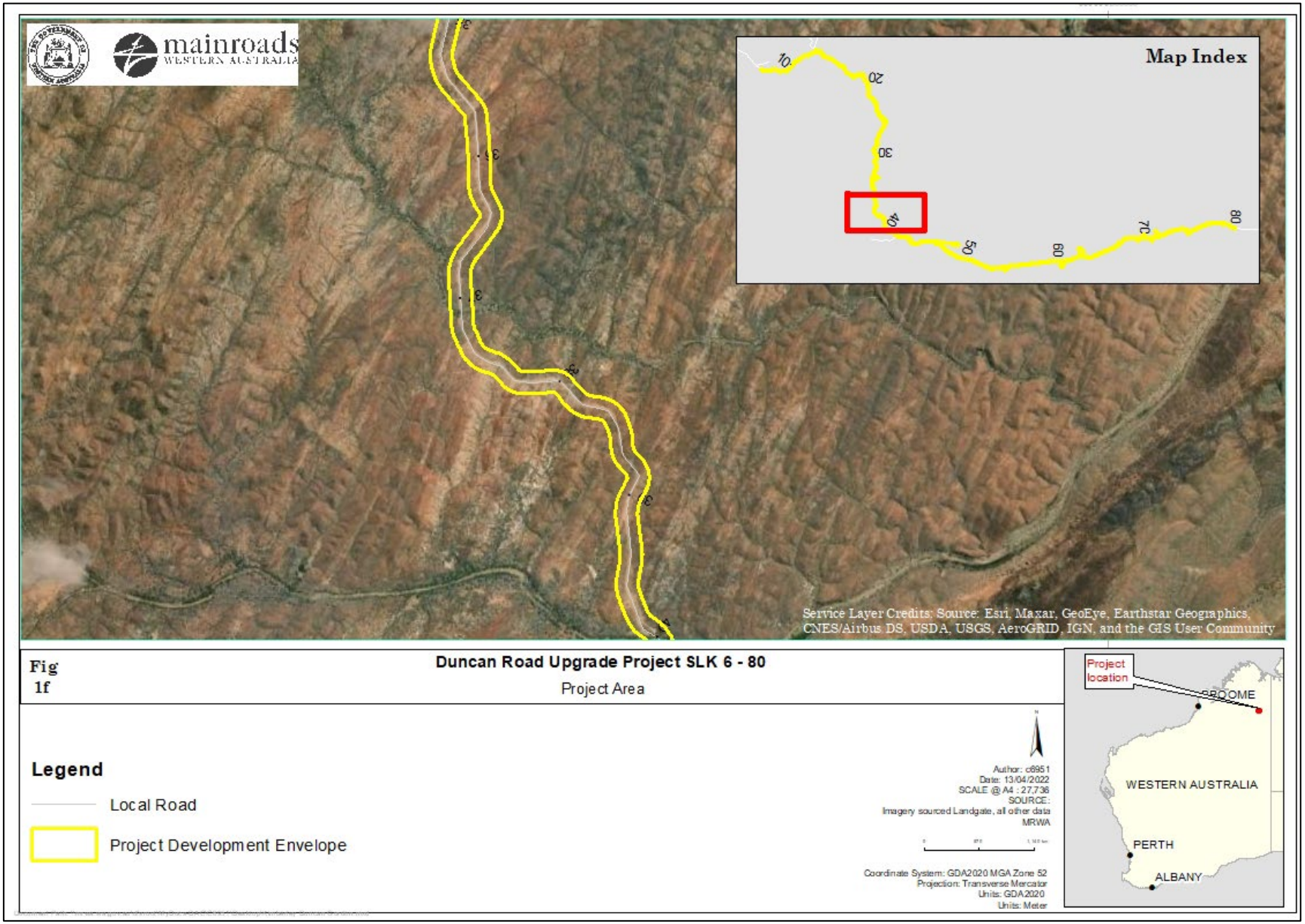

Figure 1f. Project Area

Figure 1g. Project Area

Figure 1h. Project Area

Figure 1i. Project Area

Figure 1j. Project Area

Figure 1k. Project Area

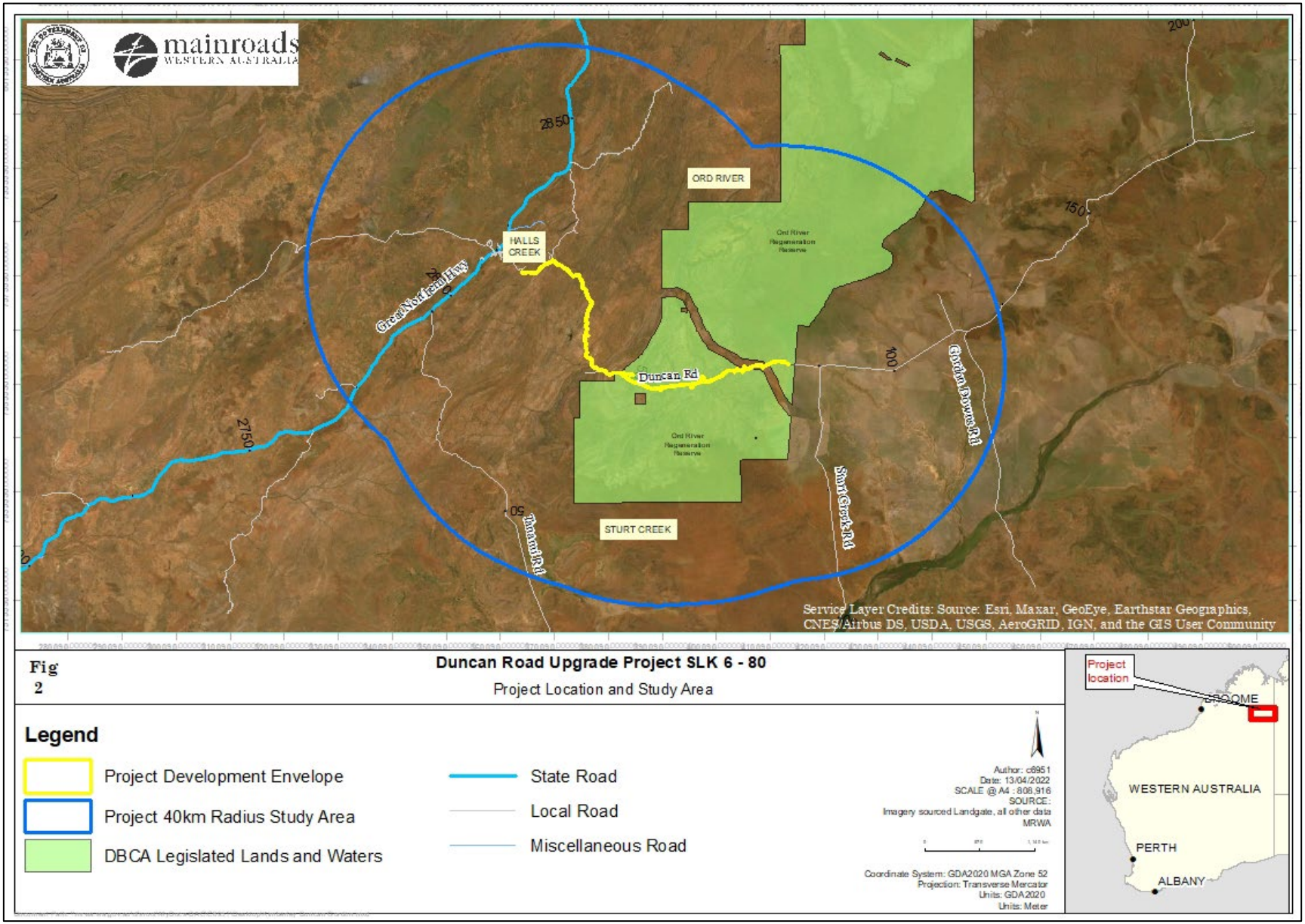

Figure 2. Project Location and Study Area

2.3 Alternatives to clearing

The following alternatives to clearing were considered during the design phase of the project:

- Use of existing cleared areas for material pits, turkey nest dams, laydown and truck turnaround areas. Mature trees and termite mounds will be retained along clearing lines to assist with revegetation (seed source) and to minimise the clearing footprint.
- Modification of the turkey's nest access track alignment to avoid mature trees.

2.4 Measures to Avoid, Minimise, Reduce and Manage Project Clearing Impacts

The design and management measures implemented to avoid and minimise the project clearing impacts are provided in Table 1. In addition, the following measure will be applied:

- A pre-clearance survey for the Greater Bilby will be conducted and 50 m exclusion zones will be established around any active burrows identified.
- Clearing in the areas identified as Gordon Land System PEC in "Excellent to Good Condition" will be confined to 15m from the centreline.
- Material Areas originally proposed within the Gordon Land System PEC is removed to minimise impacts to the ecological community.
- Areas of Priority floras will be tagged, demarcated and a 10m buffer will be created around to avoid impacts to the species at the local level.

Table 1. Measures undertaken to Avoid, Minimise, Reduce and Manage the Project Clearing Impacts

Design or Management Measure	Discussion and Justification
Steepen batter slopes	Not relevant to construction of proposed works
Installation of safety barriers	Not relevant to construction of proposed works
Alignment to one side of existing road	Not relevant to proposed works as working on both sides of the road
Alternative alignment to follow existing road (or) to preferentially locate within pasture or a degraded area	Not relevant
Installation of kerbing	No kerbing is proposed as the road will not be sealed in most areas. Kerbing has no impact on the construction footprint for road safety and drainage requirements.
Simplification of design to reduce number of lanes and/or complexity of intersections	The proposed works involve the construction of a dual carriageway gravel road. There are no further simplifications in design possible.
Preferential use of existing cleared areas for access tracks, construction storage and stockpiling	Where applicable, the majority of access points to material areas and bore locations do contain existing or historic tracks. These access points will be re-used to minimise unnecessary clearing.
Drainage modification	No drainage modification has been proposed for the project in application.

2.5 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 (see Section 1.3), Main Roads has also had regard to the below instruments.

Other Legislation of relevance 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)
- Town Planning and Development Act 1928

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 (DEC, December 2014)
- Procedure: Native vegetation clearing permits (DWER, October 2019)
- Environmental Offsets Guidelines (Government of Western Australia, August 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
- Approved Recovery Plans for threatened species
- EPBC Act Referral guidelines for the three threatened black cockatoo species
- Strategic advice - EPA

3 SUMMARY OF SURVEYS

3.1 Biological Survey

The Duncan Road Upgrade SLK 6.5-86.5 Biological Survey was conducted between May 23rd - June 8th, 2020 by Biota Environmental Sciences.

Section 3.1.1 contains the summary of the survey.

3.1.1 Summary of Biological Survey

Main Roads commissioned Biota Environmental Sciences to carry out a biological survey to identify key flora and fauna values relevant to the design and construction of the project. The spatial scopes for the biological survey comprised:

- the survey area (typically 390m from road centreline - the development envelope for the project, which will accommodate all physical components of the proposal for the purposes of EIA)
- a contextual area (a 500 m buffer on the survey area) and
- the study area (a 40 km buffer from the survey area for broader context setting).

A desktop flora and fauna assessment were undertaken for the study area, to use existing information to identify likely fauna and flora within the survey area. This was followed by a field survey which comprised a detailed and targeted flora and vegetation survey and a basic and targeted fauna field survey. Significant fauna species were targeted based on factors such as their likelihood of occurrence, level of listing and recommendations of EPA and Department of Biodiversity, Conservation and Attractions (DBCA) guidance. Particular survey effort was expended on the threatened Bilby, Northern Quoll, Ghost Bat and Night Parrot as the key fauna species of potential relevance to the survey.

Vegetation

Thirteen vegetation types were identified from the survey area, three units on hills (H1, H2 and H3) five units on plains (P1, P5, P6, P8 and P9) and five units associated with drainage lines / springs (D1, D2, D3, D5 and D6). Three of the units represented Priority Ecological Communities (PECs):

- Vegetation types P8 and P9 comprised the Gordon land system PEC. Only areas in Poor or better condition were considered to represent the PEC; areas in Degraded or Completely Degraded condition are already extensively degraded through overgrazing and weed invasion and would be unlikely to have the capacity to regenerate sufficiently to qualify as the PEC.
- Vegetation type P1 represented the Kimberley Association 850 PEC (easternmost stands) and the Gordon land system PEC (western stand).

Flora

A total of 465 native vascular flora species from 187 genera and 62 families have been recorded from the survey area. No Threatened flora are listed for the locality. Eleven of the species recorded were either confidently considered to be Priority species or were tentatively identified as such. These included five Priority 1 species: the confirmed species *Eriachne armitii, Goodenia lunata* and *Pentalepis trichodesmoides* subsp. *incana*, and the tentative species *Fimbristylis ? subaristata* and *Goodenia ? malvina*.

A total of 39 weed species were recorded from the survey area, including three significant weed species: **Azadirachta indica* (Neem Tree), **Calotropis procera* (Calotrope) and **Jatropha gossypifolia*

(Bellyache Bush) are listed as Declared Plants, with the latter species also listed as a Weed of National Significance. Neem Tree and Bellyache Bush are currently fairly restricted in the survey area, however Calotrope is well established.

Fauna

During the field survey, a combined total of 154 species of vertebrate fauna was recorded, including four native ground mammals, 12 bats, 99 birds, 29 reptiles and five amphibians. Three significant species were recorded:

- Gouldian Finch (*Erythrura gouldiae*; DBCA Priority 4 and EPBC Act Endangered);
- Grey Falcon (*Falco hypoleucos*; BC Act and EPBC Act Vulnerable); and
- Freshwater Crocodile (*Crocodylus johnstoni*; BC Act Other Specially Protected Fauna).

Based on previous records and field assessment of the habitats present, an additional nine species of significance were considered likely to occur within the survey area:

- Ghost Bat (*Macroderma gigas*; BC Act and EPBC Act Vulnerable)
- Gravel Dragon (*Cryptagama aurita*; DBCA Priority 1)
- Yellow-lipped Cave Bat (*Vespadelus douglasorum*; DBCA Priority 2)
- Peregrine Falcon (*Falco peregrinus*; BC Act Other Specially Protected Fauna)
- Fork-tailed Swift (*Apus pacificus*; BC Act Migratory and EPBC Act Migratory/Marine)
- Gull-billed Tern (*Gelochelidon nilotica*; BC Act Migratory and EPBC Act Migratory/Marine)
- Eastern Yellow Wagtail (*Motacilla flava*; BC Act Migratory and EPBC Act Migratory/Marine)
- Oriental Plover (*Charadrius veredus*; BC Act Migratory and EPBC Act Migratory/Marine); and
- Oriental Pratincole (*Glareola maldivarum*; BC Act Migratory and EPBC Act Migratory/Marine).

Nine fauna habitats were described within the survey area. The permanent spring-fed water source was considered to have the highest local significance. This permanent water source supported higher local biodiversity and supported the presence or likely presence of a number of significant species, including the Freshwater Crocodile (*Crocodylus johnstoni*), which was recorded during the survey.

3.2 Summary of Additional Surveys

The Duncan Road Targeted Flora Survey was conducted from 25th - 30th March 2021 by Ecologia Environment.

Section 3.2.1 contains the summary of the survey.

3.2.1 Summary of the Targeted Flora Survey

Following biological survey, Main Roads engaged Ecologia in 2021 to undertake a follow up targeted flora survey of significant flora species that were recorded or were considered by Biota to potentially occur within the biological survey area. Ten significant or potentially significant taxa were recorded during the current survey:

- *Cyperus* sp. (potentially new species)
- *Fimbristylis sieberiana* (P3)
- *Fimbristylis* sp. (potentially new species),
- *Glycine falcata* (P3)
- *Goodenia lunata* (P1)
- *Goodenia byrnesii* (P3)
- *Ipomoea racemigera* (P2)
- *Pentalepis trichodesmoides* subsp. *incana* (P1)
- *Pterocaulon xenicum* (P3)
- *Tephrosia* sp. Mistake Creek (A.C. Beauglehole 54424) (P3)

Significant and potentially significant species recorded by Biota (2021) but not located during the survey were:

- *Eriachne armitii* (P1)
- *Euphorbia*? *inappendiculata* var. *inappendiculata* (P2)
- *Acmella grandiflora* (
- *Iseilema* ?*windersii*
- *Synostemon* sp. (?*stenocladus*)

Additionally, *Dendrophthoe odontocalyx* (P3) has historically been recorded within the project area but no individuals were located during either the biological or targeted surveys.

3.3 Summary of Site Inspection of Supplementary Material Areas

A Site Inspection of two additional material areas at SLK [Redacted] along Duncan Road not included in the original biological survey was carried out by a Consultant Botanist and Main Roads Environment Officer (EO) on 9 May 2021 with a follow up site visit by Main Roads EO on 14 May 2021.

Section 3.3.1 contains the summary of the survey.

3.3.1 Summary of the Site Inspection

Vegetation types were mapped and allocated to the closest vegetation unit described by Biota (2021). 87 additional records for a P3 species (*Tephrosia* sp. Mistake Creek) were detected with the majority being located outside the survey area.

4 VEGETATION DETAILS

4.1.1 Project Site Vegetation Description

The vegetation mapping produced by Biota (2021) was based on 2005 aerial imagery (Antrim_4561_Aug_2005_Mosaic) which under-represented the amount of cleared areas that are actually present due to disturbances such as road upgrade works, material extraction etc. that occurred afterwards. To enable a more accurate assessment of impacts, Biota's vegetation mapping was updated as part of this assessment using aerial imagery from 2017 to 2020 and refined to a scale of 1:4,000 (ESRI 2021). Figure 3, 4 & 5 illustrates the difference in extent of existing clearing between adjacent areas of the 2005 and 2019/2020 aerial imagery where Green overlay represents vegetated extents. The 2020 mapping is the more accurate reflection of the current condition of the project areas and should therefore be considered in EIA. All impact statistics provided herein were calculated using the updated and refined mapping. This approach is consistent with the Gibb River Road Project approved PCIA D20#102347.

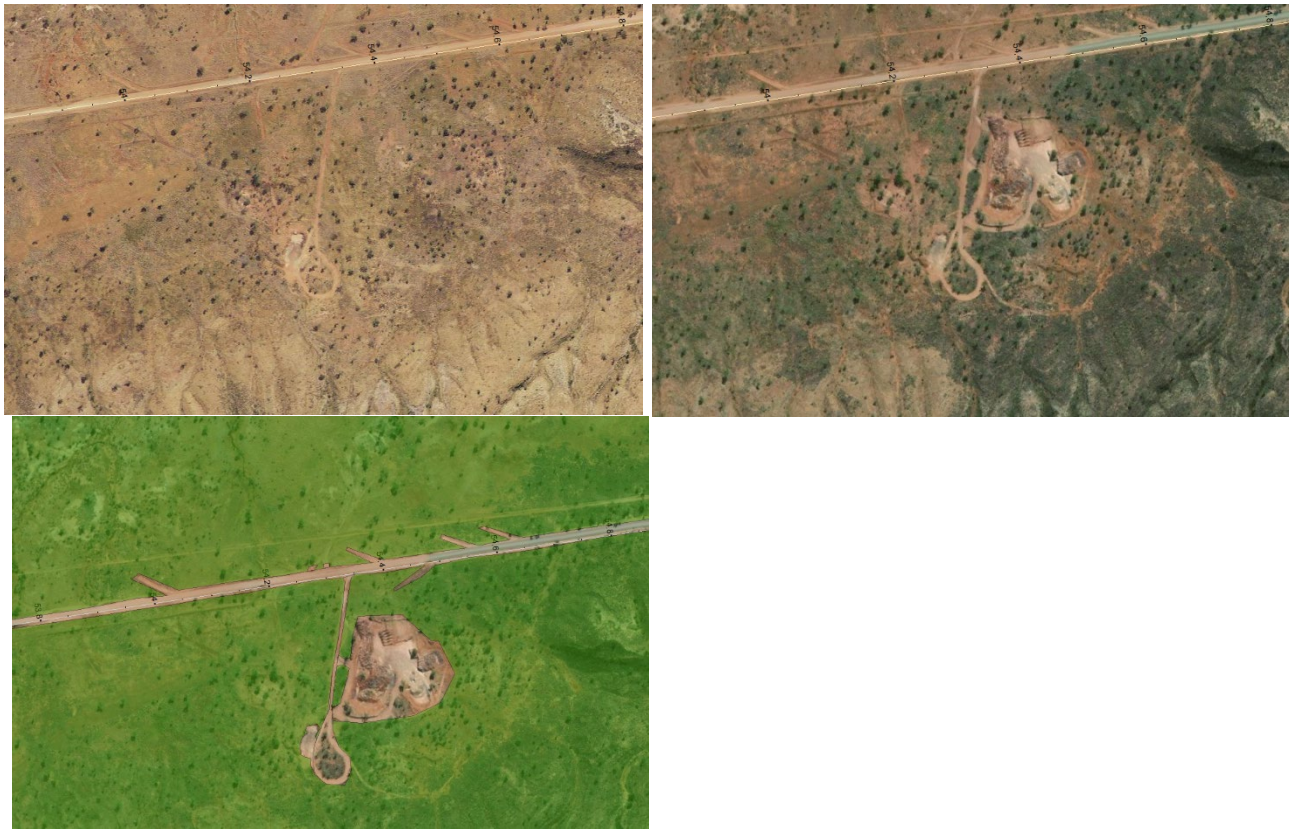

Figure 3: Biota (2021) Vegetation Mapping (based on 2005 aerial imagery) on left vs Refined mapping (based on aerial imagery 2020) on right

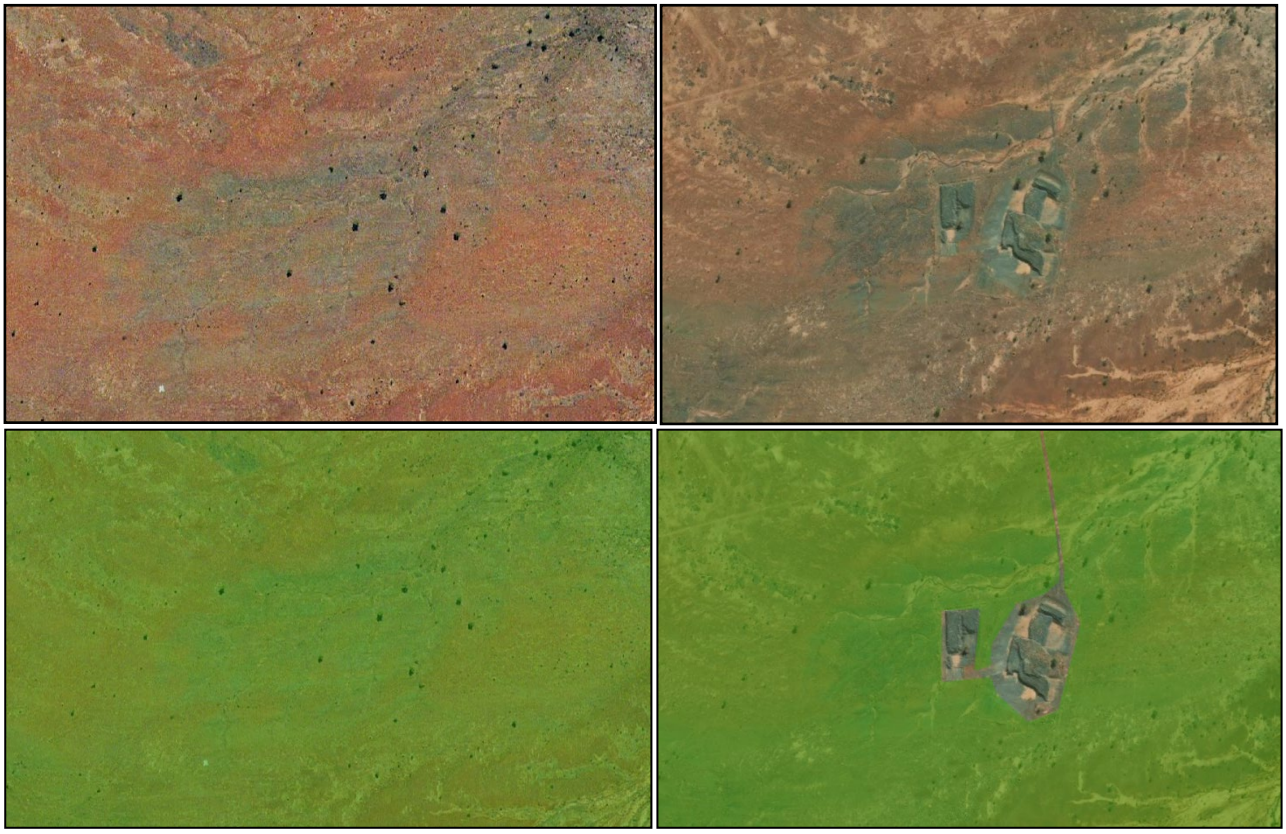

Figure 4: Biota (2021) Vegetation Mapping (based on 2005 aerial imagery) on left vs Refined mapping (based on aerial imagery 2020) on right

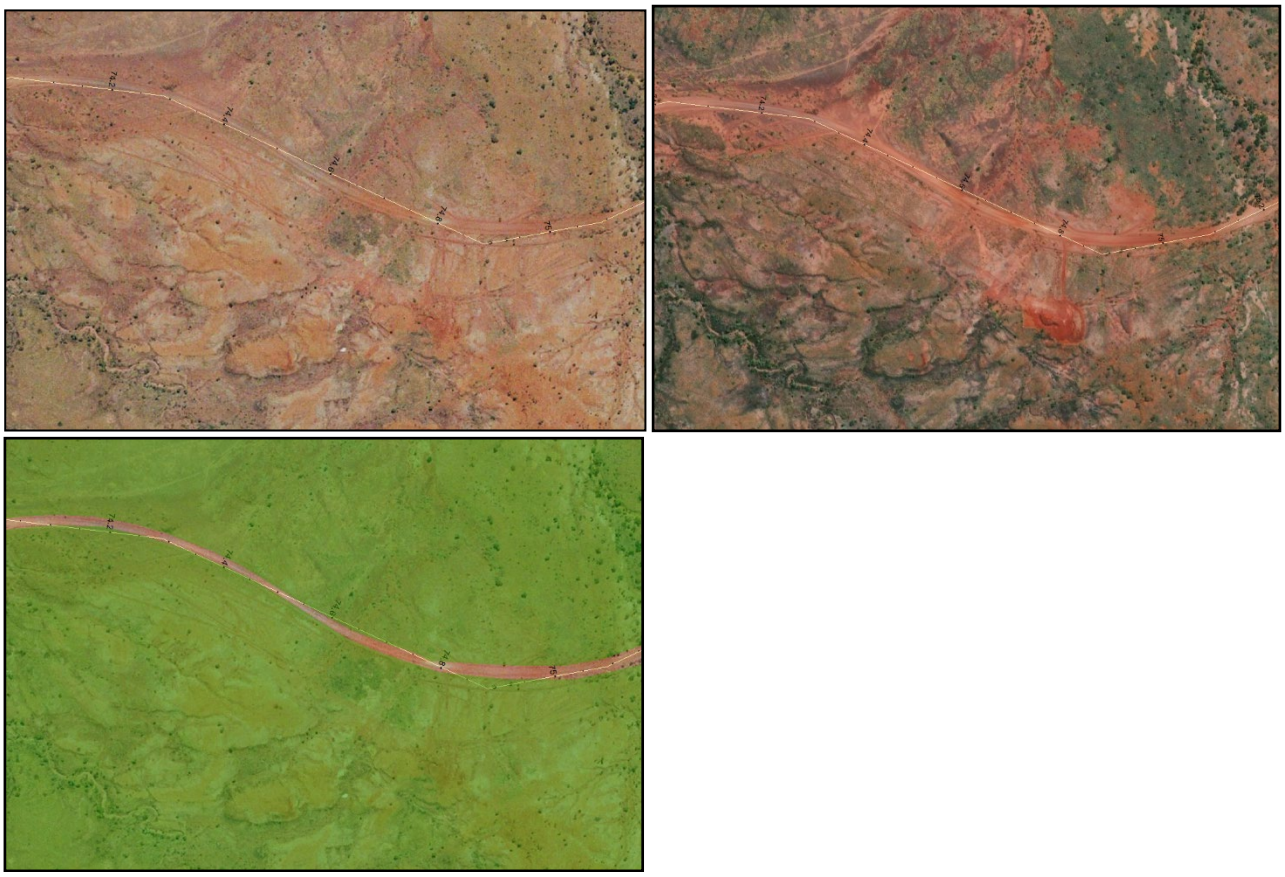

Figure 5: Biota (2021) Vegetation Mapping (based on 2005 aerial imagery) on left vs Refined Mapping (based on aerial imagery 2019) on right.

Eight vegetation units as identified in the field survey will be impacted by the project clearing - three units on hills (H1, H2 and H3) and five units on plains (P1, P5, P6, P8 and P9) as described in detail below:

Table 2. Vegetation Types Representation within the proposed clearing as mapped by Biota (2021)

Vegetation Type		Extent within Survey Area (ha)	Proposed Clearing (Approx. ha)
H1	*Eucalyptus brevifolia, Corymbia opaca* scattered low trees to low open woodland over *Triodia intermedia* hummock grassland.	5218.8	134 (2.56%)
H2	*Corymbia opaca, Eucalyptus brevifolia* low open woodland over *Triodia wiseana* hummock grassland.	160.84	10.8 (6.71%)
H3	*Corymbia opaca, Eucalyptus brevifolia, (Corymbia cliftoniana*) scattered low trees over *Triodia inutilis, (T. stenostachya*) open hummock grassland	316.4	1.06 (0.33%)
P1	*Astrebla pectinata, Chrysopogon fallax, Dichanthium fecundum* tussock grassland.	303.27	2.98 (0.98%)
P5	*Corymbia opaca, Eucalyptus brevifolia* scattered low trees over *Triodia intermedia* open hummock grassland.	962.06	41.31 (4.29%)
P6	*Corymbia opaca, Gyrocarpus americanus* scattered low trees over *Triodia intermedia* open hummock grassland.	863.26	26.44 (3.06%)
P8	*Acacia synchronicia, *Vachellia farnesiana, Carissa lanceolata* scattered shrubs to tall open shrubland over *Chrysopogon fallax, Dichanthium fecundum, *Cenchrus* spp. open tussock grassland.	1,073.36	18.7 (1.74%)
P9	*Terminalia arostrata* scattered low trees over *Dichrostachys spicata* tall open shrubland over open annual grassland / herbland.	856.67	39.5 (4.6%)

Tables 2 and 3 provide details of the Pre-European Vegetation Associations with the project area and the remaining extents of these associations.

Table 3. Summary of Project Area's Mapped Pre-European Vegetation Associations

Pre-European Vegetation Association(s)	Clearing Description	Vegetation Condition	Comments
Veg Assoc No. 91 Hummock grasslands, sparse tree steppe; snappy gum over soft spinifex	Clearing of up to 3 ha for road widening and material areas for the project	Completely Degraded - Excellent (EPA 2016)	Vegetation description and condition determined from Biological Survey report – "Biota (2021). Duncan Road Upgrade SLK 6.5 –
Veg Assoc No. 816 Grasslands, short bunch grass savanna, low tree, Mt House box (*Eucalyptus argilliacea*) & bloodwood over arid short grass (*Enneapogon spp.*)	Clearing of up to 157 ha for road widening, material areas and turkey's nests for the project		
Veg Assoc No. 831 Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex *Triodia intermedia* & *T. inutilis*	Clearing of up to 60 ha for road widening, material areas and turkey's nest for the project		

Table 3. Summary of Project Area's Mapped Pre-European Vegetation Associations

Veg Assoc No. 847 Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (*Eucalyptus terminalis*) over soft spinifex	Clearing of up to 13 ha for road widening and Turkey's nest for the project		86.5 Biological Survey. Prepared for Main Road Western Australia."
Veg Assoc No. 848 Hummock grasslands, low tree steppe; eucalypts over curly spinifex on laterite sand plains	Clearing of up to 3 ha for road widening for the project		
Veg Assoc No. 851 Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (*E. terminalis*) over hard spinifex, *Triodia wiseana* & *T. intermedia* on basalt and dolerite	Clearing of up to 39 ha for road widening and material areas for the project		

Table 4. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale		Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 91	**Statewide**		438,282.66	437,621.56	99.85	18.99
	IBRA Bioregion Ord Victoria Plain		168,408.21	168,408.21	100.00	49.35
	IBRA Sub-region Purnululu		143,499.45	143,499.45	100.00	57.90
	Local Government Authority Shire of Halls Creek		438,105.03	437,621.56	99.89	18.99
Veg Assoc No. 816	**Statewide**		132,973.51	132,853.40	99.91	57.61
	IBRA Bioregion Ord Victoria Plain		89,542.91	89,422.79	99.87	85.59
	IBRA Sub-region	Purnululu	89,397.28	89,277.16	99.87	85.58
		South Kimberley Interzone	145.63	145.63	100.00	95.74
	Local Government Authority Shire of Halls Creek		83,752.03	83,752.03	100.00	91.39
Veg Assoc No. 831	**Statewide**		381,764.51	381,594.39	99.96	8.42
	IBRA Bioregion Ord Victoria Plain		380,910.53	380,744.09	99.96	8.44
	IBRA Sub-region Purnululu		379,001.70	378,835.26	99.96	8.48
	Local Government Authority Shire of Halls Creek		381,764.51	381,594.39	99.96	8.42
Veg Assoc No. 847	**Statewide**		71,106.64	71,106.64	100.00	60.55
	IBRA Bioregion Ord Victoria Plain		71,106.64	71,106.64	100.00	60.55
	IBRA Sub-region		66,473.97	66,473.97	100.00	64.76

	Purnululu				
	Local Government Authority Shire of Halls Creek	71,106.64	71,106.64	100.00	60.55
Veg Assoc No. 848	**Statewide**	225,104.97	223,937.05	99.48	8.30
	IBRA Bioregion Ord Victoria Plain	224,082.03	223,581.51	99.78	8.31
	IBRA Sub-region South Kimberley Interzone	222,798.39	222,297.87	99.78	8.13
	Local Government Authority Shire of Halls Creek	224,406.42	223,919.78	99.78	8.30
Veg Assoc No. 851	**Statewide**	111,037.36	110,983.69	99.95	0.05
	IBRA Bioregion Ord Victoria Plain	110,998.40	110,944.72	99.95	0.05
	IBRA Sub-region Purnululu	110,984.56	110,930.89	99.95	0.05
	Local Government Authority Shire of Halls Creek	111,037.36	110,983.69	99.95	0.05

5 ASSESSMENT AGAINST THE TEN CLEARING PRINCIPLES

In assessing whether the project's proposed clearing is likely to have a significant impact on the environment, the project was assessed against the ten Clearing Principles (Environmental Protection Act 1986, Schedule 5).

Each principle has been assessed in accordance with DWER's 'A Guide to the Assessment of Applications to Clear Native Vegetation' and other relevant CPS Decision Reports prepared by DWER.

The proposed clearing is not likely to be at variance with the 10 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

No Environmentally Sensitive Areas (ESAs) and Threatened Ecological Communities (TECs) were identified in the 40km radius desktop database searches nor recorded during the field survey by Biota (2021).

The desktop assessment identifies three Priority Ecological Communities (PECs), all listed as priority 3, from project 40km radius search:

- **Gordon land system**: Described as "Low hilly to undulating limestone country on inland and coastal erosional plains". (DBCA 2021b).
- **Vegetation Association 850 as defined by John Beard's vegetation mapping for the Kimberley (Beard 1979):** Described as "Grasslands, tall bunch grass savanna, mitchell & blue grass". (DBCA, 2020)
- **Vegetation Association 834 as defined by John Beard's vegetation mapping for the Kimberley (Beard 1979):** Described as "Grasslands, tall bunch grass savanna, mitchell & blue grass". (DBCA, 2020)

The Biota Biological Survey, (2021) identified three vegetation units from the survey area that are a representative of PECs:

- **P1 -** *Astrebla pectinata, Chrysopogon fallax, Dichanthium fecundum* tussock grassland representing the Priority 3 **Kimberley Association 850 PEC**.
- **P8** - *Acacia synchronicia, *Vachellia farnesiana, Carissa lanceolata* scattered shrubs to tall open shrubland over *Chrysopogon fallax, Dichanthium fecundum, *Cenchrus spp. open tussock grassland* representing Priority 3 **Gordon land system PEC**.
- **P9 -** *Terminalia arostrata* scattered low trees over *Dichrostachys spicata* tall open shrubland over open annual grassland/herbland representing Priority 3 **Gordon land system PEC**.

Gordon land system PEC

The Biological Survey recorded 761.16 ha of the Priority 3 Gordon land system PEC within the survey area which consists of 596.57 ha in Excellent-Good Condition and 164.59 ha in Poor Condition. As part of the project activities 8.68 ha of "Good Condition" and 2.74 ha of "Poor Condition" PEC vegetation is proposed to be cleared representing 1.5% of the Gordon Land System PEC from within the local area. In addition, the desktop assessment identified a total 12,3078.23 ha of the mapped "Gordon land system" in the region that is likely to constitute the associated PEC (DPIRD 2019), of which 10,7891.68 ha (87.6%) is protected within DBCA managed land. Furthermore, threats to the Gordon Land System PEC are considered by DBCA to be "extensive threatening processes acting at landscape scales, namely over-grazing and weed invasion (buffel grass)" (DBCA 2021b).

Amendments to the project have been made to further reduce impacts to the PEC with:

- material areas originally located with Gordon Land System PEC areas removed, and
- clearing for road upgrade reduced to 15 meters from the centreline in the areas of Gordon Land System PEC.

The proposed project clearing is narrow, linear and is alongside an existing road corridor. A significant proportion of the undisturbed Gordon land System PEC is located outside the project area and will remain unaffected by the project activities. Furthermore vegetation condition outside of the project development envelope is of a high quality (see Vegetation Condition below). Impacts to the PEC as a result of the project clearing is unlikely to be significant.

Kimberley Association 850 PEC

Vegetation Association 834 PEC is located more than 7km from the project western end and Kimberley Association 850 was recorded more than 130 m from the eastern end of the project envelope, as such they will not be impacted by the project activities.

Priority Flora

The biological survey (Biota 2021) recorded a total of 465 native vascular flora species from 187 genera and 62 families. Eleven of the species recorded were either confirmed or were considered to possibly represent Priority flora species. Three additional Priority species that were not recorded during the field survey were considered as may occur. Five other taxa represented undescribed taxa. Following the Biological survey, Main Roads engaged Ecologia to undertake an additional targeted flora survey to accurately assess these Priority listed or otherwise significant flora species Biota identified. A further Environmental Site Inspection of two supplementary material areas was carried out by Main Roads in 2021. The following list of priority or otherwise significant species identified with the survey area from the Biological survey, Targeted Flora Survey and the Site Inspection:

- *Eriachne armitii* (P1)
- *Fimbristylis ? subaristata* (tentative identification only) (P1)
- *Goodenia lunata* (P1)
- *Goodenia ? malvina* (tentative identification only) (P1)
- *Pentalepis trichodesmoides* subsp. *Incana* (P1)
- *Euphorbia ? inappendiculata* var. *inappendiculata* (tentative identification only) (P2)
- *Ipomoea racemigera* (P2)
- *Fimbristylis sieberiana* (P3)
- *Glycine falcata* (P3)
- *Goodenia byrnesii* (P3)
- *Pterocaulon ? xenicum* (P3)
- *Tephrosia sp.* Mistake Creek (A.C. Beauglehole 54424) (P3)

Otherwise significant species recorded during the survey were:

- *Acmella grandiflora*
- *Cyperus sp.* (TAN14-4)
- *Iseilema ? windersii*
- *Synostemon sp. (? stenocladus)*

The following species will be impacted by the project clearing activities:

- ***Pentalepis trichodesmoides* subsp. *Incana* (P1)** – A total of 880 individuals of the species were recorded from the field survey by Biota (2021) and Ecologia (2021) of which only 13 individuals in the vicinity of halls creek are required to be cleared for the project activities which represents 1.47% of the individuals recorded during the field survey. Three individuals that were located in the project development envelope at SLK 14.6 will be flagged and demarcated to prevent any impacts from clearing activities. All the populations from the survey area were recorded from vegetation type H1 – *Eucalyptus brevifolia, Corymbia opaca* scattered low trees to low open woodland over *Triodia intermedia* hummock grassland. Only 2.56% of the H1 Vegetation Type from the survey area is proposed to be cleared.
- ***Glycine falcata* (P3) –** A total of 56 individuals of the species were recorded during the Biological and Targeted Flora Survey of which only one individual is required to be cleared. This represents the clearing of 1.78% of the individuals recorded during the field survey. The population were recorded from Vegetation Type P1- *Astrebla pectinata, Chrysopogon fallax, Dichanthium fecundum* tussock grassland and P8 - *Acacia synchronicia, *Vachellia farnesiana, Carissa lanceolata* scattered shrubs to

tall open shrubland over *Chrysopogon fallax, Dichanthium fecundum, *Cenchrus* spp. open tussock grassland. 2.98 ha representing 0.98% of the total P1 Vegetation Type and 18.7 ha representing 1.74% of the P8 Vegetation Type from the survey area is proposed to be cleared. It should be noted that this species has a very broad distribution; over 3,700km, ranging from the Pilbara to southeastern Queensland (Biota 2021). It is therefore likely to be under-collected rather than truly rare.

Both priority species described above have a large proportion of populations and the suitable habitat types outside the project clearing. As such impact to these species as result of the project activities is unlikely to be significant.

The following species fall within the Project Development Envelope and but will not be impacted by the project clearing activities. A 10m buffer will be created around these priority floras during on ground works so that they are not impacted:

- ***Goodenia byrnesii* (P3) –** Ecologia (2021) recorded 256 individuals of the species from vegetation P1 **-** *Astrebla pectinata, Chrysopogon fallax, Dichanthium fecundum* tussock grassland and P8 **-** *Acacia synchronicia, *Vachellia farnesiana, Carissa lanceolata* scattered shrubs to tall open shrubland over *Chrysopogon fallax, Dichanthium fecundum, *Cenchrus* spp. open tussock grassland. Of which 84 individuals fall within the project development envelope. However, none of them will be cleared for project activities. None of them were recorded in the proposed material pits.
- ***Pterocaulon ? xenicum* (P3) –** Ecologia, (2021) recorded 117 individuals of species from vegetation types H1 *Eucalyptus brevifolia, Corymbia opaca* scattered low trees to low open woodland over *Triodia intermedia* hummock grassland and P5 *Corymbia opaca, Eucalyptus brevifolia* scattered low trees over *Triodia intermedia* open hummock grassland. Of which 30 individuals were recorded from one location within the project development envelope. However, none of them will be cleared for project activities. None of them were recorded in the proposed material pits.
- ***Tephrosia sp.* Mistake Creek (A.C. Beauglehole 54424) (P3) –** 155 individuals of the species were recorded from all three surveys of which only 3 individuals fall within the project development envelope. However, they will be avoided and not be cleared for the project activities.

***Eriachne armitii* (P1), *Fimbristylis ? subaristata* (tentative identification only) (P1)**, ***Ipomoea racemigera* (P2) and *Fimbristylis sieberiana* (P3)** were also located within the project development envelope however no individuals of these species will be cleared under this application. A 10m buffer will be created around these priority floras that fall within the project development envelope.

A likelihood of assessment undertaken by Biota, (2021) and Ecologia, (2021) identified following species considered as "may" occur within the survey area:

- *Polygala crassitesta* (P1)
- *Paspalidium retiglume* (P2)
- *Iotasperma sessilifolium* (P3)
- *Dendrophthoe odontocalyx* (historical record only) (P3)

Polygala crassitesta (P1), *Paspalidium retiglume* (P2) and *Iotasperma sessilifolium* (P3) are all annual species and were considered to have some potential to occur in the area as Vegetation type P1 would comprise suitable habitat for these species. However, none of these species were recorded during the biological survey and the follow up targeted survey despite the adequate survey effort. Whilst 2.98 ha of P1 vegetation is proposed to be cleared, the vegetation type is well represented locally and regionally with 275,303 ha of vegetation likely to constitute P1 vegetation within the project 40km radius. In addition, these Priority species have a wider distribution across the Kimberley region and are not limited within the project development envelope. As such impacts to these species as a result of the project activities is likely to be insignificant.

Dendrophthoe odontocalyx (P3) is a mistletoe (an aerial hemiparasite) and has a very broad distribution over 2,030 km, extending from the Dampier Peninsula in the Kimberley to Queensland (Ecologia, 2021). This mistletoe could potentially occur along any of the drainage lines within the survey area. There are at least 26 species known to be used by this species as hosts, many of which are common in the project area and

beyond making the restriction in range highly unlikely (Downey 1998). Vegetation associated with drainage lines will not be cleared under this application and subsequently this specie will not be impacted.

No listed Threatened flora species are identified from the desktop assessment of 40km radius study area or were recorded during the biological or the subsequent targeted survey.

It is considered that the loss of the vegetation associated with the PECs and Priority flora as a result of the clearing will not impact the conservation status of the communities and taxa present, with the vast majority of the floristic biodiversity within the proposed clearing area likely to be represented in the areas surrounding the project. Impact from the project and will not significantly impact their local or regional occurrence.

Fauna

Nine fauna habitats were described from within the biological survey area:

- Low rolling stony hills
- Open shrubland/woodland on tussock grass plains
- Open shrubland/woodland on spinifex plains
- Cracking clay plains
- Ridgeline breakaways and scree slopes
- Major drainage lines and associated tributaries
- Permanent spring-fed waterhole
- Permanent minor spring
- Man-made dam

Five habitat types are required to be cleared of which three habitat types comprise more than 80% of the project area. These are low rolling stony hills, open shrubland/woodland on spinifex plains and open shrubland/woodland on tussock grass plains. No clearing of the vegetation associated with Permanent spring-fed waterhole, Permanent minor spring, Man-made dam or Major drainage lines and associated tributaries is proposed under this application.

The desktop database searches carried out by Biota, (2021) returned a total of 317 species of terrestrial vertebrae fauna previously recorded from the 40 km radius desktop study area of which 41 comprised listed significant species. The desktop assessment was followed up by a field survey which recorded a combined total of 154 species of vertebrae fauna including two birds and one reptile species of conservation significance. The three species of conservation significance recorded during the survey are:

- Gouldian Finch *Erythrura gouldiae* (EN, P4)
- Grey Falcon *Falco hypoleucos* (VU)
- Freshwater Crocodile *Crocodylus johnstoni* (OS)

Four records, each of a single Gouldian Finch, were made at two locations (SLK 9 and SLK 11) and a single Grey Falcon was sighted near the tributary of the Elvire River at SLK 21.8. Both species were recorded near the water source. Gouldian Finch is the only grassfinch that nests exclusively in tree hollows or holes in termite mounds (Birdlife Australia, 2022). Hollow in the trees such as Snappy Gums *Eucalyptus brevifolia* and *E. leucophloia* or Salmon Gums *E. tintinans* are used for nesting (DEPW, 2021). The project consists of the habitat suitable for the species such as Low rolling Stony Hills and Open shrubland/woodland on tussock grass plains both of which are were dominated by a sparse to open low woodland of *Eucalyptus brevifolia* (Snappy Gum). A total of 201 ha or 2.8% of the available habitats (7198.01 ha) within the survey area is proposed to be cleared . Snappy Gums were recorded from 22 locations from within the survey area ranging from height 150cm - 800 cm and % coverage from 0.1% - 5%. None of these recorded snappy gums occur inside the project development envelope. In addition, no hollow bearing Snappy Gum trees were recorded from the survey area.

Similarly, Grey Falcon nests usually in the tallest trees along watercourses, particularly River Red Gum (*Eucalyptus camaldulensis*) and Coolibah (*E. coolabah*) (DAWE, 2021b). No habitats associated with watercourse or drainage will be cleared under this application. The Grey Falcon may utilise other habitats such open shrubland/woodland on tussock grass plains for hunting opportunities however a wide extensive

range of habitat distribution is known to occur outside the project envelope across the Australian mainland. They are known to occur at low densities across inland Australia (Birdlife International 2022). Records from the Atlas of Living Australia (ALA) shows that the species has been recorded across most of the mainland (ALA 2022a). As such they are only likely utilise the project envelope in a fly over or as a foraging visitor.

Four records of twenty-one individuals of Freshwater Crocodiles were recorded at Palm Springs and along the Black Elvire River (non-perennial watercourse) - on several occasions during nocturnal survey. The habitat type suitable for Freshwater Crocodile is mapped as Major Drainage lines and associated Tributaries. No such habitat type associated with the watercourse or wetlands is proposed to be cleared under this application and no clearing or disturbance is proposed at Palm Springs.

A likelihood of assessment based on previous records and habitat requirements identified a list of twenty-four species of conservation significance considered "likely" or "may" occur within the survey area. Of which 16 species are listed as migratory birds under the EPBC and BC Acts. These species are non-breeding migrants to Australia and have a wide range of occurrence across Australia. The project envelope does not represent their core habitat and they may only utilise the project envelope as a foraging visitor or in a fly over nature.

- Ghost Bat *Macroderma gigas* (VU)
- Australian Painted Snipe *Rostratula australis* (EN)
- Gravel Dragon *Cryptagama aurita* (P1)
- Yellow-lipped Cave Bat *Vespadelus douglasorum* (P2)
- Short-tailed Mouse *Leggadina lakedownensis* (P4)

None of the above 5 species were recorded during the field survey.

Despite targeted searches, no Ghost Bats nor suitable roost caves for the species were detected during the biological survey.

Australian Painted Snipe may occur in the survey area following large rainfall events that create flood-out zones suitable for foraging most likely permanent water hole, watercourses and associated tributaries. However, no vegetation associated with watercourse or wetlands is proposed to be cleared under this application and as such significant impact on this specie is unlikely.

Areas of open woodland over spinifex hummock grassland on stony soils were present throughout the survey area and may be suitable for Gravel Dragon. Approximately 2.97 % (211 ha out of 7092.17 ha) of this habitat type from the survey area is proposed to be cleared. With the presence of a significant available habitat in the outside the project area it is unlikely that these species are reliant on, small area of habitat within the project area and impact to the species. As such a large portion of the intact suitable habitat type is outside the project envelope.

Suitable roosting and denning habitat for the Yellow-lipped Cave Bat (Ridgeline breakaways and scree slopes) occur within the survey area. The Yellow-lipped Cave Bat was not detected during the analysis of the ultrasonic sound recorders deployed during the survey and no core roosting habitats (caves) lie within the project area. Approximately 2.5 ha out of 445ha (0.56%) of potential suitable habitat within the surveyed area is required to be cleared. With no detection of the species during the field survey, lack of critical roosting habitat (caves) in the project area and the availability of significant habitat outside the immediate project area, the project clearing will not have a significant impact on the species habitat.

Short-tailed Mouse is known to occur in areas of open tussock and hummock grassland, Acacia shrubland and savannah woodland, on sandy soils and cracking clays, hilltops and sandy coastal areas across northern Australia (the Pilbara and Kimberley regions in WA) (ALA, 2022b). The desktop searches did not identify the previous records of this species in the project 40 km radius desktop area. Biota (2021) did not detect this species during the field survey but considered that they have a suitable habitat within the survey area, particularly in the crackling clay grasslands, tussock grassland and spinifex hummock grassland on plains. The species was therefore considered to have the potential to occur in the survey area during optimal

seasonal conditions. However, only 3.17% of the total suitable habitat from within the biological survey area is proposed to be cleared. A large portion of the more suitable habitat for the specie is outside project clearing. As such, the impacts to the species as a result of project clearing is unlikely to be significant.

Vegetation Condition
The area proposed to be cleared consists of a lower quality vegetation in comparison to the available vegetation in the surrounding areas. Biological surveys carried out to date have mapped the quality of vegetation based on a 'Good condition: poorer condition' ratio with vegetation within the Project Development Envelope having a ratio of 70%:29% of 'Good or better': 'poorer'. In contrast vegetation located outside the development envelope has a ratio of 82%:18% of 'Good or better': 'poorer'. As the representation of vegetation in poorer condition is higher in the project development envelope in comparison to surrounding areas, the level of biological diversity is likely to be lower.

The proposed clearing is considered not likely to be at variance for the following reasons:

1. Conservation Significant Flora: loss of priority flora as a result of the clearing will not impact the conservation status of the species with less than 2% of the individuals detected during Project surveys to be impacted. Furthermore, *Glycine falcata* records indicate a wide distribution between the Pilbara and south-eastern Queensland indicating it is likely under-collected
2. Conservation Significant Fauna: Only two species, the Gouldian Finch and Grey Falcon were detected within the survey area, both of which are broadly dispersed and are not reliant on habitat within the proposed clearing in relation to areas outside it.
3. Priority Ecological Communities: A single PEC, the Gordon Land System will be impacted, though the impacts from clearing are likely to be insignificant; less than 2% for the Gordon Land System
4. Vegetation Condition: Vegetation types within the project envelope are well represented locally and regionally with the vast majority of the floristic biodiversity within the proposed clearing area likely to be represented in the areas surrounding the project. In addition, the vegetation within the proposed clearing is of substantially poorer quality than that of the immediate surrounds, indicating that diversity will in general be lower than the immediate surrounds.

Methodology
ALA (2022a & 2022b))
Biota (2021)
Birdlife International (2022)
DBCA shapefiles
DBCA NatureMap Species Report (Accessed 25/08/2021)
Ecologia (2021)
EPBC Act Protected Matters Search Report (Accessed 25/08/2021)
Main Road ArcGIS Shapefiles
Main Roads (2021)
Species Profile and Threats Database (Accessed 08/09/2021)
WA Florabase (Accessed 15/09/2021)

(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

Only five fauna habitat types will be impacted by the project clearing as follows:

Habitat	Description	Extent within Survey Area (ha)	Clearing Required (Approx. ha)

Low Rolling Stony Hills	Occurring on hills with rocky and stony substrates. Open *Eucalyptus brevifolia* woodland over mixed *Triodia intermedia* hummock grasslands.	5,262.47	143 (2.7%)
Open shrubland/woodland on tussock grass plains	*Acacia synchronicia, *Vachellia farnesiana*, *Carissa lanceolata* scattered shrubs to tall open shrubland over *Chrysopogon fallax, Dichanthium fecundum, *Cenchrus spp.* open tussock grassland	1,935.54	58 (3%)
Open shrubland/woodland on spinifex plains	Open *Acacia* over spinifex hummock grasslands, occasionally supporting termite mounds, over stony substrate on broad undulating plains	1,829.7	68 (3.7%)
Cracking Clay Plains	Heavy clay and stony substrates on basalt, supporting *Astrebla pectinata*, *Chrysopogon fallax*, *Dichanthium fecundum* open tussock grasslands.	303.4	3 (0.98%)
Ridgelines, breakaways and scree slopes	Ironstone and granite ridgeline formations supporting rocky boulder, overhangs, and caves (none in the survey area). Vegetation comprised scattered *Corymbia opaca* and *Eucalyptus brevifolia* trees over *Triodia intermedia* open hummock grassland.	445.38	2.5 (0.56%)

As evident from the table above, the mapped fauna habitats are widespread throughout the larger survey area and the proposed clearing represents only a small fraction (between 0.67% - 3.7%) of current extent of the each of these habitats.

Three significant species from the biological survey area (Biota, (2021) were recorded:

Gouldian Finch *Erythrura gouldiae* (EN, P4) - Four records, each of a single Golden Finch, were made outside the Project Development Envelope at two locations (SLK 9 and SLK 11). All observations were made along the non-perennial Halls Creek being used by multiple finch species. Gouldian Finch is the only grassfinch that nests exclusively in tree hollows or holes in termite mounds (Birdlife Australia, 2022). Hollow in the trees such as Snappy Gums *Eucalyptus brevifolia* and *E. leucophloia* or Salmon Gums *E. tintinans* are used for nesting (DEPW, 2021). The project consists of the habitat suitable for the species such as Low rolling Stony Hills and Open shrubland/woodland on tussock grass plains both of which are were dominated by a sparse to open low woodland of *Eucalyptus brevifolia* (Snappy Gum). A total of 201ha of these habitat types is proposed to be cleared which represents 2.8% of the available habitats (7198.01 ha) within the survey area. Snappy Gums were recorded from 22 locations from within the survey area ranging from height 150cm - 800 cm and percentage % coverage from 0.1% - 5% however none of these species occur inside the project development envelope. Also, no hollow bearing Snappy Gum trees were recorded from the survey area. As such a large amount of intact vegetation suitable for this species is outside the development envelope.

Grey Falcon *Falco hypoleucos* (VU) - A single Grey Falcon was sighted near the tributary of the Elvire River at SLK 21.8. Grey Falcon nests usually in the tallest trees along watercourses, particularly River Red Gum (*Eucalyptus camaldulensis*) and Coolibah (*E. coolabah*) (DAWE, 2021b). No habitats associated with watercourse or drainage will be cleared under this application. They may also utilise other habitats such Open shrubland/woodland on tussock grass plains for hunting opportunities. Besides they have a wide range of known habitat distribution outside the project envelope. As such they may only utilise the area in a fly over nature or a foraging visitor. Given that, impacts to the species due to proposed clearing under this application is unlikely to be significant.

The presence of a significant available habitat in the wider area, the transient nature of the Gouldian finch and Grey Falcon species, coupled with the linear shape and small extent of clearing adjacent to an existing

road imply that the vegetation proposed to be cleared is not likely to comprise significant habitat for these fauna species and impact is unlikely to be significant.

Freshwater Crocodile *Crocodylus johnstoni* (OS) - Four records of twenty-one individuals of Freshwater Crocodiles were recorded at Palm Springs (permanent spring-fed waterhole) and along non perennial watercourse - Black Elvire River at around 41 SLK on several occasions during nocturnal survey. The size of individuals recorded ranged from juveniles at 45 cm to adults at >2 m. It is likely that these individuals spread out from the permanent water source along ephemeral rivers following large rainfall events. The project envelope is intersected by one major non-perennial watercourse- Johnston River, two minor non-perennial watercourses – Black Elvire River and Fox river and associated tributaries such as Halls Creek, Spring Creek and Butcher's Gully. It also contains a permanent freshwater upwelling called Palm Springs, which discharges into the Black Elvire River. The habitat type associated with the Freshwater Crocodile is mapped as Major Drainage lines and associated Tributaries. No such habitat type is proposed to be cleared under this application. No clearing or disturbance is proposed at Palm Springs. As such the direct impact to the species as a result of this application is unlikely. Any indirect impacts during project ground works will be managed through Main Roads Standard Construction Environment Management Plan.

Biota, (2021) assessment identified nine species of conservation significance as "likely" to occur within the survey area:

- Ghost Bat *Macroderma gigas (*VU)
- Gravel Dragon *Cryptagama aurita* (P1)
- Yellow-lipped Cave Bat *Vespadelus douglasorum* (P2)
- Peregrine Falcon *Falco peregrinus* (OS)
- Fork-tailed Swift *Apus pacificus* (MI)
- Gull-billed Tern *Gelochelidon nilotica* (MI)
- Eastern Yellow Wagtail *Motacilla flava* (MI)
- Oriental Plover *Charadrius veredus* (MI)
- Oriental Pratincole *Glareola maldivarum* (MI)

A further fifteen species were assessed as "may occur" within the survey area:

- Bilby *Macrotis lagotis* (VU)
- Australian Painted Snipe *Rostratula australis* (EN)
- Short-tailed Mouse *Leggadina lakedownensis* (P4)
- Curlew Sandpiper *Calidris ferruginea* (CR, MI)
- Little Curlew *Numenius minutus* (MI)
- Barn Swallow *Hirundo rustica* (MI)
- Glossy Ibis *Plegadis falcinellus* (MI)
- Black-tailed Godwit *Limosa limosa* (MI)
- Sharp-tailed Sandpiper *Calidris acuminata* (MI)
- Red-necked Stint *Calidris ruficollis* (MI)
- Pectoral Sandpiper *Calidris melanotos* (MI)
- Common Sandpiper *Actitis hypoleucos* (MI)
- Marsh Sandpiper *Tringa stagnatilis* (MI)
- Wood Sandpiper *Tringa glareola* (MI)
- Common Greenshank *Tringa nebularia* (MI)

Ghost Bat – There are three known records of the species within project 40km radius recorded in 1964 and 1966. A specimen was collected in 1964 and secondary signs were recorded in 1966. Ghost Bats are known to occur in a broad range of landforms, with distribution influenced by the availability of suitable caves for roost sites. They forage over large areas, with foraging ranges of over 60 ha. However, despite targeted searches, no Ghost Bats nor suitable roost caves for the species were detected during the biological survey. It is considered likely to forage within the project envelope particularly over Ridgeline breakaways and scree slopes. Only a small portion of this habitat (2.5 ha out of 445.38 ha in the survey area) is proposed to be cleared and there are better and intact habitat types outside the project envelope that are more suitable for

the species such as Major drainage lines and associated tributaries. As such impact to the species habitat as a result of this clearing is unlikely to be significant.

Gravel Dragon – There are three known records of the species within the project 40km radius collected in 1979. The species is known to occur in the north-eastern interior of WA and in the adjacent Northern Territory. It is superbly adapted to mimic a gibber stone and has so far only been recorded from stony 'gibber' soils with spinifex. This species was not recorded during the biological survey, however areas of open woodland over spinifex hummock grassland on stony soils were present throughout the survey area. Only 2.97 % (211 ha out of 7092.17 ha within the survey area) of the habitat type from the survey area suitable for the species is proposed to be cleared. As such a large portion of the intact suitable habitat type is outside the project envelope.

Yellow-lipped Cave Bat – There are two historical records of the species collected in 1965 within 200 m of Palm Springs along Black Elvire River. They are restricted to the Kimberley region and is widespread within this range (Atlas of Living Australia, 2021) mostly associated with areas of rainfall greater than 800 mm per annum (Australian Museum, 2021). They utilise caves in both sandstone and limestone, typically near water. Typical habitats from which the species has been recorded include melaleuca and pandanus-lined waterways and adjacent open woodlands. This species was not detected during the analysis of the ultrasonic sound recorders deployed during the survey. No core roosting habitats (caves) occur within the survey area, however there is favourable roosting and denning habitat -Ridgeline breakaways and scree slopes that hosts the caves and crevices scattered throughout. Only 2.5 ha out of 445 ha of this habitat is proposed to be cleared. Based on this, the species is only likely to occur in the project envelope as a foraging visitor.

Bilby – The species formerly occurred in over 70% of the Australian mainland, however it now occupies less than 20% of its former range. The remaining populations of the greater bilby occupy three main habitats: open tussock grassland on uplands and hills, *Acacia aneura* (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. It prefers areas suitable for burrowing where the substrate comprises sand, sandy clay or sandy gravel though they are also known from atypical stony gravelly areas. No evidence of the Bilby that includes burrows, foraging diggings, scats and tracks were recorded during the survey despite targeted survey. There are no previous records within the project 40km desktop radius. Bilby Expert Rick Southgate surveyed bilby activity along the Duncan Road and the Gordon Downs Road to Ringer Soak (approx. 166 km) on behalf of Main Roads in 2020. Southgate, R.I., (2020) reports that the first two thirds of the 166 km of road staring from Halls Creek passes through rugged stony country and the cracking black soil plains (with scant shrubs and trees) and Bilbies have previously not been recorded from these habitats. As such it is unlikely that Bilby will permanently utilise the area proposed for clearing. The impacts to the bilby as a result of the project clearing is therefore considered unlikely. As a precautionary measure potential impacts to Bilby will be managed through a pre-clearance survey described in the EWI - Clearing in Potential Bilby Habitat (Appendix 4).

Australian Painted Snipe – The species typically inhabits shallow inland wetlands, either freshwater or brackish, that are permanent or ephemeral. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge on mudflats. The species has a scattered distribution throughout many parts of Australia. The species was not recorded during the survey and the nearest historical record is approximately 75 km southwest of the survey area in 1999. The species may occur in the survey area following large rainfall events that create flood-out zones suitable for foraging most likely permanent water hole, watercourses and associated tributaries. No vegetation associated with watercourse or wetlands is proposed to be cleared under this application. Based on this, the species is only likely to occur in the project envelope as a foraging visitor.

Short-tailed Mouse – Its distribution includes the Pilbara and Kimberley regions and is known to occur in areas of open tussock and hummock grassland, Acacia shrubland and savannah woodland, on sandy soils and cracking clays and sandy coastal areas. The species was not recorded during the survey nor are there any previous records within the 40km radius. However, there is suitable habitat for the species within the survey area, particularly in the crackling clay grasslands, tussock grassland and spinifex hummock grassland

on plains. It is therefore considered to have the potential to occur during optimal seasonal conditions and unlikely to permanently utilise the habitat.

Besides several other marine and migratory birds were considered likely or may occur within the project envelope. Most of these species are non-breeding migrants to Australia and breed in the northern hemisphere. Shorebirds forage primarily on muddy margins and shallow waters of wetlands and other inundated habitats, with some exhibiting preferences for saline or freshwater habitats. They may use freshwater habitats regularly and may use the margins of wetlands and other inundated habitats within the survey area on occasion. However, these species have a wide range of occurrence across Australia and the extent of suitable habitat within the project envelope is very limited.

Based on the above, the project is not likely to be at variance with this Principle.

Methodology
Biota (2021)
DBCA shapefiles
DBCA NatureMap Species Report (Accessed 25/08/2021)
EPBC Act Protected Matters Search Report (Accessed 25/08/2021)
Main Road ArcGIS Shapefiles
Main Roads (2021)
Species Profile and Threats Database (Accessed 08/09/2021)

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Proposal is not at variance to this Principle

The Desktop Database Searches (Main Roads ArcGIS files, NatureMap and PMST report) identified no known records of rare flora listed under the Biodiversity Conservation Act 2016 from the project 40km radius desktop search.

The Biological Survey undertaken by Biota (2021) and the subsequent Targeted Flora Survey by Ecologia (2021) did not record any rare flora taxa from within the broader survey area.

As such, the project clearing is not at variance to this Principle.

Methodology
Biota (2021)
DBCA shapefiles
DBCA NatureMap Species Report (Accessed 25/08/2021)
Ecologia, (2021)
EPBC Act Protected Matters Search Report (Accessed 25/08/2021)
Main Road ArcGIS Shapefiles

(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

The Desktop database searches (PMST report and DBCA Shapefiles) show no known records of State listed Threatened Ecological Communities (TEC) from within the project 40 km radius desktop search.

None of the vegetation communities recorded during the Biological Survey carried out by Biota, 2021 represents TECs.

As such, the proposed clearing is not at variance to this Principle.

Methodology
DBCA shapefiles
Biota (2021)
EPBC Act Protected Matters Search Report (Accessed 25/08/2021)

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

Proposed clearing is not at variance to this Principle

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

Pre-European Vegetation Association(s)	Clearing Description	Vegetation Condition	Comments
Veg Assoc No. 91 Hummock grasslands, sparse tree steppe; snappy gum over soft spinifex	Clearing of approximately 3 ha for road widening and material areas for the project	Completely Degraded - Excellent (EPA 2016)	Vegetation description and condition determined from Biological Survey report – "Biota (2021). Duncan Road Upgrade SLK 6.5 – 86.5 Biological Survey. Prepared for Main Road Western Australia."
Veg Assoc No. 816 Grasslands, short bunch grass savanna, low tree, Mt House box (*Eucalyptus argilliacea*) & bloodwood over arid short grass (*Enneapogon spp*.)	Clearing of approximately 157 ha for road widening, material areas and turkey's nests for the project		
Veg Assoc No. 831 Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex *Triodia intermedia* & *T. inutilis*	Clearing of approximately 60 ha for road widening, material areas and turkey's nest for the project		
Veg Assoc No. 847 Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (*Eucalyptus terminalis*) over soft spinifex	Clearing of approximately 13 ha for road widening and Turkey's nest for the project		
Veg Assoc No. 848 Hummock grasslands, low tree steppe; eucalypts over curly spinifex on laterite sand plains	Clearing of approximately 3 ha for road widening for the project		
Veg Assoc No. 851 Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (*E. terminalis*) over hard spinifex, *Triodia wiseana* & *T. intermedia* on basalt and dolerite	Clearing of approximately 39 ha for road widening and material areas for the project		

Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining after proposed clearing*(Approx)
Veg Assoc No. 91 Hummock grasslands, sparse tree steppe; snappy gum over soft spinifex	**Statewide**	438,282.66	437,621.56	99.85	99.84
	IBRA Bioregion Ord Victoria Plain	168,408.21	168,408.21	100.00	99.99
	IBRA Sub-region Purnululu	143,499.45	143,499.45	100.00	99.99
	Local Government Authority Shire of Halls Creek	438,105.03	437,621.56	99.89	99.88
Veg Assoc No. 816 Grasslands, short bunch grass savanna, low tree, Mt House box (*Eucalyptus argilliacea*) & bloodwood over arid short grass (*Enneapogon spp.*)	**Statewide**	132,973.51	132,853.40	99.91	99.79
	IBRA Bioregion Ord Victoria Plain	89,542.91	89,422.79	99.87	99.69
	IBRA Sub-region Purnululu	89,397.28	89,277.16	99.87	99.69
	Local Government Authority Shire of Halls Creek	83,752.03	83,752.03	100.00	99.81
Veg Assoc No. 831 Hummock grasslands, sparse tree steppe; snappy gum over hard spinifex *Triodia intermedia* & *T. inutilis*	**Statewide**	381,764.51	381,594.39	99.96	99.94
	IBRA Bioregion Ord Victoria Plain	380,910.53	380,744.09	99.96	99.94
	IBRA Sub-region Purnululu	379,001.70	378,835.26	99.96	99.94
	Local Government Authority Shire of Halls Creek	381,764.51	381,594.39	99.96	99.94
Veg Assoc No. 847 Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (*Eucalyptus terminalis*) over soft spinifex	**Statewide**	71,106.64	71,106.64	100.00	99.98
	IBRA Bioregion Ord Victoria Plain	71,106.64	71,106.64	100.00	99.98
	IBRA Sub-region Purnululu	66,473.97	66,473.97	100.00	99.98

	Local Government Authority Shire of Halls Creek	71,106.64	71,106.64	100.00	99.98
Veg Assoc No. 848 Hummock grasslands, low tree steppe; eucalypts over curly spinifex on laterite sand plains	**Statewide**	225,104.97	223,937.05	99.48	99.48
	IBRA Bioregion Ord Victoria Plain	224,082.03	223,581.51	99.78	99.77
	IBRA Sub-region South Kimberley Interzone	222,798.39	222,297.87	99.78	99.77
	Local Government Authority Shire of Halls Creek	224,406.42	223,919.78	99.78	99.78
Veg Assoc No. 851 Hummock grasslands, sparse tree steppe; snappy gum & bloodwood (*E. terminalis*) over hard spinifex, *Triodia wiseana* & *T. intermedia* on basalt and dolerite	**Statewide**	111,037.36	110,983.69	99.95	99.91
	IBRA Bioregion Ord Victoria Plain	110,998.40	110,944.72	99.95	99.91
	IBRA Sub-region Purnululu	110,984.56	110,930.89	99.95	99.91
	Local Government Authority Shire of Halls Creek	111,037.36	110,983.69	99.95	99.91

*Percentage remaining after clearing was calculated by the following process: ((current remaining extent – proposed clearing)/ pre-European extent) x 100

As evident form the table above, the current extent of Pre-European remnant vegetation is more than 30% "National Threshold Level" at all scales (State IBRA Bioregion, IBRA Subregion, LGA), even after the proposed clearing is considered. As such, the project is not located in an area with a regionally significant remnant vegetation. The largest impact noted from the project was a loss of an estimated 0.2% of Association 816 at the Bioregion level. Given that the vegetation associations are rather widespread throughout the area and are very well represented locally and regionally, impacts due to project clearing is not likely to be significant.

Based on the above, the project is not at variance to this Principle.

Methodology

Government of Western Australia (2019)
Main Roads Pre-European Vegetation Mapping

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

Proposed clearing is not at variance to this Principle
No vegetation growing in, or in association with a water course or wetland will be cleared in the project development envelope and as such no impact to watercourses or wetlands will occur. Based on the above, the project is not at variance to this Principle.
Methodology DWER and DBCA shapefiles Biota (2021)

(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

Four land systems are mapped over the Project Development Envelope:

Soil Description (Schoknecht and Payne 2011)	Extent within 40 km Search Buffer (ha)	Proposed Clearing (Approx. ha)	Impact (%)
Antrim System Hills and lowlands with eucalypt woodlands and tussock grasses. Much of the system is stony and not susceptible to erosion.	52,194.37	5	0.01
Dockrell System Hills, ranges and plateaux with eucalypt woodlands and spinifex. A rough hill system with hard spinifex vegetation; very low pastoral value, stable, very low susceptibility to erosion.	235,742.16	101	0.042
Gordon System Undulating plains with tussock grasslands. Prone to degradation if grazing is uncontrolled. Moderately to highly susceptible to erosion if vegetative cover is lost.	89,516.48	142	0.16
Wickham System Hills, ranges and plateaux with eucalypt woodlands and spinifex. Very rugged and poor accessible system, high scenic amenity and conservation value; unsuitable for pastoralism.	63,576.44	27	0.042

The project is in an area prone to severe rainfall events and long dry summer, which could contribute to land degradation via flooding and erosion. Most of the project clearing (approx. 89%) falls within Gordon and Dockrell Land system. Gordon system is moderately to highly susceptible to erosion if vegetation cover is lost.

The Duncan Road is of low quality with numerous floodways along its length and is subject to scouring and washout after heavy rainfall. The overall purpose of the project is to upgrade the road including drainage improvements, construction of stabilised floodway, sealing and pavement construction to protect the road from flooding events. Clearing works will be completed in a dry period and no interaction with groundwater or interruption of nature surface water flows is expected. The upgrade works is expected to reduce the likelihood of water logging, scouring, and flooding along the length of the road during wet season.

The desktop assessment indicates that there are significant vegetated areas immediately adjacent to the project. Proposed clearing will be spread over 74 km and is to be undertaken in stages over 2 years. Clearing within the material areas is to be undertaken in stages and as required. Any land degradation issues due to clearing for gravel and water resource will be contained within the material pits and turkey's dam.

The project development envelope is located within an area mapped as cq(p4) - extremely low probability of occurrence of Acid Sulphate Soils and unlikely to cause significant impacts.

The project will operate under Main Roads Standard CEMP and any land degradation issues such as erosion, flooding will be effectively managed through the implementation of standard and project specific management practices.

As such, the project is not likely to be at variance to this Principle.

Methodology
DPIRD, (2019)
Main Roads ArcGIS Shapefiles
Schoknecht, N, and Payne, A L. (2011)

(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 likely at variance to this Principle

The project's development envelope (SLK 44.8 to SLK 80) intersects the Ord River Regeneration Reserve (R 28538), a Department of Biodiversity, Conservation and Attractions (DBCA) managed Reserve, managed under section 5(1)(h) of the Conservation and Land Management Act 1984 (DBCA 2022). The Ord River Regeneration Reserve has been established to regenerate eroded areas in Ord River Dam catchment area and prevent sedimentation threats to Lake Argyle (DBCA 2022 & DPRID 2004).

The Ord River Regeneration Reserve covers an area of 567,674 ha with the project located in the southern portion of the reserve. Clearing of native vegetation within the reserve is narrow, linear in nature and adjacent to an existing road and is unlikely to impact the environmental values of the reserve. The area proposed to be cleared consists of a lower quality vegetation in comparison to the available vegetation in the surrounding areas (see Vegetation Condition under Principle A). The vegetation proposed to be cleared is unlikely to provide a buffer, ecological linkage or act as outlier to the conservation area with extensive reserve located outside to the north and south of the project development envelope.

The proposed clearing under CPS 818 will not impact any drainage lines or associated vegetation and subsequently not impact the impact the conservation values that the Ord River Regeneration Reserve has been established for.

Consultation with DBCA has been undertaken and approval to access the Ord River Regeneration Reserve to complete the works has been obtained.

As such the project is not likely at variance to this Principle.

Methodology
DBCA shapefiles - Legislated Lands and Waters (DBCA 2022)
Payne, Watson and Novelly 2004 – Spectacular recovery in the Ord River Catchment.
DMIRS 2021 – Description of Land Type Categories
DER 2014 – A guide to the assessment of applications to clear native vegetation

(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 likely to be at variance to this Principle
The project is located within the Ord River and Tributaries/ Ord Irrigation District and Groundwater Area and Canning-Kimberley Groundwater Area both of which are Proclaimed Surface Water Areas. The Halls Creek Water Reserve, a Public Drinking water Source area is located 750 m north west of the project area. A major non-perennial watercourse area, the Johnston River and 2 minor non-perennial watercourses, Black Elvire River and Fox river intersects the project envelope. The road encounters several minor non-perennial watercourses such as Halls Creek, Spring Creek and Butcher's Gully along the entire length. No clearing under this application is proposed along or around the watercourses. Water requirement for the project will be sourced from Main Roads approved licensed bores and associated Turkeys dams. The project will adhere to Main Roads Standard Construction Environmental Management Plan (CEMP) to ensure the works won't disturb the watercourses and interrupt the natural surface water flows. The CEMP will also have appropriate provisions to manage possible contamination risk as such as spill incidents due to fuel leakage during on-ground works. As such the deterioration of quality of surface and groundwater from sedimentation, erosion, or spill contamination because of project activities is unlikely. Rather the proposed culverts installation and construction of stabilised floodway along the length of the road are likely to result in a positive outcome to surface water quality. Based on the above, the project is unlikely to be at variance to this Principle.
Methodology ARCGIS shapefiles- Watercourse CSIRO, (2014) DWER- Shapefiles

(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 likely to be at variance to this Principle
The subregional climate is described as dry winter and hot semi-arid summer with an average annual rainfall of 559.1 mm (Fox River (Site ID- 2062) (BoM, 2021)). Extreme weather events are a significant component of Kimberley climate. Tropical cyclones and tropical storms can bring heavy and sustained rainfall, particularly in the months leading up to and during the wet season. It is common for a large proportion of the region's rainfall to be recorded in one single event, leading to extensive flooding of rivers, creeks and roadways. The climatic conditions are the main factor influencing flooding in the region however, clearing of vegetation for the project is spread over 74 km and will be undertaken during dry conditions in several stages over two years. Standard flood management measures will be implemented as a part of Main Roads Standard CEMP during on-ground works. Given the above, the proposed clearing is not likely to be at variance to this Principle.
Methodology Main Roads ArcGIS Shapefiles Payne, A L, Watson, I W, and Novelly, P E., (2004)

6 ADDITIONAL ACTIONS REQUIRED

Table 5 summarises what further pre-clearing impact assessment and vegetation management is required in accordance with CPS 818.

Table 5. 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. Where the clearing is at variance or 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: (i) a minor non-perennial watercourse(s); (ii) a wetland(s) classed as a multiple use management category wetland(s); and/or (iii) a wetland that is not a defined wetland; the preparation of an Assessment Report, as required by condition 6(e), is not required.	**NO**	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. The project involves clearing for temporary works (as defined by CPS 818).	**NO**	No further action required.
4 a. Project is within Region that: - Has rainfall greater than 400mm and - Is South of the 26th parallel and - Works are in 'Other than dry conditions' and - Works have potential for **uninfested** areas to be impacted	**NO**	No further action required.

Impact of Clearing	Yes/No or NA	*Further Action Required*
4b. Does the proposed works require clearing within or adjacent to DBCA estate in non-dry conditions?	**NO**	The proposal require clearing within and adjacent to DBCA estate, but the clearing is proposed to be undertaken in dry conditions. In addition, appropriate management measures will be in place to address any potential environmental issues related with spread of disease and weeds.
5. 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.
6. The vegetation within the area to be cleared and/or the surrounding vegetation in a good or better condition and weeds 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. The proposal includes implementation of a Main Roads Standard Construction Environmental Management Plan (CEMP), which will have appropriate provisions to prevent the spread of weeds to adjacent areas of native vegetation.

7 STAKEHOLDER CONSULTATION

Main Roads has undertaken and will further undertake stakeholder consultation in accordance with CPS 818/15 Condition 8. Following stakeholders have been consulted during the development of the project:

Table 6. Project Stakeholder Consultation

Name	Agency	Date
[Redacted]	Shire of Halls Creek	18/11/2021
[Redacted]	Kimberley Land Council (KLC)	25/10/2021
[Redacted]	Jaru & Tjurbalan People	8/12/2021
[Redacted]	Ringer Soak (Kundat Djaru Community)	8/12/2021
[Redacted]	Northern Minerals (Browns Range)	30/11/2021
[Redacted]	Department of Biodiversity, Conservation & Attractions (DBCA)	14/03/2022
[Redacted]	Koongie Park and Alvire	16/03/2022
[Redacted]	Burks Park	16/03/2022

Further consultation will be undertaken prior to native vegetation clearing and the implementation of the project.

8 VEGETATION MANAGEMENT

Main Roads will avoid clearing native vegetation where possible. Where clearing cannot be avoided then this clearing is kept to a minimum. Vegetation will be managed in accordance with the Main Roads Standard Construction Management Plan (CEMP).

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10 APPENDICES

Appendix	Title
Appendix 1	DBCA Threatened Flora and Fauna Database Searches
Appendix 2	EPBC Act Protected Matters Search Report
Appendix 3	NatureMap Species Report
Appendix 4	Environmental Work Instruction – Clearing in Potential Bilby Habitat

Appendix 1: DBCA Threatened Flora and Fauna Database Searches

Appendix 2: EPBC Act Protected Matters Search Report

Appendix 3: NatureMap Species Report

Appendix 4: Environmental Work Instruction – Clearing in Potential Bilby Habitat