



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 10526/1
Permit Holder:	Main Roads Western Australia
Duration of Permit:	From 2 June 2024 to 2 June 2034

The permit holder is authorised to clear *native vegetation* subject to the following conditions of this permit.

PART I – CLEARING AUTHORISED

1. Clearing authorised (purpose)

The permit holder is authorised to clear *native vegetation* for the purpose of construction of a new road alignment and bridge, laydown areas and sourcing of road materials.

2. Land on which clearing is to be done:

Lot 530 on Deposited Plan 221145, Maitland
 Lot 286 on Deposited Plan 242018, Maitland
 Lot 32 on Deposited Plan 47815, Maitland
 Lot 530 on Deposited Plan 221145, Cooya Pooya
 Lot 285 on Deposited Plan 242018, Maitland and Gap Ridge
 Lot 693 on Deposited Plan 30490, Maitland
 Lot 693 on Deposited Plan 30490, Cooya Pooya
 Lot 693 on Deposited Plan 30490, Gap Ridge
 Lot 4896 on Deposited Plan 30490, Gap Ridge
 Lot 665 on Deposited Plan 30490, Maitland and Gap Ridge
 Lot 663 on Deposited Plan 30490, Gap Ridge
 Lot 663 on Deposited Plan 30490, Maitland and Gap Ridge
 Lot 688 on Deposited Plan 30490, Maitland
 Lot 664 on Deposited Plan 30490, Gap Ridge
 Lot 604 on Deposited Plan 66691, Cooya Pooya
 Lot 10 on Deposited Plan 56467, Stove Hill
 Lot 11 on Deposited Plan 56467, Stive Hill
 Lot 603 on Deposited Plan 66690, Gap Ridge
 Lot 602 on Deposited Plan 66690, Cooya Pooya
 Lot 601 on Deposited Plan 66690, Cooya Pooya
 Lot 555 on Deposited Plan 74205, Cooya Pooya
 Lot 501 on Deposited Plan 76571, Stove Hill
 Lot 1502 on Deposited Plan 75876, Maitland
 Unnamed Road Reserve (PIN 11441929), Gap Ridge and Stove Hill

Unnamed Road Reserve (PIN 11733156), Cooya Pooya and Stove Hill
Unnamed Road Reserve (PIN 11733157), Maitland, Gap Ridge, Cooya Pooya and Stove Hill

3. Clearing authorised

The permit holder must not clear more than 110.72 hectares of native vegetation within the 131.67 hectare footprint cross-hatched yellow in Figure 1 of Schedule 1.

4. Period during which clearing is authorised

The permit holder must not clear any *native vegetation* after 2 June 2029.

5. Application

This permit allows the permit holder to authorise persons, including employees, contractors and agents of the permit holder, to clear native vegetation for the purposes of this permit subject to compliance with the conditions of this permit and approval from the permit holder.

PART II – MANAGEMENT CONDITIONS

6. Avoid, minimise, and reduce impacts and extent of clearing

In determining the *native vegetation* authorised to be cleared under this permit, the permit holder must apply the following principles, set out in descending order of preference:

- (a) avoid the clearing of *native vegetation*;
- (b) minimise the amount of *native vegetation* to be cleared; and
- (c) reduce the impact of clearing on any environmental value.

7. Weed management

When undertaking any clearing authorised under this permit, the permit holder must take the following measures to minimise the risk of introduction and spread of *weeds*:

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- (b) ensure that no known *weed*-affected soil, *mulch*, *fill*, or other material is brought into the area to be cleared; and
- (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.
- (d) where weed-affected soil, mulch, fill, or other material is to be removed from the area to be cleared, ensure it is transferred to areas of comparable weed status.

8. Flora management – avoidance of priority flora

Prior to undertaking any clearing authorised under this permit, the permit holder shall demarcate the clearing area authorised under this permit to avoid clearing of priority flora which may potentially occur outside of the approved clearing area.

9. Directional clearing

The permit holder must conduct clearing activities in a slow, progressive manner in the direction of adjacent native vegetation to allow fauna to move into adjacent *native vegetation* ahead of the clearing activity.

10. Erosion management

The permit holder must commence construction and other activities for which clearing is authorised no later than two (2) months after undertaking the authorised clearing activities to reduce the potential for wind and water erosion.

11. Limitation of clearing – road material sourcing

With regards to clearing for road material sourcing, the permit holder must:

- (a) not clear native vegetation from more than one (1) site within the areas cross-hatched yellow in Figure 1 at any given time;
- (b) road material extraction activities must occur within two (2) months of undertaking any clearing for that purpose under this permit;
- (c) not clear more than two (2) hectares at any given time within the area cleared in accordance with condition 11(a);
- (d) retain the vegetative material and topsoil removed by clearing authorised under this permit and stockpile the vegetative material and topsoil in an area that has already been cleared;
- (e) construct drainage around the cleared area and topsoil stockpiles.

12. Rehabilitation and revegetation of temporary clearing areas

The permit holder must:

- (a) retain the vegetative material and topsoil removed by clearing authorised under this permit and stockpile the vegetative material and topsoil in an area that has already been cleared;
- (b) construct drainage around topsoil stockpiles;
- (c) at an optimal time within 12 months following completion of temporary clearing, *revegetate* the areas not required for the authorised purpose for which they were cleared under this permit, by:
 - (i) ripping the ground on the contour to remove soil compaction; and
 - (ii) laying the vegetative material and topsoil retained under condition 12(a) on the cleared area(s).
- (d) within 24 months of laying the vegetative material and topsoil on the cleared area in accordance with condition 12(c) of this permit:
 - (i) engage an *environmental specialist* to determine the species composition, structure and density of the area *revegetated* and rehabilitated; and
 - (ii) engage an *environmental specialist* to make a determination as to whether the composition, structure and density determined under condition 12(d)(i) of this permit will, without further *revegetation*, result in a similar species composition, structure and density to that of pre-clearing vegetation types in that area.

- (e) if the determination made by the environmental specialist under condition 12(d)(ii) is that the species composition, structure, and density determined under condition 12(d)(i) will not, without further revegetation, result in a similar species composition, structure and density to that of pre-clearing vegetation types in that area, the permit holder must *revegetate* the area by deliberately planting and/or direct seeding native vegetation seeds that will result in a similar species composition, structure, and density of native vegetation to pre-clearing vegetation types in that area and ensuring only *local provenance* seeds and propagating material are used
- (f) where additional planting or direct seeding of native vegetation is undertaken in accordance with condition 12(e), the permit holder must repeat the activities required by condition 12(d) and 12(e) within 24 months of undertaking the additional planting or *direct seeding* of native vegetation.
- (g) where a determination is made by an *environmental specialist* under condition 12(d)(ii) that the composition, structure and density within areas *revegetated* and rehabilitated will result in a similar species composition, structure and density to that of pre-clearing vegetation types in that area, that determination shall be submitted to the CEO within three months of the determination being made by the *environmental specialist*.

PART III - RECORD KEEPING AND REPORTING

13. Records that must be kept

The permit holder must maintain records relating to the listed relevant matters in accordance with the specifications detailed in Table 1.

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	<ul style="list-style-type: none"> (a) the name of persons, contractors and agents given the authorities to clear native vegetation under this permit; (b) the species composition, structure, and density of the cleared area; (c) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 2020 (GDA2020), expressing the geographical coordinates in Eastings and Northings; (d) the date that the area was cleared; (e) the size of the area cleared (in hectares); (f) the direction that clearing was undertaken; (g) the date that clearing within each site ceased; (h) the date that gravel extraction from within each material sourcing site began in accordance with condition 11(b);

No.	Relevant matter	Specifications
		<ul style="list-style-type: none"> (i) the date that gravel extraction from within each material sourcing site ceased in accordance with condition 11(b); (j) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 6; and (k) actions taken to minimise the risk of the introduction and spread of <i>weeds</i> in accordance with condition 7
2.	In relation to rehabilitation and revegetation of areas pursuant to condition 12 of the permit	<ul style="list-style-type: none"> (a) actions taken to retain vegetative material and topsoil; (b) actions taken to construct drainage; (c) the size of the area revegetated; (d) the date(s) on which the area revegetation was undertaken; (e) the revegetation activities undertaken; (f) the date(s) where additional planting or direct seeding of native vegetation was undertaken; and (g) the boundaries of the area revegetated (recorded digitally as a shapefile).

14. Reporting

The permit holder must provide to the *CEO* the records required under condition 13 of this permit when requested by the *CEO*.

DEFINITIONS

In this permit, the terms in Table 2 have the meanings defined.

Table 2: Definitions

Term	Definition
CEO	Chief Executive Officer of the department responsible for the administration of the clearing provisions under the <i>Environmental Protection Act 1986</i> .
clearing	has the meaning given under section 3(1) of the EP Act.
condition	a condition to which this clearing permit is subject under section 51H of the EP Act.
fill	means material used to increase the ground level, or to fill a depression.
department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.

Term	Definition
direct seeding	means a method of re-establishing vegetation through the establishment of a seed bed and the introduction of seeds of the desired plant species
environmental specialist	means a person who holds a tertiary qualification in environmental science or equivalent, and has experience relevant to the type of environmental advice that an environmental specialist is required to provide under this Permit, or who is approved by the CEO as a suitable environmental specialist.
EP Act	<i>Environmental Protection Act 1986 (WA)</i>
local provenance	means native vegetation seeds and propagating material from natural sources within 25 kilometres and the same Interim Biogeographic Regionalisation for Australia (IBRA) subregion of the area cleared;
mulch	means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation.
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
planting	planting means a method of re-establishing vegetation through the use of
revegetation, revegetate, revegetated	means the re-establishment of a cover of native vegetation in an area such that the species composition, structure and density is similar to pre-clearing vegetation types in that area, and can involve regeneration, direct seeding and/or planting;
weeds	means any plant – <ul style="list-style-type: none"> (a) that is a declared pest under section 22 of the <i>Biosecurity and Agriculture Management Act 2007</i>; or (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or (c) not indigenous to the area concerned.

END OF CONDITIONS


Ryan Mincham
MANAGER
NATIVE VEGETATION REGULATION

*Officer delegated under Section 20
of the Environmental Protection Act 1986*

10 May 2024

Schedule 1

The boundary of the area authorised to be cleared is shown in the map below (Figure 1).

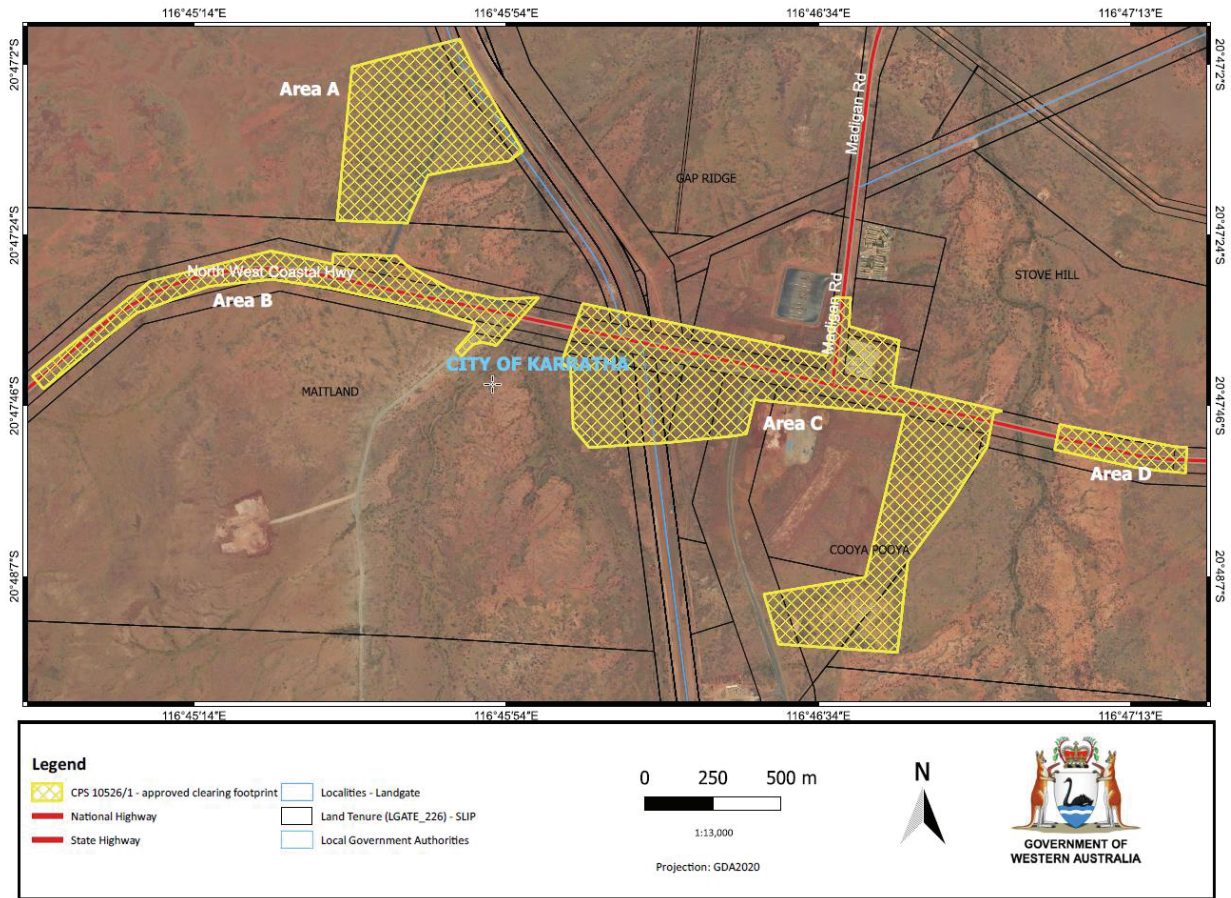


Figure 1: Map of the boundary of the area within which clearing may occur



Clearing Permit Decision Report

1 Ages can you pleaApplication details and outcome

1.1. Permit application details

Permit number:	CPS 10526/1
Permit type:	Purpose permit
Applicant name:	Main Roads Western Australia
Application received:	19 February 2024
Application area:	110.72 hectares (ha) of native vegetation within a 131.67 ha footprint
Purpose of clearing:	Construction of new road alignment and bridge, laydown areas and sourcing of road materials.
Method of clearing:	Mechanical
Property:	<p>Lot 530 on Deposited Plan 221145, Maitland Lot 286 on Deposited Plan 242018, Maitland Lot 32 on Deposited Plan 47815, Maitland Lot 530 on Deposited Plan 221145, Cooya Pooya Lot 285 on Deposited Plan 242018, Maitland and Gap Ridge Lot 693 on Deposited Plan 30490, Maitland Lot 693 on Deposited Plan 30490, Cooya Pooya Lot 693 on Deposited Plan 30490, Gap Ridge Lot 4896 on Deposited Plan 30490, Gap Ridge Lot 665 on Deposited Plan 30490, Maitland and Gap Ridge Lot 663 on Deposited Plan 30490, Gap Ridge Lot 663 on Deposited Plan 30490, Maitland and Gap Ridge Lot 688 on Deposited Plan 30490, Maitland Lot 664 on Deposited Plan 30490, Gap Ridge Lot 604 on Deposited Plan 66691, Cooya Pooya Lot 10 on Deposited Plan 56467, Stove Hill Lot 11 on Deposited Plan 56467, Stive Hill Lot 603 on Deposited Plan 66690, Gap Ridge Lot 602 on Deposited Plan 66690, Cooya Pooya Lot 601 on Deposited Plan 66690, Cooya Pooya Lot 555 on Deposited Plan 74205, Cooya Pooya Lot 501 on Deposited Plan 76571, Stove Hill Lot 1502 on Deposited Plan 75876, Maitland Unnamed Road Reserve (PIN 11441929), Gap Ridge and Stove Hill Unnamed Road Reserve (PIN 11733156), Cooya Pooya and Stove Hill Unnamed Road Reserve (PIN 11733157), Maitland, Gap Ridge, Cooya Pooya and Stove Hill</p>
Location (LGA area/s):	City of Karratha
Localities (suburb/s):	Maitland, Gap Ridge, Cooya Pooya and Stove Hill

1.2. Description of clearing activities

Main Roads Western Australia (Main Roads, the applicant) in partnership with Rio Tinto Iron Ore (RTIO) is planning to grade separate the RTIO railway by constructing a new bridge and road alignment to the south of the existing North West Coastal Highway (NWCH). The grade separation is required to improve road user safety due

to the increase in road traffic along this route. The project includes bridge construction, upgrades to an approximately 4.5 km stretch of the North West Coastal Highway, and sourcing of road construction materials.

The proposal is to clear up to 110.72 hectares (ha) of native vegetation within a 131.67 ha development envelope (clearing footprint) distributed across four areas as depicted in Figure 1. The proposed clearing areas would be utilised for the new road alignment and bridge, laydowns and material sourcing areas for the development of the road. Material sourcing areas, interchangeably referred to as borrow pits in this report, will be sited in portions of Area A and Area C (Figure 1). The material pits will serve as strategic borrow pits to supply road building material for future Main Roads projects in the region. The Department considers clearing for road and bridge construction as permanent clearing, and that for material sourcing as temporary clearing.

1.3. Decision on application

Decision:	Granted
Decision date:	10 May 2024
Decision area:	110.72 ha of native vegetation within 131.67 ha of footprint as depicted below in Section 1.5.

1.4. Reasons for decision

This clearing permit application was submitted, accepted, assessed and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The Department of Water and Environmental Regulation (DWER) advertised the application for 21 days and no submissions were received.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix A), relevant datasets (see Appendix E.1), the findings of a biological survey (see Appendix D), the clearing principles set out in Schedule 5 of the EP Act (see Appendix B), relevant planning instruments and any other matters considered relevant to the assessment (see Section 3). The Delegated Officer also took into consideration that the clearing is required to improve public safety in an area that has seen an increase in traffic load. The Delegated Officer particularly considered the following:

- Clearing will remove 1.6 ha of vegetation unit AtExEt which has similar characteristics to the Roebourne Plains gilgai grass lands ecological community (Priority Ecological Community (PEC) - Priority 1). A flora and vegetation survey over the application area (ELA, 2022) determined that this roadside patch is in a predominantly Degraded condition (Trudgen, 1991) due to edge effects and being on the major road verges and associated artificial drainage, the natural waterflows have altered the cracking clays that otherwise characterise the PEC. The vegetation is considered unlikely to be representative of the PEC. Although the vegetation is considered unlikely to be representative of the PEC, it is noted that approximately 6,394.9 ha of the PEC in Good or better condition and of high conservation value remains in the region (EPA, 2023). Demarcating the clearing footprint to avoid unnecessary clearing of the vegetation unit, or native vegetation nearby can further mitigate the potential impacts to the PEC and has been conditioned on the permit.
- While no conservation significant fauna species were recorded during a biological survey, the clearing footprint was determined to comprise three broad fauna habitat types. Within the context of abundant vegetation of the same types in Good or better condition surrounding the application area (EPA, 2023), the removal of the vegetation is unlikely to impact habitat considered to be significant for the conservation of fauna species locally and regionally. Inadvertent impacts on fauna individuals present at the time of clearing can be minimised by conducting clearing in slow, directional manner to allow any fauna present to move to adjacent vegetation. This requirement has been imposed as a condition on the permit.
- Clearing may introduce and spread weeds into adjacent vegetation, which could impact on the quality of adjacent vegetation and its habitat values. The likelihood of weed introduction and spread can be reduced by applying stringent weed management measures. The rehabilitation and revegetation of areas of temporary clearing will further reduce the exposure time of cleared areas to weed spread and infestation.
- Clearing may exacerbate sediment transport to nearby areas via indiscriminate flows of surface water, wind erosion and dust deposition. Noting that most of the roadworks occur in a narrow and linear dimension and within the context of largely vegetated surrounds, the proposed clearing is unlikely to result in appreciable

land degradation. The impacts are likely to be localised and temporary. Installation of culverts and a drainage system along the road areas committed by the applicant will further mitigate the potential impacts.

- Clearing for the creation of strategic borrow pits is considered temporary clearing. The potential impact of the temporary clearing on land and water resources can be mitigated with progressive rehabilitation and revegetation of exhausted borrow pits using salvaged vegetative material and topsoil. A condition has been imposed on the permit which requires topsoil and cleared vegetation to be retained for rehabilitation of exhausted borrow pits.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined that the proposed clearing is unlikely to lead to appreciable land or water degradation, or have long-term adverse impacts on fauna and vegetation. The potential impacts can be minimised and managed to unlikely lead to an unacceptable risk to environmental values. The applicant has suitably demonstrated avoidance and minimisation measures.

The Delegated Officer decided to grant a clearing permit subject to conditions to:

- avoid and minimise to reduce the impacts and extent of clearing
- take hygiene steps to minimise the risk of the introduction and spread of weeds
- demarcation of clearing areas prior to, and during clearing to avoid inadvertent clearing of adjacent native vegetation and priority flora species
- staged clearing to minimise wind and water erosion
- commence construction and approved activities within two months of authorised clearing being conducted.
- undertake slow, progressive, one-directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity
- retain cleared vegetation and topsoil for rehabilitation of material sourcing areas.

1.5. Site map

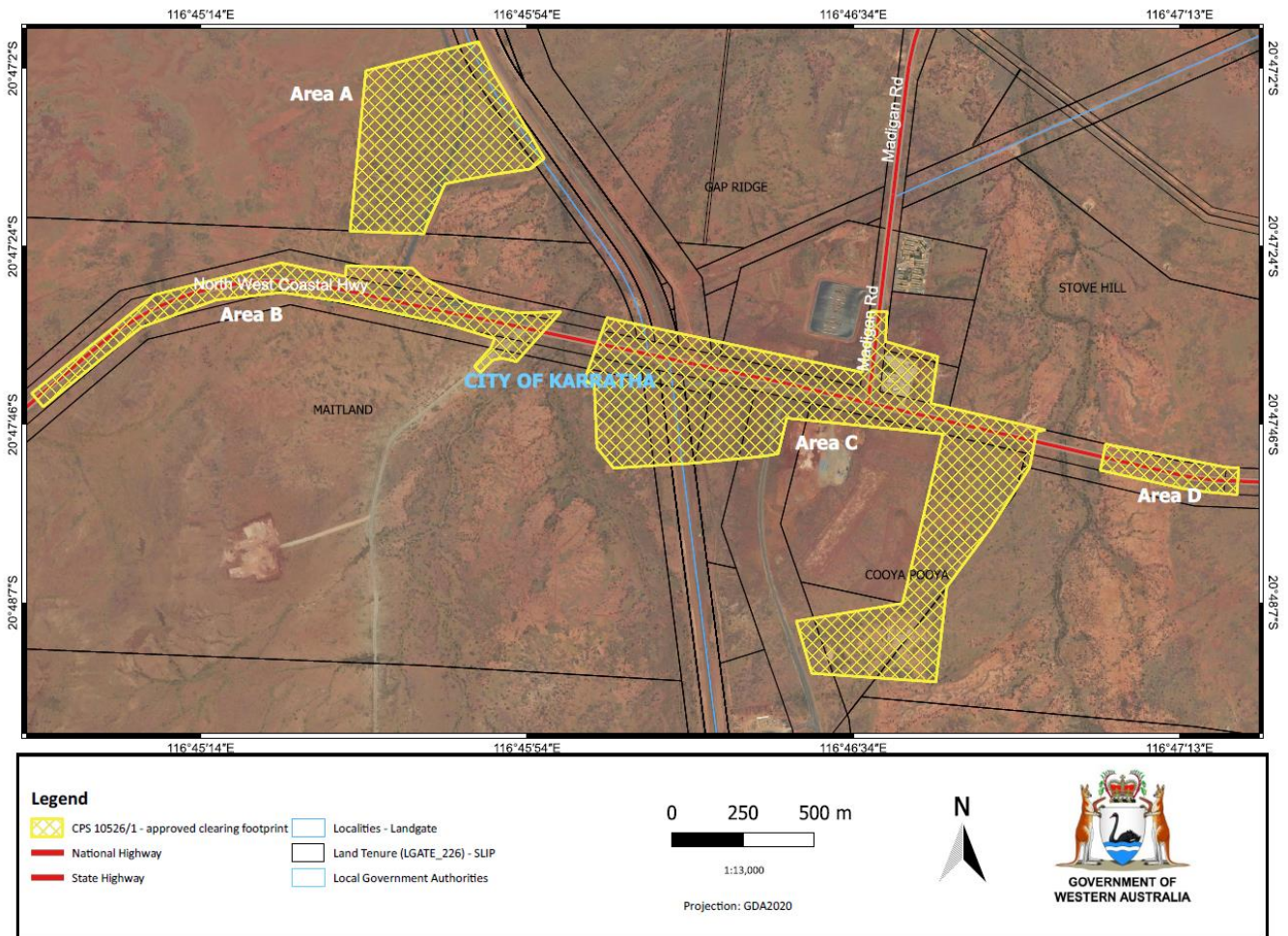


Figure 1 Map of the application area

The areas cross-hatched yellow indicate the footprint within which clearing is authorised under the granted clearing permit.

2 Legislative context

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 1.4), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

- the precautionary principle
- the principle of intergenerational equity
- the principle of the conservation of biological diversity and ecological integrity.

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- Technical guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016)
- Technical guidance – *Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA, 2016)

3 Detailed assessment of application

3.1. Avoidance and mitigation measures

In an effort to minimise impacts to the environment, Main Roads considered alternatives to the proposed clearing during the development stage of the project. The alternatives included the 'no development' option and reducing the speed limit to ensure safety without further road improvements. The alternatives were deemed insufficient in addressing the main objective of the project, which is improving the road safety (Main Roads, 2024b).

The proposed design and siting of the road alignment and project components were selected to avoid and minimise the extent of clearing and impact on environmental values. The measures include the following:

- locating alternative road alignment within degraded areas or pastures adjacent to existing road corridors, railways, parking bays and material pits;
- simplifying design to reduce the number of lanes or complexity of intersections. However, it is noted that that the simplification must not compromise the safety of road users;
- reducing the extent of clearing by steepening batter slopes where possible;
- using existing cleared areas and material source for access tracks, construction storages, laydowns, and stockpiling;
- modifying drainage with culverts to maintain the existing hydrological regime and prevent erosion;
- stockpiling topsoils from areas disturbed for material sourcing (Main Roads, 2024b)

The Delegated Officer was satisfied that the applicant has undertaken reasonable measures to avoid and minimise potential impacts of the proposed clearing on environmental values.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see Appendix A) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, or land and water resource values.

The assessment against the clearing principles (see Appendix B) identified that the impacts of the proposed clearing present a risk to fauna, adjacent flora and vegetation, and land and water resources. The consideration of these impacts, and the extent to which they can be managed through conditions applied in line with sections 51H and 51I of the EP Act, is set out below.

3.2.1. Biological values – Biodiversity, Flora and Fauna – Principles (a) and (b)

The vegetation within the proposed clearing footprint is mapped as the broadscale vegetation association (VA) Abydos Plain-Roebourne - 589 (Beard, 1979), described as short bunch-grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex short bunch-grass savanna / grass-steppe. This VA is well represented across all scales (i.e. State, IBRA Bioregion, IBRA Sub-region and Local Government Area (LGA)), with over 99% of the pre-European extent remaining. The vegetation is a part of an expansive tract of native vegetation in the region.

The majority of the application area lies along an existing road (approximately 4.5 km in length) and its intersection with other minor roads. A detailed flora, vegetation and fauna survey was conducted by ELA (2022) to describe key flora, vegetation and fauna values within the application area and to determine the potential impact to areas of sensitivity. An additional desktop survey (ELA, 2023) covering an extension area previously unsurveyed by ELA (2022) was also undertaken. The time of the initial field survey (June) was the preferred survey timing from an ecological perspective (EPA, 2016). The follow up survey (extrapolation mapping) was conducted in August which can be considered outside of the appropriate season but was still considered suitable for floristic surveys with late season flowering occurring.

The survey and assessment identified seven vegetation units. A detailed description, representative photographs and mapping of these units is presented in Table 1. These vegetation units are consistent with the broadscale vegetation association mentioned above. The vegetation is in Degraded to Very Good condition (Trudgen, 1991) with the majority being in Very Good condition (Trudgen, 1991). These vegetation units may provide habitat to fauna species in the region.

Disturbances within the application area include the presence of weeds, grazing and historical clearing. Nine introduced flora (weeds) were identified, with *Cenchrus ciliaris* being dominant. However, none of the weed species are listed as Weeds of National Significance or Declared Pests under the State *Biosecurity and Agriculture Management Act 2007* (BAM Act).

Flora

Twenty-four (24) conservation significant flora species have been recorded from the local area (50 km radius from the application area), none of which are classified as Threatened under the EPBC Act and BC Act. Twelve (12) of the recorded flora species were found in similar soil and vegetation as the application area and were considered likely to occur (see Appendix A). The closest record of flora species to the application area (0.9 km) is that of *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479) listed as Priority 3 by DBCA which is a poorly known species. Only four (4) records of the species are known from within 50 km radius of the application area. A further 34 records of this flora species are known from outside of the local area, all of which were from the Pilbara IBRA Region distributed across four Subregions, namely Chichester, Fortescue, Hamersley and Roebourne. The recorded flora species are all associated with open grassland vegetation typical of the vegetation in the Pilbara Bioregion, which is representative of the vegetation within the application area.

Although the flora and vegetation survey (ELA, 2022) did not identify any conservation significant flora species, the survey and extrapolation analysis have identified suitable habitat for *Dolichocarpa* sp Hamersley Station within the application area and considered that the flora species was likely to occur. Noting the species' annual herb nature, it is considered possible that this species was not flowering at the time of survey. While the occurrence of this flora species within the application area cannot not be ruled out, suitable habitat is also present immediately outside of the development envelope. Noting the limited records of this flora species within the local area and its likelihood of occurrence in the application area and surrounds, measures must be taken to prevent the inadvertent clearing of any individuals of this flora species which may be present in adjacent areas. Demarcating the clearing areas prior to, and during clearing works can reduce the risks of inadvertent impacts and has been imposed as a condition on the permit.

The survey confirmed that no Threatened Ecological Communities occurred within the application area. However, the AxEtEx (*Acacia xiphophylla* tall isolated clumps of shrubs over *Enchylaena tomentosa*, *Atriplex codonocarpa* mid isolated chenopod shrubs over *Eragrostis xerophila*, *Xerochloa barbata*, **Cenchrus ciliaris* low open tussock grassland) vegetation unit occurring within the application area has been known to support the Roebourne Plains gilgai grass lands ecological community (Priority 1) (PEC). Figure 2 depicts the map of the vegetation units identified in the survey. The AxEtEx vegetation comprises 3.17 ha of the total 131.67 ha of development envelope, of which 1.6 ha is proposed to be cleared. Approximately 90 per cent of the AxEtEx vegetation proposed to be cleared (1.44 ha) lies along the existing road and is in Degraded condition due to edge effects, including the infestation of weeds. Given its predominantly Degraded condition, the 1.6 ha of AxEtEx is considered unlikely to represent the PEC. Although the vegetation is considered unlikely to be representative of the PEC, it is noted that approximately 6,394.9 ha of the PEC in Good or better condition and of high conservation value remains in the region (EPA, 2023). The potential impact can be further mitigated by demarcating the clearing area to avoid inadvertent clearing of this vegetation unit outside of the clearing area.

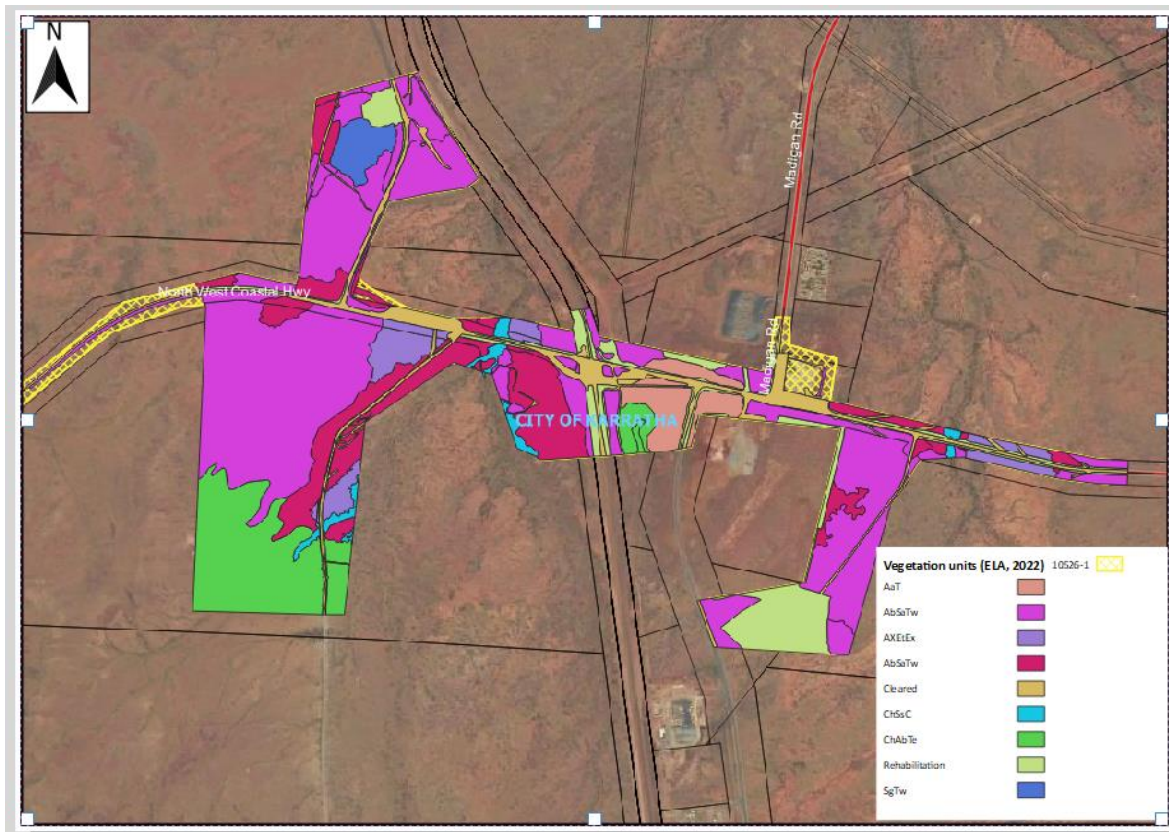


Figure 2. Map of vegetation types within the application area (ELA, 2022)

Clearing removes topsoil which contains a seed bank and vegetative propagules of locally provenanced taxa. The retention and storage of this resource for future rehabilitation and revegetation of cleared areas can further mitigate potential impact on local biodiversity values. Parts of the clearing areas in this project will be used as road material excavation pits which would operate beyond the proposed road works associated with this clearing permit application. Main Roads has committed to rehabilitate the pits once they are exhausted in accordance with the *Main Road Specification 304: Rehabilitation of Disturbed Areas*. It is important that topsoil is retained for future rehabilitation and revegetation, which is required as a condition on the permit and is further discussed in Section 3.2.2. Given the duration of topsoil storage, measures to ensure that the topsoil will not be lost to wind or water erosion have been conditioned on the permit.

The Arid Region supports a large remnant vegetation cover. However, the vegetation in the Arid Region has been identified as being threatened by weed invasion, grazing and fragmentation (DBCA, 2021). Nine introduced species were recorded during a survey in the area (ELA, 2022). *Cenchrus ciliaris* (Buffel grass) found over the application area has been known as the most widespread weed species in the arid and semi-arid zones of Australia, introduced and spread by people movement, feral animals including camels, road and rail corridor development, and the application of dust control measures in the widely scattered Aboriginal communities (Scott et.al. in H. Lambers, 2018). Long-lived seedbanks and vegetative parts of the weed species may be present in the soil and other materials from an area previously infested by the weed species. As the application area contains *C. ciliaris*, stringent measures that control the transport and transfer of infested soils or materials from the proposed clearing activities is therefore crucial to minimise and mitigate the risks of weed spread and introduction to nearby vegetation. A weed management condition has been imposed on the permit to mitigate this impact.

Fauna

A fauna survey conducted within the development envelope identified a total of 30 vertebrate fauna species (27 native and 3 introduced), comprising of 25 birds, 4 mammals and 1 reptile (ELA, 2022). No threatened fauna species listed under the EPBC Act or the BC Act, or Priority listed species by DBCA were recorded within the biological survey area from the field survey. The survey, however, identified three fauna habitats covering a total area of 186.07 ha in the application area and vicinity. The most widespread habitat was Acacia shrubland over mixed grassland which occurred across 81.30% of the vegetated area (ELA, 2022, 2023). Descriptions and representative photographs of these habitats are provided in Figure 5. The abundant vegetated area surrounding the application area contains similar types of vegetation and is likely in Very Good condition or better (EIA, 2023).

Within this context, the removal of fauna habitat as a result of the proposed clearing is unlikely to be significant or impact on the conservation value or viability of the fauna species utilising the habitats. Demarcation of the clearing footprint and directional clearing will further mitigate the potential impacts on fauna habitats.

Based on a post-survey likelihood of occurrence assessment and available habitats, the following six (6) significant fauna species were considered as having the potential to occur within the application area:

- Northern Quoll (*Dasyurus hallucatus*; listed as EN under the EPBC Act and BC Act);
- Fork-tailed Swift (*Apus pacificus*; listed as MI under the EPBC Act and BC Act);
- Oriental Pratincole (*Glareola maldivarum*; listed as MI under the EPBC Act and BC Act);
- Northern Short-tailed Mouse (*Leggadina lakedownensis*; listed as P4 by DBCA);
- Lined Soil-crevice Skink (Dampier) (*Notoscincus butleri*; listed as P4 by DBCA); and
- Western Pebble-mound Mouse (*Pseudomys chapmani*; listed as P4 by DBCA).

Several Northern quoll, Western pebble-mound mouse and Northern short-tailed mice have been recorded within a 50 km radius of the application area. While the vegetation types in the application area are considered suitable to support these species, they are transient with restricted home ranges and may visit the area on an occasional basis. Given the abundance of suitable habitat for northern quoll and the mouse species in the local area, including vegetation immediately surrounding the application area, the proposed clearing is not considered to be significant for local populations of these species should any individuals be utilising the application area. Similarly, several Lined soil-crevice skinks have been recorded in the local area. This reptile species is known to inhabit stony grasslands, similar to that of the application area. Within the context of the vast grasslands available surrounding the application area, it is unlikely that the vegetation within the application area comprises a significant habitat for this species and the proposed clearing is unlikely to impact on the conservation status of *N. butleri*. Potential impacts of clearing on any individual present can be minimised by conducting clearing in a slow, one-directional manner.

Records of Fork-tailed Swift and Oriental Pratincole occur within the local area, with the closest records located approximately within nine and three kilometres from the application area, respectively. The migratory birds are transitory at most sites and have a wide range of habitat. therefore the application area is unlikely to comprise a significant habitat for these species. The removal of some native vegetation from the application area is unlikely to have significant impact on the migratory birds, with actions that can have or are likely to have a significant impact being those that substantially modify (including by altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species and or, seriously disrupt the lifecycle (breeding, feeding, migration or resting) of an ecologically significant proportion of each species population (DoE, 2015).

While the proposed clearing activities are unlikely to result in the significant modification of the habitat or populations, clearing may promote the invasion of the remaining vegetation by weeds. Weeds, particularly of the rainforest species, may contribute to the loss of habitat for these fauna species as the weeds are likely to promote fire (DoE, 2015). The weed control and management measures and progressive rehabilitation required as conditions on the permit can mitigate this potential impact.

Conclusion:

Based on the above assessment, the Delegated Officer has determined that the proposed clearing is not likely to have a significant impact on biodiversity values or any conservation significant flora or fauna recorded within the local area. Management conditions imposed on the permit will further reduce impacts to conservation significant flora and fauna.

Conditions:

To address the above impacts, the following conditions will be imposed on the permit:

- implement stringent weed management strategies;
- store topsoils for future rehabilitation in cleared areas;
- construct drainage around the topsoil stockpiles to prevent loss and transfer of topsoils;
- conduct clearing in a slow, one-directional manner to allow any fauna individuals present to move into adjacent vegetation ahead of the clearing activity.

3.2.2. Land and water resources - Clearing Principles (g) and (i)

The application area is in the semi-arid region where the soils comprise of sands and clays and the climate is dry.

DWER North West Region advised that there are no significant water resource features in the vicinity of this proposal. The proposal area appears to lie outside of the main waterways in the area. Consequently, the risk of erosion or sedimentation of the waterways is minimised and the risk of subsequent water quality impacts downstream is reduced (DWER, 2024). Despite the low water erosion risk and limited rainfall, the region experiences cyclone events from time to time. Where rainfall is sufficient, which may occur in the late summer months, runoff in the area can drain as sheet flow which may transport sediment to nearby areas. Indiscriminate flows of runoff may also exacerbate the spread of seedbank of weeds contained in the sediment (Scott, J.K. et.al, 2018).

The soils in the application area, typical of the semi-arid region, are prone to wind erosion in the absence of ground cover. This may also result in a high dust load. Dust is known to accumulate on plants, particularly near to the source, and may affect the plant health and the nearby vegetation, even if temporarily. Research on the impacts of dust on plant health in the semi-arid and arid zones asserted that the accumulation of dust and impacts on plant health in the arid region are driven more by the variability of cumulative rainfall than dust load (Matsuki et.al., 2016). Clearing may increase the risks of dust deposition and land degradation, which can be exacerbated by the longer time required to clear and perform the works.

The proposed clearing area will be utilised for the development of a bridge and new road alignment as well as the creation of strategic borrow pits for road material sourcing for the current and future Main Roads projects in the area. DWER considers that the nature and extent of impacts of clearing for the road / bridge construction on the water and land resources are different from that of material sourcing (borrow pits). Clearing for the road and bridge constructions is considered permanent due to its final land use. The clearing for borrow pits is considered temporary and it is appropriate that areas of temporary disturbance are rehabilitated once all sources of borrow material have been exhausted. The impacts of clearing for borrow pits could span over a longer term due to the nature of works required for the pits. The discussion on impacts and mitigating measures below reflects this assessment.

Impacts due to road and bridge construction

Clearing for roads and bridges are mostly occurring within linear and narrow width areas. Within the context of the large extent and condition of vegetation cover surrounding the proposed clearing area and given the narrow dimension of clearing, impacts of clearing for road and bridge development on land and water resources are likely to be minor, localised and temporary due to the limited construction timeframe. The installation of drainage systems including the use of culverts along the roadsides can avoid the changes in the hydrological regime in the local area, and subsequently minimise impacts on the land and water resources along the roads. Main Roads has committed to installing culverts for this purpose. Limiting the exposure time of cleared areas to wind and the application of appropriate land management measures during clearing and construction works can further mitigate the potential soil erosion and sedimentation transfer risks and dust deposition. These requirements have also been conditioned on the permit.

Impacts due to borrow pits

Road building material will be excavated from borrow pits in the material sourcing areas. The pits will be located mainly in Area A of the application area and in parts of Area C (see Figure 1) away from the road alignment. Some of the material excavated from the borrow pits will be used for the current road project associated with this clearing permit application. However, the pits will also be used as strategic borrow pits for future Main Roads projects until the pits are exhausted (Main Roads, 2024d). In accordance with its standard, Main Roads has committed to rehabilitate the borrow pits once the material is exhausted of the pits. Noting the above and the end use of the cleared areas post-gravel extraction, the Department considers the proposed clearing for borrow pits as temporary clearing and requires it to be managed accordingly to minimise and mitigate the potential impacts.

In the absence of a detailed plan for the pits and based on available information, it is inferred that considerably large areas will be cleared for the creation of the borrow pits. Given the low rainfall and sandy soils of the area, clearing and subsequent material excavation can increase the risks of dust deposition and land degradation. This may be exacerbated by the longer time required to clear and extract gravel from the large areas which would prolong the exposure of cleared grounds to the wind. With water scarcity and low rainfall in the area, watering of the cleared area to suppress dust is not practical. However, limiting the exposure time of cleared areas to wind and application of appropriate land management measures during clearing and post-gravel excavation can mitigate this potential impact. These measures include conducting staged clearing and progressive rehabilitation and revegetation of disturbed area using stockpiled vegetative materials and topsoil at the end of gravel extraction from

each borrow pit. Progressive rehabilitation and revegetation using stockpiled topsoils from the sites can minimise potential impacts to the surrounding environment by:

- reducing the potential for long-term wind erosion;
- reducing the time overburden piles and loose soils are exposed to wind;
- reducing the potential for dust deposition;
- reducing the time topsoil stockpiles are exposed to weeds;
- ensuring topsoil seed viability for use in the revegetation program; and
- re-establishing ecological values that facilitate the movement of fauna.

Construction and placement of drains around the gravel pits and associated overburden piles and topsoil stockpiles could avoid and minimise the potential for indiscriminate flows of runoff during the rainy season. This in turn would minimise and mitigate the risks of sediment transports.

Conclusion

Given the above, the proposed clearing is considered unlikely to result in appreciable and long-term land degradation and dust deposition provided appropriate land management measures are applied.

Conditions:

To address the above impacts, the following management measures will be required as a condition on the clearing permit:

- commencement of construction works no later than two months after the authorised clearing;
- limit clearing for road material extraction to one site at any given time;
- minimise active gravel extraction to no more than two hectares in size within each site at any given time;
- progressively rehabilitate and revegetate temporary cleared areas using stored overburden materials and topsoil salvaged from the location within twelve months of the area no longer being required for the purpose of extraction;
- constructing drains around the borrow pits and topsoil stockpiles to minimise water erosion and sediment transport during the rainy season.

3.3. Relevant planning instruments and other matters

The application area occurs within the proclaimed Pilbara groundwater and surface water areas. Advice from DWER's North West Region regarding requirements under the RIWI Act was received for the application (DWER, 2024). Being in the proclaimed areas under the RIWI Act, the application area is subject to licensing requirements under the *Rights in Water and Irrigation Act 1914* (RIWI Act). However, the proposal did not indicate that water supplies were required for the proposed clearing and ensuing road works. Consequently, a 5C licence to take water and a 26D licence to construct any new water supply bores are not required.

The application area is within the native title areas for the Ngaluma People and Yindjibarndi People. Upon receiving notification from DWER regarding the clearing application, representatives of the Ngalurma Aboriginal Corporation (NAC) who represent the Ngalurma People and assist with their Aboriginal heritage and management matters provided their comments in a letter (NAC, 2024a). The Ngalurma People hope that all entities and individuals seeking to conduct mining, exploration and related activities including clearing of native vegetation and other ground disturbing activities on Ngalurma country indicate their goodwill by committing to the fair, pragmatic, and robust terms contained in a standard heritage protection agreement. NAC requested that Main Roads enter into this standard agreement and was willing to negotiate the terms. With a consent from NAC (NAC, 2024b), DWER provided the letter to Main Roads.

Main Roads submitted that they are aware of their obligations under the *Native Title Act 1993* (Commonwealth) and *Aboriginal Heritage Act 1972* (WA). Main Roads are committed to ensure that their projects are developed and delivered in compliance with all relevant laws (local, State and Commonwealth). Main Roads are currently liaising with representatives of the NAC regarding heritage matters. Main Roads is also committed to consult relevant landowners to ensure the necessary land access agreements are in place prior to the commencement of clearing (Main Roads, 2024b).

It is the permit holder's responsibility to comply with the *Aboriginal Heritage Act 1972* (WA) and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

End

Appendix A. Site characteristics

A.1. Site characteristics

Characteristic	Details
Local context	<p>The area proposed to be cleared is situated along North West Coastal Highway in the City of Karratha surrounded by vast extents of native vegetation and some industrial facilities and infrastructure. It is mapped within the Pilbara IBRA bioregion and the Roebourne (PIL04) sub-region, described as '<i>Coastal and sub-coastal plains with a grass savannah of mixed bunch and hummock grasses, and dwarf shrub steppe of Acacia stellaticeps or A. pyrifolia and A. inaequilatera. Uplands are dominated by Triodia hummock grasslands</i>' (Kendrick and Stanley 2001).</p> <p>The vegetation proposed to be cleared is distributed over four large patches within an expansive tract of native vegetation in the extensive land use zone of Western Australia. Spatial data indicates the local area (50-kilometre radius from the centre of the area proposed to be cleared) retains approximately 90 per cent of the original native vegetation cover.</p>
Ecological linkage	Given the expansive tract of native vegetation in the local area, the vegetation proposed to be cleared does not represent a significant ecological linkage.
Conservation areas	There are 126 conservation areas within the local area, none of which occur within the application area. The nearest conservation area is 8.19 km from the application area.
Vegetation description	<p>Biological survey performed within the application area (Ecological, 2022) indicates that vegetation within the proposed clearing area and surrounds consists of seven dissimilar vegetation units, namely:</p> <p>AxEtEx: <i>Acacia xiphophylla</i> tall isolated clumps of shrubs over <i>Enchylaena tomentosa</i>, <i>Atriplex codonocarpa</i> mid isolated chenopod shrubs over <i>Eragrostis xerophila</i>, <i>Xerochloa barbata</i>, *<i>Cenchrus ciliaris</i> low open tussock grassland.</p> <p>AbSaTw: <i>Acacia bivenosa</i>, <i>Acacia ancistrocarpa</i>, <i>Acacia inaequilatera</i> tall sparse shrubland over <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, <i>Senna glutinosa</i> subsp. <i>pruinosa</i>, <i>Eremophila longifolia</i> mid sparse shrubland over <i>Diplopeltis eriocarpa</i> low sparse shrubland and <i>Triodia wiseana</i>, <i>Triodia epactia</i> low open hummock grassland.</p> <p>SgTw: <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Senna glutinosa</i> subsp. <i>pruinosa</i> mid isolated shrubs over <i>Triodia wiseana</i> low hummock grassland and <i>Eriachne mucronata</i>, *<i>Cenchrus ciliaris</i> low sparse tussock grassland.</p> <p>ChSsCc: <i>Corymbia hamersleyana</i>, <i>Acacia coriacea</i> subsp. <i>pendens</i>, <i>Acacia trachycarpa</i> low open woodland over <i>Scaevola spinescens</i>, <i>Santalum lanceolatum</i>, <i>Clerodendrum tomentosum</i> mid open shrubland over <i>Triodia epactia</i> low open hummock grassland and *<i>Cenchrus ciliaris</i>, <i>Chrysopogon fallax</i> low open tussock grassland.</p> <p>AaTe: <i>Acacia arida</i>, <i>Acacia maitlandii</i>, <i>Acacia ancistrocarpa</i> mid sparse shrubland over <i>Triodia epactia</i> low hummock grassland.</p>

Characteristic	Details
	<p>ChAbTe: <i>Corymbia hamersleyana</i>, <i>Acacia inaequilatera</i>, <i>Hakea lorea</i> low open woodland over <i>Acacia bivenosa</i>, <i>Acacia pyrifolia</i>, <i>Eremophila longifolia</i> mid sparse shrubland over <i>Triodia epactia</i>, <i>Triodia wiseana</i> low hummock grassland.</p> <p>AxSgTw: <i>Acacia xiphophylla</i> tall sparse shrubland over <i>Senna glutinosa</i> subsp. <i>x luerssenii</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i> mid sparse shrubland over <i>Triodia wiseana</i>, <i>Triodia epactia</i> low open hummock grassland and *<i>Cenchrus ciliaris</i>, <i>Eragrostis xerophila</i> low sparse tussock grassland.</p> <p>Representative photos, survey descriptions and maps are available in Appendix D.</p> <p>Vegetation types have been mapped at the regional scale into broad vegetation associations (Beard, 1975). The mapped vegetation association for the area which is Abydos Plain-Roebourne 589, described as short bunch-grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex short bunch-grass savanna / grass-steppe. The vegetation units identified by ELA (2022) are consistent with the mapped vegetation association.</p> <p>The Abydos Plain-Roebourne 589 vegetation association retains approximately 99.44 per cent of the original extent (Government of Western Australia, 2019).</p>
Vegetation condition	<p>The biological survey conducted within the application area (Ecological, 2022) indicates that the vegetation within the proposed clearing area ranges in condition between Degraded and Very Good condition (Trudgen, 1991). The majority of native vegetation (49.69 per cent) was recorded as being in Very Good condition, and 8.50 per cent was completely devoid of vegetation (cleared).</p> <p>The full Trudgen (1991) condition rating scale is provided in Appendix C. Excerpts of the survey descriptions and mapping are available in Appendix D.</p>
Climate and landform	<p>The climate of the region is arid (semi desert) tropical climate with highly variable rainfall. The annual average rainfall is 297.5mm which mostly falls in the summer months between December and March. Temperatures in the region have been recorded as ranging between the lowest 13.9°C and highest 36.2° C.</p> <p>The project is in the Karratha Coast Zone of the Pilbara Province. The Karratha Coast Zone is characterised by coastal mudflats with sandy coastal plains and some hills on marine deposits and some sedimentary and volcanic rocks of the Pilbara Craton (Tille 2006). The landform and geology of the region comprises quaternary alluvial and older alluvial coastal and subcoastal plains (Kendrik and Stanley (2001) in ELA (2022)). The land systems of the application area are the mapped as:</p> <ul style="list-style-type: none"> • Horseflat system described as 'Gilgaied clay plains supporting Roebourne Plains grass grasslands and minor grassy snakewood shrublands'. • Ruth system described as 'Hills and ridges of volcanic and other rocks supporting shrubby hard spinifex and occasionally soft spinifex grasslands'. (DPRID, 2024)
Soil description	<p>Two soil units overlap the area, with MM17 comprising most of the survey area and Fa19 occurring in the south-west (ASRIS 2021 in ELA, 2024)</p>
Land degradation risk	<p>The application area is in the semi-arid region where the soils comprise of sands and clays and the climate is dry. Loose soils are prone to wind erosion in the absence of groundcover. Due to low rainfall and high evaporation, water erosion risk is generally low except for during cyclone events when surface water may transport loose sediments.</p>
Waterbodies	<p>There are no significant water resources features in the vicinity of the proposed project. Additionally, the proposed clearing area appears to lie outside of the main waterways</p>

Characteristic	Details
	in the local area that the risks of erosion and sedimentation and subsequent water quality impacts downstream are low (DWER - Northwest Planning, 2024)
Hydrogeography	<p>The application area is mapped as within the Port Hedland Coast Basin and Karratha Coast sub-catchment. It occurs within the proclaimed Pilbara groundwater and surface water areas and are subject to licensing requirements under the RIWI Act. However, given the nature of the proposed clearing, water supply is unlikely to be required and therefore water licencing is not required (DWER - Northwest Planning, 2024).</p> <p>The application area does not occur within a Public Drinking Water Source Areas (DWER-034) or an area subject to the <i>Country Areas Water Supply Act 1947</i>.</p> <p>Groundwater salinity level (Total Dissolved Solids) is mapped as 1,000-3,000 milligrams per litre (fresh to brackish) (DWER-026).</p>
Flora	<p>No threatened flora species has been recorded within the local area. Several priority flora species have been recorded in the local area, some of which were found in areas with similar soil and vegetation to that of the application area.</p> <p>The flora and vegetation survey conducted within the application area did not identify any flora species of conservation significance, however, acknowledged that suitable habitat for <i>Dolichocarpa sp. Hamersley Station</i> (A.A. Mitchell PRP 1479) (P3) is present (ELA, 2022).</p>
Ecological communities	The application area is outside of any mapped ecological communities of conservation values. The nearest ecological community to the application area is the Roebourne Plains gilgai grasslands Priority Ecological Community (PEC – Priority 1). The flora and vegetation survey over the application area found a small section of the application area contained a vegetation type that may support the PEC, however, given its Degraded condition it is not considered representative of the PEC.
Fauna	There are records of more than 70 fauna species of conservation significance within the local area. Many of the records are associated with marine and coastal habitats which are not represented within the application area. Most terrestrial fauna species recorded are migratory birds, small mammals and reptiles which may utilise or inhabit the vegetation within the application area. The fauna survey for the project did not identify any conservation significant fauna species, however, suitable habitats for six conservation significant fauna species were present within the application area.

A.2. Vegetation extent

	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)	Current extent in all DBCA managed land (ha)	Current proportion (%) of pre-European extent in all DBCA managed land
IBRA bioregion*					
Pilbara	17,808,657.04	17,731,764.88	99.57	1,801,714.98	10.12
Vegetation complex					
Beard vegetation association Abydos Plain-Roebourne 589	728,768.20	724,695.82	99.44	15,304.39	2.10

*Government of Western Australia (2019a)

	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)	Current extent in all DBCA managed land (ha)	Current proportion (%) of pre-European extent in all DBCA managed land
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**Government of Western Australia (2019b)

A.3. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix E.1), and biological survey information, impacts to the following conservation significant flora required further consideration.

Species name	Conservation status	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	Y	Y	0.92	4	Y
<i>Eragrostis crateriformis</i>	P3	Y	Y	22.27	1	Y
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	P2	Y	Y	29.28	1	Y
<i>Gomphrena cucullata</i>	P3	Y	Y	20.51	1	Y
<i>Goodenia pallida</i>	P1	Y	Y	26.18	1	Y
<i>Neptunia longipila</i>	P2	Y	Y	6.96	2	Y
<i>Rhynchosia bungarensis</i>	P4	Y	Y	0.30	1	Y
<i>Tephrosia rosea</i> var. <i>Port Hedland</i> (A.S. George 1114)	P1	Y	Y	39.28	5	Y
<i>Terminalia supranitifolia</i>	P3	Y	Y	0.30	4	Y
<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	Y	Y	5.97	1	Y
<i>Trianthema</i> sp. Python Pool (G.R. Guerin & M.E. Trudgen GG 1023)	P2	Y	Y	22.33	2	Y
<i>Vigna triodiophila</i>	P3	Y	Y	25.66	6	Y

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

A.4. Fauna analysis table

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
<i>Actitis hypoleucos</i> (common sandpiper)	MI	Y	Y	2.96	112	Y
<i>Apus pacificus</i> (fork-tailed swift)	MI	Y	Y	8.59	8	Y
<i>Ardenna pacifica</i> (wedge-tailed shearwater)	MI	N	N	22.29	172	Y
<i>Arenaria interpres</i> (ruddy turnstone)	MI	Y	Y	4.00	191	Y
<i>Calidris acuminata</i> (sharp-tailed sandpiper)	MI	Y	Y	2.82	43	Y
<i>Calidris alba</i> (sanderling)	MI	Y	Y	7.62	23	Y

Species name	Conservation status	Suitable habitat features ? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
<i>Calidris canutus</i> (red knot)	EN	Y	Y	5.14	15	Y
<i>Calidris ferruginea</i> (curlew sandpiper)	CR	Y	Y	4.00	35	Y
<i>Calidris ruficollis</i> (red-necked stint)	MI	Y	Y	5.14	52	Y
<i>Calidris subminuta</i> (long-toed stint)	MI	Y	Y	2.82	11	Y
<i>Calidris tenuirostris</i> (great knot)	CR	Y	Y	5.14	40	Y
<i>Charadrius veredus</i> (oriental plover)	MI	Y	Y	6.73	7	Y
<i>Chlidonias leucopterus</i> (white-winged black tern)	MI	Y	Y	4.00	16	Y
<i>Ctenotus angusticeps</i> (Airlie Island Ctenotus, Northwestern coastal Ctenotus)	P3	Y	Y	14.28	5	Y
<i>Cuculus optatus</i> (oriental cuckoo)	MI			22.29	2	Y
<i>Dasyurus hallucatus</i> (northern quoll)	EN	Y	Y	0.00	540	Y
<i>Falco hypoleucos</i> (grey falcon)	VU	Y	Y	28.68	2	Y
<i>Falco peregrinus</i> (peregrine falcon)	OS	Y	Y	9.19	13	Y
<i>Fregata ariel</i> (lesser frigatebird)	MI	Y	Y	14.47	59	Y
<i>Gallinago stenura</i> (pin-tailed snipe)	MI	Y	Y	16.82	1	Y
<i>Gelochelidon nilotica</i> (gull-billed tern)	MI	Y	Y	7.86	31	Y
<i>Glareola maldivarum</i> (oriental pratincole)	MI	Y	Y	2.96	16	Y
<i>Hirundo rustica</i> (barn swallow)	MI	Y	Y	7.17	4	Y
<i>Hydromys chrysogaster</i> (water-rat, rakali)	P4	N	N	19.32	15	Y
<i>Hydroprogne caspia</i> (Caspian tern)	MI	Y	Y	2.96	340	Y
<i>Leggadina lakedownensis</i> (northern short-tailed mouse, Lakeland Downs mouse, kerakenga)	P4	Y	Y	4.65	15	Y
<i>Lerista neviniae</i> (Nevin's slider)	EN	Y	Y	34.21	88	Y
<i>Lerista quadrivincula</i> (four-lined slider (Karratha))	P1	Y	Y	23.43	2	Y
<i>Liasis olivaceus barroni</i> (Pilbara olive python)	VU	Y	Y	13.95	35	Y
<i>Limicola falcinellus</i> (broad-billed sandpiper)	MI	Y	Y	7.62	5	Y
<i>Limosa lapponica</i> (bar-tailed godwit)	MI	Y	Y	4.00	153	Y
<i>Limosa limosa</i> (black-tailed godwit)	MI	Y	Y	13.88	6	Y
<i>Macroderma gigas</i> (ghost bat)	VU	Y	Y	18.68	8	Y
<i>Notoscincus butleri</i> (lined soil-crevice skink (Dampier))	P4	Y	Y	6.41	42	Y
<i>Numenius madagascariensis</i> (eastern curlew)	CR	Y	Y	4.00	102	Y
<i>Numenius minutus</i> (little curlew)	MI	Y	Y	4.00	21	Y
<i>Numenius phaeopus</i> (whimbrel)	MI	Y	Y	4.00	173	Y
<i>Oceanites oceanicus</i> (Wilson's storm-petrel)	MI	Y	Y	10.76	14	Y
<i>Onychoprion anaethetus</i> (bridled tern)	MI	Y	Y	19.14	95	Y
<i>Ozimops cobourgianus</i> (northern coastal free-tailed bat)	P1	Y	Y	18.68	19	Y

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
<i>Plegadis falcinellus</i> (glossy ibis)	MI	Y	Y	7.62	8	Y
<i>Pluvialis fulva</i> (Pacific golden plover)	MI	Y	Y	6.74	16	Y
<i>Pluvialis squatarola</i> (grey plover)	MI	Y	Y	7.62	41	Y
<i>Pseudomys chapmani</i> (western pebble-mound mouse, ngadji)	P4	Y	Y	11.47	19	Y
<i>Rhinonictis aurantia</i> (Pilbara form) (Pilbara leaf-nosed bat)	VU	Y	Y	12.94	1	Y
<i>Sterna dougallii</i> (roseate tern)	MI	Y	Y	22.29	56	Y
<i>Sterna hirundo</i> (common tern)	MI	Y	Y	18.53	25	Y
<i>Sternula albifrons</i> (little tern)	MI	Y	Y	7.62	14	Y
<i>Sula leucogaster</i> (brown booby)	MI	Y	Y	20.27	20	Y
<i>Thalasseus bergii</i> (crested tern)	MI	Y	Y	6.74	130	Y
<i>Tringa brevipes</i> (grey-tailed tattler)	MI & P4	Y	Y	2.96	206	Y
<i>Tringa glareola</i> (wood sandpiper)	MI	Y	Y	2.82	37	Y
<i>Tringa nebularia</i> (common greenshank)	MI	Y	Y	4.00	150	Y
<i>Xenus cinereus</i> (Terek sandpiper)	MI	Y	Y	2.82	51	Y

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

A.5. Ecological community analysis table

Community name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Horseflat Land System of the Roebourne Plains	P3	Y	Y	Y	4.47	47	Y
Roebourne Plains coastal grasslands with gilgai microrelief on deep cracking clays (Roebourne Plains gilgai grasslands)	P1	Y	Y	Y	0.68	18	Y

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

Appendix B. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		

Assessment against the clearing principles	Variance level	Is further consideration required?
<p><u>Principle (a):</u> <i>“Native vegetation should not be cleared if it comprises a high level of biodiversity.”</i></p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared comprises of seven different vegetation units which contain three fauna habitats suitable for six conservation significant fauna species. The vegetation also contains suitable habitat for a conservation significant flora species. No conservation significant flora or fauna were identified during the biological surveys and it is considered that the application area does not represent an area of high biodiversity value.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><u>Principle (b):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>No conservation significant fauna or habitat features such as nests or roosts were observed during a biological survey over the application area. However, the vegetation was assessed as containing suitable habitat for six conservation significant fauna species. Vegetation occurring in the region and surrounding the application area also contains similar fauna habitat and it is unlikely that the vegetation within the application area represents significant habitat for conservation significant fauna</p>	At variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><u>Principle (c):</u> <i>“Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.”</i></p> <p><u>Assessment:</u></p> <p>There are no records of threatened flora listed under the BC Act within the application area, with no threatened flora species identified during the flora and vegetation survey.</p>	Not likely to be at variance	No
<p><u>Principle (d):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>No threatened ecological communities are mapped within the area proposed to be cleared, (TEC/PEC). The flora and vegetation survey did not identify vegetation dominated by species indicative of a threatened ecological community.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
Environmental value: significant remnant vegetation and conservation areas		
<p><u>Principle (e):</u> <i>“Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.”</i></p> <p><u>Assessment:</u></p> <p>The extent of the mapped vegetation type and native vegetation in the region is approximately 99% which is consistent with the national objectives and targets for biodiversity conservation in Australia. The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area.</p>	Not likely to be at variance	No
<p><u>Principle (h):</u> <i>“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.”</i></p>	Not at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
<p><u>Assessment:</u></p> <p>The application area does not intersect any conservation areas. The nearest conservation area to the application area is 8.19 km away, in which case the proposed clearing is not likely to have an impact on the environmental values of any conservation areas.</p>		
Environmental value: land and water resources		
<p><u>Principle (f):</u> <i>“Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.”</i></p> <p><u>Assessment:</u></p> <p>DWER Northwest Planning Branch (2024) advised that no significant waterbodies or watercourse are present within the vicinity of the application area. The vegetation proposed to be cleared is not associated with any watercourses or wetland.</p>	Not likely to be at variance	No
<p><u>Principle (g):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><u>Assessment:</u></p> <p>While the clearing impacts are localised and temporary, the mapped soils may be susceptible to wind or water erosion when vegetation cover is removed. Dust can also be dispersed and deposited to nearby vegetation. Noting the long narrow shape of the application area and the large extent and condition of the surrounding vegetation, the proposed clearing is not likely to have an appreciable impact on land degradation.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (i):</u> <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.”</i></p> <p><u>Assessment:</u></p> <p>The activities associated with the proposed clearing will not intercept groundwater or impact surface water resources or Public Drinking Water Sources Areas. The proposed clearing is unlikely to impact surface or ground water quality. Drainage structures designed for the road project will further minimise and mitigate any potential impacts to the hydrology of the area.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (j):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</i></p> <p><u>Assessment:</u></p> <p>The mapped soils and topographic contours in the surrounding area do not indicate the proposed clearing is likely to contribute to increased incidence or intensity of flooding.</p>	Not likely to be at variance	No

Appendix C. Vegetation condition rating scale

Vegetation condition is a rating given to a defined area of vegetation to categorise and rank disturbance related to human activities. The rating refers to the degree of change in the vegetation structure, density and species present in relation to undisturbed vegetation of the same type. The degree of disturbance impacts upon the vegetation’s ability to regenerate. Disturbance at a site can be a cumulative effect from a number of interacting disturbance types.

Considering its location, the scale below was used to measure the condition of the vegetation proposed to be cleared. This scale has been extracted from Trudgen, M.E. (1991) *Vegetation condition scale* in National Trust (WA) 1993 Urban Bushland Policy. National Trust of Australia (WA), Wildflower Society of WA (Inc.), and the Tree Society (Inc.), Perth.

Measuring vegetation condition for the Eremaean and Northern Botanical Provinces (Trudgen, 1991)

Condition	Description
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Very poor	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix D. Biological survey information excerpts

The application for the clearing permit is supported by surveys and assessments. Main Roads commissioned Eco Logical Australia (ELA) to conduct a biological survey in 2022 which included field fauna and flora survey of the survey area (Figure 3 below). This was followed with an additional desktop assessment in 2023 of an additional 2.59 ha area due to the change in project design. The survey area and the additional area comprise the clearing footprint. Further, in 2023 Main Roads also performed an extrapolated desktop assessment of an additional area of 8.94 ha based on data acquired by ELA in 2022.

Survey Results – ELA (2022 and 2023)

The Biological Surveys (Eco Logical 2022, 2023) included a 227.33 ha survey area for the Rail Separation footprint. A detailed and targeted flora and vegetation survey and basic fauna survey were undertaken from 20 to 24 June 2022, and on 3 August 2022.

The survey area includes seven intact native vegetation units that were delineated and mapped, covering a total area of 186.07 ha (81.80%). The remaining 41.26 ha (18.20%) comprises cleared and rehabilitated areas (i.e. current and historic borrow pits and prominent roadside batters). Vegetation condition ranged from Degraded to Very Good condition. The most widespread community is AbSaTw, which occurs across 81.30% of the vegetated area. Full description and representative photographs of the vegetation units and their extent are presented in Table 1 below:

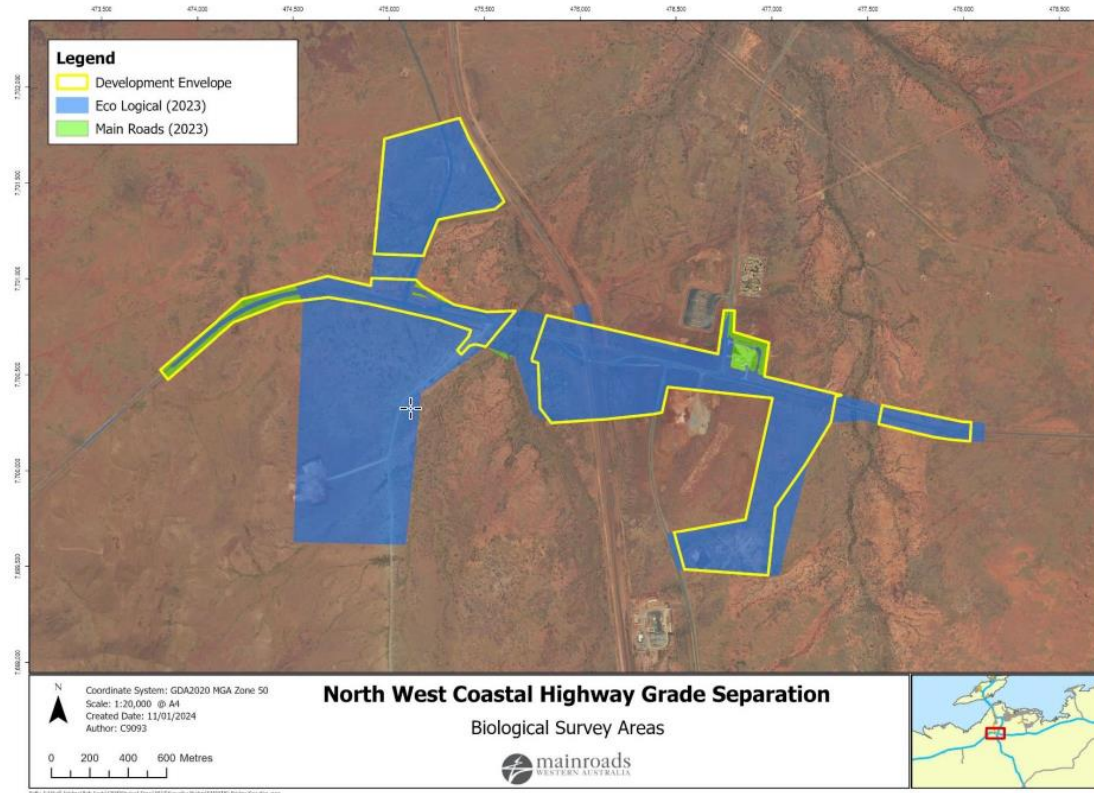


Figure 3. Mapped of areas for biological survey and assessment performed by ELA (2022 and 2023) and Main Roads (2023). (Main Roads, 2024b)

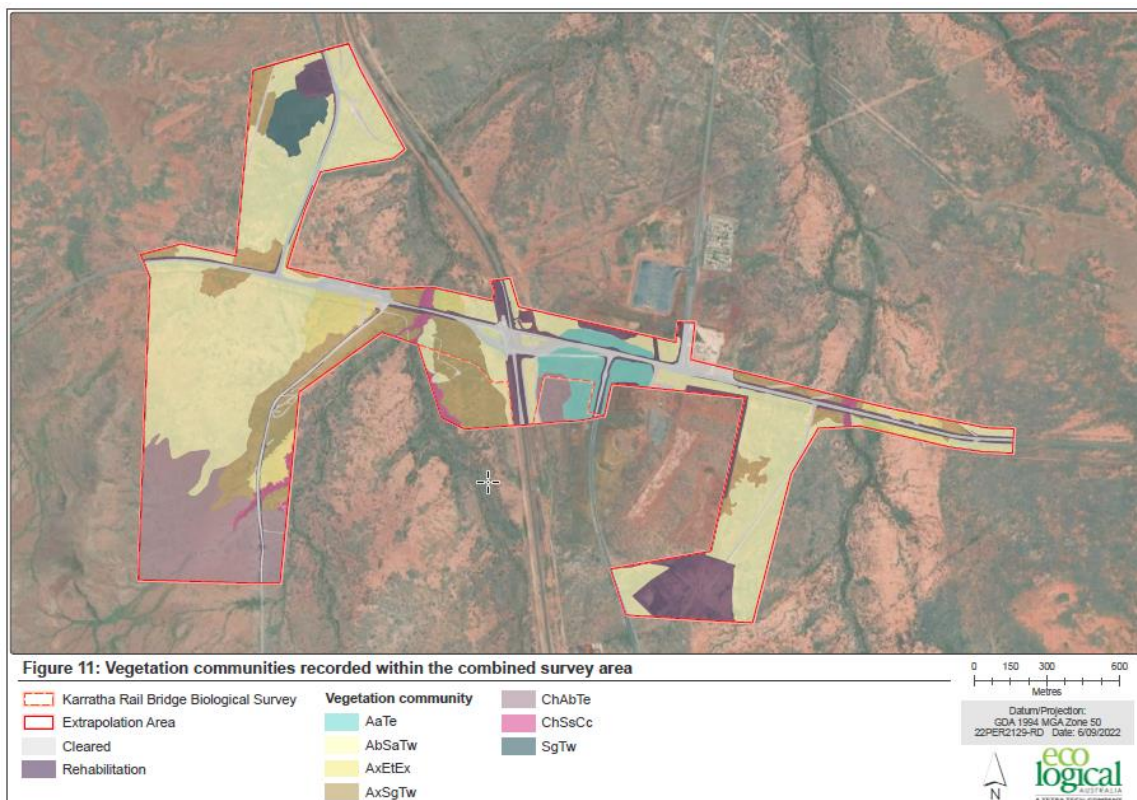









Figure 4. Map of identified vegetation types (ELA, 2022 in Main Roads, 2024b)

Table 1. Representative photographs and description of vegetation units within the survey area (ELA, 2022)

Representative photograph	Vegetation unit name and description	Associated species	Extent in survey area (ha)	Percentage of area
	<p>AxEtEx</p> <p><i>Acacia xiphophylla</i> tall isolated clumps of shrubs over <i>Enchylaena tomentosa</i>, <i>Atriplex codonocarpa</i> mid isolated chenopod shrubs over <i>Eragrostis xerophila</i>, <i>Xerochloa barbata</i>, *<i>Cenchrus ciliaris</i> low open tussock grassland.</p>	<p><i>Alysicarpus muelleri</i>, <i>Aristida contorta</i>, <i>Corchorus trilocularis</i>, <i>Chrysopogon fallax</i>, <i>Dactyloctenium radulans</i>, <i>Enneapogon caerulescens</i>, <i>Euphorbia biconvexa</i>, <i>Iseilema membranaceum</i>, <i>Nellica maderaspatensis</i>, <i>Neptunia dimorphantha</i>, <i>Panicum decompositum</i>, <i>Rhynchosia minima</i>, <i>Salsola australis</i>, <i>Sclerolaena costata</i>, <i>Sclerolaena densiflora</i>, <i>Sida fibulifera</i>, <i>Trianthema triquetrum</i>.</p>		
	<p>AbSaTw</p> <p><i>Acacia bivenosa</i>, <i>Acacia ancistrocarpa</i>, <i>Acacia inaequilatera</i> tall sparse shrubland over <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, <i>Senna glutinosa</i> subsp. <i>pruinosa</i>, <i>Eremophila longifolia</i> mid sparse shrubland over <i>Diplopeltis eriocarpa</i> low sparse shrubland and <i>Triodia</i></p>	<p><i>Aristida contorta</i>, <i>Afrohybanthus aurantiacus</i>, <i>Bonamia pilbarensis</i>, <i>Cassya capillaris</i>, *<i>Cenchrus ciliaris</i>, <i>Corchorus laniflorus</i>, <i>Cymbopogon ambiguus</i>, <i>Euploca ovalifolia</i>, <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>, <i>Goodenia muelleriana</i>, <i>Indigofera monophylla</i>, <i>Paraneurachne muelleri</i>, <i>Paspalidium clementii</i>, <i>Ptilotus astrolasius</i>,</p>	99.44	44.24

	<p><i>wiseana</i>, <i>Triodia epactia</i> low open hummock grassland.</p>	<p><i>Trichodesma zeylanicum</i>, <i>Triumfetta clementii</i>.</p>		
	<p>SgTw <i>Senna glutinosa</i> subsp. <i>glutinosa</i>, <i>Senna glutinosa</i> subsp. <i>pruinosa</i> mid isolated shrubs over <i>Triodia wiseana</i> low hummock grassland and <i>Eriachne mucronata</i>, *<i>Cenchrus ciliaris</i> low sparse tussock grassland.</p>	<p><i>Abutilon amplum</i>, <i>Bonamia pilbarensis</i>, <i>Corchorus elachocarpus</i>, <i>Cucumis variabilis</i>, <i>Dysphania rhadinostachya</i>, <i>Euphorbia biconvexa</i>, <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>, <i>Gomphrena cunninghamii</i>, <i>Indigofera monophylla</i>, <i>Paspalidium clementii</i>, <i>Rhynchosia minima</i>, <i>Solanum horridum</i>, <i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356), <i>Trachymene oleracea</i>, <i>Tribulus astrocarpus</i>.</p>	<p>4.30</p>	<p>1.91</p>
	<p>ChSsCc <i>Corymbia hamersleyana</i>, <i>Acacia coriacea</i> subsp. <i>pendens</i>, <i>Acacia trachycarpa</i> low open woodland over <i>Scaevola spinescens</i>, <i>Santalum lanceolatum</i>, <i>Clerodendrum tomentosum</i> mid open shrubland over <i>Triodia epactia</i> low open hummock</p>	<p><i>Abutilon amplum</i>, <i>Acacia bivenosa</i>, <i>Acacia pyrifolia</i>, <i>Alysicarpus muelleri</i>, <i>Bonamia erecta</i>, <i>Corchorus laniflorus</i>, <i>Cucumis variabilis</i>, <i>Eremophila longifolia</i>, <i>Eulalia aurea</i>, <i>Indigofera trita</i>, <i>Rhynchosia minima</i>, <i>Senna artemisioides</i> subsp. <i>oligophylla</i>, <i>Solanum phlomoides</i>, <i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356),</p>	<p>3.36</p>	<p>1.50</p>

	<p>grassland and *<i>Cenchrus ciliaris</i>, <i>Chrysopogon fallax</i> low open tussock grassland.</p>	<p><i>Trichodesma zeylanicum</i>, <i>Triodia wiseana</i>.</p>		
	<p>AaTe <i>Acacia arida</i>, <i>Acacia maitlandii</i>, <i>Acacia ancistrocarpa</i> mid sparse shrubland over <i>Triodia epactia</i> low hummock grassland.</p>	<p><i>Acacia pyrifolia</i>, <i>Afrohybanthus aurantiacus</i>, <i>Bonamia pilbarensis</i>, <i>Cassytha capillaris</i>, <i>Corchorus elachocarpus</i>, <i>Corchorus laniflorus</i>, <i>Enneapogon caerulescens</i>, <i>Goodenia stobbsiana</i>, <i>Indigofera monophylla</i>, <i>Paspalidium clementii</i>, <i>Ptilotus calostachyus</i>, <i>Sporobolus virginicus</i>, <i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356), <i>Trichodesma zeylanicum</i>, <i>Triumfetta clementii</i>.</p>	<p>8.39</p>	<p>3.73</p>
	<p>ChAbTe <i>Corymbia hamersleyana</i>, <i>Acacia inaequilatera</i>, <i>Hakea lorea</i> low open woodland over <i>Acacia bivenosa</i>, <i>Acacia pyrifolia</i>, <i>Eremophila longifolia</i> mid sparse shrubland over <i>Triodia epactia</i>, <i>Triodia wiseana</i> low hummock grassland.</p>	<p><i>Abutilon amplum</i>, <i>Acacia tumida</i>, <i>Afrohybanthus aurantiacus</i>, <i>Aristida contorta</i>, <i>Bonamia erecta</i>, <i>Bulbostylis barbata</i>, <i>Cassytha capillaris</i>, *<i>Cenchrus ciliaris</i>, <i>Eragrostis eriopoda</i>, <i>Eriachne pulchella</i> subsp. <i>dominii</i>, <i>Goodenia muelleriana</i>, <i>Hibiscus coatesii</i>, <i>Indigofera monophylla</i>, <i>Senna artemisioides</i></p>	<p>27.09</p>	<p>12.05</p>

		subsp. <i>oligophylla</i> , <i>Paspalidium</i> <i>clementii</i> , <i>Trigastrotheca</i> <i>molluginea</i> , <i>Urochloa</i> <i>holosericea</i> .		
	AxSgTw <i>Acacia</i> <i>xiphophylla</i> tall sparse shrubland over <i>Senna</i> <i>glutinosa</i> subsp. x <i>luerssenii</i> , <i>Senna</i> <i>artemisioides</i> subsp. <i>oligophylla</i> mid sparse shrubland over <i>Triodia</i> <i>wiseana</i> , <i>Triodia</i> <i>epactia</i> low open hummock grassland and * <i>Cenchrus</i> <i>ciliaris</i> , <i>Eragrostis</i> <i>xerophila</i> low sparse tussock grassland.	<i>Aristida</i> <i>contorta</i> , <i>Abutilon</i> <i>amplum</i> , <i>Chrysopogon</i> <i>fallax</i> , <i>Dactyloctenium</i> <i>radulans</i> , <i>Enchylaena</i> <i>tomentosa</i> , <i>Enteropogon</i> <i>ramosus</i> , <i>Euphorbia</i> <i>biconvexa</i> , <i>Fimbristylis</i> <i>dichotoma</i> , <i>Maireana</i> <i>tomentosa</i> , <i>Paspalidium</i> <i>clementii</i> , <i>Rhynchosia</i> <i>minima</i> , <i>Sclerolaena</i> <i>densiflora</i> , <i>Sida</i> <i>fibulifera</i> , <i>Solanum</i> <i>phlomoides</i> , <i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356), <i>Xerochloa</i> <i>barbata</i> .	32.69	14.55

No ecological communities listed as threatened under the EPBC Act or the BC Act occur, or were inferred to occur within the survey area. One community, Roebourne Plains gilgai grasslands (DBCA Priority 1 PEC) was considered as likely to occur, given the survey area lies within the known PEC buffer and vegetation community AxEtEx is considered to potentially represent floristic and soil/landform aspects of the PEC (ELA, 2022).

A total of 160 flora taxa (151 native and 9 introduced) from 49 families and 104 genera were recorded across 23 quadrats established within the biological survey area and from opportunistic collections (ELA, 2022). No Threatened flora species listed under the EPBC Act or the BC Act, or Priority listed species by DBCA were recorded within the biological survey area from the field survey.

Three fauna habitats covering a total area of 186.07 ha were identified and mapped within the survey area. The most widespread habitat was *Acacia* shrubland over mixed grassland which occurred across 81.30% of the vegetated area (ELA, 2022, 2023). A total of 30 vertebrate fauna species (27 native and 3 introduced) were recorded within the biological survey area, comprising 25 birds, 4 mammals and 1 reptile. No Threatened fauna species listed under the EPBC Act or the BC Act, or Priority listed species by DBCA were recorded within the biological survey area from the field survey. Based on a post-survey likelihood of occurrence assessment, the following 6 significant fauna species were considered as having the potential to occur within the Survey area:

- Northern Quoll (*Dasyurus hallucatus*; listed as EN under the EPBC Act and BC Act);
- Fork-tailed Swift (*Apus pacificus*; listed as MI under the EPBC Act and BC Act);

- Oriental Pratincole (*Glareola maldivarum*; listed as MI under the EPBC Act and BC Act);
- Northern Short-tailed Mouse (*Leggadina lakedownensis*; listed as P4 by DBCA);
- Lined Soil-crevice Skink (Dampier) (*Notoscincus butleri*; listed as P4 by DBCA); and
- Western Pebble-mound Mouse (*Pseudomys chapmani*; listed as P4 by DBCA).




Fauna habitat	Description	Significant fauna species potentially utilising the habitat	Extent in the combined survey area (ha)	Proportion of the combined survey area (%)	Photo
Acacia shrubland over mixed grassland	This habitat contains <i>Acacia xiphophylla</i> , <i>Acacia bivenosa</i> or <i>Acacia arida</i> over mixed tussock grassland or <i>Triodia</i> spp. hummock grassland. Aligned with vegetation communities AxEtEx, AbSaTw, AaTe and AxSgTw.	<ul style="list-style-type: none"> • Northern Quoll foraging habitat • Fork-tailed Swift foraging habitat • Oriental Pratincole habitat • Northern short-tailed mouse habitat 	149.73	66.62	
Corymbia and Acacia open woodland	This habitat contains <i>Corymbia hamersleyana</i> and <i>Acacia</i> spp. over <i>Triodia</i> spp. hummock grassland. Aligned with vegetation communities ChSsCc and ChAbTe.	<ul style="list-style-type: none"> • Northern Quoll foraging habitat • Fork-tailed Swift foraging habitat • Northern short-tailed mouse habitat 	30.71	13.67	
Rocky hill	This habitat contains <i>Senna</i> spp. shrubs over <i>Triodia wiseana</i> on a rocky hill. Aligned with vegetation community SgTw.	<ul style="list-style-type: none"> • Northern Quoll foraging habitat • Fork-tailed Swift foraging habitat • Lined soil-crevice skink habitat • Western pebble-mound mouse 	4.30	1.91	
		Rehabilitation	20.90	9.30	
		Cleared	19.11	8.50	
		Total	224.74	100.00	

Figure 5. Three fauna habitats identified within the survey area and development envelope (ELA, 2022)

Appendix E. Sources of information

E.1. GIS databases

Publicly available GIS Databases used (sourced from www.data.wa.gov.au):

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Aboriginal Heritage Places (DPLH-001)
- Cadastre (LGATE-218)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography – Inland Waters – Waterlines
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Imagery
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Native Title (ILUA) (LGATE-067)
- Offsets Register – Offsets (DWER-078)
- Pre-European Vegetation Statistics
- Public Drinking Water Source Areas (DWER-033)
- Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality – Flood Risk (DPIRD-007)
- Soil Landscape Land Quality – Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality – Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Water Repellence Risk (DPIRD-014)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available
- Soil Landscape Mapping – Systems
- Wheatbelt Wetlands Stage 1 (DBCA-021)

Restricted GIS Databases used:

- ICMS (Incident Complaints Management System) – Points and Polygons
- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

E.2. References

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