Government of Western Australia
Department of Water and Environmental Regulation

Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 9838/1
Permit type:	Purpose permit
Applicant name:	Main Roads WA
Application received:	8 August 2022
Application area:	15.7 hectares (revised) of native vegetation
Purpose of clearing:	Road construction and associated activities
Method of clearing:	Mechanical
Property:	Bodeguero Road Reserve (PIN 1246563), Chedaring Road Reserve (PIN 11738663) Coates Road Reserve (PIN 1292195) Great Eastern Highway Road Reserve (PINs 11738669, 11738661, 11739099, 1292196 and 1292197), Hawke Avenue Road Reserve (PIN 11739100), Inkpen Road Reserve (PIN 11739094) Oyston Road Reserve (PIN 11744703), Warin Road Reserve (PIN 11721415) Unnamed Road Reserve (PIN 11738674) Lot 1 on Diagram 25486, Easement on Plan 39712, Lot 5 and 6 on Diagram 79870, Lots 1-35 on Strata Plan 49035, Lot 61 on Diagram 67856, Lot 87 and 88 on Strata Plan 39712, Lot 801 on Deposited Plan 59557, Lot 803 on Deposited Plan 417699, Lot 6808 on Deposited Plan 117944, Lot 28751 on Deposited Plan 215405 (Crown Reserve 14276), Lot 3586 on Deposited Plan 254838, Lot 4121 on Deposited Plan 108084, Lot 4960 on Deposited Plan 114985, Lot 8986 on Deposited Plan 124070, Lot 17122 on Deposited Plan 85865, Lot 28280 on Deposited Plan 175178, Lot 29046 on Deposited Plan 190152, Unallocated Crown Land (PIN 448269),
Location (LGA area/s):	Shire of Northam and Mundaring
Localities (suburb/s):	Wooroloo, Wundowie, Woottating, Copley and Bakers Hill

1.2. Description of clearing activities

The proposed clearing is required for the Great Eastern Highway (GEH) Coates Gully Upgrade Project. Significant age and wear along sections of GEH severely affect the highway's safety and efficiency (Main Roads, 2022a). The current condition of GEH does not meet current road safety standards leading to poor safety outcomes for road users.

GEH forms part of National Highway 94, and is a strategic freight, tourist and inter-town route. The efficiency and reliability of GEH is vital to the mining and agricultural sectors of the Wheatbelt and Goldfields regions (Main Roads, 2022b). This route has been identified as the third riskiest road in regional Western Australia due to poor road conditions. The inadequate road formation, seal widths, and the narrow or absent shoulders are of particular concern.

The Coates Gully proposal is to improve the GEH through the reconstruction and realignment of the existing 9 metre formation and widening of GEH. The proposal will also include intersection improvements at Bodeguero Way, Wariin Road, Chedaring Road, Hawke Ave, Inkpen Road, Coates Road and Oyston Road (Main Roads, 2022b). The vegetation proposed to be cleared is located along either side of a 10.5 kilometre stretch of GEH (see Figure 1, Section 1.5).

1.3. Decision on application

Decision:	Granted
Decision date:	14 June 2024
Decision area:	15.70 hectares of native vegetation within a 33.8-hectare footprint, as depicted in Section 1.5, below.

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 one submission was received. Consideration of matters raised in the public submission is summarised in Appendix A.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix C), relevant datasets (see Appendix H.1), the findings of biological surveys (see Appendix G), the clearing principles set out in Schedule 5 of the EP Act (see Appendix D), relevant planning instruments and any other matters considered relevant to the assessment (see Section 3). The Delegated Officer also took into consideration that the purpose of the clearing is to improve the safety of the Great Eastern Highway and associated intersections.

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined the proposed clearing will result in the following significant residual impacts:

- the loss of 15.6 hectares of potential breeding and roosting habitat for black cockatoo species, containing 400 potentially suitable black cockatoo breeding trees (DBH >300mm), and
- the loss of 15.7 hectares of black cockatoo foraging habitat.

In accordance with the Government of Western Australia's *Environmental Offsets Policy* (2011) and *Environmental Offsets Guidelines* (2014), the Delegated Officer determined that the following land acquisition and revegetation of Lot 704 on Deposited Plan 424577, Great Eastern Highway, Coates Gully are required to address the above significant residual impacts:

- Conservation and revegetation of 26.15 hectares of native vegetation that provide medium quality foraging habitat that supports breeding individuals, for black cockatoos.

The Delegated Officer determined that the above offset was sufficient to counterbalance the significant residual impacts associated with this project and will result in a net gain in the extent of native vegetation. Further information on the suitability of the offsets provided are summarised in Section 4. The Delegated Officer determined that the proposed clearing may also result in the potential risk of land degradation from minor wind erosion, and potential direct impacts to fauna utilising the application area during the time of clearing.

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

- avoid, minimise to reduce the impacts and extent of clearing,
- take hygiene steps to minimise the risk of the introduction and spread of weeds,
- construction activities to occur within three months of clearing to minimise wind erosion risks,
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity,
- provision of an offset, as outlined above (see section 4)

1.5. Site maps

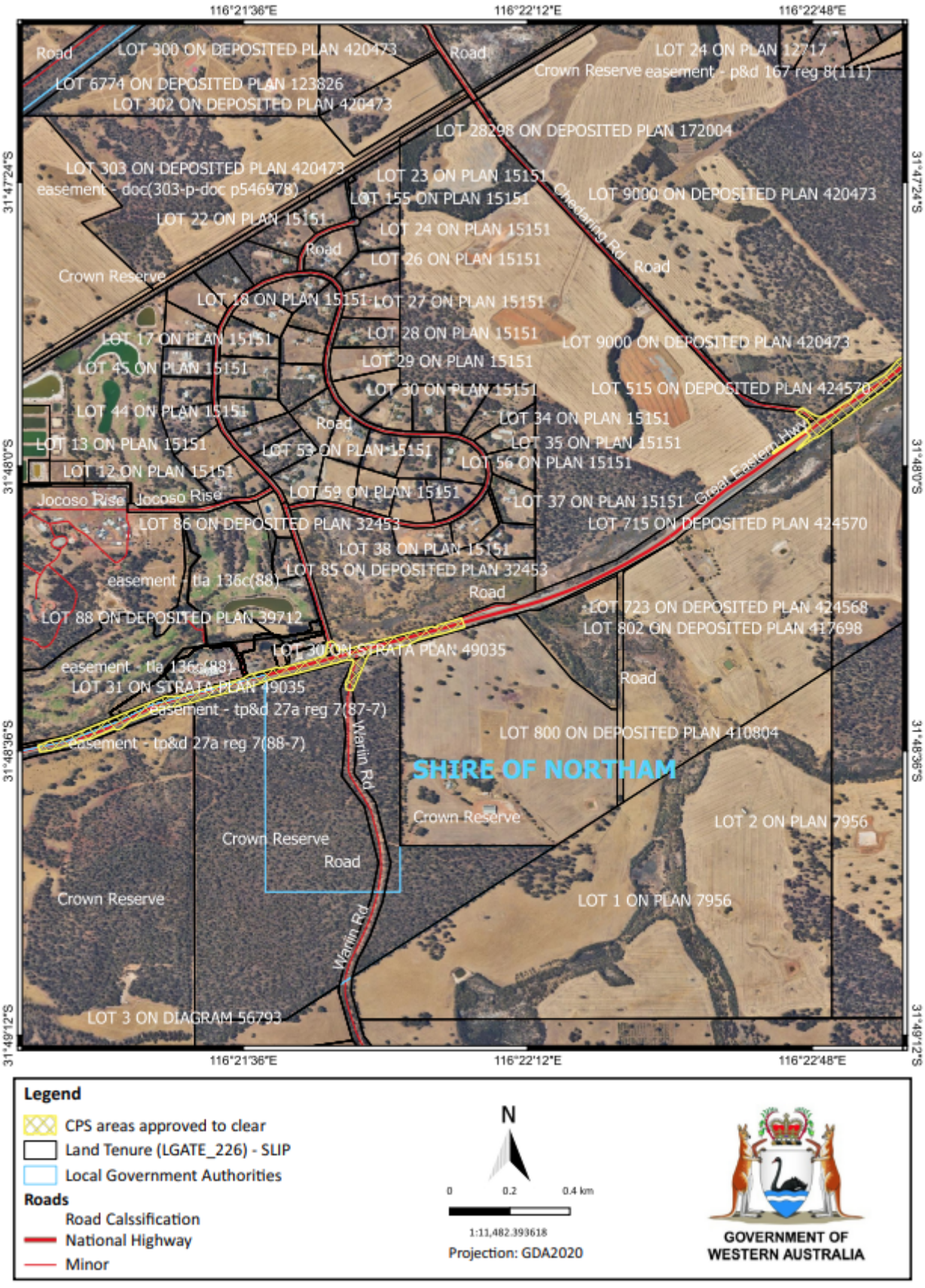


Figure 1 Map of the application area

The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit.

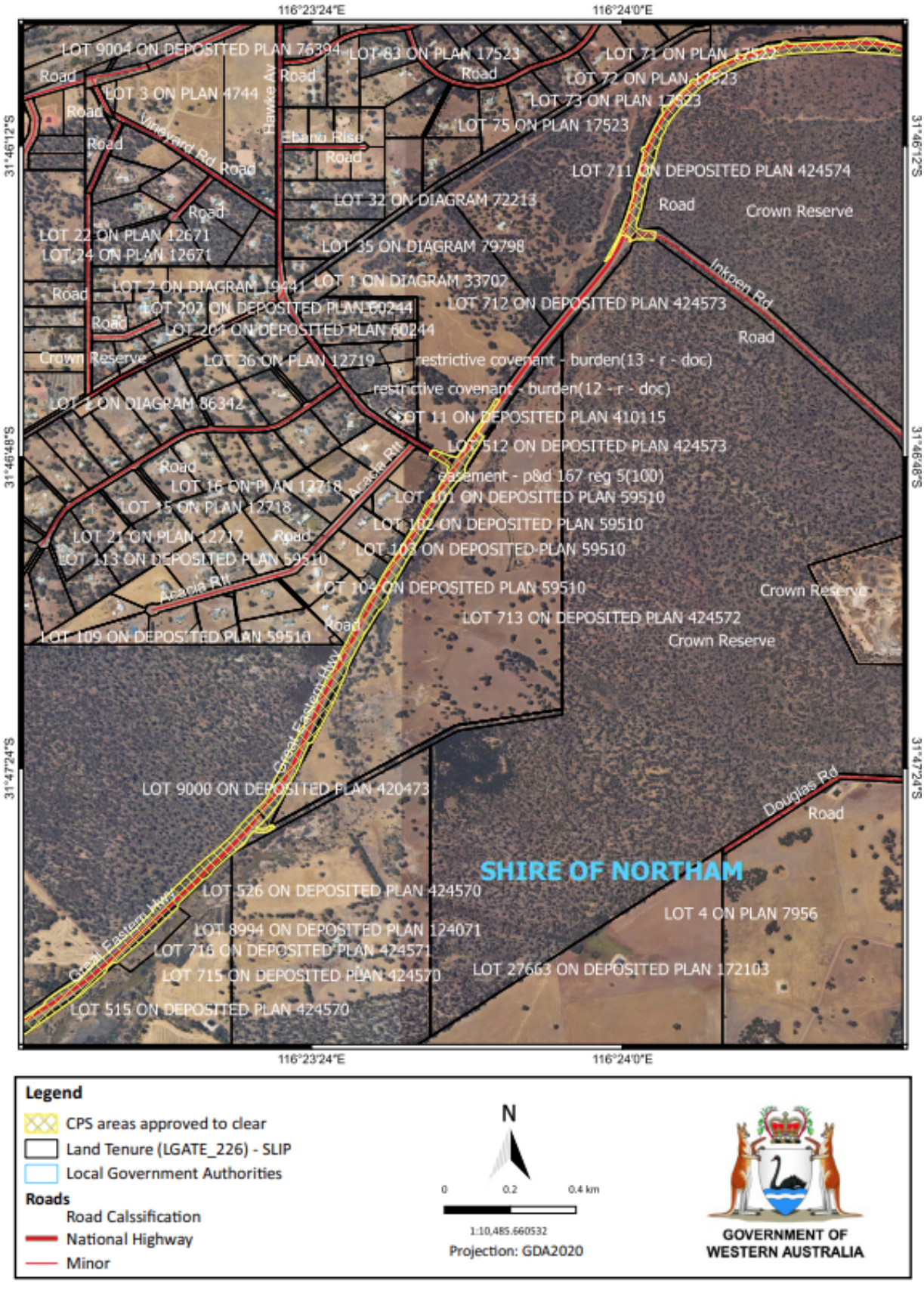


Figure 2 Map of the application area

The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit.

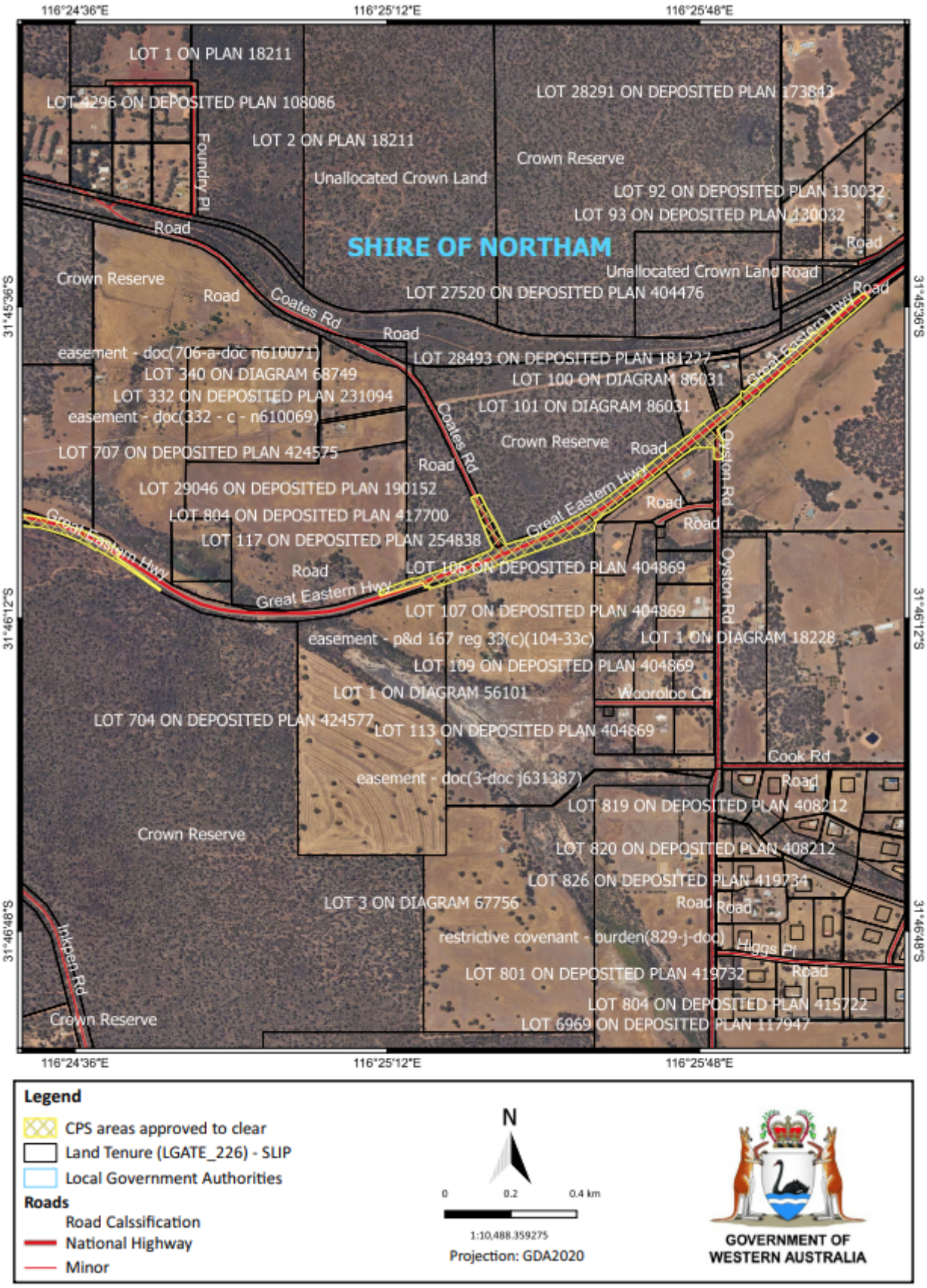


Figure 3 Map of the application area

The areas crosshatched yellow indicate the areas authorised to be cleared 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* (EPBC Act)

Relevant policies considered during the assessment include:

- *Environmental Offsets Policy* (2011)

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)
- *Environmental Offsets Guidelines* (August 2014)
- 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

Main Roads WA revised the application area during the assessment phase to (Main Roads, 2023):

- reduce the clearing area from 16.3 to 15.7 hectares;
- reduce the clearing footprint from 35.3 to 33.8 hectares; and
- avoidance of a potential black cockatoo breeding tree, containing a suitably sized hollow.

Main Roads WA advised the following avoidance and mitigation measures had been considered during the design of the proposed clearing area (Main Roads, 2023):

- the proposed clearing will not impact known roosting habitat;
- temporary ancillary activities such as site offices, storage areas, laydown areas and stockpiles will be restricted to previously cleared areas;
- the potential impacts of clearing and construction, such as land degradation from erosion and sedimentation, will be managed through the implementation of standard avoidance and mitigation measures applicable to construction activities, such as the demarcation of the proposed clearing boundary to avoid over clearing into adjacent vegetation; and
- the road design incorporates the construction of new drainage structures that will maintain existing surface water flows.

A Vegetation Management Plan (VMP) was prepared by Main Roads for the purpose of managing impacts associated with the proposed clearing for the GEH Upgrade project (Main Roads, 2022b). The VMP includes details on the following (Main Roads, 2022b; 2023):

- dieback and weed management;
- erosion and sedimentation control;
- Fauna (including pre-clearing inspection of suitable black cockatoo hollows and limiting clearing during the breeding period);
- machinery and vehicle management;
- mulch and topsoil management;
- pegging and fagging;
- water drainage management; and
- monitoring and auditing.

The Delegated Officer was satisfied that the applicant has made a reasonable effort 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 C) 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 D) identified that the impacts of the proposed clearing present a risk to biological values (fauna, adjacent flora and vegetation) and conservation areas. 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 (flora and fauna) - Clearing Principles (a) and (b)

Assessment

Flora and vegetation surveys identified 18 vegetation types within the survey area, with 14 occurring within the application area (360 Environmental, 2020; Biologic, 2021). The vegetation was broadly described as consisting of:

- *Eucalyptus* spp. woodland
- *Allocasuarina* spp. and *Eucalyptus* spp. woodland
- *Eucalyptus marginata*, *Corymbia calophylla* and *Eucalyptus wandoo* woodland
- Tall *Melaleuca viminea* shrubland with scattered *Eucalyptus wandoo*

The vegetation condition within the proposed clearing area ranges from excellent to completely degraded (Keighery, 1994) (360 Environmental, 2020; Biologic, 2021). The main disturbances observed in the survey area are mainly associated with GEH, including clearing, weeds and rubbish (Biologic, 2021).

Conservation significant flora

A total of 26 conservation significant flora have been recorded within the local area (10 kilometres of the application area), of these, one is Threatened, and 25 are Priority flora species. There are records of two priority flora within 1 kilometre of the application area, *Tetratheca pilifera* (P3) and *Cyanicula ixioides* subsp. *ixioides* (P4).

Flora and vegetation surveys recorded two Priority flora species within the application area; *Tetratheca pilifera* (P3), and *Grevillea olivacea* (P4) with the latter considered to be planted at this location. No threatened flora listed under the BC Act or EPBC Act were recorded within the application area during the survey (360, 2020; Biologic, 2021).

Tetratheca pilifera (P3) is a small spreading shrub (0.1 - 0.3 metres), commonly found in Eucalyptus woodlands, on gravelly soils, drainage lines, outcrops and breakaways. *T. pilifera* is known from 35 Western Australian Herbarium records within the Jarrah Forest and Swan Coastal Plain IBRA Regions. According to available databases, nine records of *T. pilifera* occur within the local area, including the adjacent Woondowing Nature Reserve (WA Herbarium, 1998~).

The proposed clearing will directly impact on ten individuals of *T. pilifera* (P3), representing 52 per cent of the recorded population in the survey area. More records likely occur in adjacent remnant vegetation and nature reserves (Biologic, 2021). The removal of up to 10 individuals of *T. pilifera* (P3), which represents 8 per cent of total individuals recorded in the state, is not considered a significant impact to the species or to alter its conservation status.

Advice was sought from the Department of Biodiversity, Conservation and Attraction (DBCA) on the impacts of the proposed clearing on the recorded *T. pilifera* individuals. DBCA noted that the proposed impacts to the subpopulation is likely to be significant at a local scale, however, as the species is present within the adjacent nature reserve, the impact is unlikely to be considered significant at a regional or species level (DBCA, 2022).

Conservation significant fauna

Six broad fauna habitats are mapped across the survey area from the current and previous field surveys, including cleared areas (Biologic, 2021). These fauna habitats comprised;

- *Eucalyptus wandoo* Woodland over Banksia (25.36 ha, 33.8%);
- Corymbia and *Eucalyptus marginata* Woodland (4.44 ha, 5.9%);
- Melaleuca Shrubland (3.05 ha, 4.1%);
- Isolated Trees (7.03 ha, 9.4%); and
- Sedgeland (0.79 ha, 1.1%).

The two woodland habitats provide the highest quality of fauna habitat, in particular, the Eucalypt woodlands are regionally important for black cockatoos, with wandoo (*Eucalyptus wandoo*), marri (*Corymbia calophylla*), and jarrah (*Eucalyptus marginata*) recognised as nesting trees for all three cockatoo species. These habitats are also likely to provide suitable habitat for other conservation significant species such as quenda (*Isoodon fusciventer*), western brush wallaby (*Notamacropus irma*), chuditch (*Dasyurus geoffroii*), south-western brush-tailed phascogale (*Phascogale tapoatafa wambenger*), and reptile species such as *Ctenotus delli* (Biologic, 2021).

According to available databases, 21 conservation significant fauna species occur within the local area (Appendix C). In determining the likelihood of conservation significant fauna occurring within the proposed clearing area, the department considered the results of the preferred habitat types, frequency and proximity of records to the application area (Appendix **Error! Reference source not found.**).

Taking into account the findings of the fauna survey (Bamford, 2021; Biologic, 2021; Kirkby, 2021) and the likelihood assessment, the application area is considered to comprise suitable habitat for four conservation significant fauna species:

- Carnaby's cockatoo (*Zanda latirostris*, EN)
- Baudin's black cockatoo (*Zanda baudinii*, EN),
- Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*, VU)
- Quenda (*Isoodon fusciventer*, VU),

Black cockatoos

The proposed clearing area occurs within the known distribution range of Baudin's black cockatoo, Carnaby's cockatoo (non-breeding range) and the forest red-tailed black cockatoo (non-breeding range). Black cockatoos are considered moderately common within the local vicinity of the proposed clearing with 101 records within 10 kilometres of the application area.

Habitat requirements for black cockatoos can be categorised as foraging habitat, breeding habitat and night roosting habitat. The application area is located within the Jarrah forest IBRA region. This region is characterised by Jarrah and Marri forest, with Marri-Wandoo woodlands towards the eastern edge. Black cockatoos will generally forage up to 12 kilometres from an active breeding site. Following breeding, they will flock in search of food, usually within six kilometres of a night roost (DAWE, 2022).

Suitable breeding habitat for black cockatoos includes trees that either have a suitable nest hollow or are of a suitable DBH to develop a nest (50 cm for most tree species) (DAWE, 2022). A review of available desktop data revealed one confirmed white-tailed black cockatoo (either Baudin's or Carnaby's black cockatoo) breeding record within 12 kilometres of the application area. The nearest confirmed forest-tailed black cockatoo breeding record is 15 kilometres south west of the application area. Black cockatoos will roost in the tallest trees of an area, and in close proximity to both a food supply and surface water (DAWE, 2022). According to available databases, nine roost sites occur within 12 kilometres of the application area.

Food resources within the range of breeding sites and roost sites are important to sustain populations, and foraging resources are therefore viewed in the context of known breeding and night roosting sites, particularly within 12 kilometres of an impact area (DAWE, 2022).

Field surveys (Bamford, 2021; Biologic, 2021; Kirkby, 2021) identified a total of five broad fauna habitats within the application, of which three (two woodland habitat types and isolated trees habitat are considered to provide high-quality foraging habitat for black cockatoos. A black cockatoo habitat assessment conducted across the application area (Bamford, 2021), recorded foraging value of the vegetation ranging from low (some areas of Wandoo woodland) to moderate to high foraging value (Marri and Jarrah woodland over Banksia). Evidence of black cockatoo feeding, potentially attributed to all three species of black cockatoo was recorded (Bamford Consulting, 2021; Biologic, 2022).

The black cockatoo assessment recorded a total of 400 potential breeding trees (DBH >30cm) trees within the proposed clearing area. One tree was recorded to contain a hollow suitable for breeding by black cockatoos (Bamford, 2021; Biologic, 2021; Kirkby, 2021), however, Main Roads revised the application area to ensure this tree will not be cleared (Main Roads, 2023).

Advice received from DBCA noted that while the vegetation proposed to be cleared in the application does not currently support many suitable breeding hollows, hollow succession planning for the black cockatoos is necessary. Therefore, consideration should be given to the retention of trees despite absence of hollows, as a number are likely to contribute to additional breeding trees, over time. Cumulative impacts from the continued loss of foraging habitat may eventually result in a reduction in overall breeding success (DBCA, 2022).

Based on the above, the proposed clearing area is considered to contain:

- approximately 15.6 ha of potential breeding and roosting habitat;

- 400 potentially suitable black cockatoo breeding trees (DBH >30 cm, but no suitable breeding hollows); and
- 15.7 hectares of moderate black cockatoo foraging habitat.

Quenda

According to available databases, 187 records of quenda (*Isoodon fusciventer*) occur within the local area with the closest record 0.01 kilometres from the application area. Habitat requirements for quenda include jarrah forest and swamp habitats with the species preferring dense, low shrubland for foraging underneath, and low grass trees for diurnal nests to provide protection from predators (DEC, 2012). Old and fresh quenda foraging signs were recorded at four locations within the survey area within both the "woodland" and "riparian" (Melaleuca Shrubland, and Sedgeland) habitats (Bamford, 2021; Biologic 2021).

Given the linear nature of the application area, it is considered likely to provide marginal foraging habitat and dispersal between neighbouring reserves. The proposed clearing is therefore not considered to contain significant habitat for Quenda.

Other conservation significant fauna

The 'woodland' habitat types recorded within the application area (Biologic, 2021) are considered likely to support other conservation significant species such as chuditch, western brush wallaby and south-western brush-tailed phascogale, as they contain core habitat requirements such as hollows and logs (Bamford, 2021; Biologic, 2021). However, given the narrow strip proposed for clearing, the area is unlikely to provide core habitat for these species. The application area is considered likely to provide marginal foraging habitat and dispersal between neighbouring reserves such as Coates Reserve, Kwolyinine Nature Reserve, and Woondowing Nature Reserve where their core habitat is more likely to be.

Chuditch

Chuditch occupy a range of habitats including jarrah forests, eucalypt woodlands, mallee shrublands and heathland, favouring riparian vegetation. Chuditch require den resources such as tree hollows, hollow logs, burrows or rock crevices.

The application area occurs within the known range of the chuditch. According to available databases, 30 records of chuditch occur within the local area, with the closest 1.57 kilometres from the application area. The results of the fauna survey (Biologic, 2021) identified suitable denning habitat to support the species occurs within the "woodland" habitat types where there is the presence of fallen logs and tree hollows.

Western brush wallaby

The western brush wallaby inhabits a wide range of habitats including low Banksia woodlands, jarrah/marri woodlands and moist Melaleuca lowlands, favouring open, grassy areas. The species abundance is noted to have significantly declined until widespread fox control was implemented in state forests and conservation estates (Woinarski et al., 2014b).

According to available databases, the western brush wallaby has been recorded 14 times within the local area with the closest record 3.17 kilometres from the proposed clearing area. The field surveys (Bamford, 2021; Biologic, 2021) did not record the species from motion camera, scat observations, or direct observation. However, suitable habitat was identified within the two "woodland" habitats, particularly the wandoo woodland that contained Banksia and Hibbertia and a diverse understorey (Biologic, 2021).

South-western brush-tailed phascogale

South-western brush-tailed phascogale inhabit dry sclerophyll forests and open woodlands, with hollow-bearing trees (usually eucalypts) and sparse understorey. According to available databases, 17 records occur in the local area, with the closest record is 6.45 kilometres from the application area.

The fauna survey recorded signs of Brush-tailed Possums on tree trunks and camera traps adjacent to the application area, within the Kwolyinine Nature Reserve (Bamford, 2021). While no evidence was recorded within the application area (Biologic, 2021; Bamford, 2021), suitable habitat was identified due to the presence of jarrah and marri trees with suitably sized hollows for phascogales.

Ecological linkage

Advice received from DBCA highlighted the importance of ecological linkages provided by roadside vegetation is crucial for the persistence of black cockatoos in fragmented landscapes (DBCA, 2022). Roadside vegetation is used for foraging habitat and transitory corridors between patches of vegetation by black cockatoo species.

Ecological linkages are also significantly important for ground dwelling species. The application area is considered to contribute towards the ecological linkage along the Great Eastern Highway between Keaginine Nature Reserve, Kwolyinine Nature Reserve and surrounding reserves.

Conclusion

Based on the above assessment, the proposed clearing may comprise the clearing of 10 individuals of *Tetratheca pilifera* (P3), and three individuals of the planted *Grevillea olivacea* (P4). The impacts to these species are not considered significant at a regional or species level.

The proposed clearing will result in the loss of approximately 15.6 ha of potential breeding and roosting habitat; and 15.7 hectares of black cockatoo foraging habitat. It is considered that these impacts constitute a significant residual impact and an offset is required (see section 4).

While suitable habitat occurs within the application area for other conservation significant fauna species, given the narrow strip proposed for clearing, the area is unlikely to provide core habitat for these species. Given this, the proposed clearing is unlikely to constitute significant habitat for ground dwelling and arboreal fauna.

Conditions

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

- offset – revegetation, conserved in perpetuity, which includes:
  - 26.15 hectares of vegetation that provides significant foraging habitat for black cockatoos, to address the significant residual impacts of the proposed clearing (see section 4)
- slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of clearing activity.

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

Assessment

Three nature reserves abut the application area, the Keaginne nature reserve, Kwolyinine nature reserve and Woondowing nature reserve. Given the proximity of the application area to these reserves, the proposed clearing actions may cause degradation of the native vegetation by facilitating the introduction and spread of weeds and dieback. It is considered that this can be managed through Main Roads' implementation of the project's Vegetation Management Plan (see section 3.1).

The soils in the application area are sandy which makes them prone to wind and water erosion and water logging. Clearing may exacerbate this risk. The area is also mapped as prone to substrate acidification and Phosphorus export risk. Noting the extent of clearing, the clearing is unlikely to result in permanent and detrimental impacts to land and water resources. Given the purpose of the proposed clearing, cleared areas will be replaced with a hard road surface negating any potential for wind erosion. Soils will not be excavated at depth, and groundwater will not be intersected, reducing the risk of exposing any acid sulphate soils. Noting the extent of the proposed clearing, the condition of the vegetation, and standard road construction methods employed, the proposed clearing is not likely to cause appreciable land degradation.

Conclusion

Given the above, the Delegated Officer has considered that the impact of clearing on the land and water resources is unlikely to be significant.

Conditions

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

- commencement of road works will be required to commence within three months of clearing;
- weed and dieback management to manage potential impacts to adjacent vegetation as a result of the proposed clearing.

3.3. Relevant planning instruments and other matters

The applicant has advised that the purpose of the proposed clearing is to improve the safety of the Great Eastern Highway and to ensure that the highway meets Australian road safety standards.

The proposal was referred under the Environment Protection and Biodiversity Conservation Act 1999 and determined to be a controlled action (EPBC 2022/9151). This assessment is ongoing.

The proposed clearing will occur within designated road reserves managed by Main Roads WA.

No planning approvals are required for the purpose of the proposed clearing.

No Aboriginal sites of significance have been mapped within the local area. 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.

4 Suitability of offsets

Through the detailed assessment outlined in Section 3.2 above, the Delegated Officer has determined that the following significant residual impacts remain after the application of the avoidance and mitigation measures summarised in Section 3.1.

- Loss of 15.70 hectares of black cockatoo foraging habitat (evidence of foraging identified).
- Loss of 15.60 ha of potential breeding and roosting habitat; and
- Loss of 400 black cockatoo habitat trees (DBH >30 cm, but no suitable breeding hollows).

Main Roads WA have proposed an environmental offset consisting of the land acquisition and on ground rehabilitation and revegetation of 26.15 hectares within Lot 704 on Deposited Plan 424577, Great Eastern Highway, Coates Gully (Figure 4; Main Roads, 2024).

Figure 4. Proposed offset area, Lot 704 on Deposited Plan 424577

Offset site characteristics

A site inspection (DWER, 2024) and black cockatoo assessment (Kirkby, 2023) identified that the vegetation across the offset site included isolated trees of wandoo, marri, flooded Gum and jarrah. The assessment identified a total of 100 trees with a suitable DBH needed to form a nest hollow (Lot 704 Great Eastern Highway). Of the 100 trees with a suitable DBH, five hollows were deemed possible Black cockatoo breeding hollows when viewed from ground level. Based on additional investigations with a pole camera, and evidence of chewing at the entrance, two were considered to be likely/possible Black Cockatoo breeding hollows (Main Roads, 2024).

In support of the above offset proposal Main Roads has provided an Offset Management Plan outlining the land management and revegetation actions to be undertaken to achieve the rehabilitation of 26.15 hectares of moderate quality foraging habitat suitable for the three listed species of Black cockatoos, within the offset site.

Offset site land management actions

Protection

The offset area is owned freehold by the Commissioner of Main Roads, currently managed by Main Roads for conservation purposes and will continue to be so, ensuring the protection and maintenance of ecological benefits in perpetuity, beyond the life of the approval. Main Roads' long-term intention is for the Coates Gully offset to be transferred to DBCA and incorporated in the conservation estate once the environmental values have reached DBCA's requirements, reserving the values for conservation purposes. If this cannot be achieved, Main Roads will be required to place a conservation covenant over the property to ensure long-term protection of the native vegetation.

Site preparation and ongoing maintenance

- Installation and maintenance of fencing on the property boundary to prevent unauthorised property access
- Earthworks (site preparation), including formation of access tracks and drainage structures
- Selective weed control
- Phytophthora dieback management
- Fire management

Revegetation

The aim of the revegetation actions is the creation, quality improvement and management of 26.15 hectares of diverse Black Cockatoo foraging habitat, specifically, Eucalypt woodlands containing suitable foraging tree species for each of the three species of Black Cockatoos of Medium/Moderate quality.

- Revegetation species:
    - The species list will be developed based on the soil land system and vegetation complexes mapped for the area, as well as local knowledge of the sites.
    - seed reflective of species contained within adjacent nature reserve/s and as reported within the Biological Surveys, will be collected or sourced and provided to registered nurseries for propagation.
    - The offset area will be revegetated using seed and/or tube stock.
- Coverage and density:
    - The vegetation coverage will include a variety of species within vegetation structural groups that provides Black Cockatoo foraging habitat, with a focus on the upper and mid-storey layers.
    - Plant density will vary across the site in response to local soil types, existing (remnant) vegetation density, and will aim to minimise bare ground and maximise the structural integrity and long-term viability of the established vegetation.
    - Planting density will be managed to ensure achievement of the completion criteria and ecological benefits.
    - Planting densities will be managed to achieve 30-50% canopy cover for black cockatoo foraging habitat.

Monitoring

Twice-yearly monitoring will be conducted for the Offset Area for an initial three-year period to enable early detection of changes that may impede realisation of the ecological benefits, and to enable measurement of progress towards and maintenance of the ecological benefits. Following this, monitoring will be reduced to annual frequency unless site observations suggest increased monitoring is required.

Contingency measures

- Implement corrective actions which may include:
    - Review and modify as required pest animal control program
    - Review and modify as required weed control program
    - Review and modify as required fire management measures
    - Undertake targeted infill planting as required
    - Spot spray of Weeds of National Sigfnificance, Declared weeds or weeds
    - Improve personnel training and education
    - Review monitoring frequency and method

In assessing whether the proposed offsets are adequate and proportionate to the significance of environmental values being impacted, a calculation using the WA State Offset Metric was undertaken. The calculation indicates that the proposed offsets will address 100 per cent of the significant residual impacts of clearing and is therefore consistent with the WA Environmental Offsets Policy, September 2011. The justification for the values used in the offset calculation is provided in Appendix F.

End

Appendix A. Details of public submissions

Summary of comments	Consideration of comment
Request to assess the proposed clearing area on behalf of The Forest Products Commission to understand the opportunity to recover any commercial material for the benefit of the local timber industry.	This was not assessed in the assessment of the proposed clearing as it falls outside of the provisions of the EP Act. It is advised to communicate directly with the applicant.

Appendix B. Additional information provided by applicant

Information provided	Consideration of information
Further avoidance and minimisation	Main Roads revised the application area to: • reduce the clearing area from 16.3 to 15.7 hectares, • reduce the clearing footprint from 35.3 to 33.8 hectares, • avoid a potential black cockatoo breeding tree, containing a suitably sized hollow. Avoidance and minimisation measures are provided in section 3.1 of the Decision Report.
Black cockatoo habitat assessment (Bamford, 2021)	A survey was conducted on the 5th, 6th and 8th October 2015. The survey included the following: • Black cockatoo nest tree assessment; • Black cockatoo foraging value assessment; • Black cockatoo roosting surveys; • Targeted searching for conservation significant fauna (i.e. Chuditch and Quenda); • Opportunistic fauna observations; and • Motion-sensitive camera surveys (conducted on the 28th October – 4th November 2015).
Black cockatoo Breeding hollow inspection (Kirby.T, 2021)	The purpose of this survey was to undertake a detailed inspection of possible black cockatoo breeding hollows.
Survey of possible black cockatoo breeding trees and hollows (Kirby.T, 2022)	The purpose of the survey was to inspect, in detail, 22 trees containing hollows with an entrance of a suitable size to be used by black cockatoos as a breeding hollow.
Single season detailed flora and vegetation survey, a basic vertebrate fauna survey, and a targeted black cockatoo habitat assessment (Biologic, 2022).	The survey was completed over three days on the 21 and 23 October, and on the 20 November 2020. The fauna component of the survey was completed over two days on the 24 and 30 November 2020.
Detailed flora and vegetation report (360 environmental, 2020)	The survey was undertaken between the 9 to the 11 of October 2019. The scope of works includes: • Desktop Assessment • Field Survey – an in season detailed flora and vegetation survey • Post Survey Debrief Email • Biological Report • GIS Spatial Data – according to Main Roads and IBSA geospatial requirements.
Native vegetation clearing permit supporting document prepared by main roads (2022b)	The document describes: • native vegetation present within the Proposal Area; • activities associated with the Proposal; • the extent of clearing to be undertaken; and • potential impacts in relation to the ten clearing principles and strategies to be implemented to minimise impact to native vegetation.

Appendix C. Site characteristics

C.1. Site characteristics

The information provided below describes the key characteristics of the area proposed to be cleared and is based on the best information available to the department at the time of this assessment. This information was used to inform the assessment of the clearing against the Clearing Principles, contained in Appendix D.

Characteristic	Details
Local context	The area proposed to be cleared consists of scattered native vegetation along approximately 11 kilometres of road verge. The proposed clearing area is surrounded by farmlands and patches of remnant vegetation. Spatial data indicates the local area (10-kilometre radius from the centre of the area proposed to be cleared) retains approximately 41.6 per cent of the original native vegetation cover.
Ecological linkage	A portion of the application area to the west intersects the Perth Regional Ecological Linkages. Roadsides Conservation value scores range between 5 and 10, or Medium-Low to High conservation value roadsides: • Natural structure disturbed (shrubs and / or ground cover absent) • Low diversity of native flora – mostly weeds • Medium to low value as biological corridor
Conservation areas	Three nature reserves abuts the application area; Keaginne nature reserve, Kwolyinine nature reserve and Woondowing nature reserve.
Vegetation description	Vegetation survey (360 Environmental, 2019) indicate the vegetation within the proposed clearing area consists of 14 vegetation types, broadly consisting of: • *Eucalyptus* spp. woodland • *Allocasuarina* spp. and *Eucalyptus* spp. woodland, • *Eucalyptus marginata*, *Corymbia calophylla* and *Eucalyptus wandoo* woodland • Tall *Melaleuca viminea* shrubland with scattered *Eucalyptus wandoo* This is mostly consistent with the Beard (DPIRD, 2018) mapped vegetation types: • Bannister 1006: Woodland southwest; Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*) and Wandoo (*E. wandoo*). • East Darling 3003: Forest: Mainly Jarrah (*Eucalyptus marginata*), and Marri (*Corymbia calophylla*). The mapped vegetation types retain approximately 53 and 58 per cent of the original extent respectively (Government of Western Australia, 2019).
Vegetation condition	Vegetation survey (360 Environmental, 2019) indicate the vegetation within the proposed clearing area is in Excellent to Completely Degraded (Keighery, 1994) condition. The full Keighery (1994) condition rating scale is provided in Appendix E. Representative photos are available in Appendix G.
Climate and landform	The landform of the area is characterised by undulating terrain with rock outcrop.
Soil description	The soil is mapped as: • Boyagin System (253By): Large duricrust remnants surrounded by stripped terrain of rock outcrops and fresh soils in Eastern Darling Range Zone. Gravels have Jarrah-Marri-Parrotbush forest. Loams and duplexes with York and Wandoo. Mallet and Powderbark on scarp. • Murray Valleys System (255Mv): Western Darling Range from the Avon Valley to Harvey. Deeply incised valleys with Red loamy earths, shallow duplexes and

Characteristic	Details
	rock outcrop and Jarrah-marri-wandoo forest and woodland with mixed shrubland.
Land degradation risk	The application area has a low to high risk of land degradation due to wind erosion, water erosion, salinity, flooding, Phosphorus export and a high risk of substrate acidification.
Waterbodies	The desktop assessment and aerial imagery indicated that the application area intersects two minor nonperennial tributaries of the Avon River system.
Hydrogeography	The application area occurs within the Swan Avon catchment area and is located within the Swan River System Surface Water Area proclaimed under the RIWI Act.
Flora	A total 26 conservation significant flora have been recorded within the local area (10 kilometres of the application area), of these one is Threatened, and 25 are Priority flora species. There are records of two priority flora within 1 kilometre of the application are, *Tetratheca pilifera* (P3) and *Cyanicula ixioides* subsp. *ixioides* (P4). The Flora and vegetation survey (Biologic, 2021) recorded two Priority species within the application area, *Tetratheca pilifera* (P3), and *Grevillea olivacea* (P4).
Ecological communities	Patches of remnant vegetation identified as the Eucalyptus Woodlands of Western Australia Wheatbelt are mapped within the local area. The Eucalyptus Woodlands are listed as Priority 3 PEC in Western Australia which is synonymous with the Commonwealth listed TEC. The closest mapped occurrence is 8.9 kilometres east of the application area.
Fauna	There are records of 21 fauna of conservation significance within the local area. The application area is within the mapped distribution of Carnaby, Baudin's and the Forest Red-tailed Black cockatoos. Seven known black cockatoo roost sites are recorded within the local area, the closest is 0.4 kilometres from the application area. The fauna survey (Bamford, 2022) recorded the presence of all three species of black cockatoos and evidence of Quenda (*Isoodon obesulus*) within the application area.

C.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*					
Jarrah Forest	4,506,660.25	2,399,838.15	53.25	1,673,614.25	37.14
Vegetation association					
Coolakin (ck)	163,991.68	64,204.65	39.15	33,494.02	20.12
Murray 2 (My2)	59,317.10	40,952.07	69.04	25,961.02	40.39
Pindalup (Pn)	167,151.00	128,358.24	76.79	102,702.88	60.14
Yalanbee (Y5)	126,609.77	83,829.11	66.21	49,737.89	38.79
Yalanbee (Y6)	197,849.01	92,080.88	46.54	42,555.73	21.08
Local area					
10km radius	52,274.54	21,771.71	41.65	-	-

*Government of Western Australia (2019)

C.3. Flora analysis table

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

Species 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]
Tetratheca pilifera	P3	Y	Y	Y	0.02	9	Y
Cyanicula ixioides subsp. *ixioides*	P4	Y	Y	Y	0.68	19	Y
Stylidium striatum	P4	Y	Y	Y	1.50	2	Y
Thysanotus cymosus	P3	Y	Y	Y	1.50	2	Y
Asterolasia grandiflora	P4	Y	Y	Y	2.23	4	Y
Adenanthos cygnorum subsp. *chamaephyton*	P3	Y	Y	Y	3.50	8	Y
Acacia aphylla	T	Y	Y	Y	6.78	10	Y
Acacia campylophylla	P3	Y	Y	Y	7.56	1	Y
Verticordia serrata var. *linearis*	P3	Y	Y	Y	8.70	3	Y
Eucalyptus loxophleba x *wandoo*	P4	Y	Y	Y	8.81	3	Y
Hemigenia platyphylla	P4	Y	Y	Y	9.16	1	Y
Sowerbaea multicaulis	P4	Y	Y	Y	9.31	1	Y

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

C.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]
Calyptorhynchus banksii naso (Forest red-tailed black cockatoo)	VU	Y	Y	0.01	2	Y
Zanda baudinii (Baudin's cockatoo)	EN	Y	Y	0.01	18	Y
Zanda latirostris (Carnaby's cockatoo)	EN	Y	Y	0.01	49	Y
Isoodon fusciventer (quenda)	P4	Y	Y	0.01	10	Y
Calyptorhynchus sp. 'white-tailed black cockatoo' (white-tailed black cockatoo)	EN	Y	Y	0.51	32	Y
Idiosoma schoknechtorum (Mortlock River shield-backed trapdoor spider)	P3	Y	Y	1.50	2	N/A
Dasyurus geoffroii (chuditch)	VU	Y	Y	1.57	6	Y
Bettongia penicillata ogilbyi (woylie)	CR	Y	Y	1.68	8	Y
Apus pacificus (Fork-tailed swift)	MI	Y	Y	1.97	1	Y
Macrotis lagotis (bilby)	VU	N	N	2.87	2	Y
Falsistrellus mackenziei (western falsistrelle)	P4	Y	Y	2.98	1	Y
Notamacropus Irma (western brush wallaby)	P4	Y	Y	3.17	4	Y
Falco peregrinus (Peregrine falcon)	OS	Y	Y	3.30	3	Y
Myrmecobius fasciatus (numbat)	EN	N	Y	5.23	5	Y
Leipoa ocellata (malleefowl)	VU	Y	Y	6.12	4	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]
Phascogale tapoatafa wambenger (south-western brush-tailed phascogale)	CD	Y	Y	6.45	3	Y
Synemon gratiosa (graceful sunmoth)	P4	N	N	8.46	1	Y
Hydromys chrysogaster (water-rat)	P4	N	Y	8.81	1	Y
Notamacropus eugenii derbianus (Tammar wallaby)	P4	Y	Y	9.51	7	Y
Pseudocheirus occidentalis (western ringtail possum)	CR	Y	Y	9.91	3	Y
Setonix brachyurus (quokka)	VU	Y	Y	9.91	2	Y

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

C.5. Land degradation risk table

Risk categories	Soil unit 255Mv	Soil unit 253By
Wind erosion	H1: 50-70% of the map unit has a high to extreme hazard	H2: 70% of the map unit has a high to extreme hazard
Water erosion	L1: < 3% of the map unit has a very high to extreme hazard	H2: 70% of the map unit has a very high to extreme hazard
Salinity	L1: < 3% of the map unit has a moderate to high hazard	M2: 30-50% of the map unit has a high to extreme hazard
Subsurface Acidification	H2: 70% of the map unit has a high risk or currently acid	H2: 70% of the map unit has a high risk or currently acid
Flood risk	L1: < 3% of the map unit has a moderate to high hazard	H2: 70% of the map unit has a moderate to high hazard
Water logging	L1: < 3% of the map unit has a moderate to high hazard	H2: 70% of the map unit has a moderate to high hazard
Phosphorus export risk	M1: 10-30% of the map unit has a high to extreme hazard	H2: 70% of the map unit has a very high to extreme hazard

Appendix D. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
Principle (a): *"Native vegetation should not be cleared if it comprises a high level of biodiversity."* Assessment: The area proposed to be cleared contains regionally significant habitat for all three species of black cockatoo.	At variance	Yes *Refer to Section 3.2.1, above.*
Principle (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."* Assessment: The area proposed to be cleared contains foraging, and potential roosting and/or breeding habitat for black cockatoos; *Zando baudinii* (Baudin's cockatoo), *Zando latirostris* (Carnaby's cockatoo) and the *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo).	At variance	Yes *Refer to Section 3.2.1, above.*

Assessment against the clearing principles	Variance level	Is further consideration required?
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment The area proposed to be cleared is unlikely to contain Threatened flora. No threatened flora were recorded during the flora and vegetation survey.	Not likely to be at variance	No
Principle (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."* Assessment: The area proposed to be cleared does not contain species that represent a threatened ecological community.	Not likely to be at variance	No
Environmental value: significant remnant vegetation and conservation areas		
Principle (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."* Assessment: The extent of the mapped vegetation type and the native vegetation within the local area 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.	Not likely to be at variance	No
Principle (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."* Assessment Given the distance to the nearest conservation area, the proposed clearing may have an impact on the environmental values of the adjacent conservation areas.	Not likely to be at variance	Yes *Refer to Section 3.2.2, above.*
Environmental value: land and water resources		
Principle (f): *"Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."* Assessment: The application area intersects two minor non perennial watercourses. Given no major water courses or wetlands are recorded within the application area, the proposed clearing is unlikely to impact on- or off-site hydrology and water quality.	Not likely to be at variance	No
Principle (g): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation."* Assessment: Portions of the mapped soils are highly susceptible to wind, water erosion, nutrient export, and salinity. Noting the extent of the application area and the avoidance and mitigation measures proposed by Main Roads, the proposed clearing is not considered likely to have an appreciable impact on land degradation.	Not likely to be at variance	Choose an item. Refer to Section 3.2.3, above.

Assessment against the clearing principles	Variance level	Is further consideration required?
Principle (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."* Assessment Two non-perennial watercourses interest the application area, however no perennial rivers or wetlands are recorded within one kilometre of the application area. Given this, the proposed clearing is unlikely to impact on- or off-site hydrology and water quality or the environmental values of any riparian communities.	Not likely to be at variance	No
Principle (j): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."* Assessment: The mapped soil types within the application area have a moderate to high risk of flooding. These occurrences are aligned with the numerous non-perennial watercourses in the local area. Given the proposed clearing is a narrow segment of native vegetation on each side of the road it is unlikely that the incidence or intensity of flooding will increase.	Not likely to be at variance	No

Appendix E. 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 Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Measuring vegetation condition for the South West and Interzone Botanical Province (Keighery, 1994)

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, with disturbance affecting individual species; weeds are non-aggressive species.
Very good	Vegetation structure altered, with obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and/or grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and/or grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and/or grazing.
Completely degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Appendix F. Offset calculator value justification

Calculation	Score (Area)	Rationale
Conservation significance		
Description	Carnaby's black cockatoo habitat	Critical foraging and potential breeding habitat for black cockatoos.
Significant impact		
Description	Carnaby's black cockatoo habitat	Critical foraging and potential breeding habitat for black cockatoos
Significant impact (hectares)	15.70	15.70 hectares of suitable foraging and potential breeding habitat.
Quality (scale)	7.00	The application area contains jarrah, marri and wandoo woodland providing primary foraging resources for black cockatoos, including potential roosting and future breeding habitat (DBH> 50cm). A black cockatoo assessment identified the value of forging habitat across the application ranges from low to high value. Several breeding and roosting sites occur within 20 kilometres of the application area. The foraging habitat therefore provides foraging resources for breeding and roosting individuals. Given the extent and linear nature of the clearing (10.5 km) along the GEH, the vegetation provides a linkage value across the landscape.
Conservation and revegetation		
Proposed offset (area in hectares)	26.15	Calculated value
Current quality of offset site	2.0	The vegetation is mostly cleared, in degraded - completely degraded condition, containing isolated trees of jarrah, marri and wandoo. Two trees contain suitable hollows for breeding and signs of use by black cockatoos. Several roost sites occur within 20 kilometres of the proposed offset site.
Future quality WITHOUT offset	2.0	The quality is considered unlikely to improve or decline beyond its current quality over the next 20 years.
Future quality WITH offset	8.0	Through revegetation, the quality of foraging value is expected to increase to moderate-high and provide foraging habitat in close proximity to breeding sites for black cockatoos.
Time until ecological benefit (years)	17	Once planted (2 years for site preparation), it is expected that the vegetation will take 15 years for the vegetation to mature and provide foraging habitat values for black cockatoos.
Confidence in offset result (%)	85%	There is a moderate to high level of confidence that the revegetation will meet the completion criteria of the revegetation plan (Main Roads, 2024).
Duration of offset implementation (maximum 20 years)	20.00	The offset site will be protected in perpetuity either through ceded to DBCA for the purpose of conservation or protected under a conservation covenant.
Time until offset site secured (years)	1.00	It is expected that the site is secured in next 12 months.
Risk of future loss WITHOUT offset (%)	15.0%	The site is zoned as rural, therefore there is a moderate risk of future loss
Risk of future loss WITH offset (%)	5.0%	The site is to be managed for conservation and therefore the risk of loss is considered to be low.

Appendix G. Biological survey information excerpts (DWER, 2024)

Site visit photographs (DWER, 2024)

Photo #P3120484
Lat/Long: -31.76736, 116.423425

Photo #P3120486
Lat/Long: -31.776028, 116.417281

Photo #P3120488
Lat/Long: -31.7761, 116.417297

Photo #P3120489
Lat/Long: -31.7760, 116.417256

Representative photos vegetation across the application area (Bamford, 2021)

Plate 1. Jarrah, Marri Open Woodland (J)

Plate 2. Jarrah open woodland (M)

Plate 3. Wandoo, Jarrah over Banksia (W)

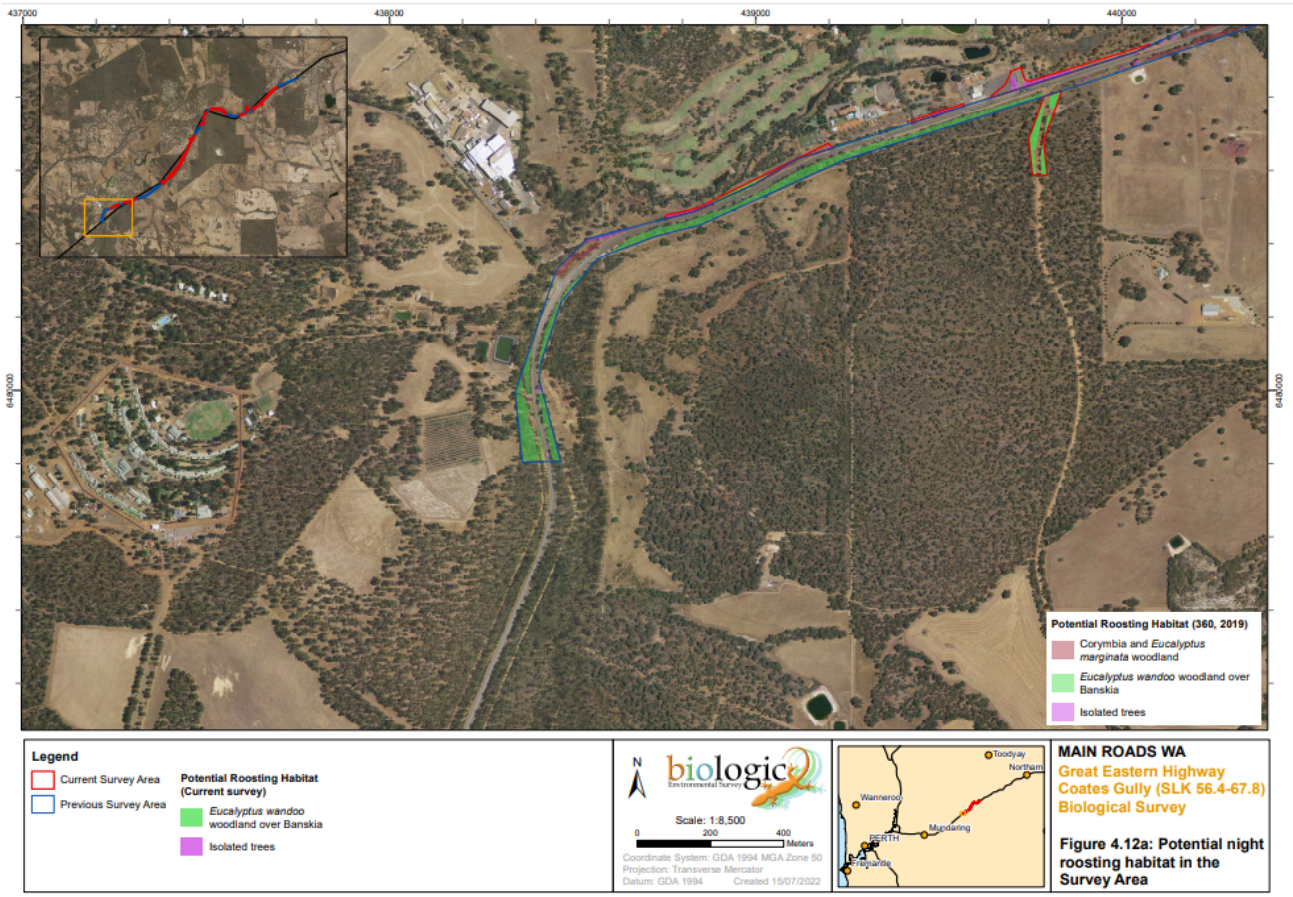


Figure 5 Vegetation Condition of the Proposal Area (360 Environmental, 2020; Biologic, 2021)

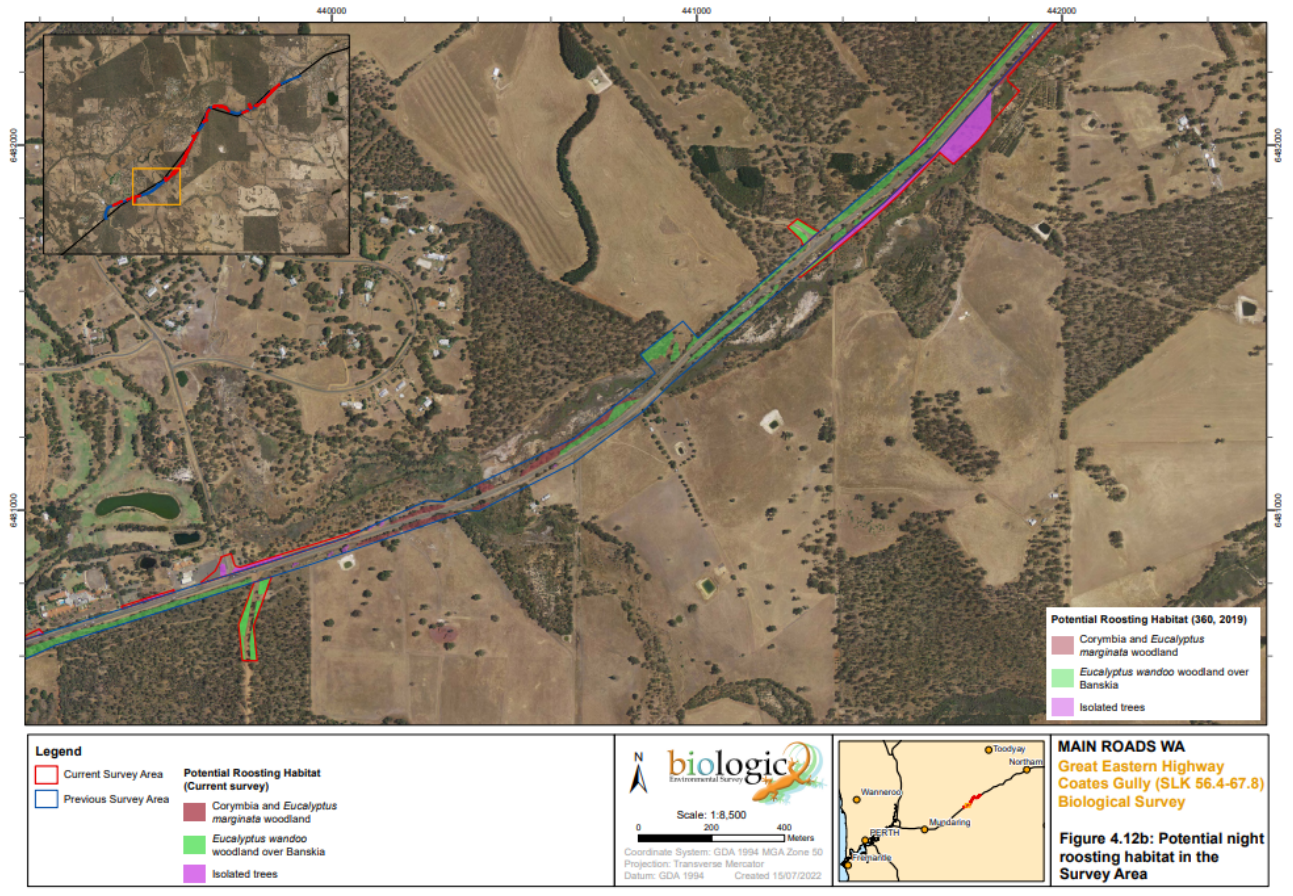


Figure 6 Vegetation Condition of the Proposal Area (360 Environmental, 2020; Biologic, 2021)

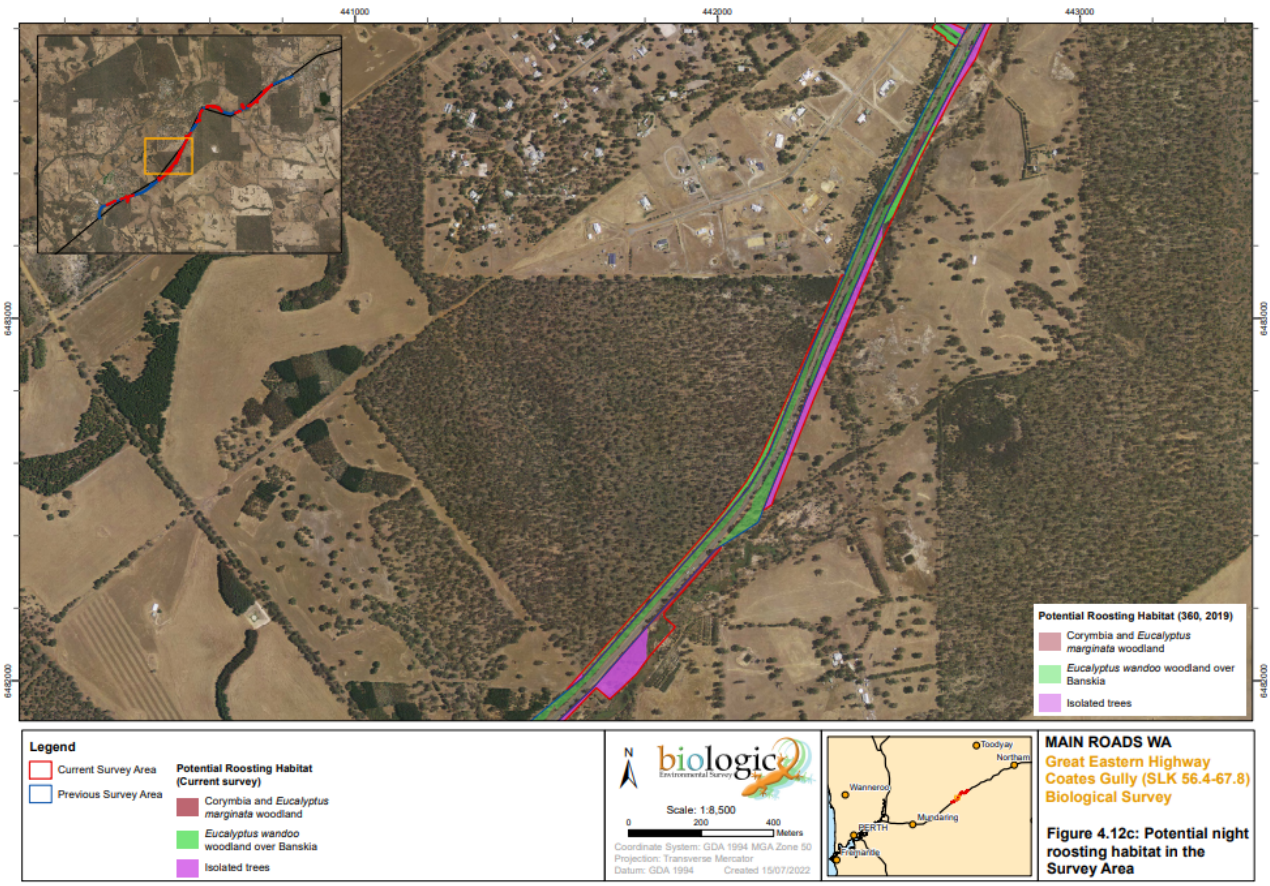


Figure 7 Vegetation Condition of the Proposal Area (360 Environmental, 2020; Biologic, 2021)

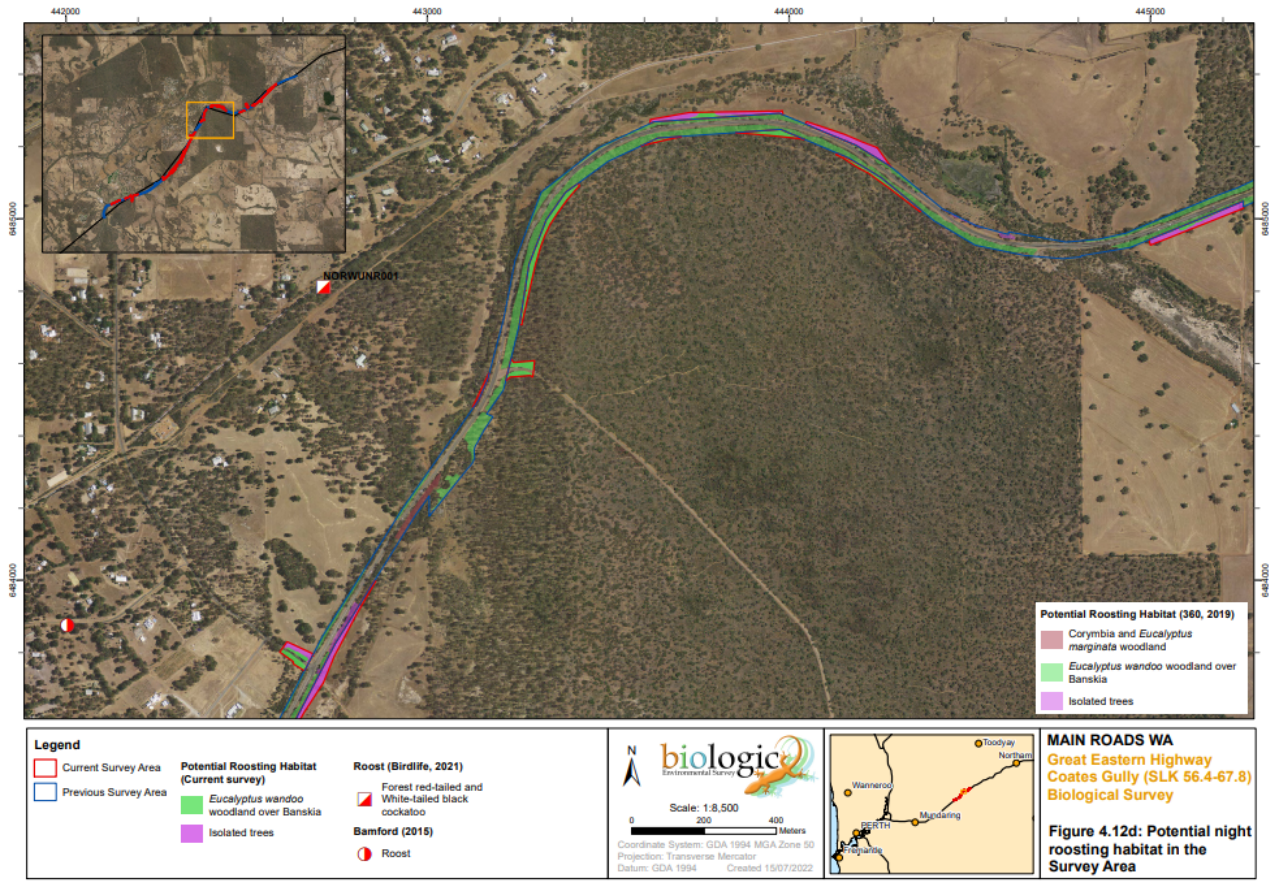


Figure 8 Vegetation Condition of the Proposal Area (360 Environmental, 2020; Biologic, 2021)

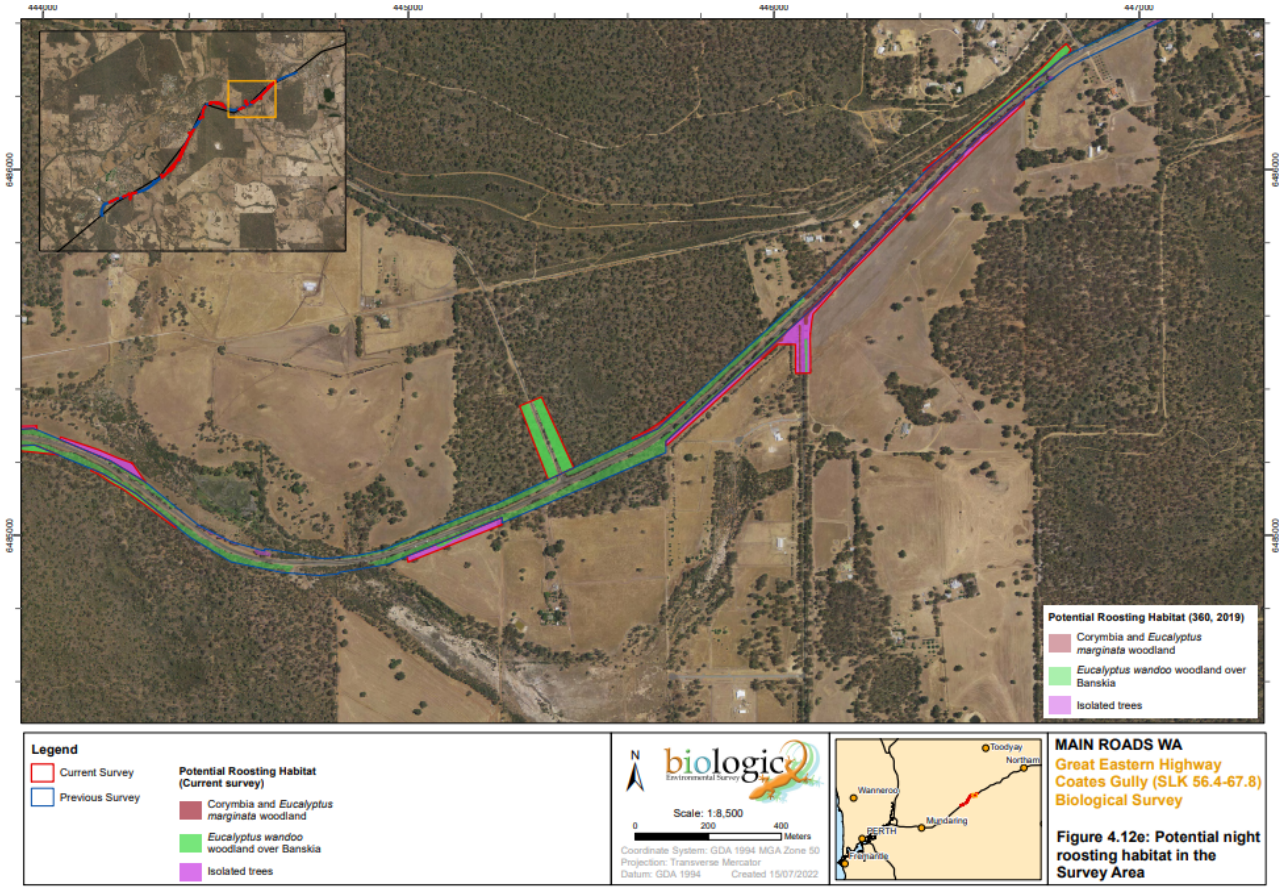


Figure 9 Vegetation Condition of the Proposal Area (360 Environmental, 2020; Biologic, 2021)

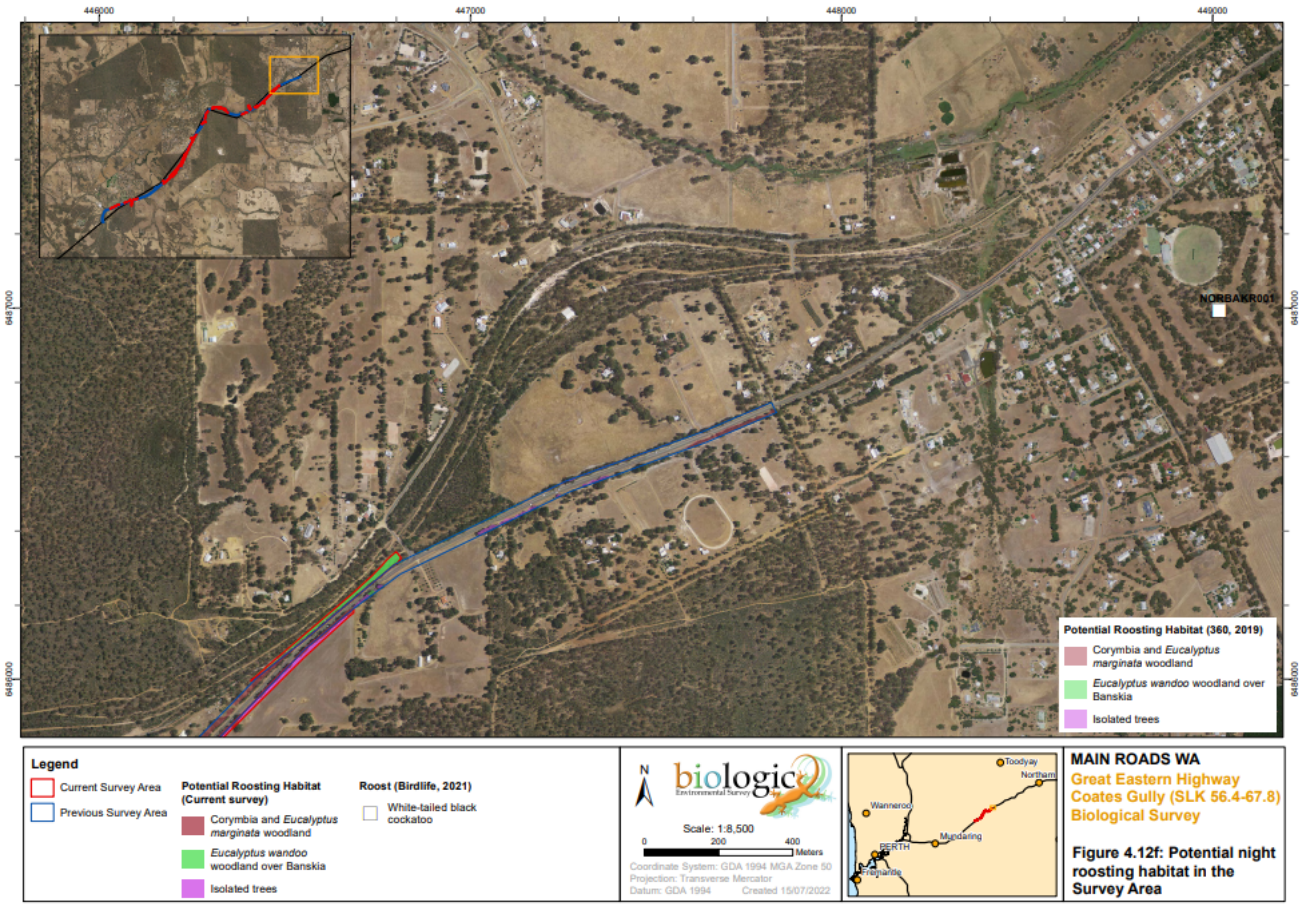


Figure 10 Vegetation Condition of the Proposal Area (360 Environmental, 2020; Biologic, 2021)

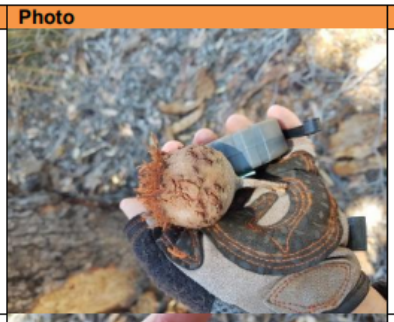
Species	Foraging species	Photo	Foraging species	Photo
Carnaby's cockatoo	Marri nut		Allocasuarina nut	
Baudin's cockatoo	Marri nut			
Forest red-tailed black cockatoo	Marri nut		Jarrah nut	

Figure 11 Foraging evidence (biologic, 2021)

Appendix H. Sources of information

H.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)

H.2. References

Main Roads Western Australia (Main Roads) (2022a) *Clearing permit application CPS 9838/1*, received 9 August 2022 (DWER Ref: DWERDT641774).

Main Roads Western Australia (Main Roads) (2022b), *Supporting information for clearing permit application CPS 9838/1,* received 16 September 2022 (DWER Ref: DWERDT660363).

Main Roads Western Australia (Main Roads) (2023), *Response to DWER's request for further information for clearing permit application CPS 9838/1,* received 16 February 2023 (DWER Ref: DWERDT732955).

Main Roads (2024) *Great Eastern Highway Upgrade Project SLK 56.4-67.8 Offset Strategy*, received 6 May 2024 (DWER Ref: DWERDT926885)

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