



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 9321/1
Permit Holder:	Shire of Ngaanyatjaraku
Duration of Permit:	From 05 May 2022 to 05 May 2027

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 road upgrade and realignment of the Jameson Cutline Road.

2. Land on which clearing is to be done

Lot 9 on Deposited Plan 91722 (Crown Reserve R 17614), Ngaanyatjarra-Giles

3. Clearing authorised

The permit holder must not clear more than 63.2 hectares of *native vegetation* within the area cross-hatched yellow in Figure 1 of Schedule 1.

PART II – MANAGEMENT CONDITIONS

4. 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.

5. Weed control

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.

6. Vegetation management

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 *native vegetation* outside of the approved clearing area.

7. Directional clearing

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

8. Wind erosion management

To reduce the potential for wind erosion, the permit holder must commence the construction of road and associated structures no later than three (3) months after undertaking the authorised clearing activities.

PART III - RECORD KEEPING AND REPORTING

9. 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	<ol style="list-style-type: none">(a) the species composition, structure, and density of the cleared area;(b) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings;(c) the date that the area was cleared;(d) the size of the area cleared (in hectares);(e) the date of the road construction works

No.	Relevant matter	Specifications
		<p>commenced;</p> <p>(f) the direction of clearing</p> <p>(g) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 4;</p> <p>(h) actions taken to minimise the risk of the introduction and spread of <i>weeds</i> in accordance with condition 5; and</p> <p>(i) actions taken to demarcate each <i>the clearing area</i> in accordance with condition 6.</p>

10. Reporting

The permit holder must provide to the *CEO* the records required under condition 9 of this permit when requested by the *CEO*.

DEFINITIONS

In this permit, the terms in Table 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.
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.
EP Act	<i>Environmental Protection Act 1986</i> (WA)
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
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

A handwritten signature in black ink, appearing to be 'Mathew Gannaway', written over a horizontal line.

Mathew Gannaway
MANAGER
NATIVE VEGETATION REGULATION

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

11 April 2022

Schedule 1

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

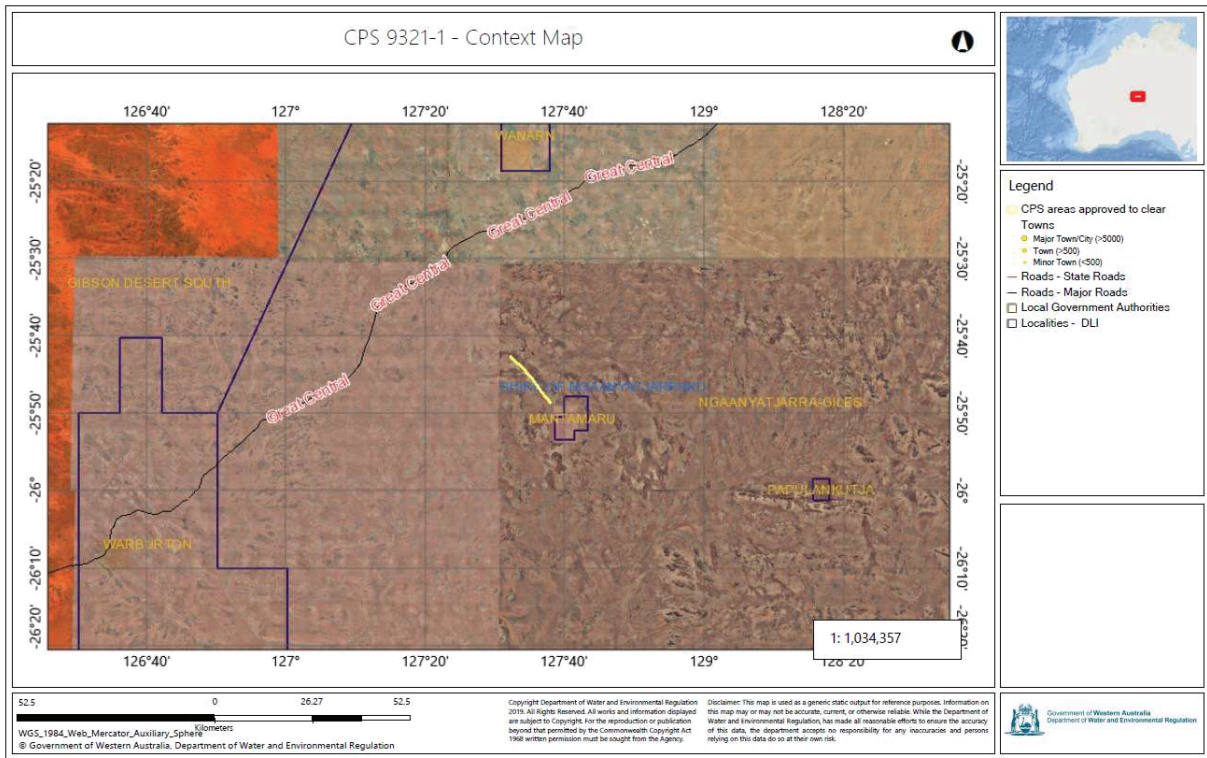


Figure 1-A: Map of the boundary of the area within which clearing may occur

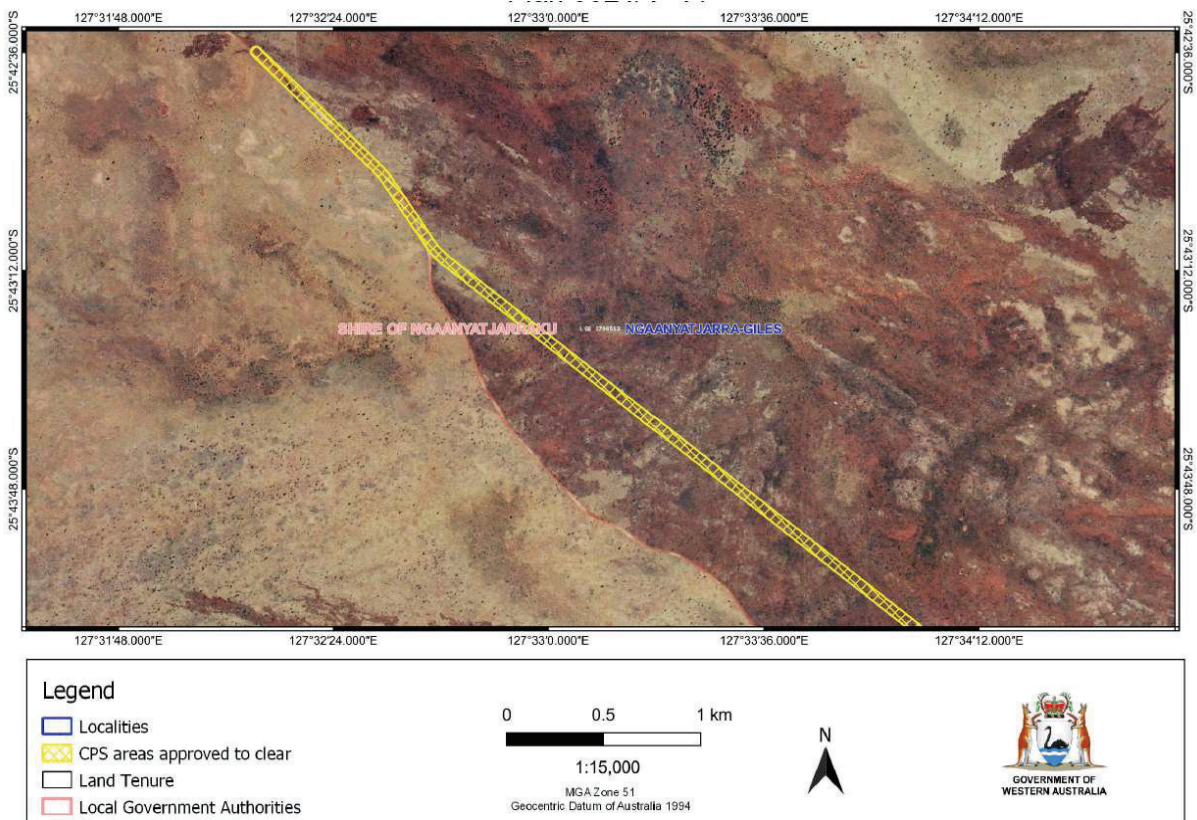


Figure 1-B. Map A of the application area

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

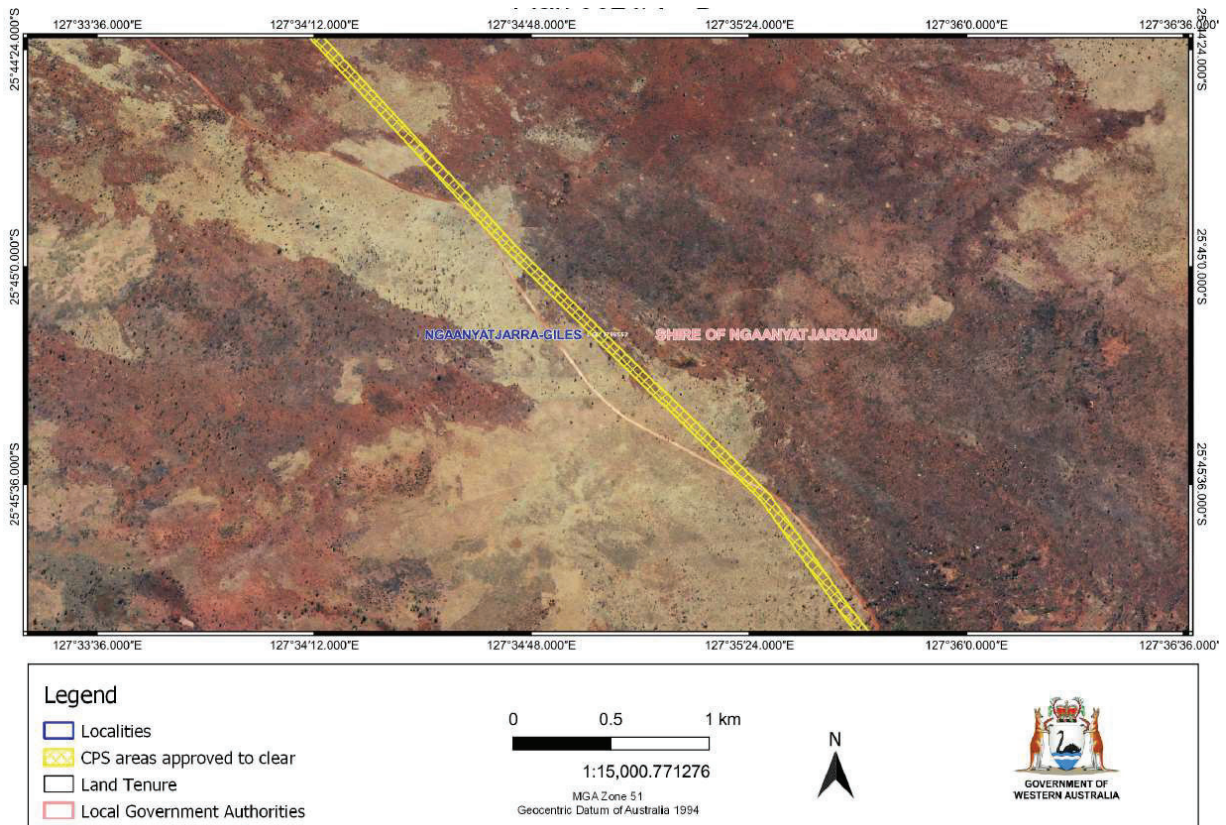


Figure 1-C. Map B of the application area
 The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit

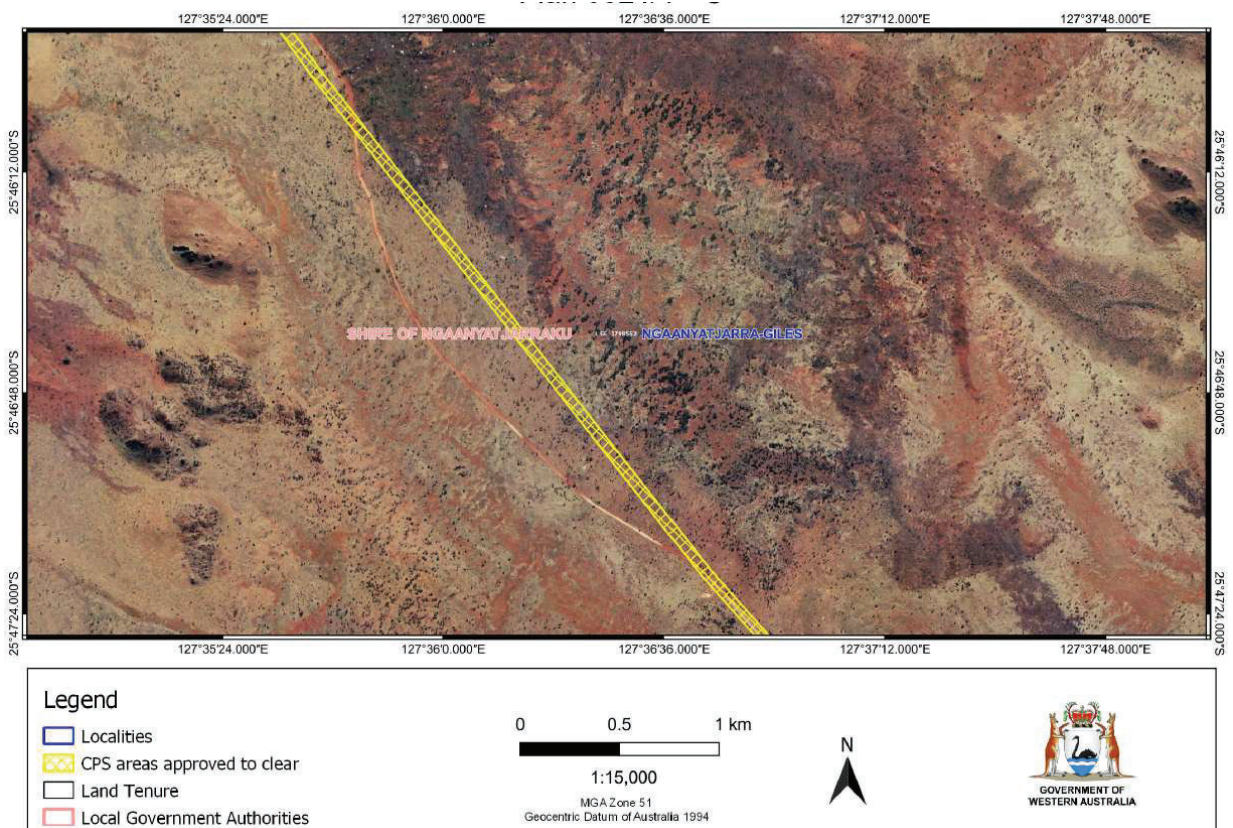


Figure 1-D. Map C of the application area
 The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit

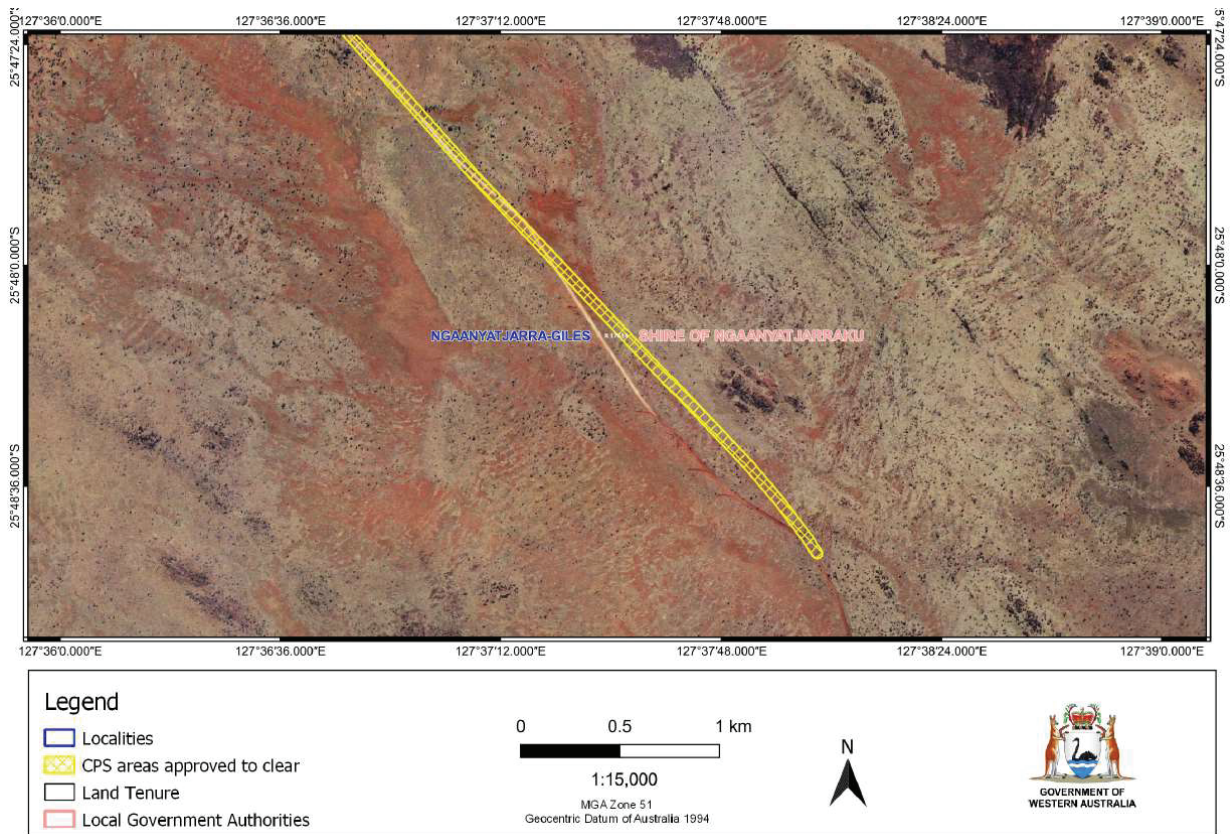


Figure 1-E. Map D of the application area
 The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit



Clearing Permit Decision Report

1 Application details and outcome

1.1 Permit application details

Permit number:	CPS 9321/1
Permit type:	Purpose permit
Applicant name:	Shire of Ngaanyatjarraku
Application received:	11 June 2021
Application area:	63.2 hectares (ha) (revised) of native vegetation within a 79 ha clearing footprint
Purpose of clearing:	Road construction
Method of clearing:	Mechanical
Property:	Lot 9 on Deposited Plan 91722 (Crown Reserve R 17614)
Location (LGA area/s):	Shire of Ngaanyatjarraku
Localities (suburb/s):	Ngaanyatjarra-Giles

1.2 Description of clearing activities

The application is to clear native vegetation within a road development envelope measuring 15 kilometres (km) long and an average width of 50 metres (m), totalling 79 ha in size. The development envelope is required to construct and realign a 15 km section of the Jameson Cutline Road north of Jameson Community to improve the road safety and sight lines by removing the curves. The actual width of clearing is not intended to be 50 m. In most part, the clearing width would be 16 m for the road and a further 15 to 17 m from the road edge at places where offshoot drainages need to be constructed. The purpose permit application is to allow for flexibility within the road corridor in the dimensions and placement of the surface water offshoot drainages, and the number and locations of truck turnaround areas. The road will be gravel and will not be sealed.

During the assessment, the Shire committed to limiting the clearing to 80 percent of the original application area, or a maximum of 63.2 hectares (ha) within the 79 ha footprint.

1.3 Decision on application

Decision:	Granted
Decision date:	11 April 2022
Decision area:	63.2 ha of native vegetation within a 79 ha clearing 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 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 flora and fauna survey (see Appendix D), the clearing principles set out in Schedule 5 of the EP Act (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 purpose of clearing is to improve road and community safety.

In particular, the Delegated Officer has considered the following:

- Clearing may result in land degradation due to wind erosion unless appropriate land management measures are put in place. Staged clearing and commencement of road works as soon as authorised clearing has been carried out can minimise the risk of wind erosion and is required as a condition on the permit.
- Clearing can introduce and spread weeds into adjacent vegetation, which could impact on the quality of the adjacent vegetation and its habitat values. Appropriate weed management measures could minimise and mitigate this risk.
- Clearing may result in inadvertent loss of fauna individuals that may be present at the time of clearing. To minimise the potential impacts, demarcation of the clearing area prior to and during clearing and slow progressive one directional clearing are required as conditions to the permit.

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 is unlikely to lead to appreciable land degradation nor have long-term adverse impacts on the habitat values of adjacent vegetation. Potential impacts of clearing can be minimised and managed to unlikely lead to an unacceptable risk to environmental values by imposing management conditions to the permit.

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
- demarcation of clearing area prior to ensure that no more than 63.2 ha of native vegetation is cleared within the application area
- staged clearing and commencement of road works and associated drainage within three months of the authorised clearing to minimise wind erosion
- undertake slow, progressive one directional clearing towards adjacent native vegetation to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity.

1.5 Site maps

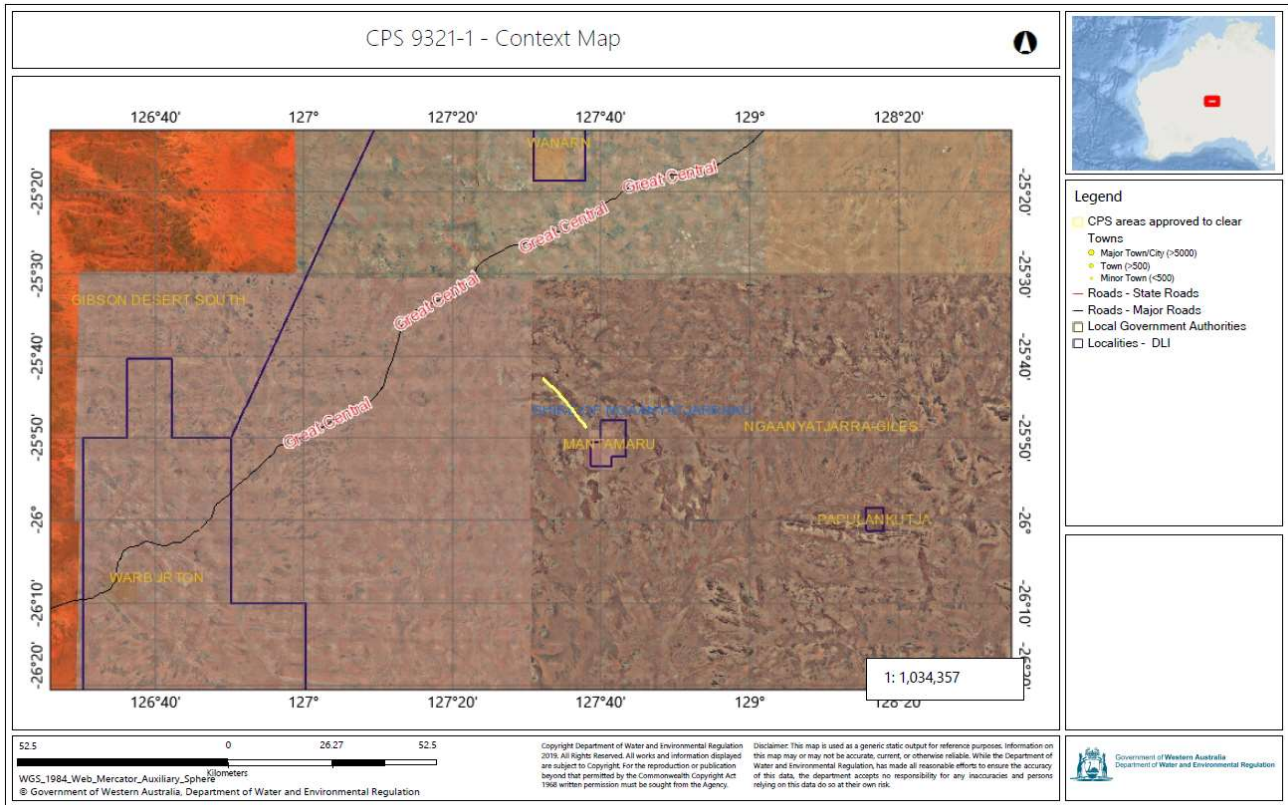


Figure 1 Context map of the application area

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

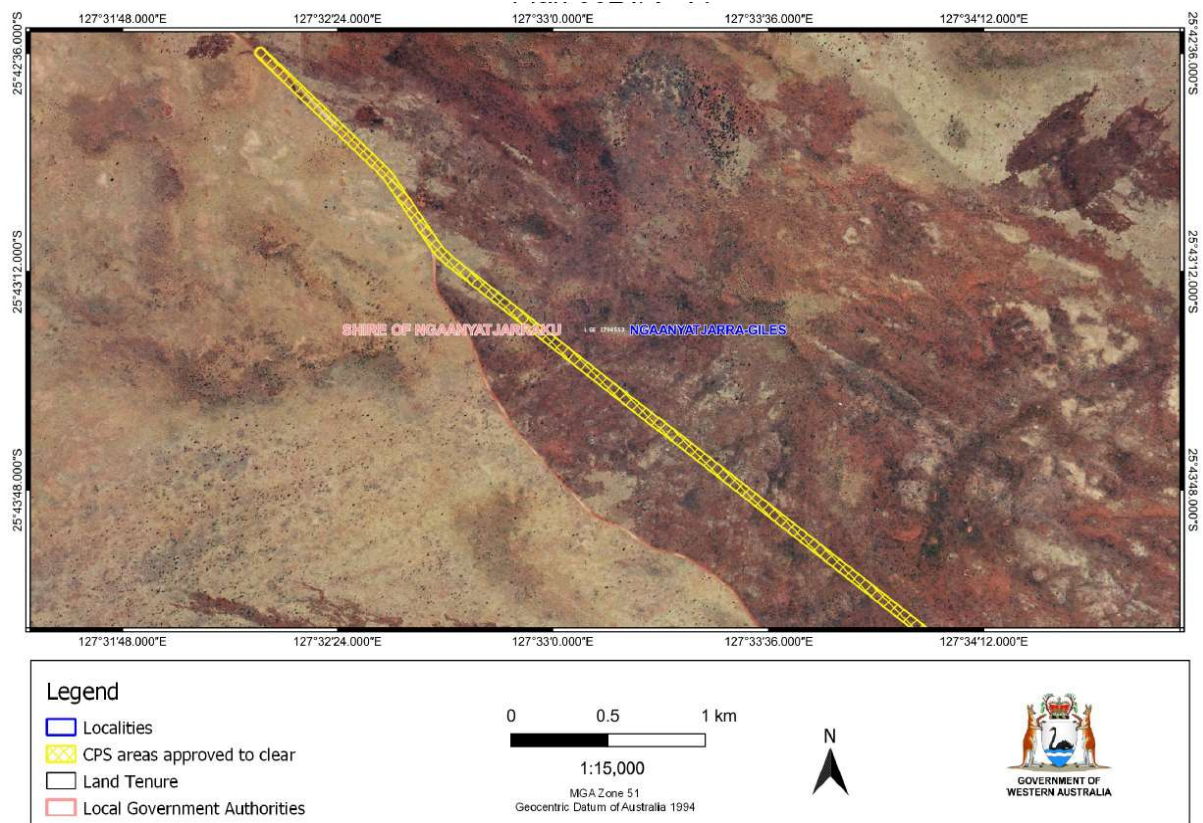


Figure 2-A. Map A of the application area

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

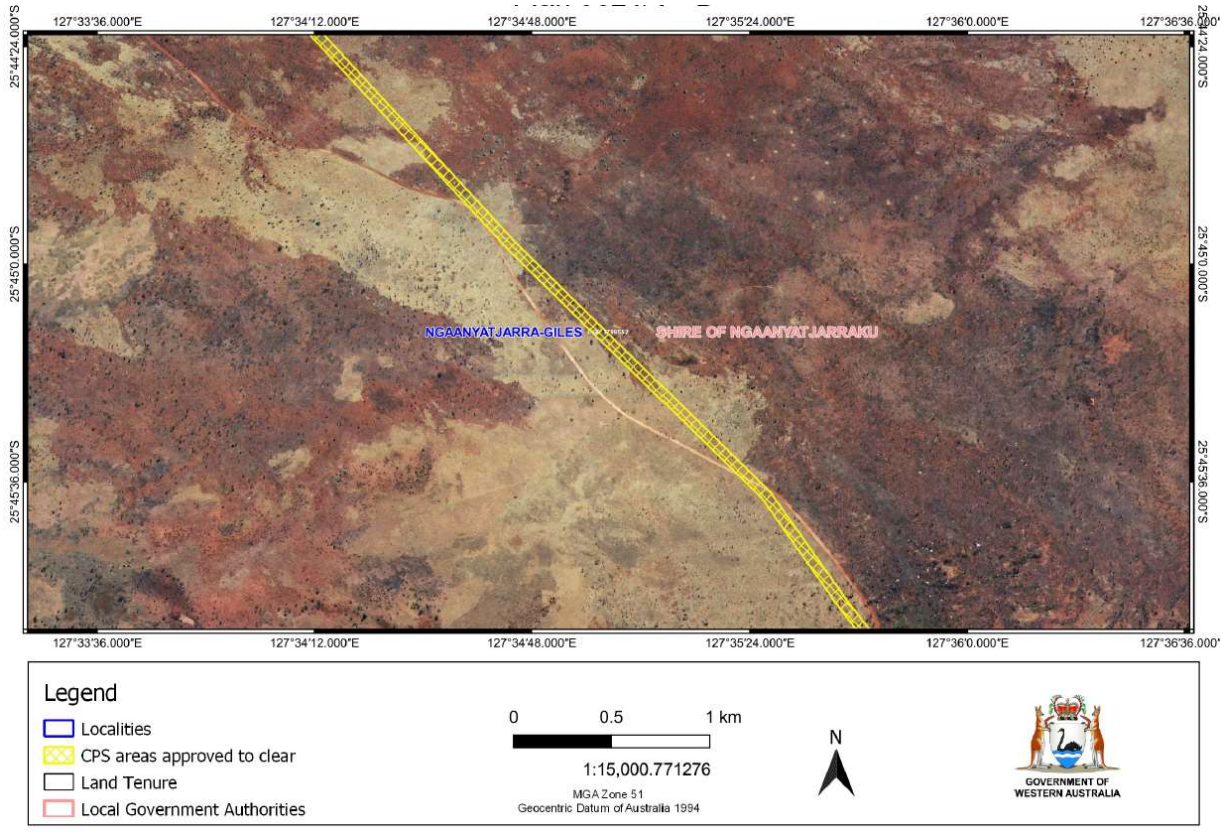


Figure 2-B. Map B of the application area

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

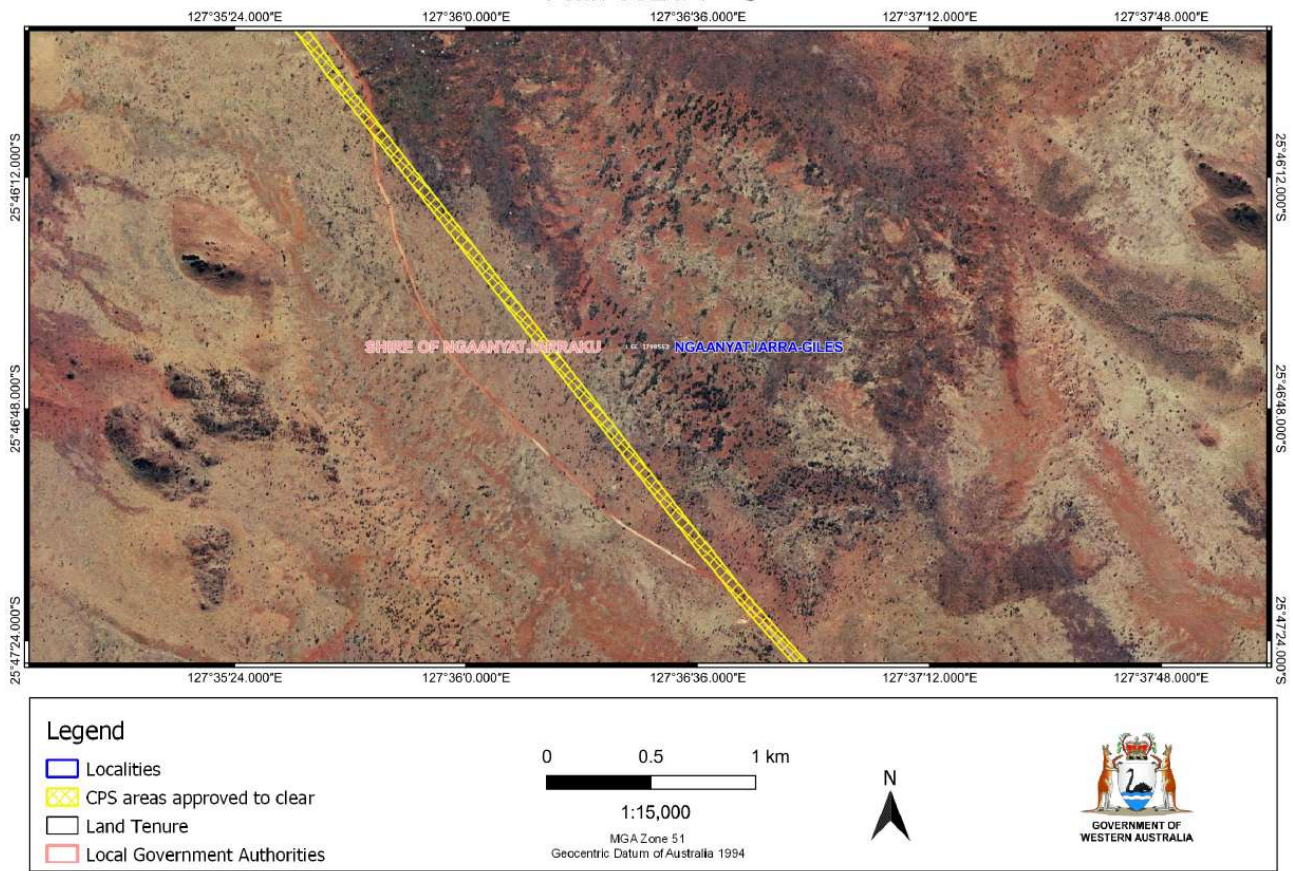


Figure 2-C. Map C of the application area

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

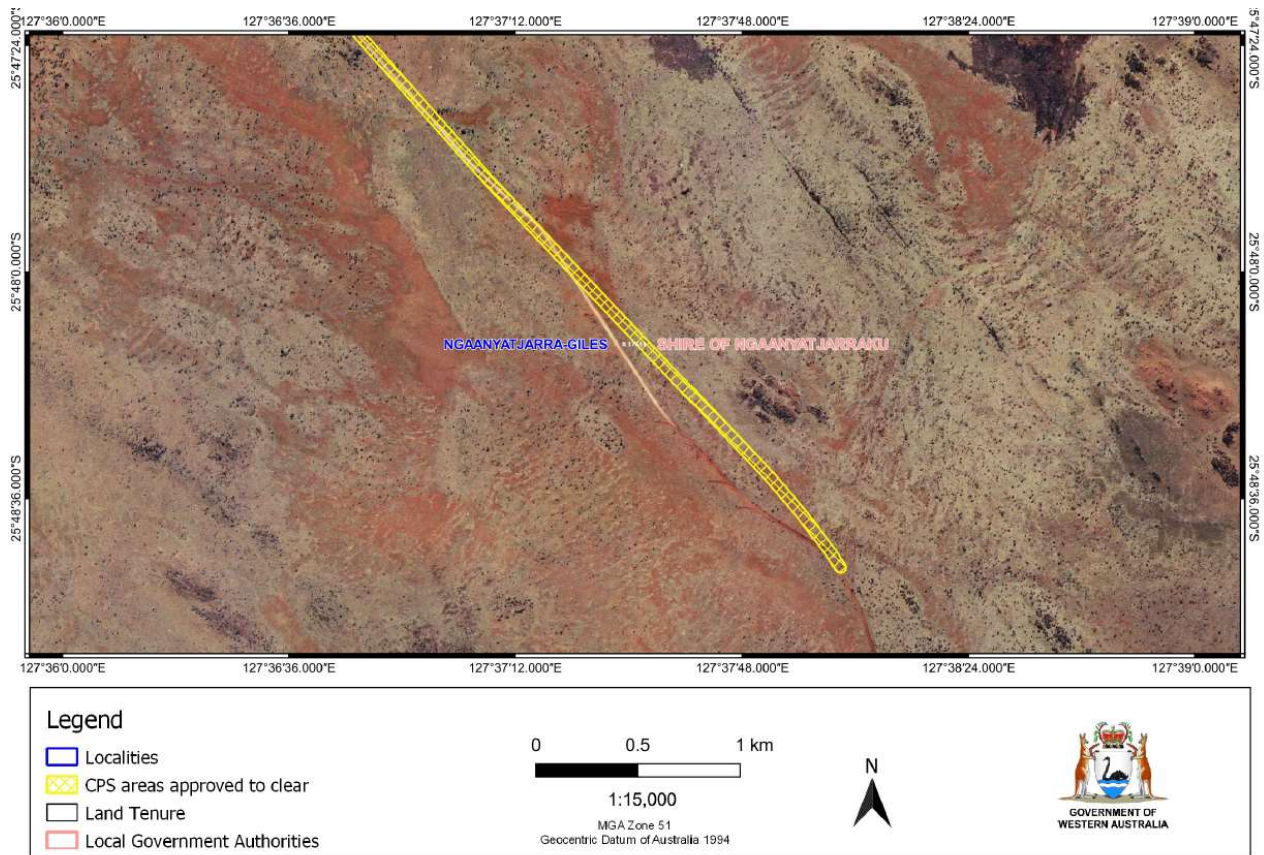


Figure 2-D. Map D of the application area

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)
- *Conservation and Land Management Act 1984* (WA) (CALM Act).
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Planning and Development Act 2005* (WA) (P&D Act)
- *Soil and Land Conservation Act 1945* (WA)

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)

3 Detailed assessment of application

3.1 Avoidance and mitigation measures

In response to DWER's preliminary assessment and request to minimise the extent and impact of clearing, the Shire committed to reduce the clearing area by 20 percent (Shire of Ngaanyatjarraku, 2021b) of the original application area of 79 ha. Therefore, within the 75.4 ha clearing envelope proposed, only a maximum of 63.2 ha will be cleared. Noting that offshoot drainage will only be constructed intermittently along the road, further minimisation is also committed by limiting clearing for the offshoot drainage to the sites where the offshoot drains are required.

Given the above, 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 **Error! Reference source not found.**) 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 **Error! Reference source not found.**) identified that the impacts of the proposed clearing may present a risk to biodiversity (flora and fauna) 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 - Clearing Principles (a) and (b)

Assessment

Flora

Several records of conservation significant flora and fauna have been recorded from within the local area (50 km radius from the application area). The lack of records is likely because the Central Ranges bioregion, or the Mann-Musgrave Block subregion, is poorly surveyed. The vegetation in the Central Ranges has only been mapped at a broad scale (1:1,000,000) and was completed at association level (Beard, 1974). The current vegetation extent in the area has been mapped as having more than 99 percent of its pre-European extent.

A flora and vegetation survey has been undertaken over the application area and two other sites within the Shire (GHD, 2021). The survey area is depicted in Figure 3, Appendix D. The survey broadly describes the dominant vegetation types as Mulga (*Acacia* spp.) woodlands, *Triodia* hummock grasslands, and *Aristida* tussock grasslands, with 174 native taxa and four introduced taxa (GHD, 2021). These vegetation types are well represented in the Central Ranges (DBCA, 2021). The survey identified a threatened flora taxon (*Seringia exastia*) which occurs in abundance, and Priority 2 and 3 flora (*Goodenia virgata* and *G. gibbosa* respectively) at sites within the Shire (located approximately within 100 km from the application area) whose vegetation types are similar to that of the application area. The identified priority and threatened flora species have been recorded on vegetation types that are well represented in the survey area (DBCA, 2021). The survey did not identify any threatened or priority ecological communities or threatened and priority flora within the application area itself however. Given the timing and survey effort, threatened and priority flora are not likely to occur within the application area.

The Survey identified Buffel grass (**Cenchrus ciliaris*) to thrive in some areas, particularly along the roadsides and tracks. The survey found that the greater the distance from the road and disturbed areas, the less evident the weeds' presence. Buffel grass has been known as the most widespread weed species in the Arid Zone 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 the weed, a stringent measure that controls the transport and transfer of such 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 control condition is imposed on the permit to mitigate this impact.

Fauna

As mentioned above, fauna records are not available from the local area (50 km radius from the application area), however conservation significant fauna have been recorded within the local area (See Appendix A). The fauna were

recorded from areas with similar habitat and vegetation features to that of the application area. Noting the poorly surveyed nature of the Central Ranges and in the absence of a fauna survey, the presence of conservation significant fauna individuals within the application area cannot be ruled out.

Of the recorded fauna species, the Vulnerable *Liopholis kintorei* (great desert skink) and Priority 4 *Dasyercus blythi* (Brush-tailed mulgara) are the most likely to occur in the local area. The two species were recorded from within 33 km from the application area and are known to occur in the Central Ranges.

The great desert skink is a burrowing skink well known and important to Aboriginal people throughout the western desert region of Australia for lore and as a food source (McAlpin, 2001). It is characterised by its large size (weighing up to 350 grams), blunt head, smooth scales, pale fawn to rich reddish brown dorsal colouring and its contrasting creamy or yellow ventral surface. The fauna species is vulnerable to predation by feral cats, foxes and dingoes. Its main distribution area includes the Ngaanyatjarra Indigenous Protected Area (TSS, 2016), which has the grasslands vegetation preferred by the skink. Given the above, dispersing great desert skink individuals may forage in the application area. However, given the vast area of similar and uncleared vegetation surrounding the application area, it is unlikely that the application area comprises significant habitat for this species.

Brush-tailed mulgara is a rat-sized carnivorous marsupial with a broad head, pointed muzzle and rounded ears. It is one of the largest remaining marsupial predators to persist across the Australian arid zone, including Central Western Australia. At least 131 records of this fauna species have been known from within 50 km of the application area. The spinifex *Triodia* spp. grasslands and *Acacia aneura* (Mulga) woodlands, which are well represented in the Shire and the application area, are the Mulgara's preferred habitat. The main threat to the species is fauna predation by feral cats, foxes and dingoes. Mature spinifex hummocks have been known as an important resource of protection from the introduced predators. The mulgara is also reported to be using the resource rich patches including the termite mounds and great desert skink's burrows for food sources and protection. Noting the above, it is not unlikely that the Brush-tailed mulgara occurs in the application area and that the vegetation proposed to be cleared may provide habitat to this species. However, given the vast area of uncleared vegetation nearby and the species ability to utilise several components in the landscape to increase access to food resources (Molyneux et al., 2018), the foraging habitat being removed within the application area is unlikely to be significant. Impact of clearing on any individuals present can be minimised by conducting the clearing in stages, slowly and in the direction toward the adjacent vegetation to allow any individual present to disperse into nearby vegetation ahead of the clearing.

Conclusion

Based on the above assessment, the proposed clearing may impact on the habitat for the Great desert skink and Brush-tailed mulgara. The potential impacts of the proposed clearing on the adjacent vegetation and fauna individuals that may be present at the time of clearing can be managed by implementing flora, fauna and weed management practices.

Conditions

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

- Demarcation of the clearing area to prevent inadvertent loss any conservation significant flora individuals outside that may be present nearby
- Slow directional clearing to allow any fauna individuals present to move into adjacent vegetation ahead of the clearing activity will minimise impact to individuals
- Implement weed management measures to prevent the introduction and spread of weeds into the adjacent vegetation

3.2.2 Land and water resources – Wind erosion and sediment export - Clearing Principles (g)

Assessment

The application area is in the Arid Internal Region where the soils comprise of sands and the climate is dry. Consequently, in the absence of ground cover, the loose sands are prone to wind erosion. With limited rainfall and high evaporation, the risk from water erosion is low. However, where rainfall is sufficient, runoff in the area generally drains as sheet flow (GHD, 2021) which may transport sediment to nearby areas. The sub-bioregion is known to be the source of sediment for the neighbouring regions (Tille, P.J., 2006). Indiscriminate flows of runoff may also exacerbate the spread of seedbank of weeds contained in the sediment (Scott, J.K. et al, 2018).

The application area, typical of the Arid region, may have a high dust load. Dust is known to accumulate on plants, particularly near to the source, and may affect the plant health. Research on the impacts of dust on plant health in the 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). Given the low rainfall and sandy soils of

the application area, the proposed clearing may exacerbate the risk of dust accumulation. However, noting the linear nature of the proposed clearing within the context of a largely uncleared area with extensive vegetation extent, the proposed clearing is not expected to lead to significant degradation of the vegetation nearby due to the dust. Similarly, although clearing may increase the risk of land degradation due to wind erosion and sediment transport; within the context of the extensive vegetation cover of the local area and the region, this impact is unlikely to be significant. Application of appropriate land management measures during clearing and in post clearing can mitigate the impact.

Construction and placement of table drains and associated offshoot drainages alongside the road 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. Appropriate land management measures can minimise and mitigate the potential impact.

Conditions

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

- Commencement of the construction of the road and associated drainages no later than three (3) months after undertaking the authorised clearing activities to reduce the potential for wind erosion.

4 Relevant planning instruments and other matters

Reserve R 17614 within which the application area is located, is vested with the Aboriginal Affairs Planning Authority and leased to the Ngaanyatjarra Land Council (Aboriginal Corporation) (NgLC) for the "Use and Benefit of Aboriginal Inhabitants" and overlapping the Ngaanyatjarra Lands native title determination. NgLC as the landholder of reserves and leases of the area, including Reserve 17614, which are proclaimed under Part III of the *Aboriginal Affairs Planning Authority Act 1972 (WA)*, has provided support for the road works for the use and benefit of the Ngaanyatjarra people on the leased land (NgCL, 2021).

Several Aboriginal sites of significance have been mapped within the Shire of Ngaanyatjarraku. The Shire had appointed FB Nicholson, the Senior Anthropologist of the Ngaanyatjarra Land and Culture Unit with the Ngaanyatjarra Council, to perform a heritage survey for the purpose of having a heritage clearance for the works associated with the road upgrade and realignment of the Jameson Cutline Road. The survey was performed on 28 September 2022 following a consultation with the Jameson community on the 25 September 2020. Senior members of the Community were involved in the survey. As a result of the survey, a minor amendment was made to the original proposed route of the road. The current proposed road alignment has been given the heritage clearance and approval (Nicholson, 2020). In addition, the report highlighted the key Jameson residents' support of the proposed road work.

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

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

Characteristic	Details
Local context	<p>The area proposed to be cleared is in the extensive land use zone of Western Australia, approximately 6 kilometres from Jameson Community, in the Central Ranges IBRA bioregion. It is an approximately 15-kilometre-long by 50-metre-wide corridor within the Jameson – Wanarn Road.</p> <p>Aerial imagery indicates the local area (50-kilometre radius from the centre of the area proposed to be cleared) retains approximately 99 per cent of the original native vegetation cover.</p>
Ecological linkage	The application area is not mapped within any formal ecological linkages.
Conservation areas	The nearest conservation area from the application area is the Pila Nature Reserve (Gibson Desert) – Reserve R34606, located approximately 137 km northwest of the application area.
Vegetation description	<p>Vegetation mapping of the region is that of a broad scale (1:1,000,000) and was completed at association level (Beard 1974). The mapping indicates that two vegetation associations occur across the application area:</p> <ul style="list-style-type: none"> • Low woodland; mulga (<i>Acacia aneura</i>) (vegetation association 18) • Hummock grasslands, shrub steppe; acacia and grevillea over <i>Triodia basedowii</i> (vegetation association 95) <p>The current extents of the vegetation associations are greater than 99 per cent of the pre-European extent at all scales (e.g. State, IBRA Sub-region and Local Government Area (LGA)).</p> <p>The Flora and Vegetation survey (GHD, 2021) identified the vegetation in the application area as largely dominated by tussock grasslands / forblands with isolated to small patches of tall shrubs or low trees (<i>Acacia sibirica</i>, <i>A. incurvaneura</i>, <i>A. aneura</i>, <i>A. sericophylla</i> and <i>Hakea lorea</i>) on open stony claypans (VT03). Vegetation cover ranged from bare patches to a moderately dense grass and herb layer dominated by <i>Aristida holathera</i> Domin var. <i>holathera</i>, <i>Enneapogon polyphyllus</i>, <i>Eragrostis dielsii</i>, <i>Dactyloctenium radulans</i>, <i>Sclerolaena cornishiana</i>, <i>Ptilotus</i> spp., <i>Boerhavia coccinea</i>, <i>Portulaca intraterranea</i> and <i>Tribulus occidentalis</i>. A small patch of mulga open woodland (VT01) is present at the southern end of the alignment and a small patch of hummock grasslands dominated by <i>Triodia basedowii</i> associated with a low sandy rise is situated towards the northern end of the alignment (VT04).</p>
Vegetation condition	<p>Vegetation condition was assessed using the condition rating scale adapted by the EPA (2016) for the Eramaeen and Northern Botanical Province. GHD (2021) survey assessed the vegetation to be predominantly in Very Good condition with some roadside vegetation in Good condition due to the presence of weeds, edge effects and clearing. Patches of Buffel Grass (*<i>Cenchrus ciliaris</i>) was recorded within the alignment, predominantly along the existing roadside.</p> <p>The full Trudgen (1991) condition rating scale is provided in Appendix C. Representative photos are available in Appendix D.</p>
Climate and landform	The climate of the Central Ranges bioregion is hot and arid. The average annual rainfall at Warburton Airfield is 243.8 mm, which predominantly occurs between December and March, derived from summer storms. The area is warm to hot throughout the year, with a mean maximum daily temperature of 37.8 °C (recorded in January).
Soil description	The soils and landforms within the application area are mapped (Department of Primary Industries and Regional Development, 2021) as:

Characteristic	Details
	<ul style="list-style-type: none"> 619My109 (northern 2/3 of application area) - Outwash plains and dissected fan and terrace formations flanking ranges of sedimentary and some metamorphic, volcanic, and granitic rocks 192AB47 (southern 1/3 of application area) - Plains and dunes—longitudinal and ring dunes with interdune corridors and plains; occasional salt pans. <p>The soils within the application area consist of red sandy earths, red deep sands and red loamy earths (Tille, P.J., 2006)</p>
Land degradation risk	Being in the Arid Region and consisting mostly of sands, the soils in the area are prone to wind erosion. The area is also the source of sediments to the neighbouring regions (Tille, P.J., 2006). With limited rainfall and high evaporation, the risk from water erosion is low. Where rainfall is sufficient, runoff in the area generally drains as sheet flow (GHD, 2021).
Waterbodies	No significant surface water features or watercourses occur within or in the vicinity of the application area. Surface water in the region is severely limited by a combination of high evaporation/evapotranspiration rates and low annual rainfall. When rainfall is sufficient, runoff in the area generally drains as sheet flow (GHD, 2021). There are no vegetation types within the survey areas which are considered representative of riparian vegetation (GHD, 2021).
Hydrogeography	The area proposed to be cleared is within the East Murchison Groundwater Area proclaimed under the <i>Rights in Water and Irrigation Act 1914</i> .
Flora	There is no record of conservation significant flora in the application area or vicinity. The closest recorded significant flora are of <i>Goodenia gibbosa</i> and <i>G. hirsuta</i> located approximately 24 km from the application area. There are records of at least 12 priority flora within 50 kilometres radius, all of which are found on the same soil and vegetation types as the application area. No threatened or priority flora were identified within the application area during the flora survey by GHD (2021).
Ecological communities	There are no mapped threatened (TEC) or priority (PEC) ecological communities within 100km of the area proposed to be cleared. The GHD (2021) survey did not identify any TEC or PEC within the survey areas and reported it to be unlikely that any of the vegetation communities present are restricted only to the survey area.
Fauna	No records of conservation significant fauna have been known from the application area and vicinity. However, at least 10 conservation significant fauna species, five of which are Vulnerable or Endangered, have been recorded from within 50 km radius of the application area. These fauna were found in similar soil and habitat types as 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*					
Central Ranges - Mann-Musgrave Block subregion (Giles Botanical District)	4,701,519.37	4,700,206.00	99.97		
Local area					
20km radius	186,643.35		99.9	-	-

*Government of Western Australia (2019a)

**Government of Western Australia (2019b)

A.3 Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix **Error! Reference source not found.**), 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]
<i>Amaranthus centralis</i>	3	Y	Y	Y	44.43	2	Y
<i>Chrysocephalum apiculatum</i> subsp. racemosum	3	Y	Y	Y	47.93	2	Y
<i>Euphorbia parvicaruncula</i>	1	Y	Y	Y	46.14	1	Y
<i>Goodenia asteriscus</i>	3	Y	Y	Y	34.90	2	Y
<i>Goodenia gibbosa</i>	3	Y	Y	Y	48.86		Y
<i>Goodenia hirsuta</i>	3	Y	Y	Y	24.06	1	Y
<i>Indigofera warburtonensis</i>	1	Y	Y	Y	47.93	2	Y
<i>Neurachne lanigera</i>	1	Y	Y	Y	30.48	2	Y
<i>Seringia exastia</i>	T	Y	Y	Y	31.25		Y
<i>Stackhousia clementii</i>	3	Y	Y	Y	29.67	2	Y
<i>Thryptomene</i> sp. Warburton (M. Henson & M. Hannart 32433)	1	Y	Y	Y	30.57	1	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>Amytornis striatus striatus</i> (Striated grasswren (sandplain))	P4	Y	Y	33.87	5	N/A
<i>Dasyercus blythi</i> (Brush-tailed mulgara)	P4	Y	Y	32.87	130	N/A
<i>Falco peregrinus</i> (Peregrine falcon)	OS	Y	Y	23.71	1	N/A
<i>Leipoa ocellata</i> (malleefowl)	VU	Y	Y	48.40	1	N/A
<i>Leporillus conditor</i> (greater stick-nest rat, wopilkara)	CD	Y	Y	32.16	2	N/A
<i>Liopholis kintorei</i> (Great desert skink)	VU	Y	Y	33.87	1	N/A
<i>Macrotis lagotis</i> (Bilby, dalgyte, ninu)	VU	Y	Y	33.87	1	N/A
<i>Notoryctes sp.</i> (marsupial mole)	P4	Y	Y	47.28	2	N/A
<i>Petrogale lateralis lateralis</i> (Black-flanked rock-wallaby, black-footed rock-wallaby)	EN	Y	Y	31.18	1	N/A
<i>Petrogale lateralis</i> subsp. (MacDonnell Ranges)(MacDonnell Range black-footed rock-wallaby, black-footed rock-wallaby (MacDonnell Ranges), warru)	VU	Y	Y	31.10	1	N/A

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		
<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 does not contain significant flora, fauna habitats or assemblages of plants. The closest records of conservation significant flora are from within 30 km radius from the application area. Whilst the area has been poorly surveyed, a survey of the application area did not record any PEC, TEC or threatened or priority flora.</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 has been recorded from the application area or nearby. The nearest records of conservation significant fauna are from within 30 km radius from the application area. The application area contains suitable habitat, albeit not significant habitat, for conservation significant fauna recorded within the local area.</p>	Not likely to be 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>The area proposed to be cleared does not contain any flora species listed under the BC Act or EPBC Act.</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 TEC is mapped within 20 km radius of the application area. The vegetation survey also confirmed the absence of any TEC from the application area and surrounds (GHD, 2021).</p>	Not likely to be at variance	No
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 the local area are consistent with the national objectives and targets for biodiversity conservation in Australia.</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> <p><u>Assessment:</u></p> <p>Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of any conservation areas.</p>	Not likely to be at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
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>No water courses or wetlands are recorded within the application area and vicinity. The proposed clearing is unlikely to impact on- or off-site hydrology and water quality. Vegetation survey also confirms that the vegetation types in the area do not indicate any riparian vegetation (GHD, 2021).</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>The soils in the application area comprise of loose sands that are prone to wind erosion. Soil management practices may mitigate the impact of land degradation.</p>	May 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>Given no water courses / wetlands / Public Drinking Water Sources Areas are recorded within the application area, the proposed clearing is unlikely to impact surface or ground water quality.</p>	Not likely to be at variance	No
<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 and surveyed 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 and photographs of the vegetation

The Shire commissioned GHD Pty Ltd (GHD) to undertake a detailed flora and vegetation assessment of the proposed Warburton Bypass, Jameson Wanarn (Cutline) Road realignment, Blackstone realignment and eight gravel pit sites. The purpose of the assessment was to identify key flora and vegetation values within the survey areas. The result of the assessment is used to support a clearing permit application to the Department of Water and Environmental Regulation (DWER) for the proposed roadworks. For the Jameson Wanarn Road project, the survey area is limited to the area within the proposed road corridor, namely the clearing permit application area, measuring approximately 15 km long and 79 ha in total area (Figure 3).

Methods of the survey include:

- Desktop assessment of the survey area
- Field survey was conducted between 4 and 7 March of 2021:
 - Performed by GHD Senior Ecologist and Ecologist
 - In accordance with the Environmental Protection Authority (EPA) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016)
 - Involved a combination of sampling quadrats, relevés, photographic reference points and walking traverses
 - Quadrats, measuring 50 m x 50 m each, were located within each identified vegetation unit
 - Significant flora identified in the desktop assessment were targeted.

The survey effort has not been subject to any constraints, which affect the thoroughness of the assessment and the conclusions that have been formed.

Results:

- Three vegetation types were identified and described for the Jameson Wanarn Road Survey area. The dominant vegetation types mapped within the survey areas are broadly described as Mulga (*Acacia* spp.) woodlands, *Triodia* hummock grasslands and *Aristida* tussock grasslands.
- The topography and soils of the survey areas consisted predominantly of stony sandy/loamy plains and claypans. The map and description of the vegetation types and substrates are given in Table 1 and Figure 3 below.
- The condition of the vegetation within the application area ranged from Good to Very Good
- No threatened or priority ecological communities (TEC/PEC) were identified within the application area
- No threatened or priority flora species listed under the EPBC Act and/or the BC Act was identified within the application area.

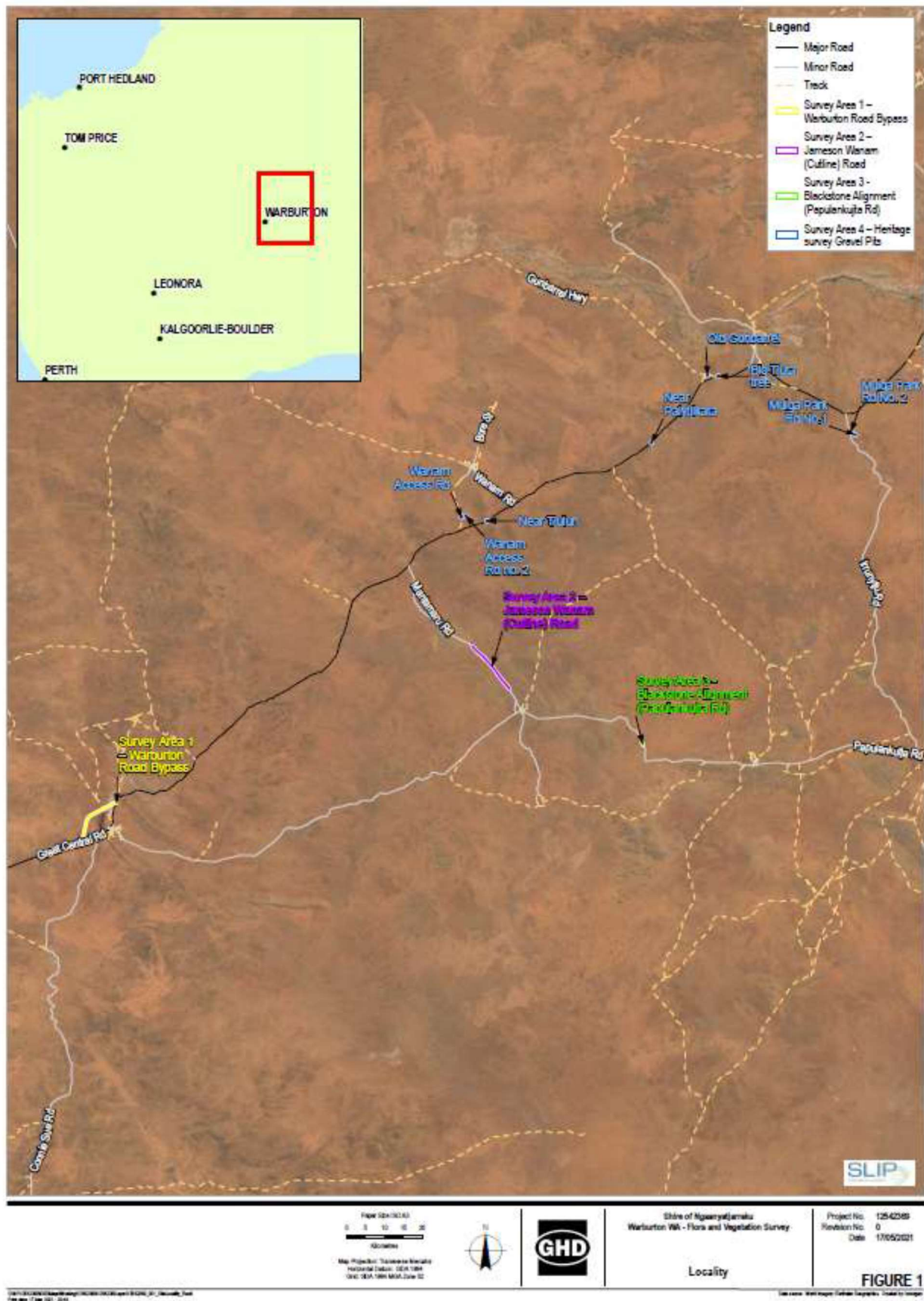





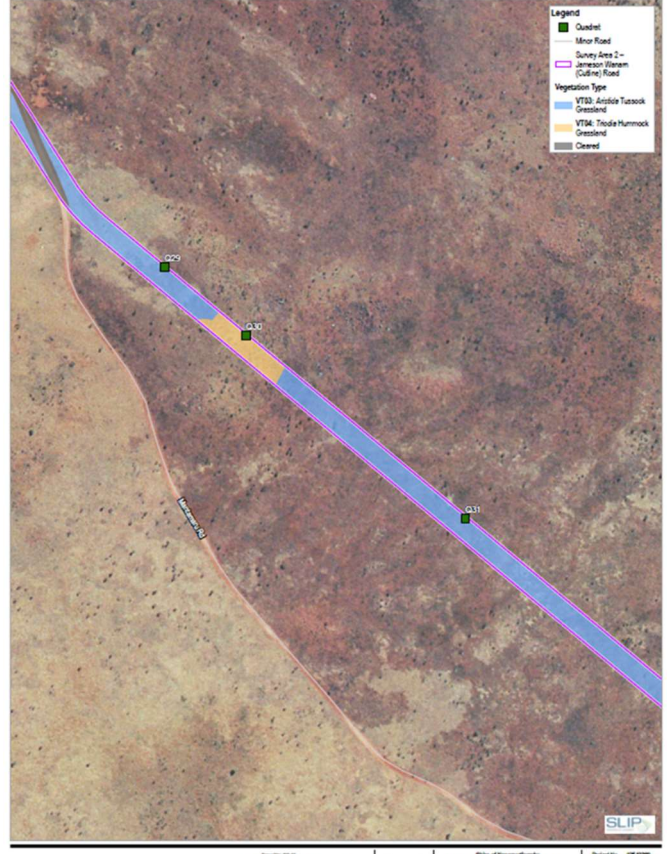
Figure 3. The flora and vegetation survey area. The application area is shaded purple (GHD, 2021)

Table 1. Description of vegetation types recorded within the application area (GHD, 2021a).

Vegetation Type	Vegetation Association	Landform / Substrate	Representative Photograph
Acacia (Mulga) Woodland (VT01)	<i>A. aneura</i> , <i>Acacia sericophylla</i> and <i>A. minyura</i> low woodland to low open woodland/shrublands over <i>Eremophila latrobei</i> subsp. <i>filiformis</i> scattered shrubs over <i>Triodia spp.</i> , <i>Aristida holathera</i> Domin var. <i>holathera</i> , and <i>Eriachne spp.</i> open hummock/tussock grassland over <i>Ptilotus xerophilus</i> , <i>Sida spp.</i> and <i>Brunonia australis</i> sparse forbland.	Sandy-loam plain / hardpan / stony plain	
Aristida Tussock Grassland/ Forbland (VT03)	Mixed Acacia species (dominant species <i>Acacia incurvaneura</i> , <i>A. sibirica</i> , <i>A. sericophylla</i> , <i>A. pruinocarpa</i> and <i>A. tetragonophylla</i>) and <i>Hakea lorea</i> open low woodland to isolated shrubs over <i>Rhagodia eremaea</i> , <i>Senna spp.</i> and <i>Eremophila spp.</i> sparse mid shrubland over <i>Ptilotus spp.</i> , <i>Sclerolaena cornishiana</i> and <i>Salsola australis</i> low shrubland over <i>Aristida holathera</i> Domin var. <i>holathera</i> , <i>Enneapogon polyphyllus</i> , <i>Eragrostis dielsii</i> and <i>Dactyloctenium radulans</i> tussock grassland to over <i>Boerhavia coccinea</i> , <i>Portulaca intraterranea</i> and <i>Tribulus occidentalis</i> forbland. A variable vegetation type with some bare patches and others with occasional patches of Mulga.	Red/brown gravelly claypans	
Triodia Hummock Grassland (VT04)	<i>Hakea lorea</i> , <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> and <i>A. dictyophleba</i> sparse shrubland over <i>Triodia basedowii</i> , <i>Aristida holathera</i> Domin var. <i>holathera</i> and <i>Eragrostis dielsii</i> hummock grassland over <i>Waltheria indica</i> , <i>Ptilotus spp.</i> and <i>Solanum coactiliferum</i> sparse forbland.	Red /brown sandy slope/ low dune	



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 Scale: 1:5000
 GHD
 State of Queensland
 Workforce WA - Flora and Vegetation Survey
 Project No: 1264286
 Revision No: 3
 Date: 17/09/2021
 Vegetation Types:
 Jameson Wanam (Cutline) Road
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FIGURE 3



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 Workforce WA - Flora and Vegetation Survey
 Project No: 1264286
 Revision No: 3
 Date: 17/09/2021
 Vegetation Types:
 Jameson Wanam (Cutline) Road
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FIGURE 3



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FIGURE 3



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FIGURE 3

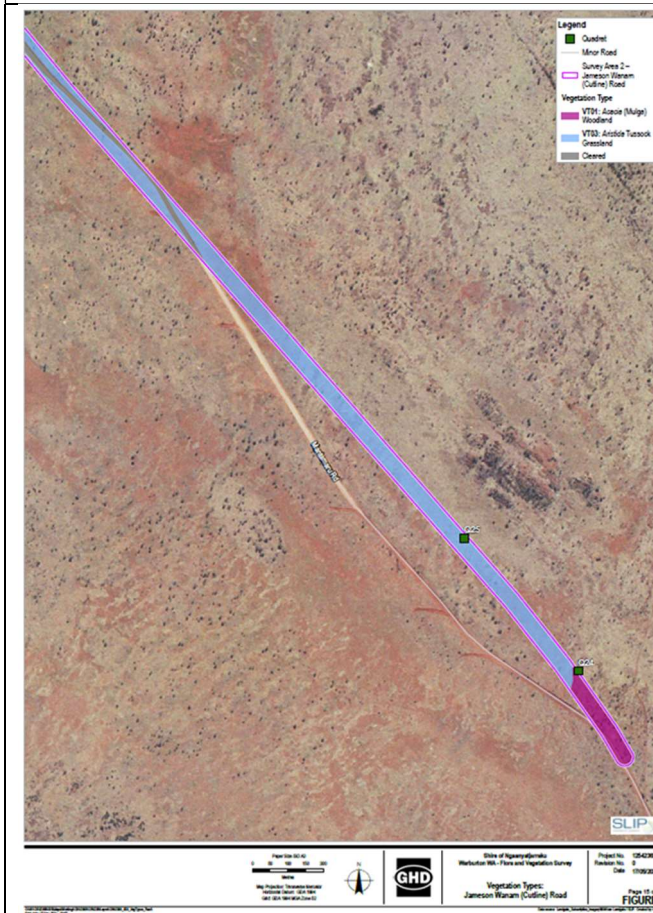


Figure 4. Vegetation type within the survey area (GHD, 2021)

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)
- 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

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)

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