GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 9547/1
Permit Holder:	Commonwealth Scientific, Industry and Research Organisation's (CSIRO)
Duration of Permit:	From 9 January 2023 to 9 January 2028

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

PART I –CLEARING AUTHORISED

1. Purpose for which clearing may be done

Clearing for the purpose of constructing an accommodation camp, contractor compound, fibre cable, emergency airstrip and access road for the Square Kilometre Array Project.

2. Land on which clearing is to be done

Lot 18 on Plan 220344, South Murchison
Boolardy-Kalli Road Reserve (PIN 11708251), South Murchison
Beringarra-Pindar Road Reserve (PIN 11665424), South Murchison

3. Area of clearing

The permit holder must not clear more than 99 hectares of *native vegetation* within the areas shaded yellow in Figures 1 and 2 of Schedule 1.

4. Application

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

5. Staged clearing

The permit holder shall not clear *native vegetation* unless the purpose for which the clearing is authorised is enacted within three months of the clearing being undertaken.

PART II –MANAGEMENT CONDITIONS

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

The permit holder must apply the following principles in relation to clearing authorised under this permit, set out in 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 where it is reasonably practicable to do so.

7. Weed control

When undertaking any clearing authorised under this permit, the permit holder must take the following steps to minimise the risk of the 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.

8. Priority flora management - *Gunniopsis divisa*

The permit holder shall not cause or allow the clearing of more than 50 percent of the population of *Gunniopsis divisa* (Priority 3) recorded within the approved clearing area, as identified in AECOMs pre-clearance flora survey of the approved clearing area undertaken on 14 September 2022.

9. Priority flora management - *Calandrinia* sp. Boolardy Station (P. Jayasekara 719-JHR-01)

The permit holder shall not clear within the area shaded red in Figure 3 of Schedule 1, to maintain a 20-metre buffer to the recorded location of *Calandrinia* sp. Boolardy Station (P. Jayasekara 719-JHR-01) (Priority 1).

10. Directional clearing

The permit holder must:

(a) conduct clearing authorised under this permit from one direction to the other towards adjacent *native vegetation*; and
(b) allow a reasonable time for fauna present within the areas being cleared to move into adjacent *native vegetation* ahead of the clearing activity.

PART III - RECORD KEEPING AND REPORTING

11. 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	(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 1994/2020, 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) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 6; (f) actions taken to minimise the risk of the introduction and spread of weeds in accordance with condition 7; (g) the population of *Gunniopsis divisa* (Priority 3) cleared in accordance with condition 8; (h) actions taken in accordance with condition 9; (i) actions undertaken in accordance with condition 10.

12. Reporting

(a) The permit holder must provide to the *CEO*, on or before 30 June of each calendar year, a written report containing:

(i) the records required to be kept under condition 11; and

(ii) records of activities done by the permit holder under this permit between 1 January and 31 December of the preceding calendar year.

(b) If no clearing authorised under this permit has been undertaken, a written report confirming that no clearing under this permit has been undertaken, must be provided to the *CEO* on or before 30 June of each calendar year.

(c) The permit holder must provide to the *CEO*, no later than 90 calendar days prior to the expiry date of the permit, a written report of records required under condition 11, where these records have not already been provided under condition 12(a).

DEFINITIONS

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

Table 2: Definitions

Term	Definition
CEO	Chief Executive Officer of the department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*.
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 *Public Sector Management Act 1994* (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.

Term	Definition
EP Act	*Environmental Protection Act 1986* (WA)
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
priority flora	means those plant taxa described as priority flora classes 1, 2, 3, or 4 in the *Department of Biodiversity, Conservation and Attractions Threatened and Priority Flora List for Western Australia* (as amended).
weeds	means any plant – (a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or not indigenous to the area concerned.

END OF CONDITIONS

Mathew Gannaway
MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under section 20
of the Environmental Protection Act 1986

16 December 2022

Schedule 1

The boundary of the areas authorised to clear are shown in Figures 1 and 2. The boundary of the area that is not authorised to clear, subject to Condition 9, is shown in Figure 3.

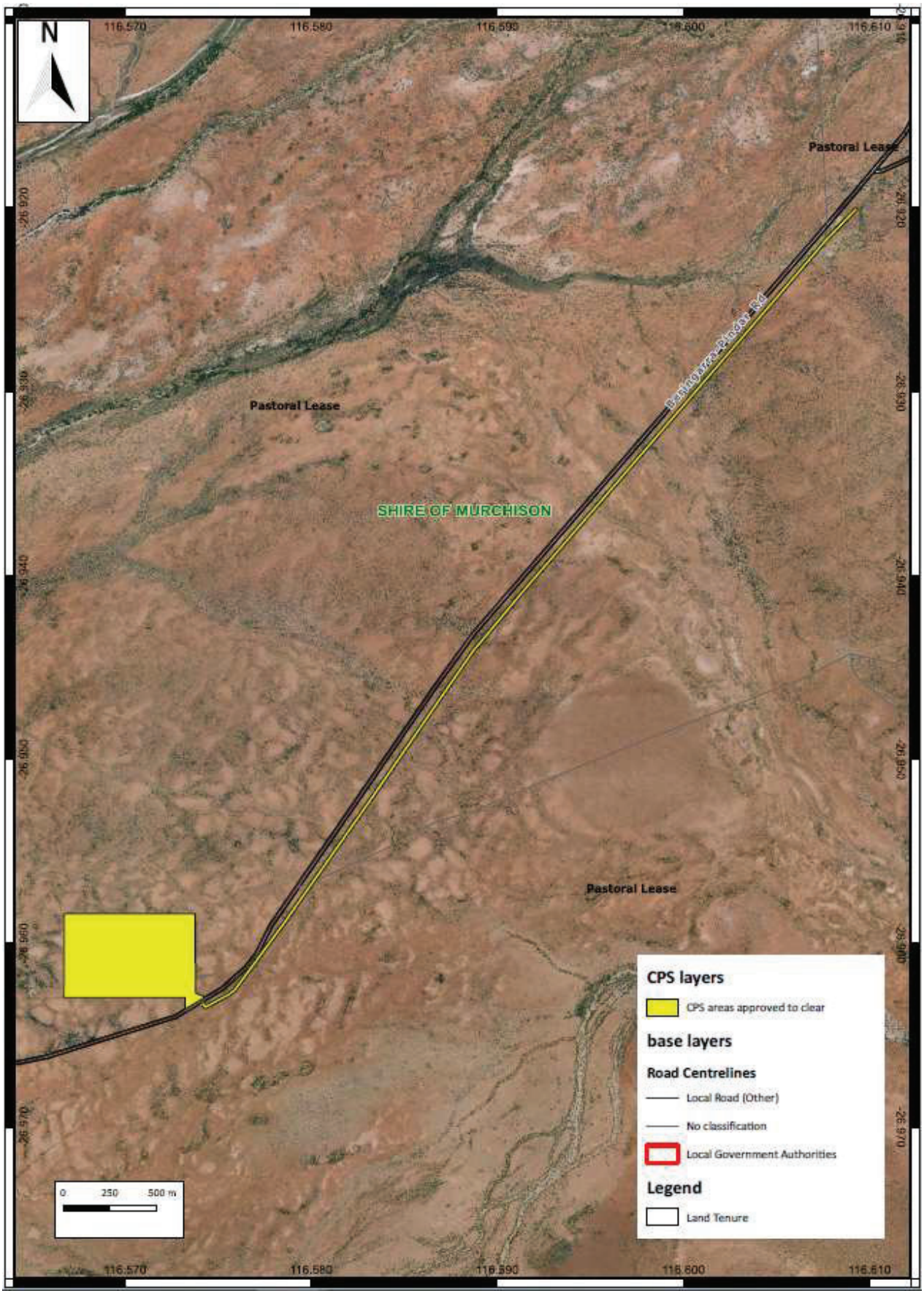

Figure 1: Map of the boundary of the area within which clearing may occur.

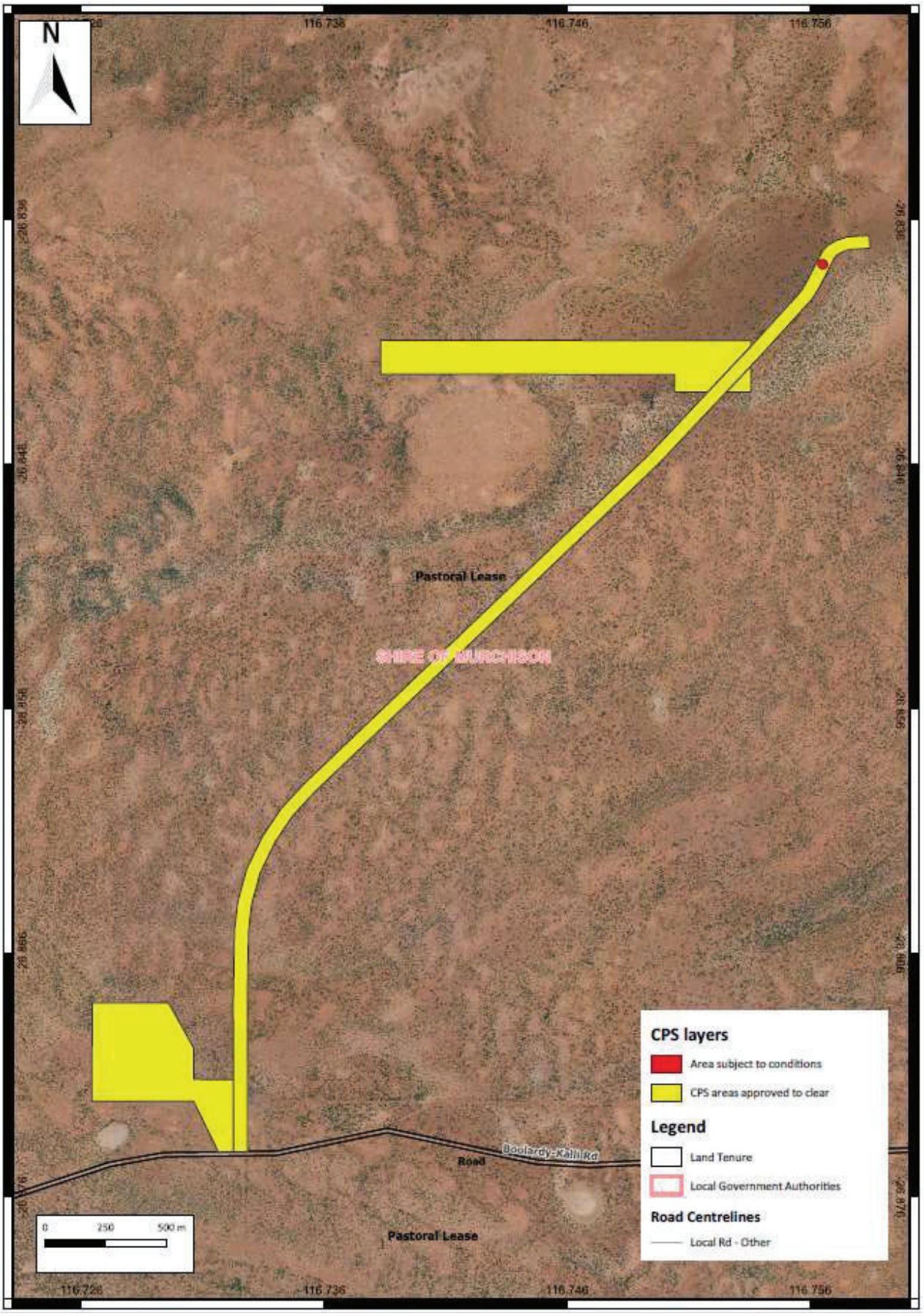

Figure 2: Map of the boundary of the area within which clearing may occur shaded yellow. The area subject to conditions that is not authorised to clear is shaded red.

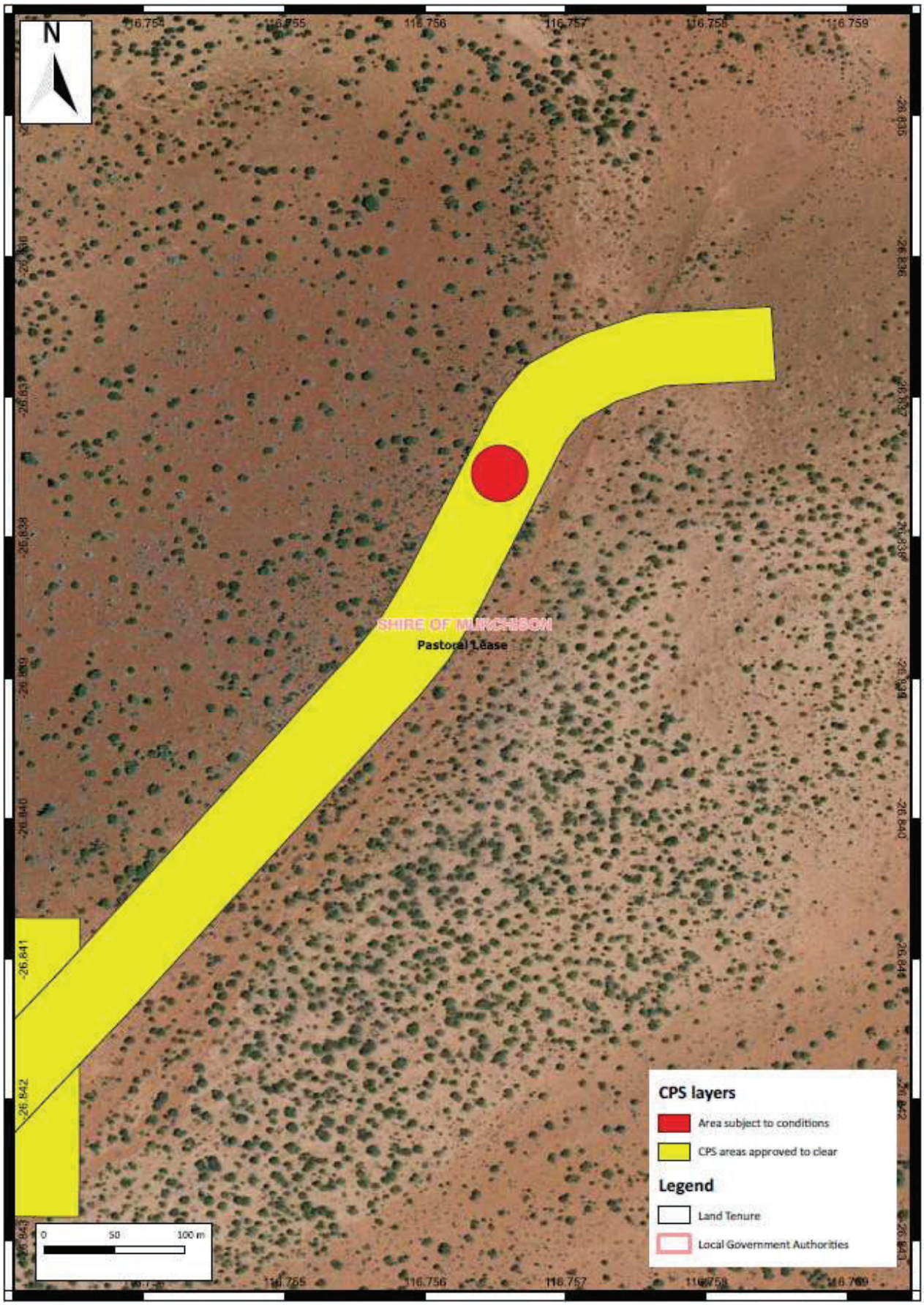

Figure 3: Map of the boundary of the area that is not authorised to clear as shaded red, subject to Condition 9 of this clearing permit.

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 9547/1
Permit type:	Purpose permit
Applicant name:	Commonwealth Scientific, Industry and Research Organisation's (CSIRO)
Application received:	24 December 2021
Application area:	99 hectares of native vegetation within a 123.48-hectare application footprint
Purpose of clearing:	Constructing an accommodation camp, contractor compound, fibre cable, emergency airstrip and access road for the Square Kilometre Array Project
Method of clearing:	Mechanical
Property:	Lot 18 on Plan 220344 Beringarra-Pindar Road Reserve (PIN 11665424) Boolardy-Kalli Road Reserve (PIN 11708251)
Location (LGA area/s):	Shire of Murchison
Localities (suburb/s):	South Murchison

1.2. Description of clearing activities

The proposed clearing is to construct an accommodation camp, contractor compound, fibre cable, emergency airstrip and access road associated with the Square Kilometre Array (SKA) Project (SKA1-Low array). The SKA1-Low array project is an international effort to build the world's largest radio astronomy observatory with the potential to provide greater understanding of the universe (AECOM, 2021).

The proposed clearing represents the first stage of this project, with later stages relating to the installation of numerous antennas to construct a radio telescope that enables fine resolution imaging (AECOM, 2021).

The application area is around 350 kilometres northeast of Geraldton, in South Murchison. It occurs within an extensively vegetated landscape, with the local area retaining around 99 per cent remnant native vegetation. The application area is subject to a CSIRO lease, having formerly been part of Boolardy Pastoral Station before its excision. The applicant notes that the area was selected to host the SKA1-Low array due to its excellent radio-quiet environment and proximity to services and infrastructure (AECOM, 2021).

1.3. Decision on application

Decision:	Granted
Decision date:	16 December 2022
Decision area:	99 hectares of native vegetation 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 public 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 assessment (GHD, 2018; AECOM 2022a;2022b), 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).

In particular, the Delegated Officer has considered the following:

- the application area includes two priority flora species, *Gunniopsis divisa* (Priority 3) and *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) (Priority 1) and the proposed clearing will result in direct impacts to these species
- the soils in the application area are prone to wind erosion and the proposed clearing may increase this risk
- the proposed clearing may introduce and spread weeds into adjacent vegetated areas

After considering the available information, as well as the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined that the following requirements will be conditioned on the clearing permit to manage and address the impacts of clearing:

- avoid and minimise measures to reduce the impacts and extent of clearing
- construction activities must occur within three months of clearing to reduce the exposure time of bare sandy soils and minimise the risk of wind erosion
- take hygiene steps to reduce the risk of introducing and spreading weeds into adjacent conservation areas
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity
- avoid and provide a 20 metre buffer to the recorded occurrence of *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) (Priority 1)
- clear no more than 50 per cent of the recorded population of *Gunniopsis divisa* (Priority 3)

The Delegated Officer determined that the proposed clearing is unlikely to lead to an unacceptable risk to the environment, noting that the above conditions will manage and address the environmental impacts of clearing.

1.5. Site maps

The applicant is authorised to clear up to 99 hectares with the areas shaded yellow as shown in Figures 1 and 2 below. The applicant is not authorised to clear within the area shaded red in Figure 3, noting that this area represents the recorded location of *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) (Priority 1) and a surrounding 20 metre buffer.

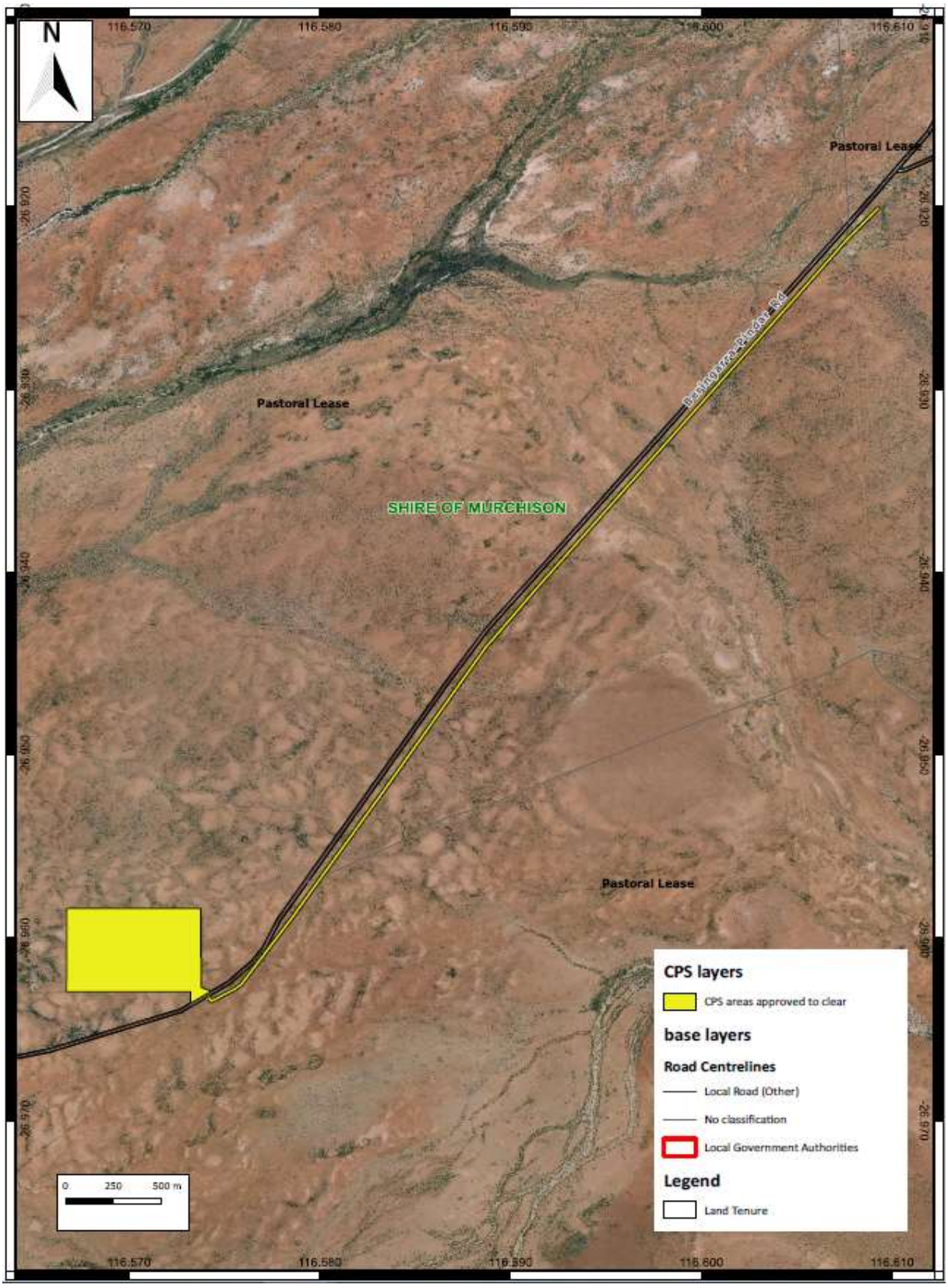

Figure 1. Map of the southernmost approved clearing area shaded yellow.

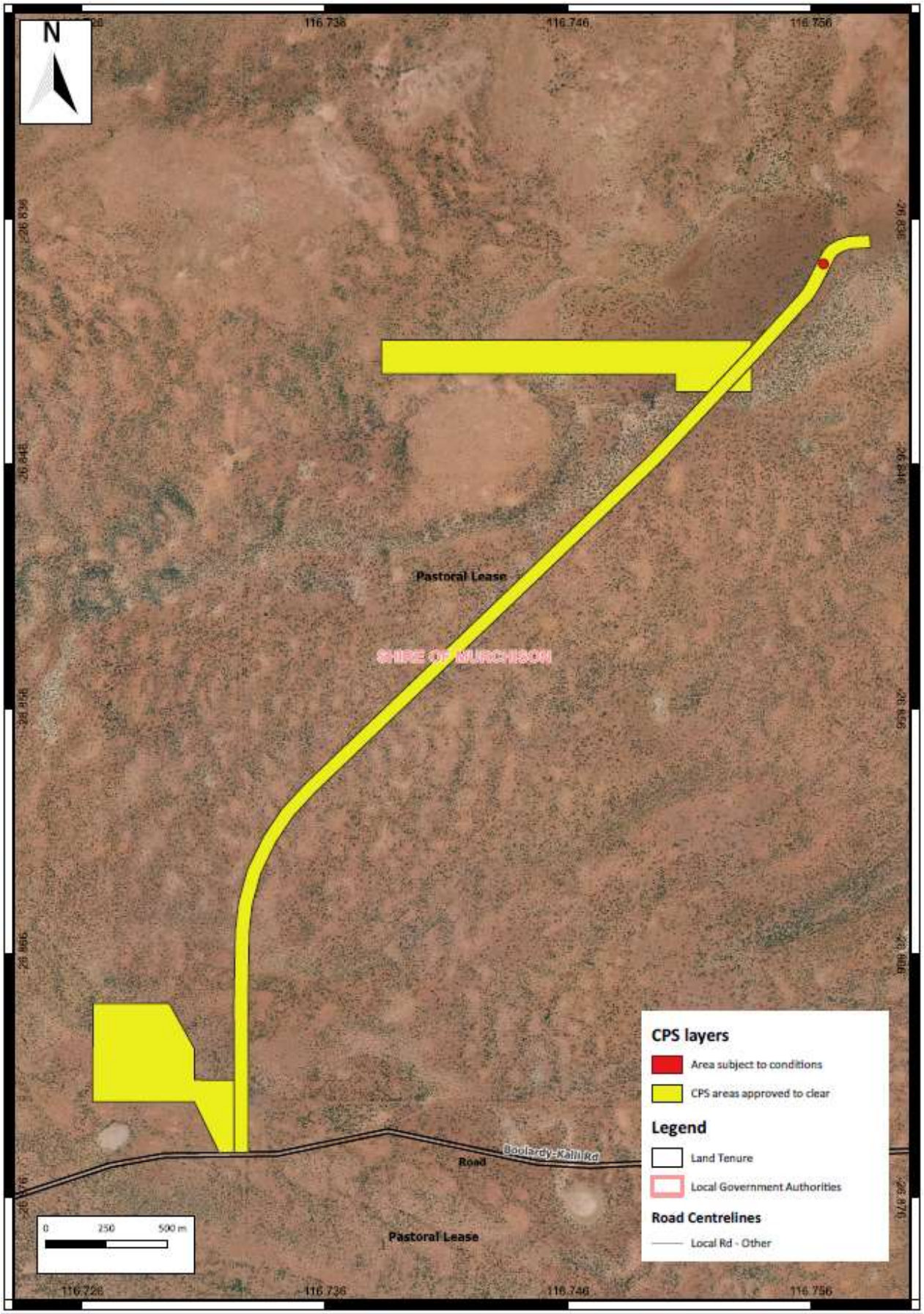

Figure 2. Map of the northernmost approved clearing area shaded yellow.

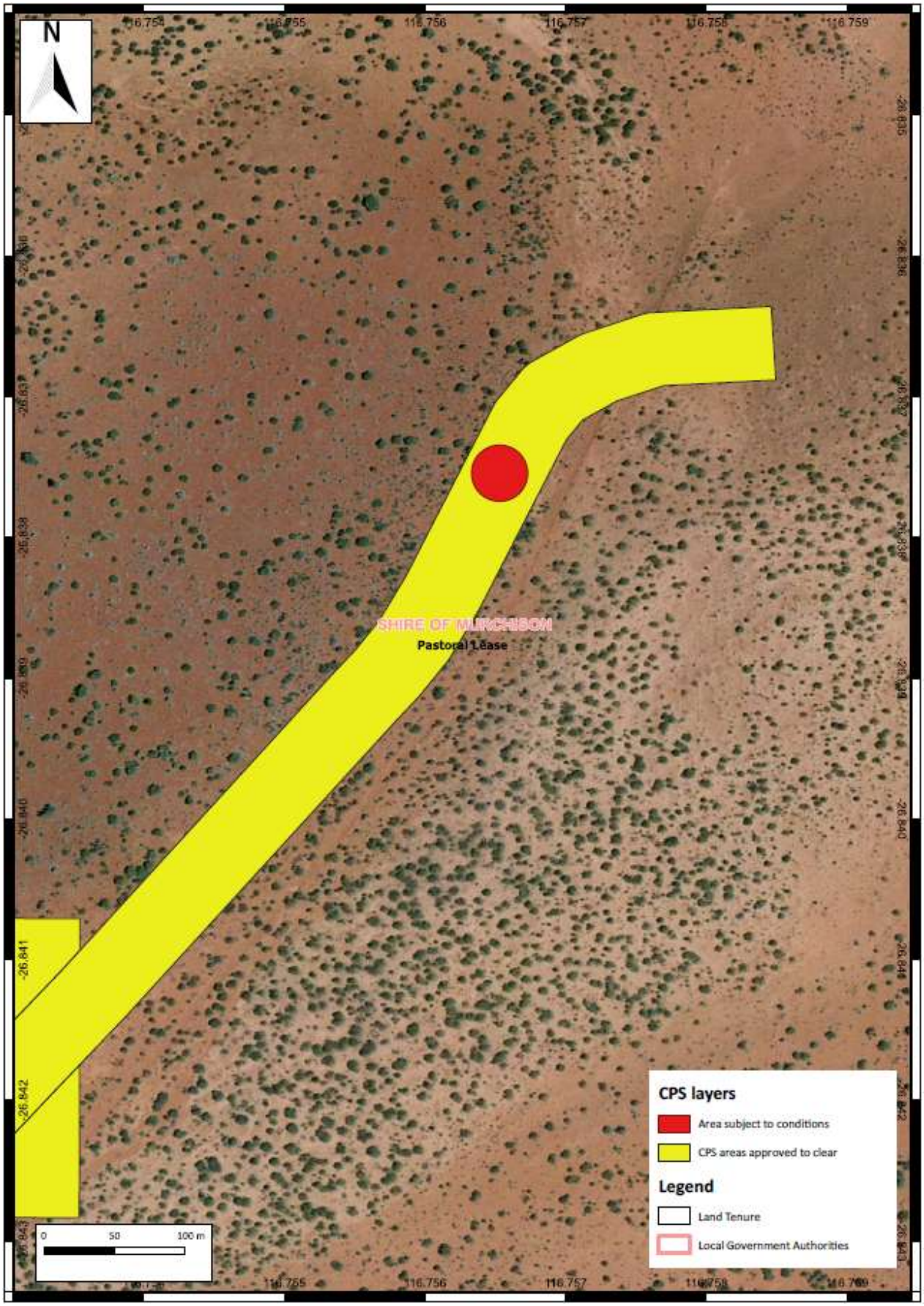

Figure 3. Map showing the area not authorised to clear shaded red, representing the *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) (Priority 1) location and a 20 metre buffer.

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 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 polluter pays principle
- 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)

The key guidance documents which inform this assessment are:

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

3 Detailed assessment of application

3.1. Avoidance and mitigation measures

The applicant has committed to undertaking the following management measures for the proposed development (AECOM, 2021):

- demarcate the approved clearing area using GPS coordinates and flagged star pickets
- demarcate any native vegetation within the site boundary that will be retained
- demarcate topsoil and weed management boundaries
- restrict access by personnel, vehicles and plant into vegetated areas adjacent to the project boundary
- ensure no new informal tracks arise and all vehicle and personnel movements are limited to the approved project boundary
- report all incidents relating to vegetation clearing management actions to CSIRO within 24 hours of the incident
- stockpile all cleared vegetation separately and mulch for use either on-site (for stabilisation) or for other rehabilitation projects
- weed hygiene management
    - control weeds should monitoring indicate weed spread
    - ensure all vehicles, equipment and plant undergo a complete quarantine inspection prior to site access
    - ensure fill (if used) is certified weed free
    - control, with an aim to eradicate, any infestations of high priority weeds
    - locate topsoil and cleared vegetation stockpiles away from areas where runoff from rainfall may occur

The Delegated Officer is satisfied that the applicant has made a reasonable effort to avoid, minimise and mitigate potential impacts of the proposed clearing on environmental values.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer had regard for the site characteristics (see Appendix A) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, 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 flora and fauna. 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 value – Fauna – Clearing Principle (b)

Background

The Ecological Assessment included a basic fauna survey which was conducted between 17 and 20 May 2022. The applicant notes that the survey was conducted in accordance with Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (AECOM, 2022a). The survey was conducted concurrently with the flora and vegetation survey, to enable consistent mapping of the fauna habitats and vegetation communities (AECOM, 2022a).

AECOM (2022a) notes that the survey was primarily focused on verifying the findings of the desktop assessment and identifying and mapping fauna habitat. Signs of threatened fauna species with potential to utilise the application area were searched for during the survey. Fauna habitats were assessed for specific habitat components, including consideration of structural diversity and refuge opportunities for fauna, to determine the potential for these habitats to support conservation significant species.

The Ecological Assessment identified three fauna habitat types as described below (AECOM, 2022a):

- Hardpan plain with intermittent sandplain – comprises 104.64 hectares of the application area

  This habitat type contains sparse *Acacia* over mixed native shrubs on hardpan plain with intermittent sandplains. The understorey density varies throughout, ranging from bare ground to moderately dense shrubs. Surface leaf litter and small rocks occurred occasionally, with large logs rare throughout the application area. Microhabitats were minimal, with the fauna observed primarily consisting of small birds moving in flocks through the application area. Habitat quality ranged from low to high primarily due to the lack of variety in microhabitats.

- Channels and creek line - comprises 11.62 hectares of the application area

  This habitat type comprised major and minor drainage lines subject to occasional and seasonal flooding. This habitat exhibits little variation in habitat characteristics to hardpan plains (when dry), apart from slightly higher vegetation cover and sandier soils. The major drainage channels contained larger trees. The habitat quality for these areas ranged from moderate to high. The drainage lines and floodplains contain a variety of microhabitats and provide a wildlife corridor for migratory species. Large logs were infrequently observed, and no rocks were present. Standing water was observed at numerous locations, with a large amount of new grass and annual herbs. This would provide suitable foraging for larger herbivores and encourage insect populations which supports small mammals, reptiles and bird species.

- Sandplain – comprises 7.5 hectares of the application area

  This habitat type contains alluvial plains of orange to brown sands (often with thin crust). This habitat supports *Acacia, Eremophila* and *Ptilotus* species. The sandplain habitat contained a wider variety of microhabitats than the hardpan plains. Small logs were common, with medium sized logs (10- 30 centimetres) occurring occasionally. Grass was abundant, with larger amounts of course leaf litter present than other sections of the application area. Small stones also occurred occasionally on the surface. This habitat is moderate to high quality due to the variety in microhabitats present and the broad number of fauna observed.

Conservation Significant Fauna

Based on the Ecological Assessment findings (AECOM, 2022a), including an assessment of fauna habitat suitability within the application area of species known from the local area (50 kilometre radius), it was considered that up to 11 conservation significant fauna species may utilise the application area, including:

- seven conservation significant listed waders and waterbird species which may utilise the 11.62 hectares of marginal and creek line habitat:
  - curlew sandpiper (*Calidris ferruginea*) (state listed as critically endangered)
  - long-toed stint (*Calidris subminuta*) (migratory - protected under international agreement)
  - gull-billed tern (*Gelochelidon nilotica*) (migratory - protected under international agreement)
  - Australian painted snipe (*Rostratula australis*) (migratory - protected under international agreement)
  - wood sandpiper (*Tringa glareola*) (migratory - protected under international agreement)
  - common greenshank (*Tringa nebularia*) (migratory - protected under international agreement)
  - grey wagtail (*Motacilla cinerea*) (migratory - protected under international agreement)
- peregrine falcon (*Falco peregrinus*) (state listed as other specially protected fauna), which may utilise the major channel creek lines with large eucalypts
- northern shield-back trapdoor spider (*Idiosoma clypeatum*) (state listed as Priority 3), which may utilise the sandplain or hardpan plain habitat types

- brush-tailed mulgara (*Dasycercus blythi*) (state listed as Priority 4)
- long-tailed dunnart (*Sminthopsis longicaudata*) (state listed as Priority 4)

Of these 11 species, none were positively identified within the application area (AECOM, 2022a). One (unknown) species of Dasyuridae mammal was recorded within the survey area, where it was seen briefly escaping into its nearby burrow (AECOM, 2022a). At the time of survey, it was thought that this species could have been either the brush-tailed mulgara or long-tailed dunnart (AECOM, 2022a).

On 14 September, a follow up targeted fauna survey was undertaken by AECOM to identify any potentially significant fauna species utilising the application area, and particularly utilising the Dasyuridae mammal burrow (AECOM, 2022b). The survey deployed a camera trap facing the entrance of the burrow and left in place for four nights (AECOM, 2022b).

No conservation significant fauna species were observed during the targeted fauna survey (AECOM, 2022b). The Dasyuridae mammal burrow was re-visited by AECOM and appeared to be unoccupied with no signs of recent activity and cobwebs across the entrance (AECOM, 2022b). A juvenile red kangaroo (*Macropus rufus*) was the only animal captured on the motion sensor camera (AECOM, 2022b). Based on the proximity of known records and species recorded in previous surveys, it is considered likely that the fauna identified in the initial survey was a fat-tailed dunnart (*Sminthopsis crassicaudata*). AECOM (2022b) note that individuals of this species will often utilise empty burrows belonging to other species for short periods. This species is not conservation significant.

It was initially considered that the application area may provide suitable habitat for the western spiny-tailed skink (*Egernia stokesii badia*). This species is state listed as vulnerable. This species is rock dwelling, and occupies rock crevices in large, isolated rocky outcrops, typically granite (AECOM, 2022a). Occasionally, hollow logs or semi-arboreal habitats are utilised for shelter (AECOM, 2022a). This species was the subject of a targeted search during the Ecological Assessment and no suitable habitat was identified (AECOM, 2022a). Therefore, this species is unlikely to occur within the application area.

Regarding the abovementioned wader and waterbirds, these species prefer coastal wetland habitats, and the relatively small areas of creekline habitat within the application area present only marginal habitat for these species. Therefore, the application area is not considered significant for these species. This is also noting that extensive riparian habitat occurs in the local area. Slow, one directional clearing methods will help to ensure that the proposed clearing does not adversely impact on these species.

AECOM (2022a) note that a previous targeted fauna survey of Boolardy Station (outside of the application area) undertaken by Phoenix twice recorded a trapdoor spider species (*Idiosoma nigrum)* (AECOM, 2022). After a detailed revision of the genus *Idiosoma*, it is considered that all *Idiosoma* populations recorded in the Murchison bioregion are the northern shield-backed trapdoor spider (*Idiosoma clypeatum*) (AECOM, 2022a). This species is state listed as Priority 3. The Ecological Assessment, which included a search for burrows of this species, did not identify any burrows within the application area (AECOM, 2022a). Similarly, the follow up targeted fauna survey did not identify any evidence of this species within the application area (AECOM, 2022b). Therefore, the proposed clearing is not likely to impact on this species.

The peregrine falcon is known from three records within a 50-kilometre radius, the most recent recorded in 2003. The peregrine falcon is a highly mobile avian species with a large home range. Noting that there are extensive areas of native vegetation within the local area (which retains 99 per cent native vegetation cover), including numerous watercourses which are likely to contain suitable habitat, the proposed clearing is not likely to impact on significant habitat for this species.

The application area does not intersect any known ecological linkages and noting the extent of surrounding vegetation, the proposed clearing will not impact on any significant ecological linkage values.

Conclusion

Based on the above assessment, the proposed clearing is not likely to impact on significant habitat for conservation significant fauna. While no conservation significant fauna species were recorded in the application area, the proposed clearing may impact on any fauna species utilising the application area at the time of clearing.

Outcome

The Delegated Officer determined that the proposed clearing requires management conditions in relation to this environmental value. Therefore, the following management measures will be required as conditions on the clearing permit:

- avoid and minimise measures to reduce the impacts and extent of clearing
- slow directional clearing to allow fauna to move into adjacent vegetation ahead of the clearing activity

3.2.2. Biological value – Flora and ecological communities – Clearing Principle (a)

Background

The application area was subject to an Ecological Assessment undertaken by AECOM. The assessment comprised a reconnaissance flora and vegetation survey, which was undertaken between 17 and 20 May 2022. AECOM (2022a) notes that the assessment utilised methods outlined in the Technical Guidance – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016). AECOM (2022a) noted that focus was placed on targeting significant flora species, using relevés to support the delineation of vegetation communities as necessary. AECOM (2022a) further noted that targeted searches were conducted for conservation significant flora in the desktop assessment considered likely to occur, informed by the desktop assessment and surveys of the surrounding area undertaken in 2014 and 2020 (AECOM, 2022a).

AECOM (2022a) note that the out of season survey timing (May, rather than in Spring which is the regions peak flowering time) was not optimal to detect annual Priority flora species, and some perennial Priority flora species.

AECOM subsequently undertook a follow up targeted flora survey of the application area on 14 September 2022 (AECOM, 2022b), which is considered the optimal time to detect annual flora species in the region. The survey was undertaken in accordance with EPA Flora and Vegetation Survey Technical Guide (2016) and focused on significant flora that were considered as having the potential to occur within the application area.

Vegetation Communities

According to available datasets, no threatened or priority ecological communities (TECs/PECs) have been recorded within or nearby the application area, and none were recorded during the Ecological Assessment of the application area (AECOM, 2022a). Two Acacia woodland vegetation communities were defined and mapped within the Ecological Assessment (see detailed vegetation community descriptions under section A.1 below). The vegetation was largely homogenous, characterised by *Acacia* open woodlands on clays, clay loams and clay sands on flat terrain, sometimes with quartz on the surface (AECOM, 2022a). The recorded vegetation communities are not considered to be representative of any known TEC's or PEC's.

Threatened and Priority Flora

No threatened flora have been recorded in the local area (50 kilometre radius of the application area). The Ecological Assessment did not identify the presence of any threatened flora species (AECOM, 2022a), and none are considered likely to occur based on the lack of suitable habitat and absence of records in the local area.

No priority flora have been recorded within the application area and the Ecological Assessment did not identify any priority flora within the application area (AECOM, 2022a). However, 13 species of priority flora were identified as having the potential to occur within the application area, based on habitat suitability. These species are listed below, with their likelihood of occurrence based on habitat observed in the application area during the Ecological Assessment (AECOM, 2022a):

Species Name	Conservation status	Likelihood of occurrence post Ecological Assessment	Total number of known records
Baeckea sp. Mount Barloweerie (J.Z. Weber 5079)	Priority (P) 1	May	7 records over a ~30km range
Calandrinia Butcherensis	P1	Likely	12 records over a ~270 km range
Calandrinia sp. Boolardy Station (P.Jayasekara 719-JHR-01)	P1	Likely	1 record
Eremophila muelleriana	P3	Likely	14 records over a ~235 records km range
Eremophila simulans subsp. *Megacalyx*	P3	Likely	11 records, over a ~550 km range
Goodenia neogoodenia	P4	May	20 records over a ~420 km range

Gunniopsis divisa	P3	Likely	25 records over a ~335 km range
Hemigenia tysonii	P3	May	20 records over a ~450 km range
Micromyrtus placoides	P3	Likely	25 records over a ~256 km range
Prostanthera tysoniana	P3	May	15 records over a ~75 km range
Ptilotus beardii	P3	May	38 records over a ~255km range
Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	P3	May	24 over a ~490km range
Verticordia jamiesonii	P3	May	34 over a ~600km range

The follow up targeted flora survey identified the following two priority flora species within the application area:

- *Calandrinia* sp. Boolardy Station (P. Jayasekara 719-JHR- 01) (P1)
- *Gunniopsis divisa* (P3)

The timing of the targeted flora survey was considered appropriate to detect the 13 priority flora species listed in the above table.

Calandrinia sp. Boolardy Station (P.Jayasekara 719-JHR-01) is a short-lived annual herb that is known from only one other record, around 14.2 kilometres north east of the application area (WA Herbarium, 1998-). The targeted flora survey identified one individual of this species within the northern portion of the application area (AECOM, 2022b). The plant was removed in its entirety for identification purposes. This location was revisited by AECOM on 12 November 2022 and no individuals were present (AECOM, 2022b). AECOM note that this species absence in November does not necessarily reflect the species absence from the survey area (AECOM, 2022b). AECOM note that the seed bank is likely to contain seeds of this species, which will germinate during favourable conditions likely to coincide with the 2022 flowering period (September) (AECOM, 2022b).

Given *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) is known from only one other location, the potential impact to the seed bank at this location is significant. The potential for seed bank re-location was discussed with DBCA. DBCA noted that it is unknown whether topsoil relocation for this species will result in germination at the re-location site, and given the lack of confidence in this management measure, complete seed bank impact avoidance is recommended. The applicant will be required to retain a 20-metre buffer around the recorded location of this species.

Gunniopsis divisa is an annual herb that is known from 25 records over a range of around 335 kilometres. The targeted flora survey identified 448 individuals of this species within the application area (AECOM, 2022b). Around 181 *Gunniopsis divisa* plants were also recorded outside of the application area (AECOM, 2022b). Given the total number of known records, range, and that numerous records of this species were recorded outside of the application area, the proposed clearing is unlikely to impact on the conservation status or regional extent of this species. The applicant will be required to clear no more than 50 per cent of the recorded population of this species to limit impacts to its local extent.

Conclusion

Based on the above assessment, and with consideration of the applicants measures to avoid and minimise impacts, the proposed clearing will impact on the following priority flora species:

- *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) (P1)
- *Gunniopsis divisa* (P3)

The Delegated Officer determined that with management conditions imposed on the permit, the proposed clearing is not likely to result in a significant impact to this species.

Outcome

The Delegated Officer determined that the proposed clearing requires management conditions in relation to this environmental value. Therefore, the following management measures will be required as conditions on the clearing permit:

- avoid and minimise measures to reduce the impacts and extent of clearing
- avoid and provide a 20 metre buffer to the identified location of *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) (P1) to avoid impacts to the seed bank of this species
- clear no more than 50 per cent of the recorded population of *Gunniopsis divisa* to reduce the extent of local impact to this species.

3.3. Relevant planning instruments and other matters

The SKA project is an international effort to build the world's largest radio astronomy observatory with the potential to provide greater understanding of the universe (AECOM, 2021).

This application represents the first stage of the SKA1-Low array element of the larger project, which involves the construction of an accommodation camp, contractor compound, fibre cable, emergency airstrip and access road. The next stages, which relate to the installation of numerous antennae to enable fine resolution imaging, will be progressed in the later stages. The applicant notes that the location was selected to host the SKA1-Low array due to its excellent radio-quiet environment and proximity to services and infrastructure (AECOM, 2021).

The application area is zoned 'pastoral' under the town planning scheme zone. The application area is located near to the Murchison Radio Astronomy Observatory (MRO) that is proposed for expansion as part of the SKA project to encompass Boolardy Pastoral Station. CSIRO has a pastoral lease over the application area, which was not consistent with the proposed SKA1-Low array end land use. CSIRO subsequently applied for a special lease over the area specific to the SKA1-Low array. The Department of Planning, Lands and Heritage (DPLH) advised that the MRO and SKA Lease will be granted over Lot 18 on Deposited Plan 220344 (encompassing the application area), Lot 226 on Deposited Plan 220344, and Lot 502 on Deposited Plan 55945, for a term of sixty 60 years commencing 4 November 2022. Noting that the proposed clearing will be consistent with the special lease, the applicant has advised that Development Approval form the Shire of Murchison is not required for the development.

The application area intersects Boolardy-Kali Road Beringarra-Pindar Road Reserves, South Murchison. The Shire of Murchison advised that it has no objection for CSIRO to enter into and clear theses portions of the road reserves.

Boolardy Station is in the Gascoyne Groundwater Area proclaimed under the *Rights in Water Irrigation Act 1914* (RIWI Act). The taking of groundwater to facilitate constructing an accommodation camp, contractor compound, fibre cable, emergency airstrip and access road is subject to water licencing requirements (under section 26D of the RIWI Act), including to take from an existing bore (under section 5C of the RIWI Act). To date, the department has not received a groundwater licence (5C) application, or an application to construct or alter a well (CAW) (26D). The applicant is aware of its obligations under the RIWI Act and will obtain relevant approvals if necessary.

According to available datasets, there are no Aboriginal Sites of Significance mapped within the application area. The applicant notes that heritage surveys of the broader project area have been undertaken. The heritage surveys identified several sites, which led to a significant change in the array configuration (AECOM, 2021). 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.

The SKA project was referred to the Environmental Protection Authority (EPA) in 2017 and the level of assessment was 'Not Assessed'. The EPA's advice in the Not Assessed decision was (EPA, 2017):

> "The central core of arrays and infrastructure are located on vegetation communities that are common in the region. The balance of the arrays will be constructed along a 6-metre-wide access track. Due to the linear nature of the tracks, impacts on locally significant riparian vegetation and Priority flora species will be minimised. The majority of the fauna species are common to the region. The access tracks will be constructed to avoid the habitat of conservation significant fauna species…
>
> The EPA is of the view that the potential impacts of the proposal can be adequately managed through the implementation of the proposal in accordance with the referral documentation and the proponent's management and mitigation measures. There is limited concern about the likely effects of the proposal, if implemented, on the environment".

The SKA project was also referred to the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Commonwealth determined that the proposed action was not a controlled action and would not require assessment under the EPBC Act.

CSIRO has advised that it has attended and spoken at forums and town hall meetings with Mid-West residents about the SKA and other projects at the MRO. MRO Indigenous Land Use Agreement (ILUA) Liaison meetings have been held annually since 2009/10, and the project has held regular and additional meetings when required, with relevant WA Government agencies.

End

Appendix A. 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.

A.1. Site characteristics

Characteristic	Details
Local context	The application area is part of an expansive tract of native vegetation in the Murchison Bioregion, in the locality of South Murchison. Spatial data indicates the local area (50km radius from the centre of the application area) retains around 99 per cent of its original native vegetation cover.
Ecological linkage	According to available datasets, the application area is not within any formal ecological linkages and is unlikely to provide any specific linkage values noting the extent of surrounding native vegetation.
Conservation areas	The closest conservation area to the proposed clearing is Lakeside National Park, located around 100kms southeast of the application area.
Vegetation description	The Ecological Assessment identified the following vegetation types within the application area (AECOM, 2022a): **AfEfPo -** Acacia Woodland *Acacia fuscaneura, Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii, Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus, Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland. This vegetation type comprises 18.31 hectares of the application area footprint. **ApAgEf -** Acacia Woodland *Acacia pteraneura* low woodland to open woodland over *Acacia grasbyi* and *Acacia tetragonophylla* tall sparse shrubland over *Eremophila forrestii* subsp. *forrestii, Senna artemisioides* subsp. *helmsii* and *Eremophila fraseri* subsp. *parva* mid shrubland. This vegetation type comprises 105.46 hectares of the application area footprint. According to broad scale vegetation association mapping, the application area comprises Beard Vegetation Association 29, described as sparse low woodland; Mulga, discontinuous in scattered groups (Shepherd et al., 2001). This vegetation association retains 99.8 per cent of its pre-European vegetation extent.
Vegetation condition	The Ecological Assessment identified that Boolardy station, within which the application area forms a part of, has been used for sheep and cattle grazing since 1876 (AECOM, 2022a). This has resulted in a loss of biomass, erosion of the surface, and soil compaction. The Ecological Assessment considered that the application area is in a 'Very Good' (Trudgen, 1991) condition (AECOM, 2022a). The full Trudgen (1991) condition rating scale is provided in Appendix C.
Climate and landform	The Shire of Murchison has an arid climate with a mean annual rainfall of 190-240mm. Rainfall varies significantly depending on the occurrence of sporadic significant rainfall events that are driven by cyclonic weather from the north and cold fronts from the southwest (AECOM, 2021). The Western Murchison subregion supports low Mulga woodlands with bunch grasses and ephemerals (annuals). Landscape features include outcrop and extensive fine textured hardpan wash plains. Quaternary sandplains support hummock grasslands,

Characteristic	Details
	calcareous soils support Saltbush and saline alluvia support *Halosarcia* low shrublands (AECOM, 2021).
Soil description	Soil landscape mapping indicates that the following soil subsystems occur within the application area: • Challenge, comprising gently undulating gritty-surfaced plains, occasional granite hills, tors and low breakaways, with *Acacia* shrublands – mapped over 0.4 hectares of the application area • Beringarra, comprising riverine plains with floodplains and channels, supporting halophytic shrublands, mixed acacia shrublands and low woodlands with minor perennial grasses – mapped over 1.7 hectares of the application area • Ero, comprising tributary floodplains with shallow, erodible duplex soils on red-brown hardpan, saline, and supporting *Acacia* shrublands with halophytic and non-halophytic undershrubs; grazed preferentially and widely degraded and eroded – mapped over 24.5 hectares of the application area • Millrose, comprising level or very gently undulating stony plains on hardpan and granite with irregularly distributed sandy Wanderrie banks, supporting mostly scattered Mulga shrublands with minor Wanderrie grasses – mapped over 30.4 hectares of the application area • Yanganoo, comprising almost flat hardpan wash plains, with or without small Wanderrie banks and weak grooving; supporting Mulga shrublands and Wanderrie grasses on banks – mapped over 66.8 hectares of the application area.
Land degradation risk	The soils in the local area are prone to water and wind erosion. Given the low rainfall in the region, and lack of major watercourses or wetlands within the application area, the water erosion risk is minimal. The wind erosion risk is more prominent, particularly on bare soils.
Waterbodies	The desktop assessment and aerial imagery indicate that no watercourses or wetlands are mapped within the application area. However, the Ecological Assessment identified minor areas of marginal channels and creek lines within the application area (AECOM, 2022a). The southern most application area is also located in an area that is mapped as being 'subject to inundation'.
Conservation significant flora	According to available datasets, no threatened flora species have been recorded in the local area. There are 27 priority flora species recorded in the local area. According to available datasets, no priority flora had previously been recorded within the application area. The Ecological Assessment (undertaken out of season) did not identify any priority flora (AECOM, 2022a); however the appropriately timed targeted flora survey identified the following two priority flora species in the application area (AECOM, 2022b): • *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) (P1) • *Gunniopsis divisa* (P3)
Ecological communities	No threatened or priority ecological communities are mapped within or near the application area. The Priority 1 listed 'Meka calcrete groundwater assemblage type on Murchison palaeodrainage on Meka Station' is the closest conservation significant ecological community to the application area, located 18km southeast.
Fauna	21 conservation significant fauna species have been recorded in the local area (see Section A.3. below). The closest record is the western spiny-tailed skink located around 3.2 km from the application area. Suitable habitat does not occur for this species. The Ecological Assessment identified that 11 species of conservation significant fauna may occur within the application area (see below fauna analysis table) based on

Characteristic	Details
	similarities between the preferred habitat for these species and that recorded within the application area (AECOM, 2022a). Of these, none were recorded in the application area (AECOM, 2022a; AECOM, 2022b).

A.2. Flora analysis table

The below flora species have been recorded within the local area and were considered as having the potential to occur pre-survey, based on mapped soil and vegetation types. The likelihood of occurrence of each species post survey is included, based on the above site characteristics (informed by the Ecological Assessment and desktop analysis) relative to the known habitat for each of these species (AECOM, 2022a).

The Ecological Assessment was undertaken outside of the peak period to identify priority flora species in the region, and was not adequate to identify the potential presence of the below listed flora within the application area. A subsequent appropriately timed targeted flora survey was undertaken by AECOM on 24 September 2022 and identified two priority species within the application area, *Calandrinia* sp. Boolardy Station (P. Jayasekara 719JHR-01) and *Gunniopsis divisa*.

Species	WA Cons. Code	Likelihood post survey	Justification
Angianthus microcephalus	P2	Unlikely	No suitable habitat present. Soils in the survey area are clays, clay loams and clay sands on flat terrain, no salt swamps and pans were observed. This species has an annual life cycle and detectability is restricted to September-December. There is one record from 1953 (WA Herbarium) described as being near Boolardy Station. It has not been recorded since.
Baeckea sp. Mount Barloweerie (J.Z. Weber 5079)	P1	May	Suitable habitat is present. This species is a perennial and would have been detected if present. No Myrtaceae species were recorded or collected in the survey area.
Calandrinia butcherensis	P1	Likely	Records in the vicinity are associated with Mulga woodlands on red fine sand on undulating plains. Suitable habitat is present. This species has an annual life cycle and detectability is restricted to August-October.
Calandrinia sp. Boolardy Station (P. Jayasekara 719JHR-01)	P1	Present	Suitable habitat is present. This species has an annual life cycle. Detectability is likely to be limited to the flowering period. There is very little information publicly available for this species. There is one DBCA record in the vicinity of the survey area (WA Herbarium record from October 2006). Identified in the AECOM (2022b) targeted flora survey.
Eremophila muelleriana	P3	Likely	Suitable habitat is present. This species is perennial and may have been detectable during the survey. Despite this, sterile *Eremophila* spp. can be difficult to identify.
Eremophila simulans subsp. *megacalyx*	P3	Likely	Suitable habitat is present. This species has been recorded during previous surveys on Boolardy and requires suitable flowering material to be confidently identified to this subspecies. Four collections of *Eremophila* were made during the survey however, none represented *E. simulans.*
Frankenia confusa	P4	Unlikely	No suitable habitat is present.
Goodenia neogoodenia	P4	May	Suitable habitat is present in the form of minor drainage channels where soils were clay and clay loam. The likelihood of this species occurring is listed as 'may' due to the age of its last record (1999). This species has an annual life cycle and detectability is restricted to August-September.
Gunniopsis divisa	P3	Present	Suitable habitat is present. This species has an annual life cycle and detectability is restricted to August. Identified in the AECOM (2022b) targeted flora survey.
Hemigenia tysonii	P3	May	Suitable habitat is present. The flowering time for this species coincided with the survey dates as such it would have been detectable, yet it was not recorded.
Micromyrtus placoides	P3	Likely	Suitable habitat is present. As a perennial species it is anticipated that it would have been present.
Prostanthera tysoniana	P3	May	Marginal habitat was identified for this species as soils in the survey area are clay dominated. As a perennial species it is anticipated that it would have been present.

Ptilotus beardii	P3	May	This species has been recorded during previous surveys on Boolardy station where it was associated with clayey soil, saline flats and breakaways.
Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	P3	May	This species has been recorded on Boolardy station during previous surveys where it was associated with mixed mulga and *Eremophila* shrubland over sand. This habitat was absent in the survey area. As a perennial species it is anticipated that it would have been present.
Verticordia jamiesonii	P3	May	Suitable habitat representing sandy clay soils are present. As a perennial species it is anticipated that it would have been present.

A.3. Fauna analysis table

The below table indicates the application area likelihood of occurrence of conservation significant fauna that have known distributions that overlap the application area (AECOM, 2022a; AECOM, 2022b).

Scientific Name	Common Name	Conservation Status		Likelihood of occurrence post-survey	Did surveys identify? (AECOM, 2022a; AECOM 2022b)	Reasoning for likelihood or exclusion
		State	Federal			
Actitis hypoleucos	Common Sandpiper	Migratory (MI), Protected Under International Agreement	Migratory (MI)	May	No	Coastal wetlands preferred habitat for this species although may seasonally utilise the marginal channel and creek line habitats.
Calidris acuminata	Sharp-tailed Sandpiper	MI	MI	Unlikely	No	Likely to be too far inland for this species to utilise the application area.
Calidris ferruginea	Curlew Sandpiper	Critically endangered (CR)	Critically endangered (CE)	May	No	Coastal wetlands preferred habitat for this species although may seasonally utilise the marginal channel and creek line habitats
Calidris subminuta	Long-toed Stint	MI	MI	May	No	Coastal wetlands preferred habitat for this species although may seasonally utilise the marginal channel and creek line habitats
Egernia stokesii	Western Spiny-tailed Skink	Vulnerable (VU)	E	Unlikely	No	Granite outcrops were searched for during the survey, however no suitable habitat was identified.
Falco peregrinus	Peregrine Falcon	Other specially protected fauna (OS)	-	Likely	No	May utilise the major channel creek lines with large eucalypts.
Gelochelidon nilotica	Gull-billed Tern	MI	MI	May	No	May seasonally utilise the marginal channel and creek line habitats.
Hypseleotris aurea	Golden Gudgeon	P2	-	Unlikely	No	Suitable habitat not present.
Idiosoma clypeatum	Northern Shield-backed Trapdoor Spider	P3	-	May	No	Many records nearby, within species distribution, potential habitat present.
Leipoa ocellata	Malleefowl	VU	VU	Unlikely	No	Unlikely due to lack of nearby records.
Motacilla cinerea	Grey Wagtail	MI	MI	May	No	May seasonally utilise the marginal channel and creek line habitats.
Motacilla flava	Yellow Wagtail	MI	MI	Unlikely	No	On edge of the species distribution, habitat not present within survey area, no records with search area.

Ninox connivens subsp. connivens	Barking Owl	P3	-	Unlikely	No	Suitable habitat not present.
Ogyris subterrestris petrina	Arid Bronze Azure Butterfly	CR	CE	Unlikely	No	Suitable habitat not present.
Oxyura australis	Blue-billed Duck	P4	-	Unlikely	No	Suitable habitat not present.
Pezoporus occidentalis	Night Parrot	CR	E	Unlikely	No	Suitable habitat not present.
Plegadis falcinellus	Glossy Ibis	MI	MI	Unlikely	No	Suitable habitat not present.
Rostratula australis	Australian Painted Snipe	EN	E	May	No	May seasonally utilise the marginal channel and creek line habitats.
Sminthopsis longicaudata	Long-Tailed Dunnart	P4	-	May	No	May utilise the sandplain habitat which contains a higher density of grasses.
Tringa glareola	Wood Sandpiper	MI	MI	May	No	May seasonally utilise the marginal channel and creek line habitats.
Tringa nebularia	Common Greenshank	MI	MI	May	No	May seasonally utilise the marginal channel and creek line habitats.

Appendix B. 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 Ecological Assessment recorded a total of 34 native flora species from 15 genera and 12 families. Two weed species were recorded during the survey, **Cenchrus ciliaris* and **Erodium aureum* (AECOM, 2022a). The application area does not contain vegetation in better condition than that in the surrounding region, noting that it has been subject to historical grazing pressures. The Ecological Assessment did not identify any threatened or priority ecological communities within the application area (AECOM, 2022a). An appropriately timed targeted flora survey identified two priority flora species within the application area (AECOM, 2022b): • *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) (P1) • *Gunniopsis divisa* (P3) Given the above, and noting that *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01) is known from only one other record, the application area is considered to comprise a high level of biodiversity. The clearing permit requires the following measures to limit impacts to biodiversity: • avoidance and provision of a 20m buffer to the recorded location of *Calandrinia* sp. Boolardy Station (P.Jayasekara 719-JHR-01)	At variance	Yes *Refer to Section 3.2.1 above*

Assessment against the clearing principles	Variance level	Is further consideration required?
• the clearing of no more than 50 per cent of the recorded population of *Gunniopsis divisa* to limit the extent of local impact to this species. Noting the above conditions, the proposed clearing is not likely to result in a significant residual impact.		
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 application area contains suitable habitat for 11 species of conservation significant fauna, as identified in the above Table under Appendix A.3. (AECOM, 2022a). Of these, the Ecological Assessment and a follow up targeted fauna survey of the application area did not identify any of these species (AECOM, 2022a; AECOM, 2022b). The application area is therefore not expected to provide significant habitat for these species, also noting the extent of similar habitat within the local area, which retains 99 per cent native vegetation cover. To minimise the risk of the proposed clearing impacting on fauna utilising the application area at the time of clearing, the applicant will be required to undertake clearing in a slow one directional manner to allow fauna to move ahead of the clearing activity into adjacent vegetation.	Not likely to be at variance	Yes *Refer to Section 3.2.1 above.*
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: According to available datasets, no threatened flora species have been recorded within the local area, and none were recorded during the Ecological Assessment or targeted flora survey (AECOM, 2022a; AECOM, 2022b). The proposed clearing is not likely to impact on any threatened flora species.	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: According to available datasets, and the Ecological Assessment (AECOM, 2022a), the vegetation within the application area is not representative of any known threatened ecological communities.	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 native vegetation in the local area is around 99 per cent. The mapped vegetation association in the application area retains 99.98 per cent of its pre-European extent (Government of Western Australia, 2019), and is considerably higher than the national objectives and targets for biodiversity conservation in Australia to prevent clearing ecological communities below 30 per cent of that present pre-1750 (Commonwealth of Australia, 2001) Therefore, the proposed clearing is not within an extensively cleared area.	Not likely to be at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
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: The closest conservation area to the proposed clearing is Lakeside National Park, located approximately 100kms southeast of the application area. The proposed clearing is not likely to impact on this conservation area.	Not likely to be at variance	No
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: There are no wetlands or watercourses mapped within the application area. However, the Ecological Assessment identified areas comprising creeklines and flood channels within the application area (AECOM, 2022a). The proposed clearing is not likely to significantly impact on these creeks or channels, or on the riparian vegetation within the local area. This is noting the relatively small portions of the application area that intersect creeklines and that there are numerous watercourses mapped throughout the local area that will not be impacted by the proposed clearing.	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: While the recorded soils within the application area are susceptible to wind and water erosion, the proposed clearing of 99 hectares, of which includes long linear areas within an extensively vegetated landscape, is not likely to result in appreciable land degradation. As a condition of the clearing permit, the applicant will be required to undertake construction activities within three months of clearing to limit the exposure of bare sandy soils.	Not likely to be at variance	No
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: The proposed clearing of 99 hectares over a linear area is not likely to result in a perceptible rise in groundwater levels, particularly noting the extent of surrounding native vegetation. The application area does not intersect any known watercourses or wetlands. However, the Ecological Assessment identified small areas comprising channels and creek line habitat within the application area (AECOM, 2022a), and the proposed clearing may lead to increased sedimentation of these areas, particularly after heavy rainfall. However, this impact is likely to be short term and localised, noting the minimal intersection with creeks/channels.	Not likely to be at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
As a condition of the clearing permit, the applicant is required to undertake construction activities within three months of clearing which will help to reduce the exposure time of bare sandy soils and the risk of sedimentation. The applicant also advised that it intends to minimise erosion when preparing access tracks through maintaining existing ground levels and minimising windrows so channelling and erosion due to stormwater flows did not occur (AECOM, 2021).		
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 climate of the region is described as arid with an average annual rainfall of 190 to 240 mm. It is expected that given the high average daily evaporation rate for the area, any surface water resulting from rainfall events is likely to be relatively short lived, even in bare areas post clearing. Noting the above, and that the application area is largely linear and surrounded by extensive tracts of remnant vegetation, run-off and surface flows will be limited, and the risk of flooding is considered low.	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.).

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

Condition	Description
Excellent	Pristine or nearly so, no 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 after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or 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

AECOM was commissioned to undertake a reconnaissance survey of the application area from 17 – 20 May 2022. The methods used are described under Section 3.2.1 (fauna) and 3.2.2 (flora). The vegetation and fauna habitat types identified within the application area are shown in the figure below (AECOM, 2022a).

Vegetation Types Recorded in the Application Area

Description	Site details	Photo
Plains		
AfEfPo Acacia Woodland *Acacia fuscaneura, Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii, Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus, Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.	Common community found across variety of landscapes including hardpan clays, clay loams and clay sandy soils on flat terrain. May have quartz or granite rocks (small to large) on surface. Extent within survey area (ha): 18.31 Species richness: • 7 native species	
ApAgEf Acacia Woodland *Acacia pteraneura* low woodland to open woodland over *Acacia grasbyi* and *Acacia tetragonophylla* tall sparse shrubland over *Eremophila forrestii* subsp. *forrestii, Senna artemisioides* subsp. *helmsii* and *Eremophila fraseri* subsp. *parva* mid shrubland.	Undulating flat terrain with red-brown sandy loam soils. Extent within survey area (ha): 105.46 Species richness: • 30 native species • 2 weed species	

Fauna Habitat Types Recorded in the Application Area

Fauna Habitat	Habitat for conservation significant fauna	Survey Area		Representative Photo
		Ha	%	
Channels and creek line Major and minor drainage lines subject to occasional and seasonal flooding. Minor drainage areas tend to exhibit little variation in habitat characteristics to hardpan plains (when dry), apart from slightly higher vegetation cover and sandier soils. Major drainage channels tend to contain larger trees. The habitat quality for these areas ranges from moderate to high. The drainage lines and floodplains contain a variety of microhabitats and also provide an important wildlife corridor for many migratory species. Large logs were infrequently observed and no rocks were present. Standing water was observed at numerous locations, with a large amount of new grass and annual herbs. This would provide suitable foraging for larger herbivores and encourage insect populations which supports small mammals, reptiles and many bird species.	This habitat may seasonally provide habitat for waterbird species including: • Curlew Sandpiper *Calidris ferruginea* • Long-toed Stint *Calidris subminuta* • Gull-billed Tern *Gelochelidon nilotica* • Australian Painted Snipe *Rostratula australis* • Wood Sandpiper *Tringa glareola* • Common Greenshank *Tringa nebularia*. May provide habitat for Peregrine Falcon *Falco peregrinus*. Possible habitat for the Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum*.*	11.62	9.4	 

Hardpan plain with intermittent sandplain This habitat contains sparse *Acacia* over mixed native shrubs on hardpan plain with intermittent sandplains. Density of understorey varied throughout this habitat type, ranging from bare ground to moderately dense shrubs. Surface leaf litter and small rocks occurred occasionally, with large logs rare throughout the survey area. Microhabitats were minimal, with the fauna observed primarily consisting of small birds moving in flocks through the survey area. Tracks, scats and bones of larger mammals were also observed throughout this habitat type. Habitat quality ranged from low to high primarily due to the lack of variety in microhabitats.	Possible habitat for the Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum*.* Potential habitat for the Mulgara *Dasycercus blythi*. Although not identified in the initial desktop assessment, the suitability of habitat for this species has been assessed due to its inclusion in the assessment outlined in Section 6.3.1.	104.64	84.5	
Sandplain Alluvial plains of orange to brown sands (often with thin crust). Supports *Acacia, Eremophila* and *Ptilotus* species. The sandplain habitat contained a wider variety in microhabitats than the hardpan plains. Small logs were common, with medium sized logs (10-30 cm) occurring occasionally. Grass was abundant, with larger amounts of course leaf litter present than other sections of the survey area. Small stones also occurred occasionally on the surface. Tracks in a range of sizes were observed for both mammals and reptiles, along with numerous flocks of small birds. This habitat is moderate to high quality due to the variety in microhabitats present and the broad number of fauna observed.	Possible habitat for the Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum*.* Potentially suitable habitat for the Long-tailed Dunnart *Sminthopsis longicaudata*. Potential habitat for the Mulgara *Dasycercus blythi*. Although not identified in the initial desktop assessment, the suitability of habitat for this species has been assessed due to its inclusion in the assessment outlined in Section 6.3.1.	7.50	6.1	
TOTAL Area (including Cleared – 0.04 ha)		**123.80**	**100**	

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)
- 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)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography – Inland Waters – Waterlines
- IBRA Vegetation Statistics
- 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 – Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available

Restricted GIS Databases used:

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

E.2. References

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