Government of Western Australia
Department of Mines, Industry Regulation and Safety

Clearing Permit Decision Report

1. Application details and outcomes

1.1. Permit application details

Permit number:	7139/4
Permit type:	Purpose Permit
Applicant name:	BHP Iron Ore Pty Ltd
Application received:	12 June 2023
Application area:	1,000 hectares
Purpose of clearing:	Rehabilitation, geotechnical investigations, access tracks, mineral exploration, monitoring facilities, hydrogeological drilling, water bores and associated activities
Method of clearing:	Mechanical Removal
Tenure:	*Iron Ore (Mount Goldsworthy) Agreement Act 1964*, Mineral Lease 249SA *Iron Ore (Goldsworthy-Nimingarra) Agreement Act 1972*, Mineral Lease 251SA *Iron Ore (Mount Goldsworthy) Agreement Act 1964*, Mineral Lease 281SA Exploration Licence 47/13-I Exploration Licence 47/14-I Exploration Licence 47/15-I Exploration Licence 47/17-I Exploration Licence 47/1540-I Prospecting Licence 47/1611-I
Location (LGA area/s):	Shire of Ashburton and Shire of East Pilbara
Colloquial name:	Central Pilbara West Exploration Project

1.2. Description of clearing activities

BHP Iron Ore Pty Ltd proposes to clear up to 1,000 hectares of native vegetation within a boundary of approximately 96,373 hectares, for rehabilitation, geotechnical investigations, access tracks, mineral exploration, monitoring facilities, hydrogeological drilling, water bores and associated activities. The application area is located approximately 80 kilometres southeast of Tom Price and 80 kilometres northwest of Newman, within the Shire of Ashburton and Shire of East Pilbara.

Department of Mines and Petroleum (now the Department of Mines, Industry Regulation and Safety) granted the native vegetation clearing permit CPS 7139/1 on 18 August 2016 and valid from 10 September 2016 to 30 November 2031. The permit authorised the clearing of up to 1,000 hectares of native vegetation within a boundary of approximately 97,680 hectares, for rehabilitation of historical disturbance, geotechnical investigations, access tracks, mineral exploration, hydrogeological drilling, water bores and associated activities. The objective of clearing permit application CPS 7139/1 was to consolidate five existing clearing permits held by BHP Billiton Iron Ore Pty Ltd. The application to clear up to 1,000 hectares within a clearing permit boundary of 97,680 hectares increased the amount of native vegetation proposed to be cleared by approximately 363.33 hectares, and increase the clearing permit boundary by approximately 60,965 hectares. The increased area to be cleared and increased clearing permit boundary incorporated additional areas of clearing required within tenure that was rolled into the State Agreement Mineral Lease ML 281SA.

CPS 7139/2 was granted on 19 December 2016, amending the permit to update the tenure following the conversion of several exploration licences to State Agreement Act tenure. The permit boundary have been slightly reduced due to a minor realignment of tenement boundaries. In addition, an administrative error in CPS 7139/1 has been corrected by adding Exploration Licences 47/1540 and 47/1870 to the tenure listed on the amended permit. The CPS 7139/2 was amended on 12 July 2018 to include monitoring facilities for the permit.

The permit holder applied to amend CPS 7139/3 on 13 June 2023 to change the name of the permit holder from “BHP Billiton Iron Ore Pty Ltd” to “BHP Iron Ore Pty Ltd”, and update tenure list on the permit following the conversion of Exploration Licences 47/1429 and 47/1870 to Mineral Lease 251SA (held pursuant to the *Iron Ore (Goldsworthy-Nimingarra) Agreement Act 1972*). The tenure conversion resulted in a slight reduction in the permit boundary due to a minor realignment of tenement boundaries.

1.3. Decision on application and key considerations

Decision:	Grant
Decision date:	17 August 2023
Decision area:	1,000 hectares of native vegetation

1.4. Reasons for decision

This clearing permit application was made in accordance with section 51E of the Environmental Protection Act 1986 (EP Act) and was received by the Department of Mines, Industry Regulations and Safety (DMIRS) on 12 June 2023. DMIRS advertised the application for public comments for seven days, and no submissions were received.

In making the decision, the delegated officer considered the site characteristics, relevant databases and supporting information provided by the applicant including flora, vegetation and fauna surveys, the clearing principles set out in Schedule 5 of the EP Act, and any other matters considered relevant to the assessment. The assessment identified that the proposed clearing will not have significant impacts on habitat for flora, fauna, ecological communities or conservation areas.

Upon consideration of available information and applicants mitigation and minimisation efforts, the Delegated Officer determined that the proposed clearing is not likely to lead to an unacceptable risk to environmental values.

Newly imposed condition to avoid, minimise and reduce the impacts of clearing with the conditions currently imposed on clearing permit CPS 7139/3 are considered adequate to manage the impacts of clearing;
- fauna management condition in the form of an exclusion zone
- staged clearing condition to reduce impacts to land degradation,
- take hygiene steps to minimise the risk of the introduction and spread of weeds;
- flora management condition to minimise impacts to priority flora species;
- watercourse management condition to reduce the impacts to riparian vegetation;
- condition for environmental management plan to reduce the impacts to Northern Quoll; and
- rehabilitation conditions.

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, and
- the principle of the conservation of biological diversity and ecological integrity.

Other legislation of relevance for this assessment include:
- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Mining Act 1978* (WA)
- *Iron Ore (Mount Goldsworthy) Agreement Act 1964*, Mineral Lease 249SA
- *Iron Ore (Goldsworthy-Nimingarra) Agreement Act 1972*, Mineral Lease 251SA
- *Iron Ore (Mount Goldsworthy) Agreement Act 1964*, Mineral Lease 281SA

The key guidance documents which inform this assessment are:
- *A guide to the assessment of applications to clear native vegetation* (DER, December 2014)
- *Procedure: Native vegetation clearing permits* (DWER, October 2021)

3. Detailed assessment of application

3.1. Avoidance and mitigation measures

The applicant has indicated implementation of following avoidance and mitigation measures (BHP Billiton, 2016):
- Avoidance of all priority flora where practicable;
- Control of established weed populations according to the *BHP Billiton Iron Ore Weed Control and Management Procedure*;
- Avoidance of active Pebble-mouse mounds where practicable;
- Excluding all suitable bat caves with 50 metre buffer (excised from the application area);
- A 50 metre buffer from the Coolibah-lignum flats: *Eucalyptus victrix* over *Muehlenbeckia florulenta,* Priority Ecological community;
- Implementing 50 metre buffer from adjacent border of the Karijini National Park;
- Restricting clearing to the bare minimum near surface water features;
- Revegetation of cleared areas that are no longer requires; and
- Minimising the disturbance to the Gorge/Gully habitat within the application area.

Therefore, 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

The permit holder has reported that 651.06 ha of native vegetation has been cleared as of 30 June 2022 under clearing permit 7139/3 (BHP Iron Ore, 2022). The proposed amendment is to change the permit holder's name and to update the tenure list to reflect the recent transfer of tenements. The permit boundary has been slightly reduced to reflect the new tenement boundary.

No new biological information has been provided in support of the application. However, the applicant has previously undertaken multiple surveys intersecting the application area which was submitted as supporting information for the CPS 7139/1 application were utilised in this assessment.

The application area is located in the Hamersley subregion of the Pilbara Biographic Regionalisation for Australia bioregion (IBRA). The Hamersley subregion can be described as Mulga low woodlands over bunch grasses on fine-textured soils in valley floors and *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils of the ranges (GIS Database). The surveys identified 48 vegetation associations within the application area, with large amounts of areas mapped in an 'excellent' condition, and the major disturbances within the application area were a result of domestic herbivores, weed infestations, and operational or disused mining areas (BHP Billiton, 2016). The beard vegetation associations 18, 29, 82 and 567 are recorded in the application area and retain approximately 99% or above of their pre-European extent at both the state and bioregion level (Government of Western Australia, 2019).

No threatened Ecological Communities have been identified within the application area (GIS Database). The application area is located within the buffer of the Priority Ecological Community (PEC) Coolibah-lignum flats: *Eucalyptus victrix* over *Muehlenbeckia florulenta*. The applicant has excluded this PEC from the application area with a 50 metre buffer (BHP Billiton, 2016). Therefore, the proposed clearing is unlikely to cause a significant impact on the conservation significance of this PEC (BHP Billiton, 2016).

There have been 24 Priority Flora species were identified within the application area. This includes one priority 1 species, three priority 2 species, 15 priority 3 species, and five priority 4 species (BHP Billiton, 2016; DBCA, 2023). The previously identified *Goodenia Nuda.* Species and *Josephinia* sp. Marandoo (M.E. Trudgen 1554) (now known as *Josephinia eugeniae* (F. Muell) have now been delisted (DBCA, 2023). The applicant has committed to avoid clearing Priority Flora where practical (BHP Billiton, 2016). The proposed clearing of 1,000 ha within 96,373 ha of the permit boundary is unlikely to impact the conservation significance of these species. Further, the potential impact on these species will be managed by existing flora management conditions.

The fauna surveys conducted across the application area have identified 11 broad fauna habitat types (Appendix B.1). These habitat types, except for the gorge/gully and major drainage line habitats, are considered to be common and well-presented over the Pilbara bioregion (BHP Billiton, 2016). Major drainage line habitat and parts of the gorge/gully habitats are considered to be of high significance because they are most likely to support or provide areas of core habitat for several conservation-significant species (BHP Billiton, 2016). The gorge/gully provides habitat for *Liasis olivaceus barroni* (Pilbara olive python), *Macroderma gigas* (ghost bat), *Dasyurus hallucatus* (northern quoll), and *Underwoodisaurus seorsus* (Pilbara barking gecko). Some areas of the gorge/gully habitat contain caves that support the local population *of M. gigas* or cliff-face habitats suitable for *Falco peregrinus* (peregrine falcon). The major drainage line habitat provides suitable habitat for high diversity of bird species, potential breeding and/or foraging sites and dispersal corridors for several conservation significant species (BHP Billiton, 2016).

Nine conservation-significant fauna species have been recorded within the study area (BHP Billiton, 2016; GIS Database) and additional six conservation-significant species identified as to possibly occur in the area (Appendix B.3). Evidence of Ghost Bat and Northern Quoll occupancy was recorded within the application area (BHP Billiton, 2016). Most species are transitory and unlikely to use the application area other than for foraging (BHP Billiton, 2016). The applicant has excluded all suitable bat caves (except six caves nearby disturbance which require rehabilitation) with a 50 metre buffer and the majority of gorge/gully habitat including known locations for Northern quoll records (BHP Billiton, 2016). The applicant has committed to minimising the disturbance to the gorge/gully habitat (BHP Billiton, 2016). Further, the potential impact on the fauna and fauna habitats will be managed by existing fauna management conditions.

The application area is not located within a conservation area (GIS Database). The closest conservation area, Karijini National Park is located adjacent to the western boundary of the application area (GIS database). However, the applicant has implemented a 50 metre buffer from the national park (BHP Billiton, 2016). The area surrounding the Karijini National Park is largely uncleared (GIS Database). The potential risk of weed infestation in the National Park by the proposed clearing and activities will be minimised by existing weed management condition.

There are no permanent watercourses or wetlands within the application area (GIS Database). However, significant streams, major and minor rivers/tribes, and multiple non-perennial watercourses (GIS Database), which would only intermittently flow after major rainfall events transect the area proposed to be cleared (BHP Billiton, 2016). However, this application is not considered likely to adversely alter water tables, and as such will not impact any ecological communities that are wetland or groundwater dependent (BHP Billiton, 2016). However, 12 vegetation types (Appendix B) have been identified to be associated with drainage lines (BHP Billiton, 2016). Given the non-contiguous nature of the proposed clearing and the large permit boundary (96,373 hectares), it is considered unlikely that the proposed clearing will significantly impact any vegetation growing in association with non-perennial watercourses. Considering strict weed hygiene procedures and commitments to avoid or minimise disturbance to riparian habitats, substantial impacts to these vegetation are not anticipated (BHP Billiton, 2016). Further, impacts on these riparian vegetation will be managed by existing vegetation management conditions.

The vegetation associations, fauna habitats and landform types present within the application area are well represented locally (GIS Database). The review of current environmental information (Appendix B), proposed avoid and mitigation measures and

conditions on the permit reveals the clearing is not considered to result in significant environmental impacts. The conditions currently imposed for staged clearing, weed control, flora, fauna and vegetation management and rehabilitation on clearing permit CPS 7139/3 are considered adequate to manage the impacts of clearing. However, condition to avoid, minimise and reduce impacts and extent of clearing will be imposed on this version.

The proposed administration amendments are unlikely to result in any significant change to the environmental impacts of the proposed clearing and reveals that the assessment against the clearing principles has not changed from the previous versions of this decision report.

3.3. Relevant planning instruments and other matters

The amendment application was advertised on 21 July 2023 by the Department of Mines, Industry Regulation and Safety inviting submissions from the public. No submissions were received in relation to this application.

There are four native title claims over the area under application (DPLH, 2023). These claims have been determined by the Federal Court on behalf of the claimant groups. However, the mining tenure has been granted in accordance with the future act regime of the *Native Title Act 1993* and the nature of the act (i.e. the proposed clearing activity) has been provided for in that process, therefore, the granting of a clearing permit is not a future act under the *Native Title Act 1993*.

There are multiple registered Aboriginal Sites of Significance within the application area (DPLH, 2023). It is the proponent's responsibility to comply with the *Aboriginal Cultural Heritage Act 2021* as amended and ensure that no Aboriginal Cultural Heritage Sites are damaged through the clearing process.

Other relevant authorisations required for the proposed land use include:

- A Programme of Work approved under the *Mining Act 1978*.
- A Mining Proposal / Mine Closure Plan approved under the *Mining Act 1978*.

It is the proponent's responsibility to liaise with the Department of Water and Environmental Regulation and the Department of Biodiversity, Conservation and Attractions, to determine whether a Works Approval, Water Licence, Bed and Banks Permit, or any other licences or approvals are required for the proposed works.

End

Appendix A. Additional information provided by applicant

Summary of comments	Consideration of comment
New spatial file provided to reflect minor amendments to the permit boundary as a result of tenure conversion.	Spatial file used in assessment of clearing permit application.

Appendix B. Site characteristics

B.1. Site characteristics

Characteristic	Details
Local context	The area proposed to be cleared is located approximately 80 kilometres southeast of the Tom Price and 80 kilometres northwest of Newman, within Shire of Ashburton and Shire of East Pilbara (GIS Database). The area proposed to be cleared is part of an extensive land use zone of Western Australia (GIS Database). The proposed area located on mixture of unallocated crown land and Juna Downs Pastoral stations (GIS Database). Over 99% of the native vegetation within a 50 kilometre radius of the application area remains uncleared (GIS Database).
Ecological linkage	The application area is not considered to form part of an ecological linkage (BHP Billiton, 2016).
Conservation areas	The application area is not located within conservation area (GIS database). The nearest main conservation area is an 'A class' Karjini National Park (R30082), located adjacent to the west border of the application area (GIS Database).
Vegetation description	The vegetation of the application area is broadly mapped as the following Beard vegetation associations (GIS database): **18:** Low woodland; mulga (*Acacia aneura*); **29:** Sparse low woodland; mulga, discontinuous in scattered groups; **82:** Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*; and **567:** Hummock grasslands, shrub steppe; mulga & kanji over soft spinifex and *Triodia basedowii*. The following 48 vegetation associations were recorded to occur within the application area as per the consolidated report provided by BHP Billiton Iron Ore Pty Ltd in support of the clearing permit CPS 7139/1 in 2016 (BHP Billiton, 2016). ***Acacia* High Shrubland** - FP AbApr Tp AcoSau - High Shrubland of *Acacia bivenosa* and *Acacia pruinocarpa* over Open Hummock Grassland of *Triodia pungens* and Very Open Hummock Grassland of *Aristida contorta* and *Sporobolus australasicus* on brown loam on stony dolerite floodplains and outwash zones; and - MA AtpApyAse Ec TmbTtCpr - High Shrubland *of Acacia tumida* var. *pilbarensis, Acacia pyrifolia* var. *pyrifolia* and *Acacia sericophylla* with Scattered Trees of *Eucalyptus camaldulensis* subsp. *refulgens* over Open Tussock Grassland of *Themeda* sp. Mt Barricade (M.E. Trudgen 2471), *Themeda triandra* and *Cymbopogon procerus* on brown loam and gravels on major drainage channels. ***Acacia* Low Open Forest** - FP AaApaApt TtCfEb - Low Open Forest of *Acacia aptaneura*, *Acacia paraneura* and *Acacia pteraneura* over Open Tussock Grassland of *Themeda triandra, Chrysopogon fallax* and *Eriachne benthamii* on red brown clay loam on plains; - FP AaCa Mv Tm - Low Open Forest of *Acacia aptaneura* and *Corymbia aspera* over Low Open Shrubland of *Maireana villosa* over Open Hummock Grassland of *Triodia melvillei* on red brown cracking clays and alluvial loams on floodplains; - MA AaAciApr CcTtCf EvEc - Low Open Forest of *Acacia aptaneura, Acacia citrinoviridis* and *Acacia pruinocarpa* over Open Tussock Grassland of **Cenchrus ciliaris, Themeda triandra* and *Chrysopogon fallax* with Open Woodland of *Eucalyptus victrix* and *Eucalyptus camaldulensis* subsp. *refulgens* on brown loamy sand on major drainage lines with broad and deeply incised drainage channels; - SP AaApr TmTwTp TtCfAin - Low Open Forest of *Acacia aptaneura* and *Acacia pruinocarpa* over Open Hummock Grassland of *Triodia melvillei, Triodia wiseana* and *Triodia pungens* over Tussock Grassland of *Themeda triandra*, *Chrysopogon fallax* and *Aristida inaequiglumis* on red brown loam on plains; and - SP AcaAa AobDamCf - Low Open Forest of *Acacia catenulata* subsp. *occidentalis* and *Acacia aptaneura* over Very Open Tussock Grassland of *Aristida obscura, Digitaria ammophila* and *Chrysopogon fallax* on red brown clay loam on stony lower plains.

Characteristic	Details
	***Acacia* Low Open Woodland** - FP AaAcaApa ElaSlPo AcoEdAj - Low Open Woodland of *Acacia aptaneura, Acacia catenulata* subsp. *occidentalis* and *Acacia paraneura* over Low Open Shrubland of Eremophila lanceolata, *Solanum lasiophyllum* and *Ptilotus obovatus* over Very Open Tussock Grassland of *Aristida contorta, Eragrostis dielsii* and *Aristida jerichoensis* var. *subspinulifera* on red brown clay loam on hardpan intergrove plains. ***Acacia* Low Woodland** - FP AaEv Mf EaEbAco - Low Woodland of *Acacia aptaneura* and *Eucalyptus victrix* with Scattered Shrubs of *Muehlenbeckia florulenta* over Open Tussock Grassland of *Eulalia aurea, Eriachne benthamii* and *Aristida contorta* on orange brown clay loam on alluvial plains; - FP Ev Aa EaEbTt - Woodland of *Eucalyptus victrix* over Low Woodland of *Acacia aptaneura* over Open Tussock Grassland of *Eulalia aurea, Eriachne benthamii* and *Themeda triandra* on orange clay loam on alluvial plains; - GG AaAcaEl DpaEtEj TpTw - Low Woodland of *Acacia aptaneura, Acacia catenulata* subsp. *occidentalis* and *Eucalyptus leucophloia* subsp. *leucophloia* over Open Shrubland of *Dodonaea pachyneura*, *Eremophila tietkensii* and *Eremophila jucunda* subsp. *pulcherrima* over Open Hummock Grassland of *Triodia pungens* and *Triodia wiseana* on red brown loam on breakaway slopes, cliff lines and minor gorges; - HS AaApr EjAmmCco TwTp - Low Woodland of *Acacia aptaneura* and *Acacia pruinocarpa* over Shrubland of *Eremophila jucunda* subsp. *pulche*rrima, *Acacia marramamba* and *Codonocarpus cotinifolius* over Open Hummock Grassland of *Triodia wiseana* and *Triodia pungens* on red brown loam on hill slopes; and - SP Aa EfrSgl TtAco - Low Woodland of *Acacia aptaneura* over High Shrubland of *Eremophila fraseri* and *Senna glutinosa* subsp. x *luerssenii* over Very Open Tussock Grassland of *Themeda triandra* and *Aristida contorta* on red brown clay loam on stony dolerite drainage plains. ***Acacia* Open Forest** - FP AaEv EaEb Mf - Open Forest of *Acacia aptaneura* and *Eucalyptus victrix* over Open Tussock Grassland of *Eulalia aurea* and *Eriachne benthamii* with Open Shrubland of *Muehlenbeckia florulenta* on red brown clay loam on alluvial plains. ***Acacia* Open Scrub** - MI AtpPlAmo TpTs ChEl - Open Scrub of *Acacia tumida* var. *pilbarensis, Petalostylis labicheoides* and *Acacia monticola* over Open Hummock Grassland of *Triodia pungens* and *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) with Low Open Woodland of *Corymbia hamerselyana and Eucalyptus leucophloia* subsp. *leucophloia* on red brown sandy loam on minor drainage lines. ***Acacia* Shrubland** - MI AbAdAma Tp TtPmEa - Shrubland of *Acacia bivenosa, Acacia dictyophleba* and *Acacia maitlandii* over Open Hummock Grassland of *Triodia pungens* over Open Tussock Grassland of *Themeda triandra, Paraneurachne muelleri* and *Eulalia aurea* on brown sandy loam on minor drainage lines. ***Callitris* Low Open Forest** - GG CcoCfeEl EmuTmbCa - Low Open Forest of *Callitris columellaris, Corymbia ferriticola* and *Eucalyptus leucophloia* subsp. *leucophloia* over Open Tussock Grassland of *Eriachne mucronata*, *Themeda* sp. Mt Barricade (M.E. Trudgen 2471) and *Cymbopogon ambiguus* and Very Open Hummock Grassland of *Triodia pungens* on orange brown loam on upper gorges. ***Corymbia* Low Woodland** - GG CfeElFb AhDvmAha CaEmuTmb - Low Woodland of *Corymbia ferriticola, Eucalyptus leucophloia* subsp. *leucophloia* and *Ficus brachypoda* over Open Shrubland of *Acacia hamersleyensis*, *Dodonaea viscosa* subsp. *mucronata* and *Astrotricha hamptonii* over Open Tussock Grassland of *Cymbopogon ambiguus, Eriachne mucronata* and *Themeda* sp. Mt Barricade on red brown loam along cliff lines and gorges. ***Enneapogon* Tussock Grassland** - HS EliCa EfrAte ImDau - Tussock Grassland of *Enneapogon lindleyanus* and *Cymbopogon ambiguus* with Shrubland of *Eremophila fraseri* and *Acacia tetragonophylla* over Low Shrubland of *Indigofera monophylla* and *Dipteracanthus australasicus* on brown sandy clay loam on mudstone outcrops and boulders on lower slopes of The Governor Range. ***Eriachne* Tussock Grassland**

Characteristic	Details
	- FP EbEaTt Ev Mf - Tussock Grassland of *Eriachne benthamii, Eulalia aurea* and *Themeda triandra* with Woodland of *Eucalyptus victrix* over Open Shrubland of *Muehlenbeckia florulenta* on orange brown loamy clay on alluvial plains; and - MI Eb VfAteAa PhCmPg - Tussock Grassland of *Eriachne benthamii* with Shrubland of **Vachellia farnesiana*, *Acacia tetragonophylla* and *Acacia aptaneura* over Low Open Herbland of *Pimelea holroydii, Centipeda minima* and *Ptilotus gomphrenoides* on red silty loam on basalt parent rock along small drainage lines. ***Eucalyptus* Low Open Forest** - MA EcEvEx ApyAtpGr TtEaCpr - Low Open Forest of *Eucalyptus camaldulensis* subsp. *refulgens*, *Eucalyptus victrix* and *Eucalyptus xerothermica* over High Shrubland of *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis* and *Gossypium robinsonii* over Open Tussock Grassland of *Themeda triandra, Eulalia aurea* and *Cymbopogon procerus* on red brown clay loam on major drainage lines. ***Eulalia* Tussock Grassland** - FP EaEbTt EvAa Mf - Tussock Grassland of *Eulalia aurea, Eriachne benthamii* and *Themeda triandra* with Woodland of *Eucalyptus victrix* and *Acacia aptaneura* over Open Shrubland of *Muehlenbeckia florulenta* on red brown clay loam on alluvial plains. ***Petalostylis* Shrubland** - MI PlAtpAmo ChEl TwTp - Shrubland of *Petalostylis labicheoides, Acacia tumida* var. *pilbarensis* and *Acacia monticola* with Low Open Woodland of *Corymbia hamersleyana* and *Eucalyptus leucophloia* subsp. *Leucophloia* over Open Hummock Grassland of *Triodia wiseana* and *Triodia pungens* on red brown loam on minor drainage lines. ***Themeda* Closed Tussock Grassland** - FP Ths Ca PoSau - Closed Tussock Grassland of *Themeda* sp. Hamersley Station (M.E. Trudgen 11431) with Low Open Woodland of *Corymbia aspera* over Low Open Shrubland of *Ptilotus obovatus* and *Salsola australis* on orange light clay on level flood plains. ***Themeda* Open Tussock Grassland** - ME TtAinCa ChEl AmoPlAlu - Open Tussock Grassland of *Themeda triandra, Aristida inaequiglumis* and *Cymbopogon ambiguus* with Low Open Woodland of *Corymbia hamersleyana* and *Eucalyptus leucophloia* subsp. *leucophloia* over Open Shrubland of *Acacia monticola, Petalostylis labicheoides* and *Androcalva luteiflora* on red brown alluvium on minor and medium drainage lines. ***Themeda* Tussock Grassland** - FP TtEa ExAa AprAtpElo - Tussock Grassland of *Themeda triandra* and *Eulalia aurea* with Low Woodland of *Eucalyptus xerothermica* and *Acacia aptaneura* over Open Shrubland of *Acacia pruinocarpa, Acacia tumida* var. *pilbarensis* and *Eremophila longifolia* on red brown clay loam on unincised drainage lines and floodplains; and - GG TtEmuTmb ElChCfe AtpGrPl - Tussock Grassland of *Themeda triandra*, *Eriachne mucronata* and *Themeda* sp. Mt Barricade with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia*, *Corymbia hamersleyana* and *Corymbia ferriticola* over High Shrubland of *Acacia tumida* var. *pilbarensis, Gossypium robinsonii* and *Petalostylis labicheoides* on red brown sandy loam in narrowly incised rocky drainage lines. ***Triodia* Closed Hummock Grassland** - HC TpTw El NhrOs - Closed Hummock Grassland of *Triodia pungens* and *Triodia wiseana* with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia* over Scattered Shrubs of *Newcastelia* sp. Hamersley Range (S. van Leeuwen 4264) and *Olearia stuartii* on brown silty loam on high sloping hill crest of Mount Robinson. ***Triodia* Hummock Grassland** - HS TsTwTp ElCh AhiAad - Hummock Grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835), *Triodia wiseana* and *Triodia pungens* with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia hamersleyana* over Low Open Shrubland of *Acacia hilliana* and *Acacia adoxa* var. *adoxa* on red brown sandy loam on hill slopes; - CP TwTa Es AbPlApy - Hummock Grassland of *Triodia wiseana* and *Triodia angusta* with Open Mallee of *Eucalyptus socialis* subsp. *eucentrica* and Open Shrubland of *Acacia bivenosa, Petalostylis labicheoides* and *Acacia pyrifolia* var. *pyrifolia* on light brown clay loam on calcrete plains and rises; - FS Ts CdHc AanAiGw - Hummock Grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) with Low Open Woodland of *Corymbia deserticola* subsp. *deserticola* and *Hakea*

Characteristic	Details
	chordophylla over Open Shrubland of *Acacia ancistrocarpa*, *Acacia inaequilatera* and *Grevillea wickhamii* subsp. *hispidula* on red brown sandy loam on foot slopes and stony plains; - FS TsTpTw El AbApaAan - Hummock Grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835), *Triodia pungens* and *Triodia wiseana* with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia* and Open Shrubland of *Acacia bivenosa*, *Acacia pachyacra* and *Acacia ancistrocarpa* on red brown loam on foot slopes and low undulating hills; - HC Tw Ah EkEgCh - Hummock Grassland of *Triodia wiseana* with Shrubland of *Acacia hamersleyensis* and Open Mallee of *Eucalyptus kingsmillii* subsp. *kingsmillii*, *Eucalyptus gamophylla* and *Corymbia hamersleyana* (mallee form) on red brown loam and silty loam on hill crests; - HC Tw AiAb IrSao - Hummock Grassland of *Triodia wiseana* with High Open Shrubland of *Acacia inaequilatera* and *Acacia bivenosa* over Low Open Shrubland of *Indigofera rugosa* and *Senna artemisioides* subsp. *oligophylla* on red silty loam on dolerite hill crests; - HC TwTbrTp ElCh AmaGwAb - Hummock Grassland of *Triodia wiseana, Triodia brizoides* and *Triodia pungens* with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia hamersleyana* over High Open Shrubland of *Acacia maitlandii, Grevillea wickhamii* subsp. *hispidula* and *Acacia bivenosa* on red brown sandy loam on hill crests and upper hill slopes; - HC TwTsTp ElCh Ah - Hummock Grassland of *Triodia wiseana, Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) and *Triodia pungens* with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia* and *Corymbia hamersleyana* over Open Shrubland of *Acacia hamersleyensis* on red brown clay loam on hill crests and upper hill slopes; - HS Tbr El Er - Hummock Grassland of *Triodia brizoides* with Scattered Low Trees of *Eucalyptus leucophloia* subsp. *leucophloia* over Open Mallee of *Eucalyptus repullulans* on gently inclined low breakaway hill slope; - HS Tp Ama Tt - Hummock Grassland of *Triodia pungens* with Shrubland of *Acacia maitlandii* over Very Open Tussock Grassland of *Themeda triandra* on brown loam on low basalt hills; - HS TwTbrTs ElExCh PcaPasAhi - Hummock Grassland of *Triodia wiseana, Triodia brizoides* and *Triodia* sp. Shovelanna Hill with Low Open Woodland of *Eucalyptus leucophloia* subsp. l*eucophloia*, *Eucalyptus xerothermica* and *Corymbia hamersleyana* over Low Open Shrubland of *Ptilotus calostachyus, Ptilotus astrolasius* and *Acacia hilliana* on brown loam on eroded outcropping upper slopes and crests; - HS TwTpTbr El Ep - Hummock Grassland of *Triodia wiseana, Triodia pungens* and *Triodia brizoides* with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia* over Open Mallee of *Eucalyptus pilbarensis* on red brown loam on steep hill slopes; - HS TwTpTs El AprAaAan - Hummock Grassland of *Triodia wiseana, Triodia pungens* and *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia* over Open Shrubland of *Acacia pruinocarpa, Acacia aptaneura* and *Acacia ancistrocar*pa on red brown loam on plains and low hills; - ME TpTl ExAciCh PlApyGr - Hummock Grassland of *Triodia pungens* and *Triodia longiceps* with Low Woodland of *Eucalyptus xerothermica, Acacia citrinoviridis* and *Corymbia hamersleyana* over High Shrubland of *Petalostylis labicheoides*, *Acacia pyrifolia* var. *pyrifolia* and *Gossypium robinsonii* on red brown clay loam on medium drainage lines and surrounding floodplains; - SP TpTb Eg PlAbAan - Hummock Grassland of *Triodia pungens* and *Triodia basedowii* with Open Mallee of *Eucalyptus gamophylla* and Shrubland of *Petalostylis labicheoides*, *Acacia bivenosa* and *Acacia ancistrocarpa* on red brown loamy sand on stony plains and foot slopes; and - SP TsTwTp EgEt AbApaApr - Hummock Grassland of *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835), *Triodia wiseana* and *Triodia pungens* with Very Open Mallee of *Eucalyptus gamophylla* and *Eucalyptus trivalva* over Open Shrubland of *Acacia bivenosa*, *Acacia pachyacra* and *Acacia pruinocarpa* on red brown sandy loam and clay loam on stony plains. ***Triodia* Open Hummock Grassland** - HS Tp AaApr EfrAmmSgl - Open Hummock Grassland of *Triodia pungens* with Low Open Woodland of *Acacia aptaneura* and *Acacia pruinocarpa* over Open Shrubland of *Eremophila fraseri, Acacia marramamba* and *Senna glutinosa* subsp. x *luerssenii* on red brown loam on hills; - HS Tp El SggGwEll - Hummock Grassland of *Triodia pungens* with Scattered Low Trees of Eucalyptus *leucophloia* subsp. *leucophloia* and Scattered Shrubs of *Senna glutinosa* subsp. *glutinosa, Grevillea wickhamii* subsp. *hispidula* and *Eremophila latrobei* subsp. *latrobei* on skeletal orange brown loam on stony hill slopes; and

Characteristic	Details
	- SP TpTm AaExAca ApaEffAad - Hummock Grassland of *Triodia pungens* and *Triodia melvillei* with Low Open Woodland of *Acacia aptaneura, Eucalyptus xerothermica* and *Acacia catenulata* subsp. *occidentalis* and Open Shrubland of *Acacia pachyacra*, *Eremophila forrestii* subsp. *forrestii* and *Acacia adsurgens* on red brown clay loam or silty loam on stony plains and floodplains.
Vegetation condition	The vegetation mapping (BHP Billiton, 2016) indicates that, vegetation within the proposed clearing area is in Excellent to Completely degraded condition (Trudgen, 1991). The major disturbances resulting declined vegetation condition are identified as grazing by domestic herbivores, weed infestations, and operational or disused mining areas (BHP Billiton, 2016). The full Trudgen (1991) condition rating scale is provided in Appendix C.
Climate and landform	The central Pilbara is arid- tropical semi desert climate with nine to eleven dry months, occasionally influenced by tropical cyclones (BHP Billiton, 2016). Average annual rainfall is recorded as 317.8mm (BoM, 2023). The application area is located in Hamersley Plateaux Zone described as hills and dissected plateaux (with some stony plains and hardpan wash plains) on sedimentary and volcanic rocks of the Hamersley Basin with stony soils, red shallow loams and some red/brown non-cracking clays and red loamy earths (GIS Database). The landform of the application area is described as hills and ranges including steep to precipitous cliffs, gorges and gullies, range and hill crests, upper scree slopes and hill slopes (BHP Billiton, 2016).
Land systems	The application area is broadly mapped into 11 land systems (DPIRD, 2023; van Vreeswyk et al., 2004); 1. Boolgeeda Land System - stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands. Hard spinifex grasslands are not preferred by livestock but soft spinifex is moderately preferred for a few years following fire. Vegetation is generally not prone to degradation and the system is not susceptible to erosion. The system is subject to fairly frequent burning. 2. Calcrete Land System – low calcrete platforms and plains supporting shrubby hard spinifex grasslands. Depositional surfaces; valley fill deposits - stony plains as a mosaic of calcrete tables and low rises elevated up to 10 metres above the surrounding surfaces of narrow inter-table drainage areas and restricted sandy plains; drainage patterns absent to sparse tributary tracts and occasional through going trunk channels. This land system has a low erosion risk. 3. Egerton Land System - highly dissected plains and slopes with sparse mulga shrublands or shrubby hard spinifex grasslands. Erosional surfaces; surfaces formed by dissection of the old Tertiary plateau; minor residual hardpan plains with extensive marginal dissection zones consisting of narrow interfluves and slopes; very closely spaced tributary drainage patterns becoming more widely spaced downslope to narrow drainage floors leading to major through drainage; dissected slopes adjacent to major drainage lines are often calcrete. Relief up to 20 metres. The system is not susceptible to erosion. 4. Elimunna Land System - stony plains on basalt supporting sparse acacia and cassia shrublands and patchy tussock grasslands. Mainly depositional surfaces; level to gently undulating stony plains, other level plains with a mosaic of surfaces with and without gilgai micro relief, widely or very widely spaced tributary and non-tributary drainage floors with clay soils and central through channels; also sluggish internal drainage patterns on gilgai plains; occasional low hills and rises on basalt. Relief up to 15 metres. Some drainage floors are slightly susceptible to erosion but most of the system is inherently resistant. 5. Jamindie Land System - stony hardpan plains and rises supporting grooved mulga shrubland, occasionally with spinifex understorey. Depositional surfaces; non-saline plains with hardpan at shallow depth and grooved vegetation, stony upper plains and low rises on hardpan or rock, very widely spaced tributary drainage tracts and channels; minor stony Gilgai plains, sandy banks and low ridges and hills. Relief up to 30 metres. Drainage tracts are moderately susceptible to erosion, some hardpan plains are slightly susceptible and other parts are inherently resistant. 6. Newman Land System - rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands. Erosional surfaces; plateaux and mountains - extensive high plateaux, mountains and strike ridges with vertical escarpments and steep scree slopes and more gently inclined lower slopes; moderately spaced dendritic and rectangular tributary drainage patterns of narrow valleys and gorges with narrow drainage floors and channels. Relief up to 450 metres. The system is not susceptible to erosion.

Characteristic	Details
	7. Pindering Land system - gravelly hardpan plains supporting grooved mulga shrublands with hard and soft spinifex. Depositional surfaces; level to gently undulating stony plains and gravelly plains on hardpan, receiving sheet flow; numerous small linear or arcuate drainage foci (groves) arranged at right angles to direction of sheet flow, rare tributary drainage tracts with minor channels. Relief up to 10 metres. The system is not susceptible to erosion. 8. Platform Land System - dissected slopes and raised plains supporting shrubby hard spinifex grasslands. Erosional surfaces formed by partial dissection of the old Tertiary surface; very gently inclined upper plains with extensive marginal dissection zones with gently inclined to steep slopes, closely spaced dendritic or sub-parallel drainage patterns with narrow floors in upper parts, floors incised up to 30 metres with steep stable marginal slopes and becoming wider downslope. The system is not susceptible to erosion. 9. Rocklea Land System- basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs. Erosional surfaces; hills, ridges and plateaux remnants on basalt with steep stony slopes, restricted lower slopes, stony interfluves and minor Gilgai plains; moderately spaced tributary drainage patterns of small channels in shallow valleys in upper parts becoming broader floors and channels downslope. Relief up to 110 metres. The system has very low erosion hazard. 10. Spearhole Land System - depositional surfaces; gently undulating non-saline plains with hardpan at shallow depth and grooved vegetation, sparse patterns of tributary drainage with restricted areas of shallow valleys and finely dissected slopes. Relief up to 35 metres. The system is not prone to erosion. 11. Wannamunna Land system- hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands and occasionally eucalypt woodlands. Depositional surfaces; level hardpan wash plains subject to overland sheet flow, drainage foci as discrete arcuate groves and broad internal drainage flats both receiving run-on from adjacent hardpan surfaces; rare channelled tracts but mostly not organised through drainage. Generally the system has low susceptibility to erosion. Disturbances to overland flow processes by inappropriate positioning or construction of infrastructure such as roads can have adverse effects on vegetation.
Soil description	The following soil unit occurs within the application area (BHP Billiton, 2016); Fa13: Ranges of banded jaspilite and chert along with shales, dolomites, and iron ore formations; some areas of ferruginous duricrust as well as occasional narrow winding valley plains and steeply dissected pediments. The soils are frequently stony and shallow and there are extensive areas without soil cover: chief soils are shallow stony earthy loams, Fa14: Steep hills and steeply dissected pediments on areas of banded jaspilite and chert along with shales, dolomite, and iron ore formations; some narrow winding valley plains: chief soils are shallow stony earthy loams, Fa15: Ranges of basalt along with shale, chert, jaspilite, and dolomite; some narrow winding valley plains. The soils are frequently shallow and there are extensive areas without soil cover: chief soils are shallow stony loams, Fb3: High-level valley plains set in extensive areas of unit Fa13. There are extensive areas of pisolitic limonite deposits: principal soils are deep earthy loams, and Ja2: This unit occupies the central position within the high-level valley plains represented by unit Fb3: chief soils are earthy clays along.
Land degradation risk	Majority of the mapped land systems of the application area is considered resistant or low risk of the erosion (van Vreeswyk et al., 2004). Drainage tracts and hardpan plains of the Jasmindie land system and some drainage floors of Elimunna land system are susceptible to the erosion (van Vreeswyk et al., 2004). The application area has low risk of soil acidity and salinity indicating 0-30% of map units with moderate to high risk of salinisation and acidification (DPIRD, 2023).
Waterbodies	The Application Area is located in the Ashburton River and Fortescue River Upper catchments (BHP Billiton, 2016). The desktop assessment indicated that significant streams, major and minor rivers/tribes, and multiple non-perennial watercourses transect the area proposed to be cleared (GIS database).

Characteristic	Details
	No permanent waterbodies have been identified within the application area. The closest surface water body, Turee Creek East Branch, is approximately nine kilometres to the south west of the application area (GIS Database). The following 12 vegetation types have been recorded as associated with watercourses (BHP Billiton, 2016); 1. MA AtpApyAse Ec TmbTtCpr - High Shrubland of *Acacia tumida* var. *pilbarensis*, *Acacia pyrifolia* var. *pyrifolia* and *Acacia sericophylla* with Scattered Trees of *Eucalyptus camaldulensis* subsp. *refulgens* over Open Tussock Grassland of *Themeda* sp. Mt Barricade (M.E. Trudgen 2471), *Themeda triandra* and *Cymbopogon procerus* on brown loam and gravels on major drainage channels; 2. MA AaAciApr CcTtCf EvEc - Low Open Forest of *Acacia aptaneura*, *Acacia citrinoviridis* and *Acacia pruinocarpa* over Open Tussock Grassland of **Cenchrus ciliaris*, *Themeda triandra* and *Chrysopogon fallax* with Open Woodland of *Eucalyptus victrix* and *Eucalyptus camaldulensis* subsp. *refulgens* on brown loamy sand on major drainage lines with broad and deeply incised drainage channels; 3. MI AtpPlAmo TpTs ChEl - Open Scrub of *Acacia tumida* var. *pilbarensis*, *Petalostylis labicheoides* and *Acacia monticola* over Open Hummock Grassland of *Triodia pungens* and *Triodia* sp. Shovelanna Hill (S. van Leeuwen 3835) with Low Open Woodland of *Corymbia hamersleyana* and *Eucalyptus leucophloia* subsp. *leucophloia* on red brown sandy loam on minor drainage lines; 4. MI AbAdAma Tp TtPmEa - Shrubland of *Acacia bivenosa*, *Acacia dictyophleba* and *Acacia maitlandii* over Open Hummock Grassland of *Triodia pungens* over Open Tussock Grassland of *Themeda triandra*, *Paraneurachne muelleri* and *Eulalia aurea* on brown sandy loam on minor drainage lines; 5. MI Eb VfAteAa PhCmPg - Tussock Grassland of *Eriachne benthamii* with Shrubland of **Vachellia farnesiana*, *Acacia tetragonophylla* and *Acacia aptaneura* over Low Open Herbland of *Pimelea holroydii*, *Centipeda minima* and *Ptilotus gomphrenoides* on red silty loam on basalt parent rock along small drainage lines; 6. MA EcEvEx ApyAtpGr TtEaCpr - Low Open Forest of *Eucalyptus camaldulensis* subsp. *refulgens*, *Eucalyptus victrix* and *Eucalyptus xerothermica* over High Shrubland of *Acacia pyrifolia* var. *pyrifolia*, *Acacia tumida* var. *pilbarensis* and *Gossypium robinsonii* over Open Tussock Grassland of *Themeda triandra*, *Eulalia aurea* and *Cymbopogon procerus* on red brown clay loam on major drainage lines; 7. MI PlAtpAmo ChEl TwTp - Shrubland of *Petalostylis labicheoides*, *Acacia tumida* var. *pilbarensis* and *Acacia monticola* with Low Open Woodland of *Corymbia hamersleyana* and *Eucalyptus leucophloia* subsp. *leucophloia* over Open Hummock Grassland of *Triodia wiseana* and *Triodia pungens* on red brown loam on minor drainage lines; 8. ME TtAinCa ChEl AmoPlAlu - Open Tussock Grassland of *Themeda triandra*, *Aristida inaequiglumis* and *Cymbopogon ambiguus* with Low Open Woodland of *Corymbia hamersleyana* and *Eucalyptus leucophloia* subsp. *leucophloia* over Open Shrubland of *Acacia monticola*, *Petalostylis labicheoides* and *Androcalva luteiflora* on red brown alluvium on minor and medium drainage lines; 9. FP TtEa ExAa AprAtpElo - Tussock Grassland of *Themeda triandra* and *Eulalia aurea* with Low Woodland of *Eucalyptus xerothermica* and *Acacia aptaneura* over Open Shrubland of *Acacia pruinocarpa*, *Acacia tumida* var. *pilbarensis* and *Eremophila longifolia* on red brown clay loam on unincised drainage lines and floodplains; 10. GG TtEmuTmb ElChCfe AtpGrPl - Tussock Grassland of *Themeda triandra*, *Eriachne mucronata* and *Themeda* sp. Mt Barricade with Low Open Woodland of *Eucalyptus leucophloia* subsp. *leucophloia*, *Corymbia hamersleyana* and *Corymbia ferriticola* over High Shrubland of *Acacia tumida* var. *pilbarensis*, *Gossypium robinsonii* and *Petalostylis labicheoides* on red brown sandy loam in narrowly incised rocky drainage lines; 11. ME TpTl ExAciCh PlApyGr - Hummock Grassland of *Triodia pungens* and *Triodia longiceps* with Low Woodland of *Eucalyptus xerothermica*, *Acacia citrinoviridis* and *Corymbia hamersleyana* over High Shrubland of *Petalostylis labicheoides*, *Acacia pyrifolia* var. *pyrifolia* and *Gossypium robinsonii* on red brown clay loam on medium drainage lines and surrounding floodplains; and 12. SP TpTm AaExAca ApaEffAad - Hummock Grassland of *Triodia pungens* and *Triodia melvillei* with Low Open Woodland of *Acacia aptaneura*, *Eucalyptus xerothermica* and *Acacia*

Characteristic	Details
	catenulata subsp. *occidentalis* and Open Shrubland of *Acacia pachyacra*, *Eremophila forrestii* subsp. *forrestii* and *Acacia adsurgens* on red brown clay loam or silty loam on stony plains and floodplains.
Hydro geography	Southern Fortescue and Marandoo Water Reserves drinking water source (PDWSA) is approximately 40 kilometres from the application area. The application area is located in Pilbara ground water, surface water and irrigation district (GIS database). Marginal salinity (TDS 500-1000 mg/L) was recorded in the groundwater.
Flora	Desktop assessment or flora surveys does not indicate the presence of known threatened flora in the application area. Desktop assessment and review of four level 2 flora surveys of the application area has indicated the presence of 24 priority flora species including one priority 1 species, three priority 2 species, 15 priority 3 species, and five priority 4 species (BHP Billiton, 2016; GIS Database).
Ecological communities	No known Threatened Ecological Communities (TEC) identified within the 50 kilometre buffer zone. The application area is situated within the buffer of the Priority Ecological Community (PEC) Coolibah-lignum flats: *Eucalyptus victrix* over *Muehlenbeckia florulenta* (GIS Database). There are two sub-types of this PEC: - Coolibah (*Eucalyptus victrix*) woodland over Lignum (*Muehlenbeckia florulenta*) over Swamp Wandiree (*Eriachne benthamii*) (Priority 1); and - Coolibah (*Eucalyptus victrix*) and Mulga (*Acacia aneura*) woodland over Lignum (*Muehlenbeckia florulenta*) and tussock grasses on clay plains (Priority 3) (BHP Billiton, 2016).
Fauna	The previous surveys undertaken across the application area has identified 11 potential habitat types including: calcrete plain, gilgai plain, hardpan plain, sand plain, stony plain, drainage area / floodplain, major drainage line, minor drainage line, mulga woodland, crest / slope, and gorge / gully (BHP Billiton, 2016). Nine conservation significant species have been recorded in the application area and six conservation significant species identified as likely to present in the area (BHP Billiton, 2016; GIS Database). Seven species found within 50 kilometre boundary (Appendix B.3) considered as not likely to occur in the application area, considering the number of records and distance to the closet record (GIS Database).

B.2. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix D.1), and biological survey information, impacts to the following conservation significant flora required further consideration (BHP Billiton, 2016; GIS Database).

Species Name	Conservation code	Number of records within 50km	Distance to the closest record (km)	Suitable soil type (Yes/No)	Suitable vegetation (Yes/No)
Acacia bromilowiana	4	54	0	Y	Y
Acacia effusa	3	14	2	Y	Y
Acacia subtiliformis	3	21	6	Y	Y
Aristida jerichoensis var. *subspinulifera*	3	300	0	Y	Y
Aristida lazaridis	2	23	0	Y	Y
Dampiera metallorum	3	121	0	Y	Y
Eremophila magnifica subsp. *magnifica*	4	46	0	Y	Y
Eremophila naaykensii	3	13	0	Y	Y
Eremophila pusilliflora	2	17	0	Y	Y
Eremophila sp. West Angelas (S. van Leeuwen 4068)	2	8	0	Y	Y
Euphorbia australis var. *glabra*	3	4	18	Y	Y
Glycine falcata	3	3	17	Y	Y
Goodenia lyrata	3	7	0	Y	Y

Grevillea saxicola	3	19	0	Y	Y
Indigofera gilesii	3	21	0	Y	Y
Ipomoea racemigera	2	5	21	N	Y
Isotropis parviflora	3	18	4	Y	Y
Kohautia australiensis	2	6	18	N	Y
Lepidium catapycnon	4	278	0	Y	Y
Oxalis sp. Pilbara (M.E. Trudgen *12725)*	2	10	0	Y	Y
Pilbara trudgenii	3	9	0	Y	Y
Ptilotus mollis	4	3	0	Y	Y
Rhagodia sp. Hamersley (M. Trudgen 17794)	3	46	0	Y	Y
Rhodanthe ascendens	1	1	1	N	Y
Rostellularia adscendens var. *latifolia*	3	23	0	Y	Y
Sida sp. Barlee Range (S. van Leeuwen 1642)	4	55	0	Y	Y
Solanum kentrocaule	3	13	0	Y	Y
Streptoglossa sp. Cracking clays (S. van Leeuwen et al. PBS 7353)	3	5	0	N	Y
Stylidium weeliwolli	3	10	11	Y	N
Synostemon hamersleyensis	1	30	34	Y	Y
Tetratheca fordiana	2	12	6	Y	N
Teucrium pilbaranum	2	1	0	Y	Y
Themeda sp. Hamersley Station (M.E. Trudgen 11431)	3	21	0	Y	Y
Triodia basitricha	3	1	4	Y	Y
Triodia sp. Karijini (S. van Leeuwen 4111)	1	11	0	Y	Y
Triodia sp. Mt Ella (M.E. Trudgen 12739)	3	29	0	Y	Y
Vittadinia sp. Coondewanna Flats (S. van Leeuwen 4684)	3	21	0	Y	Y
Xerochrysum boreale	3	1	0	Y	Y

T: threatened, P: priority (BHP Billiton, 2016; DBCA, 2023; GIS Database)

B.3. Fauna analysis table

Scientific Name	Common Name	WA conservation status	Number of records within 50 km	Distance to the closet record (km)
Anilios ganei	Gane's blind snake (Pilbara)	P1	4	0
Apus pacificus	Fork-tailed swift	MI	567	6
Dasycercus blythi	Brush-tailed mulgara	P4	12	30
Dasyurus hallucatus	Northern quoll	EN	546	3
Falco hypoleucos	grey falcon	VU	6	0
Falco peregrinus	Peregrine falcon	OS	15	0
Gelochelidon nilotica	Gull-billed tern	MI	1	46

Leggadina lakedownensis	Northern short-tailed mouse	P4	4	0
Leiopotherapon aheneus	Fortescue grunter	P4	25	37
Lerista macropisthopus remota	Unpatterned robust slider (Robertson Range)	P2	3	9
Liasis olivaceus barroni	Pilbara olive python	VU	27	0
Macroderma gigas	Ghost bat	VU	95	0
Macronectes giganteus	Southern giant petrel	MI	3	23
Macrotis lagotis	Bilby, dalgyte	VU	1	0
Ninox connivens	Barking owl (southwest subpop.)	P3	1	19
Notomys longicaudatus	Long-tailed hopping-mouse	EX	1	48
Pandion cristatus	Osprey, eastern osprey	MI	1	37
Pseudomys chapmani	Western pebble-mound mouse	P4	359	0
Rhinonicteris aurantia (Pilbara)	Pilbara leaf-nosed bat	VU	13,120	1
Tringa nebularia	Common greenshank	MI	2	21
Underwoodisaurus seorsus	Pilbara barking gecko	P2	14	0
Tringa glareola	Wood Sandpiper	MI	≥1	0

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority, MI- Migratory, OS- Other specially protected species. (BHP Billiton, 2016; DBCA, 2023; GIS Database).

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. Sources of information

D.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)
- Clearing Regulations – Schedule One Areas (DWER-057)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrographic Catchments – Catchments (DWER-028)
- Hydrography – Inland Waters – Waterlines
- Hydrography, Linear (DWER-031)
- IBRA Vegetation Statistics
- Native Title (ILUA) (LGATE-067)
- Pre-European Vegetation Statistics
- 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 (DPIRD-027)
- Soil Landscape Mapping – Rangelands (DPIRD-064)
- WA Now Aerial Imagery

Restricted GIS Databases used:

- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

D.2. References

BHP Billiton (2016) Central Pilbara West Strategic Exploration NVCP, Native Vegetation Clearing Permit Application Supporting Document for Exploration Drilling. BHP Billiton Iron Ore Pty Ltd, Western Australia, June 2016.

BHP Iron Ore (2022) Annual Environmental Report, July 2021- June 2022, BHP Iron Ore Pty Ltd, Western Australia, 2022.

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Department of Biodiversity, Conservation and Attractions (DBCA) (2023) *Threatened species and communities.* Department of Biodiversity, Conservation and Attractions, Western Australia Available from: https://www.dbca.wa.gov.au/management/threatened-species-and-communities (Accessed 21 July, 2023).

Department of Environment Regulation (DER) (2014) *A guide to the assessment of applications to clear native vegetation*. Perth. Available from: https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Guidelines/Guide2_assessment_native_veg.pdf

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Department of Water and Environmental Regulation (DWER) (2021) Procedure: Native vegetation clearing permits. Joondalup. Available from: https://dwer.wa.gov.au/sites/default/files/Procedure_Native_vegetation_clearing_permits_v1.pdf

Government of Western Australia (2019) 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions. https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics

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Van Vreeswyk, A.M.E., Payne, A.L., Leighton, K.A. and Hennig, P. (2004) An inventory and condition survey of the Pilbara Region, Western Australia. Technical Bulletin No. 92. Department of Agriculture, South Perth, Western Australia.

Western Australian Herbarium (1998-) FloraBase - the Western Australian Flora. Department of Biodiversity, Conservation and Attractions, Western Australia. https://florabase.dpaw.wa.gov.au/ (Accessed 21 July 2023).

4. Glossary

Acronyms:

BC Act	*Biodiversity Conservation Act 2016,* Western Australia
BoM	Bureau of Meteorology, Australian Government
DAA	Department of Aboriginal Affairs, Western Australia (now DPLH)
DAFWA	Department of Agriculture and Food, Western Australia (now DPIRD)
DCCEEW	Department of Climate Change, Energy, the Environment and Water, Australian Government
DBCA	Department of Biodiversity, Conservation and Attractions, Western Australia
DER	Department of Environment Regulation, Western Australia (now DWER)
DMIRS	Department of Mines, Industry Regulation and Safety, Western Australia
DMP	Department of Mines and Petroleum, Western Australia (now DMIRS)
DoEE	Department of the Environment and Energy (now DCCEEW)
DoW	Department of Water, Western Australia (now DWER)
DPaW	Department of Parks and Wildlife, Western Australia (now DBCA)
DPIRD	Department of Primary Industries and Regional Development, Western Australia
DPLH	Department of Planning, Lands and Heritage, Western Australia
DRF	Declared Rare Flora (now known as Threatened Flora)
DWER	Department of Water and Environmental Regulation, Western Australia
EP Act	*Environmental Protection Act 1986*, Western Australia
EPA	Environmental Protection Authority, Western Australia
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Federal Act)
GIS	Geographical Information System
ha	Hectare (10,000 square metres)
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union
PEC	Priority Ecological Community, Western Australia
RIWI Act	*Rights in Water and Irrigation Act 1914*, Western Australia
TEC	Threatened Ecological Community

Definitions:

{DBCA (2019) Conservation Codes for Western Australian Flora and Fauna. Department of Biodiversity, Conservation and Attractions, Western Australia}:-

T **Threatened species:**

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR **Critically endangered species**
Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN **Endangered species**
Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU **Vulnerable species**
Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct Species:

EX **Extinct species**
Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW **Extinct in the wild species**
Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species:

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI **Migratory species**
Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD **Species of special conservation interest (conservation dependent fauna)**
Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS **Other specially protected species**
Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P **Priority species:**

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

P1 **Priority One - Poorly-known species**
Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

P2 **Priority Two - Poorly-known species**
Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

P3 **Priority Three - Poorly-known species**
Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

P4 **Priority Four - Rare, Near Threatened and other species in need of monitoring**
(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Principles for clearing native vegetation:

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

(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.

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

(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.

(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.

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

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

(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.

(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.

(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.