

Valhalla Gas Exploration and Appraisal Program (Phase I and II)

Application Number: **02593**

Commencement Date:

Status: **Locked**

16/09/2024

1. About the project

1.1 Project details

1.1.1 Project title *

Valhalla Gas Exploration and Appraisal Program (Phase I and II)

1.1.2 Project industry type *

Exploration (mineral, oil and gas - non-marine)

1.1.3 Project industry sub-type

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1.1.4 Estimated start date *

01/01/2026

1.1.4 Estimated end date *

01/01/2033

1.2 Proposed Action details

1.2.1 Provide an overview of the proposed action, including all proposed activities. *

The purpose of the proposed action is to confirm and appraise the positive results from previous exploration activities within EP 371.

The proposed action includes the construction of up to twenty (20) exploration wells on ten (10) well sites, under two phases.

The initial six (6) wells to be developed under phase I are believed to be the most gas prospective and are strategically located to de-risk Phase II drilling activities. If Phase I indicates commercial production is economically feasible, it will be followed by the Phase II drilling program involving up to fourteen (14) wells.

Site preparation at each well site will involve civil activities including clearing of vegetation and construction of well sites, construction of well site ponds, pits, sumps, and well cellars and installation of groundwater extraction and monitoring bores.

Drilling activities will then comprise mobilization of the drilling package, ancillary services, rig camp, personnel and supplies, completion of drilling activities and casing and suspending the well, or if required, plugging and decommissioning the well.

Hydraulic fracture stimulation (HFS) activities will comprise the mobilization of HFS spread (equipment), personnel and supplies, well perforation and clean-up, HFS treatment and well testing.

The types and use of HFS fluids used for HFS treatment have evolved greatly over the last 60 years and continue to evolve due to the investment of significant research effort. This has led to the development of 'green' HFS fluids that optimise environmental objectives and outcomes. One of these is Halliburton's CleanStim Aus® HFS fluid system, which is proposed to be used for this program. Ecotoxicity testing of the combined fluid system was previously undertaken by the previous operator and demonstrated that the fluid system is of very low toxicity (Buru Energy, 2018). For a detailed description of the chemicals planned to be used, refer (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix A). Following the completion of well testing, site reinstatement/decommissioning will comprise the suspension or shutting in of the wells, plugging decommissioned wells permanently with multiple concrete plugs (in accordance with Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) accepted Well Management Plan), removal of all infrastructure from the sites, environmental sampling to ensure contamination has not occurred, and to address any contamination issues, draining and backfilling ponds, sumps, and pits, ripping and contouring hardstands as required and the respreading of topsoil and stockpiled vegetation.

Over the course of the project, water will be extracted, injected and separated from the produced fluid stream. A detailed description of water, fluids and gas cycle over the course of the project (including flow diagram and water balance assessment), is provided in (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Section 2.4.4 pp 61-65). No additional developments are happening as part of the proposed action.

For further information about the Proposed Action, each component is described in detail within (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Section 2 pp 56-70)

The Proposed Action may have direct and indirect impacts on the environment.

Direct impacts may include:

- Habitat loss - site preparation activities
- Vehicle strike – site preparation activities, drilling activities and vehicle / equipment movement

Indirect impacts may include:

- Light emissions– site preparation activities and drilling activities
- Noise and vibration emissions– site preparation activities, drilling and HFS activities
- Dust emissions – site preparation activities, drilling activities and vehicle / equipment movement
- Changes to fire regimes – site preparation activities and drilling activities
- Introduction or spread of weeds – site preparation activities and vehicle / equipment movement
- Water resource impacts – water extraction activities, aquifer contamination

See Section 4.1.4 and Att 9 – Assessment of potential impacts to MNES for further details.

The Project Area comprises a total area of ~210 ha, which includes all well sites, access tracks, camp and the existing road (Calwynyardah-Noonkanbah Road, an existing gravel road which branches south from the sealed Great Northern Highway). The estimated disturbance footprint for the well sites, access tracks and camp is ~110 ha.

Att 6 – Project Figure, shows the Project Area including labelled well sites, the intended camp site and associated access tracks. The Calwynyardah-Noonkanbah Road is an existing public use road but has been included in the Project Area even though no additional development is required on this road. All assessments completed in this referral are based upon the most conservative and highest potential disturbance (clearing) numbers to ensure the maximum potential impact has been assessed noting that under this referral, no more than ten (10) wellsite's and associated access tracks will be cleared.

There are no avoidance and / or retention areas associated with the Proposed Action.

1.2.2 Is the project action part of a staged development or related to other actions or proposals in the region?

No

1.2.6 What Commonwealth or state legislation, planning frameworks or policy documents are relevant to the proposed action, and how are they relevant? *

Environment Protection and Biodiversity Conservation Act 1999

Matters of National Environmental Significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth of Australia, 2013) provides basis for consideration of what constitutes a significant impact to a matter of environmental significance.

Matters of national environmental significance known or likely to occur within or adjacent to the Development Envelope include:

- National Heritage Place (the West Kimberley National Heritage Area (WKNHA))
- Nationally threatened species
- Migratory species
- Water resource in relation to large coal mining development or coal seam gas

Western Australian State Legislation

Environmental Protection Act 1986 (WA) (Part IV)

Part IV the Environmental Protection Act 1986 (EP Act) for the assessment of a significant proposal. EPA (2021) Statement of Environmental Principles, Factors, Objectives and aims of EIA outlines the objective of the EP Act, and the five environmental principles to be regarded in achieving the object of the EP Act.

Environmental factors and associated objectives to be considered (not all relevant to the Proposed Action) include:

- Flora and Vegetation - To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
- Terrestrial fauna - To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
- Subterranean fauna - To protect subterranean fauna so the biological diversity and ecological integrity are maintained.

- Inland waters - To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
- Marine fauna - To protect marine fauna so that biological diversity and ecological integrity are maintained.
- Marine environmental quality - To maintain the quality of water, sediment and biota so that environmental values are protected.
- Coastal processes - To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.
- Benthic communities and habitat - To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.
- Terrestrial environmental quality - To maintain the quality of land and soils so that environmental values are protected.
- Greenhouse gas emissions - To minimise the risk of environmental harm associated with climate change by reducing greenhouse gas emissions as far as practicable.
- Social surroundings - To protect social surroundings from significant harm.
- Air quality - To maintain air quality and minimise emissions so that environmental values are protected.

The referral has been assessed, and the level of assessment set at Public Environmental Review (PER).

Petroleum and Geothermal Energy Resources Act 1967 (WA)

Under this Act, various subsidiary legislation has been enacted, which requires BNR to seek additional approvals from Department of Energy Mines, Industry Regulation and Safety (DEMIRS) before implementing the Proposal.

Under the Petroleum and Geothermal Energy Resources (Environment) Regulations (PGER(E)R) 2012, an Environment Plan (EP) must be accepted by DEMIRS for petroleum-related activities, before such activities can commence. The EP must evaluate all impacts and risks that are associated with an activity, and demonstrate that, with the management measures identified, the impacts and risks are reduced to levels that are 'As Low As Reasonably Practicable' (ALARP). Further to this, the EP must demonstrate that the environmental impacts and risks are acceptable. Included as part of an EP is the requirement to submit an Oil Spill Contingency Plan (OSCP) for approval. An EP cannot be accepted without an approved OSCP. The OSCP covers all spill scenarios associated with the activity.

Under the Petroleum and Geothermal Energy Resources (Resource Management and Administration) Regulations 2015 a Well Management Plan (WMP) that describes the history of all well activities relating to the planning, design, construction, integrity, and management of a well throughout its life cycle must be approved by DEMIRS.

Rights in Water and Irrigation Act 1914 (WA)

Requirement for licence to take water (5C licence). Requirement for licence to construct a bore (26D licence).

Dangerous Goods Safety Act 2004 (WA)

Classification of hazardous substances into classes and specifies management of transportation, storage and use of these substances under associated regulations.

Aboriginal Cultural Heritage Act 2021 (to be repealed and replaced with the Aboriginal Heritage Act 1972) (WA)

Regime for the protection and preservation of Aboriginal cultural heritage in Western Australia.

Biodiversity Conservation Act 2016 (WA)

Provides for the protection and preservation of Western Australian conservation significant fauna, flora and threatened ecological communities.

1.2.7 Describe any public consultation that has been, is being or will be undertaken regarding the project area, including with Indigenous stakeholders. Attach any completed consultation documentations, if relevant. *

The Project Area is within the Shire of Derby / West Kimberley (SDWK) in the broader West Kimberley region. It is characterised by semi-arid rangelands, which are areas of open country used by pastoralists and Traditional Owners for various activities, including grazing cattle and hunting and collecting bush foods.

In summary, the Project Area overlays:

- two pastoral stations (leased Crown land)—Blina Station and Noonkanbah Station
- two registered native title groups, the Warlangurru people and the Yungngora people

Bennett Resources Pty Ltd believes that relevant stakeholders are those whose functions, interests, or activities have the potential to be affected by the Proposed Action; therefore, the relevant stakeholders are:

- Blina Station
- Noonkanbah Station
- Warlangurru People
- Yungngora (Noonkanbah) People.

As the project pre-dates Bennett Resources Pty Ltd previous operators have engaged with relevant stakeholders for a prolonged period of time (dating back to initial fracture activities in 2012). However following acquisition of the asset, Bennett Resources Pty Ltd has continued to engage with these stakeholders.

A detailed summary of consultation has been provided (Att 1 – Summary of Stakeholder Consultation).

In summary, engagement has generally been positive with the main outcome of the engagement being that all mentioned relevant stakeholders have shown continuing support for the Proposed Action, with the only concerns being for how slow the project is taking to move through regulatory approvals.

1.3.1 Identity: Referring party

Privacy Notice:

Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

By completing and submitting this form, you consent to the collection of all personal information contained in this form. If you are providing the personal information of other individuals in this form, please ensure you have their consent before doing so.

The Department of Climate Change, Energy, the Environment and Water (the department) collects your personal information (as defined by the Privacy Act 1988) through this platform for the purposes of enabling the department to consider your submission and contact you in relation to your submission. If you fail to provide

some or all of the personal information requested on this platform (name and email address), the department will be unable to contact you to seek further information (if required) and subsequently may impact the consideration given to your submission.

Personal information may be disclosed to other Australian government agencies, persons or organisations where necessary for the above purposes, provided the disclosure is consistent with relevant laws, in particular the Privacy Act 1988 (Privacy Act). Your personal information will be used and stored in accordance with the Australian Privacy Principles.

See our Privacy Policy to learn more about accessing or correcting personal information or making a complaint. Alternatively, email us at privacy@awe.gov.au.

Confirm that you have read and understand this Privacy Notice *

1.3.1.1 Is Referring party an organisation or business? *

No

Referring party details	
Name	Ashley Fertch
Job title	Environmental Specialist
Phone	0892001685
Email	BME@environmentalsolutions.net.au
Address	197 St Gorges Terrace, Perth 6000

1.3.2 Identity: Person proposing to take the action

1.3.2.1 Are the Person proposing to take the action details the same as the Referring party details? *

No

1.3.2.2 Is Person proposing to take the action an organisation or business? *

Yes

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Person proposing to take the action organisation details

ABN/ACN 73145113186
Organisation name BENNETT RESOURCES PTY LTD
Organisation address 6000 WA

Person proposing to take the action details

Name Michael Laurent
Job title Chief Operating Officer
Phone 92001685
Email perthoffice@bennettresources.com.au
Address Level 14, 225 St Georges Terrace, Perth WA 6000

1.3.2.14 Are you proposing the action as part of a Joint Venture? *

No

1.3.2.15 Are you proposing the action as part of a Trust? *

No

1.3.2.17 Describe the Person proposing the action's history of responsible environmental management including details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against the Person proposing to take the action. *

The Proposed Action will be undertaken in accordance with BNRs environmental policy and framework.
Bennett Resources Pty Ltd has a satisfactory record of responsible environmental Management.
There are no proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against Bennett Resources Pty Ltd.

1.3.2.18 If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

Bennett Resources Pty Ltd Environmental Policy is included as Att 2 – BNR Environmental Policy.

Summary of Bennett Resources Pty Ltd Environmental Policy

Through its Environmental Policy Bennett Resources Pty Ltd (BNR) is committed to achieve the best possible balance between economic development and protection of the environment.

BNR is committed to managing environmental matters to achieve long-term environmentally sustainable development.

To achieve this, BNR is committed to:

- Complying with all applicable environmental laws, regulations and requirements and where able, exceeding those applicable standards for environmental management.
- Establishing, developing and maintaining management systems that are consistent with internationally recognised standards to identify, monitor and control all aspects of its environmental activities.
- Ensuring continuous improvement in its environmental performance including promoting its environmental progress through public reporting.
- Identifying and assessing the potential environmental effects of our activities and manage environmental risks and improvement opportunities.
- Regularly monitoring environmental performance to ensure minimisation and where possible, prevention of negative impacts on the environment.
- Promoting environmental awareness amongst our employees and contractors, ensuring they are aware of their roles and relevant responsibilities for environmental management.
- Developing our people and providing them with the necessary resources to ensure that sustainable environmental development is an integral part of how we do business.
- Working with local communities and governments to minimise environmental impacts and developing opportunities for involvement in environmental programs.
- Integrating environmental processes into all aspects of our operations.

It is the responsibility of all employees, contractors and suppliers to comply with the requirements *of this policy*.

It is the responsibility of managers and supervisors to ensure this policy is implemented, reinforced and maintained through *active* leadership.

1.3.3 Identity: Proposed designated proponent

1.3.3.1 Are the Proposed designated proponent details the same as the Person proposing to take the action? *

No

1.3.3.2 Is Proposed designated proponent an organisation or business? *

Yes

Proposed designated proponent organisation details

ABN/ACN 73145113186
Organisation name BENNETT RESOURCES PTY LTD
Organisation address 6000 WA

Proposed designated proponent details

Name Michael Laurent
Job title Chief Operating Officer
Phone 0863162200
Email perthoffice@bennettresources.com.au
Address Level 4, 225 St Georges Terrace, Perth WA 6000

1.3.4 Identity: Summary of allocation

Confirmed Referring party's identity

The Referring party is the person preparing the information in this referral.

Name Ashley Fertch
Job title Environmental Specialist
Phone 0892001685
Email BME@environmentalsolutions.net.au
Address 197 St Gorges Terrace, Perth 6000

✔ Confirmed Person proposing to take the action's identity

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

ABN/ACN	73145113186
Organisation name	BENNETT RESOURCES PTY LTD
Organisation address	6000 WA
Representative's name	Michael Laurent
Representative's job title	Chief Operating Officer
Phone	92001685
Email	perthoffice@bennettresources.com.au
Address	Level 14, 225 St Georges Terrace, Perth WA 6000

✔ Confirmed Proposed designated proponent's identity

The Person proposing to take the action is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

ABN/ACN	73145113186
Organisation name	BENNETT RESOURCES PTY LTD
Organisation address	6000 WA
Representative's name	Michael Laurent
Representative's job title	Chief Operating Officer
Phone	0863162200
Email	perthoffice@bennettresources.com.au
Address	Level 4, 225 St Georges Terrace, Perth WA 6000

1.4 Payment details: Payment exemption and fee waiver

1.4.1 Do you qualify for an exemption from fees under EPBC Regulation 5.23 (1) (a)? *

No

1.4.3 Have you applied for or been granted a waiver for full or partial fees under Regulation 5.21A? *

No

1.4.5 Are you going to apply for a waiver of full or partial fees under EPBC Regulation 5.21A?

No

1.4.7 Has the department issued you with a credit note? *

No

1.4.9 Would you like to add a purchase order number to your invoice? *

No

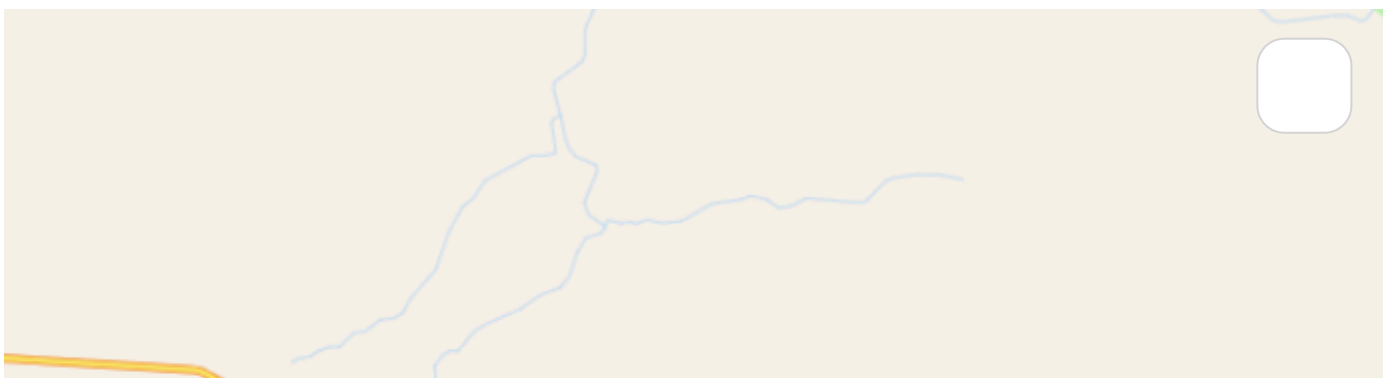
1.4 Payment details: Payment allocation

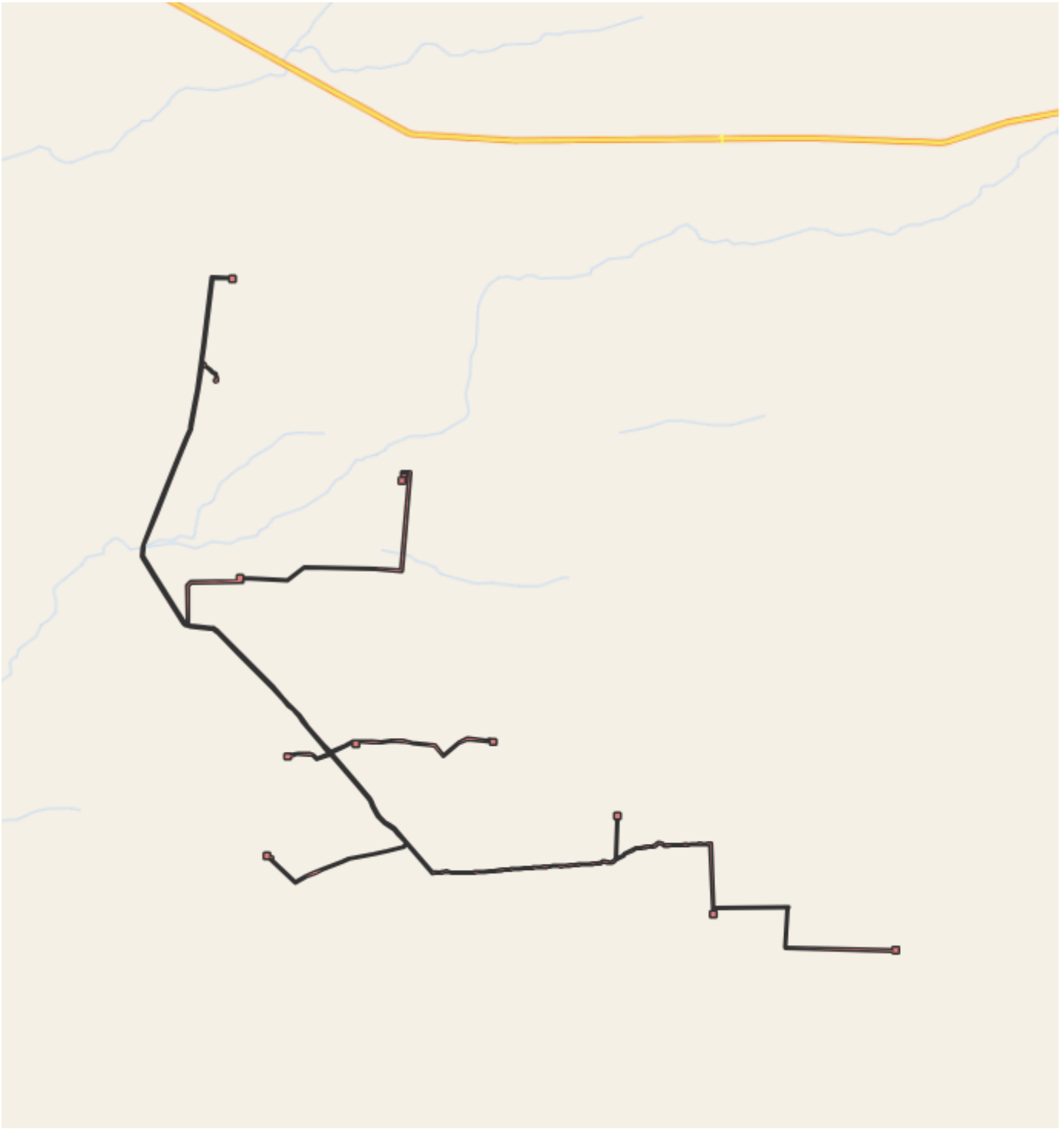
1.4.11 Who would you like to allocate as the entity responsible for payment? *

Proposed designated proponent

2. Location

2.1 Project footprint





Project Area: 210.91 Ha
Disturbance Footprint: 106.14 Ha

Maptaskr © 2024 -18.284168, 124.835256

Powered By Esri - Sources: Esri, TomTom, Garmin, F...

2.2 Footprint details

2.2.1 What is the address of the proposed action? *

Calwynyardah-Noonkanbah Rd, Mount Hard, Shire of Derby/West Kimberley

2.2.2 Where is the primary jurisdiction of the proposed action? *

Western Australia

2.2.3 Is there a secondary jurisdiction for this proposed action? *

No

2.2.5 What is the tenure of the action area relevant to the project area? *

The Project Area is located on Crown Land and zoned for pastoral use. Traditional Owners hold a pastoral lease over the Project Area.

An Indigenous Land Use Agreement (ILUA) and a Land Access and Use Agreement (LAUA) are in place, with the Yungngora (Yungngora Aboriginal Corporation RNTBC) and Warlangurru People, respectively.

3. Existing environment

3.1 Physical description

3.1.1 Describe the current condition of the project area's environment.

The Project Area is 265 km east of Broome, located on Crown Land, and zoned for pastoral use. Traditional Owners hold a pastoral lease over the Project Area. An Indigenous Land Use Agreement (ILUA) and a Land Access and Use Agreement (LAUA) are in place, with the Yungngora (Yungngora Aboriginal Corporation RNTBC) and Warlangurru People, respectively. Surrounding boundaries to the Project Area are zoned as pastoral.

Given the nature of the Project Area being a pastoral station many edge effects from existing tracks (both public and pastoral) are evident. As such, well sites and associated access tracks are planned to be built adjacent to, and branching off from, the Calwynyardah-Noonkanbah Road, an existing gravel road which branches south from the sealed Great Northern Highway.

Following a contemporary survey of the Project Area (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey), a total of thirteen vegetation communities were recorded delineated and mapped within the Project Area generally comprising broad mixtures of *Adansonia gregorii*, *Corymbia* and *Eucalyptus spp.*, *Atalaya hemiglauca*, *Bauhinia cunninghamii* and *Erythrophleum chlorostachys* woodland over mixed

Acacia, Grevillea, Hakea spp. shrubland over *Triodia* spp. hummock grassland and *Aristida*, *Eriachne*, *Eragrostis* and *Sorghum* spp. tussock grassland. This survey was completed in accordance with the Western Australian state guidelines to support the environmental approvals under the *Environmental Protection Act 1986*.

Landforms recorded across the Project Area comprised sandy clay to light clay flats and gentle slopes, dune slopes, crests and swales and open depressions and creekline communities. None of the vegetation associations delineated within the Project Area were inferred to represent any known or potential conservation significant communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey, Table 9, pp 37-44), these communities and their structures are listed below:

- AgCgEc: *Adansonia gregorii* mid isolated trees and *Corymbia greeniana*, *Erythrophleum chlorostachys*, *Bauhinia cunninghamii* low open woodland over *Acacia colei*, *Grevillea pyramidalis*, *Carissa lanceolata* mid sparse shrubland over *Triodia bitextura* low open hummock grassland and *Sorghum plumosum*, *Chrysopogon fallax* tall open tussock grassland.
- EmEcAg: *Eucalyptus microtheca*, *Eucalyptus camaldulensis*, *Adansonia gregorii* tall open woodland and *Bauhinia cunninghamii*, *Atalaya hemiglauca* low open woodland over *Acacia colei*, *Terminalia platyphylla*, *Vachellia farnesiana* tall open shrubland over *Corchorus fascicularis* low sparse shrubland and *Aristida latifolia*, *Sehima nervosum* tall open tussock grassland.
- AgBc: *Adansonia gregorii* mid isolated trees and *Bauhinia cunninghamii* low open woodland over *Grevillea pyramidalis*, *Hakea arborescens*, *Hakea macrocarpa* tall sparse shrubland over *Indigofera colutea* low sparse shrubland, *Sorghum plumosum* tall open tussock grassland and *Eriachne obtusa* low sparse grassland.
- BcCg: *Bauhinia cunninghamii*, *Corymbia greeniana* low open woodland over *Hakea macrocarpa*, *Grevillea pyramidalis*, *Acacia colei* tall sparse shrubland over *Triodia intermedia* low sparse hummock grassland, *Sorghum plumosum* tall open tussock grassland and *Eragrostis eriopoda* low sparse tussock grassland.
- CgAgBc: *Corymbia greeniana*, *Adansonia gregorii* mid open woodland and *Bauhinia cunninghamii* low open woodland over *Acacia colei*, *Hakea arborescens*, *Hakea chordophylla* tall sparse shrubland over *Sorghum plumosum* tall open tussock grassland and *Eriachne obtusa*, *Aristida hygrometrica* low sparse grassland.
- CgCzBc: *Corymbia greeniana*, *Corymbia zygomorpha*, *Bauhinia cunninghamii* low open woodland over *Acacia platycarpa*, *Grevillea pyramidalis*, *Atalaya hemiglauca* tall sparse shrubland over *Sorghum plumosum*, *Sorghum stipoides* tall open tussock grassland and *Aristida latifolia* mid sparse tussock grassland.
- BcTc: *Bauhinia cunninghamii*, *Terminalia canescens* low open woodland over *Grevillea pyramidalis*, *Acacia ancistrocarpa*, *Acacia colei* tall sparse shrubland over *Triodia intermedia*, *Triodia bitextura* low sparse hummock grassland and *Sorghum plumosum* tall open tussock grassland.
- CbEc: *Corymbia bella*, *Eucalyptus coolabah* mid open woodland over *Acacia colei*, *Lophostemon grandiflorus* subsp. *riparius*, *Sesbania cannabina* tall sparse shrubland over *Triodia bitextura* low open hummock grassland and *Aristida hygrometrica*, *Eriachne obtusa* low sparse grassland. Ag: *Adansonia gregorii* mid open woodland over *Grevillea pyramidalis*, *Hakea chordophylla*, *Dolichandrone occidentalis* tall sparse shrubland over *Triodia intermedia* low sparse hummock grassland, *Sorghum plumosum* tall sparse tussock grassland and *Aristida holathera* low sparse grassland.
- AtAcDo: *Atalaya hemiglauca*, *Acacia synchronica*, *Dolichandrone occidentalis* tall sparse shrubland over *Carissa lanceolata*, *Gossypium australe*, *Chamaecrista symonii* low sparse shrubland over *Triodia intermedia*, *Triodia wiseana* low hummock grassland and *Eriachne obtusa* low sparse grassland.
- BcGaCg: *Bauhinia cunninghamii*, *Gyrocarpus americanus*, *Corymbia greeniana* low open woodland over *Acacia platycarpa*, *Acacia tumida* tall open shrubland and *Carissa lanceolata* mid sparse

shrubland over *Triodia bitextura* low sparse hummock grassland and *Aristida hygrometrica*, *Eriachne obtusa* low sparse grassland.

- EcCg: *Erythrophleum chlorostachys*, *Corymbia greeniana* low open woodland over *Acacia tumida*, *Acacia ancistrocarpa* tall sparse shrubland and *Carissa lanceolata* mid sparse shrubland over *Bonamia pannosa*, *Bonamia linearis* low sparse shrubland and *Aristida hygrometrica* low open grassland.
- CzEcCg: *Corymbia zygomphylla*, *Erythrophleum chlorostachys*, *Corymbia greeniana* low open woodland over *Acacia tumida*, *Acacia platycarpa* tall sparse shrubland and *Waltheria indica* low sparse shrubland over *Triodia bitextura*, *Triodia wiseana* low open hummock grassland and *Eriachne obtusa* low sparse grassland.

Of these seven identified communities, vegetation ranged from Poor to Excellent in condition, and are presented in the following extents of the disturbance footprint (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey, Section 4.2.8, Table 10, pp 45):

- Completely degraded 0% (0 ha)
- Degraded 0% (0 ha)
- Poor: 2.25 % (1.75 ha)
- Good: 10.68 % (8.34 ha)
- Very Good: 69.93 % (54.57 ha)
- Excellent: 45.28 % (35.34 ha)

3.1.2 Describe any existing or proposed uses for the project area.

Existing uses within the Project Area include pastoral grazing (cattle) and existing petroleum infrastructure.

Pastoral activities have been present across the Project Area since the late 1800s.

Petroleum activities within Exploration Permit EP 371 have occurred since 1995, with various well sites and infrastructure, owned by Bennet Resources Pty Ltd, currently under care and maintenance.

3.1.3 Describe any outstanding natural features and/or any other important or unique values that applies to the project area.

The Project Area is not located within any national parks, nature reserves or conservation parks (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey, Section 2.1.6, pg. 14). Surveys indicate the natural landscape does not comprise any outstanding natural features or important / unique values that are not ubiquitous within the surrounding landscape (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey, Section 2.1.6, pg. 14).

3.1.4 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

The gradient across the Project Area is even; with heights varying from the 80 – 130 m above sea level.

3.2 Flora and fauna

3.2.1 Describe the flora and fauna within the affected area and attach any investigations of surveys if applicable.

A number of flora and fauna surveys across the Project Area have been conducted in support of previous petroleum activities within EP 371. The most contemporary indicate a total of thirteen vegetation communities were recorded in the survey area, (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey) Section 4.2.6, pp 37-44). The vegetation condition within the disturbance footprint ranged from poor to excellent (Att 3– Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey Section 4.2.8, Table 10, pp 45).

Flora

No EPBC listed flora species or vegetation communities were recorded during the survey.

Fauna

Fauna presence within the Project Area is well understood given the numerous surveys that have been conducted for previous petroleum activities within EP 371.

To support the likelihood assessment, a Targeted Fauna survey of the ten (10) well pads and all access tracks was undertaken in 2024 by Ecologia Environment (Ecologia) (Att 5 Valhalla Targeted Significant Vertebrate Fauna Survey Memo), in accordance with the DCCEEW survey guidelines (Department of Sustainability, Environment, Water, Population and Communities, 2011; DBCA, 2017).

- targeted significant fauna survey was conducted by two Ecologia zoologists from 22/07/2024 – 29/07/2024
- all proposed well sites and associated access tracks were traversed on foot at 20 m transect intervals
- motion cameras and autonomous recording units were deployed at each pad for a minimum of four nights to passively recorded species present in the area
- habitats at each pad and access track were assessed for their likelihood to be suitable for significant species.

Potential old Bilby diggings were found at well pads three (3) and four (4), this suggests that Bilbies have previously foraged within the Project Area. The survey found no presence of Bilby scats, active burrows or fresh tracks, which according to the Bilby Survey Guidelines, (DBCA, 2017) are needed to confirm presence of Bilbies (Att 5 Valhalla Targeted Significant Vertebrate Fauna Survey Memo). Survey guidelines for the presence of bilbies (DBCA, 2017) state that old diggings on their own do not confirm presence of bilbies, therefore it is considered as “potential bilby activity, presence is not confirmed” (DBCA, 2017). Similarly, DCCEE guidelines state that diggings provide indirect evidence of a species’ presence but are used to inform more direct survey methods (such as passive survey techniques) (Department of Sustainability, Environment, Water, Population and Communities, 2011). Ecologia (Att 5 Valhalla Targeted Significant Vertebrate Fauna Survey Memo), noted that scats, active burrows or tracks (fresh and very distinctive) would need to be observed to confirm the presence of bilbies but after considerable survey effort in the vicinity of the diggings, none of those were found indicating that bilbies are not present within the Project Area.

During the 2024 Targeted Survey no habitat for the Northern Quoll or Ghost Bat were recorded, nor individuals observed via the deployment of motion cameras and autonomous recording units indicating it is considered highly unlikely these species will utilise the habitat with the well pad locations and access tracks.

The presence of subterranean fauna is strongly linked to the geology and hydrology of the area as well as the availability of suitable microhabitats, such as non-hypersaline aquifers for stygofauna and air-filled voids or caves for troglofaunal (Environmental Protection Authority, 2016). The Liveringa Formation is the uppermost aquifer in the Project Area and comprises mainly fine-grained sediments (siltstone and shale), with more-permeable sandstone beds being less common. The shallow shale and siltstone sediments of the formation provide a potential habitat for stygofauna; however, bore yields in the Project Area suggest that permeability is low (Innovative Groundwater Solutions, 2015), and thus it is less likely that stygofauna would be present troglofaunal. Groundwater salinity in the Liveringa Aquifer is within a range that stygofauna are known to occur, with salinities of local bores ranging from 450 to 1,600 mg/L TDS (Att 3 - Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix I, Hydrogeological Assessment of Paradise-Valhalla-Asgard Project Areas, Section 3.3.4, Page 15).

The Liveringa Group Formation consists of mainly fine-grained sediments (siltstone and shale) with more-permeable sandstone beds being less common. Given the absence of caves or significant voids in the fine-grained sediments within the immediate surrounding region indicates that there is unlikely to be suitable habitat for troglofaunal.

Based on the results of previous sampling, it appears that sandstone aquifers of the Kimberley region contain moderately diverse stygofauna communities with very few stygofauna species restricted to small (project-level) scales (Att 3 - Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix I, Hydrogeological Assessment of Paradise-Valhalla-Asgard Project Areas, Section 3.3.4, Page 15).

3.2.2 Describe the vegetation (including the status of native vegetation and soil) within the project area.

Following a contemporary survey of the Project Area (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey), a total of thirteen vegetation communities were recorded in the survey area, of which seven were delineated and mapped within the Project Area (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey, Section 4.2.6, pp 37-44), these communities and their structures are listed below:

- AgCgEc: *Adansonia gregorii* mid isolated trees and *Corymbia greeniana*, *Erythrophleum chlorostachys*, *Bauhinia cunninghamii* low open woodland over *Acacia colei*, *Grevillea pyramidalis*, *Carissa lanceolata* mid sparse shrubland over *Triodia bitextura* low open hummock grassland and *Sorghum plumosum*, *Chrysopogon fallax* tall open tussock grassland.
- EmEcAg: *Eucalyptus microtheca*, *Eucalyptus camaldulensis*, *Adansonia gregorii* tall open woodland and *Bauhinia cunninghamii*, *Atalaya hemiglauca* low open woodland over *Acacia colei*, *Terminalia platyphylla*, *Vachellia farnesiana* tall open shrubland over *Corchorus fascicularis* low sparse shrubland and *Aristida latifolia*, *Sehima nervosum* tall open tussock grassland.
- AgBc: *Adansonia gregorii* mid isolated trees and *Bauhinia cunninghamii* low open woodland over *Grevillea pyramidalis*, *Hakea arborescens*, *Hakea macrocarpa* tall sparse shrubland over *Indigofera colutea* low sparse shrubland, *Sorghum plumosum* tall open tussock grassland and *Eriachne obtusa* low sparse grassland.
- BcCg: *Bauhinia cunninghamii*, *Corymbia greeniana* low open woodland over *Hakea macrocarpa*, *Grevillea pyramidalis*, *Acacia colei* tall sparse shrubland over *Triodia intermedia* low sparse hummock grassland, *Sorghum plumosum* tall open tussock grassland and *Eragrostis eriopoda* low sparse tussock grassland.
- CgAgBc: *Corymbia greeniana*, *Adansonia gregorii* mid open woodland and *Bauhinia cunninghamii* low open woodland over *Acacia colei*, *Hakea arborescens*, *Hakea chordophylla* tall sparse shrubland over *Sorghum plumosum* tall open tussock grassland and *Eriachne obtusa*, *Aristida hygrometrica* low sparse grassland.
- CgCzBc: *Corymbia greeniana*, *Corymbia zygophylla*, *Bauhinia cunninghamii* low open woodland over *Acacia platycarpa*, *Grevillea pyramidalis*, *Atalaya hemiglauca* tall sparse shrubland over *Sorghum plumosum*, *Sorghum stipoides* tall open tussock grassland and *Aristida latifolia* mid sparse tussock grassland.
- BcTc: *Bauhinia cunninghamii*, *Terminalia canescens* low open woodland over *Grevillea pyramidalis*, *Acacia ancistrocarpa*, *Acacia colei* tall sparse shrubland over *Triodia intermedia*, *Triodia bitextura* low sparse hummock grassland and *Sorghum plumosum* tall open tussock grassland.
- CbEc: *Corymbia bella*, *Eucalyptus coolabah* mid open woodland over *Acacia colei*, *Lophostemon grandiflorus* subsp. *riparius*, *Sesbania cannabina* tall sparse shrubland over *Triodia bitextura* low open hummock grassland and *Aristida hygrometrica*, *Eriachne obtusa* low sparse grassland. Ag: *Adansonia gregorii* mid open woodland over *Grevillea pyramidalis*, *Hakea chordophylla*, *Dolichandrone occidentalis* tall sparse shrubland over *Triodia intermedia* low sparse hummock grassland, *Sorghum plumosum* tall sparse tussock grassland and *Aristida holathera* low sparse grassland.
- AtAcDo: *Atalaya hemiglauca*, *Acacia synchronicia*, *Dolichandrone occidentalis* tall sparse shrubland over *Carissa lanceolata*, *Gossypium australe*, *Chamaecrista symonii* low sparse shrubland over *Triodia intermedia*, *Triodia wiseana* low hummock grassland and *Eriachne obtusa* low sparse grassland.
- BcGaCg: *Bauhinia cunninghamii*, *Gyrocarpus americanus*, *Corymbia greeniana* low open woodland over *Acacia platycarpa*, *Acacia tumida* tall open shrubland and *Carissa lanceolata* mid sparse shrubland over *Triodia bitextura* low sparse hummock grassland and *Aristida hygrometrica*, *Eriachne obtusa* low sparse grassland.

- EcCg: *Erythrophleum chlorostachys*, *Corymbia greeniana* low open woodland over *Acacia tumida*, *Acacia ancistrocarpa* tall sparse shrubland and *Carissa lanceolata* mid sparse shrubland over *Bonamia pannosa*, *Bonamia linearis* low sparse shrubland and *Aristida hygrometrica* low open grassland.
- CzEcCg: *Corymbia zygophylla*, *Erythrophleum chlorostachys*, *Corymbia greeniana* low open woodland over *Acacia tumida*, *Acacia platycarpa* tall sparse shrubland and *Waltheria indica* low sparse shrubland over *Triodia bitextura*, *Triodia wiseana* low open hummock grassland and *Eriachne obtusa* low sparse grassland.

The landscape of the Project Area consists of sandy clay to light clay flats and gentle slopes, dune slopes, crests and swales and open depressions and creek line communities (Att 3 – Valhalla Gas Exploration and Appraisal Program Section 38 Assessment – Environmental Review Document, Appendix C, Valhalla Flora and Fauna Survey, Executive Summary, pp vi-vii). The Project Area sits within the Camelgooda System (331Cm) and the Calwynyarda System. The Camelgooda System is described as '*Sandplains, swales and linear sand dunes supporting low pindan woodlands of acacias and low woodlands of bauhinia and bloodwood with curly spinifex and ribbon grass*' (Payne & Schoknecht, 2010). The Camelgooda System is not generally prone to erosion or degradation, although in recently burnt areas there may be a minor susceptibility to wind erosion (Payne & Schoknecht, 2010) The Calwynyarda System is described as Alluvial plains with scalded tracts downslope from lateritic remnants with yellowish loamy soils.

The Project Area has selected to avoid areas that are swampy damplands which provides both environmental benefits (avoiding State listed priority flora species) and operational benefits ensuring site access is optimised. Grass fires are a regular occurrence in this area and typically occur every two to four years. Given the nature of the vegetation it is likely that fire frequency is why the vegetation remains high quality even though it is comprised of a pastoral station and exposed to ongoing (though low frequency) disturbance. No EPBC Act listed flora species or vegetation communities were identified.

Grass fires occur regularly in the Canning Basin during the dry season. Although fire frequency varies, grass fires typically occur every two to four years (NAFI, 2021). Weather conditions, fire history and vegetation fuel load all contribute to grass fire patterns and intensity. Fire scar data shows that the areas in and around the Project Area has been subject to burning events (natural fires, or prescribed burns from pastoral activities).

3.3 Heritage

3.3.1 Describe any Commonwealth heritage places overseas or other places recognised as having heritage values that apply to the project area.

No sites listed on the National Heritage List occur within the disturbance footprint (DCCEEW, 2023). The Project Area intersects one area listed as natural (Place ID 106063). However, this is a main road (Calwynyardah-Noonkanbah Road, an existing gravel road which branches south from the sealed Great Northern Highway) and is used by the public.

The nearest National Heritage List site is the West Kimberley (Listed Place – Heritage Place No. 18769). The West Kimberley Heritage Place No. 18769 is important due to its great biological richness and contains important geological and fossil evidence of Australia's evolutionary history.

A search of the Australian Heritage Database (DCCEEW, 2023) identified one site adjacent to the Project Area classed as a 'natural, indicative place' under the Register of the National Estate (non-statutory archive)—the Walgidee Hills Lamproite Site (Place ID: 101095). The Walgidee Hills Lamproite Site is on Noonkanbah Station has been classified as a 'Landscape' by the National Trust since 1991 (Heritage Council, 2024).

World and Commonwealth heritage

No world heritage sites, or Commonwealth Heritage sites occur within the Project Area (DCCEEW, 2023).

3.3.2 Describe any Indigenous heritage values that apply to the project area.

Native title

The Project Area is overlapped by a claim by the Warlangurru People (claim WAD509/2015, also known as the Warlangurru 1 Claim) and a determination in favour of the Yungngora (Noonkanbah) People (determination WAD6229/1998, also known as the Yungngora Native Title Determination).

An Indigenous Land Use Agreement (ILUA) and a Land Access and Use Agreement (LAUA) are in place, with the Yungngora (Yungngora Aboriginal Corporation RNTBC) and Warlangurru People, respectively.

The Yungngora and Warlangurru people support the further appraisal and development of the gas resources in the area and support future grants of tenure, as required. The agreements include structured processes for managing cultural, heritage, and environmental matters in relation to BNR's proposed exploration activity within these native title areas.

Heritage sites

A search of the WA Government's Aboriginal Heritage Inquiry System (DPLH, 2021) identified that two registered Aboriginal heritage sites and two other heritage places are located within or adjacent to the Project Area:

- Dunggaba Complex 1 (Mythological – site 14215)
- Walgidee Hills 4 (Mythological – site 14224).
- No. 19 bore (Mythological – site 13851)
- No. 20 bore (Mythological – site 13852).

Although none of the proposed well sites are located within any known heritage sites, the proposed access track to the Alfheim well site crosses the No.19 bore (other heritage place [not registered]). During heritage clearance surveys completed by BNR in 2021, it became clear that access for stock to existing dams and bores is of high concern and importance. As such, on request from the Traditional Owners, the access track was diverted around the existing dam (and outside of the area of importance [No19 bore]) so that no disturbance or unplanned impact (direct or indirect associated with traffic) would occur.

In consultation with the Yungngora and Warlangurru Traditional Owners, a pre-disturbance ethnographic and archaeological heritage survey of the Proposal's disturbance footprint was undertaken in September and October 2021. Access tracks, camps and well sites were surveyed. No Aboriginal sites with an archaeological component were found in any parts of the proposed disturbance footprint. Disturbance of Aboriginal heritage sites is managed through Department of Planning, Lands and Heritage (DPLH) licencing in accordance with:

- s 16 authorisation to enter, excavate, examine or remove anything on an Aboriginal site.
- s 18 consent for impact on an Aboriginal site.

Although the Disturbance Footprint crosses the No.19 heritage site – engagement with the Traditional Owners verified that no impacts to the site will occur (based upon realignment of the track). It should be noted that although BNR aligned the access track, the Disturbance Footprint still intersects the No. 19

heritage site due the geospatial buffer applied to the site. As such BNR will still be required to apply for s 16 approval (to enter the defined heritage site) even though Traditional Owners have validated that no impacts to the site will occur.

A summary of recent consultation with traditional owners is included in Attachment 1 - Stakeholder Consultation.

3.4 Hydrology

3.4.1 Describe the hydrology characteristics that apply to the project area and attach any hydrological investigations or surveys if applicable. *

Groundwater systems – regional context

The Project Area is situated in the Canning Basin region within the Fitzroy River Catchment. The Canning Basin is considered the second largest groundwater resource in Australia after the Great Artesian Basin (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document – Appendix I – Hydrogeological Assessment of Paradise-Valhalla-Asgard Project Areas, Section 2, pp 2). It is a large sedimentary basin covering an onshore area >450,000 km² (DoW, 2012). The major regional aquifer systems in the Fitzroy Trough area of the Canning Basin are (in order of increasing depth) (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document – Appendix I – Hydrogeological Assessment of Paradise-Valhalla-Asgard Project Areas, Section 2, Table 3):

- Liveringa Group
- Grant Group (including the Poole Sandstone)

Data from three petroleum wells drilled on EP 371 by the previous operator provides a two-dimensional cross-section of the aquifers located within EP 371 (Att 7– Aquifer Data for Wells).

The two aquifers considered “useable” for other purposes within the project area include the Liveringa and Grant Group (including the Poole Sandstone).

The Liveringa Group comprises interbedded sandstones, siltstones with lenses, and minor beds of claystone and shale, varying in thickness from 319 m–900 m (Innovative Groundwater Solutions, 2015).

The Poole Sandstone and Grant Group are considered to be hydrogeologically similar and are both regarded as good aquifers because of their combined thickness and widespread distribution (Lindsay & Commander, 2005). The Poole Sandstone is mainly fine-grained with some medium to coarse sandstone towards the base. The Grant Group is much thicker than the Poole Sandstone. Available salinity records from DWER’s Water Information Reporting (WIR) database (DWER, 2021) for the Poole Sandstone range from 200 to 325 mg/L TDS, with 860 mg/L TDS for the Grant Group. In other areas of the Grant Group, oil accumulations are known to occur (hydrocarbons have previously been produced from the Grant Group from the Sundown, Boundary, and West Terrace wells at Blina Oilfield, which is north of the Project Area) (Jonasson, 2001).

Recharge and discharge mechanisms

Groundwater recharge to the Liveringa Aquifer is believed to be mainly from rainfall on outcrop areas (Lindsay & Commander, 2005). During the Fitzroy River integrated ground and surface water hydrology assessment conducted between 2008 and 2011, the then WA Department of Water (DoW) led the monitoring of the Liveringa Aquifer and surface alluvial waters associated with the Fitzroy River, which indicated a strong connection between the river and the aquifer. The multilevel piezometers that were installed at three sites on Noonkanbah Station as part of the DoW and RNWS project showed a

groundwater response to high river flow events (Lindsay & Commander, 2005). This, and comparatively low groundwater salinities measured in these piezometers compared with other regional bores, suggests some recharge to the aquifer by floodwaters.

Infiltration to the Liveringa Formation (and subsequent aquifers) from rainfall will be retarded by clay, shale and siltstone layers, both above and below the water table. Water is likely to take 70–300 days to travel from the ground surface to the water table within the Project Area (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document – Appendix I – Hydrogeological Assessment of Paradise-Valhalla-Asgard Project Areas, Section 3.2.3, pp 8).

Aquifer connectivity (surface water/groundwater interaction)

The Liveringa Aquifer and Poole Sandstone (associated with the Grant Group) are separated by the Noonkanbah (shale) Formation. The Noonkanbah Formation is considered an aquitard, comprising siltstone, limestone and minor sandstone (Lindsay & Commander, 2005), and it is a geological barrier (at least 357 m thick) between the Liveringa and Poole Sandstone aquifers. Consequently, within the Project Area the surface aquifer (Liveringa) is geologically separated from the Poole Sandstone (and subsequently, the targeted Laurel Formation).

Aquifer connectivity (surface water/groundwater interaction)

The Liveringa Aquifer and Poole Sandstone (associated with the Grant Group) are separated by the Noonkanbah (shale) Formation. The Noonkanbah Formation is considered an aquitard, comprising siltstone, limestone and minor sandstone (Lindsay & Commander, 2005), and it is a geological barrier (at least 357 m thick) between the Liveringa and Poole Sandstone aquifers. Consequently, within the Project Area the surface aquifer (Liveringa) is geologically separated from the Poole Sandstone (and subsequently, the targeted Laurel Formation).

Local and regional use

Within the broader Canning–Kimberley area, the Grant Group comprises ~13.6 GL (67.4%) of the total water allocation within the proclaimed groundwater area (>300,000 ML/year (DoW, 2014). Although there are multiple licenses to take water from within the Grant Group (including from the Poole Sandstone), these are associated with other oil and gas operators, mining operators, Main Roads, communities, and the local shire. Some water extraction within the broader region is unlicensed for uses such as livestock and domestic bores (pastoral activities), tourist activities and Aboriginal community bores (Harrington & Harrington, 2015).

Locally, there are three known users of groundwater from the Poole Sandstone, near the Project Area —the Yungngora Community, and the towns of Camballin and Fitzroy Crossing.

Hydrological Connectivity to the West Kimberly National Heritage Area (WKNHA)

Surface waters from the Project Area to the WKNHA are connected via Mt Hardman Creek which flows into the Fitzroy River, a main river system that flows through the WKNHA to the south-west of the Project Area. As Mt Hardman Creek is a non-perennial waterbody, surface water is connected to the West Kimberley National Heritage Area during the wet season and remains disconnected for the remainder of the year.

The Fitzroy River near Noonkanbah is likely recharged by the Liveringa Group, a Canning Basin aquifer shared by the Project Area (Vogwill R. , 2015). Given the Liveringa group aquifer underlies the Project area, and on the conservative assumption that the aquifer is ubiquitous in the area, the project area can be considered hydrologically connected. However, assuming conservative hydraulic connectivity properties (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document – Appendix I – Hydrogeological Assessment of Paradise-Valhalla-Asgard Project Areas, Page 9-10), it would take

approximately 7,300 years for groundwater to move from the project area to the Fitzroy River, indicating that whilst connected in geological terms any unlikely groundwater impacts at the project site are then highly unlikely to result in any impacts to the Fitzroy River, and subsequently, the WKNHA.

4. Impacts and mitigation

4.1 Impact details

Potential Matters of National Environmental Significance (MNES) relevant to your proposed action area.

EPBC Act section	Controlling provision	Impacted	Reviewed
S12	World Heritage	No	Yes
S15B	National Heritage	No	Yes
S16	Ramsar Wetland	No	Yes
S18	Threatened Species and Ecological Communities	Yes	Yes
S20	Migratory Species	Yes	Yes
S21	Nuclear	No	Yes
S23	Commonwealth Marine Area	No	Yes
S24B	Great Barrier Reef	No	Yes
S24D	Water resource in relation to large coal mining development or coal seam gas	Yes	Yes
S26	Commonwealth Land	No	Yes
S27B	Commonwealth Heritage Places Overseas	No	Yes
S28	Commonwealth or Commonwealth Agency	No	Yes

4.1.1 World Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.1.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.1.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact.

*

The Proposed Action is not located within or adjacent to any World Heritage Properties.

4.1.2 National Heritage

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	National heritage
No	No	The West Kimberley

4.1.2.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.2.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact.

*

The West Kimberley National Heritage Area (WKNHA) was gazetted on 31 August 2011, recognising the natural, historic and Indigenous stories of the region that are of outstanding heritage value to the nation. The listing also recognizes the important history of non-Indigenous exploration and settlement of the

Kimberley (DCCEEW, 2011).

Specifically, two parts of the WKNHA have been considered in this assessment:

- Noonkanbah Gate on Calwinyardah-Noonkanbah Road
- The broader West Kimberley National Heritage Area.

Noonkanbah Gate on Calwinyardah-Noonkanbah Road

Noonkanbah Gate is a historical landmark under Criterion A of the WKNHA. When speaking about 'Noonkanbah' the Aboriginal people are referring to a series of events that took place Noonkanbah station between 1979 and 1980, where the nation's attention was drawn to the struggle of the Aboriginal people to protect their rights to practice traditional law and culture. Noonkanbah is just one in a series of important steps in the national struggle of Aboriginal people to have their rights to practice traditional law, culture, and have their rights to traditional ownership recognised. Noonkanbah also brought significant change to resource company policies and practices in relation to consultation and negotiation with Aboriginal people and in the protection of Aboriginal Heritage (DCCEEW, 2011).

This area of the WKNHA is listed under Criterion A which generally applies to places which have figured in defining events resulting in important changes to the political, economic, or social fabric of Indigenous Australia, relate to economic, political or social processes characteristic of Indigenous Australia during different periods of its history, or places that best demonstrate a characteristic way of life in the history of Indigenous Australia. As the Criterion indicates, this area is associated with a historical series of events none of which will be impacted nor detrimental to the meaning and history associated and attached to this place.

Specifically, this place is heavily disturbed and lies within an intersection of Calwinyardah-Noonkanbah Road and an existing cleared access track. Although the project may utilize Calwinyardah-Noonkanbah Road, the action will comprise activities consistent with its current public and pastoral uses. No additional civil works are required in this area. No additional environmental values are attached to this part of the WKNHA and subsequently, no environmental impacts arising from the proposal would directly (nor indirectly) impact environmental values attached to this site.

Broader WKNHA associated with the Fitzroy River

The West Kimberley National Heritage Area provide a vital refuge for many native plants and animals that are found nowhere else, or which have disappeared from much of the rest of Australia. The WKNHA has been occupied by Aboriginal people for at least 40,000 years and continues to be home to Aboriginal groups practicing traditional law in the world's oldest continuous culture (DCCEEW, 2023).

While no management plan has been developed and implemented, the values contained within the WKNHA are largely place based. Listed under Criterion D, and associated with the Fitzroy River that provides both resources (food sources) and spiritual enrichment for Aboriginal people. The Fitzroy River and a number of its tributaries, together with their floodplains and the jila sites of Kurrpurrngu, Mangunampi, Paliyarra and Kurungal, demonstrate four distinct expressions of the Rainbow Serpent tradition associated with Indigenous interpretations of the different ways in which water flows within the catchment (Commonwealth of Australia, 2011).

One small listed Natural Heritage location (Place ID 106063), classed as natural, is intersected by the Project Area. The part of the Project area is the Calwinyardah-Noonkanbah Road. This road is an existing gravel road which branches south from the sealed Great Northern Highway and is used by the public. There will be no potential impact to that Natural Heritage location as the proposed action will be driving on the existing road to gain access to the well pads and access tracks.

Based upon a review of the values associated with the WKNHA, BNR have determined that the potential key risk from the project is impacting or affecting the Rainbow Serpent deity. based upon the hydraulic interconnectivity and proximity from the project area to the WKNHA, the only mechanism for an

environmental impact to the West Kimberley Heritage Area is through a large-scale indirect impact resulting from contamination of regional groundwater or surface waters.

Although not considered plausible due to distance from site, hydraulic connectivity and the nature of this Action, the potential impact pathways are addressed in more detail below.

Accidental release of drilling fluids and chemicals during drilling

An accidental spill of drilling fluids or produced formation water is very unlikely. The risk of a surface or subsurface release to aquifers is well understood and a standard suite of management measures has been developed to mitigate the risk, including:

- a cement casing is installed down well across the surface or 'useable' aquifers to isolate them (DMPR, 2002).
- drilling fluid systems for sensitive well sections comprise of non-toxic mud systems
- produced water pond and mud sump will have multiple liners and a leak detection system

A spill would result in, at most, localised impacts which, given the distance of 12 km south, 24 km west and 19 East from the Project Area to the WKNHA, presents no potential impact to the WKNHA.

Changes to water quality from vertical migration of reservoir fluids

International peer-reviewed studies have found that hydraulic fracturing in shale and tight gas formations affects a very limited portion of the overlying bedrock and does not create direct hydraulic communication between target zones and shallow aquifers (Fisher & Warpinski, 2012; Davies, Mathias, Moss, Hustoft, & Newport, 2012). The review by Davies et al. (2012) was based on analysing the data acquired from several thousand shale gas HFS in the United States (US). A further study by Davies et al. (2012) in the United Kingdom found that hydraulic fractures remain well confined to the target interval, even in the presence of faults.

The shallowest surface or 'useable' aquifers in the Project Area do not extend below 1,000 m bgl, (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document – Appendix I, Section 2, Table 3), with HFS operations proposed at depths greater than 2,600m bgl (and more likely over 3,200 m bgl), providing a rock thickness of 1,600 m – 2,200m between any injection point and any potential 'useable' aquifer.

Thus, the potential for vertical migration of reservoir fluids is not credible given the onsite subsurface geology and the preventative mitigations to be in place consistent with the recommendations of the Hydraulic Fracture Stimulation Scientific Enquiry (such as separation distances from impermeable subsurface layers), and as such presents no potential impact to the WKNHA.

Changes to water regime from groundwater abstraction

Two primary models were developed to assess potential groundwater drawdown associated with groundwater abstraction; one simulating abstraction from the unconfined Liveringa aquifer (Model 1) and one simulating abstraction from the confined Grant / Poole Group system (Model 2).

The modelled drawdown at the end of the six-month pumping period (for 20 wells) for the Liveringa Aquifer showed potential for a 0.2 m drawdown within 500 m of each bore, assuming that all well sites were abstracting water at the same time (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document – Appendix L, Section 5, pp 5).

The modelled drawdown at the end of the six-month pumping period (for 20 wells) for the Grant/Poole Group system showed potential for a 0.2 m drawdown within the Project Area, including four existing pastoral bores (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document – Appendix L, Figure 5-2).

The potential minor short-term drawdown associated with the groundwater abstraction required to support the exploration program is predicted to be limited to the Project Area and is not expected to have any impact on the WKNHA.

No changes to the water quality within the surface or 'useable' aquifers are expected as a result of the Proposed Action, and as such presents no potential impact to the WKNHA.

Hydrological Connectivity to the West Kimberly National Heritage Area (WKNHA)

Surface waters from the Project Area to the WKNHA are connected via Mt Hardman Creek which flows into the Fitzroy River, a main river system that flows through the WKNHA to the south-west of the Project Area. As Mt Hardman Creek is a non-perennial waterbody, surface water is connected to the West Kimberley National Heritage Area during the wet season and remains disconnected for the remainder of the year.

The Fitzroy River near Noonkanbah is likely recharged by the Liveringa Group, a Canning Basin aquifer shared by the Project Area (Vogwill R., 2015). Given the Liveringa group aquifer underlies the Project area, and on the conservative assumption that the aquifer is ubiquitous in the area, the project area can be considered hydrologically connected. However, assuming conservative hydraulic connectivity properties (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document – Appendix I, (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document – Appendix I, Page 9-10), it would take approximately 7,300 years for groundwater to move from the project area to the Fitzroy River, indicating that whilst connected in geological terms any groundwater impacts at the project site are highly unlikely to result in any impacts to the Fitzroy River, and subsequently, the WKNHA.

4.1.3 Ramsar Wetland

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.3.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.3.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact.

*

No Ramsar Wetlands in or near the Project Area

4.1.4 Threatened Species and Ecological Communities

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Threatened species

Direct impact	Indirect impact	Species	Common name
No	Yes	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper
No	No	<i>Calidris ferruginea</i>	Curlew Sandpiper
Yes	Yes	<i>Chloebia gouldiae</i>	Gouldian Finch
No	Yes	<i>Dasyurus hallucatus</i>	Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu]
No	Yes	<i>Erythrotriorchis radiatus</i>	Red Goshawk
Yes	Yes	<i>Falco hypoleucos</i>	Grey Falcon
No	No	<i>Macroderma gigas</i>	Ghost Bat
Yes	Yes	<i>Macrotis lagotis</i>	Greater Bilby
No	No	<i>Pezoporus occidentalis</i>	Night Parrot
No	No	<i>Polytelis alexandrae</i>	Princess Parrot, Alexandra's Parrot
No	Yes	<i>Pristis pristis</i>	Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish
No	No	<i>Rostratula australis</i>	Australian Painted Snipe
Yes	Yes	<i>Tiliqua scincoides intermedia</i>	Northern Blue-tongued Skink
No	No	<i>Trichosurus vulpecula arnhemensis</i>	Northern Brushtail Possum
No	Yes	<i>Varanus mertensi</i>	Mertens' Water Monitor, Mertens's Water Monitor

Ecological communities

—

4.1.4.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.4.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

A 'Likelihood of Occurrence' category was applied to all species identified within the Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) report to assess the potential for these to occur within, or in proximity to, the Project Area. Criteria used for the 'Likelihood of Occurrence' are described in Att 8 - MNES Likelihood of Occurrence Assessment, Table 1).

The following information and data sources were used to inform the 'Likelihood of Occurrence' assessment for species listed under the EPBC Act and identified in the PMST:

- Results of recent vegetation and fauna surveys over the Project Area
- Peer-reviewed scientific papers and studies, as cited
- Database searches:
 - EPBC Protected Matters Search Tool (PMST) (DCCEEW)
 - Atlas of Living Australia (CSIRO)
 - Species Profile and Threats Database (SPRAT) (DCCEEW)
 - Biologically Important Areas (BIA) (DCCEEW)
- Species Recovery Plans and Conservation Advice; and
- Previous environmental studies within or in proximity to the Project Area, as cited.

As a result of this assessment five (5) species have been identified as occurring or potentially occurring within the Project Area (Att 8 - MNES Likelihood of Occurrence Assessment, Table 2).

- Gouldian Finch (*Erythura hallucatus*)
- Grey falcon (*Falco hypoleucos*)
- Northern Blue-tongue Skink (*Tiliqua scincoides intermedia*) (*Varanus mertensi*)
- Mertens' Water Monitor (*Varanus mertensi*)
- Red Goshawk (*Erythrotriorchis radiatus*)

Further, several species identified as of concern have been assessed at the request of DCCEEW. These include:

- Greater Bilby (*Macrotis lagotis*)
- Northern Quoll (*Dasyurus hallucatus*)
- Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*)
- Ghost Bat (*Macroderma gigas*)
- Purple-crowned fairy-wren (western) (*Malurus coronatus coronatus*)
- Largetooth sawfish (*Pristis pristis*)

A summary of the potential direct and indirect impact mechanisms are listed for these species below. It should be noted that all species have the same impact mechanisms, though some will have a lower likelihood of occurring due to the absence of preferred habitat. These mechanisms are assessed in detail in Att 9 - Assessment of potential impacts to MNES, Section 1, pp 1-5.

Greater Bilby

Potential direct impacts :

- Vehicle strike
- Habitat loss

Potential indirect impacts :

- Light emissions
- Noise and vibration emissions
- Dust emissions
- Changes to fire regimes
- Introduction or spread of weeds

Potential impacts to the Greater Bilby are assessed in Att 9 - Assessment of potential impacts to MNES, Table 1, Page 6.

Northern Quoll

Similar to other ground-dwelling species, direct impacts to the Northern Quoll were identified as:

- Vehicle strike
- Habitat loss

However targeted surveys indicate this species is not likely to utilise habitat within the project area, thus the likelihood of occurrence (and subsequent direct impacts) in the Project Area is unlikely (Att 5 Valhalla Targeted Significant Vertebrate Fauna Survey Memo in prep.). Consequently the only potential impact to this species would arise from indirect species to habitat outside of the Project Area.

Potential indirect impacts:

- Light emissions
- Noise and vibration emissions
- Dust emissions
- Changes to fire regimes
- Introduction or spread of weeds
- Indirect impacts to habitat from changes to groundwater levels or pollution events

Additional assessment for the Northern Quoll is provided in Att 9 - Assessment of potential impacts to MNES, Table 1, pp10.

Northern Brushtail Possum

Given the nature of the proposed action, and the absence of suitable habitat within the Project area, an impact assessment has not been completed for this species. For completeness however, an assessment against the EPBC Significant Impact Guidelines for Vulnerable species is presented for this species in Att 9 - Assessment of potential impacts to MNES, Table 1, Page 12.

Ghost Bat

Although this species was identified as a species of concern by DCCEEW targeted surveys indicate this species is not likely to utilise habitat within the project area, thus the likelihood of occurrence (and subsequent impact) in the Project Area is unlikely (Att 5 Valhalla Targeted Significant Vertebrate Fauna Survey Memo in prep.).

Given the absence of suitable habitat within the Project area, an impact assessment has not been completed for this species.

Gouldian Finch

Potential direct impacts:

- Vehicle strike
- Habitat loss

Potential indirect impacts are:

- Light emissions
- Noise and vibration emissions
- Changes to fire regimes

Potential impacts to the Gouldian Finch are assessed in Att 9 - Assessment of potential impacts to MNES, Table 1, Page 15.

Grey Falcon

Potential direct impacts are:

- Vehicle strike
- Habitat loss (foraging habitat)

Potential indirect impacts are:

- Light emissions
- Noise and vibration emissions
- Dust emissions
- Changes to fire regimes
- Introduction or spread of weeds

Potential impacts to the Grey Falcon are assessed in Att 9 - Assessment of potential impacts to MNES, Table 1, Page 18.

Largetooth sawfish (Freshwater sawfish)

No direct impacts are credible for this species as the Project Area does not intersect suitable habitat for this species.

Potential indirect impacts to the Largetooth sawfish (Freshwater sawfish) are:

- Changes to water resources through depletion or pollution of aquifers
- Light emissions
- Noise and vibration

Potential impacts to the Largetooth sawfish are assessed in Att 9 - Assessment of potential impacts to MNES, Table 1, Page 23.

Northern Blue-tongue Skink

Potential direct impacts to the Northern Blue-tongue Skink are:

- Vehicle strike
- Habitat loss

Potential indirect impacts to the Northern Blue-tongue Skink are:

- Light emissions
- Noise and vibration emissions
- Dust emissions
- Changes to fire regimes
- Introduction or spread of weeds
- Indirect impacts to habitat arising from changes to groundwater levels or pollution

Potential impacts to the Northern Blue-tongue Skink are assessed in Att 9 - Assessment of potential impacts to MNES, Table 1, Page 25.

Mertens' Water Monitor

Potential direct impacts to the Mertens' Water Monitor are:

- Vehicle strike during site preparation activities, drilling activities and vehicle / equipment movement
- Habitat loss due to clearing.

Potential indirect impacts to the Mertens' Water Monitor are:

- Light emissions
- Noise and vibration emissions
- Dust emissions
- Changes to fire regimes
- Introduction or spread of weeds
- Indirect impacts to habitat arising from changes to groundwater levels or pollution

Potential impacts to the Mertens' Water Monitor are assessed in Att 9 - Assessment of potential impacts to MNES, Table 1, Page 27.

Red Goshawk

Potential indirect impacts to the Red Goshawk are:

- Light emissions
- Noise and vibration emissions
- Changes to fire regimes
- Indirect impacts to habitat arising from changes to groundwater levels or pollution

Potential impacts to the Red Goshawk are assessed in Att 9 - Assessment of potential impacts to MNES, Table 1, Page 30.

Sharp-tailed sandpiper

Potential direct impacts to the to the Sharp-tailed sandpiper are:

- Vehicle strike
- Habitat loss

Potential indirect impacts to the Sharp-tailed sandpiper are:

- Light emissions
- Noise and vibration emissions
- Dust emissions
- Changes to fire regimes
- Introduction or spread of weeds
- Indirect impacts to habitat arising from changes to groundwater levels or pollution events

Potential impacts to the Sharp-tailed sandpiper are assessed in Att 9 - Assessment of potential impacts to MNES, Table 1, Page 35.

4.1.4.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact?

*

No

4.1.4.6 Describe why you do not consider this to be a Significant Impact. *

A detailed assessment of the potential impacts to each of the species considered as occurring or potentially occurring within the Project Area is presented in (Att 9– Assessment of potential impacts to MNES, Table 1). No significant impacts are expected to any of the identified MNES.

Further, several species identified as of concern by DCCEEW (the Greater Bilby (*Macrotis lagotis*) Northern Quoll (*Dasyurus hallucatus*), Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*), Ghost Bat (*Macroderma gigas*), Purple-crowned fairy-wren (western) (*Malurus coronatus coronatus*) and the Targettooth sawfish (*Pristis pristis*) are also assessed at the request of DCCEEW (Att 9 – Assessment of potential impacts to MNES, Table 1).

Northern Quoll

Low Ecological Services (Att 4 Odin Flora and Fauna Survey) recorded unconfirmed signs (native mammal scats) of the Northern Quoll adjacent to the Project Area. However, given the absence of species habitat requirements (rocky areas, Eucalypt forests etc.) (Hill B.M. and Ward S.J. , 2010) and with no previous confirmed records within 100 km of the Project Area this species is considered unlikely to occur within the Project Area (Att 3 – Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C Valhalla Flora and Fauna Survey). A Targeted survey undertaken in 2024 (Att 5 Valhalla Targeted Significant Vertebrate Fauna Survey Memo in prep.) for the entire disturbance footprint recorded no presence of the Northern Quoll nor suitable habitat present. During the 2024 Targeted survey traditional owners participating in the survey confirmed no Northern Quoll's had been previously observed in the area. Based on the absence of records within the Project Area, the limited extent of clearing, as summarised in Att 9 - Assessment of potential impacts to MNES the Proposed Action is not expected to cause significant direct or indirect impacts to the Northern Quoll.

Ghost bat

No habitat or populations for this species is present within the Project Area. A historical record shows the closest Ghost Bat habitat 50km northeast of the Project Area. A Targeted survey of the disturbance footprint was undertaken in 2024 (Att 5 Valhalla Targeted Significant Vertebrate Fauna Survey Memo in prep.) where a motion camera and bat detector were deployed at each pad for four nights, no recorded presence of Ghost Bats was detected. During the 2024 Targeted survey traditional owners participating in the survey confirmed no Ghost Bats had been previously observed in the area. Based on the absence of suitable habitat and results of the 2024 Targeted Survey, as summarised in Att 9 - Assessment of potential impacts to MNES the Proposed Action is not expected to cause significant direct or indirect impacts to the Ghost Bat.

Greater Bilby

Surveys completed by Eco Logical did not identify any Greater Bilby burrows within the Project Area, indicating that no breeding is known to occur within the Project Area (Att 3 – Valhalla Flora and Fauna Survey Section 4.3.3, pp 46). A Targeted Fauna survey has subsequently been completed in 2024 for species including the Greater Bilby for the entire Disturbance Footprint (Att 5 Valhalla Targeted Significant Vertebrate Fauna Survey Memo in prep.). Potential old diggings found at well pads three (3) and four (4) suggest that Bilbies have previously foraged within the area. However, according to the guidelines, old diggings on their own do not confirm presence of bilbies, therefore it is considered as “potential bilby activity, presence not confirmed” (DBCA, 2017). No presence of Bilby scats, active burrows or fresh tracks needed to confirm presence of Bilbies were found during the survey Validating historic survey effort in the area that suggests low likelihood that bilby's will be impacted by the proposed Action.

The targeted survey indicates that although Greater Bilby individuals may utilize the South Eastern portion of the Project Area (associated with the propose wellsite three (3) and four (4)) suggesting that (conservatively) total area of clearing arising from the action with the potential to impact potential suitable habitat is 22.5 ha which comprises only 21% of the proposed disturbance footprint.

Suitable bilby habitat as identified by (Att 5 Valhalla Targeted Significant Vertebrate Fauna Survey Memo in prep.) correspond with broadscale vegetation unit North Fitzroy Plains_700 based upon Shepherd et al. (2002) which comprise 212,971.66 ha within the local region, Consequently, clearing of 22.5 ha comprises Proposed Action will result in the removal of less than 0.01% of similar habitat in the region. The

nature of the clearing, consisting of discrete well sites and access tracks, is not expected to prevent the species using the broader Project Area, as summarised in Att 9 - Assessment of potential impacts to MNES the Proposed Action is not expected to cause significant direct or indirect impacts to the Greater Bilby.

Northern Brushtail Possum

No habitat or populations for this species is present within the Project Area. Most recent record (2006) is 50 km northeast of the Project Area, based on the absence of suitable habitat and populations as summarised in Att 9 - Assessment of potential impacts to MNES the Proposed Action is not expected to cause significant direct or indirect impacts to the Northern Brushtail Possum.

Gouldian Finch

A recent record of this species from 2010 is located within 30 km of the Project Area (DBCA, 2021). Its preferred habitat consists of open woodlands that are dominated by Eucalypt trees and support a ground cover of Sorghum and other grasses (TSSC, 2016). Within the Project Area, Fauna habitat 1; 'Mixed open woodland over grassland on sandy clay flats and slopes' and Fauna habitat 2; 'Mixed open woodland over tussock grasses on dune slopes and crests' are considered potentially suitable habitat for this species (Att 3 – Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C, Valhalla Flora and Fauna Survey, Section 5.2.3, pp 64).

Although Gouldian Finch individuals have been recorded 30 km south of the Project Area (Att 3 Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C, Valhalla Flora and Fauna Survey - Appendix D, pp 89), and may utilize the Project Area on occasion, the habitats within the Project Area are well represented more widely in the West Kimberley area. Utilising broadscale vegetation mapping analysis (North Fitzroy Plains_700 and 699) BNR estimates that if the entire Project Area was considered potentially suitable foraging habitat, the direct impact equates to a loss of less than 0.01 % of potential Gouldian Finch foraging habitat in the West Kimberley area. As summarised in Att 9 - Assessment of potential impacts to MNES the Proposed Action is not expected to cause significant direct or indirect impacts to the Gouldian Finch

Grey Falcon

The Grey Falcon has the potential to occur within the Project Area due to their range and habitat requirements, with records occurring across most bioregions of Western Australia from the south-west to the Kimberley region (Att 3 – Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C, Valhalla Flora and Fauna Survey, Section 5.2.3, Page 63). Marginally suitable habitat for this species occurs within the Project Area, though only one local record, from 50 km south of the Project Area (2002) is known (Att 3 – Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C, Valhalla Flora and Fauna Survey, Appendix D, Page 89).

The nature of the clearing, consisting of discrete well sites and access tracks, is not expected to prevent the species using the broader Project Area. Indirect impacts, such as displacement of individuals from the Project Area or surrounds, due to light or noise emissions, are not expected to be of concern. Lighting will be local to the well sites and camp only and will be the minimum required for safe operations. Noise emissions associated with drilling activities will be local and minor. As summarised in Att 9 - Assessment of potential impacts to MNES the Proposed Action is not expected to cause significant direct or indirect impacts to the Grey Falcon. Bennet Resources Pty Ltd do not consider the impact to the Grey Falcon as significant.

4.1.4.7 Do you think your proposed action is a controlled action? *

No

4.1.4.9 Please elaborate why you do not think your proposed action is a controlled action.

*

Bennet Resources Pty Ltd has completed a detailed review of published conservation advice, available species guidelines and the significant impact guidelines to inform this assessment. Bennet Resources Pty Ltd believe that the suite of proposed mitigation measures will ensure that no direct impacts to any fauna species will occur as a result of the Proposed Action (with clearing being the highest risk item for fauna associated with the activity). Bennet Resources Pty Ltd have undertaken targeted surveys with the survey showing no critical habitat or presence of Bilby, Northern Quoll or Ghost Bat. Bennet Resources Pty Ltd will also implement controls to minimise any residual impact through pre-activity inspections and speed limit enforcement. Given the limited footprint of the Proposed Action, ubiquitous habitat surrounding the Project Area and proposed controls that are well practiced and implemented by the industry in this region, Bennet Resources Pty Ltd does not believe the Proposed Action poses a significant impact to these species and thus the Proposed Action is not considered to be a controlled action.

4.1.4.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

BNR considered “excising” the south-east area of the Project Area from the Action to further eliminate the risk of impacts to Bilby’s. However, following the request for additional targeted surveys that were completed in accordance with both State and Commonwealth guidelines, the Project Area was deemed as not currently being used by threatened species (particularly the Bilby) and although diggings were found, no active species were determined to be present. This suggests that clearing of vegetation in this area pose little risk to the species (consistent BNR’s previous analysis). Given the proposed Action already provides such a small risk to these species, the removal of the south-east area was not considered to result in a significant reduction in exposure to the species, thus was not contemplated further.

A suite of mitigation measures, following the hierarchy, has been developed to manage potential impacts to Threatened Fauna (Att 10 – Table of Mitigation Measures (Flora and Fauna)).

A summary of mitigation measures - flora and vegetation

Avoid - Demarcation of clearing area

Avoid - Fire breaks

Avoid - Bush Fires Regulations 1954 and exemptions

Minimise - Topsoil windrows <2 m

Minimise - Fill verified as having low weed risk

Minimise - Hygiene management requirements

Rehabilitate - Progressive rehabilitation

A summary of mitigation measures - Terrestrial fauna:

Avoid - Fauna exclusion and egress

Avoid - Targeted Bilby Survey

Minimise - Specific bilby management measures

Minimise - Speed limits

Avoid - Fire breaks

Avoid - Bush Fires Regulations 1954

Minimise - Site inspections of fauna traps

Minimise - Weed management measures

Minimise - Introduced predator management

Rehabilitate Progressive rehabilitation

4.1.4.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

None identified for the Proposed Action.

4.1.5 Migratory Species

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

Direct impact	Indirect impact	Species	Common name
Yes	Yes	Actitis hypoleucos	Common Sandpiper
Yes	Yes	Apus pacificus	Fork-tailed Swift
Yes	Yes	Calidris acuminata	Sharp-tailed Sandpiper
No	No	Calidris ferruginea	Curlew Sandpiper
No	No	Calidris melanotos	Pectoral Sandpiper

Direct impact	Indirect impact	Species	Common name
No	No	Charadrius veredus	Oriental Plover, Oriental Dotterel
No	No	Crocodylus porosus	Salt-water Crocodile, Estuarine Crocodile
No	No	Glareola maldivarum	Oriental Pratincole
No	No	Hirundo rustica	Barn Swallow
No	No	Motacilla cinerea	Grey Wagtail
No	No	Motacilla flava	Yellow Wagtail
No	No	Pristis pristis	Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish

4.1.5.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

Yes

4.1.5.2 Briefly describe why your action has a direct and/or indirect impact on these protected matters. *

A 'Likelihood of Occurrence' category was applied to all migratory species identified within the DCCEEW Protected Matters Search Tool (PMST) report to assess the potential for these to occur within, or in proximity to, the Project Area.

The following migratory species have been identified as potentially occurring within the Project Area (Att 8 - MNES Likelihood of Occurrence Assessment, Table 3).

- Common Sandpiper (*Actitis hypoleucos*),
- Fork-tailed swift (*Apus pacificus*) and
- Sharp-tailed sandpiper (*Calidris acuminata*)

These species have been identified as potentially at risk from the following impacts:

Potential direct impacts to the to the Common Sandpiper are:

- Vehicle strike
- Habitat loss

Potential indirect impacts to the Common Sandpiper are:

- Light emissions
- Noise and vibration emissions
- Dust emissions
- Changes to fire regimes
- Introduction or spread of weeds

- Indirect impacts to habitat arising from changes to groundwater levels or pollution events

Potential direct impacts to the Fork-tailed swift are:

- Vehicle strike
- Habitat loss

Potential indirect impacts to the Fork-tailed swift (*Apus pacificus*) are:

- Light emissions
- Noise and vibration emissions
- Dust emissions
- Changes to fire regimes
- Introduction or spread of weeds
- Indirect impacts to habitat arising from changes to groundwater levels or pollution events

Potential direct impacts to the Sharp-tailed sandpiper:

- Vehicle strike
- Habitat loss

Potential indirect impacts to the Sharp-tailed sandpiper are:

- Light emissions
- Noise and vibration emissions
- Dust emissions
- Changes to fire regimes
- Introduction or spread of weeds
- Indirect impacts to habitat arising from changes to groundwater levels or pollution events

4.1.5.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact?

*

No

4.1.5.6 Describe why you do not consider this to be a Significant Impact. *

A detailed assessment of the potential impacts to each of the species considered as occurring or potentially occurring within the Project Area is presented in Att 9 – Assessment of potential impacts to MNES. A brief summary is presented below:

Common Sandpiper

The Common Sandpiper is a migratory bird species which may utilise habitat within the Project Area only when conditions are favourable (e.g. after periods of heavy rainfall) (Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C, Att 3 - Valhalla Flora and Fauna Survey, Appendix D, Page 90). Two records from 2009 occur 10 km north of the Project Area. Sections of the Project Area are likely to provide marginally suitable habitat seasonally and after major rainfall events. Based on that, at most there is potential periodic occurrence of the species in the Project Area, and the nature of the clearing, consisting of discrete well sites and access tracks, it is not considered likely that the Proposed Action will destroy or isolate an area of important habitat for the Common Sand Piper or disrupt breeding cycles of an ecologically significant proportion of the population. As summarised in Att 9- Assessment of potential impacts to MNES the Proposed Action is not expected to cause significant direct or indirect impacts to the Common Sandpiper.

Fork-tailed Swift

The Fork-tailed Swift is a migratory bird species which may utilise habitat within the Project Area only when conditions are favourable (e.g. after periods of heavy rainfall) (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C, Valhalla Flora and Fauna Survey, Appendix D, Page 91). This species occurs across a variety of habitats. One record from 2010 occurs 15 km west of the Project Area. Based on the at most potential periodic occurrence of the species in the Project Area, and the nature of the clearing, consisting of discrete well sites and access tracks, it is not considered likely that the Proposed Action will destroy or isolate an area of important habitat for the Fork-tailed Swift or disrupt breeding cycles of an ecologically significant proportion of the population. As summarised in Att 9 - Assessment of potential impacts to MNES the Proposed Action is not expected to cause significant direct or indirect impacts to the Fork-tailed Swift.

Sharp-tailed Sandpiper

The Sharp-tailed sandpiper is a migratory bird species which may utilise habitat within the Project Area only when conditions are favourable (e.g. after periods of heavy rainfall) (Att 3 - Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C, Valhalla Flora and Fauna Survey, Appendix D, Page 91). One record from 2009 occurs 10 km north of the Project Area. Sections of the Project Area are likely to provide marginally suitable habitat seasonally and after major rainfall events. Based on the at most potential periodic occurrence of the species in the Project Area, and the nature of the clearing, consisting of discrete well sites and access tracks, it is not considered likely that the Proposed Action will destroy or isolate an area of important habitat for the Sharp-tailed Sandpiper or disrupt breeding cycles of an ecologically significant proportion of the population. As summarised in Att 9 - Assessment of potential impacts to MNES the Proposed Action is not expected to cause significant direct or indirect impacts to the Sharp-tailed Sandpiper.

4.1.5.7 Do you think your proposed action is a controlled action? *

No

4.1.5.9 Please elaborate why you do not think your proposed action is a controlled action.

*

Bennet Resources Pty Ltd has completed a detailed review of published conservation advice, available species guidelines and the significant impact guidelines to inform this assessment. Given the absence of habitat defined as critical to the survival of migratory species, limited footprint associated with the Proposed Action, ubiquitous habitat surrounding the Project Area and standard industry controls that are well practiced and implemented by the industry, Bennet Resources Pty Ltd does not believe the Proposed Action poses a significant impact to these species and thus the Proposed Action is not considered to be a controlled action.

4.1.5.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

A suite of mitigation measures, following the hierarchy, has been developed to manage potential impacts to Threatened Fauna (Att 10 – Table of Mitigation Measures (Flora and Fauna).

Summary of mitigation measures:

Avoid - Fauna exclusion and egress

Minimise - Bird diverters

Minimise - Speed limits

Avoid - Fire breaks

Avoid - Bush Fires Regulations 1954

Minimise - Site inspections of fauna traps

Minimise - Weed management measures

Minimise - Introduced predator management

Rehabilitate - Progressive rehabilitation

4.1.5.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

None identified for the Proposed Action.

4.1.6 Nuclear

4.1.6.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.6.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact.

*

No Nuclear actions were undertaken during Proposed Action.

4.1.7 Commonwealth Marine Area

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.7.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.7.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact.

*

Project area is not located in a Commonwealth Marine Area

4.1.8 Great Barrier Reef

4.1.8.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

No

4.1.8.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact.

*

Project action in not in the Great Barrier Reef

4.1.9 Water resource in relation to large coal mining development or coal seam gas

4.1.9.1 Is the proposed action likely to have any direct and/or indirect impact on this protected matter? *

Yes

4.1.9.2 Briefly describe why your action has a direct and/or indirect impact on this protected matter. *

On 15 December 2023, the *Environment Protection and Biodiversity Conservation Act 1999* Water Trigger was amended to include consideration of likely significant impacts on water resources in relation to all types of unconventional gas, for example, shale and tight gas related developments.

The Proposed Action involves hydraulic fracture stimulation (HFS), whereby groundwater is mixed with sand and chemical additives prior to the pumping of this mix down each well, to create hairline fractures in the target formation and allowing gas to flow to the wellbore. Thus, this trigger is now of relevance to the Proposed Action.

It is noted however, that the Valhalla Gas Exploration and Appraisal Project is not a coal seam gas project. The Valhalla Gas Exploration and Appraisal Project is an unconventional gas project targeting deep tight gas formations located within the Laurel formation over 2000m below the surface. As such the risk profile associated with this project is significantly different to shallow unconventional coal seam gas projects given the geological separation from the formation to useable aquifers and the associated HFS depths.

Direct impacts to water resources:

Changes to groundwater levels (groundwater drawdown) associated with water extraction

- it is extremely unlikely that due to the migration timeframe and the nature of the low-toxicity mud system used that any change to groundwater quality would be observed, noting that the closest groundwater user is at least 18 km from the project area.

Potential indirect Impacts to water resources:

Potential contamination of aquifers through unplanned fracture heights

- BNR does not believe that contamination of useable aquifers through unplanned fracture heights is a credible risk for the Proposal.

Potential contamination of surficial aquifers from an accidental release at the surface of drilling fluids, HFS chemicals, liquid hydrocarbons, or produced formation water

- if standard management measures are implemented, BNR does not expect these events to occur, but if they do, any indirect impacts are not expected to cause a significant environmental impact.

Potential risk to site activities and infrastructure due to extreme rainfall events

- the GWMP will be implemented to demonstrate that residual impacts are not greater than predicted, which are not deemed to be significant after analysis of local rainfall and flooding events.

4.1.9.4 Do you consider this likely direct and/or indirect impact to be a Significant Impact?

*

No

4.1.9.6 Describe why you do not consider this to be a Significant Impact. *

As per Significant impact guidelines 1.3 - Coal seam gas and large coal mining developments — impacts on water resources (DCCEEW, 2022) impacts are addressed in Att 11 Impacts to key aspects when assessing changes in hydrological characteristics.

“an action is likely to have a significant impact on a water resource if there is a real or not remote chance or possibility that it will directly or indirectly result in a change to:

- The hydrology of a water resource; or
- The water quality of a water resource

...that is of sufficient scale or intensity as to reduce the current or future utility of the water resource for third party users, including environmental and other public benefit outcomes, or to create a material risk of such reduction in utility occurring”. Specifically, a significant impact on the hydrological characteristics of a water resource may occur where there are, as a result of the action:

- changes in the water quantity, including the timing of variations in water quantity
- changes in the integrity of hydrological or hydrogeological connections, including structural damage
- changes in the area or extent of a water resource.

...where these changes are of sufficient scale or intensity as to significantly reduce the current or future utility of the water resource for third party users, including environmental and other public benefit outcomes”.

Throughout the planning phase, BNR has reviewed studies undertaken by the previous operator of EP 371 and analysed geological records to understand the potential impacts associated with the Proposal. Based on this information, the outcomes of the Proposal are predicted to be:

- no impacts to hydrological regimes or groundwater quality, demonstrated by:
 - no significant drawdown of the aquifer following completion of the Proposal that is considered outside seasonal fluctuations
 - no change to groundwater quality attributable to the Proposal.

Based on these predicted outcomes and the evidence shown throughout this ERD, BNR does not believe that the Proposal will result in a significant impact to water resources.

The guidelines (DCCEEW, 2022) further state that a number of key aspects may need to be considered when assessing changes in hydrological characteristics. These impacts are addressed in Att 11 - Impacts to key aspects when assessing changes in hydrological characteristics.

4.1.9.7 Do you think your proposed action is a controlled action? *

No

4.1.9.9 Please elaborate why you do not think your proposed action is a controlled action.

*

It is unlikely, given industry standard industry controls that are well practiced and implemented by the industry, along with a detailed review of the Significant impact guidelines 1.3 Coal seam gas and large coal mining developments — impacts on water resources (2022), that a significant impact to this protected matter will occur, and thus BNR does not believe that it could be considered a controlled action. It should be noted that the action is not a coal seam gas project. It is a deep unconventional gas project which carries with it a completely different environmental risk profile to shallow coal seam gas projects of which BNR has demonstrated through the completed detailed impact assessment above.

In addition to this, the protection of the water resource is sufficiently regulated under Western Australian Legislation including:

- Environmental Protection Act 1986
- Petroleum and Geothermal Energy Resources Act 1967
- Rights in Water and Irrigation Act 1914

4.1.9.10 Please describe any avoidance or mitigation measures proposed for this action and attach any supporting documentation for these avoidance and mitigation measures. *

A suite of mitigation measures, following the hierarchy, has been developed to manage any potential impacts to water resources (Att 11– Table of Mitigation Measures (Water)).

A summary of mitigation measures:

Avoid - Geomechanical risks assessment

Avoid - Early warning system for detecting geomechanical events

Avoid - HFS not located within 2,000 m of a PDWSA

Avoid - HFS treatment will have more than 600 m vertical separation to the nearest useable aquifer

Avoid - Surface casing cemented across all useable freshwater aquifers

Avoid - Well Management Plan

Avoid - Well integrity assessment

Avoid / Minimise - Part IV Groundwater Management Plan

Minimise - Produced formation water storage pond design

Minimise - Groundwater monitoring bore installation

Minimise - Petroleum well installation

Minimise - Pond design
Minimise - Chemical inventory
Minimise - Low-toxicity mud system
Minimise - Fugitive discharges are monitored and reported
Minimise - Groundwater licences for extraction bores
Minimise - Meter calibration and monitoring for extraction bores
Monitor - Site water audit
Monitor - Ecotoxicology testing on produced formation water

4.1.9.11 Please describe any proposed offsets and attach any supporting documentation relevant to these measures. *

None identified for the Proposed Action.

4.1.10 Commonwealth Land

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.10.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.10.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact.

*

Proposed Action is not undertaken in Commonwealth Lands

4.1.11 Commonwealth Heritage Places Overseas

You have identified your proposed action will likely directly and/or indirectly impact the following protected matters.

A direct impact is a direct consequence of an action taken – for example, clearing of habitat for a threatened species or permanent shading on an ecological community as the result of installing solar panels.

An indirect impact is an 'indirect consequence' such as a downstream impact or a facilitated third-party action.

—

4.1.11.1 Is the proposed action likely to have any direct and/or indirect impact on any of these protected matters? *

No

4.1.11.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact.

*

Proposed Action is not in Commonwealth Heritage Place Overseas

4.1.12 Commonwealth or Commonwealth Agency

4.1.12.1 Is the proposed action to be taken by the Commonwealth or a Commonwealth Agency? *

No

4.2 Impact summary

Conclusion on the likelihood of significant impacts

You have indicated that the proposed action will likely have a significant impact on the following Matters of National Environmental Significance:

None

Conclusion on the likelihood of unlikely significant impacts

You have indicated that the proposed action will unlikely have a significant impact on the following Matters of National Environmental Significance:

- World Heritage (S12)
- National Heritage (S15B)
- Ramsar Wetland (S16)
- Threatened Species and Ecological Communities (S18)
- Migratory Species (S20)
- Nuclear (S21)
- Commonwealth Marine Area (S23)
- Great Barrier Reef (S24B)
- Water resource in relation to large coal mining development or coal seam gas (S24D)
- Commonwealth Land (S26)
- Commonwealth Heritage Places Overseas (S27B)
- Commonwealth or Commonwealth Agency (S28)

4.3 Alternatives

4.3.1 Do you have any possible alternatives for your proposed action to be considered as part of your referral? *

No

4.3.8 Describe why alternatives for your proposed action were not possible. *

Based upon the known geology and tightness of the rock, no economic volumes of gas can flow if conventional methods are utilised and no alternative approaches or technologies are available other than using unconventional techniques.

These conclusions are consistent with several other basins throughout Australia including the Cooper Basin.

5. Lodgement

5.1 Attachments

1.2.1 Overview of the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix A - Chemical Inventory of substances used for the Proposed Action, including Safety Data Sheets.	21/06/2024	No	High
#2.	Document	Attachment 6 - Project Figure.png Project figure		No	High
#3.	Document	Attachment 9 - Assessment of potential impacts to MNES.pdf Assessment of potential impacts to MNES (Threatened and Migratory Species).		No	High
#4.	Link	Fracking Inquiry WA https://frackinginquiry.wa.gov.au/sites/default/..			High

1.2.6 Commonwealth or state legislation, planning frameworks or policy documents that are relevant to the proposed action

Type	Name	Date	Sensitivity	Confidence
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#1.	Link	Matters of National Environmental Significance Significant impact guidelines 1.1 https://www.dcceew.gov.au/sites/default/files/do..	High
#2.	Link	Statement of Environmental Principles, Factors, Objectives and aims of EIA https://www.epa.wa.gov.au/statement-environmenta..	High

1.2.7 Public consultation regarding the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 1 - Summary of Stakeholder Consultation.pdf Bennet Resources Pty Ltd stakeholder consultation for Proposed Action		No	High

1.3.2.18 (Person proposing to take the action) If the person proposing to take the action is a corporation, provide details of the corporation's environmental policy and planning framework

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 2 - BNR Environmental Policy.pdf Bennet Resources Environmental Policy	13/10/2020	No	High

3.1.1 Current condition of the project area's environment

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C - Valhalla Flora and Fauna Survey -A desktop assessment of the Project Area was undertaken to inform local and regional context, to assess for the potential presence of conservation significant species and vegetation associations, and to inform the flora and fauna survey in terms of landform, vegetation associations, fauna habitat and accessibility. A Detailed and Targeted flora and vegetation survey and a Basic fauna survey were conducted by Eco Logical Australia from 3 to 10 March 2021. An additional supplementary survey was conducted from 25-27 May 2021.	20/06/2021	No	High

3.1.3 Natural features, important or unique values that applies to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document				

Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C - Valhalla Flora and Fauna Survey -A desktop assessment of the Project Area was undertaken to inform local and regional context, to assess for the potential presence of conservation significant species and vegetation associations, and to inform the flora and fauna survey in terms of landform, vegetation associations, fauna habitat and accessibility. A Detailed and Targeted flora and vegetation survey and a Basic fauna survey were conducted by Eco Logical Australia from 3 to 10 March 2021. An additional supplementary survey was conducted from 25-27 May 2021.	20/06/2021	High
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3.2.1 Flora and fauna within the affected area

Type	Name	Date	Sensitivity	Confidence
#1.	Document Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix I, Rockwater was engaged to prepare this assessment of the hydrogeology of the Paradise– Valhalla–Asgard area, which includes Valhalla Central; and the results of monitoring during fracturing of reservoirs at Valhalla North and Asgard. It is an update of a report that has been prepared since 2013, and will be progressively updated as new projects are planned and additional data are collected.	20/06/2021	High	High
#2.	Document Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C, A desktop assessment of the Project Area was undertaken to inform local and regional context, to assess for the potential presence of conservation significant species and vegetation associations, and to inform the flora and fauna survey in terms of landform, vegetation associations, fauna habitat and accessibility. A Detailed and Targeted flora and vegetation survey and a Basic fauna survey were conducted by Eco Logical Australia from 3 to 10 March 2021. An additional supplementary survey was conducted from 25-27 May 2021.	20/06/2021	High	High
#3.	Document Attachment 5 - Valhalla Targeted Significant Vertebrate Fauna Survey Memo.pdf Ecologia Environment (ecologia) undertook a targeted significant vertebrate fauna survey for the Threatened bilby (Macropis lagotis), northern quoll (Dasyurus hallucatus) and ghost bat (Macrodermas gigas) at the Valhalla Project	27/08/2021	High	High

Area (Petroleum Exploration Permit EP 371) in the Canning Basin for Bennett Resources.			
#4.	Link	Environmental Factor Guideline - Subterranean Fauna https://www.epa.wa.gov.au/policies-guidance/envi..	High
#5.	Link	Guidelines for surveys to detect the presence of bilbies, and assess the importance of habitat in We https://library.dbca.wa.gov.au/FullTextFiles/072..	High
#6.	Link	Survey guidelines for Australias threatened mammals: Guidelines for detecting mammals listed as thr https://www.dcceew.gov.au/environment/epbc/publi..	High

3.2.2 Vegetation within the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C - A desktop assessment of the Project Area was undertaken to inform local and regional context, to assess for the potential presence of conservation significant species and vegetation associations, and to inform the flora and fauna survey in terms of landform, vegetation associations, fauna habitat and accessibility. A Detailed and Targeted flora and vegetation survey and a Basic fauna survey were conducted by Eco Logical Australia from 3 to 10 March 2021. An additional supplementary survey was conducted from 25-27 May 2021.	20/06/2021	High	High
#2.	Link	Fire History https://www.firenorth.org.au/nafi3/			High
#3.	Link	Land systems of the Kimberley region, Western Australia, Technical Bulletin 98 https://library.dpird.wa.gov.au/tech_bull/11/	01/10/2021		High

3.3.1 Commonwealth heritage places overseas or other places that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Australian Heritage Database https://www.dcceew.gov.au/parks-heritage/heritag..			High

#2.	Link	InHerit – State Heritage Office database https://inherit.dph.wa.gov.au/Public/		High
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3.3.2 Indigenous heritage values that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 1 - Summary of Stakeholder Consultation.pdf Bennet Resources Pty Ltd stakeholder consultation for Proposed Action		No	High
#2.	Link	Australian Heritage Inquiry System https://www.wa.gov.au/government/document-collec..			High

3.4.1 Hydrology characteristics that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix I - Hydrogeological Assessment of Paradise-Valhalla-Asgard Project Areas. Rockwater was engaged to prepare this assessment of the hydrogeology of the Paradise-Valhalla-Asgard area, which includes Valhalla Central; and the results of monitoring during fracturing of reservoirs at Valhalla North and Asgard. It is an update of a report that has been prepared since 2013, and will be progressively updated as new projects are planned and additional data are collected.	20/06/2024	No	High
#2.	Document	Attachment 7 - Aquifer Data for Wells.pdf Project Area Aquifer data for wells.		No	High
#3.	Link	Broome Water Reserve drinking water source protection plan https://www.wa.gov.au/government/publications/br..			High
#4.	Link	HG16 - Hydrogeological assessment of the Fitzroy Alluvium https://www.wa.gov.au/government/publications/hg..			High
#5.	Link	Lower Fitzroy River Groundwater Review. A report prepared by Innovative Groundwater Solutions https://www.agric.wa.gov.au/sites/gateway/files/..			High
#6.	Link				

		Water Information Reporting database https://www.wa.gov.au/service/natural-resources/..	High
#7.	Link	Water resources inventory 2014 https://www.wa.gov.au/government/publications/wa..	High
#8.	Link	Water Resources of the Mardoowarra (Fitzroy River) Catchment https://www.wilderness.org.au/images/resources/W..	High
#9.	Link	Western Australia Atlas of Petroleum Fields, Canning Basin https://www.dmp.wa.gov.au/Petroleum/Canning-Basi..	High

4.1.2.3 (National Heritage) Why your action is unlikely to have a direct and/or indirect impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix L Response to comments on the 3 October 2023 technical memorandum titled "Modelling of drawdown impacts from proposed rig supply bores in the Bennett Resources Valhalla Gas Development Project"	20/06/2024	High	High
#2.	Document	Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix I Rockwater was engaged to prepare this assessment of the hydrogeology of the Paradise-Valhalla-Asgard area, which includes Valhalla Central; and the results of monitoring during fracturing of reservoirs at Valhalla North and Asgard. It is an update of a report that has been prepared since 2013, and will be progressively updated as new projects are planned and additional data are collected.	20/06/2024	High	High
#3.	Link	Commonwealth of Australia Gazette No. S132, 31 August 2011. https://www.dcceew.gov.au/sites/default/files/en..			High
#4.	Link	Guidelines for the protection of surface and groundwater resources during exploration drilling https://www.dmp.wa.gov.au/Environment/Guidelines..			High
#5.	Link				

		Hydraulic fractures: how far can they go? https://www.sciencedirect.com/science/article/ab..	01/11/2012	High
#6.	Link	Hydraulic-Fracture-Height Growth: Real Data https://onepetro.org/PO/article-abstract/27/01/8..	16/02/2012	High
#7.	Link	National Heritage Places - West Kimberley https://www.dcceew.gov.au/parks-heritage/heritag..		High
#8.	Link	Water Resources of the Mardoowarra (Fitzroy River) Catchment https://www.wilderness.org.au/images/resources/W..		High
#9.	Link	West Kimberley National Heritage assessment https://www.dcceew.gov.au/parks-heritage/heritag..		High

4.1.4.2 (Threatened Species and Ecological Communities) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 8 - MNES Likelihood of Occurrence Assessment.pdf A 'Likelihood of Occurrence' assessment was conducted for the listed MNES, assessing the potential for these to occur within, or in proximity to, the Project Area.		No	High
#2.	Document	Attachment 9 - Assessment of potential impacts to MNES.pdf Assessment of potential impacts to MNES (Threatened and Migratory Species).			High

4.1.4.6 (Threatened Species and Ecological Communities) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 4 - Odin Flora and Fauna Survey.pdf Low Ecological Services (LES) was commissioned by Bennett Resources (BR) to undertake a level 1 flora and fauna survey within Petroleum Exploration Lease EP371, located in the Kimberley Region of Western Australia. BR proposes to undertake 2D and 3D seismic surveys across a section of the lease. This is jointly referred to as the Odin project.	04/03/2020	No	High
#2.	Document	Attachment 9 - Assessment of potential impacts to MNES.pdf Assessment of potential impacts to MNES (Threatened and Migratory Species).		No	High
#3.	Link				

		Conservation Advice <i>Erythrura gouldiae</i> https://environment.gov.au/biodiversity/threaten..	High
#4.	Link	Guidelines for surveys to detect the presence of bilbies, and assess the importance of habitat in We https://library.dbca.wa.gov.au/FullTextFiles/072..	High
#5.	Link	National recovery Plan for the Norther Quoll <i>Dasyurus hallucatus</i> . https://www.dcceew.gov.au/sites/default/files/do..	High
#6.	Link	NatureMap https://static.dbca.wa.gov.au/pages/naturemap.html	Low or uncertain
#7.	Link	Resource Management Technical Reports https://library.dpird.wa.gov.au/rmtr/235/	High

4.1.4.10 (Threatened Species and Ecological Communities) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 10 - Table of Mitigation Measures (Flora and Fauna).pdf This attachment summarises the flora, vegetation and fauna mitigation measures and their hierarchy.		No	High

4.1.5.2 (Migratory Species) Why your action has a direct and/or indirect impact on the identified protected matters

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 8 - MNES Likelihood of Occurrence Assessment.pdf A 'Likelihood of Occurrence' assessment was conducted for the listed MNES, assessing the potential for these to occur within, or in proximity to, the Project Area.		No	High

4.1.5.6 (Migratory Species) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 3 - Valhalla Gas Exploration and Appraisal Program S38 Assessment - ERD.pdf Valhalla Gas Exploration S38 Assessment - Environmental Review Document - Appendix C A desktop assessment of the Project Area was undertaken to inform local and regional context, to assess for the potential presence of conservation significant species and vegetation associations, and to inform the flora and fauna survey in terms of landform, vegetation associations, fauna habitat and accessibility. A Detailed and Targeted flora and	20/06/2024		High

vegetation survey and a Basic fauna survey were conducted by Eco Logical Australia from 3 to 10 March 2021. An additional supplementary survey was conducted from 25-27 May 2021.

#2.	Document	Attachment 9 - Assessment of potential impacts to MNES.pdf Assessment of potential impacts to MNES (Threatened and Migratory Species).	No	High
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4.1.5.10 (Migratory Species) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 10 - Table of Mitigation Measures (Flora and Fauna)_Rev1.pdf Mitigation measures (Flora and Fauna)	22/11/2021	No	High

4.1.9.6 (Water resource in relation to large coal mining development or coal seam gas) Why you do not consider the direct and/or indirect impact to be a Significant Impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 11 - Impacts to key aspects when assessing changes in hydrological characteristics.pdf The guidelines (DCCEEW, 2022) further state that a number of key aspects may need to be considered when assessing changes in hydrological characteristics. These impacts are addressed in this Attachment		No	High
#2.	Link	Significant impact guidelines 1.3 - Coal seam gas and large coal mining developments — impacts on water https://www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-1.3-coal-seam-gas-and-large-coal-mining-developments-impacts-on-water			High

4.1.9.9 (Water resource in relation to large coal mining development or coal seam gas) Why you do not think your proposed action is a controlled action

	Type	Name	Date	Sensitivity	Confidence
#1.	Link	Significant Impact Guidelines 1.3: Coal seam gas and large coal mining developments - impacts on water https://www.dcceew.gov.au/environment/epbc/publications/significant-impact-guidelines-1.3-coal-seam-gas-and-large-coal-mining-developments-impacts-on-water			High

4.1.9.10 (Water resource in relation to large coal mining development or coal seam gas) Avoidance or mitigation measures proposed for this action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Attachment 12 - Table of Mitigation Measures (Water).pdf The attachment summarises the water mitigation		No	High

5.2 Declarations

Completed Referring party's declaration

The Referring party is the person preparing the information in this referral.

Name	Ashley Fertch
Job title	Environmental Specialist
Phone	0892001685
Email	BME@environmentalsolutions.net.au
Address	197 St Gorges Terrace, Perth 6000

Check this box to indicate you have read the referral form. *

I would like to receive notifications and track the referral progress through the EPBC portal. *

By checking this box, I, **Ashley Fertch**, declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. *

I would like to receive notifications and track the referral progress through the EPBC portal. *

Completed Person proposing to take the action's declaration

The Person proposing to take the action is the individual, business, government agency or trustee that will be responsible for the proposed action.

ABN/ACN	73145113186
Organisation name	BENNETT RESOURCES PTY LTD
Organisation address	6000 WA
Representative's name	Michael Laurent

Representative's job title	Chief Operating Officer
Phone	92001685
Email	perthoffice@bennettresources.com.au
Address	Level 14, 225 St Georges Terrace, Perth WA 6000

Check this box to indicate you have read the referral form. *

I would like to receive notifications and track the referral progress through the EPBC portal. *

I, **Michael Laurent of BENNETT RESOURCES PTY LTD**, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf or for the benefit of any other person or entity. *

I would like to receive notifications and track the referral progress through the EPBC portal. *

Completed Proposed designated proponent's declaration

The Proposed designated proponent is the individual or organisation proposed to be responsible for meeting the requirements of the EPBC Act during the assessment process, if the Minister decides that this project is a controlled action.

ABN/ACN	73145113186
Organisation name	BENNETT RESOURCES PTY LTD
Organisation address	6000 WA
Representative's name	Michael Laurent
Representative's job title	Chief Operating Officer
Phone	0863162200
Email	perthoffice@bennettresources.com.au
Address	Level 4, 225 St Georges Terrace, Perth WA 6000

Check this box to indicate you have read the referral form. *

I would like to receive notifications and track the referral progress through the EPBC portal. *

I, **Michael Laurent of BENNETT RESOURCES PTY LTD**, the Proposed designated proponent, consent to the designation of myself as the Proposed designated proponent for the purposes of the action described in this EPBC Act Referral. *

I would like to receive notifications and track the referral progress through the EPBC portal. *