

# Syngas and Power Generation, Stage 1 Commercial Development, NeuRizer Urea Project

Application Number: **01799**Commencement Date: **26/04/2023**Status: **Locked**

## 1. About the project

### 1.1 Project details

#### 1.1.1 Project title \*

Syngas and Power Generation, Stage 1 Commercial Development, NeuRizer Urea Project

#### 1.1.2 Project industry type \*

Energy Generation and Supply (non-renewable)

#### 1.1.3 Project industry sub-type

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#### 1.1.4 Estimated start date \*

01/01/2024

#### 1.1.4 Estimated end date \*

31/12/2055

## 1.2 Proposed Action details

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

Leigh Creek Operations Pty Ltd (LCO), a subsidiary of NeuRizer Ltd (NRZ), proposes to develop a commercial long-term in-situ gasification (ISG) project in South Australia within the Petroleum Production Licence (PPL) 269 area. The project area comprises 4.98 km<sup>2</sup>, including an approximate disturbance footprint of 2.43 km<sup>2</sup> and avoidance of 2.55 km<sup>2</sup>.

The proposed action only comprises the first stage (Stage 1 Commercial Development) of the projected 25-year NeuRizer Urea Project (NRUP) (formerly known as the Leigh Creek Energy Project (LCEP)). The proposed action is described and assessed in detail in **Section 3 (pp 19-63)** of the Environmental Impact Report (EIR) that is **Att 1 NRZ EIR Stage 1 Commercial Development**. The proposed action will involve the ISG of coal resources (underground) at the Leigh Creek coalfield site and construction of a small-scale (<5MW) power generation plant to demonstrate the technical and financial capability of producing syngas at a commercial scale.

Stage 1 will start with 3 gasifiers (2 online plus 1 spare), which will be developed (initiated, operated and preserved) as per **Att 1 NRZ EIR Stage 1 Commercial Development, Section 3.1- 3.8, pp 20-49**. Each gasifier will be initiated and brought up to production over a period of months, with 1 gasifier continually in operation, which will act as the main stable source of syngas for the power station. New gasifiers will be opened as soon as an existing gasifier reaches the commercial rates and is turned off and preserved for Stage 2 of the NRUP. The syngas produced will be treated at the Leigh Creek site and used as fuel to generate electrical power. The power produced will be used for on-site power demand. An indicative block flow diagram of the proposed Stage 1 Commercial facility and air blown gasification is illustrated in **Att 2 Figures, Figure 1, pp 1**.

ISG - Process description: The ISG process converts underground coal from its solid state into a gaseous form, resulting in the generation of synthesis gas (syngas) containing predominantly methane (CH<sub>4</sub>), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>) and hydrogen (H<sub>2</sub>). The conversion of solid coal into syngas works by reacting coal at high temperatures in an oxygen-controlled environment. The ISG process is

fundamentally different to, and not a type of, coal seam gas (CSG) or large coal mining development. While CSG and ISG both produce gas, the product gases are very different and are produced differently. ISG uses air, temperature and water to control the chemical reaction of converting the solid coal in the coal seam to syngas and allow the produced syngas to flow to the surface, whereas CSG depressurises the coal seam allowing the naturally occurring gas that is in the cleats and pores of the coal seam to be released and flow to the surface.

As ISG does not rely on depressurisation of coal formations for production of gas, there is negligible co-produced water associated with gas production as is the case for CSG. Production wells are required to be dried and dewatered prior to initiating ISG, but water quantities are much smaller. The ISG process will vaporise the formation water within the coal seam and gasifier chamber during the gasification process. The "steam" or water vapour generated during the gasification process may be consumed in chemical reaction or produced and condensed in surface equipment. Condensed water collected in surface equipment will be used for gas scrubbing and recycled after oily water separation. Surplus scrubbing water may be disposed of using a thermal oxidiser.

Proposed activities associated with the ISG process are summarised in **Att 3 Additional information of proposed action, Section 1, pp 1**. An illustration of the gasification process is shown in **Att 2 Figures, Figures 2, 3 and 4, pp 2-3**.

Small scale power plant: Construction and operation of a small-scale power plant (nominally <5MW). This will enable the development of multiple gasifiers to provide the required average rate of syngas, with stable quality and the needed contingency and redundancy over the design life of the facility in future stages. Syngas generated will be used as fuel to generate electrical power, allowing the project to operate in 'island mode', independent of grid power.

The minimum generator performance standards set within the National Electricity Market by the Australian Energy Regulator will be met. The commissioning procedures including start-up, shutdown and operating, will be provided by the EPC contractor.

Proposed commissioning of gasifiers: A commissioning approach based on process engineering risk management will be implemented, as recommended by the Independent Scientific Panel (Moran et al. 2013) (See **Att 30 Reference list for EPBC 2023\_09538 referral**). The main process commissioning stage will involve the following steps:

- Dry-out of the gasifier chamber using compressed air (outlet flow directed to cold vent).
- Insertion of initiation tool and subsequent initiation under pressure.
- Monitoring the composition of initial gas released to detect products of gasification with gases flowing to cold vent.
- Once gasification has established and oxygen levels fall to a pre-determined value, the gases will be combusted in the thermal oxidiser or directed to above ground plant for conditioning.
- Ramp-up of oxidant (air) flow and on-going gas composition analysis.

Water: Water for the proposed action is expected to be sourced from SA Water as potable quality water. Several iterations of the Stage 1 design have been developed with the aim of reducing overall water consumption. The final design will require up to 50 ML/year during peak of operation and employ air cooling and water recycling to reduce water usage.

For information about monitoring and data collection, decommissioning and rehabilitation and minor ancillary activities, please see **Att 3 Additional information of proposed action, Section 2- 4, pp 1-2**.

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

Yes

### 1.2.3 Is the proposed action the first stage of a staged development (or a larger project)?

Yes

### 1.2.5 Provide information about the staged development (or relevant larger project).

The NRUP will involve two stages.

Stage 1 – Commercial Development (NRUP site power development), which is the proposed action subject of this referral, is outlined above and described and assessed in detail in the EIR that is **Att 1 NRZ EIR Stage 1 Commercial Development**. Specifically refer to **Att 1 NRZ EIR Stage 1 Commercial Development, Section 3, pp 19-63**.

Stage 2 - UPP, which is not part of the proposed action, would require the design and construction of a Urea Production Plant to combine the hydrogen component of a conditioned syngas derived from Stage 1, which would be converted into ammonia (NH<sub>3</sub>) by reaction with nitrogen. Ammonia would then be combined with carbon dioxide to form urea (CO(NH<sub>2</sub>)<sub>2</sub>). The UPP would produce urea in a granular (solid) form for local and export agriculture markets.

A portion of the syngas would also be used to provide power for the site. Stage 2 - UPP will specifically involve:

1. Early works: construction, installation, or provision of the site preparation activities within the proposed Stage 2 site.
2. Above ground infrastructure: construction, commissioning, and operation of the NRUP plant and equipment, including the ammonia synthesis plant, urea synthesis plant, urea granulation warehouse, conveyor, load out facility, and ancillary infrastructure.

Stage 1 is separate to Stage 2, and Stage 2 will be subject to an assessment and approvals process under the applicable South Australian legislation. Prior to the NRUP progressing to Stage 2, NRZ would consult with the Federal Department to determine whether Stage 2 will be referred to the Federal Minister for the Environment as a proposed action under the EPBC Act.

The Stage 2 UPP will be subject to an Environmental Impact Statement (EIS) study under the Planning, Development and Infrastructure Act 2016; however the gasification process, processing of syngas and transmission to the plant will be managed under the EIR and Statement of Environmental Objectives (SEO) process under the Petroleum and Geothermal Energy Act 2000 (PGE Act) and the Petroleum and Geothermal Energy Regulations 2013 (PGE Regulations). The focus of this referral (and the EIR and SEO) is the Stage 1 Commercial Development.

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

### State legislation

The *Aboriginal Heritage Act 1988* applies to the entirety of the Leigh Creek Coalfield and provides for the protection of all Aboriginal sites, objects and remains, including recorded, reported, or undiscovered heritage. For the purpose of undertaking petroleum exploration operations pursuant to PEL 650 and avoiding risk to any Aboriginal sites, NRZ adopted a heritage survey process with the Adnyamathanha Traditional Lands Association (ATLA). ATLA is the prescribed body corporate for Adnyamathanha native title holders of the greater region.

The *Environment Protection Act 1993* imposes a “general environmental duty” of care not to undertake an activity that pollutes or might pollute the environment unless all reasonable and practicable measures have been taken to prevent or minimise any resulting environmental harm.

The *Native Vegetation Act 1991* provides for the management, enhancement, and protection of native vegetation in South Australia. It stipulates that native vegetation must not be cleared unless approval is granted by the Native Vegetation Council under this Act, or it is permitted under the *Native Vegetation Regulations 2017*. Under Regulation 14, clearance of native vegetation is permitted if it is undertaken in accordance with the PGE Act.

The *Landscape South Australia Act 2019* promotes the sustainable and integrated management of South Australia’s landscapes and makes provision for the protection of the State’s natural resources.

As a petroleum production activity, the proposed action is governed by the PGE Act and the PGE Regulations. This legislation is administered by the South Australian Department for Energy and the Mining - Energy and Resources Division (DEM-ERD). As a requirement of Section 99 of the PGE Act, a regulated activity can only be conducted if an approved Statement of Environmental Objectives (SEO) has been developed. Please refer to **Att 22 DEM BROCH027, pp 3** for more information about legislation regulating underground coal gasification in South Australia.

In accordance with Section 97 of the PGE Act, the EIR must take into account cultural, amenity and other values of Aboriginals and other Australians. It also considers risks to the health and safety of the public and contains sufficient information for an informed assessment of the likely impact of the activities on the environment. Refer to Regulation 10 of the PGE Regulations for a comprehensive list of information that must be provided for purposes of an EIR or refer to **Att 3 Additional information of proposed action, Section 5, pp 2**.

The final version of the EIR for the Stage 1 Commercial Development will be submitted to DEM-ERD and the level of environmental impact will be classified using the criteria set out in **Att 4 Criteria Classifying level of environmental impact of regulated activities**, or <https://www.energymining.sa.gov.au/industry/energy-resources/regulation/environmental-register>.

A corresponding draft SEO is prepared, reflecting the impacts and measures identified in the EIR or other assessments that may be required as determined by the classification. Once the approval process is complete, all documentation, including the EIR and its associated SEO, must be entered on a public Environmental Register accessible to the community from the DEM website.

Activity Notification / Approval Process: Prior to commencing a regulated activity, Section 74 (3) of the PGE Act, requires the Minister’s prior written approval for activities requiring high level supervision.

### Commonwealth legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) is the primary Commonwealth environmental statute relevant to the proposed action.

NRZ undertook a self-assessment of the Stage 1 proposal against the criteria presented in the EPBC Act to determine if a referral may be required. The outcome from the self-assessment was that there are no matters of national environmental significance (MNES) present or likely to be significantly impacted. In particular, NRZ is satisfied that sections 18 and 18A (listed threatened species and communities) and sections 24D and 24E (protection of water resources from coal seam gas development and large coal mining development) of the EPBC Act, are not “controlling provisions” for the Stage 1 Project. NRZ is confident that the Stage 1 Project will not have a significant impact on any protected matter of national environmental significance.

Yet, NRZ has decided for the Stage 1 Project to be referred pursuant to section 68 of the EPBC Act for the project to be formally assessed and provide opportunity for public comment and consultation period.

NRZ has provided answers to potential questions that may arise for the Stage 1 Proposal in **Att 23 NRZ Q&A Stage 1 Commercial Development**).

The Commonwealth *Native Title Act 1993* and the *Native Title (South Australia) Act 1994* provide for the recognition and protection of native title. Native title will exist in those areas of land or water where it has not been extinguished by the conduct of public works or the grant of land tenure, or where there is clear intent to extinguish freehold tenure and certain other forms of land title.

NRZ issued a section 23 application under the South Australian *Aboriginal Heritage Act 1988* in late 2020. This application was considered and granted in December 2021. Nevertheless, NRZ has a Cultural Heritage Policy and will work within its guidelines for the purpose of avoiding damage and/or disturbance to any Aboriginal site object or remains not covered by the Section 23.

**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. \***

NRZ distributed the draft Environmental Impact Report (EIR) and supporting Statement of Environmental Objectives (SEO) for the Stage 1 Commercial Development to relevant stakeholders prior to submitting these draft documents to DEM-ERD. A summary of key stakeholders who were sent the draft documents and consulted can be found in **Att 1 NRZ EIR Stage 1 Commercial Development, Section 8.1, pp 212-213**.

For the proposed Stage 1 Commercial Development, NRZ had targeted the first community stakeholder meetings in the Leigh Creek township, which were held in January and February 2021. Further community consultations and project update meetings have been held in Leigh Creek, Copley, Iga Warta, Nepabunna, Marree and Port Augusta to date. A copy of previous invitations and update flyers can be found in **Att 5 Invite notice to community meetings and flyers**.

In June 2021, NRZ received feedback from DEM-ERD and the Department for Environment and Water (DEW) on the Hydrogeological Conceptual Site Model and related sections within the EIR for the Project. Responses to comments and questions can be found in **Att 1 NRZ EIR Stage 1 Commercial Development, Appendix B2 (pp 249-312)**.

The Environmental Defenders Office, representing the Adnyamathanha Traditional Lands Association (ATLA), presented submissions to the EIR and SEO for the Project.

NeuRizer also received submissions in relation to the draft EIR and SEO from:

- Outback Communities Authority (OCA)
- Leigh Creek and Copley and District Progress Associations
- Department of the Premier and Cabinet - Aboriginal Affairs and Reconciliation (DPC-AAR) South Australian Arid Lands Landscape Board
- Department for Environment and Water - National Parks and Protected Area Program Department for Energy and Mining – Mineral Resources Division
- Department for Energy and Mining – Energy Resources Division (DEM-ERD)

The draft EIR and SEO have subsequently been updated following the stakeholder comments and these updated drafts were submitted to DEM-ERD in 2022.

Additionally, as the northern Flinders Ranges region is culturally significant to ATLA, as the prescribed body corporate for the native title area, NRZ issued a Section 23 application under the South Australian Aboriginal Heritage Act 1988 in late 2020 (as stated above). The Premier granted the authorisation in December 2021. The authorisation allows NRZ to impact aboriginal sites, objects or remains if certain conditions are met. A summary of the conditions and NRZ's progress and commitments can be found in **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.2.1, pp 76 – 77**. The Cultural Heritage Risk Management Plan (CHMP) was shared with ATLA and the various heritage groups in 2022 for further implementation and will be subject to annual review. **Att 6 Cultural Heritage Management Plan NRZ** contains the current CHMP.

Stakeholder and community engagement will continue to be an ongoing activity. NRZ has a targeted community feedback email address for interested community members and stakeholders. Stakeholders can easily share their experiences of the project, leave feedback and request information. The email address is [community@neurizer.com.au](mailto:community@neurizer.com.au). The email address offers two-way communication where community users can be directed to the person who can best answer their questions in a timely matter.

### 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.

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**Confirm that you have read and understand this Privacy Notice \***

### 1.3.1.1 Is Referring party an organisation or business? \*

Yes

Referring party organisation details	
<b>ABN/ACN</b>	25146966305
<b>Organisation name</b>	LEIGH CREEK OPERATIONS PTY LTD
<b>Organisation address</b>	Level 11, 19 Grenfell Street, Adelaide SA 5000
Referring party details	
<b>Name</b>	Maria Sanchez
<b>Job title</b>	Environmental Scientist
<b>Phone</b>	0416680527
<b>Email</b>	maria.sanchez@neurizer.com.au
<b>Address</b>	

## 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

Person proposing to take the action organisation details	
<b>ABN/ACN</b>	25146996305
<b>Organisation name</b>	Leigh Creek Operations Pty Ltd

<b>Organisation address</b>	Level 11, 19 Grenfell Street, Adelaide SA 5000
Person proposing to take the action details	
<b>Name</b>	Cristian Bolda
<b>Job title</b>	Chief Operating Officer
<b>Phone</b>	+61 8 8132 9100
<b>Email</b>	Cristian.Bolda@neurizer.com.au
<b>Address</b>	Level 11, 19 Grenfell Street, Adelaide SA 5000

**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. \***

**Environmental Management**

NeuRizer, the parent company of Leigh Creek Operations Pty Ltd, has demonstrated responsible environmental management within the PEL 650 having successfully completed the pre-commercial demonstration (PCD) operations. For the PCD, the monitoring program scope included groundwater level, groundwater chemicals of potential concern (COPC), air quality and surface subsidence. The results showed no detected migration of COPCs from the gasifier chamber into the surrounding formation, no detection above air quality criteria were measured as per the Air Quality Monitoring Plan and there were no meaningful surface subsidence movements detected. NeuRizer also received State approvals for its SEOs for Geophysical Operations and Exploration Drilling in 2020 under the Petroleum and Geothermal Energy Act 2000.

NeuRizer has contracted Jacobs (an engineering consulting firm), T&M Consulting (environmental consulting firm), Water Technology (water consultants) and JBS&G (a brownfield consulting firm), to conduct fauna/flora surveys and ground water quality surveys.

Reflecting a commitment to environmental stewardship, no proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources have been commenced against NeuRizer or its subsidiary Leigh Creek Operations Pty Ltd.

NeuRizer is committed to the principles of environmental management as outlined by the Environment Institute of Australia and New Zealand and the AS/NZ ISO 14001:2016 Standard. NeuRizer is committed to the implementation and maintenance of an Environmental Management System within the framework of its Integrated Business Management System.

NeuRizer have been awarded Climate Active Certification in March 2021 and is signatory to the United Nations Global Compact. More information can be found in following link: <https://neurizer.com.au/our-responsibility/climate-active/> and **Att 29 NRZ Environmental Policy, ESG Policy and Climate Change Policy**, pp 1-3.

**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**

NRZ has designed an Environmental Management System based on the principles of *ISO 14001: Environmental Management Systems*. NRZ's Environmental Management System therefore comprises the following components, as described by ISO 14001:

- Environmental Policy
- Planning

- Support
- Operation
- Performance evaluation
- Management Review.

Consistent with the NRZ's environmental policy, the intended outcomes of the environmental management system include:

- Enhancement of environmental performance;
- Fulfilment of compliance obligations;
- achievement of environmental objectives.

For more information about the NRZ Environmental Management Framework, please refer to **Att 1 NRZ EIR Stage 1 Commercial Development, Section 7, pp 208-211**.

Regarding NRZ's Environmental Policy, the organization acknowledges that excellence in environmental management is essential to the success of the NRZ. Therefore, NRZ's Environmental Policy is a statement of the company's intent to achieve environmental compliance and ensures all environmental activities are consistent with NRZ's objectives. The policy is a statement of commitment from management and reflects the values of the NRZ Board. The policy is reviewed every year by the Board for its appropriateness and to ensure it is up to date with current legislation. The policy is signed and dated by the Managing Director after every review.

The policy is communicated to people working for or on behalf of NRZ through environmental health and safety inductions and is displayed by the entrance to the NRZ offices. The policy is made available to the public on the NRZ website via link, [www.neurizer.com.au](http://www.neurizer.com.au). Please also refer to **Att 29 NRZ Environmental Policy, ESG Policy and Climate Change Policy, pp. 1-2** for a copy of NRZ's Environmental Policy and ESG policy.

As a subsidiary of NRZ, Leigh Creek Operations Pty Ltd is bound by NRZ's Environmental Management System.

### 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? \*

Yes

Proposed designated proponent organisation details	
<b>ABN/ACN</b>	25146996305
<b>Organisation name</b>	Leigh Creek Operations Pty Ltd
<b>Organisation address</b>	Level 11, 19 Grenfell Street, Adelaide SA 5000
Proposed designated proponent details	
<b>Name</b>	Cristian Bolda
<b>Job title</b>	Chief Operating Officer
<b>Phone</b>	+61 8 8132 9100
<b>Email</b>	Cristian.Bolda@neurizer.com.au
<b>Address</b>	Level 11, 19 Grenfell Street, Adelaide SA 5000

### 1.3.4 Identity: Summary of allocation

**Confirmed Referring party's identity**

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

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ABN/ACN	25146966305
Organisation name	LEIGH CREEK OPERATIONS PTY LTD
Organisation address	Level 11, 19 Grenfell Street, Adelaide SA 5000
Representative's name	Maria Sanchez
Representative's job title	Environmental Scientist
Phone	0416680527
Email	maria.sanchez@neurizer.com.au
Address	

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### 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.

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ABN/ACN	25146996305
Organisation name	Leigh Creek Operations Pty Ltd
Organisation address	Level 11, 19 Grenfell Street, Adelaide SA 5000
Representative's name	Cristian Bolda
Representative's job title	Chief Operating Officer
Phone	+61 8 8132 9100
Email	Cristian.Bolda@neurizer.com.au
Address	Level 11, 19 Grenfell Street, Adelaide SA 5000

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### 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.

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Same as Person proposing to take the action information.

## 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

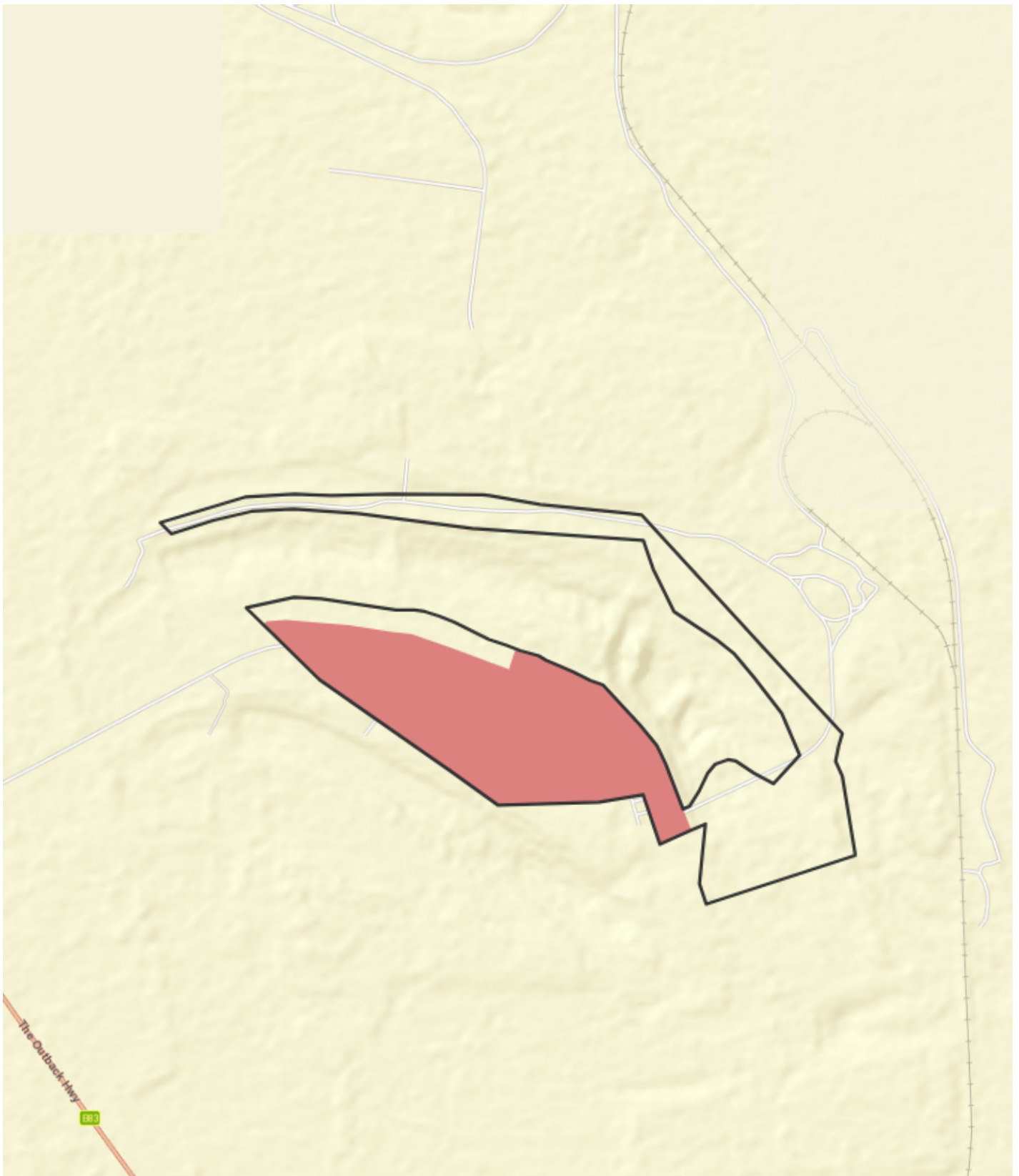
## 1.4 Payment details: Payment allocation

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

Proposed designated proponent

# 2. Location

## 2.1 Project footprint



## 2.2 Footprint details

### 2.2.1 What is the address of the proposed action? \*

Leigh Creek Coal Fields, 16908 The Outback Highway, Copley SA, 5732

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

South 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 is specifically located on Perpetual Crown Lease 6209/921 and Crown Lease 6230/175. A map of the Crown Lease numbers relevant to the petroleum retention license (PRL) is shown in **Att 2 Figures, Figure 5, pp. 4**.

The PDF version of the maps showing the project footprint are presented in **Att 7 Disturbance footprint, pp 1** and **Att 8 Project Location - PPL 269, pp 1**.

## 3. Existing environment

### 3.1 Physical description

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

The Stage 1 Commercial Development is proposed to be developed in the former Leigh Creek mine located 10 km northeast of the Leigh Creek Township within the northern Flinders Ranges. Leigh Creek is located 550 km north of Adelaide. The location of the proposed action will be within the PPL 269 that falls within the PEL 650 (**Att 2 Figures, Figure 6, pp 5**). The closest population centres to the PPL 269 are Copley (8.7 km south of the PPL), Leigh Creek (10 km south of the PPL) and Lyndhurst (21.4 km north of the PPL). Beltana is located 37 km to the south of the PPL and Neppabunna is located 56 km to the east.

The proposed project is located on land designated for mining and is surrounded by land designated for mining. The site is situated within an area where there is ongoing care and maintenance works relating to mine closure, and operations are being undertaken in consultation with the Department of Energy and Mining (DEM) who are currently the custodians of the former Flinders Power mine site. Please refer to **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.1, pp 73-75** for a summary of historical activities within the PEL 650 and Leigh Creek Coalfield components and **Att 2 Figures, Figure 9, pp 9** for a map of the Leigh Creek Coalfield and surrounds. Further out from the proposed project site (PPL 269), the surrounding land use is Pastoral with the Leigh Creek Station (east) and Myrtle Springs Station (west) bordering the former Leigh Creek Coalfield. No sensitive land-use or areas of significant environmental values are present at the project site.

There are also no conservation reserves in close proximity to the Project site (see **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.13.2.3, pp 159**). Moreover, the proposed site is not visible from the adjacent Outback Highway and is distant from public roads or pastoral stations while being and separated from them by the mine stockpiles and mine boundary. See **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.13, pp 156-161** for more information about land uses on boundaries of the project area and a description of the major land uses in the region.

Site access for the PEL 650 is via the existing paved public highway B83 (the Outback Highway) from Leigh Creek. Once within the PEL 650, the existing mine roads will be utilised to access the PPL 269. Any other access will be along designated access roads. The construction and operational vehicles will arrive on site via the existing road network. All vehicles will be registered for operation on public roads and do not require transport to site. Access to the Stage 1 proposed site and project area is restricted as all project personnel shall report their arrival at the gate or authorised personnel may use secure access. Compliance with all safety signs and instructions is mandatory upon entry to site.

During the operational phase, traffic will largely be restricted to light vehicles with a limited number of truck movements required, primarily for fuel deliveries and transport of water or waste. See **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.14, pp 161-162** and **Section 6.10, pp 184** for more information about traffic and transport on the proposed site.

A previous regular and extensive environmental monitoring program (as a result of the Pre-Commercial Demonstration) undertaken within the proposed area from April 2019 to April 2022 revealed no groundwater contamination issues (there was no detected migration of Contaminants of Potential Concern (CoPCs) from the gasifier chamber into the surrounding formation), no loss of containment of gaseous

compounds, no changes in pressure or temperature from gasification, no air quality issues and no ground surface subsidence on site (**Att 1 NRZ EIR Stage 1 Commercial Development, Section 3.1.3, pp 20-21**).

The Stage 1 proposal lies within a highly modified environment due to previous mining operations and is located between two existing mine pits which are reported, according to the Mine Closure Plan (MCP) (**Att 26 FPP Mine Closure Plan, Section 13.8, pp 373-377**) analytical modelling (by MWH 2016 and revised by Stantec 2018), as permanent evaporative sinks and where surface water controls restrict water from entering or leaving the site.

No Groundwater Dependent Ecosystem (GDE) has been identified in the project area's environment. A search of the Bureau of Meteorology (BOM) GDE Atlas was undertaken for the Leigh Creek Mine region, as shown in **Att 1 NRZ EIR Stage 1 Commercial Development, Figure 5-32 {Aquatic}, pp 130** and **Figure 5-33 {Terrestrial}, pp 131**. The mapped water-dependent ecosystems within the Telford Basin have also been presented in **Att 1 NRZ EIR Stage 1 Commercial Development, Figure 5-34, pp 132**.

In **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.6.8.3, pp 133** and having cross-referenced data from the GDE Atlas, it was concluded that:

- No potential aquatic GDEs were identified within the PPL 269 or within the Telford Basin.
- No terrestrial GDEs have been identified in the area within or surrounding the Telford Basin. No potential GDEs have been identified within PPL 269.
- No subterranean GDEs were identified.

The rehabilitation monitoring operator (Flinders Power) has implemented and is maintaining a surface water management strategy on the former Leigh Creek mine as per the MCP; in which surface water flows outside of the existing mine are diverted around the site and on-site surface water flows are retained and managed within site (See **Att 26 FPP Mine Closure Plan, section 13.7, pp 347-372**).

The subsurface coal and the sedimentary formations surrounding the underground gasifiers within the project area are tight aquitard materials with fault testing indicating no preferential flow of liquid and/or gases. Please refer to **Att 28 IKON- Geomechanical\_Model\_Final\_22\_01\_2018, Section 7, pp 55-69**. A preliminary review of the geology and geotechnical information has shown that the gasifiers are suitable for the future storage of carbon dioxide, based on the geology of the rock units within the Telford Basin.

The tightness of the Basin aquitards has been shown to prevent propagation of impacts associated with decades of mining practices beyond tens to hundreds of metres. The gasifiers for Stage 1 are situated in an undeveloped area within the existing mining lease. Low permeability rock formations on site also ensure no path or permeability for gas to escape.

An updated geotechnical model that accounts for caving, subsidence and subsurface modelling was developed in May 2022 (See **Att 27 NRZ Geotechnical Modelling May 2022**). The basin-scale geotechnical model predicts a maximum subsidence over the Stage 1 gasifiers of 0.030m based on site conditions, demonstrating that the amount of subsidence would be negligible, and it would only be over a small area (See **Att 1 NRZ EIR Stage 1 Commercial Development, Section 4.1.1.3, pp 65-70**).

For a summary of the project location, site access, land use and population centres please refer to **Att 3 Additional information of proposed action, Section 6, pp 3-4**. Information on the project area's existing environment can be found in **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5, pp 73-164** and **Att 16 Addendum to Winter Ecology Survey, Section 6.1- 6.8, pp 13-30**.

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

There are currently no industrial, economic or social uses of the Stage 1 Commercial Development area.

The primary land use in PEL 650 was open cut coal mining which commenced in Leigh Creek in the 1940s. The Leigh Creek open cut mine was originally established under a Crown Agreement issued by the South Australian Government to the ETSA in an effort to secure the State's electricity supply. After the Mining Act 1971 came into effect to regulate mining in the state, the Leigh Creek area continued to be reserved from its provisions rather than operating under a conventional Mining Lease issued under the Mining Act. The Leigh Creek Coalfield was most recently operated by Alinta Energy. Mining ceased in November 2015 after it became increasingly uneconomic. Mine closure activities are currently being undertaken within the Leigh Creek Coalfield by the current rehabilitation monitoring operator, Flinders Power. See **Att 26 FPP Mine Closure Plan, Section 1-6, pp 26-50** for more details regarding the mine closure plan for the Leigh Creek Coalfield.

The proposed site is located within an area where there is ongoing care and maintenance works undertaken by the rehabilitation operator, and operations are being undertaken in consultation with the Department of Energy and Mining who are currently the custodians of the former Flinders Power mine site. There are also no conservation reserves in close proximity to the project site.

The project area is not visible from the adjacent Outback Highway and is distant from public roads or pastoral stations while being separated from them by the mine stockpiles and mine boundary.

#### Proposed uses

The proposed use of the project area is the NRUP, which will be developed in two stages as indicated in section 1.2 of this referral. There are no other proposed uses of the project area.

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

There are no outstanding natural features and/or any other important or unique values relevant to the project area. Most of the landform and ground surface within the coalfield in the PPL 269 has been heavily disturbed and modified by over 70 years of open cut coal mining activities. See **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5, pp 73-164** for more information about existing environment.

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

PEL 650 and the Leigh Creek Coalfield are located at an elevation of approximately 200 m above sea level and approximately 230 kilometres from the closest coast. In the immediate area of the PEL 650, the landform is generally a gently undulating plain comprised of reddish powdery calcareous soils and low rocky outcrops. At the base of the nearby ranges, alluvial fans and closely spaced dunes of crusty red duplex soil and loose aeolian sands extend over the plains.

The pits within the coalfield are surrounded by extensive mine spoil piles and waste rock dumps. Other earthworks have also been undertaken extensively across the coalfield site, including construction of the retention dam and numerous berms around the site to modify water flows, and construction of numerous access tracks.

Refer to **Att 2 Figures, Figure 7 and Figure 8, pp 6-7** showing the main series pit and the locations of the proposed gasifiers.

## 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.

NRZ have carried out four ecological surveys covering the spring, summer and winter seasons. The first baseline ecological assessment of the PEL was undertaken in December 2017 to determine the flora and fauna species within a 20-kilometre buffer from the PEL 650 boundary. A further study was commissioned in December 2018 to present an overview of the ecological assets present within the area of the PPL 269. The spring study was a targeted survey of EPBC listed Thick-billed Grasswren (*Amytornis modestus*) and Sea Heath (*Frankenia plicata*). The final study was a winter flora and fauna survey completed in August 2021 (Jacobs, 2021), with an addendum to this winter survey (focused on assessing the proposed action's potential direct and indirect impacts to conservation significant species) being completed in August 2022. See **Att 30 Reference list for EPBC 2023\_09538 referral**. A detailed overview of the ecological assets within the area of the PPL 269 and PEL 650 are presented in **Att 9 Flora and Fauna Assessment PEL650 Jan 2018, Att 10 Flora and fauna assessment Leigh Creek Energy site investigation 2018, Att 11 Targeted EPBC Species and habitat assessment, Att 12 Winter Survey 2021 PEL 650, and Att 16 Addendum to Winter Ecology Survey**.

Refer to **Att 16 Addendum to Winter Ecology Survey** for an assessment of the potential direct and indirect impacts of the proposed action on flora and fauna and an updated Commonwealth conservation significant species assessment.

The most recent addendum to winter survey concluded, in relation to flora and fauna, that (see **Att 16 Addendum to Winter Ecology Survey, pp 13, pp 32 – 33, pp 44 – 48 & pp 51**):

- There are no EPBC listed flora or EPBC listed migratory or threatened fauna occurs within the proposed project area.
- No EPBC listed Threatened Ecological Communities (TECs) were detected across PEL 650, and none are considered likely to occur.
- The species highlighted by the Protected Matters Search Tool (PMST) are considered unlikely to occur, in particular low shrub *Frankenia plicata* and the conspicuous tree *Codonocarpus pyramidalis* (Slender Bell-fruit).
- No vegetation of conservation significance is present in the proposed impact areas for Stage 1 – Commercial Development since the site has been subject to heavy disturbance relating to previous coal mining activities.

- No EPBC listed flora, threatened fauna or migratory species are likely to be significantly impacted by direct or indirect impacts as a result of the proposed activity (Stage 1-Commercial Development).

In addition to the aforementioned reports relating to the flora and fauna within and surrounding the affected area, refer to **Att 13 Desktop review MNES - April 2023** for a desktop review on newly listed EPBC threatened species in effect under EPBC Act since 31 March 2023 relevant to Stage 1 project.

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

#### Vegetation

Over 650 species of plants have been recently recorded within 50 km of PEL 650 (since 1995, and to within 1km reliability); (BDBSA 2021). Of these, 96 have been recorded during recent spring and summer surveys in PEL 650 (T&M Ecologists 2018a; 2018b, Jacobs 2019) (See **Att 30 Reference list for EPBC 2023\_09538 referral**).

Refer to **Att 9 Flora and Fauna Assessment PEL650 Jan 2018**, **Att 10 Flora and fauna assessment: Leigh Creek Energy site investigation 2018**, and **Att 11 Targeted EPBC Species and habitat assessment**, for the ecological surveys during the summer and spring seasons and refer to **Att 12 Winter Survey 2021 PEL 650** for the ecological survey during the winter season.

There are recent Biological Survey of South Australia (BDBSA) records for 18 State-listed plants within 50km of PEL 650 (records post 1995, < 1km spatial reliability) and historical records for four other state-listed species.

No EPBC listed flora have been detected within PEL 650. All flora species highlighted by the EPBC PMST (50 km buffer) are considered unlikely to occur (See **Att 12 Winter Survey 2021 PEL 650, Section 3.6.2, pp 69** and **Att 16 Addendum to Winter Ecology Survey, Section 7.3, pp 32**). All vegetation types observed on site were considered to be widespread and common (see **Att 10 Flora and fauna assessment: Leigh Creek Energy site investigation 2018, Section 4, pp 9**). The largest patches of remnant vegetation present in the PEL 650 are bounded to the north and south by extensive, deep mining pits. The small amount of vegetation that occurs within the Stage 1 impact footprint, although native vegetation, is highly disturbed and patchy, and not well connected to the known preferred habitat of the EPBC listed species (See **Att 16 Addendum to Winter Ecology Survey, Section 6.1.4, pp 17-18**). Moreover, the vegetation that is present in the project site has been assessed as 'not suitable' for EPBC listed flora and fauna species, primarily based on level of disturbance, size of patches of vegetation, and lack of connectivity to large expanses of preferred habitat outside of the areas previously disturbed for coal mining. Refer to **Att 16 Addendum to Winter Ecology Survey, Section 6.1. pp 13-18 & Section 7.4, pp 32-33**.

#### Soils

A significant proportion of PEL 650 has been heavily modified and little of the natural landform or vegetation remains intact.

In the immediate area of the PEL 650, the landform is generally a gently undulating plain comprised of reddish powdery calcareous soils and low rocky outcrops. At the base of the nearby ranges, alluvial fans and closely spaced dunes of crusty red duplex soil and loose aeolian sands extend over the plains.

PEL 650 is located on the boundary of the Stony Plains biogeographical region (or bioregion) and the Flinders Lofty Block bioregion. The western half of PEL 650 lies in the southern-most section of the Stony Plains bioregion, in the Murnpeowie subregion, which is characterized by stony downs and alluvial plains. The eastern half of PEL 650 (and the extreme south-western margin of the PEL) lies in the Flinders Lofty Block bioregion, in the Northern Flinders subregion which is characterized by ranges and hills with rock outcrops, stony pediments and small basin plains, narrow valleys with some gorges, and some remnants of stony downs.

The IBRA subregions can be further divided into land systems, which provide a smaller mapping unit. Three land systems have been mapped in PEL 650: Paradise (in the western half of PEL 650), Morris (in the eastern half of the PEL 650), and Umberatana (on the extreme south-western margin of the PEL 650). Refer to **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.4, pp 82-87** on Bioregions, Land Systems and Soils.

A description of land systems can be found in **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.4.1, Table 5.2, pp 84**.

## 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.

There are no Commonwealth heritage places overseas or other places recognized as having heritage values that apply to the project area.

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

The name “Adnyamathanha” is the Adnyamathanha language form of the name generally applied to the Aboriginal inhabitants of the Flinders Ranges and surrounding areas by their neighbours. The name may be etymologically analysed as “adnya” – “stone” or “rock”, “matha” – “mob” or “group”, plus “nha” – suffix (proper noun marker): literally, “stone people”. The name is generally rendered however, as “ranges people” or “hills mob” (EDO NSW 2019).

A search of the Central Archive, which contains the Register of Aboriginal Sites and Objects (DPC-AAR 2016) indicated that there are 22 registered or reported sites within 10 km of PEL 650. There are no registered sites located within the PPL 269. Site types on the Register identified in the region include objects, archaeological sites, engravings, quarries, and ceremonial and burial sites.

The *Aboriginal Heritage Act 1988* applies to the entirety of the Leigh Creek Coalfield (including PEL 650) and provides for the protection of all Aboriginal sites, objects and remains, including recorded, reported, or undiscovered heritage. The protection extends to Aboriginal sites, objects and remains which may exist in areas which have been disturbed in the past and / or subject to a cultural heritage survey or work area clearance.

NeuRizer (formerly Leigh Creek Energy) signed, in September 2016, a Work Area Clearance Agreement (WACA) with the Adnyamathanha Traditional Lands Association (ATLA), as the prescribed body corporate for the native title area. Over the last 70 years, mining and extraction activities have heavily disturbed portions of PPL 269. Issues have also arisen with honouring the WACA, resulting in NRZ issuing a Section 23 application in December 2020 for authorisation under the *Aboriginal Heritage Act 1988* to damage, disturb or interfere with any Aboriginal heritage within the PPL 269 works area.

The Premier granted the authorisation sought by NRZ in December 2021. The Section 23 authorisation includes a list of 10 conditions that are to be met.

A summary of the conditions and NRZ’s progress and commitments can be found in **in Att 14 NRZ Section 23 Commitments, pp 1-2.**

#### The Mura Traditions and the Leigh Creek Coal Field

The Adnyamathanha recognise the Mura as the fundamental source of all law. The Mura is articulated through ritual, through Wibma (“history songs”) and through the Mura “history” stories themselves; and in the second, through the operation and application of the moiety system which is itself derived from the Mura (EDO NSW 2019).

The formation and presence of the Leigh Creek coalfield according to the Mura has several levels of explanation. According to the tradition relating to the Leigh Creek Coalfield Yulu, the sacred kingfisher, was travelling to Wilpena Pound – Ikara in anticipation of a Malkarra (man-making ceremony) which was being assembled at that location. Yulu was bringing with him new initiation methods he intended to demonstrate at the gathering. He travelled from the north via Kakarlapunha (Termination Hill) and Myrtle Springs to the Leigh Creek location where he lit a fire made from dry mallee sticks to signal his approach to those gathered at Ikara (EDO NSW 2019). It is by these means Yulu created the coal, which Adnyamathanha people have always called Yulu’s Coal.

In addition to the natural features of the landscape, some significant naturally occurring, cultural artifacts which were previously excavated during coal mining operations at Leigh Creek, are housed within 4 km of PPL 269 in a specially constructed shed.

Those objects were spherical items about 2 metres in diameter that appeared to be constituted of Carbonaceous mudstone. Also recovered were what appeared to be fossilised tree trunks/limbs. The existence of such objects was apparently predicted by the Adlya Wirri at the time of mining commencing. The Adnyamathanha Adlya Wirri associated them with the “fire” which [Yurlu] had lit at this location to signal his intention to travel and join with Aboriginal men gathered at Ikara (Wilpena Pound) for a Vardnapa (Malkarra) ceremony. The spherical objects were “dampers” placed in the fire by [Yurlu] and the fossilized timber was wooden material, including fire sticks [Yurlu] had used to light and maintain the fire. Consequently, both forms of objects were considered culturally significant and their continued association with the coal field essential.

See **Att 30 Reference list for EPBC 2023\_09538 referral.**

## 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. \*

A small reproduction of information from the EIR (**Att 1 NRZ EIR Stage 1 Commercial Development**) and Hydrological Conceptual Site Model (CSM) (**Att 15 NRZ Hydrogeological CSM Stage 1 - Part 1 and Part 2**) is presented below. Refer to **Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.6, pp 97-139 and Section 5.8, pp 147-148, and Att 15 NRZ Hydrogeological CSM Stage 1 – Part 1, Section 5, pp 51-91 and Section 3.3, pp 16-22** for a comprehensive understanding of site information. Note that the Mine Closure Plan (**Att 26 FPP Mine Closure Plan**) was referenced in developing the EIR/CSM and provides numerous relevant reports as appendices.

#### Surface Water

PEL 650 lies in the catchment of Leigh Creek, which is on the southern edge of the Lake Eyre Basin and drains north-west towards Lake Eyre. The major surface water features in the region are Lake Torrens, located approximately 55 km to the west, and Lake Frome which is located approximately 110 km east of PEL 650, on the eastern side of the Gammon Ranges.

Leigh Creek is the main surface water system in PEL 650. It enters the PEL 650 on the southern boundary, north of Copley and exits the PEL 650 near Lobe C of the Leigh Creek Coalfield at the PEL's north-western boundary. **Att 1 NRZ EIR Stage 1 Commercial Development, Figure 5-40, pp 148** shows the regional surface water features.

Ridge lines located to the west and east of PEL 650 direct runoff via numerous small drainage lines towards the gently undulating plain where the PEL is located. Under natural (pre-mining) conditions, surface water would have moved generally northwards through PEL 650 from south to north-west, discharging to the Leigh Creek floodplain where it crosses the current Outback Highway.

Surface water within Lobe B is inferred to remain within the Telford Basin, given the likelihood of mine pits acting as groundwater depressions and the reduced surface water runoff contributions from the ranges due to interception by the earthen walls introduced to manage surface water during previous mining activities. Transport downstream of Lobe B is confined to surface water overflow around the north-eastern and north-western margins of the site (outside the earthen walls) and via limited flow in the shallow water table aquifer, primarily in the floodplain sediments from recharge north of the Main Series Pit. As discussed in **Att 15 NRZ Hydrogeological CSM Stage 1 – Part 1, Section 5.5.4, pp 66-67**, the Main Series and Upper Series pits act as groundwater sinks and would capture any shallow groundwater from south of the pits where the Telford Gravel sediments have been truncated in Lobe B.

Modifications to drainage patterns by mining operations have resulted in much of the flow of Leigh Creek and its tributaries being retained on the southern, eastern and western boundaries of Lobe B. There are artificial water storages across the site, including the Retention Dam, dams formed by the eastern and western earthen walls, the two quarries located east of the Retention Dam, the mine pits and numerous constructed surface depressions where water pools after rain events. Water in the Retention Dam, the quarries and the Upper and Lower Series pits is permanent, however during recent low rainfall periods the Retention Dam and quarries were almost dry with only small, shallow stagnating pools remaining and could be considered semi-permanent. Lobe C and Lobe D pits are both predicted to become dry and are not considered as permanent.

Aroona Dam and its catchment is outside PEL 650 and outside the Leigh Creek catchment. Aroona Dam and its feeding creeks, Emu and Windy Creeks, are part of the Lake Torrens catchment draining to the west.

#### Hydrogeology

The Leigh Creek Coal Measures were deposited in three depositional phases beginning in the Upper Triassic (250 to 200 million years ago) and concluding in the Early Jurassic (200 to 174 million years ago). These three depositional phases led to the formation of the Lower Series Coal, Main Series Coal and the Upper Series Coal.

**Aquifers:** The Telford Gravels contain groundwater. The Telford Gravel is a variably silicified sedimentary rock groundwater system. Groundwater movement is through the sediment matrix where it is not silicified, and appears to be perched on top of the aquitard below. In some locations the Telford Gravels are discontinuous and dry. The thickness of the Telford Gravels at the PCD facility ranges up to 12.5 m. The limited extent and thickness of Telford Gravels make it a minor contributor to groundwater balance.

The Upper Series Overburden contains a significant aquifer (Dames and More, 1984) comprised of a series of thin interbedded layers. The average combined thickness of Aquifers 1 to 4, identified within and immediately above the Upper Series Coal is 55 m (refer **Att 15 NRZ Hydrogeological CSM Stage 1 - Part 1, Section 5, pp 51-91**).

**Aquitards:** The remainder of the Basin sediments including the Upper Series Overburden, the Main Series Overburden and Coal, and the Lower Series Overburden, Coal and Underburden are tight to very tight aquitards (Dames and Moore 1984, AWE 2013).

The Basement can be a poor aquifer when fractured, but the data adjacent the Basin illustrates that the fresh intact Basement and the weathered Basement are aquitards (AWE, Sept 2013, and May 2015) (refer **Att 15 NRZ Hydrogeological CSM Stage 1 - Part 1, Section 5.1, pp 51 and Section 5.2, pp 51-52**). Additionally, mine closure investigations indicate limited impacts to the Basement from over 70 years of open pit mining practises.

## 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	No	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	No	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 Stage 1 Commercial Development Project is not within a World Heritage Site.

#### 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.

—  
**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 Stage 1 Commercial Development Project will not have an impact on National Heritage.

**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. \***

The Stage 1 Commercial Development Project will not have an impact on a Ramsar Wetland.

**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
No	Yes	Amytornis modestus
No	No	Aphelocephala leucopsis
No	No	Calidris ferruginea
No	No	Codonocarpus pyramidalis
No	No	Falco hypoleucos
No	No	Frankenia plicata
No	Yes	Neophema chrysostoma
No	No	Pedionomus torquatus
No	Yes	Petrogale xanthopus xanthopus
No	No	Pezoporus occidentalis
No	No	Pseudomys australis
No	No	Pterostylis xerophila
No	No	Rostratula australis

## 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 decline or losses in the ecological condition within the PEL 650 as a result of any NeuRizer activities is highly improbable. This is primarily because the area covered by PEL 650 and the PPL 269 have been mined for over 70 years and coupled with historic anthropogenic disturbance, the PPL 269 provides no suitable habitat for EPBC listed species, groundwater dependent ecosystems or water-dependent ecosystems.

Since preparation of the Winter Survey 2021 report, Jacobs have been assessing information regarding proposed construction and operation activities of the proposed Stage 1 Commercial Development project as well as any potential direct and indirect impacts to EPBC listed species that may occur as a result (See **Att 16 Addendum to Winter Ecology Survey, Section 6, pp 13-30**). This assessment included analyses of potential direct or indirect impacts that could arise from vegetation clearance, degradation of habitat, surface water, traffic and transport, soil and land, air quality, noise and vibration, groundwater and poisoning and bioaccumulation.

It was concluded that the proposed activities are unlikely to have a significant impact on any individuals or important populations of EPBC threatened species. Similarly, no significant direct or indirect impacts that could lead to a degradation of 'preferred' or 'potential/suboptimal' habitat for any of the relevant listed EPBC species are expected to occur.

Based on **Att 16 Addendum to Winter Ecology Survey, Section 6, pp 13-30** and **Section 7.6, pp 44-48**, only negligible indirect impacts could occur and will likely be short term, localised and contained within the Stage 1 footprint, which contains no EPBC listed flora and no 'suitable' habitat for any of the EPBC listed migratory or threatened fauna species. Please also refer to **Att 24 Re Addendum to Winter Survey, pp 1-2**, for statement from the retained ecologist (Zeta Bull of Jacobs, author of **Att 11 Targeted EPBC Species and habitat assessment, Att 12 Winter Survey 2021 PEL 650**, and **Att 16 Addendum to Winter Ecology Survey**) confirming the following statement *"only negligible short term indirect impacts are expected, and no direct impacts have been identified for any of the protected species. Based on the assessment of direct and indirect impacts, no significant impacts (direct or indirect) are expected upon EPBC listed species, and activities will have no significant direct or indirect impacts that could lead to a degradation of 'preferred' or 'potential/suboptimal' habitat for any of the listed EPBC species"*.

Potential indirect impacts on threatened species could arise from groundwater or surface water contamination, traffic, air pollution, and/or poisoning and bioaccumulation. However, as stated in **Att 16 Addendum to Winter Ecology Survey, Section 9, pp 51**; *"potential indirect impacts of the Stage 1 Project, such as air and noise emissions, collision with vehicles or disturbance from traffic and /or contamination of soil or land, are expected to be avoided, temporary and /or limited in spatial extent to heavily disturbed environments. Therefore, it is unlikely that any significant direct or indirect impacts to threatened species will occur as a result of the Stage 1 Project"*. For example, noise

levels from site activities are unlikely to be readily noticeable over background noise given the separation distance from preferred habitat for EPBC species and the lowered position of the Stage 1 noise source, and potential negligible noise impacts are likely to be temporary only. See **Att 17 Summary EPBC listed threatened species, Section 1, pp 1-2** for more details.

The following paragraphs contain details about the Curlew Sandpiper, Thick-billed Grasswren, Blue-winged Parrot, and Yellow-footed Rock-wallaby, as well as a summary of direct and indirect impacts upon the aforementioned species:

**Curlew Sandpiper (*Calidris ferruginea*):** This migratory wader, is a shorebird listed as critically endangered under the PMST, preferring coastal or intertidal mudflats and less frequently inland freshwater wetlands, ponds in saltworks and mudflats. This species does not breed in Australia (Jacobs, 2022). This species was not observed during recent surveys of PEL 650 (T&M Ecologists 2018a,b; Jacobs 2020, 2022). This species was identified as highly unlikely within the Stage 1 area given the occasional visitation of the species when in Australia, the fact that no core, preferred or breeding habitats are found within the PEL 650, and considering that the proposed activities would not impact the retention dam. Significant direct or indirect impacts to this species are considered unlikely. Please refer to **Att 16 Addendum to Winter Ecology Survey, Section 7.6.2, pp 46-47** for a summary of conclusions on potential direct and indirect impacts upon the species from Stage 1 activities.

**Thick-billed Grasswren (*Amytornis modestus*):** Listed as vulnerable under the PMST and is known to occur within the PEL 650. A 2019 ecological survey indicated that the PEL 650 impact area equates to 0.15% of the Area of Occupancy (AOO) for the Thick-billed Grasswren (Jacobs, 2019). The subspecies is particularly associated with major drainage lines and broad alluvial plains in undisturbed areas. There is no suitable habitat for the Thick-billed Grasswren within the PPL 269, as any native vegetation is highly disturbed, patchy and not well connected to the known preferred habitat of the species, which occurs outside the historical coal mine areas (as such the species is considered unlikely to occur in the Stage 1 project area) (Jacobs, 2022).

Surface waters providing suitable and preferred habitat for this species are located outside the Stage 1 area and are therefore not expected to be directly or indirectly negatively impacted by the proposed activities. Any impacts to soils and land, surface water, groundwater, flora and air quality are likely to be low and contained with the Stage 1 area (See **Att 16 Addendum to Winter Ecology Survey, Section 9, pp 51**). It is unlikely that preferred habitat for the Thick-billed Grasswren located within PEL 650 (or further afield) will be significantly degraded as a result of Stage 1 operations therefore, no significant direct or indirect impacts are expected. Please refer to **Att 16 Addendum to Winter Ecology Survey, Section 7.6.1, pp 45-46** for a summary of conclusions on potential direct and indirect impacts upon the species

**Blue-winged Parrot (*Neophema chrysostoma*):** This slender parrot is listed as a vulnerable species on the EPBC PMST. This species is considered a partial migrant, with preferred breeding areas including mainland Australia south of the Great Dividing Range in southern Victoria from Port Albert in Gippsland west to Nelson, and, on some occasions, far areas of the south-east of South Australia, and the north-western, central and eastern parts of Tasmania. The habitat within PEL 650 is not generally considered to be prime habitat for the species (T&M Ecologists 2018a), and the very small areas of potential habitat in the PEL 650 mean this species is considered unlikely to be present (T&M Ecologists 2018b). The species is considered unlikely to occur in the Stage 1 project site. Significant direct or indirect impacts on the species as a result of Stage 1 Project activities are unlikely. See **Att 13 Desktop review MNES - April 2023, Section 4.1.5.3, pp 20-22** for more information about the Blue-winged Parrot. Please also find **Att 16 Addendum to Winter Ecology Survey, Section 6, pp 13-30** for a review of potential impacts associated with Stage 1 project.

**Yellow-footed Rock-wallaby (*Petrogale xanthopus xanthopus*):** Listed as vulnerable under the PMST, the species is considered unlikely to occur within the PEL 650. The species prefers low hills with isolated steep rocky outcrops and scree slopes, which can be surrounded by mulga dominant vegetation for foraging, and a permanent water supply within 5 km. The nearest suitable habitat for the species is the man-made Aroona Dam located approximately 6 km southwest of the southern boundary of the PEL 650. The species has been documented from within 50 km of the PEL 650 and the next closest records were 26-29 km from the PEL 650. The species was not detected during recent surveys of PEL 650. In addition, no suitable habitat occurs within the Stage 1 project area (Jacobs, 2022).

The suboptimal habitat of this species in PEL 650 (See **Att 16 Addendum to Winter Ecology Survey, Figure 6-3, pp. 16**) is unlikely to become significantly degraded due to indirect impacts as a result of the Stage 1 activities. As previously mentioned, any impact to surface water, groundwater or air quality is expected to be minimal and localised in the Stage 1 Project area. See **Att 16 Addendum to Winter Ecology Survey, Section 7.6.3, pp 47-48** for a summary of conclusions on potential direct and indirect impacts upon the Yellow-footed Rock-wallaby.

Additional information on listed EPBC Threatened species is included in **Att 17 Summary EPBC listed threatened species, Section 2, pp 2-6**. Also refer to **Att 13 Desktop review MNES - April 2023** for a desktop review on newly listed EPBC threatened species (in effect under EPBC Act since 31 March 2023) relevant to Stage 1 project.

No EPBC listed Threatened Ecological Communities were detected across PEL 650, and none are considered likely to occur. No EPBC listed flora species were detected across the proposed project area, and the PMST outputs considered any unlikely to occur (Jacobs 2019; Jacobs, 2022).

The proposed action in the Stage 1 project area is considered unlikely to trigger the significant impact criteria provided in the Commonwealth Matters of National Environmental Significance Significant Impact Guidelines (DotE 2013). A further assessment about likelihood of occurrence and likelihood of significant impacts is summarised in **Att 16 Addendum to Winter Ecology Survey, Section 7.5, Table 7.2, pp 34-43**.

See also **Att 30 Reference list for EPBC 2023\_09538 referral**.

#### 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. \***

As indicated earlier, the area covered by PEL 650 and the PPL 269 has been mined for over 70 years and coupled with historic anthropogenic disturbance, PPL 269 provides no suitable habitat for the relevant EPBC species. In particular, it is considered that there is not a real chance or possibility that the proposed action would cause significant impacts to the listed EPBC species, including the Thick-billed Grasswren, Curlew Sandpiper, Blue-winged Parrot and Yellow-footed Rock-wallaby. In short summary, the key reasons include:

**Potential direct impacts:** Clearance of any areas of suitable or preferred habitat for EPBC conservation significant species at the PEL 650 and proposed project site will be avoided. Refer to **Att 16 Addendum to Winter Ecology Survey, Section 6.1.1, pp 13-16** for preferred, sub-optimal and low potential habitats for relevant listed EPBC species, including Thick-billed Grasswren, Curlew Sandpiper and Yellow-footed Rock-wallaby that would be avoided. Please also refer to **Att 13 Desktop review MNES - April 2023, Section 4.1.5, pp 15-24** for a review on newly listed EPBC threatened species in effect under EPBC Act since 31 March 2023, including the Diamond Firetail, Blue-winged Parrot, Hooded Robin (south-eastern), and Southern Whiteface. Moreover, any potential impact as a result of construction or operational activities is expected to be contained within the project area.

The Thick-billed Grasswren, Curlew Sandpiper, Blue-winged Parrot and Yellow-footed Rock-wallaby are unlikely to use habitat within the project areas given that:

- The habitat within PPL 269 is considered 'not suitable' for the Thick-billed Grasswren, Curlew Sandpiper, Blue-winged Parrot and Yellow-footed Rock-wallaby.
- Any 'preferred' or 'suitable' habitat for the Thick-billed Grasswren is no less than 4km from the proposed disturbance footprint area for the Stage 1 Commercial Development. If the maximum area of native vegetation (65 ha) was cleared as part of the project, it would represent 0.23% of non-suitable, non-connected habitat within the species Area of Occupancy, which is considered a negligible amount.
- Habitats within PEL 650 are not core, preferred or breeding habitats for the Curlew Sandpiper, which has not been observed during recent surveys of PEL 650.
- The main population of the Yellow-footed Rock-wallaby occurs along the Flinders Ranges, which is approximately 30 km east of PEL 650. No important populations are currently known within PEL 650. The species is therefore considered unlikely to occur in PEL 650.
- The vegetation present on the project site is unsuitable for the Blue-winged Parrot given the current level of disturbance, size of patches of vegetation, and lack of connectivity to large expanses of preferred habitat outside of the areas previously disturbed within Stage 1 project area for coal mining activities.

**Potential indirect impacts arising from the degradation of habitat:** It is not expected that potential indirect impacts as a result of habitat degradation will significantly impact threatened fauna species including the Thick-billed Grasswren, Curlew Sandpiper, Blue-winged Parrot and Yellow-footed Rock-wallaby.

As mentioned in Section 4.1.4.3 on this referral, potential indirect impacts of the Stage 1 Commercial Development, including noise, dust, collision with vehicles or disturbance from traffic, contamination of soil, land, or water and/or poisoning or bioaccumulation, are expected to be unlikely, avoided and/or negligible, temporary and limited in spatial extent to heavily disturbed environments.

It is considered unlikely that the Stage 1 Commercial Development will have a significant impact on EPBC listed species, including the Thick-billed Grasswren, Curlew Sandpiper, Blue-winged Parrot and Yellow-footed Rock-wallaby, as a result of potential indirect impacts through ground and surface water contamination, air pollution or poisoning and bioaccumulation. Key outcomes of the indirect impact assessment reported in the most recent addendum to winter survey are summarised in **Att 16 Addendum to Winter Ecology Survey, Section 7.6, pp 44-48**.

Any impacts to surface water will be localised within the project area due to the limited presence of water courses, proposed construction activities and local topography. Surface water providing 'preferred' or 'suitable' habitat for the Thick-billed Grasswren, are located outside the PPL 269, and are therefore not expected to be directly or indirectly negatively impacted by Stage 1 Commercial Development activities. No significant air quality impact is expected beyond the project area boundary, and any reduction in air quality will be localised and temporary only (See **Att 25 Air Quality Impact Assessment PPL 269 2021** for the Air Quality Impact Assessment undertaken for Stage 1 project). Noise impacts are also considered unlikely due to the location of the Stage 1 Project and the distance to preferred habitat for EPBC listed species, including the Thick-billed Grasswren that currently persists adjacent to the Outback Highway. There are no 'known' Groundwater Dependent Ecosystems (GDEs) within the Stage 1 Commercial Development footprint area and the broader PEL 650, and no potential GDEs have been identified within the project area. Pollution of groundwater by proposed activities is considered unlikely, and in the event that groundwater became polluted, this would not directly or indirectly impact protected fauna at the surface.

Potential impacts to poisoning and bioaccumulation for surface water, flora and fauna, air quality and soils and land were assessed as low. Potential Impacts to groundwater are assessed as low to moderate for deep groundwater, and the geological formations are considered isolated from the surface environment. In the event that chemicals of potential concern migrated to the surface, studies indicate that these would be contained and not spread laterally due to the "bath tub" effect arising from former mining operations.

In this regard, NRZ refers to and relies on the **Att 12 Winter Survey 2021 PEL 650, Att 13 Desktop review MNES - April 2023, Att 15 NRZ Hydrogeological CSM Stage 1 - Part 1 and Part 2** and **Att 16 Addendum to Winter Ecology Survey**.

**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. \***

The area covered by PEL 650 and the PPL 269 have been mined for over 70 years, coupled with historic anthropogenic disturbance, and the PPL 269 provides no suitable habitat for relevant EPBC species. Therefore, as assessed in the abovementioned studies, the proposed project (Stage 1 – Commercial Development) is not likely to have a significant direct or indirect impact on any listed EPBC ecological community, threatened species or other Matters of National Environmental Significance identified, and therefore is not a controlled action. In particular, it is noted that the proposed project impact area provides no suitable habitat for EPBC listed species and that NRZ proposes to implement various significant measures to avoid and/or minimise any potential impact from the Stage 1 Commercial Development as much as possible/practical.

As such, NRZ is satisfied that sections 18 and 18A (listed threatened species and communities) of the EPBC Act, are not "controlling provisions" for the Stage 1 Project. NRZ considers that the relevant analysis and findings in the most recent ecological reports (Refer to **Att 12 Winter Survey 2021 PEL 650** and **Att 16 Addendum to Winter Ecology Survey**) and desktop review (**Att 13 Desktop review MNES - April 2023**) demonstrate that there is no real chance or possibility that the Stage 1 project will cause any significant impact to any listed EPBC species, including Thick-billed Grasswren, Curlew Sandpiper, Blue-winged Parrot and Yellow-footed Rock-wallaby. NRZ is confident that the Stage 1 project will not have a significant direct or indirect impact on any protected matter of national environmental significance.

Please refer to previous items of this referral for more information.

**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. \***

**Att 1 NRZ EIR Stage 1 Commercial Development, Section 6, pp 165-207** provides detailed information about potential and perceived environmental impacts and mitigation measures related to the proposed Project. Mitigation of potential impacts to flora and fauna (see **Att 1 NRZ EIR Stage 1 Commercial Development, Section 6.5, pp 176-178**) are summarized below:

Earthworks from access tracks and Project site construction activities have the potential for localised impacts to native vegetation and wildlife habitats and to disturb or injure fauna. The general site has been highly disturbed, and no vegetation of conservation significance is present. Any disturbed sites will ultimately be rehabilitated in accordance with standard regulatory criteria.

For earthworks, dust control measures (e.g. water spraying) will be implemented where required. Vehicle access will be predominantly via sealed public roads and the main mine access road. Vehicle speeds will be restricted at the site across all PPL 269. Standard measures will be implemented to minimise the risk of introduction or spread of weeds (e.g. vehicles and equipment will be cleaned and washed down when necessary, before commencing work at site or after operating in an area of known weed infestation).

There is no habitat for the EPBC listed species, including the Thick-billed Grasswren, Curlew Sandpiper, Blue-winged Parrot or Yellow-footed Rock-Wallaby within the project footprint of the PPL 269 that will be impacted by earthwork related activities.

Spills or leaks of fuel or chemicals have the potential to damage native vegetation. Vegetation and habitats present in the vicinity of the Project site have been highly disturbed and no vegetation of conservation significance is present, which limits the potential for impact.

Access to fuel, chemicals and produced fluids will be prevented by storing and handling them appropriately in designated areas and implementing immediate containment and clean-up if any spills occur. Emus and kangaroos are occasionally present on site and stock-proof fencing will be erected around storage areas. Any spills will be immediately cleaned up and any contaminated material will be removed off-site for appropriate treatment or disposal.

Hazardous materials will be transported and disposed in accordance with appropriate standards and legislative requirements, including the Australian Dangerous Goods Code. Appropriate spill response equipment and SDS will be available on site for all fuels and chemicals used.

Activities outside designated / approved areas will be confined to designated areas, with signage and fencing installed (where required) to delineate approved areas and any restricted areas. There are no suitable habitats for the listed EPBC threatened species (including the Thick-billed Grasswren, Curlew Sandpiper, Blue-winged Parrot and Yellow-footed Rock-Wallaby) within the designated areas for Stage 1 project site. Therefore, there will be no impact.

Presence of personnel, lighting and general site activity and road use: Use of roads and tracks could also result in injury or death of small numbers of fauna. Impacts will be relatively localised and are not expected to have any significant impact on fauna populations, particularly given the disturbed nature of vegetation and habitats present within the Telford Basin.

Construction and operational activities outside of the Telford Basin will have minimal impacts on flora and fauna, due to the scale of the operation and controlled speed limits. Work area clearances, journey management plans and permitting will also help to reduce the impact of activities to flora and fauna.

Waste management will be undertaken with regard to the key elements of the Environment Protection (Waste to Resources) Policy 2010 for waste produced and disposed of within the licence area and in compliance with the Environment Protection (Movement of Controlled Waste) Policy 2014 if transported and disposed of outside of the licence area. All sewage will be treated on site and disposed in accordance with the South Australian Public Health (Wastewater) Regulations 2013 or to the satisfaction of the Department of Health.

Waste generation will be minimised when practical and all waste will be stored securely and transported to the licenced disposal or recycling facilities using licenced waste contractors. Covered bins will be used to prevent native fauna and pest animals accessing or spreading waste.

There is no habitat for EPBC listed species, including the Thick-billed Grasswren, Curlew Sandpiper, Blue-winged Parrot and Yellow-footed Rock-Wallaby, within the project footprint of the PPL 269 that will be impacted by waste management related activities.

Additional mitigation measures have been proposed to prevent, reduce and mitigate any potential direct or indirect impact upon EPBC listed species as a result of Stage 1 Commercial Development . Further detail of existing environment, potential impacts, risk assessment and mitigation measures are provided in **Att 1 NRZ EIR Stage 1 Commercial Development, Section 6 , pp 165-207** and **Att 16 Addendum to Winter Ecology Survey, Section 6, pp 13-30**. A summary of key mitigation measures is described in **Att 18 Additional mitigation measures, pp 1-3**.

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

The project will not require offsets to manage impacts and, as such, no offsets are proposed.

#### 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
No	No	Actitis hypoleucos
No	No	Apus pacificus
No	No	Calidris acuminata
No	No	Calidris ferruginea
No	No	Calidris melanotos
No	No	Charadrius veredus
No	No	Gallinago hardwickii
No	No	Motacilla cinerea
No	No	Motacilla flava
No	No	Tringa nebularia

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

No

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

The area covered by PEL 650 and the PPL 269 has been mined for over 70 years and PPL 269 provides no suitable habitat for any EPBC listed species, and therefore the proposed Stage 1 Commercial Development activities will not have any significant adverse direct or indirect impact on the relevant listed migratory species.

The identified migratory species are unlikely to occur within Stage 1 Commercial Development site area.

Curlew Sandpiper (*Calidris ferruginea*), as previously mentioned, is listed as critically endangered. The species has potential to occur in aquatic / retention dam habitats. However, it has been identified as unlikely to occur in the Stage 1 Commercial Development project area. Direct and indirect impacts are also considered unlikely to occur as a result of the proposed project. (See previous sections of this referral on Threatened Species and Ecological Communities and **Att 16 Addendum to Winter Ecology Survey, Section 7.6.2, pp 46-47**).

The Common Sandpiper (*Actitis hypoleucos*), Sharp-tailed Sandpiper (*Calidris acuminata*), Oriental Plover (*Charadrius veredus*) and Common Greenshank (*Tringa nubularia*), are considered unlikely to be significantly impacted given the occasional visitation of the species when in Australia, and the facts that core, preferred or breeding habitats are not present within the PEL 650 and impacts to the retention dam will not occur.

Fork-tailed Swift (*Apus pacificus*) uses aerial habitats. Preferred aerial habitats are not expected to be impacted as part of the proposed project.

Pectoral Sandpiper (*Calidris melanotos*) is a migratory shorebird which occurs in freshwater or brackish wetlands, grassy or lightly vegetated coastal and inland swamps. The species has not been recorded within the PEL 650 or project site area during the previous surveys. The species is considered unlikely to occur in the project location or to be significantly impacted by the project activities.

Latham's Snipe (*Gallinago hardwickii*) is listed as a migratory species and prefers tussock grass and low dense sedges surrounding freshwater wetland, permanent and ephemeral wetlands. Given lack of records in the study area during previous ecological surveys and lack of suitable dense wetland vegetation at the site and retention dam, the species is considered unlikely to be found.

Grey Wagtail (*Motacilla cinerea*) is an uncommon migratory wagtail. There are few records available to indicate the species' distribution in Australia and given the species has not been recorded within the project area, it has been categorised as unlikely to be found.

Yellow Wagtail (*Motacilla flava*) is also an uncommon migratory wagtail. This species occurs in a variety of damp or wet habitats including marshes and bogs. The species has no records within the study area, including during surveys of the project area. The species is considered unlikely to occur within the proposed site location.

Based on the above, it can be reasonably concluded that the proposed activities to be carried out as part of the Stage 1 Commercial Development, will have no direct or indirect impacts that could lead to a degradation of habitat for any of the listed EPBC migratory species, including the Curlew Sandpiper. This is also supported by the fact that the habitat in the proposed project area is considered 'not suitable' for EPBC listed migratory species. Please refer to previous sections of this referral on Threatened Species and Ecological Communities for more information about the assessment of potential direct or indirect impacts on fauna and flora as a result of Stage 1 Commercial Development. Please refer to **Att 16 Addendum to Winter Ecology Survey, Section 6, pp 13-30** for more details about direct and indirect impacts on EPBC listed species. Please also refer to **Att 13 Desktop review MNES - April 2023** for a desktop review on newly listed EPBC threatened species in effect under EPBC Act since 31 March 2023 relevant to Stage 1 project.

Significant impacts on migratory species are considered unlikely since these species are known to occur only occasionally or have the potential to occur in aquatic habitats (e.g. the Retention Dam), which are neither core habitats or breeding areas for those species and are not part of the proposed Stage 1 impact area. Please refer to **Att 16 Addendum to Winter Ecology Survey, Section 7.5, pp 34-43** for an updated significant impact assessment on EPBC listed species, including migratory species.

Moreover, NRZ proposes to implement management and mitigation measures to avoid or reduce any direct and indirect impact as much as possible. For more information about mitigation measures and assessment of potential impact on EPBC listed species refer to previous section about Threatened species and Ecological Communities; **Att 1 NRZ EIR Stage 1 Commercial Development, Section 6, pp 165-207**; **Att 16 Addendum to Winter Ecology Survey, Sections 6, 7 & 8, pp 13-50**; **Att 17 Summary EPBC listed threatened species, Section 1, pp 1-2** and **Att 18 Additional mitigation measures, pp 1-3**.

**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. \***

The Stage 1 Commercial Development Project will have no direct or indirect impact in relation to Nuclear.



#### 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.

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##### 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. \*

The Stage 1 Commercial Development Project will have no direct or indirect impact in relation to 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. \*

The Stage 1 Commercial Development Project will have no direct or indirect impact on 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? \*

No

### 4.1.9.3 Briefly describe why your action is unlikely to have a direct and/or indirect impact. \*

The proposed action will not have a direct or indirect impact on this protected matter because the proposed action clearly does not involve "coal seam gas development" or "large coal mining development" (as those expressions are defined in the EPBC Act). This is explained in the Ashurst letter of advice which is **Att 19 NRUP - Referral of Stage 1 project letter**.

Notwithstanding that the proposed action will not have a direct or indirect impact on this protected matter, it is relevant to explain why the assessed groundwater and surface water impacts of the proposed action will be acceptable and appropriately managed. The information below is a summary of information presented in the EIR (**Att 1 NRZ EIR Stage 1 Commercial Development, Section 5.6, pp 97-139, Section 5.8, pp 147-148, Section 6.2, pp 165-173 and Section 6.3, pp 173-175**) and the Hydrogeological CSM (**Att 15 NRZ Hydrogeological CSM Stage 1– Part 1, Section 3.3, pp 16-22 and Section 5, pp 51-86**).

#### Water Resource - Surface water

The surface water flow paths have been extensively modified outside the Telford Basin to manage ingress of water to the Telford Basin and mine workings. These modifications prevent almost all overland surface flow from entering the Basin through construction of a Retention Dam across Leigh Creek immediately south of the edge of the Basin, and earth bunds and waste rock dumps around the remainder of the basin to direct overland flow to the north and into Leigh Creek north of the Basin boundary.

Historical mine activities and activities associated with mine closure have modified the surface water environment significantly where there are no permanent rivers or creeks within the site footprint, with surface water movement comprising mainly sheet flow, supported by a network of small draining lines during periods of high rainfall. Surface water within PPL 269 will be limited to rainfall with any runoff within the bunded perimeter of the Basin reporting to the pit voids or evaporated as designed in the Mine Closure Plan developed by Flinders Power Partnership (**Att 26 FPP Mine Closure Plan, Section 13.7, pp 347-372**).

Surface water is inferred to remain within the Telford Basin given the likelihood of mine pits acting as groundwater depressions and no surface water runoff contributions from the ranges due to interception by the earthen walls. Moreover, as described in **Att 16 Addendum to Winter Ecology Survey, Section 6.2, pp 18-19**, the surface waters providing suitable and preferred habitat to conservation significant species, including Leigh Creek and Sunday (Tobacco Bush) Creek, are located outside PPL 269, and are not expected to be directly or indirectly negatively impacted by Stage 1 Project activities.

#### Water Resource - Groundwater

The Stage 1 Commercial Project is located within the isolated Telford Basin which contains hundreds of metres of aquitard formations. On a regional scale there is no evidence that the groundwater flow is impacted by the Telford Basin. The Telford Basin groundwater regime has been significantly impacted by mining activities, which first commenced in the area in 1943, and has resulted in the Basin acting as a permanent evaporative sink due to the presence of the open pit excavations and Upper Series dewatering.

The formations surrounding the gasifiers report very low hydraulic conductivity and act as aquitards (**Att 15 NRZ Hydrogeological CSM Stage 1, Part 1, Section 5, pp 51-53**), there are no groundwater aquifers above or near the gasifiers, no significant regional groundwater flow through the formation, a legacy of the mine pits resulting in the Telford Basin acting as a groundwater sink, the gasifiers will be operated at a pressure less than the hydrostatic pressure, creating a localised low groundwater pressure zone within the gasifier, ensuring a groundwater pressure gradient towards the gasifier. These site characteristics and measures present a few of many favourable site attributes to mitigate mobilisation of contaminants and reduce risks associated with ISG operation. Please refer to **Att 20 Summary of additional information Water resources, pp 1-7** for more information about surface water and groundwater.

In addition, negligible groundwater extraction is planned for Stage 1 commercial operations and the proposal is not likely to alter surface water flows or adversely impact on existing water users as all water is to be supplied by SA Water.

Impacts to Basement and/or surficial groundwater levels outside of the Basin are considered unlikely. Steep gradients have been developed by the existing mine pits, however little to no impacts to water levels outside of the Basin margin have been reported. **Att 20 Summary of additional information Water resources, pp 2-7** provides a summary of additional information regarding groundwater resource based on the information collected from the reports provided in **Att 15 NRZ Hydrogeological CSM Stage 1 - Part 1 and Part 2** and **Att 26 FPP Mine Closure Plan**, covering historical mining operations and the pre-commercial demonstration (PCD) project.

## 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. \***

The Stage 1 Commercial Development Project is unlikely to have any direct or indirect impact on Commonwealth Land.

**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.

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**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. \***

The Stage 1 Commercial Development Project is unlikely to have any direct or indirect impact on Commonwealth heritage places 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. \*

Camp and White (2015) (**Att 21 Camp and White Underground coal gasification**) provides a summary of attributes of an ideal site for in situ gasification. These ideal site attributes include adequate depth below aquifers, thick and impermeable overlying strata, absence of vertical connectivity, low dip angle (5 to 25 degrees), mechanically competent overlying rock and few faults. The Stage 1 Commercial Development site meets these ideal site attributes. In particular, the depth of the coal, geology and hydrogeology of the site ensure that the gasification process can be safely contained, and the location avoids sensitive features such as aquifers with beneficial uses and values, residents or towns in close proximity, sensitive land uses or sites of high environmental value.

NeuRizer's investment of some A\$20-25 million over the next 18-24 months for the NRUP Stage 1 Commercial Development is expected to generate benefits at the state, regional, and national levels including:

- Increases to the local economies of Leigh Creek Township and Copley Township.
- Direct and indirect employment opportunities. Specifically, this will include the creation of around 75 jobs during the construction phase and approximately 17 jobs during the operational phase, with approximately 68 indirect jobs (in trucking, flights, accommodation, catering, plant, and equipment servicing, etc.) being created.
- Opportunities to increase local skills capacity via apprenticeships, scholarships and vocational training and training programs.

If the Project does not proceed, all these benefits will be lost to the disadvantage of South Australia and the project proponent.

See **Att 30 Reference list for EPBC 2023\_09538 referral**.

## 5. Lodgement

### 5.1 Attachments

1.2.1 Overview of the proposed action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	High
#2.	Document	Att 2 Figures.pdf Figures and illustration of the proposed Stage 1 Commercial Facility		No	High
#3.	Document	Att 3 Additional information of proposed action.pdf Summary of additional information regarding Stage 1 proposal, including ISG process, minor ancillary activities, among others.		No	High
#4.	Document	Att 30 Reference list for EPBC 2023_09538 referral.pdf References for EPBC 2023_09538 Referral		No	High

## 1.2.5 Information about the staged development

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	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
#1.	Document	Att 22 DEM BROCH027.pdf Underground Gasification in South Australia	08/10/2018	No	High
#2.	Document	Att 23 NRZ Q&A Stage 1 Commercial Development.pdf Questions and answers about potential concerns related to NRZ Stage 1 Commercial Development		No	High
#3.	Document	Att 3 Additional information of proposed action.pdf Summary of additional information regarding Stage 1 proposal, including ISG process, minor ancillary activities, among others.		No	High
#4.	Document	Att 4 Criteria Classifying level of environmental impact of regulated activities.pdf Department of Energy and Mining - Criteria Classifying level of environmental impact of regulated activities	25/03/2019	No	High

## 1.2.7 Public consultation regarding the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	High
#2.	Document	Att 5 Invite notice to community meetings and flyers.pdf Invite notice to community meetings and flyers for project update		No	High
#3.	Document	Att 6 Cultural Heritage Management Plan NRZ.pdf Current Cultural Heritage Management Plan NRZ	31/03/2022	No	High

## 1.3.2.17 (Person proposing to take the action) Proposer's history of responsible environmental management

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 29 NRZ Environmental Policy, ESG Policy and Climate Change Policy.pdf NeuRizer Environmental Policy, ESG Policy and Climate Change Policy	31/03/2022	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				

	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023 No	High
#2.	Document Att 29 NRZ Environmental Policy, ESG Policy and Climate Change Policy.pdf NeuRizer Environmental Policy, ESG Policy and Climate Change Policy	31/03/2022 No	High

## 2.2.5 Tenure of the action area relevant to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 2 Figures.pdf Figures and illustration of the proposed Stage 1 Commercial Facility		No	High
#2.	Document	Att 7 Disturbance footprint.pdf Disturbance footprint map		No	High
#3.	Document	Att 8 Project Location - PPL 269.pdf Project location (PPL 269) map		No	High

## 3.1.1 Current condition of the project area's environment

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	High
#2.	Document	Att 16 Addendum to Winter Ecology Survey.pdf Assessment of potential direct and indirect impacts on EPBC listed species for Stage 1 Commercial Development	29/08/2022	No	High
#3.	Document	Att 2 Figures.pdf Figures and illustration of the proposed Stage 1 Commercial Facility		No	High
#4.	Document	Att 26 FPP Mine Closure Plan.pdf FPP Mine Closure Plan	21/05/2018	No	High
#5.	Document	Att 27 NRZ Geotechnical Modelling May 2022.pdf Geotechnical modelling: Telford Basing ISG Project	02/05/2022	No	High
#6.	Document	Att 28 Geomechanical Model 2018.pdf Geomechanical Model 2018	19/01/2018	No	High
#7.	Document	Att 3 Additional information of proposed action.pdf Summary of additional information regarding Stage 1 proposal, including ISG process, minor ancillary activities, among others.		No	High

## 3.1.2 Existing or proposed uses for the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 26 FPP Mine Closure Plan.pdf FPP Mine Closure Plan	21/05/2018	No	High

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

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	High

## 3.1.4 Gradient relevant to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 2 Figures.pdf Figures and illustration of the proposed Stage 1 Commercial Facility		No	High

## 3.2.1 Flora and fauna within the affected area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 10 Flora and fauna assessment Leigh Creek Energy site investigation 2018.pdf Flora and fauna assessment: Leigh Creek Energy site investigation Dec 2018	12/12/2018	No	High
#2.	Document	Att 11 Targeted EPBC Species and habitat assessment.pdf Targeted EPBC Species and habitat assessment for PEL 650	04/12/2019	No	High
#3.	Document	Att 12 Winter Survey 2021 PEL 650.pdf Winter Ecological Survey 2021 PEL 650	01/11/2021	No	High
#4.	Document	Att 13 Desktop review MNES - April 2023.pdf Desktop review of Matters of National Environmental Significance - April2023	26/04/2023	No	High
#5.	Document	Att 16 Addendum to Winter Ecology Survey.pdf Assessment of potential direct and indirect impacts on EPBC listed species for Stage 1 Commercial Development	29/08/2022	No	High
#6.	Document	Att 30 Reference list for EPBC 2023_09538 referral.pdf References for EPBC 2023_09538 Referral		No	High
#7.	Document	Att 9 Flora and Fauna Assessment PEL650 Jan 2018.pdf Flora and Fauna Assessment Leigh Creek PEL650 Jan 2018	23/02/2018	No	High

## 3.2.2 Vegetation within the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	High
#2.	Document	Att 10 Flora and fauna assessment Leigh Creek Energy site investigation 2018.pdf Flora and fauna assessment: Leigh Creek Energy site investigation Dec 2018	12/12/2018	No	High
#3.	Document	Att 11 Targeted EPBC Species and habitat assessment.pdf Targeted EPBC Species and habitat assessment for PEL 650	04/12/2019	No	High
#4.	Document	Att 12 Winter Survey 2021 PEL 650.pdf Winter Ecological Survey 2021 PEL 650	01/11/2021	No	High
#5.	Document	Att 16 Addendum to Winter Ecology Survey.pdf Assessment of potential direct and indirect impacts on EPBC listed species for Stage 1 Commercial Development	29/08/2022	No	High
#6.	Document	Att 30 Reference list for EPBC 2023_09538 referral.pdf References for EPBC 2023_09538 Referral		No	High
#7.	Document	Att 9 Flora and Fauna Assessment PEL650 Jan 2018.pdf Flora and Fauna Assessment Leigh Creek PEL650 Jan 2018	23/02/2018	No	High

## 3.3.2 Indigenous heritage values that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 14 NRZ Section 23 Commitments.pdf NRZ Section 23 Commitments		No	High
#2.	Document	Att 30 Reference list for EPBC 2023_09538 referral.pdf References for EPBC 2023_09538 Referral		No	High

## 3.4.1 Hydrology characteristics that apply to the project area

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	High

#2.	Document	Att 15 NRZ Hydrogeological CSM Stage 1-part 1.pdf NRZ Hydrogeological CSM Stage 1 Commercial Development part 1	18/11/2022	No	High
#3.	Document	Att 15 NRZ Hydrogeological CSM Stage 1-part 2.pdf NRZ Hydrogeological CSM Stage 1 Commercial Development part 2	18/11/2022	No	High
#4.	Document	Att 26 FPP Mine Closure Plan.pdf FPP Mine Closure Plan	21/05/2018	No	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	Att 11 Targeted EPBC Species and habitat assessment.pdf Targeted EPBC Species and habitat assessment for PEL 650	04/12/2019	No	High
#2.	Document	Att 12 Winter Survey 2021 PEL 650.pdf Winter Ecological Survey 2021 PEL 650	01/11/2021	No	High
#3.	Document	Att 13 Desktop review MNES - April 2023.pdf Desktop review of Matters of National Environmental Significance - April2023	26/04/2023	No	High
#4.	Document	Att 16 Addendum to Winter Ecology Survey.pdf Assessment of potential direct and indirect impacts on EPBC listed species for Stage 1 Commercial Development	29/08/2022	No	High
#5.	Document	Att 17 Summary EPBC listed threatened species.pdf Summary of conclusions of potential direct and indirect impacts upon EPBC listed threatened species		No	High
#6.	Document	Att 24 Re Addendum to Winter Survey.pdf Re Addendum to Winter Survey – Conclusions Correspondence	31/08/2022	No	High
#7.	Document	Att 30 Reference list for EPBC 2023_09538 referral.pdf References for EPBC 2023_09538 Referral		No	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	Att 12 Winter Survey 2021 PEL 650.pdf Winter Ecological Survey 2021 PEL 650	01/11/2021	No	High
#2.	Document	Att 13 Desktop review MNES - April 2023.pdf Desktop review of Matters of National Environmental Significance - April2023	26/04/2023	No	High
#3.	Document	Att 15 NRZ Hydrogeological CSM Stage 1-part 1.pdf NRZ Hydrogeological CSM Stage 1 Commercial Development part 1	18/11/2022	No	High
#4.	Document	Att 15 NRZ Hydrogeological CSM Stage 1-part 2.pdf NRZ Hydrogeological CSM Stage 1 Commercial Development part 2	18/11/2022	No	High
#5.	Document	Att 16 Addendum to Winter Ecology Survey.pdf Assessment of potential direct and indirect impacts on EPBC listed species for Stage 1 Commercial Development	29/08/2022	No	High
#6.	Document	Att 25 Air Quality Impact Assessment PPL 269 2021.pdf Air Quality Impact Assessment PPL 269 - Stage 1 Commercial Development	14/12/2021	No	High

## 4.1.4.9 (Threatened Species and Ecological Communities) Why you do not think your proposed action is a controlled action

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 12 Winter Survey 2021 PEL 650.pdf Winter Ecological Survey 2021 PEL 650	01/11/2021	No	High
#2.	Document	Att 13 Desktop review MNES - April 2023.pdf Desktop review of Matters of National Environmental Significance - April2023	26/04/2023	No	High
#3.	Document	Att 16 Addendum to Winter Ecology Survey.pdf Assessment of potential direct and indirect impacts on EPBC listed species for Stage 1 Commercial Development	29/08/2022	No	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	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	High
#2.	Document	Att 16 Addendum to Winter Ecology Survey.pdf Assessment of potential direct and indirect impacts on EPBC listed species for Stage 1 Commercial Development	29/08/2022	No	High
#3.	Document	Att 18 Additional mitigation measures.pdf Additional description of mitigation measures for Stage 1 Commercial Development		No	High

## 4.1.5.3 (Migratory Species) Why your action is unlikely to have a direct and/or indirect impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	High
#2.	Document	Att 13 Desktop review MNES - April 2023.pdf Desktop review of Matters of National Environmental Significance - April2023	26/04/2023	No	High
#3.	Document	Att 16 Addendum to Winter Ecology Survey.pdf Assessment of potential direct and indirect impacts on EPBC listed species for Stage 1 Commercial Development	29/08/2022	No	High
#4.	Document	Att 17 Summary EPBC listed threatened species.pdf Summary of conclusions of potential direct and indirect impacts upon EPBC listed threatened species		No	High
#5.	Document	Att 18 Additional mitigation measures.pdf Additional description of mitigation measures for Stage 1 Commercial Development		No	High

## 4.1.9.3 (Water resource in relation to large coal mining development or coal seam gas) Why your action is unlikely to have a direct and/or indirect impact

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 1 NRZ EIR Stage 1 Commercial Development.pdf Environmental Impact Report for Stage 1 Commercial Development within PPL 269	03/07/2023	No	High
#2.	Document	Att 15 NRZ Hydrogeological CSM Stage 1-part 1.pdf NRZ Hydrogeological CSM Stage 1 Commercial Development part 1	18/11/2022	No	High
#3.	Document	Att 15 NRZ Hydrogeological CSM Stage 1-part 2.pdf NRZ Hydrogeological CSM Stage 1 Commercial Development part 2	18/11/2022	No	High
#4.	Document	Att 16 Addendum to Winter Ecology Survey.pdf Assessment of potential direct and indirect impacts on EPBC listed species for Stage 1 Commercial Development	29/08/2022	No	High
#5.	Document	Att 19 NRUP - Referral of Stage 1 project letter.pdf NRUP - Referral of Stage 1 project letter legal advice	25/08/2022	No	High
#6.	Document	Att 20 Summary of additional information Water resources.pdf Summary of additional information surface water and groundwater resources		No	High
#7.	Document	Att 26 FPP Mine Closure Plan.pdf FPP Mine Closure Plan	21/05/2018	No	High

## 4.3.8 Why alternatives for your proposed action were not possible

	Type	Name	Date	Sensitivity	Confidence
#1.	Document	Att 21 Camp and White Underground coal gasification.pdf Camp & White Underground Coal Gasification: An overview of groundwater contamination hazards and mitigation strategies	17/03/2015	No	High

#2.	Document Att 30 Reference list for EPBC 2023_09538 referral.pdf References for EPBC 2023_09538 Referral	No	High
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## 5.2 Declarations

### ✔ Completed Referring party's declaration

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

ABN/ACN	25146966305
Organisation name	LEIGH CREEK OPERATIONS PTY LTD
Organisation address	Level 11, 19 Grenfell Street, Adelaide SA 5000
Representative's name	Maria Sanchez
Representative's job title	Environmental Scientist
Phone	0416680527
Email	maria.sanchez@neurizer.com.au
Address	

- 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, **Maria Sanchez of LEIGH CREEK OPERATIONS PTY LTD**, 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	25146996305
Organisation name	Leigh Creek Operations Pty Ltd
Organisation address	Level 11, 19 Grenfell Street, Adelaide SA 5000
Representative's name	Cristian Bolda
Representative's job title	Chief Operating Officer
Phone	+61 8 8132 9100
Email	Cristian.Bolda@neurizer.com.au
Address	Level 11, 19 Grenfell Street, Adelaide SA 5000

- 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, **Cristian Bolda of Leigh Creek Operations 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. \*

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### **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.

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Same as Person proposing to take the action information.

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, **Cristian Bolda of Leigh Creek Operations 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. \*