Safe Work. Strong Business.

Surat Gas Project North

Environmental Authority (EA) EA0001399

EA Amendment Supporting Information Report

SGP North Sustain Wells Development (Stage 5)

30 March 2026

Document Status	Final

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1. Introduction

1.1 Application overview

Arrow CSG (Australia) Pty Ltd (Arrow Energy) is seeking an amendment to its current environmental authority (EA) EA0001399 (SGP North EA) of 28 January 2026 for the Surat Gas Project North (SGP North). This document is intended to support an application to amend the SGP North EA (the application). The SGP North EA authorises Arrow Energy to develop petroleum activities within the petroleum leases as authorised by this EA (refer to **Figure 1-1**).

Arrow is seeking this amendment to update disturbance to Environmentally Sensitive Areas (ESAs) under condition (Biodiversity 9) *Schedule F, Table 2 – Maximum ESA disturbance* and also update impacts to Prescribed Environmental Matters (PEMs) under Condition (Biodiversity 11) and *Schedule F, Table 3 – Authorised impacts to PEMs* for already approved coal seam gas (CSG) wells & gathering and associated infrastructure within the SGP North area (refer to **Figure 1-2**). The overall surface disturbance from these wells is already authorised under the SGP North EA. As such, this EA amendment is not requesting an increase to this overall disturbance but only requesting an update to ESA disturbance and impacts to PEMs to be able to offset these environmental values.

To assist the Department of Environment, Tourism, Science, and Innovation (DETSI) in deciding this SGP North EA amendment application, the application will outline additional details as follows:

- a description of the proposed activity and the land on which the activity is located (refer to Section 1.3);
- the relevant requested changes or updates to the SGP North EA conditions (refer to Section 1.6 and Section 2); and
- a description of the proposed amendment, including an assessment regarding the how the proposed amendment meets the criteria for a major amendment.

Section 4 and Section 5 of this document also identifies:

- the environmental values relevant to the proposed activities;
- potential impacts to relevant environmental values; and
- Arrow Energy's proposed mitigation measures.

1.2 Proponent

Arrow Energy is an integrated energy company with interests in natural gas developments, pipeline infrastructure and electricity generation. It is a Queensland based wholly owned subsidiary of Arrow Energy Holdings Pty Ltd, a 50:50 joint venture between a subsidiary of Royal Dutch Shell plc and a subsidiary of PetroChina Company Limited (PetroChina).

Arrow Energy is a Registered Suitable Operator (RSO) in accordance with the Department of Environment, Tourism, Science, and Innovation (DETSI) Suitable Operator Register, as required by the *Environmental Protection Act 1994* (Qld) (EP Act). Arrow Energy's RSO registered number is 632276.

1.3 Currently authorised petroleum activities

The SGP North EA currently authorises the petroleum activities under Schedule A, Table 1 – Authorised petroleum activities as per **Table 1-1**.

Table 1-1 Currently authorised petroleum activities under SGP North EA[1] (EA0001399, 28/01/2026)

Activity(ies)	Total scale of petroleum activities / infrastructure	Scale / Intensity
Total Coal Seam Gas (CSG) wells	588 wells[2]: PL304 – 95 wells PL305 – 86 wells PL491 – 192 wells PL492 – 151 wells PL494 – 27 wells PL1044 - 37 wells	1.5 ha maximum per single well pads 2.5 ha maximum per multi-well pads
Existing wells[3]	56 wells	N/A
Petroleum activities carried out on a site containing a regulated structure (high or significant consequence category dam)	PL304 – Kedron Dam PL305 – Castledean Dam PL1044 – Punchbowl Dam	Kedron Dam – One (1) dam / 20 ha Castledean Dam – One (1) dam / 14 ha Punchbowl Dam – One (1) dam / 35 ha
Central gas processing facility (Field Compression Station) and a power station, and a multi-point ground flare, and a water transfer station	PL305	One (1) facility / 23 ha
Communication towers	PL305 – One (1) Comms tower PL491 – Three (3) Comms towers PL492 – One (1) Comms tower	Five (5) Comms towers / 5 ha
Sewage treatment plants (STPs)	PL492 – Two (2) facilities PL305 – Four (4) facilities	Six (6) facilities / Less than 100EP (each)
	PL305 - One (1) facility	One (1) facility / 100 to 350EP
Gravel pit (s)	Optional[4] (one of two options): **Option 1**: PL491 – One (1) facility or **Option 2**: PL305 & PL491 – One (1) facility and PL492 – Two (2) facilities	Three (3) gravel pits / 37 ha
Solar Farm	PL491	One (1) facility / 30.1 ha

[1] The petroleum activities are authorised petroleum activities for the purposes of the *Petroleum and Gas (Production and Safety) Act 2004* and *the Petroleum Act 1923*.

[2] A well variation of 10% per tenure is permitted, provide the overall well count does not exceed 588 wells.

[3] Existing wells from appraisal activities.

[4] One of the two gravel pit options will be developed.

The scale of disturbance already approved in the SGP North EA for the development of 588 wells is 4,090 ha for total ground disturbance for petroleum activities. **Table 1-2** provides the allowed disturbance by tenure as authorised under the SGP North EA (EA0001399).

Table 1-2 Scale of SGP North EA authorised disturbance by tenure

Tenure	Total Area of Tenure, ha	Approximate Disturbance Footprint, ha	Footprint Percentage of Total Tenure, %
PL304	7,688	530	6.9
PL305	7,676	600	7.8
PL491	23,051	1,240	5.4
PL492	23,026	1,250	5.4
PL494	23,081	150	0.6
PL1044	7,674	320	4.2
Total	92,196	4,090	4.4

1.4 Project area and proposed activity

The proposed activities consider the delivery of natural gas to the QGC Bellevue Delivery Point and comprises Petroleum Leases (PLs) 304, 305, 491, 492, 494 and 1044 which are located northeast of the township of Miles in Southern Queensland (refer to **Figure 1-1**).

The Project will export gas production to a medium pressure delivery point at the QGC owned and operated Bellevue Central Processing Plant (CPP). Low pressure gas will also be delivered to QGC's McNulty Field Compression Station (FCS). Produced water, or CSG water will be transported to a water delivery point at the QGC owned and operated McNulty Pond, from where it will be transferred to be processed by the QGC water treatment plants.

SGP North Stage 5 will consider the construction of wells & gathering and any associated infrastructure within PLs 305, 491, and 492 (refer to **Figure 1-2**). These wells are part of the already authorised 588 wells under the SGP North EA (refer to **Table 1-1**).

The proposed development does not differ from those activities already authorised under the current environmental authority EA0001399, i.e., does not seek to increase the petroleum activities approved by the current EA, hence there are no changes being requested to *Schedule A, Table 1 – Authorised petroleum activities* with this EA amendment (refer to **Table 1-1**).

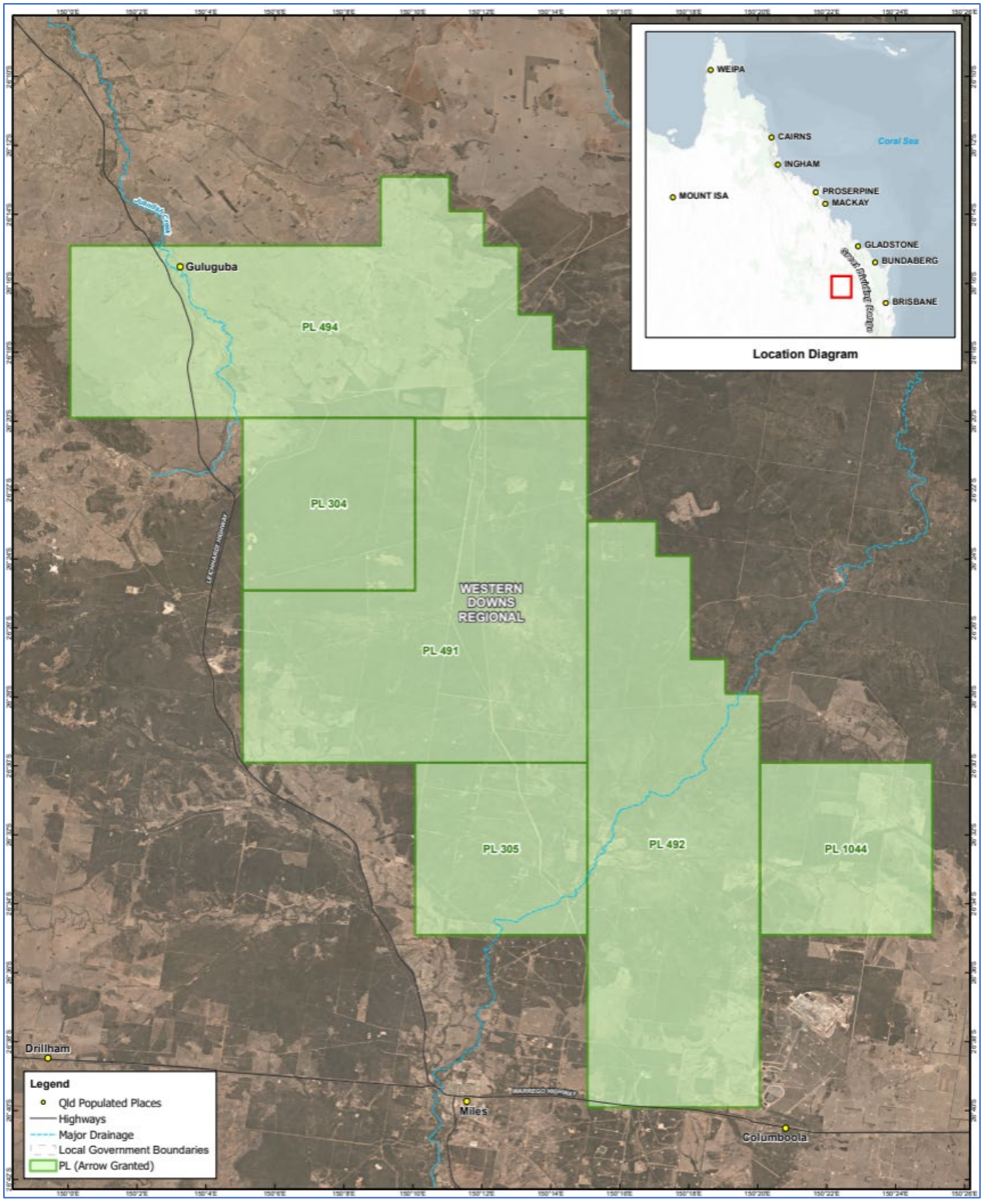

Figure 1-1 SGP North Petroleum Leases under EA0001399

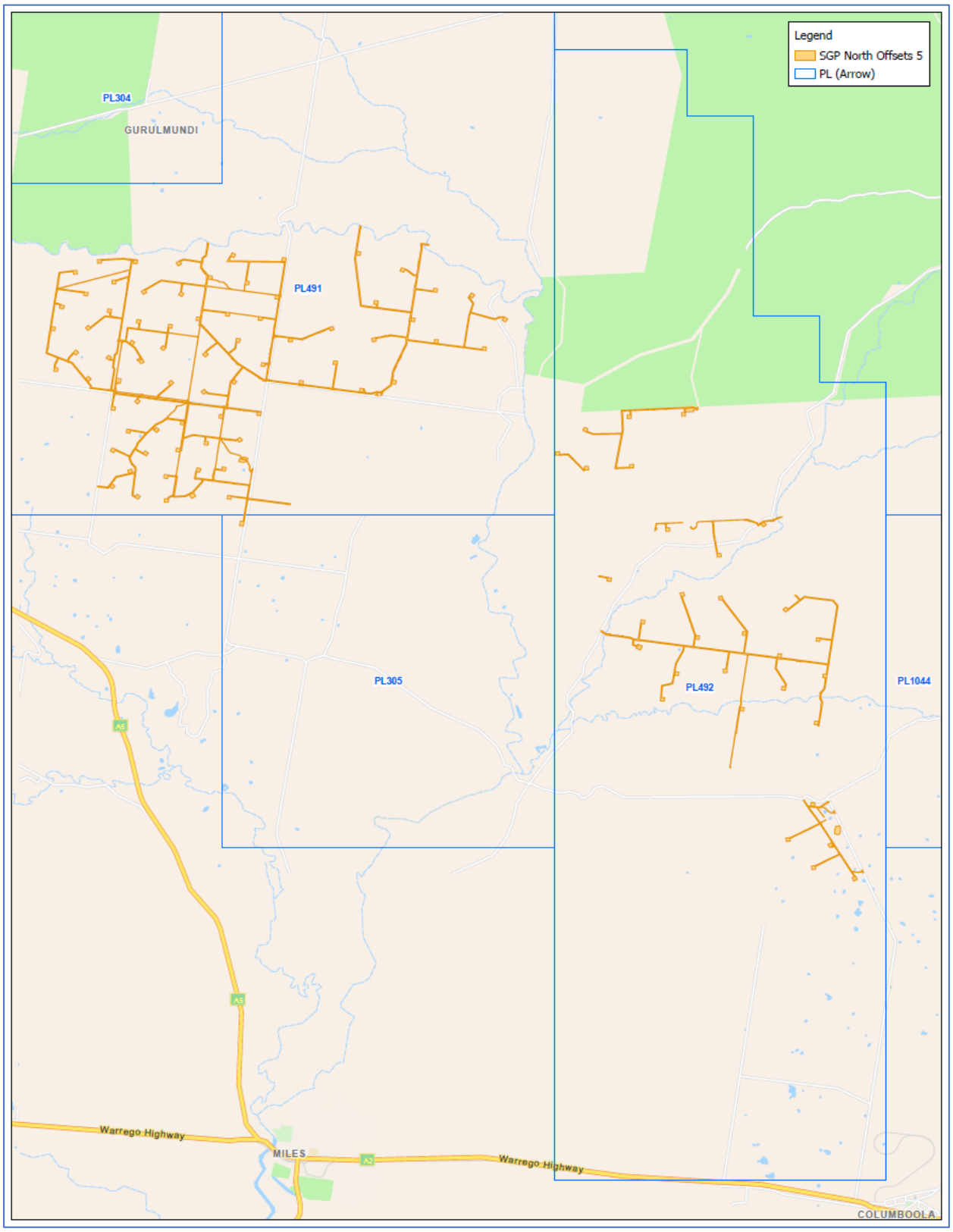

Figure 1-2 SGP North Stage 5 Project area footprint (proposed impact/offsets area)

SGP North Stage 5 will consist of primarily vertical wells, with deviated wells being implemented where required to manage surface constraints. It may also include multi-well pads (MWPs) with an area of up to 2.5 ha of disturbance as authorised under the current SGP North EA (EA0001399), depending on design and field constraints.

A Right of Way (RoW) for the construction of the gathering lines, and access tracks for wells will also be required.

The total estimated disturbance area for SGP North Stage 5 is provided in **Table 1-3**.

Table 1-3 SGP North Stage 5 Estimated Planned Disturbance

Infrastructure	Location	Scale	Proposed estimated disturbance Stage 5
Well pads - Single	PL 305, 491, and 492	104	106.62 ha
Well pads - Multi		1	
Pipeline corridor[1] and other tracks outside of the RoW	PL 305, 491, and 492	142 km	305.51 ha
Communication tower	PL 491	1	0.50 ha
Extra work areas (EWAs)	PL 491 and PL 492	87	5.16 ha
Laydown areas	PL 491 and PL 492	3	4.56 ha
Total estimated proposed disturbance SGP North Stage 5			**422.35 ha**

The total authorised disturbance under the SGP North EA (EA0001399) for PL305, PL491, and PL492 combined is 3,090 ha and the total disturbance footprint authorised for all PLs under the SGP North EA is 4,090 ha (refer to **Table 1-2**).

The total proposed disturbance for SGP North Stage 5 of 422.35 ha (refer to **Table 1-3)** does not seek to increase the petroleum activities approved by the current SGP North EA and the disturbance is already authorised (refer to **Table 1-1** and **Table 1-3**) but its required to update impacts to environmentally sensitive areas (ESAs) and Prescribed Environmental Matters (PEMs) is required (refer to **Appendix D**).

1.5 Legislative context

The EP Act and the *Petroleum and Gas (Production and Safety) Act 2004* (P&G Act) provide the principle legislative frameworks for facilitating resource projects in Queensland, including SGP North.

Arrow Energy requires an amendment to the existing SGP North EA (EA0001399) under the EP Act to enable the construction of infrastructure to support development of Stage 5 of the SGP

[1] Pipeline corridor = gas and water gathering pipelines RoW plus access tracks for well pads.

North. Further details regarding legislative requirements and compliance with the requirements under the EP Act are provided in **Appendix D**.

Arrow Energy engaged extensively with relevant community representatives through:

- the Surat Gas Project Environmental Impact Statement (SGPEIS, 2013);
- the Supplementary Report to the EIS (SREIS, 2013) processes;
- the Arrow Surat Community Reference Group (ASCRG);
- Area Wide Planning (AWP) meetings; and
- Local community drop-in information sessions conducted during the planning phase of the SGP.

Arrow Energy has ongoing and frequent engagement with the community through the Miles Chamber of Commerce and Industry, sharing regular updates. Arrow Energy also engages with the community through various community-led events and initiatives which it supports.

The consultation activities that Arrow Energy has developed, and continues to develop, are in line with the principles as set out under the *Human Rights Act 2019* (Qld), as they enable all people the freedom of expression (*Human Rights Act 2019*, s21). All engagement with Arrow Energy is conducted under privacy rules and regulations to protect stakeholder privacy and reputation (*Human Rights Act*, s25).

Arrow Energy is committed to respecting and upholding the cultural rights of Indigenous people (*Human Rights Act 2019*, s28) Arrow Energy has Cultural Heritage Management Plans with relevant Indigenous Groups and undertakes cultural heritage surveys with those groups prior to any on-ground activity, to ensure any areas of cultural significance are identified and protected.

1.6 Proposed EA amendment

This EA amendment does not seek to increase the petroleum activities approved by the current SGP North EA (EA0001399) (refer to Section 1.3).

This EA amendment seeks to update the maximum Environmentally Sensitive Area (ESA) disturbance area and the impacts to Prescribed Environmental Matters (PEMs) due to the development of the Surat Gas Project North (SGP North) Stage 5 (up to 124 wells). It does not seek to increase the number of already authorised activities under the SGP North EA and approved through the Environmental Impact Statement process with the SGPEIS (2013) for which environmental risks associated with the SGP North activities have not materially changed.

In summary, this EA amendment application seeks to update impacts to ESAs and PEMs due to the addition of a Stage 5 development to the SGP North. Specific details of these changes are provided in Section 2.

1.7 Plan of operations and estimated rehabilitation cost

Arrow Energy anticipates that the SGP North Stage 5 will likely commence in Q12027. An updated PoO addressing the development activities will be submitted to the DETSI as required under Section 293 of the EP Act.

1.8 Purpose and scope of this document

The purpose of this report is to support an amendment application to the Department of Environment, Tourism, Science, and Innovation (DETSI) to seek an amendment to Arrow

Energy's site-specific environmental authority EA0001399, and to provide sufficient information to enable DETSI to decide on the application.

This EA amendment application seeks to authorise a number of proposed amendments to EA0001399 which are described in detail in this application in Section 2.

This report has been prepared in accordance with the relevant requirements under Section 226 of the EP Act 1994 (Qld), the Environmental Protection Regulation 2019, and DETSI's *Major and minor amendments guideline* (ESR/2015/1684), version 11.04, of 5 November 2025.

2. Proposed EA Amendments

2.1 EA Amendment requested and relevant EA conditions

With this EA amendment, Arrow Energy is proposing to develop the next stage of the SGP North of the already authorised 588 wells in the SGP North EA (refer to Section 1.4). This includes associated gas and water gathering lines and access tracks and incidental infrastructure over three (3) petroleum leases, i.e., PL305, PL491 and PL492. This is known as the SGP North Development Stage 5.

No additional infrastructure is being sought to be included into the SGP North EA as part of this amendment, nor is there a request to add any environmentally relevant activities (ERAs) other than those already authorised under the SGP North EA (EA0001399) under *Condition (General 1)* and *Schedule A, Table 1 – Authorised petroleum activities*.

This EA amendment application does not seek approval for any new produced water storage dams, additional wells, access, and pipelines which are already approved under the EA. Information pertaining to wells, access and pipelines has been included for completeness as part of the application but is not subject to assessment or authorisation. There are also no major administrative changes being requested as part of this EA amendment.

This application only seeks to update impacts to biodiversity values through the amendment of the following conditions of EA0001399 to authorise maximum disturbance to ESAs and impacts to PEMs due to an additional staged impact, i.e., Stage 5.

- Condition (Biodiversity 9), *Schedule F, Table 2 – Maximum ESA disturbance,* including *Schedule F, Figure 1*; and
- Condition (Biodiversity 11), *Schedule F, Table 3 – Authorised impacts to PEMs*.

Updates to disturbance to Environmentally Sensitive Areas (ESAs)

A biodiversity impact assessment was conducted to quantify potential impacts to ESAs from the development of the SGP North Stage 5, including impacts to Category B and C ESAs as per SGP North EA Condition (Biodiversity 8) and Condition (Biodiversity 9).

An assessment on impacts to 'Category C ESA for a Protected Wildlife Habitat' was conducted as per the recent inclusion of this definition. The outcomes from this assessment concluded that Protected wildlife habitat for endangered and vulnerable species occurs within the Study area (refer to **Appendix C**).

Impacts to Category C ESAs as defined by Condition (Biodiversity 9) depending on the allowable petroleum activities as defined in Condition (Biodiversity 8) were found (refer to **Appendix C**) due to the development of the SGP North Stage 5 activities, such as: Right of Way (RoW), access tracks, extra work areas (EWAs) and laydown areas, well pads, communication towers, etc. (refer to **Table 1-3**). These are the following:

- Category C ESA 'Of Concern RE' (OCRE) = 1.50 ha disturbance
- Category C ESA 'Mapped as Essential Habitat' = 22.50 ha disturbance
- Category C ESA 'Protected Wildlife Habitat that is Category C on the Regulated Vegetation Management Map' = 256.15 ha disturbance

The total impacts to Category C ESA is 280.15 ha, which is the area of disturbance to be potentially impacted by the development of the SGP North Stage 5. Category B ESAs maximum

ESA disturbance area will remain as '*to the extent they are required for authorised activities within the SGP North EA Schedule F, Figure 1"*. SGP North EA *Schedule F, Figure 1* has been updated to include the SGP North Stage 5 development and has been incorporated into the marked-up EA (refer to **Appendix A**).

Proposed changes to Schedule F, Table 2 are presented in **Table 2-1**. Magnitudes include the previous SGP North stages as well as Stage 5.

Table 2-1 Proposed changes to EA0001399 *Schedule F, Table 2 – Maximum ESA disturbance*

Activity(ies)	**Maximum ESA disturbance Area (includes SGP North Stages 1 to 5)**	
Ground disturbance within a Category C Environmentally Sensitive Area 'Of Concern RE' (OCRE)	4.0 ha	744.7 ha
Ground disturbance within a Category C Environmentally Sensitive Area 'Mapped as 'Essential Habitat'	47.1 ha	
Ground disturbance within a Category C Environmentally Sensitive Area 'Protected Wildlife Habitat' that is Category C on the RVMM[2]	693.6 ha	
Ground disturbance within a Category C Environmentally Sensitive Area Primary Protection zones	To the extent they are required for authorised activities within the *SGP North Stages 1, 2, 3, 4, and 5 maximum boundary* in **Schedule F, Figure 1 – SGP North Stage 1, 2, 3, 4, and 5 Maximum Boundary**[2]	
Ground disturbance within a Category B Environmentally Sensitive Area Primary Protection zones		
Ground disturbance within a Category B Environmentally Sensitive Area Secondary Protection zones		

Updates to disturbance to Prescribed Environmental Matters (PEMs)

The Biodiversity impact assessment also included the assessment and quantification of impacts to PEMs from the development of the SGP North Stage 5 for Regulated Vegetation, Connectivity, Protected Wildlife Habitat (PWH), and Waterway providing for Fish Passage.

The Biodiversity impact assessment outcomes concluded impacts to PEMs from the development of the SGP North Stage 5 as per detail provided on **Table 2-2** to the following:

- Impacts to Regulated Vegetation Regional Ecosystems (REs), all within the total area of impact currently approved under the SGP North EA (EA0001399); and
- Impacts to PEMs PWH with an increase in impacts from Stage 5 to the habitat for the following species:
    - Endangered[3] wildlife:
        - *Petauroides volans volans* (Greater Glider); and

[2] EA0001399 *Schedule F, Figure 1* has been updated to include the SGP North Stage 5 development and has been incorporated into the marked-up EA as part of this amendment (refer to **Appendix A**).
[3] NC Act Status.

- *Phascolarctos cinereus* (Koala).

- Vulnerable[3] wildlife:

  - *Calyptorhynchus lathami lathami* (Glossy Black Cockatoo);
  - *Stagonopleura guttata* (Diamond Firetail);
  - *Nyctophilus corbeni* (South- eastern Long-eared Bat); and
  - *Petaurus australis australis* (Yellow-bellied Glider (south- eastern))

- Impacts to Special Least concern species *Tachyglossus aculeatus* (Short- beaked Echidna) were identified from Stage 5. These are within the total area of impact currently approved under the SGP North EA (EA0001399).

The magnitude of the impacts to these species' habitat are provided in **Table 2-2**, including proposed changes to the SGP North EA *Schedule F, Table 3 – Authorised impacts to PEMs* with the inclusion of Stage 5. Note that Arrow Energy is not proposing to change the current project footprint, rather only seeks to implement a new Stage 5 scope. As mentioned, all identified impacts for Regulated Vegetation for Stage 5 and to the Short- beaked Echidna are within the total area of impact already authorised under the SGP North EA.

Table 2-2 Proposed changes to EA0001399 *Schedule F, Table 3 – Authorised Impacts to PEMs* – Inclusion of SGP North Stage 5 and amended total area of impacts

Prescribed environmental matter	Significant Residual Impact (SRI) and Offset required? (Yes/No)	Total area of impact	Limited to within the SGP North Stages 1, 2, 3, 4 and 5 maximum boundary according to Schedule F, Figure 1				
			Total area of impact – Stage 1	Total area of impact – Stage 2	Total area of impact – Stage 3	Total area of impact –Stage 4	Total area of impact – Stage 5
REGULATED VEGETATION							
Of concern regional ecosystem (not within an urban area)							
RE 11.3.2	Yes	5 ha	0.4 ha	0 ha	0 ha	0 ha	0 ha
RE 11.3.4	Yes	20 ha	1.0 ha	0 ha	0 ha	0 ha	1.0 ha
Regional ecosystems (not within an urban area) within the **defined** distance from the defining banks of a relevant **watercourse** on the vegetation management watercourse map							
RE 11.3.2 (17a)	Yes	1 ha	0.2 ha	0 ha	0 ha	0 ha	0 ha
RE 11.3.4 (16c)		7 ha	0.5 ha	0 ha	0 ha	0 ha	0.7 ha
RE 11.3.14 (18a)		6 ha	0 ha	0 ha	0 ha	0 ha	0.3 ha
RE 11.3.25 (16a)		12 ha	0.4 ha	0 ha	0.5 ha	0 ha	0.6 ha
RE 11.5.1 (18b)		20 ha	1.8 ha	0 ha	1.8 ha	0 ha	1.9 ha
RE 11.5.4 (18b)		3 ha	0 ha	0 ha	0 ha	0 ha	0.2 ha
RE 11.5.20 (13d)		1 ha	0.2 ha	0 ha	0 ha	0 ha	0 ha
RE 11.5.21 (18a)		12 ha	0 ha	0 ha	0 ha	0 ha	1.9 ha
RE 11.7.2. (24a)		0.2 ha	0.2 ha	0 ha	0 ha	0 ha	0 ha
RE 11.7.4 (12a)		8 ha	0.6 ha	0 ha	0.8 ha	0 ha	2.3 ha
RE 11.7.5 (29b)		1 ha	<0.1 ha	0 ha	0.1 ha	0 ha	0 ha

Prescribed environmental matter	Significant Residual Impact (SRI) and Offset required? (Yes/No)	Total area of impact	Limited to within the SGP North Stages 1, 2, 3, 4 and 5 maximum boundary according to Schedule F, Figure 1				
			Total area of impact – Stage 1	Total area of impact – Stage 2	Total area of impact – Stage 3	Total area of impact –Stage 4	Total area of impact – Stage 5
RE 11.7.6 (10a)		5 ha	0 ha	0 ha	0.3 ha	0 ha	0 ha
RE 11.7.7 (12a)		10 ha	1.1 ha	0 ha	1.5 ha	0 ha	0.6 ha
Essential habitat							
Essential habitat - (not in an urban area) on the essential habitat map for **endangered wildlife** (plant or animal)							
Phascolarctos cinereus (Koala)	Yes	8.6 ha	0 ha	8.6 ha	0 ha	0 ha	0 ha
Essential habitat - (not in an urban area) for **vulnerable wildlife** (plant or animal)							
Nyctophilus corbeni (South- eastern Long-eared Bat)	Yes	**24.1 ha**	16.0 ha	0 ha	0 ha	0 ha	8.1 ha
CONNECTIVITY AREAS							
Connectivity area that is a regional ecosystem (not in urban area)							
Connectivity areas	Yes	500.4 ha	302.1 ha	151.98 ha	46.32 ha	0 ha	0 ha
PROTECTED WILDLIFE HABITAT							
Habitat for an animal that is **endangered wildlife**							
Petauroides volans volans (Greater Glider)	Yes	**860.6 ha**	269.3 ha	168.22 ha	35.48 ha	30.1 ha*	357.5
Phascolarctos cinereus (Koala)	Yes	**964.7 ha**	325.5 ha	198.65 ha	37.65 ha	30.1 ha*	372.8
Habitat for an animal that is **vulnerable wildlife**							
Adclarkia cameroni (Brigalow Woodland Snail)	Yes	2.5 ha	1.9 ha	0.6 ha	0 ha	0 ha	0 ha
Calyptorhynchus lathami lathami (Glossy Black Cockatoo)	Yes	**29.3 ha**	7.9 ha	0 ha	0 ha	19.8 ha*	1.6 ha
Stagonopleura guttata (Diamond Firetail)	Yes	**853.8 ha**	263.6 ha	168.22 ha	35.48 ha	30.1 ha*	356.4 ha
Nyctophilus corbeni (South- eastern Long-eared Bat)	Yes	**849.1 ha**	267.4 ha	165.72 ha	35.48 ha	30.1 ha*	350.4** ha
Petaurus australis australis (Yellow-bellied Glider (south- eastern))	Yes	**860.6 ha**	269.3 ha	168.22 ha	35.48 ha	30.1 ha*	357.5 ha
Habitat for an animal that is **special least concern wildlife**							
Tachyglossus aculeatus (Short- beaked Echidna)	Yes	35.4 ha	0 ha	10.7 ha	0 ha	0 ha	2.9*** ha
WATERWAY PROVIDING FOR FISH PASSAGE							
Fish passage (not in an urban area)	Yes	18.5 ha	1.9 ha	0 ha	1.5 ha	0 ha	0 ha
Staged offset made in accordance with condition (Biodiversity 14)			Yes Financial offset provided on 06/02/2025	No	No	No	No

Notes: (*) Impacts to these species for Stage 4 have been assessed under EPBC Act approval EPBC 2021/10002 for the SGP North Solar Farm project.
(**) Identified impacts to *Nyctophilus corbeni* (South- eastern Long-eared Bat) will be offset through Arrow Energy's EPBC Act Approval EPBC 2010/5344.
(***) Impacts to Short-beaked Echidna are within the total area of impact currently approved under the SGP North EA (EA0001399).

Please refer to **Appendix D** for further information on legislative requirements for EA amendment applications.

2.2 Environmental Values and Impacts

Section 4 describes the environmental values identified as relevant to the proposed development area (i.e., Project Footprint) (refer to **Figure 1-2** and **Appendix B**), and provides an assessment of potential impacts to identified values.

Section 5 provides a summary of environmental impacts and the proposed mitigation and management practices to be implemented by Arrow Energy to reduce the impacts to those identified environmental values.

Impacts to ESAs and PEMs from the proposed development are the subject of this EA amendment application. This proposed EA amendment does not impact any of the following environmental values: i.e., there are no potential impacts to air, noise & vibration, community, waste, water & wetlands, nor does it impact underground water rights as a result of the proposed development (refer to more details provided in Section 4 and Section 5).

2.3 EA Amendment offset strategy

Arrow will offset any impacts to PEMS through Stage 5, utilising either financial or land-based offsets through the Notice of Election (NoE) process (refer to Section 6 for further details).

3. Description of the Petroleum Tenures

3.1 General project area location

Arrow Energy has interests in more than 12,000 km^2 of petroleum tenures within Queensland's Surat and Bowen basins.

The petroleum tenures relevant to the SGP North EA (EA0001399) are PL304, PL305, PL491, PL492, PL494, and PL1044. These tenures are located within the Western Downs Regional Council (WDRC) Local Government Area and are located northeast of the town of Miles in Southern Queensland (refer to **Figure 1-1**).

3.2 Land use

Land use across the Project area and the broader surrounds is predominantly characterised by grazing and bushland, including the Binkey State Forest and Barakula State Forest (refer to **Table 3-1**).

Table 3-1 Queensland State Forests within the Project area

Petroleum tenure	State Forest Name	Lot on Plan
PLs 304 and 491	Binkey State Forest	60 on FTY287
PLs 491, 492 and 1044	Barakula State Forest	302 on FTY1964

Additionally, mineral extraction encroaches on the western and southern boundaries of the Project area. Thus, depending on the location of infrastructure, post operational land use will include forestry, mining, grazing, or cropping.

Key industries in the wider region surrounding the Project area include CSG exploration and agriculture.

The *Regional Planning Interest Act 2014* (Qld) identifies and protects areas of regional interest throughout Queensland, manages the impact of resource activities, supports resource activities to cohabitate with other activities, for example highly productive agricultural activities and assists in resolving land use conflicts. There are four areas of regional interest defined: priority agricultural areas (PAAs), priority living areas (PLAs), strategic environmental areas (SEAs) and strategic cropping area (SCA).

PLAs in the vicinity of the Project area (but not within) comprise the townships of Miles and Wandoan, located to the south and north, respectively. No PAAs and SEAs are located within the Project area. SCAs are scattered within the Project area, predominantly in the north, with smaller isolated and fragmented portion in the west and south.

Where Arrow Energy's resource activities are carried out in areas of regional interest, a Regional Interest development Approval (RIDA) will be sought where required.

The Binkey State Forest is within the Project Area. Parts of the Barakula State Forest and the Cherwondah State Forest intersect the Project Area.

There are no timber reserves, resource reserves, or unallocated State land within the area of this EA amendment application.

There is area designated as Category A under the Vegetation Management Act 1999 indicating the property is a legally secured offset area. Arrow is not proposing any direct impacts to the proposed property, outside of any existing disturbance (existing access track) that is already in place. Any impacts to the proposed offset area would be done in consultation with the landholder through a CCA.

3.3 Overlapping tenure

The Surat Basin is a coal and coal seam gas resource area. Therefore, there are other active mining and exploration tenures in the region with several mining related tenures located in close proximity to the Project area. The Cameby Downs Coal Mine, owned and operated by Syntech Resources, is located in the southeastern part of PL492 and beyond, is a significant mining development that overlaps the Project area.

There are some overlapping coal resource authorities within the Project area, as per detail provided in **Table 3-2** and **Figure 3-1**. Arrow Energy has a number of commercial arrangements and Joint Interaction Management Plan (JIMP) for some of these overlapping tenures.

In addition to overlapping tenure, there are also a number of existing and proposed renewable energy projects (i.e. Solar Farms) located across the Project area. The potential for these to limit the footprint of development will be considered on an ongoing basis. These renewable energy projects are not subject to the provisions of the *Mineral and Energy Resources (Common Provisions) Act 2014* but are subject to approval under the *Planning Act 2016*.

Table 3-2 Overlapping tenures within the Project Area (PLs 305, 491, and 492)

Coal Resource Authority	Resource Authority Holder	Relevant PL	Overlapping Tenure Agreement
EPC1041	Surat Coal Pty Ltd	PL305, PL 491, PL492 and PL1044	Nil.
EPC1134		PL305	
EPC813		PL305 and PL492	
MDL430		PL304, PL305 and PL491	
EPC732	Syntech Resources Pty Ltd	PL492	Nil.
ML50233			Coordination arrangement in place for overlap between PL492 and ML50233.
MLA50258			JIMP in place within the overlap of PL492 and ML50258 and ML50233 within parties that govern safety interactions. Joint Development Plan in place in respect of PL492 and ML50258 overlap.
EPC2092	SE Qld Coal Pty Ltd	PL491 and PL494	Nil.
EPC1015	Fairway Coal Pty Ltd	PL304, PL491 and PL492	Nil.
EPC1165	Sinocoal Resources Pty Ltd	PL491 and PL492	Nil.

Figure 3-1 provides an overview of overlapping tenures within the SGP North.

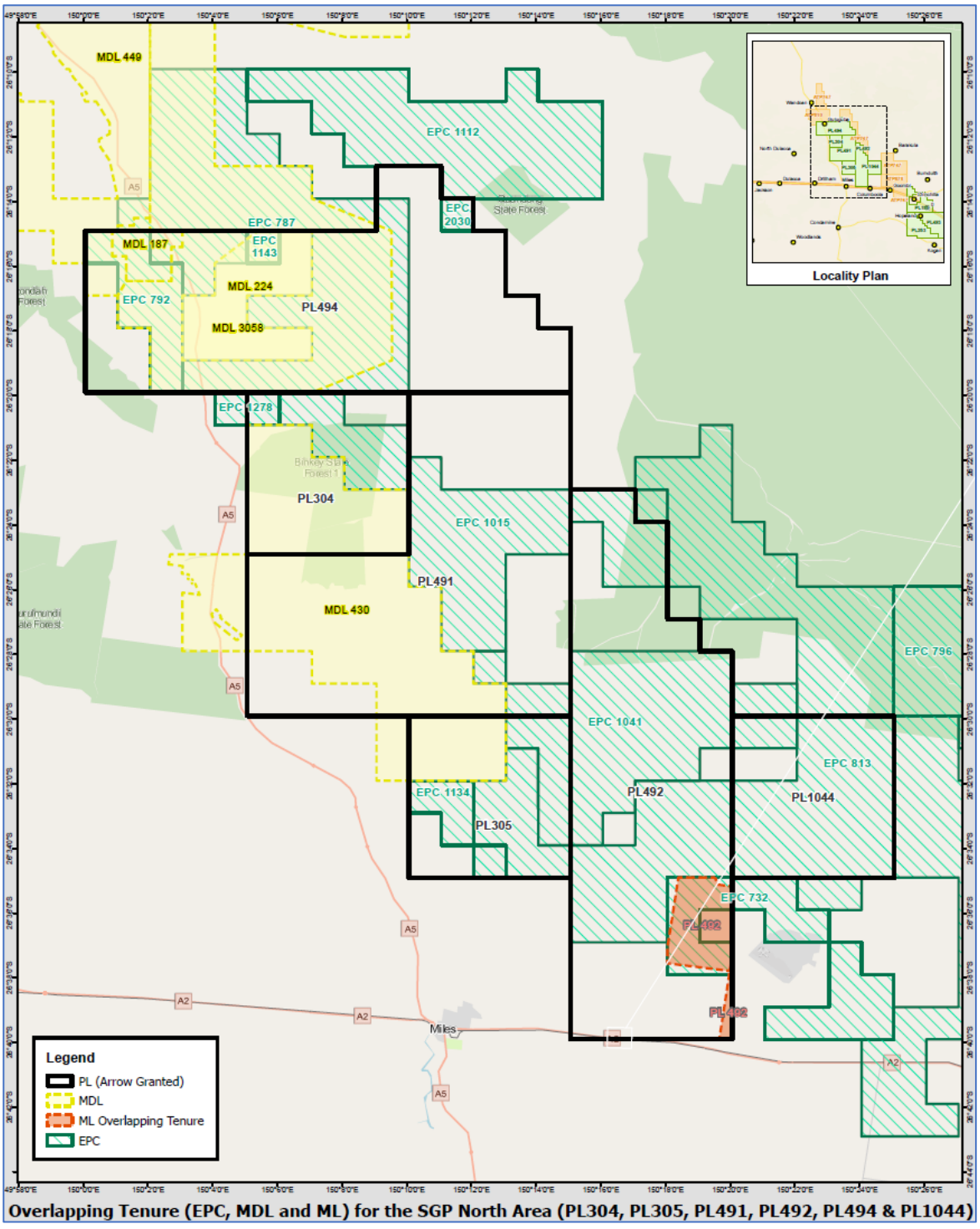

Figure 3-1 SGP North overlapping tenures

4. Existing Environment and Assessment of Environmental Impacts

4.1 Air quality and noise

4.1.1 Existing environment

Climate and meteorology

The Project area has a climate typical of subtropical regions and is summarised as follows:

- Mean monthly minimum temperatures range from 4.4°C in winter (June to August) to 21°C in summer (December to February).
- Mean monthly maximum temperatures range from 20°C in winter to 34°C in summer.
- Monthly rainfall displays a consistent pattern across the area and ranges from an average of 22 to 40 mm in winter to 87 mm summer.
- Wind patterns across the area are characterised by northerly flow predominant in the mornings and winds fairly evenly distributed in the afternoon, with a relatively low frequency of westerly winds in the afternoon. Summer is characterised by a high frequency of north to north east winds, shifting to a higher frequency of easterly winds in autumn, followed by relatively stronger southerly winds prevalent in winter which ease during the Spring months.
- Mean daily solar exposure changes throughout the year in line with the seasons, with values ranging from 12.5 MJ/m² in winter (June) to 25.8 MJ/m² in summer (January).
- Relative humidity varies with time of day and season, increasing through summer and autumn before reaching a maximum in winter (June) and falling in spring. Morning humidity levels range from an average of around 73% in early winter to around 59% in mid-spring. Afternoon humidity levels are lower, at around 49% in summer and dropping to a low of 48% in mid of spring.

Existing air quality

In collaboration with industry partners, DETSI operates an air quality monitoring network across southwest Queensland to monitor for any air quality impacts associated with the intensive CSG production activities in the Western Downs region. These monitoring stations are located on properties near CSG infrastructure, including processing facilities and active gas wells. The AQMS located at Miles Airport is the nearest AQMS to the Project site. Given this, ambient air quality data recorded by the Miles Airport AQMS is used to estimate background air quality levels for assessing cumulative impacts.

Background levels of key air pollutants for the Project area are shown in **Table 4-1**. Ambient monitoring data shows that all criteria air pollutants are well below state and national objectives.

Table 4-1 Background levels of key air pollutants

Air Pollutant	EPP (Air) Objective	Air NEPM Objective	Averaging Period	Background Concentration
	(µg/m³)			(µg/m^3)
Nitrogen dioxide (NO_2)	250	162	1 hour	6.2 [a]
	62	30	Annual	6.1 [a]

Air Pollutant	EPP (Air) Objective	Air NEPM Objective	Averaging Period	Background Concentration
	($\mu g/m^3$)			($\mu g/m^3$)
Carbon monoxide (CO)	11,000	11,250	8 hours	232 [a]
Ground level ozone (O_3)	210		1 hour	72.8 [a]
	171		4 hours	71.8 [a]
		139	8 hours	70.7 [a]
Sulfur dioxide (SO_2)	570	286	1 hour	2.9 [b]
	229	57	1 day	2.0 [b]
	57		Annual	1.4 [b]
Total suspended particulate (TSP)	90		Annual	26 [a]
Particulate matter (PM_{10})	50		1 day	13 [a]
	25		Annual	12 [a]
Particulate matter ($PM_{2.5}$)	25		1 day	16.8 [a]
	8		Annual	5.5 [a]

a Monitoring data derived from Miles Airport air quality monitoring station for 2020 and 2021. The seventieth percentile of the data was taken for sub-annual averaging periods
b Monitoring data for SO2 derived from Flinders air quality monitoring station for 2020 and 2021.

Relevant air pollutants

EA0001399 authorises the establishment of wells, gas and water gathering lines and associated access tracks. It is noted that small diesel gensets will be used to provide power to camps and minor pumps. These are assessed through screening appropriate for the source size and potential for impact.

Air pollutant sources relevant to the SGP North EA, including sources relevant for this amendment, are summarised in **Table 4-2**.

Table 4-2 Project construction and operation emission sources, relevant pollutants, and impact assessment approach

Emission Source	Relevant Air Pollutants	Air Impact Assessment Approach
Construction		
Construction of new wells through drilling and completion rigs	Combustion products, mainly NOx and CO	Generic assessment of rig emissions (NO2 and CO) to identify off-set distances based on rig emission rates.
Construction of access tracks and gathering lines	Construction dust (TSP, PM10 and PM2.5)	Site specific qualitative construction dust assessment.

Emission Source	Relevant Air Pollutants	Air Impact Assessment Approach
Operation		
Operation of new wells	Combustion products, mainly NOx and CO	Generic modelling assessments of NOx and CO of emissions from CSG fired gensets located on well pads.
Operation of small diesel generators (e.g., camp power, pumps stations)	Combustion products, mainly NOx and CO	Screened as negligible based on larger rig diesel combustion assessment.

Emissions of sulfur dioxide and volatile organic compounds from the sources in this EA application are negligible.

Ozone is a regional air pollutant that is formed from photochemical reactions between NOx and VOCs. Ozone is mainly relevant for condensed urban areas and in constrained airsheds (e.g., Sydney, Southeast Queensland). Regional assessment of ozone has been conducted for the Surat Basin and is well within recommended air quality guidelines for the entire region even when considering planned project expansions within the region (SGPEIS and SREIS, Arrow Energy 2012, 2013). The project is expected to have negligible impact on regional ozone levels.

Also, as CSG contains negligible odorous compounds (e.g. sulfur compounds) and combustion is one of the most effective methods for controlling odour, impacts from odour at are not expected from the project emissions.

The main air pollutant of concern from combustion is nitrogen dioxide (NO2). Nitrogen dioxide is predominantly formed in gas combustion through 'thermal NO_x'. Thermal NO_x is the process of thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air to form NO_x.

Combustion also results in carbon monoxide (CO) emissions through incomplete combustion of fuel. However, as the combustion efficiency of gas engines and diesel engines is so high, and background levels of CO are so low, potential impacts from CO emissions are negligible.

Particulate matter emissions are likely to be caused by construction activities and due to the disturbance and handling of material. Construction emissions will be infrequent and transient and will be managed through best practice measures to avoid dust emissions through a Construction Environmental Management Plan (refer to Section 5).

Greenhouse gases

Greenhouse gases in the earth's atmosphere include carbon dioxide, methane, nitrous oxide, and ozone.

In relation to greenhouse gas emissions, Arrow Energy supports the international, Australian and Queensland objective of achieving net zero emissions by 2050, which is designed to limit the global temperature increase.

The latest *Queensland State of the Environment Report 2020* covers an analysis of GHG emission trends for the period 1990 – 2018 for the following sectors:

- energy;
- industrial processes;
- agriculture;

- land use change, forestry; and
- waste.

When considering the existing environment and greenhouse gas, it is also important to consider global and local trends to achieve the global goal of net zero GHG emissions by 2050.

Australian natural gas is pivotal to reaching net zero in Australia and the region, supporting the transition away from coal, providing the firm dispatchable energy required to unlock renewable energy potential, and powering Australian industries including those processing the critical minerals necessary for net zero.

GHG emissions are estimated using standard methods for the accounting and reporting of six (6) greenhouse gases covered by the Kyoto Protocol: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulfur hexafluoride (SF_6).

The standard methods are consistent with international guidance on greenhouse gas reporting provided by the World Business Council for Sustainable Development and the World Resources Institute Greenhouse Gas Reporting Protocol (The GHG Protocol). These methods are also incorporated into Australian legislation through the NGER (Measurement) Determination.

Noise

The areas surrounding the Project area are predominantly rural in nature, with land uses such as grazing, pre-existing gas field development, and overlapping mining tenures dominating.

Existing road infrastructure typically includes a number of rural secondary roads linking the major regional road network, as well as numerous CSG field access roads and mining activities.

Existing noise sources are generally typical of rural roads and include fauna (birds and insects), traffic and local sources associated with mining activity and rural based human occupation.

The environmental values to be enhanced or protected under the EPP (Noise) are:

- The qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems.
- The qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following: sleep, study or learn or be involved in recreation, including relaxation and conversation.
- The qualities of the acoustic environment which are conducive to protecting the amenity of the community.

The deemed minimum background noise levels as stated in the DETSI Guideline *Streamlined Model Conditions (SMC) for petroleum activities* apply to the Project (refer to . The deemed minimum background noise levels are considered applicable to the Project area, given its rural nature and the expected low background noise levels within this area.

Table 4-3 Deemed background noise levels as per SMC (DETSI, 2016)

Time Period	Deemed Background Noise Level (dBA)
6:00 am – 7:00 am (morning)	30
7:00 am – 6:00 pm (day)	35

Time Period	Deemed Background Noise Level (dBA)
6:00 pm to 10:00 pm (evening)	30
10:00 pm – 6:00 am (night)	25

Noise sources relevant to the SGP North EA, including sources relevant for this amendment are summarised in **Table 4-4**.

Table 4-4 Overview of Project noise sources and assessment approach

Noise Source	Description of noise source	Noise Impact Assessment Approach
Construction		
Construction of new wells through drilling and completion rigs	Drilling and other rig activities, which typically involves drilling, workovers, completions, and flaring activities. Rig activities can operate on a 24 hour basis and can last from anywhere between two days up to a month depending on the depth of the well, type of well and the geology of the area. Rig activities can produce impulsive noise (e.g., impacts of drill tools) as well as constant noise. Noise from diesel engines vary according to load and speed, but the main component of the sound is the fundamental rotation speed. Flaring or venting can occur during rig activities to dispose of gas that cannot be processed in a safe manner. Typically, flaring or venting is a minor source of noise relative to the total noise of drilling activities and is only discernible in the context of other well pad construction noise within relatively short distances from the flare.	Noise assessments are conducted on each rig contractor, and these are used to determine required separation distances to achieve Arrow Energy's noise limits. Each well and rig activity is assessed to determine whether activity restrictions are required (e.g., noisy rig activities restricted to daytime only)
Construction of access tracks and gathering lines	General construction activities undertaken on Arrow Energy tenure can potentially result in noise impacts. Construction noise levels inevitably depend upon the number of plant and equipment operating at any one time and on their precise location relative to the sensitive receptor(s). Therefore, a sensitive receptor may experience a range of values representing "minimum" and "maximum" construction noise emissions.	Noise assessments have been conducted using conservative operating assumptions to derive a maximum distances where daytime noise may cause an issue. Where construction is planned to be within the maximum separation distance, additional controls are required to minimise risk of daytime construction noise impact (e.g., reduced equipment operating at a time, site specific assessment and monitoring).

Noise Source	Description of noise source	Noise Impact Assessment Approach
Operation		
Operation of wells/well pad noise	The operation of wells is a long term noise event that occurs on a 24-hour basis. The main noise impacts from the operation of wells relate to: • Gas fired generators – contained within an enclosure on the well pad • Well drive heads • Well head motors • Gas flows especially through pressure control valves (PCV) and across orifice plates where there is significant differential pressure and turbulent flow Noise levels generated by operating well pads are dependent on a number of factors including: • number of generators, • generator loads, • well pump type, • drive head type, and • well pad gas flow rate.	Arrow Energy has conducted detailed noise assessments of well pad noise levels and associated separation distances to achieve required noise levels. Well pads are located and/or configured with noise attenuation features to achieve Arrow Energy's nighttime noise limit under maximum load and worst case weather conditions.
Operation of gathering lines	Noise from high point vents is intermittent and highly variable due to varying water pressures and volumes of gas in the water lines over time.	Noise measurements have been made from a sample of high emitting high point vents in Arrow Energy's operating gas fields. Separation distances have been derived to achieve < 25 dBA under worst case HPV operation and worst case weather conditions Where these separation distances cannot be achieved noise attenuated HPVs can be used.
Operation of camps and other incidental activities	Noise from small diesel generators	Noise impact is screened using methodologies in Arrow Energy's Environmental Noise and Vibration Management Plan. Noise is minimised and sources are located to ensure compliance with relevant Environmental Authority noise criteria.

The EPP (Noise) contains Acoustic Quality Objectives (AQO) for receptors potentially sensitive to noise. Where the overall level of noise at the receptors, from all sources but excluding road and rail transport noise, are within the AQO, the environmental values are considered to be achieved.

The Queensland Department of Environment, Tourism, Science, and Innovation (DETSI) has published a noise assessment guideline entitled *Prescribing noise conditions for environmental authorities for petroleum activities* (DESI, 2016), which is intended to assist in the assessment of noise impacts and the development of noise conditions for petroleum activities within the general framework provided by the EP Act.

This guideline addresses noise management and includes best practice noise emission limits for CSG activities.

The guideline noise limits are designed to protect the acoustic values of a sensitive receptor in rural or isolated areas and to satisfy the acoustic quality objectives of the EPP (Noise) whilst considering cumulative impacts and background creep.

Best practice measured noise emission limits for long term noise exposure applicable to the Surat Basin from the DETSI's guidelines of 2016 and 2022 for each of the specified daily time periods are provided in **Table 4-5**. These noise limits closely align with the 'Streamlined Conditions' contained within the *Streamlined model conditions for petroleum activities* (DETSI, 2016), effective 5 May 2016.

Table 4-5 Best Practice measured outdoor Nosie emission limits (DETSI, 2016)

Time Period	Time of Day	Metric	Long Term Noise Limit (dBA) [a]
6:00 am – 7:00 am	Morning	$L_{Aeq, adj, 15\ minutes}$	35 ($L_{ABG + 5}$)
7:00 am – 6:00 pm	Day	$L_{Aeq, adj, 15\ minutes}$	40 ($L_{ABG + 5}$)
6:00 pm – 10 pm	Evening	$L_{Aeq, adj, 15\ minutes}$	35 ($L_{ABG + 5}$)
10:00 pm – 6:00 am	Night	$L_{Aeq, adj, 15\ minutes}$	28 ($L_{ABG + 3}$)
		Max $L_{pA, 15\ minutes}$	55

[a] LABG is the deemed background noise levels which are:
6:00 am – 7:00 am: 30 dBA
7:00 am – 6:00 pm: 35 dBA
6:00 pm – 10:00 pm: 30 dBA
10:00 pm – 6:00 am: 25 dBA

The night period is considered the most critical daily period in respect to noise compliance. Compliance with the long-term night noise limit for operating plant and equipment will ensure compliance with the noise limit for all other daily periods. Furthermore, for continuous operating plant, compliance with the nighttime limit of 28 dBA demonstrates under worst case operating conditions and worst-case weather conditions sufficiently protects against the risk of "background creep". The risk of background noise creep for temporary noise sources is very low due to their temporary nature and background noise creep being a long-term measure.

4.1.2 Assessment of environmental impacts

Air quality

An air quality impact assessment was conducted by SLR Consulting for the broader SGP North for the amendment to the development of the initial 214 wells, including the SGP North FCS and impacts from associated activities such as drill rigs and operation of well head engines, and also construction, from the generation of dust. This assessment was provided to DETSI as part of the SGP North EA (EA0001399) amendment approved on 7 November 2024.

The main potential air quality impacts associated with construction activities are nuisance and health related impacts due to fugitive dust emissions from earthworks. These potential impacts

have been assessed qualitatively by SLR Consulting with the beforementioned amendment to the SGP North EA, approved on 26 January 2026.

As mentioned, expected emissions to air during the construction activities will be primarily due to dust (i.e., particulate matter) associated with earthworks and the movement of vehicles, with some minor sources of combustion products such as nitrogen oxides (NO_x) and carbon monoxide (CO) expected from diesel vehicles and small diesel generators. Emissions from larger diesel rig engines have negligible impact of air quality values. Likewise, emissions from small diesel generators, used for camps and pump stations, which are much lower than rig engines, will also have negligible impact on air quality values.

Modelling of dust from construction activities is generally considered not appropriate, as emission rates can vary significantly depending on a combination of the activity and prevailing meteorological conditions (i.e., rainfall and wind speed), which cannot be reliably predicted.

As such, it is estimated that there will be no change to the emissions generated by the abovementioned sources as a result of this amendment application, i.e., construction of access tracks and gathering lines, and the construction of new wells through drilling, and impacts to air quality and EA conditions are already in place within the current SGP North EA (EA0001399, 28 January 2026).

Greenhouse Gases (GHG)

Forecast operational GHG emissions associated with the proposed new activities as part of the SGP North Stage 1 (i.e., 214 wells and gathering, and associated infrastructure) include the following sources:

- Scope 1 emissions: *'Direct emissions from sources within the boundary of an organisation such as fuel combustion and fugitive GHG emissions'*
    - Venting from well completions, well workovers, gas gathering lines (blowdowns and mishaps) and pressure relief valves (PRVs) at the gas fields;
    - Leaks from gas wells, gas gathering lines and produced water (entrained and dissolved methane) at the gas fields; and
    - Fuel gas combustion in CSG engines at well pads.

    Immaterial Scope 1 emissions sources that correspond to approximately 1% of Arrow Energy's current total NGER emissions for its operated gas fields and compression facilities are excluded, such as:

    - Liquid fuels consumed in light vehicles (owned or leased by Arrow Energy) and miscellaneous stationary combustion equipment (e.g. pumps, small generators, black start equipment);
    - Petroleum based oil and greases combustion in internal combustion engines; and
    - Sulfur hexafluoride used in switchgears.

- Scope 2 emissions: *'Indirect emissions from the consumption of purchased electricity, steam or heat produced by another organisation. Scope 2 emissions result from the combustion of fuel to generate the electricity, steam or heat and do not include emissions associated with the production of fuel'.*
    - Not applicable.

- Scope 3 emissions: *'All other indirect emissions that are a consequence of an organisation's activities but are not from sources owned or controlled by the organisation'*.
    - Purchased goods and services (e.g., Diesel consumption for drilling activities is anticipated to be the biggest source of construction emissions);
    - Downstream transportation and distribution; and
    - Processing of sold products.

GHG emissions due to land use change are also excluded. This is on the basis that:

- SGP North Stage 5 includes a commitment/requirement to minimise land disturbance and clearing, and an obligation to rehabilitate land to its original condition;
- cleared areas are also subject to offset requirements under the Environment Protection and Biodiversity Conservation (EPBC) Act and Environmental Offsets Act. Offsets made under the EPBC Act or Environmental Offsets Act do not result in carbon credits under the Carbon Credits (Carbon Farming Initiative) Act 2011 due to 'regulatory additionality' and that the offset areas also offset the land clearing emissions;
- as such, over the life of the activity, GHG emissions due to land use change are forecast to be net zero due to rehabilitation and environmental offset activities; and
- these emissions are not required to be reported under the NGER Scheme.

Noise

Environmental noise impacts are informed by various studies conducted by Arrow Energy and management is achieved through implementation of Arrow Energy's environmental noise and vibration management plan.

Noise assessments have been conducted on common CSG activities to inform planning and constraints analysis to avoid noise impacts from CSG activities. These activities are not all part of this EA amendment but are included for completeness and are summarised as follows:

Well pad noise

Arrow Energy has developed a well pad noise assessment tool based on noise measurements and modelling on Arrow Energy's operating well pads. The well pad noise assessment tool is used to inform:

- Required separation distances from sensitive receptors to operating well pads; and
- Site specific well pad configuration(s) to achieve noise limits

High point vent noise

Noise measurements have been made from a sample of high emitting high point vents in Arrow Energy's operating gas fields.

Separation distances have been derived to achieve less than 25 dBA under worst case HPV operation and worst-case weather conditions.

Almost all HPVs can be located to achieve this noise criteria. Where the separation distance cannot be achieved, noise attenuated HPVs can be used.

Well pad rig noise

Arrow Energy has an activity specific noise management plan for rig operations and has also introduced minimum noise performance standards for rig operators. This is driving continual improvement in noise performance from rig operations from Arrow Energy tenure through the design and implementation of attenuated sources within the rig carriers and associated equipment.

Modifications to rigs to reduce the noise impact have included, but are not limited to:

- Design and implementation of acoustic enclosures for noisy equipment
- Installation of rubber matting along pipe racks
- Replacing tonal reversing alarms with broad spectrum squawker alarms
- Heavy duty silencers on exhausts
- Acoustic cladding on mud pumps; and
- Ventilation chutes directing noise upwards and not horizontally

Construction noise

Arrow Energy limits construction activities to daytime only to avoid noise impact. Furthermore, conservative noise assessments have been made to derive maximum distances where daytime noise may cause an issue.

Where construction is planned to be within the maximum separation distance, additional controls are required to minimise risk of daytime construction noise impact.

Operation of camps and other incidental activities, such as warehouse, offices, camps and other incidental activities may have minor noise sources associated with their operations such as diesel generators. These sources of noise are selected in order to avoid noise through selection of less noisy equipment and inclusion of appropriate noise abatement technology (e.g. exhaust silencers). Sources of noise from incidental activities are also located with sufficient separation distances to sensitive receptors to avoid amenity noise impact.

Management practices for air and noise are presented in Section 5.

4.2 Biodiversity

4.2.1 Existing environment

The Study area is located approximately 20 km north-east of Miles in the Barakula subregion of the Brigalow Belt Bioregion. To enable a thorough assessment of biodiversity values and potential impacts, the Study area is comprised of the Project footprint (refer to **Figure 1-2**) and an adjoining 500-metre buffer zone (refer to **Figure 4-1**).

The Study area is predominantly characterised by Least concern vegetation in different stage of conservation (i.e., remnant, regrowth) with disturbed area by roads or access tracks, tree removal and fire. These remnants are primarily classified as gentle slopes plain eucalypt woodland to open forest ecosystem on land zone five and seven, with a canopy structure dominated by *Eucalyptus crebra*, *E. fibrosa* and *E. decorticans*. Alluvial plan areas were identified in a smaller portion of the vegetation present (a 3.5%) with an open woodland dominated by *E. populnea* and *E. tereticornis*. These vegetation communities are dissected by open forest to woodland associated with L Tree Creek and Dog wood Creek.

The Project intersects the Terrestrial Biodiversity Corridor and buffer that enhance connectivity between area of high ecological values, promoting the movement of species and the persistence of ecological processes.

Environmentally Sensitive Areas (ESAs)

Under the Environmental Protection Regulation 2019 (EP Regulation), ESAs are categorised into Categories A, B, and C, reflecting varying levels of ecological significance and regulatory protection. The associated eligibility criteria and standard environmental conditions applicable to petroleum activities, as outlined by the then Department of Environment and Heritage Protection (DEHP, 2013), are summarised in **Table 4-6**. The recent inclusion of a Category C ESA for a Protected Wildlife Habitat (PWH) is provided in **Table 4-6**.

Table 4-6 ESAs occurrence within the SGP North Stage 5 Study Area

ESA Category	ESA Type	Occurrence in the Study area
Category A	Any of the following under the *Nature Conservation Act 1992:*	
	National Park (scientific)	None
	National Park	None
	National Park (Aboriginal land)	None
	National Park (Torres Strait Islander land)	None
	National Park (Cape York Peninsula Aboriginal land)	None
	Conservation Park	None
	Special wildlife reserve	None
	Forest reserve.	None
	The Wet Tropics Area under the Wet Tropics World Heritage Protection and Management Act 1993.	None
	The Great Barrier Reef Region under the *Great Barrier Reef Marine Park Act 1975*;	None
	A marine park under the Marine Parks Act 2004, other than a part of the park that is a general use zone under that Act.	None
Category B	Any of the following areas under the *Nature Conservation Act 1992:*	
	Coordinated conservation area	None
	An area of critical habitat or major interest identified under a conservation plan.	None
	An area subject to an interim conservation order.	None
	An area subject to the following conventions to which Australia is a signatory:	
	The 'Convention on the Conservation of Migratory Species of Wild Animals' (Bonn, 23 June 1979);	None
	The 'Convention on Wetlands of International Importance, especially as Waterfowl Habitat' (Ramsar, Iran, 2 February 1971);	None
	The 'Convention Concerning the Protection of the World Cultural and Natural Heritage' (Paris, 23 November 1972).	None
	A zone of a marine park under the *Marine Parks Act 2004* that is within a general use zone of the marine park under that Act.	None
	An area to the seaward side of the highest astronomical tide.	None
	The following under the Queensland Heritage Act 1992:	
	Place of cultural heritage significance	None
	Queensland heritage place, unless there is an exemption certificate issued under that Act.	None

ESA Category	ESA Type	Occurrence in the Study area
	An area recorded in the Aboriginal Cultural Heritage Register established under the *Aboriginal Cultural Heritage Act 2003*, section 46, other than the area known as the 'Stanbroke Pastoral Development Holding', leased under the *Land Act 1994* by lease number PH 13/5398.	None
	A feature protection area, State Forest Park or Scientific area under the *Forestry Act 1959*.	None
	A declared fish habitat area under the *Fisheries Act 1994*.	None
	An 'Endangered Regional Ecosystem' identified in the Regional Ecosystem Description Database (REDD) (by biodiversity status).	None
Category C	Nature refuges as defined in the conservation agreement for that refuge under the *Nature Conservation Act 1992.*	None
	Koala habitat areas as defined under the Nature Conservation (Koala) Conservation Plan 2006.	None
	State forests or timber reserves as defined under the *Forestry Act 1959*	None
	Regional parks (previously known as resource reserves) under the Nature Conservation Act 1992.	None
	'Of concern regional ecosystems' that are remnant vegetation and identified in the database called 'RE description database' containing regional ecosystem numbers and descriptions.	RE 11.3.2 is mapped in the Study area. These communities are discussed in and mapped in **Appendix C**.
	An area validated from ground-truthing surveys as 'protected wildlife habitat' that is category A, B or C on the remnant vegetation management map, in accordance with section 20A of the Vegetation Management Act 1992, for a species of wildlife listed as critically endangered, endangered or vulnerable under the Nature Conservation Act 1992.	Protected wildlife habitat for endangered and vulnerable species occurs within the Study area. Refer to **Appendix C**.
	An area validated as from ground-truthing surveys as 'essential habitat' on the Queensland Government essential habitat map in accordance with section 20AC of the Vegetation Management Act 1999 for a species of wildlife listed as critically endangered, endangered, vulnerable under the Nature Conservation Act 1992.	Essential Habitat for *Nyctophilus corbeni* occurs within the Study Area. Refer to **Appendix C**.

The ESA areas that are within and in the vicinity of the Study area are shown in **Appendix C**.

Vegetation communities

Consistent with the broader landscape condition of the Brigalow Belt bioregion, the Study area shows a good percentage of native vegetation, comprising 90% (9,506.4 ha) of the total area (*Vegetation Management Act 1999* (VMA)). Historical and ongoing land use practices, predominantly broadscale agricultural clearing and livestock grazing, have resulted in extensive habitat loss, landscape fragmentation, and ecological degradation. The non-remnant vegetation is largely confined to small, isolated patches, associated with roads and access tracks, tree removal, and fire disturbances.

Vegetation mapping supplied by the DETSI identified six (6) Regional Ecosystems (REs) within the Study area (refer to **Appendix C**). The classification, conservation status and total mapped areas of these REs (i.e., Government mapped REs) are detailed in Table 3.2 of **Appendix C**. This includes one (1) RE classified as 'Of Concern' under the VMA, meaning they have been

substantially cleared or degraded and now occur in less than 2.2% of their pre clearing extent, and 'Non-remnant' areas, which predominantly consist of cleared land used for roads and/or access tracks, tree removal, fire disturbances, or other modified land uses, and lack remnant vegetation structure and function.

The REs within the Study area were 'ground-verified', i.e., ground-truthed RE, or GTRE, from detailed vegetation community surveys incorporating systematic ground-truthing and high-resolution spatial analysis as outlined in **Appendix C**. The mapping integrates field-validated data with existing RE datasets to improve the delineation of vegetation community boundaries and the attribution of biodiversity status classifications. The final outputs, stratified by biodiversity status, are presented in Figure 3.6 of **Appendix C**. All six (6) REs in the VMA mapping for the Study area were detected during field surveys. In addition of the REs showed on VMA mapping, seven (7) REs had been detected within the Project footprint (refer to **Figure 1-2** and **Appendix C**). No vegetation communities classified as 'Endangered' were identified within the Study area.

'Of concern REs' within the Study area are restricted to alluvial systems, typically occurring as narrow linear remnants or small patches along waterways and drainage lines, limited impacts are associated with linear infrastructure crossings. See Section 4.2.2 for more detail on impacts from the SGP North Stage 5 development on 'Of concern REs' due to linear infrastructure crossings.

Protected plants trigger mapping and threatened flora species

The Project proposed infrastructure intersect a 'high-risk' area on the Protected Plant Survey Trigger Map of approximately 20 ha, split into lot plans 36AU35 and 21AU37. The Project footprint, including areas near the mapped 'high-risk' trigger area, was surveyed by a suitably qualified Arrow Energy ecologist using a combination of secondary and quaternary flora survey techniques, supplemented by informal meander surveys. These approaches were used to gather comprehensive data on vegetation communities, assess potential habitat for threatened species, and identify ecological constraints such as the occurrence of threatened or near threatened plant species. The impact area under a 'high-risk' area on the Protected Plant Survey Trigger Map will be surveyed according with the latest version of the Flora Survey Guideline – Protected Plants – *Nature Conservation Act 1992* (NC Act).

A desktop ecological assessment identified three (3) threatened flora species and one (1) near-threatened flora species listed under the NC Act within a 50 km buffer of the Study area. Of these, two (2) species were assessed as 'Likely to occur' and one (1) are 'Possible to occur' within the Study area, based on habitat suitability, regional records, and ecological context (refer to **Appendix C**).

It is acknowledged that habitat associated with near threatened flora species does not meet the criteria for classification as an ESA, nor does it constitute a PEM under the EO Act. While the identification or potential occurrence of near threatened species within the Study area requires consideration under the NC Act, this does not translate to offset obligations or conditions within the EA. The assessment of potential impacts on these species is addressed independently in **Appendix C** in line with NC Act requirements.

Fauna habitat – vegetation, watercourses, and State forests

The Study area is dominated by Least concern vegetation areas. The remaining vegetation is dominated by eucalypt woodland to open forest habitats on soils Tertiary-early Quaternary loamy and sandy plains and plateaus and Cainozoic duricrusts. Predominantly characterised by old near

level to gently undulating loamy and sandy plains, with minor ironstone jump ups and associated scarps.

The majority of the Study area (87.5%) is mapped as 'Least concern' vegetation in different stages of conservation value (i.e., remnant and regrowth) and age. The remaining vegetation communities (2.2%) are situated along the creeks L Tree Creek and Dogwood Creek with the biodiversity status classified as 'Of concern'. These vegetation communities for both mentioned biodiversity status, range from early regrowth dominated by young, fast-growing species or resprouts to old-growth vegetation with an intact canopy and clear vertical stratification.

The habitat is dominated by *E. crebra*, *E. fibrosa* and *E. decorticans* which alternate between dominance and sub-dominance depending on the section, with Callitris glaucophylla and/or Allocasuarina luehmannii consistently present as a sub-dominant species and Allocasuarina luehmannii the most common associated species. Based on GTRE mapping, the Study area supports the broad habitat types described in Table 3.5 of **Appendix C**, mainly woodlands, alluvial woodlands, shrub, regrowth, and cleared (for details please refer to **Appendix C**).

The primary watercourse-related feature within the Study area is the L Tree Creek and Dogwood Creek, a major watercourse in the Murray-Darling Basin. The Brigalow Belt bioregion is known for its waterway systems, which often provide the only remaining landscape connectivity. These watercourses are significant landscape features that function as key migratory and dispersal corridors for a wide range of fauna, supporting diverse habitat requirements such as access to food, water, and shelter. The waterways present within the Study area contribute to local surface water dynamics and influence riparian vegetation patterns, floodplain processes, and the formation of associated alluvial landforms across the landscape.

The Project will not impact any area classified as state forest, hence the description of any existing environment relating to state forests is excluded from this report.

Conservation-significant fauna species

A desktop assessment for threatened fauna species was conducted to establish Likelihood of Occurrence (LOO) within the Study area. This assessment identified records of 42 threatened fauna species, of which two (2) are listed as Matters of National Environmental Significance (MNES) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) but not recognised as threatened as Matter of State Environmental Significance (MSES) under the *Nature Conservation Act 1992* (Qld) (NC Act). These two species, *Maccullochella peelii* (Murray cod) and *Pteropus poliocephalys* (Grey-headed flying-fox), which are also considered 'Unlikely to occur' within the Study area, are excluded from the impact assessment.

Of the total threatened fauna species considered, 12 species under the NC Act were assessed. Of these, seven (7) were assessed as 'Known to occur' and five (5) were assessed as 'Likely to occur' within the Study area, based on a combination of desktop records and habitat suitability (refer to **Appendix C**).

Table 3.6 of **Appendix C** provides a detail of the LOO assessment of species within the Study area and the requirement for inclusion as a PEM within the SGP Norh EA (EA0001399). A summary of those species 'Known to occur' and 'Likely to occur' within the SGP North Stage 5 Study area is provided in **Table 4-7**, where seven (7) species are 'Known to occur' and five (5) species are 'Likely to occur' within the Study area.

Table 4-7 Fauna species' Likelihood of Occurrence (LOO) within the SGP North Stage 5 Study area

Specie - Scientific name (common name)	LOO within the Study area
Invertebrates	
Adclarkia cameroni (Brigalow Woodland Snail)	Likely to occur
Adclarkia dulacca (Dulacca Woodland Snail)	Likely to occur
Jalmenus eubulus (Pale imperial hairstreak)	Likely to occur
Reptiles	
Strophurus taenicauda (Golden-tailed gecko)	Known to occur
Birds	
Calyptorhynchus lathami lathami (Glossy-black cockatoo (eastern))	Known to occur
Hirundapus caudacutus (White-throated Needletail)	Known to occur
Stagonopleura guttata (Diamond firetail)	Known to occur
Mammals	
Nyctophilus corbeni (Eastern Log-eared bat)	Known to occur
Petauroides volans volans (Greater glider)	Known to occur
Petaurus australis australis (Yellow-bellied glider)	Likely to occur
Phascolarctos cinereus (Koala)	Known to occur
Tachyglossus aculeatus (Short-beaked Echidna)	Likely to occur

Details of the species' typical habitat, habitat within the SGP North Stage 5 development and local records are provided in **Appendix C**.

4.2.2 Assessment of environmental impacts

The planning and management of surface activities and ground disturbance are guided by a set of hierarchical management principles aimed at avoiding, minimising, and mitigating impacts to biodiversity values. These principles are: Avoid, Minimise, Mitigate, Remediate and rehabilitate, and Offset. The proposed field development configuration for SGP North Stage 5 has been engineered in accordance with this management hierarchy.

The Study area exhibits significant native vegetation remnants constituting 87% of the area. An additional 2.9% supports regrowth and 10% non-remnant vegetation. Consequently, the development of the SGP North Stage 5 necessitates the removal of remnant vegetation. However, through the application of the mitigation hierarchy, the Project footprint's impact on remnant vegetation has been restricted to 3.3% (349.2 ha) of the total Study area. To minimise habitat fragmentation and reduce temporary construction impact, proposed flowlines and other linear infrastructure are primarily situated adjacent to existing infrastructure or within previously disturbed areas. Furthermore, the selection of infrastructure locations and the overall field layout were significantly influenced by various planning and access limitations, such as the presence the L Tree Creek, Warramoo, Hookswood Pelham, Tumba and Kowguran Roads.

The values and impact on ESAs and PEMs have been reported using a Study area around the development footprint (refer to Figure 1.1 of **Appendix C**), which is an area of 500 m buffer from the project footprint) (refer to **Figure 4-1**).

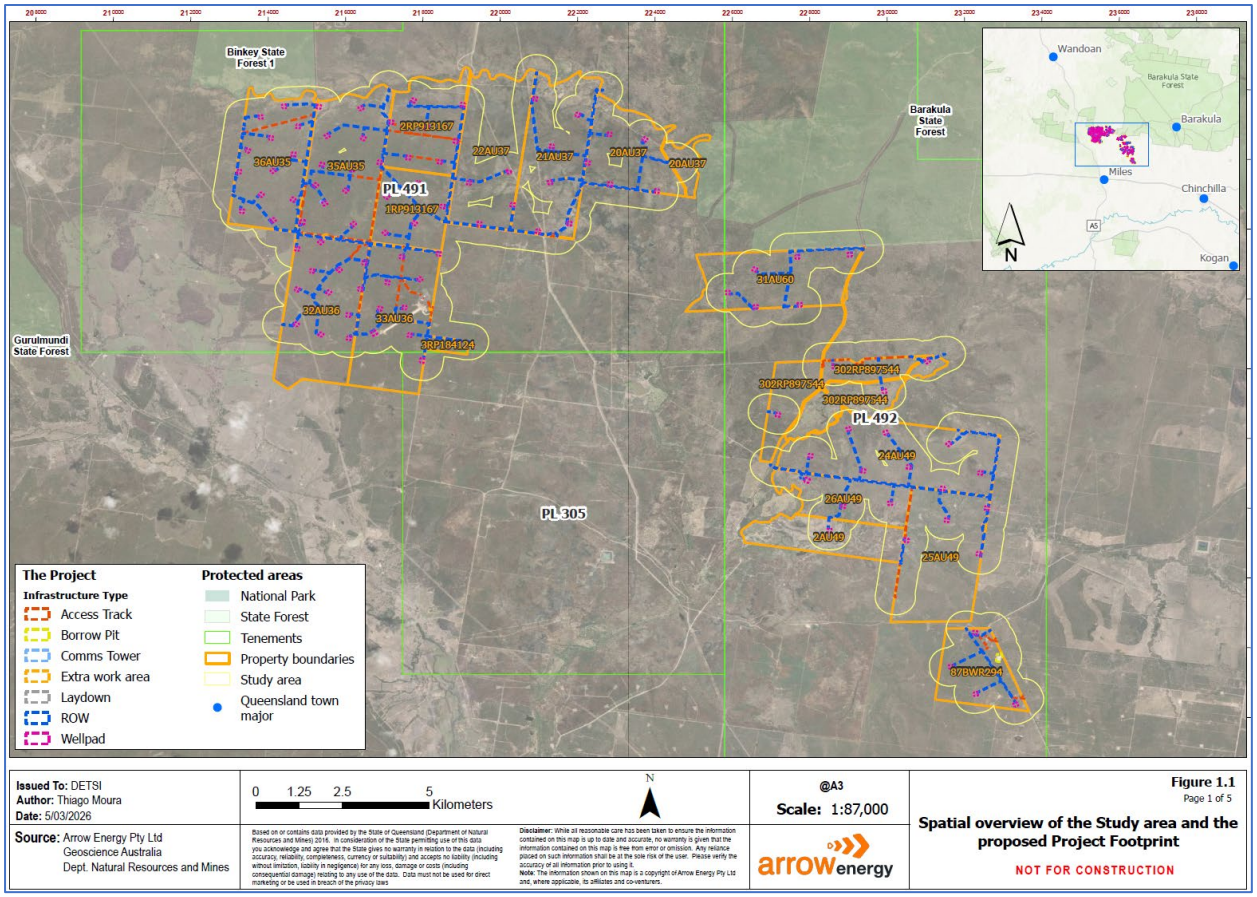

Figure 4-1 SGP North Stage 5 and Biodiversity Impact Study Area (500m buffer zone)

Vegetation clearing

The primary impact associated with the proposed development within the Study Area is the direct loss of vegetation resources resulting from construction of Project infrastructure. Specifically, these impacts include:

- Approximately 3.3% of the native remnant vegetation within the Study Area;
- Regrowth vegetation representing approximately 0.3% of the native vegetation within the Study Area; and
- Regrowth undifferentiated vegetation representing approximately 0.1% of the total vegetation within the Study Area.

Due to the extensive areas of native vegetation within the Study Area, landholder preferences influenced Arrow Energy's application of the abovementioned hierarchical management principles. While the removal of remnant and regrowth vegetation is an unavoidable consequence of the development of the Project, Arrow Energy has adopted best environmental practices to minimise environmental impacts and where possible, avoid these.

Details of impacts to vegetation communities are provided in Table 4.1 of **Appendix C**. A summary of impacts to vegetation communities due to the development of the SGP North Stage 5 is provided in **Table 4-8**.

Table 4-8 Impacts to vegetation communities from SGP North Stage 5

Vegetation community	Total Impact area (ha)
Remnant 'Of concern'	1.0
Remnant 'No concern at present'	348.7
Regrowth 'Of concern'	0.7
Regrowth 'No concern at present'	20.1
Regrowth 'Undifferentiated'	5.6
Non-remnant	47.6

Habitat fragmentation and landscape connectivity

Habitat fragmentation is defined as the process by which contiguous habitat expanses are divided into multiple smaller, isolated segments. This phenomenon comprises two interconnected elements: habitat reduction (i.e., a decrease in the total available habitat) and the actual fragmentation (i.e., the dissection of habitat, leading to amplified 'edge effects') (Bennet, 2006). The consequences of habitat fragmentation are contingent upon the spatial scale and may vary based on the specific species or ecological community under consideration. For instance, the removal of minor habitat areas that do not impede the movement of highly mobile species (e.g., raptors) could, conversely, pose a substantial dispersal barrier for less mobile or wide-ranging species (e.g., amphibians or small reptiles).

The vegetation removal for gas field developments within remnant areas is executed incrementally. Disturbance zones typically encompass approximately 20-40 meters width for linear corridors, while surrounding vegetation remains undisturbed.

The Landscape Fragmentation and Connectivity (LFC) Tool was run for the SGP North Stage 5 area based on Arrow Energy's GTRE mapping and DETSI RE mapping and identified *no significant impacts on connectivity* due to its development. Detailed results from the LFC Tool are provided within **Appendix C**. Loss of connectivity at the patch scale largely depends on the species under consideration. Impacts associated with linear infrastructure corridors and waterway crossings are considered in detail in **Appendix C**.

Impacts to hollow-bearing trees

The species *P. v. volans* (Greater glider) and *P. a. australis* (Yellow-bellied glider) are assessed as 'Likely to occur' and 'Possible to occur' within the Study area (refer to **Table 4-7**). This is associated with large, relatively old eucalyptus trees with hollows (Eyre, 2004; Eyre, 2007) as these species require large hollows suitable for sheltering and nesting.

Large trees and hollows are captured on the Ecological Field Surveys (EFS) data sheets with counts of trees with hollows between 30 cm and 50 cm. Based on the ecological survey reports data, a significant proportion of the Study area does not contain large trees with hollows.

Indirect impacts on ecological values and State forests

Indirect impacts on ecological values from the development of the SGP North Stage 5, such as: edge effects, dust generation, increased noise and lightning, and potential fauna mortality from vehicle collision will be managed in accordance with Arrow Energy's existing Environmental Management Framework.

The Project will not be developed within State forest land, therefore there are no impacts from the development of the SGP North Stage 5 on State forests.

Impacts on terrestrial flora values

Although no threatened or near threatened flora species have been identified within the Study area, the Project's proposed infrastructure intersect a 'high-risk' area on the Protected Plant Survey Trigger Map (PPSTM) (refer to **Appendix C**). The assessments of impacts to the identified high-risk area on the PPSTM will be surveyed in accordance with the latest version of the Flora Survey Guideline for Protected Plants under the *Nature Conservation Act 1992* (NC Act).

Impacts on Endangered Res by VM Class

No vegetation community classified as endangered have been identified within the Study area.

Impacts on 'Of concern REs' due to linear infrastructure crossings

As mentioned in section 4.2.1, 'Of concern REs' within the Study area are restricted to alluvial systems, typically occurring as narrow linear remnants or small patches along waterways and drainage lines and limited impacts are associated with linear infrastructure crossings.

Project impacts associated with linear infrastructure crossings include ROW for gathering infrastructure through narrow linear remnants of 'Of concern' RE 11.3.4 associated with Dogwood Creek.

Impacts on watercourse vegetation

The Project will disturb regulated vegetation located within proximity to watercourse banks; however, these are within the currently approved limits specified in the SGP North EA (EA0001399). These impacts are to the following REs:

- RE 11.3.14 - 0.3 ha
- RE 11.3.25 - 0.6 ha
- RE 11.3.4 - 0.7 ha
- RE11.5.1 - 1.9 ha
- RE 11.5.21 - 1.9 ha
- RE 11.5.4 - 0.2 ha
- RE 11.7.4 - 2.3 ha
- RE 11.7.7 - 0.6 ha

In the absence of Project-specific data defining the actual spatial location of defining banks, the watercourse centre line has been used to calculate the GTRE mapped vegetation within the defined distance relevant to the watercourse. Relevant impacts to regulated vegetation REs *(not within an urban area) within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map* were included in the proposed PEMs table as part of this EA amendment request (please refer to **Table 2-2** and marked-up EA provided in **Appendix A**).

The majority of the impacted vegetation is associated with minor waterways, i.e., these creek crossings are of minor waterways which will be trenched outside the wet season in accordance with Arrow Energy's standard crossing methodologies (refer to **Appendix C** for further details). A review of waterway crossing methods will be undertaken for all waterways that are stream order 4 or higher during the engineering design process.

Impacts to terrestrial fauna

The development of the SGP North Stage 5 will have an impact on protected wildlife habitat (PWH) of those species 'Known to occur' and 'Likely to occur' within the Study area (refer to **Table 4-7**), this is, for a total of 12 Species (refer to **Table 4-9**).

Significant Residual Impact (SRI) assessments were undertaken in accordance with the SRI Guidelines (DEHP, 2014) for endangered, vulnerable and special least concern fauna species, based on habitat, long-term decrease, and population. Details of these SRI assessments are provided in **Appendix C** and summarised in **Table 4-9**.

Table 4-9 Impacts to Prescribed Environmental Matters SGP North Stage 5

Specie - Scientific name (common name)	LOO within the Study area	PWH Status (NC Act)	SRI assessment and PEMs justification (*)	Potentially impacted area (PEMs)
Invertebrates				
Adclarkia cameroni (Brigalow Woodland Snail)	Likely to occur	Endangered	It is considered **UNLIKELY** that the Project will have a significant residual impact on the *A. cameroni*.	Not applicable
Adclarkia dulacca (Dulacca Woodland Snail)	Likely to occur	Endangered	It is considered **UNLIKELY** that the Project will have a significant residual impact on the *A. dulacca*.	Not applicable
Jalmenus eubulus (Pale imperial hairstreak)	Likely to occur	Vulnerable	It is considered **UNLIKELY** that the Project will have a significant residual impact on the *J. eubulus*.	Not applicable
Reptiles				
Strophurus taenicauda (Golden-tailed gecko)	Known to occur	Near threatened	Not applicable[4].	Not applicable
Birds				
Calyptorhynchus lathami lathami (Glossy-black cockatoo (eastern))	Known to occur	Vulnerable	It is considered **POSSIBLE** that the Project will have a significant residual impact on the *C. l. lathami*.	1.6 ha
Hirundapus caudacutus (White-throated Needletail)	Known to occur	Vulnerable	It is considered **UNLIKELY** that the Project will have a significant residual impact on the *H. caudacutus*.	Not applicable
Stagonopleura guttata (Diamond firetail)	Known to occur	Vulnerable	It is considered **POSSIBLE** that the Project will have a significant residual impact on the *S. guttata*.	356.4 ha
Mammals				
Nyctophilus corbeni (Eastern Log-eared bat)	Known to occur	Vulnerable	It is considered **LIKELY** that the Project will have a significant residual impact on the *H. caudacutus*.	350.4 ha

[4] Habitat for Near threatened species is not identified as a PEM under the *Environmental Offsets Act 2014* (EO Act).

Specie - Scientific name (common name)	LOO within the Study area	PWH Status (NC Act)	SRI assessment and PEMs justification (*)	Potentially impacted area (PEMs)
Petauroides volans volans (Greater glider)	Known to occur	Endangered	It is considered **LIKELY** that the Project will have a significant residual impact on the *P. v. volans*.	357.5 ha
Petaurus australis australis (Yellow-bellied glider)	Likely to occur	Vulnerable	It is considered **POSSIBLE** that the Project will have a significant residual impact on the *P. a. australis*.	357.5 ha
Phascolarctos cinereus (Koala)	Known to occur	Endangered	It is considered **LIKELY** that the Project will have a significant residual impact on the *P. cinereus*.	372.8 ha
Tachyglossus aculeatus (Short-beaked Echidna)	Likely to occur	Special Least concern	It is considered **UNLIKELY** that the Project will have a significant residual impact on the *T. aculeatus*.	2.9 ha (**)

(*) Refer to **Appendix C**.
(**) This impact is within the total area of impact for this species within the current SGP North EA (EA0001399).

Potential impacts to wildlife habitat from the development of the SGP North Stage 5, as provided in **Table 4-9**, are the subject of this EA amendment and being requested to be included in EA0001399 (SGP North EA) Condition (Biodiversity 11) *Schedule F, Table 3 – Authorised impacts to PEMS* (refer to **Table 2-2**).

Management practices for biodiversity are presented in Section 5.

4.3 Water and wetlands

4.3.1 Existing environment

The regional surface water environment within the Project area is comprised of two drainage basins which intersect the development area. The basin in the southern portion of the North project area is the Condamine-Culgoa Basin (primarily associated with the Balonne River catchment). The Condamine-Culgoa basin forms part of the Murray-Darling drainage division. The main watercourse is Dogwood Creek which flows into the Balonne River downstream of Miles.

The northern portion of the project area is located in the Fitzroy Drainage Basin which forms part of the Northeast Coast Drainage Division. Juandah Creek is the largest stream in this portion. This creek flows into the Dawson River and then the Fitzroy River.

The main channels of the major streams throughout the Project area are set within broad floodplains dominated by fine-grained, often cohesive alluvium. The larger streams such as Juandah and Dogwood Creeks have a dominant main channel and often several flood channels.

The hydrology of the surface waters flowing through the Project area has been extensively modified by land clearance, dams, weirs, and pumping infrastructure. Overland flow characteristics also vary, with vast areas of low-gradient floodplains or terraced surfaces generating little runoff except when saturated or under intense rainfall. When runoff is generated, expansive areas may be inundated.

Major floods occur on an average of every two years and generally in the months of late spring, summer, and autumn.

4.3.2 Assessment of environmental impacts

The environmental protection objectives for surface waters are:

- To avoid or minimise any degradation to water quality, water access, and the physical and biological characteristics of the watercourses and wetlands; and
- To maintain surface water amenity for the local community.

Potential impacts on surface water environmental values from the project's construction, operation and decommissioning activities include:

- Changes to physical form;
- Changes to hydrology; and
- Surface water quality degradation.

While the SGPEIS and SREIS (2013), available on Arrow Energy's website, provide details on potential impacts, the following is an overview. Most importantly, the planning for CSG development in regard to development on floodplains must consider the RPI Act Statutory Guideline (02/14) Carrying out resource activities in a Priority Agricultural Area (July 2017), given that a significant portion of lands in the Project area has been designated as a Priority Agricultural Area (PAA).

During construction, operation, and decommissioning of wells, gathering lines and associated facilities such as access roads, the following impacts could occur:

- Changes to physical form and diminished water quality from the removal of riparian vegetation and subsequent reduced bank stability and increased erosion and sediment mobilisation.
- Diminished water quality from the removal of terrestrial vegetation leading to increased runoff and sedimentation in the watercourses.
- Diminished water quality from controlled and uncontrolled releases of hydrotest fluids.
- Diminished water quality from spills of hazardous materials or drilling muds.
- Damage to farmers' assets (including cropland) from placement of infrastructure in floodplains.
- Diminished water quality from earthmoving and soil stockpiling leading to increased sedimentation in watercourses.
- Flooding, changes to physical form and changes to hydrology by placing infrastructure in surface water flow paths.
- Changes to physical form and diminished water quality from pipeline or vehicle watercourse crossings causing bed and bank erosion and subsequent mobilisation of sediment.
- Changes to hydrology due to blockages in streams from pipeline watercourse crossings.

Potential impacts from flooding are the inundation of infrastructure and diversion of overland flows caused by inappropriately sited well production facilities. Diverted flows can cause erosion, loss of topsoil and prolonged inundation of crops leading to losses. As there are no processing facilities proposed for the development area, floodplain management for this EA report is focussed on the effects of wells and gathering lines and associated infrastructure.

Arrow Energy has several methodologies available for pipeline construction across watercourses, including conventional 'open cut' trenching, watercourse flow diversion, and trenchless technologies, including standard open cut trenching, watercourse flow diversion, and horizontal directional drilling (HDD). A concise overview of each method, along with its respective advantages and disadvantages is conducted prior to execution. The Project only intersect bed-

level crossings of minor Department of Primary Industries (DIP) waterways (i.e. Low or Moderate categories). The impact on these waterways will be executed in adherence to the accepted development requirements stipulated by the waterway barrier self-assessable code or temporary code (DIP).

Management practices for water and wetlands are presented in Section 5.

4.4 Groundwater and underground water rights

4.4.1 Existing environment

Quaternary aged alluvial deposits are associated with the main streams in the area of the Project, this is, Juandah Creek in the north and Dogwood Creek in the south. These alluvial deposits are generally fine grained and cohesive, and confined to the floodplains of the streams. The physical aspects of these alluvial aquifers within the shallow groundwater system make them highly resilient to depressurisation impacts. The shallow groundwater system is dynamic, with several recharge mechanisms. Shallow aquifers in the project development area are predominantly recharged from surface drainage, however diffuse recharge and bedrock recharge can also occur.

The Jurassic aged Westbourne Formation, Springbok Sandstone, and Walloon Coal Measures of the Surat Basin are the main units that outcrop in the development area and sub crop under the alluvium, and overlie the Eurombah Formation, Hutton Sandstone, Evergreen Formation and Precipice Sandstone which outcrop further to the northeast of the development area.

The Westbourne Formation, Eurombah Formation and Evergreen Formation are considered tight aquitards, the Springbok Sandstone and Hutton Sandstone are partial or tight aquifers, and the Precipice Sandstone is a regional aquifer as described by OGIA . The Walloon Coal Measures are considered an interbedded aquitard, where the coal seams are thin, spatially limited water yielding zones interbedded in an otherwise tight aquifer.

4.4.2 Assessment of environmental impacts

The assessment of potential impacts to Groundwater Dependent Ecosystems (GDEs) as part of the SGPEIS/SREIS (2013) has been updated to inform the Surat Gas Project Stage 1 CSG Water Monitoring and Management Plan (WMMP, December 2018) to address the Surat Gas Project approval conditions under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), EPBC 2010/5344. The assessments included:

- identification of potential GDEs in the vicinity of the SGP;
- use of numerical groundwater modelling to predict areas of potential impact;
- correlation of potential GDEs with areas of potential impact to identify potentially at risk GDEs, including the consideration of:
    - direct observation during site visits to confirm the presence or otherwise of groundwater dependent vegetation;
    - site conceptualisation, including stratigraphy, depth to groundwater (including historical variability), characteristics of vegetation present and position in landscape;
    - interpreted GDE source aquifer; and
    - ecosystem resilience and adaptability.

A Water Monitoring Strategy (WMS) is included in the Surat Cumulative Management Area (CMA) Underground Water Impact Report (UWIR) 2021 and reflected in the WMMP for Arrow Energy

obligations. The WMS includes an integrated regional monitoring network to collect data on water pressure and water quality in the Surat CMA across a network of monitoring points and sites, monitoring all major aquifers and aquitards in the Surat CMA.

The WMS assigns requirements to petroleum tenure holders to establish the regional monitoring network, undertake routine monitoring and reporting of results and report water production data from petroleum gas and wells. The Office of Groundwater Impact Assessment (OGIA) will routinely assess the monitoring results and report on these annually. Arrow Energy will implement the elements of the UWIR WMS for which it has been assigned responsibility.

Arrow Energy has installed a comprehensive regional groundwater monitoring network that satisfies its obligations as described in the groundwater impact reports in the SPGEIS and SREIS and confirmed in Chapter 9 of the 2021 UWIR, and Chapter 6 and 7 of the Stage 1 and Updated WMMP, respectively. The objectives of this network are to:

- Establish baseline groundwater level and groundwater quality conditions;
- Assess natural variation (i.e. seasonal variations) in groundwater levels;
- Monitor groundwater levels during the operational phase;
- Establish suitable datum levels for each aquifer system;
- Target sensitive areas where more frequent monitoring and investigation is required (e.g. groundwater dependent ecosystems);
- Monitor groundwater drawdown as a result of CSG extraction;
- Monitor impacts in accordance with the Water Act and regulations;
- Provide an 'early warning system' that identifies areas potentially impacted by project activities to allow early intervention; and
- Comply with the commitments presented in the adaptive management framework described above.

While the SGPEIS/SREIS described locations to be monitored, many locations required change due to the absence of any CSG processing and CSG water discharges within the development area. The monitoring network requirements are adaptive and reviewed and updated every three years by OGIA as part of the UWIR cycle under Chapter 3 of the Water Act. Arrow will implement the elements of the UWIR WMS for which it is assigned responsibility as part of any review by OGIA.

Potential groundwater impacts of the Project have been assessed in the SGPEIS and the SREIS[5] while the Underground Water Impact Report (OGIA, 2021 - herein the UWIR) has assessed potential impacts on groundwater levels arising from CSG extraction in the Surat Basin CMA (considering all existing and proposed CSG projects, including the 588 wells already approved in the current SGP North EA) and identified 'Immediately Affected Areas' (IAA) and 'Long-term Affected Areas' (LAA).

The 2021 Surat CMA UWIR identifies aquifers where groundwater levels are predicted to fall by more than the trigger threshold as determined in the Water Act 2000 due to the exercise of underground water rights by all petroleum tenure holders. The areas are defined as the Immediate Affected Areas (IAA) where within 3 years the water level drawdown exceeds trigger thresholds of 5 m in consolidated aquifers and 2 m in unconsolidated ones. The Long-term Affected Area (LAA) is defined as areas where water levels are to decline by more than the trigger thresholds at any time.

[5]Refer to SGPEIS Chapter 14. Groundwater and to SGPSREIS Chapter 8. Groundwater, and associated appendices.

The 2021 Surat CMA UWIR model, which included all well development proposed by Arrow Energy, produced outcomes that indicate that sections of all six Petroleum Leases are within the IAA for the WCM and all are within the LAA for the WCM.

The IAA for the Springbok Sandstone intersects the southern boundary of PL305 and PL492, while the LAA extends further into these PLs and into PL304, PL491 and PL494.

In summary, the extraction of CSG will result in depressurisation of the Walloon Coal Measures which will lower aquifer pressures, which could potentially result in the following direct impacts:

- Reduced groundwater flow to groundwater-dependent ecosystems or areas of cultural and spiritual importance fed by the Walloon Coal Measures.
- Reduced groundwater supply to existing or future groundwater users accessing groundwater from the Walloon Coal Measures.
- Subsequent indirect depressurisation of adjacent aquifers has the potential to cause aquifer interflow and groundwater drawdown, resulting in the following indirect impacts:
- Diminished groundwater quality in aquifers above and below the Walloon Coal Measures. This relates to groundwater mixing as drawdown in the Walloon Coal Measures aquifers induces flow across deeper and shallower aquifers.
- Reduced groundwater flow to groundwater-dependent ecosystems or areas of cultural and spiritual importance fed by the adjacent aquifers.
- Reduced groundwater supply to existing or future groundwater users accessing groundwater from the adjacent aquifers.
- Land subsidence and changes to surface water flow regimes and landforms.
- Surface activities that can impact groundwater values include:
- Leaks and spills of chemicals, fuels and oils stored at the surface in association with CSG production facilities may result in contamination of the intersected aquifers.
- Discharges of liquid domestic wastes and effluent to land have the potential to contaminate groundwater systems.
- Reduced rain water infiltration and subsequent reductions in aquifer recharge from the surface due to:
    - Construction of impervious surface coverings associated with CSG production facilities.
    - Land disturbance activities resulting in reduced porosity and permeability of surface profiles.

Management practices for groundwater and underwater rights are presented in Section 5.

4.5 Waste

4.5.1 Existing environment

The environmental values to be protected from the waste streams through the management of waste, including the management of CSG water, are:

- Biodiversity – The diversity of ecological processes and associated ecosystems and suitability of flora and fauna habitats (refer to).
- Water resources – Quality of surface waters and groundwater. Water quality that is suitable for sustaining human health, visual amenity, and suitability of aquatic ecosystems (refer to Section).

- Land and soils – Land use capability, having regard to economic consideration, habitat for flora and fauna, and quality of land to guarantee environmental sustainability. Soils quality, including structural and chemical properties (refer to Section).
- Visual amenity – Features of the existing environment that are important for visual amenity.
- Health and safety – The life, health, and wellbeing of people including the Project workers.

The environmental protection objectives that Arrow Energy is committed to for waste management are:

- The implementation of a waste management hierarchy;
- Minimising resource utilisation by reuse and recycling of waste;
- Reducing impacts to the environment from the management of waste;
- Reducing the quantity of waste that is sent to landfills by the recycling and reuse of waste.

The construction, operation, and decommissioning and rehabilitation of the Project is expected to produce solid, liquid, and gaseous waste streams. Depending on the waste characteristics, these can be classified as general waste, inert or organic waste, recyclable waste, or regulated waste.

The anticipated typical wastes expected to be generated from the Project during construction, operation, and decommissioning and rehabilitation are presented in **Table 4-6**.

Table 4-10 Waste streams expected from the Project activities

Project Activity	Waste Stream / Characteristic	Examples of waste Type (s)
Construction of wells, gathering systems, and facilities	Solid / Regulated	• Contaminated soils • Drill cuttings and residual muds • Used lubricating oil and filters • Debris from pipe blow-outs (i.e., cleaning)
	Liquid / Regulated	• Chemicals (spent/unused solvents, paints, oils, etc.) • Drilling fluids • Wastewater (greywater and sewage) • Contaminated hydrostatic test water
	Solid / Organic	• Cleared vegetation
	Solid / Inert	• Soil
	Solid / Recyclable	• Empty drums and containers • Wood pallets • Scrap metal • Paper and cardboard • Scrap swarf (high definition PE fillings) • Unused composite pipe
	Gaseous / Air contaminants	• Nitrogen oxide • Sulfur dioxide • Carbon monoxide • Particulate matter
Operation of pipelines and facilities	Solid / Regulated	• Crystalised salt / brine • Activated carbon filters • Filter cartridges • Batteries • Oily rags and sorbents • Contaminates empty drums and containers • Grease • Sewage sludge

Project Activity	Waste Stream / Characteristic	Examples of waste Type (s)
	Solid / Inert	• Concrete • Cut and fill materials
	Solid / General waste	• Office consumables • Kitchen refuse
	Solid / Recyclable	• Paper, plastics, glass • Packaging materials • Non-contaminated empty containers • Plastic pipe cutoffs/scrap • Electric cable waste • Steel cutoffs and scrap metal • Rubber and tyres
	Solid / Organic	• Wooden pallets and timber
	Liquid / Regulated	• Produced water (or CSG water) • Wastewater (greywater and sewage) • Domestic cleaners • Fuels • Oils • Chemicals, paints, and cleaning acids • Contaminated stormwater runoff • Pigging waste (water and sludge) • Pesticides and herbicides • Wash out liquids
Decommissioning and rehabilitation	Solid / Regulated	• Debris • Chemical or oil contaminated soil • Sludge
	Solid / Inert	• Concrete
	Solid / Recyclable	• Electrical cables • Fencing • Gas compressors • Gas pipelines • Production wellheads • Power generators • Pumps • Sewage treatment plants and tanks • Storage tanks

CSG water produced from the CSG production wells and associated water gathering system from the Project will be transported through the water transfer export pipeline to QGC's McNulty Pond and then to QGC's water treatment facilities. These facilities are located outside the Project area.

4.5.2 Assessment of environmental impacts

Potential impacts from waste can come from the construction of production wells, gas and water gathering systems, the construction and operation of facilities, and from decommissioning and land rehabilitation. These potential impacts may be:

- Loss of biodiversity values and associated ecosystems;
- Loss of water quality;
- Loss of land use and soil quality; and
- Loss of visual amenity, and impacts to health and safety.

Potential waste management issues associated with the Project activities include:

- uncontrolled and/or controlled releases of waste or emissions;
- failure to properly manage waste storage and containment systems could potentially result in soil and water contamination and impacts on visual amenity; and
- discharge of wastewater and air emissions could potentially lead to adverse health and ecological impacts, e.g., discharge of raw sewage and the generation of air pollutants.

Arrow Energy aims to minimise the release of any harmful substances to the air, water, or the land, through the responsible management of its wastes. Potential impacts from the Project waste streams will be managed with the implementation of the standard waste hierarchy of avoidance, reuse, recycling, and disposal.

Specific waste management objectives and practices, depending on the waste stream and type of waste and the Project phase, are provided in Section 5.

4.6 Community and Cultural Heritage

4.6.1 Existing environment

Within the Surat Gas Project footprint, the key Indigenous cultural values are associated with either archaeological cultural significance (i.e., including physical evidence) or intangible or ethnographic significance (i.e., of significance to indigenous peoples for cultural, spiritual, or historical reasons). All engagement with indigenous people on new development is based on the principles of free, prior and informed consent.

Aspects that contribute to indigenous cultural heritage values include the following:

- Places that are included in the Queensland Aboriginal and Torres Strait Islander Cultural Heritage Database and Register recorded by Arrow Energy, other proponents and Aboriginal Parties;
- Places, objects, and areas of cultural heritage value identified during previous investigations conducted by Aboriginal parties on behalf of Arrow Energy. Where Aboriginal parties have allowed it, the details of these sites are retained on Arrow Energy's GIS database; and
- Potential for places, objects and areas of cultural heritage value that are currently not identified, including those that become known through preconstruction field site assessments.

In relation to non-Indigenous heritage, no sites of national or world heritage significance were identified within the project area. Sites identified in the region with state heritage values are all located within town centres and will not be impacted by the Project. A number of regionally known sites listed on local council registers hold historical interest to the local community and comprise infrastructure (settlements, homesteads, industry, and places of worship), schools and former schools sites, cemeteries, war-related sites and memorials. No local heritage locations have been identified within the SGP North EA footprint.

4.6.2 Assessment of environmental impacts

Potential impacts to Indigenous heritage places and values are considered to be most significantly associated with construction activities and, to a lesser extent, operations and, to an even lesser extent, decommissioning activities. Clearing activities and ground disturbance associated with the construction of the project have the potential to impact on known and unknown Indigenous cultural

heritage, places, objects, and evidence. Without the implementation of appropriate management controls the clearing activities associated with construction have the potential to impact on Indigenous cultural heritage.

Arrow Energy assesses all construction areas for Indigenous and non-Indigenous heritage. During these assessments no historical sites of world heritage, national, State, or local significance have been identified within the development area subject of this EA amendment application.

Potential impacts to non-Indigenous sites could occur through chance-find discoveries of previously unknown sites that are uncovered during construction activities. These sites are protected through 'chance find' conditions that are applied to all construction activities.

Management practices for managing potential impacts to community and cultural heritage are presented in Section 5.

5. Summary of impact assessment to environmental values and Matters of State environmental significance (MSES) and proposed management practices

5.1 Potential impacts to identified environmental values and proposed mitigation measures

Table 5-1 describes the environmental values identified as relevant to the proposed activity (i.e., the proposed EA amendment) based on surveyed and indicative alignments, assesses potential impacts to identified values, and determines the mitigation measures to be applied to reduce impacts.

Table 5-1 Assessment of potential impacts to environmental values from the proposed EA amendment and mitigation measures

Environmental Aspect	Description of relevant Environmental Values	Assessment of potential environmental impacts	Mitigation measures
Air quality	• The proposed activity is located in a rural area, predominantly characterised by grazing and bushland, including the Binkey State Forest and Barakula State Forest. • Additionally, mineral extraction encroaches on the western and southern boundaries of the Project area. Thus, depending on the location of infrastructure, post operational land use will include forestry, mining, grazing, or cropping. • The Environmental Protection (Air) Policy 2019 identifies environmental values to be enhanced or protected in relation to the air environment. The environmental values to be enhanced or protected under the policy, which are relevant to this application are the qualities of the air environment that are conducive to human health and wellbeing.	• Air quality impacts, such as dust, will be minor and restricted to the worksite for a minimal period during construction. • The proposed activity would comply with existing EA conditions regarding the air environment. • Air environmental values and any potential impacts, managed and authorised by the existing conditions are expected to remain unchanged as a result of the proposed activities.	• Dust suppression measures will be implemented to minimise dust deposition as required. • Traffic Management Plans will be developed and implemented to reduce impacts to air quality. • Implementation of the Construction Environmental Management Plan (CEMP) which will include air management and mitigation measures (e.g., use of water trucks for dust suppression activities, limited working hours as shed in Australian standards, etc.).

Environmental Aspect	Description of relevant Environmental Values	Assessment of potential environmental impacts	Mitigation measures

Noise and Vibration	• The proposed development is situated in a rural location that is expected, in general, to have a low background noise level.
	• The location is also within active petroleum tenure, so some values of the noise environment may be affected by authorised resource activities.
	• The *Environmental Protection (Noise) Policy 2019* identifies and declares environmental values of the acoustic environment.
	• The environmental values identified and declared by the policy which are relevant to this application are:
	  ○ the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems;
	  ○ The qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following: sleep, study or learn or be involved in recreation, including relaxation and conversation, and
	  ○ the qualities of the acoustic environment that are conducive to protecting the amenity of the community.
		• The proposed activity would comply with existing SGP North EA conditions regarding the acoustic environment.
		• Acoustic environmental values and any potential impacts, managed and authorized by the existing conditions, are expected to remain unchanged as a result of the proposed amendment.
			• Construction and operational noise impacts on the surrounding amenity of the rural community are assessed and are appropriately managed by Arrow Energy, including stakeholder engagement, low-noise equipment, restricted hours of operation and/or alternative arrangements as required, traffic management plans.
			• Implementation of the Construction Environmental Management Plan (CEMP) which will include noise management and mitigation measures (e.g., limited working hours as shed in Australian standards, etc.).

Environmental Aspect	Description of relevant Environmental Values	Assessment of potential environmental impacts	Mitigation measures
Land and Land Use	• Environmental values to protect and enhance in relation to land are not identified by an environmental protection policy under the *Environmental Protection Act 1994* (Qld). • Regional Ecosystems: The Queensland Herbarium has developed a methodology for mapping regional ecosystems across Queensland in the Regional Ecosystem Description Database. Regional ecosystems are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform, and soil. • Protected species: Areas with a validated record of, and/or containing habitat likely to have, one or more endangered, vulnerable or near threatened (EVNT) species, are identified in State mapping as Essential Habitat for fauna, or Flora Trigger Map 'high risk' areas for flora.	• Please refer to the attached Biodiversity Impact Assessment (BIA) report provided in **Appendix C** for a description of potential impacts to regulated vegetation and protected species at the locations of proposed activities. • The proposed activities would comply with existing EA conditions regarding land, biodiversity, and rehabilitation. • The environmental values of the land, including soils, landforms, rehabilitation and flora and fauna would be appropriately managed in accordance with Arrow Energy's existing management plans. • No material change to the environmental values protected by the current EA conditions are expected as a result of the proposed activities.	• The proposed activities' locations avoids and/or minimises disturbance in regulated vegetation, ESAs, protected plants and EVNT species habitat, to the greatest extent practicable. • Because of the extent of ESAs/PZs on the properties, some activity in these areas is unavoidable. However, proposed activities within ESAs/PZs have been collocated on, or with, areas of pre-existing disturbance wherever practicable. For example, by upgrading and using existing landholder access tracks. • The CEMP will address key activities likely to have an environmental impact and will describe strategies to be implemented to protect and manage impacts to land, flora, and fauna.
Community, amenity, and cultural heritage	• The proposed petroleum activities are located in the Western Downs Regional Council (WDRC) area. The closest settlement to the Project area is Miles, approximately 6.5 km to the Southwest. • Persons and communities that may be impacted by the proposed amendment are the surrounding sensitive receptors. The closest verified sensitive receptor to the proposed activity is a dwelling located approximately 130m away.	• It is unlikely that the development will result in a significant adverse impacts to neighbouring properties. • It is unlikely that the Project will cause visual amenity impacts, nor impacts to cultural heritage. • Where possible, the workforce during construction will be sourced from the local region i.e., the development does not involve provision for accommodation or residential activities.	• Environmental and social factors are considered as part of Area Wide Planning (AWP) process, in deciding appropriate locations for proposed petroleum activities. • Construction and operational noise impacts on the surrounding amenity of the rural community are assessed and are appropriately managed including stakeholder engagement, restricted hours of operation and/or alternative arrangements as required.

Environmental Aspect	Description of relevant Environmental Values	Assessment of potential environmental impacts	Mitigation measures
	• There are no existing active or public transport networks in the vicinity of the Project. • The Aboriginal Party for the area surveyed the location and provided recommendations with respect to aboriginal cultural duty of care.	• There will be short-term increases to traffic during the construction phase, as plant, equipment and construction staff move to and from the sites.	• Increased traffic will be managed through Road Use Management Plans which includes specified traffic routes (and no-go roads), and watering of roads to reduce dust. • There will be no greater impact on any affected persons or affected community as a result of this amendment application. • The proposed development will be undertaken in compliance with the *Aboriginal Cultural Heritage Act 2003* (Qld) Cultural Heritage Duty of Care Guidelines. • Arrow Energy and Iman #4 have a Cultural Heritage Survey Agreement that addresses the Duty of Care under the *Aboriginal Cultural Heritage Act 2003*. • The CEMP will address key activities likely to have an environmental impact to community, amenity, and cultural heritage, and will describe strategies to be implemented to protect and manage these environmental values.
Waste	• The environmental values to be protected from the waste streams through the management of waste, including the management of CSG water are: ○ Biodiversity ○ Water resources ○ Land and soils ○ Visual amenity ○ Health and safety. • The proposed development is not within the local council's reticulated water and	• The proposed amendment will not generate any waste expected to affect existing environmental values, including the life, health, and wellbeing of people; the diversity of ecological processes and associated ecosystems; and the land use capability. • It is unlikely that the Project will cause impacts due to waste generation.	• Sewerage waste will be taken off-site through a licensed waste contractor and to an authorised waste treatment facility where existing EA conditions cannot be met. • Adequate waste containers will be established via on site skip bin, which will removed offsite by an authorised waste management contractor as required during construction and operations. • No permanent or long-term storage of waste will be on site.

Environmental Aspect	Description of relevant Environmental Values	Assessment of potential environmental impacts	Mitigation measures
	sewerage infrastructure network, and due to the nature of the activity, council waste management services are not required.		• The CEMP will address key activities likely to have an environmental impact and will describe strategies to be implemented to protect and manage waste.

Water and Wetlands	• The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* identifies environmental values for waters and wetlands to be enhanced and protected.
	• The environmental values of *waters* to be enhanced or protected, relevant to this application are described in the Condamine River Basin Environmental Values and Water Quality Objectives:
	  ○ Aquatic ecosystems;
	  ○ Irrigation;
	  ○ Farm supply/use;
	  ○ Stock water;
	  ○ Aquaculture;
	  ○ Human consumers;
	  ○ Visual recreation;
	  ○ Industrial use; and
	  ○ Cultural and spiritual values.
	• State mapping identifies all watercourses in locations greater than 100 m away from the proposed activities;
	• The environmental values of *wetlands* to be enhanced or protected, relevant to this application are:
	  ○ Health of wetland ecosystems;
	  ○ Natural state and biological integrity; and
		• The proposed activities avoid watercourses and wetlands.
		• The proposed activities would comply with existing SGP North EA conditions regarding the water and wetlands environment, including erosion and sediment control and in accordance with the existing Arrow Energy's management plans.
		• Water and wetlands environmental values and any potential impacts, managed and authorised by the existing SGP North EA conditions are expected to remain unchanged as a result of the proposed activities.
			• Field surveys by suitably qualified persons confirmed all proposed activities are located outside wetland, lake, spring, and watercourse buffers.
			• The CEMP will address key activities likely to have an environmental impact and will describe strategies to be implemented to protect and manage impacts to water quality and wetlands.

Environmental Aspect	Description of relevant Environmental Values	Assessment of potential environmental impacts	Mitigation measures
	○ Natural hydrological cycle; and interaction with other ecosystems. • State mapping identifies all wetlands, lakes, or springs in locations greater than 200 m away from the proposed activities.		
Underground water rights	• Refer to SGP EIS and Supplementary EIS (2013)	• None expected. The activity does not involve taking or interfering with underground water through an artesian or sub artesian bore(s).	• Not applicable.

5.2 Potential impacts to affect MSES and proposed mitigation measures

Table 5-2 describes the environmental values identified as relevant to the proposed activity (i.e., the proposed EA amendment) and provides an assessment of potential impacts to identified values.

Table 5-2 MSES to potentially be affected by the proposed EA amendment and mitigation measures

MSES	Presence (baseline)	Potential impact	Mitigation measures
Regulated Vegetation	• Please refer to **Appendix C** *Biodiversity Impact Assessment SGP North Amendment #5 (Sustain Wells)* for a description of regional ecosystems at the locations of proposed activities.	• Impacts to Regulated Vegetation Regional Ecosystems (REs) have been identified and requested to be added to Condition (Biodiversity 11) *Schedule F, Table 3 – Authorised impacts to PEMs*. • All impacts to Regulated Vegetation as identified for SGP North Stage 5 are within the total area of impact already authorised under the SGP North EA (refer to **Table 2-2**).	• Impact areas to Regulated Vegetation from the proposed development (i.e., SGP North Stage 5) are included in the SGP North EA (EA0001399) Condition (Biodiversity 11) *Schedule F, Table 3 – Authorised impacts to PEMs*.
Connectivity Areas	• DETSI's Landscape Fragmentation and Connectivity (LFC) tool was used to assess potential for the proposed activity to affect remnant ecosystem connectivity.	• Nil. • The output from the LFC tool indicates that there are no significant residual impact on connectivity areas as a result of the activities proposed in this	• Not applicable.

MSES	Presence (baseline)	Potential impact	Mitigation measures
		application (i.e., SGP North EA Amendment Stage 5).	

Wetland and Watercourses	• The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* identifies environmental values for waters and wetlands to be enhanced and protected.
	• The environmental values of wetlands to be enhanced or protected, relevant to this application are:
	  ○ Health of wetland ecosystems;
	  ○ Natural state and biological integrity; and
	  ○ Natural hydrological cycle; and interaction with other ecosystems.
	  ○ The environmental values of waters to be enhanced or protected, relevant to this application are described in the Dawson River Sub-basin Environmental Values and Water Quality Objectives:
	  ○ Protection of aquatic ecosystems;
	  ○ The suitability of the water for agricultural purposes
	  ○ Suitability for visual recreational use; and
	  ○ Cultural and spiritual values of the water.
	• State mapping identifies all wetlands, lakes, or springs in locations greater than 200 m away from the proposed activities; and
	• State mapping identifies all watercourses in locations greater than 100 m away from the proposed activities.
		• Field surveys by suitably qualified persons confirmed all proposed activities are located outside wetlands, lakes, springs, and watercourse buffers.
		• Impacts on waterways are generally restricted to waterway crossings for linear infrastructure ROWs.
			• The proposed activity avoids wetlands.
			• Erosion and sediment control would be appropriately managed, in accordance with the existing SGP North EA conditions and Arrow Energy's management plans.
			• The proposed activity would comply with existing EA conditions regarding the water and wetlands environment.
			• Water and wetland environmental values and any potential impacts, managed and authorised by the existing conditions, are expected to remain unchanged as a result of the proposed activities.

Protected Wildlife Habitat	• Please refer to **Appendix C** *Biodiversity Impact Assessment SGP North Amendment #5 (Sustain Wells)* for a description of protected	• Please refer to **Appendix C** *Biodiversity Impact Assessment SGP North Amendment #5 (Sustain Wells)* or a description of potential impacts to	• Impact areas for affected species have been included in the proposed amendments to SGP North EA (EA0001399) *Schedule F, Table 3* –

MSES	Presence (baseline)	Potential impact	Mitigation measures

	wildlife habitat at the locations of proposed activities.	protected wildlife habitat at the locations of proposed activities.	*Authorised impacts to prescribed environmental matters (PEMs)*.
			• Arrow Energy would implement the management strategies and mitigation measures described in its Species Impact Management Plan (SIMP).
			• Planned actions include:
			  ○ marking of adjacent no-go zones;
			  ○ the presence of a suitably qualified fauna spotter during vegetation clearing; and
			  ○ slow sequential clearing to allow movement of wildlife away from activities and avoid habitat fragmentation.
			  ○ During construction, hollow-bearing trees located outside the essential clearing footprint, as identified by the ecological survey data, are designated for retention, including establishing exclusion zones. Relocation may be considered in accordance with the SIMP, where breeding of fauna is observed.

Koala Habitat in SEQ	• The surveyed area of the proposed activities is not within SEQ. – Not Applicable.	• Nil.	• Not applicable.
Protected Areas	• The surveyed area of the proposed activities is not within any National Parks or Nature Refuges – Not applicable.	• Nil.	• No applicable.
Fish Habitat	• The surveyed area of the proposed activities is not within any declared fish habitat areas – Not applicable.	• Nil.	• Not applicable.
Fish Passage	• State mapping identifies all wetlands, lakes, or springs in locations greater than 200 m away from the proposed activities;	• Limited temporary impacts to watercourses.	• Arrow Energy is committed to working in watercourses in accordance with the Accepted

MSES	Presence (baseline)	Potential impact	Mitigation measures
	• State mapping identifies all watercourses in locations greater than 100 m away from the proposed activities; and • Field surveys by suitably qualified persons confirmed all proposed activities are located outside wetlands, lakes, springs, and watercourse buffers.		Development Requirements (ADRs) for raising Waterway Barrier Works. • The ADRs have been developed by the (former) Department of Agriculture and Fisheries as a methodology which does not require additional approval and is considered low impact activity not requiring consideration for offset. • Should the ADRs be unable to be complied with, Arrow Energy will fulfill its legal obligations pursuant to the Planning Act 2016.
Marine Plants	• The surveyed area of the proposed activities is terrestrial and inland – Not applicable.	• Nil.	• Not applicable.
Offset Areas	• No legally secured offset areas were identified within the surveyed area of the proposed activities.	• Nil.	• Not applicable.

6. Offset Strategy

Given that whole of the SGP North and staged impacts are included in this EA amendment application, offsets will be delivered in accordance with DETSI's Streamlined Model Conditions for conditions Biodiversity 13 to Biodiversity 17.

Of particular note, Arrow Energy will provide DETSI with a notice of election for the staged environmental offset no less than three months before the proposed commencement of that stage (as per condition Biodiversity 16). To further support the delivery of the offsets, Arrow Energy will utilise both financial and land-based offsets. In the case of the latter, Arrow Energy have and are looking to secure further parcels of land for land-based offsets which will form part of proposed advanced offsets to draw down over the stages of development. Arrow Energy will engage with DETSI where appropriate to secure advanced offsets and registration through appropriate mechanisms such as a voluntary declaration etc.

7. Conclusion

Arrow Energy is applying to an amendment to the SGP North EA (EA0001399) to include the potential impacts on land and biodiversity values from the development of wells and gathering lines for gas and water and associated incidental infrastructure to sustain the SGP North Project through the development of its Stage 5 (the Project).

The total proposed disturbance for the Project does not seek to increase the petroleum activities approved by the current SGP North EA (EA0001399) but will require an update to impacts to environmentally sensitive areas (ESAs) and Prescribed Environmental Matters (PEMs).

Arrow Energy undertook a biodiversity impact assessment to quantify the impacts to ESAs and PEMs to request DETSI to incorporate these into an updated SGP North EA.

The identified updated biodiversity impacts are provided in **Table 2-1** and **Table 2-2** and are requested to be included in the following conditions under the SGP North EA (also refer to **Appendix A**):

- Condition (Biodiversity 9) *Schedule F, Table 2 – Maximum ESA disturbance*; and
- Condition (Biodiversity 11) *Schedule F, Table 3 – Authorised impacts to PEMs*.

An update to *Schedule F, Figure 1* is also included in this EA amendment, to update the boundary of the SGP North EA to include Stage 5. This updated figure is included in the marked-up EA (refer to **Appendix A**).

A summary of the identified impacts are provided below:

- Total impacts to Category C ESAs with this amendment (i.e., addition of SGP North Stage 5) are 280.15 ha;
- Identified impacts to Regulated Vegetation are within the total area of impact already authorised under the SGP North EA; and
- Impacts to Protected Wildlife Habitat PEMs for the following species:
    - Endangered[3] wildlife:
        - *Petauroides volans volans* (Greater Glider) – 357.5 ha; and
        - *Phascolarctos cinereus* (Koala) – 372.8 ha.
    - Vulnerable[3] wildlife:
        - *Calyptorhynchus lathami lathami* (Glossy Black Cockatoo) – 1.6 ha;
        - *Stagonopleura guttata* (Diamond Firetail) – 356.4 ha;
        - *Nyctophilus corbeni* (South- eastern Long-eared Bat) – 350.4 ha[6]; and
        - *Petaurus australis australis* (Yellow-bellied Glider (south- eastern)) – 357.5 ha.
- Impacts to Special Least concern wildlife *Tachyglossus aculeatus* (Short- beaked Echidna) were identified as 2.9 ha. These impacts from SGP North Stage 5 are within the total area of impact currently approved under the SGP North EA (EA0001399).

No other changes or amendments are requested with this EA amendment application.

Where applicable, Arrow Energy are proposing to offset impacts from the SGP North Stage 5 Development through either financial or land-based through the Notice of Election (NoE) process.

[6] Identified impacts to *Nyctophilus corbeni* (South- eastern Long-eared Bat) will be offset through Arrow Energy's EPBC Act Approval EPBC 2010/5344.

Arrow Energy requests that DETSI approve the application to amend EA0001399 under section 240 of the EP Act.

Appendix A. Marked-up EA (EA0001399) SGP North Stage 5 (30/03/2026)

Appendix B. SGP North Stage 5 Proposed Development Disturbance Spatial Data

Appendix C. Biodiversity Impact Assessment (BIA) SGP North Stage 5 (Arrow Energy, 26-03-2026)

Appendix D. Legislative Requirements

D-1. Assessment Level Decision (ALD)

Section 223 of the EP Act defines 'major' and 'minor' amendments.

Arrow Energy conducted an assessment against the requirements under Section 223 of the EP Act for a minor amendment (threshold) which is provided in **Table D - 1.**

Table D - 1 Assessment against Section 223 of the *Environmental Protection Act 1994*

223 Definitions for pt. 7 In this part – **major amendment,** for an environmental authority or PRCP schedule, means an amendment that is not a minor amendment. **minor amendment**, for an environmental authority or PRCP schedule, means an amendment that is –
(a) for an environmental authority – i. a condition conversion; or ii. a minor amendment (threshold); or
The application is for an environmental authority. The application is not for a condition conversion. An assessment against the minor amendment (threshold) provision was conducted to this EA amendment application (see below).
(b) for a PRCP schedule – a minor amendment (PRCP threshold)
The application is not for a PRCP schedule.
minor amendment (threshold), for an environmental authority, means an amendment that –
(a) is not a change to a condition identified in the authority as a standard condition, other than – i. a change that is a conditions conversion; or ii. a change that is not a condition conversion but that replaces a standard condition of the authority with a standard condition for the environmentally relevant activity to which the authority relates; and
The SGP North EA (EA0001399) is a site-specific EA, hence not a standard EA, and does not include standard conditions.
(b) does not significantly increase the level of environmental harm caused by the relevant activity; and
As previously stated, the amendment *does not* seek to increase the already authorised petroleum activities approved by the current SGP North EA (EA0001399) and approved through the Environmental Impact Statement process with the SGPEIS (2013) for which environmental risks associated with the SGP North activities have not materially changed (refer to Section 1.4). This EA amendment seeks to update the maximum Environmentally Sensitive Area (ESA) disturbance area and the impacts to Prescribed Environmental Matters (PEMs) due to the development of the Surat Gas Project North (SGP North) Stage 5.
(c) does not change any rehabilitation objectives stated in the authority in a way likely to result in significantly different impacts on environmental values than the impacts previously permitted under the authority; and

	Rehabilitation objectives stated in the SGP North EA *are not* proposed to be amended as part of this application.
(d)	does not significantly increase the scale or intensity of the relevant activity; and
	The proposed EA amendment *does not* increase the scale or intensity of the relevant activity.
(e)	does not relate to a new relevant resource tenure for the authority that is – (i) a new mining lease; or (ii) a new petroleum lease; or (iii) a new geothermal lease under the Geothermal Energy Act; or (iv) a new GHG injection and storage lease under the GHG storage Act (2009); and
	This EA amendment application *does not* relate to a new relevant resource tenure for the authority.
(f)	involves an addition to the surface area for the relevant activity of no more than 10% of the existing area; and
	This EA amendment application does not seek to increase the existing surface area of the relevant activity by more than 10%.
(g)	or an environmental authority for a petroleum activity— i. involves constructing a new pipeline that does not exceed 150km; or ii. involves extending an existing pipeline so that the extension does not exceed 10% of the existing length of the pipeline; and
	This EA amendment application *does not* relate to an existing or proposed pipeline exceeding 150km.
(h)	if the amendment relates to a new relevant resource tenure for the authority that is an exploration permit or Greenhouse gas (GHG) permit—the amendment application under seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit.
	This EA amendment application *does not* relate to a new relevant resource tenure that is an exploration permit or GHG permit.

D-2. EA Amendment Application Requirements

Table D - 2 addresses the requirements set out in Section 226(1) of the EP Act.

Table D - 2 Assessment against Ch 5, Pt 7, Div 2 of the *Environmental Protection Act 1994*

Section 224 Who may apply
The holder of an environmental authority or PRCP schedule may, at any time, apply to the administering authority to amend the environmental authority or PRCP schedule (an amendment application).
Arrow Energy is the principal holder of the EA.
Section 225 Amendment application cannot be made in particular circumstances
Despite section 224, an amendment application for an environmental authority for a prescribed ERA cannot be made if –
Not applicable. The amendment application is for a Resource ERA, not for a prescribed ERA.
Section 226 Requirements for amendment applications generally

(1) An amendment application must –	
(a)	*be made to the administering authority; and*
	This amendment application is made to DETSI as the administering authority.
(b)	*be made in the approved form; and*
	The application is made using the DETSI 'Application to amend an environmental authority' form (ESR/2015/1733, Version 23.01, 02 JULY 2025)..
(c)	*be accompanied by the fee prescribed under a regulation; and*
	The prescribed application fee has been paid upon submission of the application.
(d)	*describe the proposed amendment; and*
	The proposed EA amendment is described in the SGP North EA Amendment Supporting Information Report provided to DETSI as part of the application (this document).
(e)	*describe the land that will be affected by the proposed amendment; and*
	The land that will be affected by the proposed amendments is with the Petroleum Leases within the SGP North EA area on EA EA0001399.
(f)	*Include any other document relating to the application prescribed by regulation.*
	Not applicable. No other document relating to the application has been prescribed by regulation.
226AA Requirement for amendment application by holder of environmental authority and PRCP schedule ***(1) This section applies if –***	
(a) the holder of an environmental authority and a PRCP schedule for the environmental authority (each a relevant environmental requirement) makes an amendment application.	
Not applicable. Arrow Energy is not the holder of an environmental authority **and** a PCRP schedule, because the PCRP statutory provisions apply to mining activities, not to petroleum activities.	
226A Requirements for amendment applications for environmental authorities ***(1) If the amendment application is for the amendment of an environmental authority, the application must also–***	
(a) describe any development permits in effect under the Planning Act for the carrying out of the relevant activity for the authority; and	
Not applicable. A development permit under the Planning Act is not required for the petroleum activities authorised by the environmental authority being requested to be amended (SGP North EA (EA0001399)).	
(b) state whether each relevant activity will, if the amendment is made, comply with any eligibility criteria for the activity; and	
Not applicable. This EA authorises ERAs related to petroleum activities carried out under a petroleum lease. Eligibility criteria do not exist for petroleum activities authorised by a petroleum lease.	
(c) if the application states that each relevant activity will, if the amendment is made, comply with any eligibility criteria for the activity – include a declaration that the statement is correct; and	
Not applicable.	
(d) state whether the application seeks to change a condition identified in the authority as a standard condition; and	
Not applicable. The EA does not currently contain any standard conditions, and this amendment application does not seek to change or include a standard condition.	
(e) if the application relates to a new relevant resource tenure for the authority that is an exploration permit or GHG permit – state whether the applicant seeks an amended environmental authority that is subject to the standard conditions for the relevant activity or authority, to the extent it relates to the permit; and	
Not applicable. This EA amendment application does not relate to a new relevant resource tenure for the authority.	

(f) include an assessment of the likely impact of the proposed amendment on the environmental values, including -
i. a description of the environmental values likely to be affected by the proposed amendment; and
An assessment of the likely impact of the proposed amendment on environmental values is included in the Supporting Information Report provided to DETSI as part of the application (this document).
ii. details of any emissions or releases likely to be generated by the proposed amendment; and
No emissions or releases are likely to be generated by the proposed amendment other than those already authorised under the SGP North EA (EA0001399).
iii. a description of the risk and likely magnitude of impacts on the environmental values; and
The environmental risks and impacts that are affected by activities within the tenure are described in the Supporting Information Report provided to DETSI as part of the application (this document). The magnitude of impacts on environmental values as a result of the amendment will be no greater than risks of the activities that are currently authorised for the petroleum activity.
iv. details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and
Management practices implemented by Arrow Energy to prevent or minimise adverse impacts are described in the Supporting Information Report provided to DETSI as part of the application (this document). Arrow Energy's management practices including those required under the SGP North EA (EA0001399) will not change as a result of this amendment application request.
v. details of how the land the subject of the application will be rehabilitated after each relevant activity ceases; and
To comply with the rehabilitation conditions of the SGP North EA (EA0001399), the land the subject of the application will be rehabilitated after the relevant activity ceases. The land will be rehabilitated in accordance with the rehabilitation conditions of the SGP North EA.
(g) include a description of the proposed measures for minimising and managing waste generated by any amendments to the relevant activity; and
No additional waste is expected to be generated by the proposed EA amendment. Waste management in general will be undertaken in accordance with the existing requirements as set out in the SGP North EA (EA0001399).
(f) include details of any site management plan or environmental protection order that relates to the land the subject of the application.
Not applicable. There are no site management plans (approved under Chapter 7, Part 8 Contaminated Land of the EP Act) or environmental protection orders (under section 368 of the EP Act) relating to the land the subject to this EA amendment application.
226B Requirements for amendment applications for environmental authorities
An amendment application for a PRCP schedule must be accompanied by an amended rehabilitation planning part for the holder's PRC plan that complies with section 126C in relation to the proposed amendment.
Not applicable. Arrow Energy is not the holder of a PCRP schedule, because the PCRP statutory provisions apply to mining activities, not to petroleum activities.
227 Requirements for amendment applications—CSG activities
(1) This section applies for an amendment application if— *(a) the application relates to an environmental authority for a CSG activity; and* *(b) the proposed amendment would result in changes to the management of CSG water; and* *the CSG activity is an ineligible ERA.*
Not applicable. The proposed EA amendment will not result in a change to the management of CSG water.
227AA Requirements for amendment applications—underground water rights
(1) This section applies for an amendment application if— *(a) the application relates to a site-specific environmental authority for—*

(i) a resource project that includes a resource tenure that is a mineral development licence, mining lease or petroleum lease; or *(ii) a resource activity for which the relevant tenure is a mineral development licence, mining lease or petroleum lease; and* *(b) the proposed amendment involves changes to the exercise of underground water rights.*
Not applicable. The proposed EA amendment will not result in changes to the exercise of underground water rights.

Table D - 3 addresses the requirements set out under Schedule 4 of the EP Act.

Table D - 3 Standard Criteria (EP Act)

Schedule 4 EP Act – *standard criteria* means
(a) the following principles of environmental policy as set out in the Intergovernmental Agreement on the Environment – *(i) the precautionary principle;* *(ii) intergenerational equity;* *(iii) conservation of biological diversity and ecological integrity; and* *(b) Any Commonwealth or State government plans, standards, agreements or requirements about environmental protection or ecologically sustainable development*
The precautionary principle was considered for the application. The proposed activities will use accepted best practice technology for which there is sufficient scientific data to support the certainty of achieving the principles of sustainable development. The principle of intergenerational equity was considered for the application. It is considered that the proposed activities would not impact the use of environmental values by future generations. The principles of conservation of biological diversity and ecological integrity were considered for the application. The proposed application would not result in significant adverse impacts to biological diversity or ecological integrity when considered in its entirety. The proposed activities will be undertaken in accordance with the applicable requirements of the following: • *Environmental Protection Act 1994* (EP Act) • *Environmental Protection Regulation 2019* (EP Regulation) • *Petroleum and Gas (Production and Safety) Act 2004* • *CSG Water Management Policy 2012* • *Nature Conservation Act 1992* (and associated 2018 guidance amendments) • *Environmental Protection and Biodiversity Conservation Act 1999* and Regulations • Australian Standards. Where relevant these Acts are further referenced throughout this EA Amendment Supporting Information Report.
(d) Any relevant environmental impact study, assessment or report
The activity subject to this EA amendment application was considered in the context of the EIS completed for the SGP (SGPEIS, 2013).
(e) The character, resilience and values of the receiving environment
Refer to Section2.4.
(f) all submissions made by the application and submitters
The EA amendment may be subject to public notification due to the updates required to ESAs and potential impacts to Prescribed Environmental Matters (PEMs), although a there will not be a substantial increase in the risk of environmental harm under the amended EA in relation to the approved SGPEIS and SGPREIS, and nor there will be a substantial change in the contaminants permitted to the be released to the environment as per the approved SGPEIS.

(g) Best Practice Environmental Management (BPEM) for activities under any relevant instrument, or proposed instrument, as follows- (i) an environmental authority; (ii) a transitional environmental program; (iii) an environmental protection order; (iv) a disposal permit; (v) a development approval;
Best Practice Environmental Management (BPEM) of the proposed activities would be achieved through compliance with the conditions of the SGP North EA (EA0001399) and through the implementation of management and mitigation measures as described in Section 2.4 of this supporting information report.
(h) Financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out under this instrument
Arrow Energy will continue to provide adequate funds, equipment, and staff time to achieve compliance with the conditions of the SGP North EA. This will be reflected in the approved Estimated Rehabilitation Cost (ERC) in accordance with the Financial Provisioning Scheme. A revised ERC calculation, as necessary and applicable, in accordance with the EP Act will be submitted to the administering authority for disturbance resulting from the EA amendment activities, which will be lodged prior to the activity commencing.
(i) Public interest
The proposed EA amendment is in the public interest, as it will secure important natural gas supply which is vital to meet the needs of customers in the east coast market, along with other Australian states and territories. It plays an important role in powering the energy transition to meet State and Commonwealth renewable energy targets.
(j) Site management plan (SMP)
There are no SMPs applicable or relevant to this EA amendment application.
(k) Relevant Integrated Environmental Management System (IEMS) or proposed IEMS
The Arrow Energy Integrated Health, Safety, and Environment (HSE) Management System (HSEMS) will be implemented for the proposed activities.
(l) Other matters prescribed under a regulation
This EA amendment application demonstrates compliance with relevant prescribed environmental matters.

D-3. Requirements for EA amendment applications for Coal Seam Gas (CSG) activities

CSG water management and underground water rights

Section 227 of the EP Act is not applicable to this proposed EA amendment as the proposed activities would not result in changes to the management of CSG water and underground water rights.

Transfer of CSG water

The storage of produced water (or CSG water) as regulated waste is currently authorised under the SGP North EA via the ERA 62 *Resource recovery and transfer facility operation*[7] under the EP Reg 2019. This includes CSG water stored in dams authorised under the SGP North EA (refer

[7] As per EP Reg 2019 Schedule 2, Prescribed ERAs, and aggregate environmental scores, Ancillary 62 – Resource recovery and transfer facility operation – 1 (c) – Operating a facility for receiving and sorting, dismantling, baling or temporarily storing category 2 regulated waste.

to **Table 1-1)**. CSG water produced from the CSG production wells and associated water gathering system from the Project will be transported through the water transfer export pipeline to QGC's McNulty Pond and then to QGC's water treatment facilities. These facilities are located outside the Project area.

The transfer of CSG water to a third-party is authorised under the SGP North EA conditions (Waste 22), (Waste 23), and (Waste 24).

D-4. Great Barrier Reef Catchments

The project area is not located in a Great Barrier Reef (GBR) catchment area. As a result, Section 41AA of the Environmental Protection Regulation 2019 (EP Reg) is not applicable and hence not triggered.

Section 41AA of the EP Reg relates to the release of fine sediment and inorganic nitrogen in the GBR catchment waters and in particular, section 41AA(3) states:

The administering authority must refuse to grant the application if the authority considers that—

(a) the relevant activity will, or may, have a residual impact; and
(b) having regard to the matters mentioned in the water quality offset policy, the residual impact will not be adequately counterbalanced by offset measures for the relevant activity.

The implementation of proposed management measures for erosion and sediment control, stormwater management and potential contaminants mean the risks of fine sediment and/or contaminants entering a watercourse are minimal, and the risk of any such sediment or contaminants being transported downstream to the GBR are negligible.

D-5. Public notification

Subject to DETSI's ALD, Arrow Energy will publicly notify as required by legislation.