Surat Gas Project

Species Impact Management Plan

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EPBC Number: EPBC 2010/5344

Project Name: Surat Gas Expansion Project

Proponent and ABN: Arrow Energy Pty Ltd (ABN: 73 078 521 936)

Approved Action: To expand coal seam gas operations in the Surat Basin, Queensland, as described in the Referral provided under the EPBC on 2 February 2010; and as described in the Surat Gas Project Environmental Impact Statement (March 2012) and Supplementary Report to the Environmental Impact Statement (June 2013).

Location of the Action: The Project covers an area of approximately 6,100 km^2 and is located approximately 160 km west of Brisbane in Queensland's Surat Basin. The project development area extends from the township of Wandoan in the north towards Goondiwindi in the south.

Date of preparation of this Plan: 20 November 2018

Signed Declaration of Accuracy:

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or *Environment Protection and Biodiversity Conservation Regulation* (2000) (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have knowledge of that authorisation being revoked at the time of making this declaration.

Signed:

Full name: Nathan Blundell

Organisation:

Arrow Energy Pty Ltd

Date: 20/11/2018

Executive Summary

Background and Purpose

- On 19 December 2013 Arrow Energy Pty Ltd (Arrow) received approval from the Australian Government to proceed with the Surat Gas Project (SGP) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC 2010/5344).

- On 29 March 2017 'Variation to Conditions Attached to Approval' was granted, whereby the more detailed Offset Management Plan is now required within 12 months of project commencement. On 29 May 2018 a second 'Variation to Conditions Attached to Approval' was granted, whereby maximum Stage 1 disturbance areas were refined and Stage 1 minimum offset areas were removed. On 31 October 2018 a third variation was granted to separate the SGP Species Impact Management Plan and the Stage 1 Offset Strategy.

- The purpose of this document is to satisfy Conditions 7 of the approval, whereby Arrow is submitting the EPBC Species Impact Management Plan (SIMP) for approval by the Minister prior to project commencement.

Key Elements

- This SIMP has been prepared by suitably qualified ecologists, with evidence of the authors' qualifications and experience provided in Appendix A.

- Arrow has undertaken comprehensive seasonal ecological surveys to gain a detailed understanding of EPBC listed threatened species and EPBC communities within the Project development area, and have modified our field development layout to avoid and minimise impacts to these national values.

- This SIMP details how Arrow will meet Condition 7A and 7B of the SGP approval conditions including describing the management measures and monitoring program that will be implemented to avoid, track and further minimise impacts to EPBC Act species and communities through the life of the SGP.

- As per Condition 7B, Arrow will not commence Project Phase 1 until this EPBC SIMP has been approved by the Minister in writing. Once approved Arrow will implement this SIMP.

Recommendation

That the Minister or delegate approves this Surat Gas Project EPBC Species Impact Management Plan.

Abbreviations and Acronyms

The following table provides a list of abbreviations and acronyms used throughout this report.

Abbreviations and Acronyms

Term	Definition
CSG	Coal Seam Gas
DotEE	Department of the Environment and Energy (Australia)
EA	Environmental Authority
DES	Department of Environment and Science (Queensland)
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GIS	Geographic Information System
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
RE	Regional Ecosystem
ROW	Right of Way
SIMP	Species Impact Management Plan
SREIS	Supplementary Report to the Environmental Impact Statement
TEC	Threatened Ecological Community

1. Introduction

Arrow Energy is a Queensland based subsidiary of Arrow Energy Holdings Pty Ltd (Arrow), a 50:50 joint venture between Royal Dutch Shell (Shell) and PetroChina Company Ltd (PetroChina). Arrow is currently developing coal seam gas (CSG) resources in Queensland, including resources in the Surat Basin.

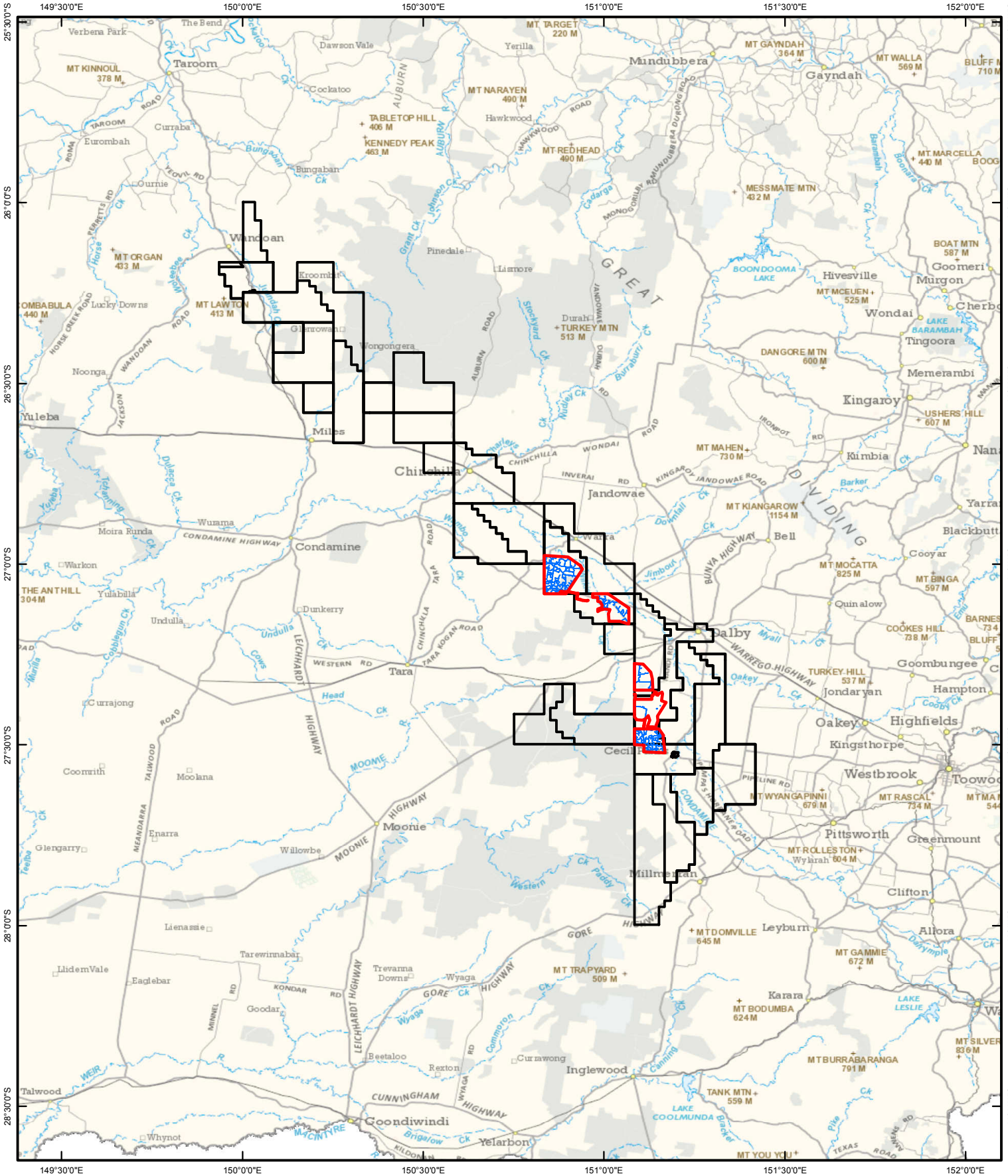
The Surat Gas Project (SGP) Environmental Impact Statement (EIS) for up to 6,500 coal seam gas production wells and associated infrastructure was granted approval from the Queensland Government in October 2013 and the Australian Government in December 2013. The Project covers an area of approximately 6,100 km^2, extending from the township of Wandoan in the north towards Millmerran in the south (see Figure 1.1).

The EPBC Act approval for the SGP (EPBC 2010/5344) specifies that "*prior to the commencement of Stage 1, the approval holder must prepare and submit an EPBC Species Impact Management Plan for the Minister's written approval*" and that the plan must include a number of matters (Condition 7A (a) – (d) of the EPBC Act approval; refer Table 1.1 of this SIMP). The purpose of this SIMP is to satisfy these conditions.

The EPBC Act approval also identifies those EPBC Act listed species and communities (listed at the date of approval for the SGP) where a significant impact is likely, and specifies disturbance limits for each (Condition 5, Table 1 of the EPBC approval; shown in Table 1.2 of this SIMP; noting that MNES with 'no disturbance' limit is excluded from Table 1.2). This SIMP addresses all of these EPBC species and communities.

For completeness, this SIMP also addresses three listed EPBC Act species which have been identified as having the potential to be impacted by the SGP (i.e. *Phascolarctos cinereus* (Koala), *Petauroides volans* (Greater Glider) and *Grantiella picta* (Painted Honeyeater)). These three species were listed under the EPBC Act subsequent to the SGP's EBPC Act approval. Although these species are discussed in this SIMP, they do not form part of the EPBC Act approval but are included by Arrow in the SGP Offset Strategy.

Table 1.1 identifies the sections within this SIMP that addresses each of the Condition 7 requirements.



Issued To: M Ryan
Author: tstringer

Source:
Arrow Energy Limited, Geosciences Australia
Dept. Envir. and Resource Mgmt.

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Figure 1.1
Surat Gas Project
Location in the Regional Context

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Table 1.1 Cross-reference table for information requirements and SIMP section

Condition Number	Condition requirement	Section of this SIMP
7A	Prior to the commencement of Stage 1, the approval holder must prepare and submit an EPBC Species Impact Management Plan for the Minister's written approval. The EPBC Species Impact Management Plan must include:	
7(a)	Measures that will be taken to avoid, mitigate and manage impacts to EPBC listed threatened species and their habitat during clearance of vegetation, including the involvement of a suitably qualified ecologist at all times during clearance of vegetation	Section 3
7(b)	Measures that will be taken to avoid, mitigate and manage impacts to EPBC listed threatened species and their habitat and to EPBC communities during construction, operation and decommissioning of the action	Section 4
7(c)	A monitoring program to determine the success of impacts avoidance and mitigation measures and that will inform adaptive implementation of the action for the duration of this approval	Section 5
7(d)	A description of how measures proposed in the EPBC Species Impact Management Plan are consistent with the measures in relevant conservation advice, recovery plans and threat abatement plans	Section 6
7B	The approval holder must not commence Stage 1 until an EPBC Species Impact Management Plan has been approved by the Minister in writing. The approved EPBC Species Impact Management Plan must be implemented by the approval holder	Section 7

Table 1.2 Whole of project maximum disturbance limits (source: Table 1 of EPBC Act approval)

Matter of National Environmental Significance	Maximum disturbance (hectares) to core habitat
Terrestrial Species	
Curly-bark Wattle (*Acacia curranii*)	1,210
Hando's Wattle (*Acacia handonis*)	1,210
Belson's Panic (*Homopholis belsonii*)	140
Lobed Blue Grass (*Bothriochloa biloba*)	305
Kogan Waxflower (*Philotheca sporadica*)	480
Prostanthera sp *Dunmore*	380
Small-leaved Denhamia (*Denhamia parvifolia*)	50
Calytrix gurulmundensis	1,210

Matter of National Environmental Significance	Maximum disturbance (hectares) to core habitat
Finger Panic Grass (*Digitaria australe*)	174
Austral Toadflax (*Thesium australe*)	160
Acacia lauta	990
Cobar Greenhood Orchid (*Pterostylis cobarensis*)	2,170
Xerothamnella herbacea	110
Hawkweed (*Picris evae*)	120
Austral Cornflower (*Rhaponticum australe*)	160
Eucalyptus virens	170
King Bluegrass (*Dichanthium queenslandicum*)	160
Queensland White-gum (*Eucalyptus argophloia*)	10
South-eastern Long-eared Bat (*Nyctophilus corbeni*)	4,080
Dunmall's Snale (*Furina dunmalli*)	4,400
Five-clawed Worm-skink (*Anomalopus mackayi*)	560
Squatter Pigeon (*Geophaps scripta scripta*)	3,261
Regent Honeyeater (Anthochaera phrygia)	20
Collared Delma (Delma torquate)	90
Yakka Skink (Ergernia rugosa)	310
Australian Painted Snipe (*Rostratula australis*)	5
EPBC Communities	
Brigalow (*Acacia harpophylla* dominant and co-dominant)	106
Coolibah-Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregion	8
Weeping Myall Woodlands	1

2. Management of EPBC Species and Communities

2.1 Management hierarchy

Coal Seam Gas developments apply an iterative process in terms of locating wells and gathering lines. This is required because there are several competing constraints when it comes to locating the infrastructure on the surface. These constraints include ecological values, landholder preferences, geological features, existing infrastructure and access tracks. Planning and management of surface activities and ground disturbance is undertaken utilising a set of hierarchical management principles used to avoid, minimise and mitigate impacts to ecological values. These principles are:

- Avoid: Arrow's first preference is to avoid EPBC Act listed threatened ecological communities and the habitat of EPBC listed threatened species
- Minimise: where other competing constraints or the scale / location of EPBC communities or species habitat dictate that avoidance is not possible (e.g. where there are long linear strips of Brigalow that need to be crossed or large areas of suitable habitat for wide ranging species such as the Squatter Pigeon), Arrow will preferentially locate infrastructure in a manner that minimises the impact to these values (e.g. cross the Brigalow at the narrowest or most degraded part or where practicable on the edge of suitable habitat for listed species so as not to bisect good quality habitat)
- Mitigate: implement mitigation measures to further minimise the direct and indirect impacts on ecological values
- Remediate and rehabilitate: actively remediate and rehabilitate impacted areas to promote and maintain long term recovery
- Offset: Arrow will offset unavoidable significant residual impacts to MNES as per the SGP Offset Strategy.

2.2 Application of the management hierarchy

Sections 3 and 4 of this document provide considerable detail of Arrow's commitments to avoid, minimise and mitigate impacts to MNES. The following steps will be undertaken to implement the above mentioned management hierarchy:

- Pre-clearance surveys
- Framing trade-offs
- On-site management and reporting
- Annual reporting.

Pre-clearance surveys

Arrow has already completed ecological surveys within the areas of proposed activities. However, additional pre-clearance surveys will be undertaken when the SGP activities proceed through the detailed design and planning phase and secondary approvals are required (e.g. an Environmental Authority, Clearing Permit or a landholder agreement).

At this point in time, a field inspection of the specified disturbance footprint will be undertaken by a suitably qualified ecologist. The pre-clearance survey will confirm the presence, absence and extent of environmental values (including EPBC Act species habitats and TECs) and these will be mapped in the field via GIS. The results of this step will be recorded within Geocortex (Arrow's GIS based mapping system) and the Arrow Sharepoint site (Arrow's data compilation software used by the Access and Approvals Team).

Framing trade-offs

Following the pre-clearance surveys, a framing trade-offs meeting will be held with the project engineers, planners, ecologists, land liaison officer and an archaeologist. The purpose of this meeting is for each specialist to discuss the proposed location of the infrastructure and the opportunities and constraints based on the findings of their field assessment. It is at this meeting where the ecologist will be reiterating Arrow's management hierarchy for MNES and aiming to avoid and minimise impacts to MNES. The outcome of the framing trade-offs meeting is an agreed location for the surface infrastructure after taking into consideration each competing constraint. The results of this step will be recorded within the Arrow Sharepoint database.

On-site management and reporting

Where the framing trade-offs meeting has identified that impacts to MNES are unavoidable, the following will be undertaken so that the actual area cleared will be surveyed to quantify the impacts (in addition to the detailed measures outlined in Table 3.1):

- Record GPS coordinates of the boundary of the MNES in relation to the proposed clearing boundaries and ensure the limits of the area to be cleared are clearly marked on the ground (e.g. high visibility flagging tape, hazard netting or similar).
- Complete a Habitat Quality Assessment as per the Queensland Government Department of Environment and Heritage Protection's *Guide to determining terrestrial habitat quality – A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy* (2017).
- Ensure a fauna spotter-catcher is present during clearing. The spotter-catcher will be a suitably qualified ecologist. The number of fauna spotter-catchers on site at the time of clearing will depend on the number of machines being used at any given time.
- Record the coordinates and total area of MNES habitats and communities cleared.
- Ensure the success of on-site mitigation measures by review and assurance against this EPBC Species Impact Management Plan and the accompanying SGP EPBC Phase 1 Offset Strategy.

Annual reporting

- The field data collected above will be provided to the Environment Team at the completion of site disturbance activities and tracked monthly against approved Stage 1 maximum disturbance limits.

- This data, together with other reporting requirements specified in this plan and the accompanying SGP EPBC Offset Strategy will be collated for annual compliance reporting as per Condition 28 of the SGP EPBC approval.

2.3 Supporting Arrow documents

Arrow has been installing and operating coal seam gas infrastructure since 2005. We have numerous guiding documents relevant to the monitoring of activities that may impact species and vegetation communities; namely:

- Operations Environmental Management Plan (ORG-ARW-AOP-PLA-00016) – this document identifies the relevant procedures and other control mechanisms that are used to minimise potential environmental impacts of production operations activities and ensures the requirements of relevant legislation are met.

- Biodiversity Standard (ORG-ARW-HSM-STA-00034) – the intent of this document is to ensure the protection of biodiversity (flora, fauna and natural habitats) in the areas in which Arrow operates in recognition of the value of healthy and functioning terrestrial and aquatic natural systems. The Standard places a responsibility on all Arrow line managers and contractors to monitor potential biodiversity impacts and controls.

- HSE Incident Management Standard (ORG-ARW-HSM-STA-00007) and the Incident Management Procedure (ORG-ARW-HSM-PRO-00089) – these documents specify the process for reporting, recording, classifying, notifying and investigating unplanned events and incidents that have resulted in damage to the environment.

Beyond the above mentioned overarching documents, two Arrow procedures are particularly relevant:

- Ecological Impact Assessment Procedure (ORG-ARW-HSM-PRO-00070) – this document provides the step by step process implemented for all Arrow development activities that involve significant disturbance to land, including the requirement to record the GPS coordinates and maps of all vegetated areas that have required clearing. Clearing extents will also be input into an Arrow database to track EPBC Act species and community disturbance against approved limits on a monthly basis.

- Fauna Management Procedure (ORG-ARW-HSM-PRO-00067) – this document informs all Arrow staff and contractors of their obligations to protect and manage native fauna whilst operating on Arrow controlled works sites. It includes the requirements to:

  - Record and report all interactions with fauna to the Arrow Ecologist (notification within 24 hours using the Fauna Incident Notification (FIN) form is required for listed

threatened (including EPBC Act listed species), near threatened and special least concern fauna).

- Record and report all interactions with fauna to the regulator, under their own permit, as required (but not before reporting to the Arrow Ecologist).
- Regularly monitor mitigation measures that have been constructed and/or implemented (e.g. fauna exclusion fences) and report their effectiveness to the Site Supervisor.
- Provide clear communications on any ongoing action requirements (e.g. monitoring and maintenance) during site handover processes, and these must be implemented, monitored and their effectiveness reported.

3. Mitigation measures

Condition 7A(a): measures that will be taken to avoid, mitigate and manage impacts to the EPBC listed threatened species and their habitat during clearance of vegetation, including the involvement of a suitably qualified ecologist at all times during clearance of vegetation.

Table 3.1 provides a description of the measures that will be implemented by Arrow to avoid, mitigate and manage impacts to the MNES.

Table 3.1 Description of mitigation measures / commitments

Mitigation	Commitment	Intended outcome	Responsible manager/s
Pre-construction clearance surveys / minimise clearing	• Minimise the disturbance footprint and vegetation clearing • Use existing roads and tracks, where practicable • Avoid unnecessary impervious surface coverings and reduce land footprint and vegetation clearing when designing facilities • Reduce the width of construction ROW within areas of sensitivity to the greatest extent practicable without compromising the safety of workers • Conduct preconstruction clearance surveys to identify any additional areas that may need to be avoided • Conduct preconstruction clearance surveys and include as a minimum: – Vegetation mapping at a scale suitable for site- specific planning – Identification of habitats and listed species – Identification of site-specific sensitive areas that require avoidance or buffer areas	• To identify opportunities where the residual impacts to MNES matters can be further reduced	• SGP Pre-execution (i.e. Planning) Manager (Arrow)
Construction activities as per plan (no-go areas)	• Ensure construction activities do not extend beyond the work site boundaries • Mark site boundaries clearly for site-specific sensitive areas that require avoidance • Demarcate buffers and inform workers and machinery operators of buffer locations when working within the vicinity of national- and state-listed species, communities and areas identified for avoidance • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts • Retain habitat trees, where practicable • Construct production wells, gathering lines and access tracks within cleared areas, where practicable, with the aim of avoiding sensitive areas • Avoid damaging standing trees not identified for removal. Limit the scraping of standing tree trunks and breaking of limbs by equipment as far as practicable	• To ensure that no unplanned impacts occur on MNES as a result of construction activities	• SGP Construction Manager (Arrow)

Mitigation	Commitment	Intended outcome	Responsible manager/s
Clear Communication	• Inform relevant workers, including contract plant and machinery operators of the location of significant remnant vegetation and buffers and use qualified personnel to guide clearing activities • Prohibit disturbance or harassment of wildlife and the unauthorised collection of flora and forest products	• To ensure that no unplanned impacts occur on MNES as a result of construction activities	• SGP Construction Managers (Arrow and Third Party Contractor)
Fauna spotter catcher	• Assess trees prior to felling for potential nesting hollows. If identified, fell trees in the presence of a qualified fauna spotter-catcher (FSC) and roll them so that the hollows are facing upwards, allowing fauna to escape • Identify key koala trees (*Eucalyptus tereticornis* and *Eucalyptus populnea*), and visually inspect prior to clearing to ensure that they are free of koalas. If koalas are located, the tree should be retained until the animals have moved on, typically overnight • Use appropriately trained personnel or a FSC to capture injured wildlife, where possible. If further action is required, consult with a qualified vet to determine appropriate action • The FSC will be present during clearing. The FSC will be suitably qualified as per the definition provided in EPBC 2010/5344. The number of FSCs on site at the time of clearing will depend on the number of machines being used at any given time • Checks for identified EPBC Act fauna species breeding places will be undertaken immediately prior to commencing vegetation clearing • Potential breeding places will be clearly marked in the field with spray paint, coloured flagging tape (unless not permitted by land owners, e.g. some cattle properties), or by other suitable methods	• To ensure that no unplanned impacts occur on the Koala, Dunmall's Snake, Greater Glider, South-eastern Long-eared Bat, Regent Honeyeater, Painted Honeyeater or Squatter Pigeon	• SGP Construction Managers (Arrow and Third Party Contractor)
Appropriate rehabilitation	• Retain woody debris, logs and rocks for use in rehabilitation, spreading them over part or all of the corridor or, as a minimum, piled along the edge of the cleared corridor to provide refuge for crossing fauna • Translocate or propagate significant species where it is deemed necessary for use during rehabilitation or in offsets in accordance with relevant legislation • Fell trees away from existing stands where practicable. Where trees unavoidably fall into a stand, leave trees in situ to emulate natural tree fall and provide habitat for ground-dwelling species, where practicable	• To ensure that no unplanned impacts occur on MNES as a result of construction activities	• SGP Construction Managers (Arrow and Third Party Contractor)

Mitigation	Commitment	Intended outcome	Responsible manager/s
Reduce light spill	• Reduce light spill resulting from project activities to reduce disturbance to nocturnal fauna	• To ensure that no unplanned impacts occur on the Koala, Dunmall's Snake, Greater Glider or South-eastern Long-eared Bat	• SGP Construction Managers (Arrow and Third Party Contractor)
Reduce project traffic speed	• Implement speed limits on project-controlled roads to reduce the potential for vehicle collisions with wildlife • Confine project traffic to designated roads and access tracks, where practicable	• To ensure that no unplanned impacts occur on the Koala, Dunmall's Snake, Collared Delma or Yakka Skink	• SGP Construction Managers (Arrow and Third Party Contractor)
Weed control	• Inspect work sites and access routes for notifiable weeds and pest plants and animals prior to accessing the site • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites • Advise all relevant personnel of the location and extent of weed infestations in the vicinity of the work areas and the risks involved in moving from one site or property to another • Identify declared weeds [as per the Land Access Code 2016] during the preconstruction clearance survey	• To avoid degradation of the Brigalow, Coolibah-Black Box or Weeping Myall TEC • To avoid reduction in the condition of listed threatened species habitat	• SGP Construction Managers (Arrow and Third Party Contractor)
Documentation	• Develop management procedures, inclusive of buffers where required, for threatened communities and species as and when project activities are identified as likely to have an impact on these values • Develop and implement a compensation framework to 'add value' rather than just compensating for impacts • Where avoidance is not possible, and significant residual impacts remain to threatened species and communities, implement an offset strategy approved by a relevant government agency and comply with reporting conditions of an offset plan	• To ensure that the planned (and actual) impacts to MNES are accurately documented and offset	• Environment Manager (Arrow)

In addition to the mitigation measures listed in Table 3.1, Arrow's response to, and reporting of, injury or mortality of EPBC Act fauna is described in Sections 3.1 and 3.2.

3.1 Arrow response to fauna mortality and injury

In the case of animal mortality/injury, the suitably qualified ecologist/spotter/catcher would inspect the animal to determine the extent of injury and the following would occur:

- If injured, temporary first-aid shall be applied (e.g. stopping blood-flow or binding a wound or broken limb). For superficial scratch wounds, antibiotic ointment, spray or powder shall be applied prior to release.
- Sickness usually takes the form of cold stress during winter (this is alleviated during trapping by providing insulated material within any traps). An animal which appears to be suffering from cold-stress will be placed in a warm holding container in a quiet area until it recovers. Holding containers are always carried as part of the survey equipment and comprise tins or appropriate wooden or plastic boxes/ carriers.
- If successful recovery does not appear to be occurring, or the injury requires further treatment, the animal will be transported in a holding container to the nearest veterinarian or to a local wildlife carer.
- Fauna will not be contained for longer than four hours. If prolonged containment is necessary due to difficultly accessing storage facilities (i.e. veterinary surgery, wildlife carers premises), food and water shall be provided.
- The final aim of the response is to release the recovered animal back into the area where it was originally captured. Once assessed by a veterinary surgeon, injured or sick fauna shall be transported to an authorised wildlife carer if it is to be rehabilitated. If the fauna is to be released into the wild, the animal will be released in the location where it was originally captured.
- If it is necessary to euthanize an animal, humane procedures will be used. These procedures will be reliable, avoid distress and produce rapid loss of consciousness without pain until death occurs. It is important to recognise that whilst some physical methods of euthanasia (e.g. stunning followed by exsanguinations) are not aesthetically pleasant, they may be humane as they ensure immediate insensitivity to pain. The choice of technique will be made based on the sensibilities of the animal to be euthanized rather than the sensitivities of the observer or personnel involved.
- Spotter/catchers used by Arrow receive instruction of humane methods of euthanasia prior to entering the field. Should a situation arise where the spotter/catcher is not suitable or comfortable then works will stop and not proceed until assistance from another suitably qualified spotter/catcher can attend the site and deal with the situation. During this time no further works are permitted to occur.

- Animals that are euthanized or found dead will be disposed of humanely and at or near the site where they were found.

3.2 Reporting on fauna mortality and injury

Regular reporting for the SGP will be included in the annual report provided to the Department.

With regards to exceptional events, such as mortality to an EPBC listed species as a result of the SGP activities, the following information is collected:

- During vegetation clearing, information on all fauna impacted by the clearing works (i.e. instances that have involved the spotter/catcher) are recorded.
- Photographs of the fauna and habitat features will be communicated through various methods (e.g. posters, presentations, etc.) to assist site staff with the identification of fauna and their required habitats.
- Data/information must be provided to the Arrow permit holder or authorised representative and include the following:
  - Fauna sighted, relocated, injured and/or euthanized
  - Fauna breeding places identified and actions taken
  - Notable actions
  - GPS co-ordinates for any species that was captured, relocated or euthanized. The co-ordinate should be of the capture point and the release point, where relevant.

With regards to exceptional events, such as mortality to an EPBC listed species as a result of SGP activities, the following reporting to the Department will occur:

- Reporting of such an exceptional event will be carried out in writing to the Secretary of DotEE within a short period (e.g. 7 days) of Arrow becoming aware of the incident (contact details used will be as per the Department's webpage: http://www.environment.gov.au/biodiversity/threatened/listed-species-and-ecological-communities-notification).
- All such incidents will be reported on an Arrow incident report form and registered in an electronic database.
- The information provided to the Secretary will include the listed threatened species, the date on which the incident took place, the activity being undertaken at the time of the incident, and the immediate actions taken as a result of the death.

- Incidents will be assessed and tracked to ensure that the appropriate investigation, corrective actions and measures are taken to prevent the incident from reoccurring.
- Incidents will be reviewed by Arrow on a monthly and annual basis to determine incident trends, which will enable targeting of areas that require further adaptive management to assist in preventing future incidents. While the review of incidents will occur monthly, the reporting of such trends will be annual.

The annual reporting required by Condition 28 will also include information pertaining to mortalities of any listed threatened species.

4. Mitigation measures during construction, operation and decommissioning

Condition 7A(b): Measures that will be taken to avoid and mitigate impacts to EPBC listed threatened species and their habitat and to EPBC communities during construction, operation and decommissioning of the action.

Table 3.1 in the preceding section described the mitigation measures relevant to the construction phase and particularly in relation to clearing activities. This section does not repeat those measures but rather describes measures additional to those provided in Table 3.1.

Table 4.1 lists the mitigation measures that will be undertaken to avoid or reduce impacts to EPBC species and communities during construction, operation and decommissioning (these are consistent with relevant SGP EIS mitigation commitments).

Further to the commitments provided within the SGP EIS and reproduced below, a number of other mitigation measures included within the Arrow Energy Species Management Program for Tampering with Animal Breeding Places (which was developed for the State Department of Environment and Science (DES) in March 2018) are of relevance and have been included in the list below.

In addition to the mitigation measures listed in Table 4.1, Arrow's response to, and reporting of, injury or mortality of EPBC Act fauna during construction, operation and decommissioning is described in Sections 3.1 and 3.2.

Table 4.1 Description of additional mitigation measures / commitments

Mitigation	Commitment	Intended outcome	Responsible manager/s
Construction - clearing	• See Table 3.1		
Construction - Open trench management	• Trenches will be inspected and monitored as per the APIA Code of Environmental Practice (B159) and will be checked within two hours of sunrise and trapped fauna released. Additional monitoring will be undertaken following rainfall events • The time a trench is left open will be minimised. Fauna exit points will be incorporated when construction is within 1 km of native vegetation, using appropriate material. Fauna refuges, such as sawdust-filled bags, will be provided regularly through areas of high fauna activity • As soon as practical following pipe laying, the trench will be backfilled with excavated material, compacted and topsoil replaced and erosion controls implemented	• To ensure that no unplanned impacts occur on Dunmall's Snake, Koala, Collared Delma or Yakka Skink	• SGP Construction Managers (Arrow and Third Party Contractor)
Construction - Reduce light spill	• Lighting will be designed in a manner that limits disruption on landscape character, views and visual amenity and lighting will be directed into the infrastructure siting rather than dispersed into native vegetation when sites are adjacent to intact habitat	• To ensure that no unplanned impacts occur on the Koala, South-eastern Long-eared Bat and Greater Glider	• SGP Construction Managers (Arrow and Third Party Contractor)
Construction - Reduce project traffic speed	• Speed limits on Project controlled roads will be developed with due consideration to reduce the potential for vehicle collisions with wildlife	• To ensure that no unplanned impacts occur on Dunmall's Snake, Squatter Pigeon, Koala or Yakka Skink	• SGP Construction Managers (Arrow and Third Party Contractor)
Construction - Bushfire	• Fire management plans will be developed for production facilities • Radiation exclusion zones around flares will be designed according to API standard • Enclosed spaces where flammable gas may accumulate will be minimised • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk assessments and relevant legislation and standards • Gathering lines will be buried at a minimum depth of 600 mm. Where gathering lines are present above the ground (at wellheads and at vents or drains), a clear area will be maintained. The size of the cleared area will be determined on a site-by-site basis with consideration of the site-specific risk of bushfire	• To avoid degradation of TECs • To avoid reduction in the condition of listed threatened species habitat	• SGP Construction Managers (Arrow and Third Party Contractor)

Mitigation	Commitment	Intended outcome	Responsible manager/s
	• Fire-safety equipment will be commissioned in the early phase of the construction period • All buildings and production facilities will be fitted with smoke or fire alarms • Fire and gas detection systems will be installed to shutdown compressors • Protocols will be developed for the control of operational activities during extreme fire danger periods, e.g., flaring or shutdowns • Regular patrols and inspections of pipeline easements will be conducted, including status of signposting subsidence and of fire breaks • Vegetation surrounding production facilities and wellheads will be maintained in a manner that limits the amount of combustible material in the area. The size of the cleared area will be determined on a site-by-site basis with consideration of the site-specific risk of bushfire • Access tracks to well sites will be kept clear of dry grass and combustible material wherever practicable and where there is a higher risk of bushfire (to minimise the risk of dry grass being ignited by hot components of vehicles accessing the sites) • Daily operations will be managed with consideration of the fire danger current at that time		
Construction / Operation / Decommissioning - Weed control	• A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species (B152). This plan will include requirements for machinery washdown procedures to be followed during all clearing activities • Weed monitoring and targeted weed control measures will be undertaken within sensitive EVNT habitats (particularly threatened communities such as Brigalow and native grasslands) (B158). Weed control methods within EVNT habitats will be selected on the basis of minimising the risk of adverse impacts on EVNT species or communities • In accordance with the Pest Management Plan regular inspections for pest flora and evidence of pest fauna will be undertaken within Project disturbed areas • Washdown facilities will be designed to ensure that runoff is contained on site and does not transfer weed seeds, spores or infected soils to adjacent areas • When sourcing maintenance materials, materials such as bedding sand, topsoil, straw bales and sand bags will be brought to site only after it is ascertained that the materials are not contaminated with weeds and plant or animal pathogens. A weed hygiene declaration form will be requested from the supplier where there is possible risk of	• To avoid degradation of TECs • To avoid reduction in the condition of listed threatened species habitat • Successful implementation of Arrow's Vehicle and Machinery Hygiene Procedure (ORG-ARW-HSM-PRO-00138) and Weed Management Procedure (ORG-ARW-HSM-PRO-00139)	• SGP Managers (Arrow and Third Party Contractor)

Mitigation	Commitment	Intended outcome	Responsible manager/s
	contamination in products • All relevant personnel will be made aware of the location and extent of weed infestations in the vicinity of the work area and the risks involved in moving from one site or property to another • A declared weed and pest management plan will be developed in accordance with the Petroleum Industry – Pest Spread Minimisation Advisory Guide (Biosecurity Queensland, 2008). Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The pest management plan will include, as a minimum, training, management of pest spread, management of pest infestations and monitoring effectiveness of control measures		
Construction / Operation / Decommissioning – Pest control	• Arrow will manage food, waste and other project activities to prevent or minimise the potential for these to transport or attract pest animals which may then impact MNES	• Successful implementation of Arrow's Pest Management Procedure (ORG-ARW-HSM-PRO-00096)	• SGP Managers (Arrow and Third Party Contractor)
Operation - Grazing	• Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites	• To avoid degradation of TECs • To avoid reduction in the condition of listed threatened species habitat	• SGP Operations Managers (Arrow)
Operation / decommissioning - Appropriate rehabilitation	• The cleared areas and stockpiles will be progressively rehabilitated through revegetation and/or mulching • Areas will be cleared progressively and rehabilitation implemented as soon as practicable following construction and decommissioning activities • Rehabilitation timeframes will be compliant with applicable Environmental Authority conditions and consider any landholder requirements/expectations • Rehabilitation plans will be developed addressing ground preparation requirements, natural and constructed drainage patterns, soil erodibility, contamination, slope steepness and length, vegetation cover, land use and landowner requirements. Partial rehabilitation of gathering lines and other linear infrastructure will be undertaken to reduce edge effects (including weed invasion) and maintain movement rates • Rehabilitation of available areas will be undertaken that is consistent with pre-clearance habitats, to increase the rate of recovery	• To ensure that no unplanned impacts occur on MNES as a result of construction activities • To return the area to pre-disturbed condition (or better) as agreed with the landholder and as required by DES in order to grant progressive rehabilitation certification and EA surrender	• SGP Managers (Arrow and Third Party Contractor)

Mitigation	Commitment	Intended outcome	Responsible manager/s
	• Woody debris, logs and rocks will be retained for use in rehabilitation. Where practical, these will be piled along the edge of the cleared corridor. Where possible these features will be spread over all or part of the corridor to provide refugia for crossing fauna. Systematic removal of surface debris will be avoided and cleared timber will never be burnt • Data collection, particularly of EVNT species identified during pre-clearance surveys, during trench checking or in other Project related activities, will be ongoing until rehabilitation is complete • Site planning, preparation and management requirements will be implemented in accordance with a decommissioning and rehabilitation plan • After decommissioning, rehabilitation areas will be inspected for regrowth similar to the surrounding environment • Regular monitoring of rehabilitation success will be carried out • During rehabilitation works, care will be taken when moving stockpiled logs and vegetation to avoid fauna mortality • Excavations, particularly pipeline trenches and drilling sumps, will be backfilled and rehabilitated. Backfilling will be conducted in a manner that will promote successful rehabilitation, including capping of exposed subsoil with topsoil and replacement of the land surface to preconstruction levels to reduce trench subsidence and concentration of flow. Soils will be mounded where required to allow for settling. However, in laser-levelled paddocks, this may not be practicable, and backfilling will be carried out in consultation with the landowner • A rehabilitation management plan for decommissioning will be developed and implemented which includes monitoring and maintenance of rehabilitated areas until rehabilitation sign off criteria are met • Monitoring of the rehabilitated areas will be undertaken to identify whether the general objectives of the rehabilitation strategy are being met, and whether a sustainable and stable landform has been achieved. Monitoring will be conducted by suitably skilled and qualified persons at representative locations. Annual reviews of monitoring data will be conducted during operations, and post closure, to assess trends and performance • A final rehabilitation report and a decommissioning plan, including a contaminated land assessment where required, landowner commitments and agreements, and rehabilitation		

Mitigation	Commitment	Intended outcome	Responsible manager/s
	status, will be prepared and submitted to the appropriate authorities for approval where required • The area disturbed within the pipeline corridor during the laying of the pipelines will be progressively rehabilitated as soon as practicable after completion of the pipeline installation. Fences, roads and tracks and other existing infrastructure impacted during construction of the pipeline will be repaired and/or replaced as required • At decommissioning, a suitable vegetation cover will be re-established to enable natural vegetation progression and minimal weed invasion • Final ground conditions will be rehabilitated to a state that is conducive to support further natural regeneration at project closure		
Construction / Operation / Decommissioning - Documentation	• A Water Management Plan, Erosion and Sediment Control Plan, and Waste Management Plan will be designed to avoid or minimise the potential impacts of Project • Corrective actions will be undertaken in accordance with the outcomes of incident investigations, audits, monitoring results or advice given by the relevant regulatory authority • Arrow will develop emergency response plans in consultation with emergency services organisations that includes a list of required equipment, training and other resources, and foreseeable emergency and crisis situations. The plans will include safe evacuation procedures, communication protocols (internal and to emergency services, including the Petroleum and Gas Inspectorate), accounting for personnel and visitors, roles and responsibilities, and requirements for training • Any residual impacts to EPBC Act species and communities will be offset. A detailed SGP Phase 1 Offset Strategy and additional offset strategies for the subsequent phases will be developed and implemented to add value rather than just compensating for impact	• To ensure that the planned (and actual) impacts to MNES are accurately documented and offset	• Environment Manager (Arrow)
Construction / Operation / Decommissioning - Hazardous materials management	• Appropriate international, Australian and industry standards and codes of practice will be applied for the handling and storage of hazardous materials, such as chemicals, fuels and lubricants • Appropriate spill response equipment including containment and recovery equipment will be available onsite • Staff will be trained on appropriate handling, storage and containment practices for chemical, fuels and other potential chemicals as relevant	• To avoid degradation of TECs • To avoid reduction in the condition of listed threatened species habitat	• SGP Managers (Arrow and Third Party Contractor)

5. Monitoring program

Condition 7A(c): A monitoring program to determine the success of impacts avoidance and mitigation measures and that will inform adaptive implementation of the action for the duration of this approval.

Monitoring will be undertaken to determine the success of the mitigation and management measures identified within this SIMP and to identify whether the general objectives of the rehabilitation strategy are being met, and whether a sustainable and stable landform has been achieved. The monitoring program will focus on those sensitive ecological values at risk of a high level of residual impact and will be based on review and assurance of the environmental management plan active for the site. The plan will include reference to the relevant environmental impact management processes and procedures, assurance methods and incident response procedures.

Monitoring will be conducted by suitably skilled and qualified persons at representative locations. Annual reviews of monitoring data will be conducted during operations, and post closure, to assess trends and performance. Corrective actions will be undertaken based on the outcomes of incident investigations, audits, monitoring results and advice given by the relevant regulatory authority.

Table 5.1 sets out the monitoring program which will be undertaken which relate specifically to EPBC Act species and communities. The table describes the location, methods and proposed timing as well as identifying responsible parties, reporting formats, trigger values for corrective actions to be initiated and describes adaptive management responses and / or how they will be determined.

Note that Geocortex and the Arrow Sharepoint database, referred to in Table 5.1 is a web-based collaborative platform that integrates with Microsoft Office and allows multiple users to enter and view project data.

Table 5.2 identifies the indicators of success and corrective actions that correlate to each of the mitigation measures identified in Tables 3.1 and 4.1.

Table 5.1 Monitoring program components for EPBC Act species and communities

Monitoring Activities	Methods / commitments	Locations	Timing	Who	Reporting format	Corrective action trigger values	Adaptive management responses
Review of compliance with approval conditions and SIMP mitigation measure commitments	The coordinates and total area of cleared EPBC Act species and community habitat will be recorded and tracked monthly against approved maximum disturbance limits and used for annual compliance reporting. All confirmed cases of non-compliance (and remedial actions) will be reported on the Arrow website. Monitoring and inspection of avoidance, mitigation and management measures will be implemented to ensure the impacts and residual risks continue to be low throughout the lifetime of the Project.	SGP activity areas	Clearing tracked & monitored monthly. Reporting to Dept annual except if non-compliance occurs – self report as per conditions.	Arrow	Annual Compliance Report	Non - compliances	As determined by Annual Compliance Reports
Pre- clearance surveys	Surveys to identify any additional areas that need to be avoided and quantify areas of EPBC Act species, species habitat or TEC which are unavoidable and will be cleared. As a minimum, these will include: • vegetation mapping at a scale suitable for site-specific planning. • identification of habitats for EVNT species.	Proposed vegetation clearing sites	Prior to all vegetation clearing Reported annually	Supervised by a suitably qualified person	Annual Pre - clearance Survey Report provided on the Arrow website	Clearances proposed which would result in the project exceeding the maximum disturbance limit for any EPBC Act species or	A more detailed assessment will be undertaken to identify if the EPBC Act species, habitat or community can be avoided or impacts minimised. Information on the findings and potential impacts will be prepared and notification provided

Monitoring Activities	Methods / commitments	Locations	Timing	Who	Reporting format	Corrective action trigger values	Adaptive management responses
	• identification of site-specific sensitive areas (e.g. ESAs) that require avoidance or buffers. Quantification will be based on field recording of GPS coordinates of the boundary of the habitat within proposed clearing boundaries. These surveys will also be used to ensure that the limits of the area to be cleared are clearly marked on the ground (i.e. high visibility flagging tape, hazard netting or similar) in accordance with the construction limits shown on construction drawings.					communities including any residual significant impact to any of these that are not included in Table 1 of the EPBC approval.	to DotEE and Department of Environment and Science (DES). Approval for additional unavoidable residual significant impacts to any EPBC Act species or community (including any of these which were not in Table 1 of the EPBC approval) will be sought. Arrow also commits to providing offsets for any such additional residual significant impacts.
	Key Koala trees will be identified and visually inspected prior to clearing to ensure that they are free of Koalas.	Proposed vegetation clearing sites	Prior to vegetation clearing and daily during clearing works	Supervised by a suitably qualified person	Koala presence recorded within Geocortex and the Arrow Sharepoint database. Spotter-catcher daily activity records	Koalas located	Trees containing Koalas retained until the animals have moved on.
	Hollow-bearing tree locations and patches of vegetation with a distinct canopy and a dense cluttered shrub layer will be recorded.	Proposed vegetation clearing areas within habitat for MNES	Prior to vegetation clearing	Supervised by a suitably qualified person	Hollow-bearing trees and preferred habitat patches recorded within Geocortex and the Arrow Sharepoint database	Hollow-bearing tree and preferred habitat patches identified	Spotter-catcher present and search for this species in these areas during clearing.

Monitoring Activities	Methods / commitments	Locations	Timing	Who	Reporting format	Corrective action trigger values	Adaptive management responses
	Trees will be assessed for potential nesting hollows prior to felling.	Proposed vegetation clearing sites	Prior to clearing	Supervised by a suitably qualified person	Nesting hollows recorded within Geocortex and the Arrow Sharepoint database. Spotter-catcher daily activity records.	Nesting hollows identified	Trees will be felled in the presence of a FSC and rolled so that the hollows are facing upwards, allowing fauna to escape.
	Data collection, particularly of EVNT species identified during pre-clearance surveys, during trench checking or in other SGP related activities, will be ongoing until rehabilitation is complete. Pre-clearance surveys will include searches for EVNT species and communities.	Predicted and known EVNT species locations	During pre-clearance surveys and checking of open trenches	Arrow	Recorded within Geocortex and the Arrow Sharepoint database	Clearances proposed which would result in the SGP exceeding the maximum disturbance limit for any EPBC Act species or communities including any residual significant impact to any of these which are not included in Table 1 of the EPBC approval.	A more detailed assessment will be undertaken to identify if the EPBC Act species, habitat or community can be avoided or impacts minimised before the clearing takes place. Information on the findings and potential impacts will be prepared and notification provided to DotEE and DES. Approval for additional unavoidable residual significant impacts to any EPBC Act species or community (including any of these which were not in Table 1 of the EPBC approval) will be sought. Arrow also commits to providing offsets for any

Monitoring Activities	Methods / commitments	Locations	Timing	Who	Reporting format	Corrective action trigger values	Adaptive management responses
							such additional residual significant impacts.
Monitoring for unauthorised clearing	Audits/checks will be undertaken during and after clearing activities to ensure no unauthorised encroachment has occurred. Buffer zones and the Project footprint will be regularly monitored using satellite imagery.	Vegetation clearing areas	At least daily during clearing and at the completion of clearing	Construction contractor (environmental representative)	The Construction Contractor is required to report any unauthorised clearing to the Arrow Environment Manager within 24hrs of becoming aware.	Unauthorised Clearing	Review of CEMP with Construction Contractor and amendment as required.
Fauna spotter-catcher monitoring	A FSC will be present during clearing. The number of FSCs on site at the time of clearing will depend on the number of machines being used at any given time.	Active vegetation clearing areas	At all times during clearing	Suitably qualified FSCs as per the definition provided in EPBC 2010/5344	All human/wildlife interactions or incidents involving EVNT Act fauna species will be reported to Arrow via the Fauna Incident Notification Form (FIN) within 24 hours, and will be detailed in the FSC report to be provided to Arrow at the completion of habitat clearing activities (or weekly if clearing activities are ongoing). The FSC report will also	Injury to or mortality of individuals of EPBC Act species.	An investigation into possible root causes would be undertaken as well as a review of relevant mitigation measures and the CEMP and refinement of these where necessary.

Monitoring Activities	Methods / commitments	Locations	Timing	Who	Reporting format	Corrective action trigger values	Adaptive management responses
					detail all human/wildlife interactions or incidents with any species irrespective of their conservation status. Interactions are defined as observations of the species on the work site, captures, removals and relocations. Incidents are defined as any injury or death.		
Inspection for fauna entrapment	Trenches will be inspected and monitored as per the APIA Code of Environmental Practice and will be checked within two hours of sunrise and trapped fauna released. Additional inspections will be undertaken after rainfall events.	All open trenches	At least daily whenever trenches are open	Suitably qualified person	Fauna rescue records	Injury to or mortality of individuals of EPBC Act species	Construction of additional fauna exit ramps / ladders; installation of additional trench plugs; increased frequency of inspections.
EPBC fauna presence and frequency monitoring	Data collection, particularly of EVNT species identified during pre-clearance surveys, during trench checking will be ongoing until rehabilitation is complete.	Representative habitat areas in proximity to project disturbed areas or infrastructure	Data collection ongoing/Opportunistic. Statistical analysis annual	Supervised by a suitably qualified person	Annual EPBC Monitoring Report	Statistically significant reduction in EPBC fauna frequency attributable to the SGP	An investigation into root causes would be undertaken as well as a review of relevant mitigation measures and the CEMP and refinement of these where necessary.

Monitoring Activities	Methods / commitments	Locations	Timing	Who	Reporting format	Corrective action trigger values	Adaptive management responses
Analysis of EPBC Act fauna species mortality records	EVNT fauna mortality (e.g. road kill) record database will be maintained and analysed.	All SGP areas	Incident based throughout the life of the project	Arrow	Recorded within Geocortex and the Arrow Sharepoint database and reported in Annual Compliance Report	Any EVNT fauna mortalities caused by SGP activities	Dependence on the cause of mortality responses could include installation of warning signs or fencing and reduction in speed limits in specific locations.
EPBC Act community condition monitoring	Inspections for EPBC community health will be undertaken in accordance with the Queensland Government Department of Environment and Heritage Protection's Guide to determining terrestrial habitat quality – A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy (2017).	Representative TEC areas in proximity to project disturbed areas or infrastructure	Annual	Supervised by a suitably qualified person	Annual EPBC Monitoring Report	A whole number fall in average habitat quality score for a TEC	An investigation into root causes would be undertaken within 3 months of a corrective action trigger as well as a review of mitigation measures and CEMP and refinement where necessary.
Weed and pest monitoring	Weed surveys (and targeted weed control measures) will be undertaken within sensitive EVNT habitats (particularly threatened communities such as Brigalow). In accordance with the Pest Management Plan regular inspections for pest flora and evidence of pest fauna will be undertaken within Project disturbed areas.	Representative Project disturbance areas within areas known to contain MNES.	At least quarterly and reported at least annually	Arrow	Annual EPBC Monitoring Report	New weeds recorded. Higher weed cover within disturbed areas relative to adjoining areas.	Additional weed management measures at problem locations. Review of Weed and Pest Management Plan.

Monitoring Activities	Methods / commitments	Locations	Timing	Who	Reporting format	Corrective action trigger values	Adaptive management responses
	Surveys will also search for any new weed and pest species being introduced to an area.						
Rehabilitation monitoring	Pipeline RoWs will be regularly inspected until ground stabilisation and natural revegetation or pasture grasses or crops are established. After decommissioning, rehabilitation areas will be inspected for regrowth similar to the surrounding environment. Regular checks of rehabilitation success will be carried out). A rehabilitation management plan for decommissioning will be developed and implemented which includes inspections and maintenance of rehabilitated areas until rehabilitation sign off criteria are met. Surveys/inspections of the rehabilitated areas will be undertaken to identify whether the general objectives of the rehabilitation strategy are being met, and whether a sustainable and stable landform has been achieved. Surveys/inspections will be conducted by suitably skilled and qualified persons at representative locations. Annual reviews of	All Project disturbed areas	Post-construction, at least quarterly and reported annually	Supervised by a suitably qualified person	Annual EPBC Monitoring Report	Rehabilitation data trending away from, and prior to, non-achievement of rehabilitation completion criteria	An investigation into root causes would be undertaken within 3 months of the corrective action trigger including a review of the suitability of rehabilitation methods being applied.

Monitoring Activities	Methods / commitments	Locations	Timing	Who	Reporting format	Corrective action trigger values	Adaptive management responses
	surveys/inspection data will be conducted during operations, and post closure, to assess trends and performance.						
Offset area monitoring	As per EPBC Approval Conditions for the SGP (EPBC 2010/5344), no Project Phases will commence until an Offset Strategy addressing offset obligations for that Project Phase has been developed by Arrow and approved by the Minister. Each Strategy will set out a program for monitoring and reporting on the effectiveness of the management measures, and identify the performance and completion criteria to be tracked for the offset areas.	Offset areas	During the life of each offset area	Arrow	Offset progress reports which will feed into the Offset Strategies for subsequent Project Phases	These will be identified within each strategy / offset area management plan	These will be identified within each strategy / offset area management plan.

Table 5.2 Description of mitigation measures, indicators of success and corrective actions

Mitigation	Commitment	Indicator of success	Corrective action
Pre-construction clearance surveys / minimise clearing	• When the project activities proceed through the detailed planning phase, a field inspection of the specified disturbance footprint (this is specified by a surveyor in the field) will be undertaken by a suitably qualified ecologist and the presence, absence and extent of environmental values will be verified and mapped in the field via GIS. The results of this step will be recorded within Geocortex and the Arrow Sharepoint database. • Where environmental values are confirmed, a 'framing trade-offs' session will be held with the project engineers, planners and ecologists to determine if the location of the activities can be modified to avoid and/or reduce the impact to environmental values. In the event that EPBC species or community habitat cannot be avoided, the actual area to be cleared will be surveyed to quantify the impacts. This data will be recorded and cumulative impact areas tracked. • The disturbance footprint and vegetation clearing will be minimised. • The land cleared for construction purposes will be kept to the minimum necessary, especially during the drier months of the year. • Land disturbance will be minimised with the smallest practical area of land being disturbed in the shortest practicable time. • All operations will be planned to ensure minimal damage on any vegetation, cropping or pasture areas outside the limits to be cleared. • Disturbance within the following areas will be avoided where possible: – Endangered EPBC Act TECs: Brigalow Ecological Community; Coolibah-Black Box Woodlands; Weeping Myall Woodlands). – Core habitat for EVNT species. • Pre-clearance surveys will be conducted to identify any additional areas that need to be avoided. As a minimum, these will include: – vegetation mapping at a scale suitable for site-specific planning. – identification of habitats for EVNT species. – identification of site-specific sensitive areas (e.g. ESAs) that require avoidance or buffers.	• Preconstruction clearance surveys by a suitably qualified ecologist are conducted at every site of proposed activities in areas mapped as habitat for MNES • There is documented evidence that the management hierarchy described in Section 2 has been implemented at every site of proposed activities in areas mapped as habitat for MNES • Linear infrastructure easements (right-of-way) will be within the limits authorised by the Environmental Authority (EA) • The MNES impact areas are equal to or less than the impact areas shown in Tables 1.2 of this document	• Undertake preconstruction clearance surveys by suitably qualified ecologist • Investigate the cause of non-conformance with the management hierarchy and amend the relevant processes / procedures to avoid future non-conformance • Investigate the cause of non-conformance with EA conditions and amend the relevant processes / procedures to avoid future non-conformance • Notify the Department of the Environment and Energy of impacts beyond those shown in Table 1.2 and make the necessary adjustment in the Offset Strategy / Plan for the subsequent phase

Mitigation	Commitment	Indicator of success	Corrective action
	• Wells, gathering lines and access tracks will be located within previous clearings or non-remnant vegetation if possible. • Infrastructure will be designed to avoid undisturbed tracts of remnant vegetation, where practical. Where collection and gathering infrastructure is to be placed within contiguous vegetation, collection networks will be designed to avoid dissection. • Access track location will avoid the repeated isolation of small parcels of remnant vegetation from more continuous tracts. • Vegetation disturbance will be minimised wherever practical. Corridors for linear infrastructure will be as narrow as practical, particularly when crossing linear corridors of vegetation. Areas cleared for field development will be as small as practical. • Habitat trees will be retained where practicable. • Removal of riparian vegetation will be avoided when directional drilling and reduction of right of ways where practical. • Access tracks and pipelines will deviate around sensitive vegetation where practicable. • Sensitive infrastructure design principles will be applied to avoid watercourse, drainage lines and riparian areas where practicable. • Pre-clearance surveys will be undertaken to determine the likelihood of the species (including weeds) occurring. • Where EVNT species are identified in proposed development areas, consideration will be given to mitigation measures such as translocation and/or propagation of flora species. Progress of any translocation programs will be monitored in accordance with the relevant translocation management plans. • The width of construction RoWs will be minimised within areas of sensitivity to the greatest extent practicable without compromising the safety of workers. • Buffer zones will be adopted for Project activities (with the exception of required creek crossings), in different areas of constraint, as defined by the project's constraints mapping. • Tracks will be restricted in riparian zones and durations of impacts minimised, except in the immediate vicinity of creek crossings.		

Mitigation	Commitment	Indicator of success	Corrective action
	• During the design and construction of waterway crossings, care will be taken to minimise the footprint of the structure and to avoid unnecessary disturbance to stream beds and banks. • Where practical the width of the easement will also be narrowed at these points, further reducing impacts on stream banks, beds and riparian zones by restricting the area of waterway that would be disturbed. • Gathering line and access road creek crossings will be kept to a minimum where possible. • Watercourse crossings will be minimised, where practicable, during route selection. Where required, crossing locations will be selected to avoid or minimise disturbance to aquatic flora, waterholes, watercourse junctions and watercourses with steep banks. • Watercourse crossings will be designed to enable passage of flows resulting from a 1 in 100 year average recurrence interval flood event, as a minimum. • Gathering lines and tracks will be designed to avoid watercourses, drainage lines and riparian areas (particularly permanent watercourses or perennial aquatic habitat), where practicable. • Pipeline RoWs widths will be designed to be narrower at watercourse crossings, where practicable.		
Construction activities as per plan (no-go areas)	• Delineation of disturbance boundary limits of works will be clearly established prior to commencement of clearing and soil stripping. • Disturbance exclusion zones (or management buffers) will be established and managed during construction and operations to effectively protect ESAs as defined by the project's constraints mapping. • Trees will be felled away from existing vegetation not identified for removal where practicable. • Damage to trees (e.g. through scraping of tree trunk or breaking of limbs by equipment) not identified for removal will be avoided where practicable. • Avoidance boundaries will be clearly delineated prior to clearing. • Audits/checks will be undertaken during and after clearing activities to ensure no unauthorised encroachment has occurred.	• There is documented evidence that the management hierarchy described in Section 2 has been implemented at every site of proposed activities in areas of MNES • Fauna spotter catcher will be on site during clearing of any MNES • As constructed impact areas (i.e. the actual area in which clearing of any MNES has occurred) are accurately documented	• Investigate the cause of non-conformance with the management hierarchy and amend the relevant processes / procedures to avoid future non-conformance • Ensure fauna spotter catcher is on site during clearing of any MNES • Ensure site works / clearing boundaries are accurately marked in the field

Mitigation	Commitment	Indicator of success	Corrective action
	• Construction activities in sensitive areas will be supervised to ensure appropriate methods (e.g., narrowing of RoW) are being implemented, where required. • Construction that will potentially affect waterways will occur during dry months (periods of low rainfall and low flow) where possible. The use of machinery and vehicles on stream beds and banks will be avoided wherever possible. • Trenching will be perpendicular to the creek where the gathering line crosses waterways. • Where possible trenching within or in the vicinity of watercourses will occur during the drier months of the year, which will reduce the potential for water quality decline as a result of sediment mobilisation. • Buffer zones and the Project footprint will be regularly monitored using satellite imagery. • Watercourse crossings will be constructed in a manner that minimises sediment release to watercourses, stream bed scouring, obstruction of water flows and disturbance of stream banks and riparian vegetation (i.e., the crossing location will be at a point of low velocity, and straight sections will be targeted, with the pipeline or road orientated as near to perpendicular to water flow as practicable). • Transport of equipment across watercourses will be avoided unless an appropriate crossing that minimises disturbance to the watercourse bed and banks and to riparian vegetation is available. • Construction and maintenance activities will be planned to minimise movement of plant and equipment between properties or areas with weed infestations.	• The MNES impact areas are equal to or less than the impact areas shown in Tables 1.2 of this document • Significant disturbance to watercourses will occur when there is no or low flow • High risk weeds are managed as per Arrow's Weed Management Procedure (ORG-ARW-HSM-PRO-00139)	• Early and clear communication of the tracking of actual versus authorised MNES impact areas and relocate future infrastructure to avoid MNES if actual impact is expected to exceed authorised impact • Revise plans of significant disturbance to watercourses to occur when there is no or low flow or improve erosion and sediment controls when such works occur during conditions of water flow • Reinforce the requirement to follow Arrow's Weed Management Procedure
Clear Communication	• Harassment of wildlife and the unauthorised collection of flora or fauna will be prohibited, unless directed by a suitably qualified and experienced person.	• Records of preconstruction 'tool box' sessions / advices provided to construction crews demonstrating compliance	• Investigate the cause of non-conformance and amend the relevant processes / procedures to avoid future non-conformance or apply appropriate measures if deemed a significant breach of conduct rules

Mitigation	Commitment	Indicator of success	Corrective action
Protection of topsoils	• Soil will be stripped according to designated profile depths, subject to further field investigations during stripping. • Where practicable, stripped material will be placed directly onto area to be rehabilitated and spread immediately (if rehabilitation sequences and weather conditions permit) to avoid the requirement for stockpiling. • Soils will be separated into windrows for later collection or re-spreading to minimise compression effects of heavy equipment. • Soil transported by dump trucks may be placed directly into storage. Soil transported by scrapers will be pushed to form stockpiles by other equipment (e.g. dozer) to avoid tracking over previously laid soil to minimise compaction. • Surface of soil stockpiles will be left in as coarsely structured a condition as possible to promote infiltration and minimise erosion until vegetation is established or suitable erosion controls have been applied, and to prevent anaerobic zones from forming. • Pipeline construction will be conducted in a manner that limits the duration of exposure of soils. Stripped and salvaged soil will be re-used within a short period of time (i.e. 28 days) in areas where rehabilitation immediately follows the installation of pipelines. • Erosion and Sediment Control Plans will be developed and maintained in accordance with the International Erosion Control Association (IECA) (2008) Best Practice Erosion and Sediment Control guidelines. All proposed erosion and sediment control measures will be implemented in advance of, or in conjunction with clearing activities. • Topsoil will be stripped, salvaged and stockpiled separately from subsoils. • Appropriate sediment and erosion control structures will be installed and maintained at work sites. • Best practice erosion and sediment control measures will be implement during decommissioning works in accordance with the requirements of the IECA (2008) Best Practice Erosion and Sediment Control manual.	• Erosion and Sediment Control Plans (inclusive of topsoil management specifications) in place and implemented prior to all clearing activities.	• Development and implementation of Plans
Open trench management	• Trenches will be inspected and monitored as per the APIA Code of Environmental Practice and will be checked within two hours of sunrise and trapped fauna released. Additional inspections will be undertaken following rainfall events.	• Site records / photographs demonstrating compliance	• Investigate the cause of non-conformance and amend the relevant processes / procedures to avoid future non-

Mitigation	Commitment	Indicator of success	Corrective action
	• The time a trench is left open will be minimised. Fauna exit points will be incorporated when construction is within 1 km of native vegetation, using appropriate material. Fauna refuges, such as sawdust-filled bags, will be provided regularly through areas of high fauna activity. • Harm to fauna from entrapment during construction and operation of dams will be prevented. • As soon as practical following pipe laying, the trench will be backfilled with excavated material, compacted and topsoil replaced and erosion controls implemented.		conformance
Fauna spotter catcher	• Suitably qualified fauna spotter-catcher (FSC) or ecologist will capture injured wildlife, where possible. Injured wildlife resultant from land clearing will be taken to a qualified veterinary surgeon or carer where practical (B153). The FSC will be at the site on the day of clearing. The FSC will be suitably qualified as per the definition provided in EPBC 2010/5344. The number of FSCs on site at the time of clearing will depend on the number of machines being used at any given time. • Trees will be assessed for potential nesting hollows prior to felling. If hollows are identified, trees will be felled in the presence of a qualified FSC and rolled so that the hollows are facing upwards, allowing fauna to escape. • Key Koala trees will be identified and visually inspect prior to clearing to ensure that they are free of Koalas. If Koalas are located, the tree will be retained until the animals have moved on, typically overnight. • Checks for identified EPBC Act fauna species breeding places will be undertaken immediately prior to commencing vegetation clearing. • Potential breeding places will be clearly marked in the field with spray paint, coloured flagging tape (unless not permitted by land owners, e.g. some cattle properties), or by other suitable methods.	• Review of spotter/catcher records / notes demonstrates compliance • Potential breeding places are clearly marked in the field	• Reinforce the requirement to follow Arrow's Fauna Spotter/Catcher Work Instruction document (ORG-ARW-AND-WOI-00001) • Investigate the cause of non-conformance and amend the relevant processes / procedures to avoid future non-conformance
Appropriate rehabilitation	• The cleared areas and stockpiles will be progressively rehabilitated through revegetation and/or mulching. • Areas will be cleared progressively and rehabilitation implemented as soon as practicable following construction and decommissioning activities.	• Inspection of site during and after installation of infrastructure demonstrates compliance • That the area has been returned to pre-disturbed	• Early and clear communication with the construction crew if inspections are not demonstrating compliance

Mitigation	Commitment	Indicator of success	Corrective action
	• Rehabilitation timeframes will be compliant with applicable Environmental Authority conditions and consider any landholder requirements/expectations. • Rehabilitation plans will be developed addressing ground preparation requirements, natural and constructed drainage patterns, soil erodibility, contamination, slope steepness and length, vegetation cover, land use and landowner requirements. Partial rehabilitation of gathering lines and other linear infrastructure will be undertaken to reduce edge effects (including weed invasion) and maintain movement rates. • Rehabilitation of available areas will be undertaken that is consistent with pre-clearance habitats, to increase the rate of recovery. • Woody debris, logs and rocks will be retained for use in rehabilitation. Where practical, these will be piled along the edge of the cleared corridor. Where possible these features will be spread over all or part of the corridor to provide refugia for crossing fauna. Systematic removal of surface debris will be avoided and cleared timber will never be burnt. • Data collection, particularly of EVNT species identified during pre-clearance surveys, during trench checking or in other Project related activities, will be ongoing until rehabilitation is complete. • Site planning, preparation and management requirements will be implemented in accordance with a decommissioning and rehabilitation plan. • After decommissioning, rehabilitation areas will be inspected for regrowth similar to the surrounding environment. • Regular monitoring of rehabilitation success will be carried out. • During rehabilitation works, care will be taken when moving stockpiled logs and vegetation to avoid fauna mortality. • Excavations, particularly pipeline trenches and drilling sumps, will be backfilled and rehabilitated. Backfilling will be conducted in a manner that will promote successful rehabilitation, including capping of exposed subsoil with topsoil and replacement of the land surface to preconstruction levels to reduce trench subsidence and concentration of flow. Soils will be mounded where required to allow for settling. However, in laser-levelled paddocks, this may not be practicable, and backfilling will be carried out in consultation with the landowner.	condition (or better) as agreed with the landholder and as required by DES in order to grant progressive rehabilitation certification and EA surrender. • Progressive rehabilitation certification is granted by the Department of Environment and Science (DES) when requested. • The EA surrender application including the Final Rehabilitation Report and landholder signoff is granted by the DES.	• Continued remediation and rehabilitation of the disturbed areas until the progressive rehabilitation certification is granted • Continued remediation and rehabilitation of the disturbed areas until the EA surrender application is granted

Mitigation	Commitment	Indicator of success	Corrective action
	• A rehabilitation management plan for decommissioning will be developed and implemented which includes monitoring and maintenance of rehabilitated areas until rehabilitation sign off criteria are met. • Monitoring of the rehabilitated areas will be undertaken to identify whether the general objectives of the rehabilitation strategy are being met, and whether a sustainable and stable landform has been achieved. Monitoring will be conducted by suitably skilled and qualified persons at representative locations. Annual reviews of monitoring data will be conducted during operations, and post closure, to assess trends and performance. • A final rehabilitation report and a decommissioning plan, including a contaminated land assessment where required, landowner commitments and agreements, and rehabilitation status, will be prepared and submitted to the appropriate authorities for approval where required. • The area disturbed within the pipeline corridor during the laying of the pipelines will be progressively rehabilitated as soon as practicable after completion of the pipeline installation. Fences, roads and tracks and other existing infrastructure impacted during construction of the pipeline will be repaired and/or replaced as required. • At decommissioning, a suitable vegetation cover will be re-established to enable natural vegetation progression and minimal weed invasion. • Final ground conditions will be rehabilitated to a state that is conducive to support further natural regeneration at project closure.		
Reduce light spill	• Lighting will be designed in a manner that limits disruption on landscape character, views and visual amenity and lighting will be directed into the infrastructure siting rather than dispersed into native vegetation when sites are adjacent to intact habitat.	• No lighting directed towards intact MNES habitat	• Lighting redirected or shielded away from intact habitat
Reduce project traffic speed	• Speed limits on Project controlled roads will be developed with due consideration to reduce the potential for vehicle collisions with wildlife.	• Review reports generated from Arrow's In-Vehicle Monitoring System (IVMS)	• Clear communication and warning for any IVMS breaches
Weed control	• A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species. This plan will include requirements for machinery washdown procedures to be followed during all clearing activities.	• Inspection of site after installation of infrastructure demonstrates compliance • High risk weeds are managed as per Arrow's Weed	• Reinforce the requirement to follow Arrow's Vehicle and Machinery Hygiene Procedure (ORG-ARW-

Mitigation	Commitment	Indicator of success	Corrective action
	• Weed monitoring and targeted weed control measures will be undertaken within sensitive EVNT habitats (particularly threatened communities such as Brigalow and native grasslands). Weed control methods within EVNT habitats will be selected on the basis of minimising the risk of adverse impacts on EVNT species or communities. • In accordance with the Pest Management Plan regular inspections for pest flora and evidence of pest fauna will be undertaken within Project disturbed areas. • Washdown facilities will be designed to ensure that runoff is contained on site and does not transfer weed seeds, spores or infected soils to adjacent areas. • When sourcing maintenance materials, materials such as bedding sand, topsoil, straw bales and sand bags will be brought to site only after it is ascertained that the materials are not contaminated with weeds and plant or animal pathogens. A weed hygiene declaration form will be requested from the supplier where there is possible risk of contamination in products. • All relevant personnel will be made aware of the location and extent of weed infestations in the vicinity of the work area and the risks involved in moving from one site or property to another. • A declared weed and pest management plan will be developed in accordance with the Petroleum Industry – Pest Spread Minimisation Advisory Guide (Biosecurity Queensland, 2008). Species-specific management will be undertaken for identified key weed species at risk of spread through Project activities. Weed control efforts will be increased in areas particularly sensitive to invasion. The pest management plan will include, as a minimum, training, management of pest spread, management of pest infestations and monitoring effectiveness of control measures.	Management Procedure (ORG-ARW-HSM-PRO-00139)	HSM-PRO-00138) and Weed Management Procedure
Grazing	• Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites.	• Livestock absent from infrastructure sites	• Reinstate integrity of exclusion fencing
Documentation	• A Water Management Plan, Erosion and Sediment Control Plan, and Waste Management Plan will be designed to avoid or minimise the potential impacts of Project. • Corrective actions will be undertaken in accordance with the outcomes of incident investigations, audits, monitoring results or advice given by the relevant regulatory authority.	• Water Management Plan, Erosion and Sediment Control Plan, and Waste Management Plan in place for the Project and Offset Strategy in place for	• Develop and implement required plans • Investigate the cause of non-conformance and amend the relevant

Mitigation	Commitment	Indicator of success	Corrective action
	• Arrow will develop emergency response plans in consultation with emergency services organisations that includes a list of required equipment, training and other resources, and foreseeable emergency and crisis situations (including escapes, blowouts, gas fire, bushfire, critical equipment failure, trapped or missing people, flooding, cyclones, power failure, security incidents and threats, and transport incidents). The plans will include safe evacuation procedures, communication protocols (internal and to emergency services, including the Petroleum and Gas Inspectorate), accounting for personnel and visitors, roles and responsibilities, and requirements for training. • Any residual impacts to EPBC Act species and communities will be offset. A detailed SGP Phase 1 Offset Strategy and additional offset strategies for the subsequent phases will be developed and implemented to add value rather than just compensating for impact.	relevant phase of the Project	processes / procedures to avoid future non-conformance
Hazardous materials management	• Appropriate international, Australian and industry standards and codes of practice will be applied for the handling and storage of hazardous materials, such as chemicals, fuels and lubricants. • Appropriate spill response equipment including containment and recovery equipment will be available onsite. • Staff will be trained on appropriate handling, storage and containment practices for chemical, fuels and other potential chemicals as relevant.	• Records of training provided to construction crews demonstrating compliance	• Undertake and record evidence of such training • Investigate the cause of non-conformance and amend the relevant processes / procedures to avoid future non-conformance
Bushfire	• Fire management plans will be developed for production facilities. • Radiation exclusion zones around flares will be designed according to API standard. • Enclosed spaces where flammable gas may accumulate will be minimised. • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk assessments and relevant legislation and standards. • Gathering lines will be buried at a minimum depth of 600 mm. Where gathering lines are present above the ground (at wellheads and at vents or drains), a clear area will be maintained. The size of the cleared area will be determined on a site-by-site basis with consideration of the site-specific risk of bushfire. • Fire-safety equipment will be commissioned in the early phase of the construction period.	• Fire management plans in place and implemented prior for all production facilities	• Development and implementation of required plans • Investigate the cause of non-conformance and amend the relevant processes / procedures to avoid future non-conformance

Mitigation	Commitment	Indicator of success	Corrective action
	• All buildings and production facilities will be fitted with smoke or fire alarms. • Fire and gas detection systems will be installed to shutdown compressors. • Protocols will be developed for the control of operational activities during extreme fire danger periods, e.g., flaring or shutdowns. • Regular patrols and inspections of pipeline easements will be conducted, including status of signposting subsidence and of fire breaks. • Vegetation surrounding production facilities and wellheads will be maintained in a manner that limits the amount of combustible material in the area. The size of the cleared area will be determined on a site-by-site basis with consideration of the site-specific risk of bushfire. • Access tracks to well sites will be kept clear of dry grass and combustible material wherever practicable and where there is a higher risk of bushfire (to minimise the risk of dry grass being ignited by hot components of vehicles accessing the sites). • Project vehicles will not be driven or parked off-track in situations that are a high risk of igniting a grass fire. • Daily operations will be managed with consideration of the fire danger current at that time.		

6. Consistencies with relevant documents

Condition 7A(d): A description of how measures proposed in the EPBC Species Impact Management Plan are consistent with the measures in relevant conservation advice, recovery plans and threat abatement plans.

Table 6.1 Relevant documents for each of the MNES addressed by this SIMP

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
Terrestrial Species				
Curly-bark Wattle (*Acacia curranii*)	• Advice dated 1 October 2008 • Focuses on grazing and fire management	• Not Required – included on the 'Not Commenced' list	• The main identified threats to Curly-bark Wattle are habitat erosion, grazing by feral goats, stock, rabbits and macropods; clearing of vegetation for fire trail widening	• Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites • Fire management plans will be developed for production facilities • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk assessments and relevant legislation and standards
Hando's Wattle (*Acacia handonis*)	• Advice dated 1 October 2008 • Focuses on inappropriate fire regimes	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Fire management plans will be developed for production facilities • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk assessments and relevant legislation and standards
Belson's Panic (*Homopholis belsonii*)	• Advice dated 1 October 2008 • Focuses on loss of populations via habitat clearing for agriculture and mining; grazing and weed invasion	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites • Inspect work sites and access routes for notifiable weeds and pest plants and animals prior to accessing the site • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
Lobed Blue Grass (*Bothriochloa biloba*)	• Advice dated 14 December 2013 • No current known threats. Potential threats are grazing and weed invasion	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites • Inspect work sites and access routes for notifiable weeds and pest plants and animals prior to accessing the site • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites
Kogan Waxflower (*Philotheca sporadica*)	• Advice dated July 2008 • Loss of large roadside populations is biggest risk due to insecure land tenure	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Pre-clearance surveys to avoid the species where possible • Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries
Prostanthera sp *Dunmore*	• Advice dated 1 October 2008 • Main threats habitat degradation via timber harvesting; inappropriate fire regimes	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts • Fire management plans will be developed for production facilities • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk assessments and relevant legislation and standards
Small-leaved Denhamia (*Denhamia parvifolia*)	• Advice dated 16 December 2008 • Main threats are the legacy of broad-scale clearing; changed fire regimes; grazing; weed	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Fire management plans will be developed for production facilities • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk assessments and relevant legislation and standards

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
	invasion			• Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites • Inspect work sites and access routes for notifiable weeds and pest plants and animals prior to accessing the site • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites
Calytrix gurulmundensis	• Advice dated 1 October 2008 • Main threats are clearing; fragmentation; changed fire regimes; quarrying; timber harvesting	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts • Fire management plans will be developed for production facilities
Finger Panic Grass (*Digitaria australe*)	• Advice dated 14 December 2013 • Main threats are clearing for agriculture; fragmentation; fire; trampling by livestock	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts • Fire management plans will be developed for production facilities • Grazing activities will be excluded from all Arrow gas and water processing and well head

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
				infrastructure sites
Austral Toadflax (*Thesium australe*)	• Advice dated 17 December 2013 • Main threats are lack of fire; grazing; clearing for development; weed invasion	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites • Minimise the disturbance footprint and vegetation clearing • Inspect work sites and access routes for notifiable weeds and pest plants and animals prior to accessing the site • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites
Acacia lauta	• Advice dated 1 October 2008 • Threats largely unknown. Susceptible to clearing for road widening and too frequent fire	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts • Fire management plans will be developed for production facilities
Cobar Greenhood Orchid (*Pterostylis cobarensis*)	• Advice dated 14 December 2013 • Main threats are grazing by feral goats; broad-scale clearing; changed hydrology and salinity; weed invasion	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites • Rehabilitation plans will be developed addressing ground preparation requirements, natural and constructed drainage patterns, soil erodibility, contamination, slope steepness and length,

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
				vegetation cover, land use and landowner requirements. Partial rehabilitation of gathering lines and other linear infrastructure will be undertaken to reduce edge effects (including weed invasion) and maintain movement rates • Rehabilitation of available areas will be undertaken that is consistent with pre-clearance habitats, to increase the rate of recovery
Xerothamnella herbacea	• Advice dated 1 October 2008 • Main threats competition from invasive plants; road widening; trampling	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites • Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites
Hawkweed (*Picris evae*)	• Advice dated 1 October 2008 • The main threats are weed invasion; inappropriate fire regimes; habitat fragmentation; clearing of vegetation for cropping and grazing	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites • Fire management plans will be developed for production facilities • Minimise the disturbance footprint and vegetation clearing
Austral Cornflower (*Rhaponticum australe*)	• Advice dated 16 December 2008 • The main threats include broad-scale vegetation clearing; invasion by exotic weeds; grazing pressure and road works	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites • Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
Eucalyptus virens	• Advice dated 16 December 2008 • The main threats include timber harvesting; loss of habitat due to vegetation clearing	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries
King Bluegrass (*Dichanthium queenslandicum*)	• Advice dated 30 January 2013 • Focuses on habitat loss via agriculture and mining; grazing; weed invasion	• Recovery Plan is required	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites
Queensland White-gum (*Eucalyptus argophloia*)	• Advice dated 1 October 2008 • Main threat is habitat destruction for agriculture and grazing; timber harvesting; road widening	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts
South-eastern Long-eared Bat (*Nyctophilus corbeni*)	• Advice dated October 2015 • Protect known and potential habitat of key populations from habitat loss and	• Required – included on the 'Commenced' list • Recovery objectives are to increase understanding of	• No Plan has been identified as being relevant for this species • Key threats are provided in the	• No clearing will occur in the Eena, Bracker or Barakula State Forests • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
	fragmentation (Eena SF, Bracker SF and Barakula SF in Qld)	basic ecology and to clarify distribution and abundance	conservation advice	
Dunmall's Snale (*Furina dunmalli*)	• Advice dated April 2014 • Legacy of past broad scale land clearing for grazing and agriculture • Manage disruptions to water flow and modifications to wetlands; investigate conservation arrangements	• Not required – see Conservation Advice	• No Plan has been identified as being relevant for this species • Key threats are provided in the conservation advice	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • Rehabilitation plans will be developed addressing ground preparation requirements, natural and constructed drainage patterns, soil erodibility, contamination, slope steepness and length, vegetation cover, land use and landowner requirements. Partial rehabilitation of gathering lines and other linear infrastructure will be undertaken to reduce edge effects (including weed invasion) and maintain movement rates • Rehabilitation of available areas will be undertaken that is consistent with pre-clearance habitats, to increase the rate of recovery
Five-clawed Worm-skink (*Anomalopus mackayi*)	• Advice dated 26 March 2008 • Main threat is habitat clearing for agriculture and development; overgrazing; predation from foxes and feral cats; soil and water pollution	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites • Arrow will manage food, waste and other project activities to prevent or minimise the potential for these to transport or attract pest animals which may then impact MNES • Rehabilitation plans will be developed addressing ground preparation requirements, natural and

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
				constructed drainage patterns, soil erodibility, contamination, slope steepness and length, vegetation cover, land use and landowner requirements. Partial rehabilitation of gathering lines and other linear infrastructure will be undertaken to reduce edge effects (including weed invasion) and maintain movement rates
Squatter Pigeon (*Geophaps scripta scripta*)	• Advice dated Oct 2015 • Nests on the ground • Manage habitat loss and fragmentation, overgrazing by livestock and rabbits, weeds, inappropriate fire regimes, predation by feral cats and fox and illegal shooting	• Not required – see conservation advice	• The *Threat abatement plan for predation by cats* (DoE, 2015a) is identified as relevant • *The threat abatement plan for competition and land degradation by rabbits* (DotEE, 2016) is identified as relevant • The *Threat abatement plan for predation by European red fox* (DEWHA, 2008c) is identified as relevant • Squatter Pigeon identified as a species being affected by rabbits	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts • Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites • Arrow will manage food, waste and other project activities to prevent or minimise the potential for these to transport or attract pest animals which may then impact MNES • Fire management plans will be developed for production facilities • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
			(through habitat degradation) and by feral cats (through predation).	
Regent Honeyeater (*Anthochaera phrygia*)	• Advice dated 8 July 2015 • Focuses on clearing of mature trees; fragmentation; inappropriate fire regimes	• Recovery Plan is required	• A broader plan targeting competition and land degradation from rabbits is linked to this species	• When clearing vegetation, seek to avoid clearing hollow-bearing trees, creating gaps in stands or patches or isolating parcels of remnant vegetation from more continuous tracts • Fire management plans will be developed for production facilities • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk assessments and relevant legislation and standards
Collared Delma (*Delma torquata*)	• Advice dated 3 July 2008 • Main threats loss of habitat from urban and agricultural development; removal of surface rocks; weed invasion	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • Rehabilitation plans will be developed addressing ground preparation requirements, retaining surface rocks, natural and constructed drainage patterns, soil erodibility, contamination, slope steepness and length, vegetation cover, land use and landowner requirements. Partial rehabilitation of gathering lines and other linear infrastructure will be undertaken to reduce edge effects (including weed invasion)
Yakka Skink (*Ergernia rugosa*)	• Advice dated 29 April 2014 • Main threats are legacy clearing; agricultural	• Not Required – included on the 'Not Commenced' list	• No Plan has been identified as being relevant for this species	• Rehabilitation plans will be developed addressing ground preparation requirements, retaining woody debris and surface rocks, natural and constructed drainage patterns, soil erodibility,

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
	development; removal of wood debris; inappropriate roadside maintenance; predation by feral animals			contamination, slope steepness and length, vegetation cover, land use and landowner requirements. Partial rehabilitation of gathering lines and other linear infrastructure will be undertaken to reduce edge effects (including weed invasion) • Arrow will manage food, waste and other project activities to prevent or minimise the potential for these to transport or attract pest animals which may then impact MNES
Australian Painted Snipe (*Rostratula australis*)	• Advice dated 30 May 2013 • Main threat is loss or degradation of wetlands; potential predation by foxes and cats	• Recovery Plan required	• No Plan has been identified as being relevant for this species	• Avoid totally, or where not possible minimise the disturbance footprint and clearing of wetlands • Rehabilitation of available areas will be undertaken that is consistent with pre-clearance habitats, to increase the rate of recovery • Arrow will manage food, waste and other project activities to prevent or minimise the potential for these to transport or attract pest animals which may then impact MNES
Koala	• Advice dated April 2012 • Manage habitat loss and fragmentation, vehicle strike, disease and predation by dogs	• Multiple National and State-based plans	• Multiple National and State-based plans	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts • Implement speed limits on project-controlled roads to reduce the potential for vehicle collisions with wildlife • Arrow will manage food, waste and other project activities to prevent or minimise the potential for

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
				these to transport or attract pest animals which may then impact MNES
Greater Glider	• Advice dated May 2016 • Cumulative effects of clearing and logging activities, current burning regimes and the impacts of climate change are a major threat to large hollow-bearing trees on which the species relies	• Recovery Plan required	• No Plan has been identified as being relevant for this species • Key threats are provided in the conservation advice	• Minimise the disturbance footprint and vegetation clearing • When clearing vegetation, seek to avoid clearing hollow-bearing trees, creating gaps in stands or patches or isolating parcels of remnant vegetation from more continuous tracts • Fire management plans will be developed for production facilities • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk assessments and relevant legislation and standards
Painted Honeyeater	• Advice dated July 2015 • Habitat loss is the key threat to this species	• Recovery Plan required	• No Plan has been identified as being relevant for this species • Key threats are provided in the conservation advice	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries
EPBC Communities				
Brigalow (*Acacia harpophylla* dominant and co-dominant)	• Advice dated December 2013 • Qld Government *Brigalow and Other Lands Development Act 1962* and *Brigalow Development Scheme* encouraged and funded the clearing of Brigalow	• Recovery Plan required	• No relevant Plan • Links to the *Threat Abatement Plan for the biological effects* is provided on the DotEE webpage	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • Fire management plans will be developed for production facilities • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
	to increase cattle stocking rates • Key threats to remaining populations are clearing, fire, weeds, feral animals and grazing			assessments and relevant legislation and standards • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites • Arrow will manage food, waste and other project activities to prevent or minimise the potential for these to transport or attract pest animals which may then impact MNES • Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites
Coolibah-Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregion	• Advice dated 10 February 2011 • Main threats clearing and fragmentation; changes to hydrology; grazing; weed invasion	• Recovery Plan required	• No Plan has been identified as being relevant for this species	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts • Rehabilitation plans will be developed addressing ground preparation requirements, natural and constructed drainage patterns, soil erodibility, contamination, slope steepness and length, vegetation cover, land use and landowner requirements. Partial rehabilitation of gathering lines and other linear infrastructure will be undertaken to reduce edge effects (including weed invasion) and maintain movement rates • Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites

MNES	Conservation Advice	Recovery Plan	Threat Abatement Plan	SIMP Consistency (Control measures included in Tables 3.1, 4.1 and 5.5 – the following are relevant to the particular MNES)
				• Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites
Weeping Myall Woodlands	• Advice dated December 2008 • Manage clearing and degradation for agriculture and from overgrazing, weed invasion and herbivory by caterpillars of the Bag-shelter Moth	• Recovery Plan required	• The *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads* (DSEWPAC, 2011) is identified as relevant	• Minimise the disturbance footprint and vegetation clearing • Ensure construction activities do not extend beyond the work site boundaries • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites

7. Commencement of Stage 1

Condition 7B: The approval holder must not commence Stage 1 until an EPBC Species Impact Management Plan has been approved by the Minister in writing. The approved EPBC Species Impact Management Plan must be implemented by the approval holder.

Arrow provides the commitment that the Surat Gas Project will not commence until this EPBC Species Impact Management Plan has been approved by the Minister or delegate and that this EPBC Species Impact Management Plan will be implemented.

8. References

Arrow Energy (2012). Surat Gas Project Environmental Impact Statement.

Arrow Energy (2013). Supplementary Report to the Surat Gas Project Environmental Impact Statement.

Biosecurity Queensland (2008). Petroleum Industry (Including Coal Seam Methane Gas) Minimising Pet Spread Advisory Guidelines.

Department of Environment and Heritage Protection (2017). Queensland Environmental Offsets Policy. Version 1.4.

International Erosion Control Association (IECA) (2008). Best Practice Erosion and Sediment Control Guidelines.

9. Document Administration

This document has been created using ORG-ARW-IMT-TEM-00003 v4.0

Revision history

Revision	Revision Date	Revision Summary	Author
0.1	28 August 2017	Draft	M. Ryan
1.0	5 June 2018	Final	M. Ryan
2.0	27 July 2018	Revised Final	M. Ryan
3.0	15 October 2018	SIMP only Draft	M. Ryan
4.0	20 November 2018	Final SIMP	M. Ryan

Key document location

Confidential Project Pearl Drive

Related documents

Document Number	Document title

Acceptance and release

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