Bowen Gas Project

Phase 1 Offset Strategy

Version	Rev 2
Released	3 October 2018
Document Owner	Approvals Manager
Document Author	Approvals Specialist
Document Status	Final
Security Classification	Standard

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Cover Page

EPBC Number: EPBC 2012/6377

Project Name: Arrow Bowen Gas Project

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

Approved Action: To develop, operate and decommission coal seam gas reserves in the Bowen Basin, Queensland, as described in the Referral provided under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) on 9 May 2012; and as described in the Bowen Gas Project Environmental Impact Statement (December 2012) and Supplementary Report to the Environmental Impact Statement (June 2014).

Location of the Action: The Project covers an area of approximately 8,000 km^2 and located approximately 150 km south-west of Mackay in Queensland's Bowen Basin. The project development area extends from near the township of Glenden in the north and near Blackwater in the south.

Date of preparation of this Strategy: 13 July 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 no knowledge of that authorisation being revoked at the time of making this declaration.

Signed: .....

Full name: GM/BOM Bowen and New Core Opportunities
Maarten van der Cieson

Organisation: Arrow Energy Pty Ltd

Date: 13/07/2018

Executive Summary

Background and Purpose

- On 27 October 2014 Arrow Energy Pty Ltd (Arrow) received approval from the Australian Government to proceed with the Bowen Gas Project (BGP) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC 2012/6377).
- On 5 May 2017 a 'Request to Vary Conditions of Bowen Gas Expansion Project' was submitted to the Department of the Environment and Energy (the Department) and approved on 25 March 2018. Revised Conditions of Approval are summarised in Table 1.1 (and provided in full in Appendix A).
- The purpose of this document is to satisfy the BGP approval conditions relevant to the strategic Phase 1 EPBC Offset Strategy (OS).

Key Elements

- Arrow has undertaken comprehensive seasonal ecological surveys to gain an understanding of EPBC listed threatened species and communities within the BGP Project area. These are summarised in the Environmental Impact Statement (EIS) and Supplementary Report to EIS (SREIS). Post EPBC approval, additional flora and fauna surveys have been completed in the Phase 1 areas. Arrow has modified the field development layout to avoid and minimise impacts to national values.
- As a result, the Phase 1 disturbance areas for all EPBC listed threatened species and ecological communities are less than the Phase 1 maximum disturbance limits set by BGP approval conditions.
- This Phase 1 OS discusses the measures that will be implemented to secure offsets for residual impacts to EPBC Act species and communities as a result of developing Phase 1 infrastructure.
- As per Condition 15 and Condition 16, Arrow provides the Department with the commitment that Phase 1 activities will not commence until the OS is approved, and that offsets for Phase 1 will be legally secured prior to the commencement of Phase 2.
- As per Condition 17A, within 12 months of project commencement, Arrow will submit for Minister approval a Phase 1 Offset Area Management Plan (OAMP) that identifies the area to be offset for each EPBC listed species and community, the land to be legally secured, the conservation gains to be achieved and management measures that will be implemented to improve the offset site/s for the respective EPBC listed threatened species and ecological communities.

Recommendation

That the Minister or delegate approve this Bowen Gas Project Phase 1 EPBC Offset Strategy.

Abbreviations and Acronyms

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

Abbreviations and Acronyms

Term	Definition
ATP	Authority to Prospect
BGP	Bowen Gas Project
CEMP	Construction Environmental Management Plan
DotEE	Department of the Environment and Energy (Australia)
DES	Department of Environment and Science (Queensland)
EA	Environmental Authority
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FEED	Front End Engineering and Design
FIN	Fauna Incident Notification
GIS	Geographic Information System
GPS	Global Positioning System
HSE	Health, Safety and Environment
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992* (Queensland)
OAMP	Offset Area Management Plan
OS	Offset Strategy
RE	Regional Ecosystem
RoW	Right of Way
SEVT	Semi-evergreen Vine Thicket
SIMP	Bowen Gas Project EPBC Species Impact Management Plan (2018)
SREIS	Supplementary Report to the Environmental Impact Statement
TEC	Threatened Ecological Community
VDec	Voluntary Declaration as defined under the VM Act
VM Act	*Vegetation Management Act 1999* (Queensland)

Definitions

Term	Definition
Bowen Gas Project	Bowen Gas Project is limited to a maximum of 4,000 coal seam gas production wells and associated infrastructure. The action must not occur outside of the Authorities to Prospect (ATPs) 1103, 1031, 1025, 749, 742 and 759.
Core Habitat Known	Core habitat for a species known from recent records (since 1980) or confirmed sightings, generally buffered by a one kilometre radius. Core Habitat Known may also include remnant or regrowth vegetation within areas where known sightings have occurred (as defined in the rules for habitat mapping provided in Appendix B.
Core Habitat Possible	Areas of potential habitat with a number of features or values known to contribute to, or be important for the occupation of the species (as defined in the rules for habitat mapping for individual species in Appendix B).
Department	The Australian Government Department administering the EPBC Act
EPBC Act species and communities	Flora and fauna species listed as 'threatened' and vegetation communities listed as 'threatened ecological communities' under the EBPC Act at the time of the EPBC Act approval for the BGP (EPBC 2012/6377)
EPBC Act fauna species	Fauna species listed as extinct, extinct in the wild, critically endangered, endangered or vulnerable under Section 178 of the EBPC Act at the time of the EPBC Act approval for the BGP (EPBC 2012/6377)
Phase 1 area	The area directly overlapping with the Phase 1 infrastructure (as shown in Figure 1.1)
Pre-clearance surveys	Surveys that are undertaken for flora and fauna species and communities for all areas of the project area that are to be disturbed by project activities
Project phase	The development phases of the project which are to be a duration of no more than 5 years and confirmed by the approval holder prior to the completion of each Project phase (as per BGP EPBC definition).
Project Phase 1	The period of no more than 5 years from commencement (as per BGP EPBC definition).
Suitably Qualified Person	A person who has professional qualifications, training or skills or experience relevant to the nominated subject matters and can give authoritative assessment, advice and analysis about performance relevant to the subject matters using relevant protocols, standards, methods or literature (as per BGP EPBC definition).

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 resources in Queensland, including resources in the Bowen Basin.

The Bowen Gas Project (BGP) was granted approval from the Queensland Government in September 2014 and the Australian Government in October 2014 for development of up to 4,000 coal seam gas production wells and associated infrastructure. The Project covers an area of approximately 8,000 km^2, and is located south-west of Mackay, extending from Glenden in the north to Blackwater in the south (see Figure 1.1).

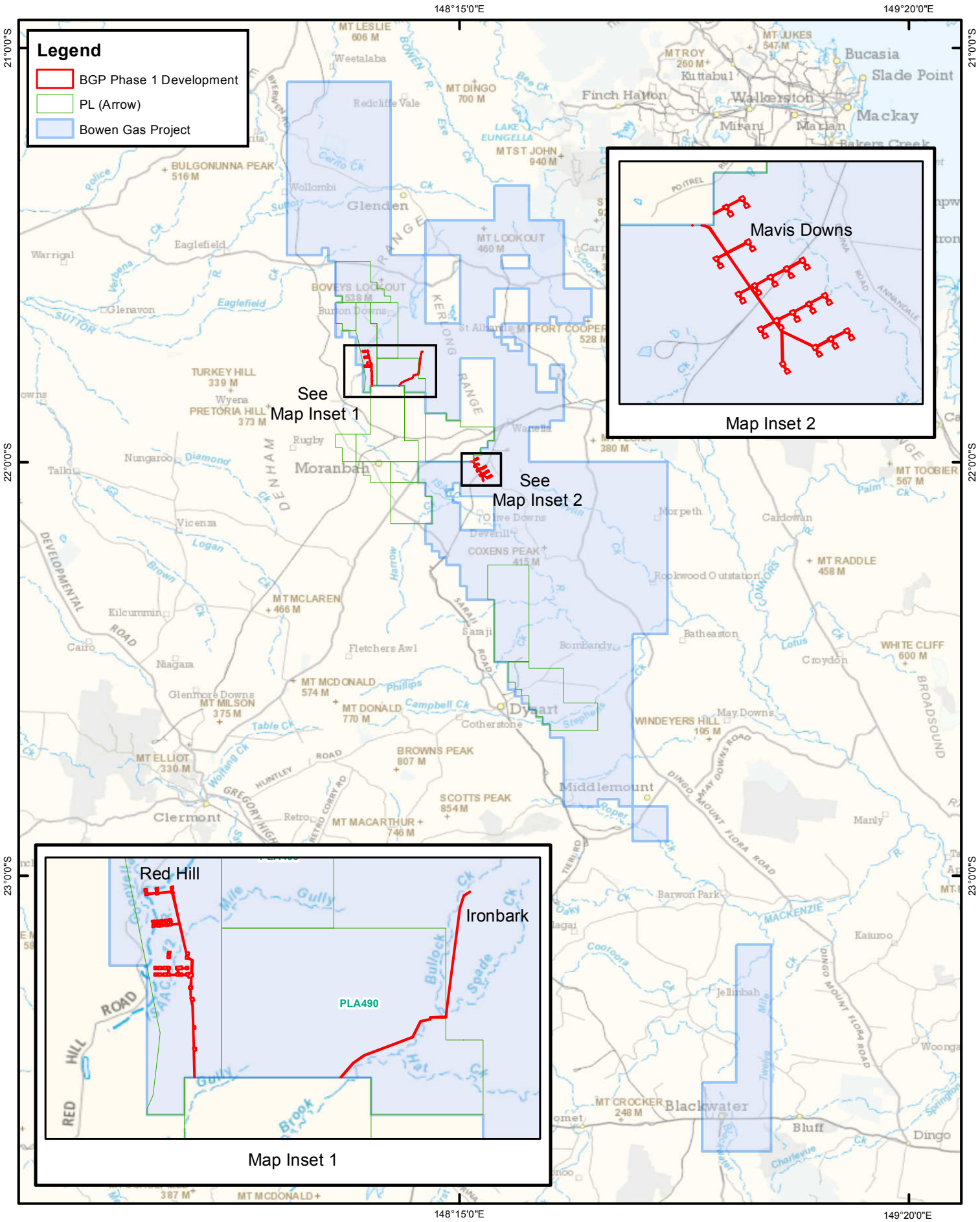
The EPBC Act approval for the BGP (EPBC 2012/6377) specifies 'Whole of Project' and 'Phase 1' maximum disturbance limits for particular Matters of National Environmental Significance (MNES). The approval also specifies that the Phase 1 EPBC Offset Strategy (Phase 1 OS) be submitted for approval of the Minister prior to project commencement. The approval decision defines project phases as "*development phases of the project which are to be a duration of no more than five years and confirmed by the approval holder prior to the completion of each project phase*".

Figure 1.1 shows the location of the Phase 1 activities in relation to the area covered by the BGP. Phase 1 activities consist of the installation of 62 gas wells (including verticals and laterals) and approximately 14 km of gathering pipelines at Red Hill, a 13 km interconnecting gas pipeline (referred to as Ironbark pipeline), and 36 wells (including verticals and laterals) and approximately 20 km of gathering at Mavis Downs. While minor refinements to the Phase 1 activities may occur during detailed engineering, the following disturbance footprint assumptions are considered reliable and therefore have been used for this strategy:

- each well pad will have a disturbance area of 1 ha
- each gathering line right-of-way (RoW) will be a maximum of 40 m in width, and
- access tracks will be preferentially located within the RoW for gathering lines or will utilise existing access tracks and as such no additional disturbance area has been included.

The front end engineering design (FEED) process will provide Arrow with further opportunities to avoid and minimise impacts to EPBC Act species and communities through more refined infrastructure location planning.

This Phase 1 OS addresses the applicable EPBC approval conditions pertaining to offsets (Conditions 11 – 17B) and provides the information required under Condition 14 pertaining to the Phase 1 OS. Table 1.1 summarises the BGP EPBC approval conditions pertaining to environmental offsets based on the 'Variation to Conditions Attached to Approval' approved by the Department on 25 March 2018 (Appendix A). The conditions applicable to this Phase 1 OS and where they are addressed in the report are also listed in the table.



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

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Figure 1.1

BGP Phase 1 Development Overview

Coordinate System: GCS GDA 1994

0 12.5 25 50
km

Date: 23/02/2018

Document: V:\Products\Australia\Queensland\Bowen_Basin\Environment\180207_MNES_BE\mxd\BGP_Phase1_Overview_.mxd

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Table 1.1: Cross-reference table for information requirements and Phase 1 OS

Condition Number	Condition requirement	Section of this Stage 1 OS
11	The approval holder must ensure that environmental offsets comply with principles of the *EPBC Act Environmental Offsets Policy.* If the approval holder has provided an offset in respect of impacts predicted for a stage of the project which subsequently are not realised, such parts of the offset in excess of the obligation for that stage can be applied towards offsets required for the impacts of subsequent project stages.	Section 2
13	The Offset Strategy may be prepared and submitted to the Minister for approval in stages. Each stage of the Offset Strategy must provide information in respect of the next Project Phase to commence and all earlier Project Phases. A Project Phase must not commence until an Offsets Strategy addressing offset obligations for that Project Phase has been approved by the Minister.	Section 3
14	The Offset Strategy must include:	
14(a)	A strategy to secure the minimum offsets proposed for the residual significant impacts for the next Project Phase.	Section 4.1
14(b)	A reconciliation of impacts predicted in the next Project Phase and actual disturbance in earlier Project Phases against the maximum disturbance limits set out in Table 1.	Section 4.4
14(c)	A process to offset, in accordance with the EPBC Act Environmental Offsets Policy, any significant impact for the next Project Phase to any EPBC listed threatened species or EPBC community not identified in Table 1.	Section 4.5
14(d)	A program to monitor and report on the effectiveness of the management measures, and progress against the performance and completion criteria.	Section 5
14(e)	A description of potential risks to the successful implementation of the Offset Strategy, and a description of the contingency measures that would be implemented to mitigate against these risks.	Section 6
14(f)	A timeline for when actions identified in the Offset Strategy will be implemented for each offset area.	Section 7
14(g)	The proposed legal mechanism for securing the offset(s).	Section 8
15	The approval holder must not commence Project Phase 1 until the Offset Strategy has been approved by the Minister in writing. The approved Offset Strategy must be implemented by the approval holder.	Sections 4.1 and 7
16	Offsets for Project Phases must be in accordance with the mechanism identified in the approved Offset Strategy and must be registered and legally secured in accordance with Queensland legislation prior to commencement of any subsequent Project Phase.	Sections 7 and 8

The below conditions relate to post Phase 1 OS and are not required to be addressed in this Strategy.		
17	At least 3 months prior to the commencement of any Project Phase after Project Phase 1, the approval holder must submit a revised Offset Strategy required at conditions 13 and 14 for approval by the Minister. The updated Offset Strategy must include:	Noted
17(a)	A strategy to secure the minimum offsets proposed for the residual significant impacts to the EPBC listed species and communities for the next Project Phase.	Noted
17(b)	A map of the location of each EPBC listed threatened species and its habitat and EPBC community in relation to infrastructure for the next Project Phase.	Noted
17(c)	The information required for the Offset Strategy at conditions 14a to 14g for the next Project Phase.	Noted
17(d)	Demonstration of how any proposed offset builds on offsets already secured and will contribute to a larger strategic offset for whole of project impacts.	Noted
17(e)	Performance and completion criteria for evaluating the management of offset areas.	Noted
17A	Within 12 months of project commencement or the Minister approving a version of the Offset Strategy for a Project Phase, the approval holder must submit for the approval of the Minister an Offset Area Management Plan which includes: a. a description of the management measures that will be implemented for the protection of EPBC listed threatened species and communities in each offset area, b. details of how the proposed offset/s and Offset Area Management Plan meet the requirements of the EPBC Act Environmental Offsets Policy; c. a field validation survey and baseline description of the current condition (prior to any management activities) of the offset area/s, including existing vegetation; d. a description and map (including shapefiles) to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes; e. information about how the offset area/s provide connectivity with other relevant habitats and biodiversity corridors including a map depicting the offset areas in relation to other habitats and biodiversity corridors; f. details of how proposed management measures take into account relevant approved conservation advices and are consistent with the measures contained in relevant recovery plans and threat abatement plans; g. completion criteria and performance targets for evaluating the effectiveness of Offset Area Management Plan implementation, and criteria for triggering corrective actions (if necessary); h. a program to monitor, report on and review the effectiveness of the Offset Area Management Plan; i. a description of potential risks to the successful implementation of the offset/s, and contingency measures that would be implemented to mitigate against these risks.	Noted

17B	The approval holder must not commence the next Project Phase until the Offset Area Management Plan for the current Project Phase has been approved in writing by the Minister.	Noted

2. EPBC Act Environmental Offsets Policy

Condition 11: The approval holder must ensure that environmental offsets comply with principles of the EPBC Act Environmental Offsets Policy.

If the approval holder has provided an offset in respect of impacts predicted for a stage of the project which subsequently are not realised, such parts of the offset in excess of the obligation for that stage can be applied towards offsets required for the impacts of subsequent project stages.

2.1 Offset delivery principles

Arrow commits that the environmental offsets, the subject of the detailed plan to be submitted to the Department within 12 months of project commencement as per Condition 17A, will comply with the principles of the EPBC Act Environmental Offsets Policy (2012). Arrow's offset delivery principles and how BGP offsets will comply are summarised in Table 2.1.

Table 2.1: Arrow's Offset delivery principles

EPBC Offset Principle	How offsets will comply
Deliver an overall conservation outcome improving or maintaining the viability of the protected matter being offset.	The offsets applied to Phase 1 may be a combination of direct and indirect offsets as per the Environmental Offsets Policy. For direct land-based offsets, these will be selected on the basis they contain, or have ability to enhance, habitats that support the listed threatened species and/or ecological communities required to be offset. Direct offsets may include: • Improving existing habitat for the protected matter; • Creating new habitat for the protected matter; • Reducing threats to the protected matter; • Averting the loss of a protected matter or its habitat that is under threat. For offsets associated with habitat for threatened species and ecological communities, any direct offset will meet, as a minimum, the quality of the habitat at the impact site; or, where a proposed offset site has a lower habitat quality than that of the impact site, the offset will be managed and resourced over a defined period of time so that its habitat quality is improved to meet the quality of habitat originally impacted. The offset areas will be legally secured prior to the commencement of the next phase and management actions will be implemented as per an approved Offset Area Management Plan (OAMP). Where compensatory measures are used to offset a protected matter, Arrow will ensure they result in conservation gains (e.g. increased knowledge of the species distribution and habitat utilisation so they can be better protected in the future) consistent with approved conservation advice, recovery plans etc.

EPBC Offset Principle	How offsets will comply
Be predominantly built around direct land-based offsets but may include compensatory measures.	BGP offsets will predominantly be delivered as direct, land-based offsets. Arrow will also investigate the use of compensatory measures (e.g. research, threat abatement) for particular protected matters where it is deemed appropriate. Measures will be tailored to the needs of that matter, and be consistent with approved recovery plans, conservation advice etc.
Be in proportion to the level of statutory protection that applies to the protected matter.	The EPBC Act offsets calculator will be used to determine the total offset area required for a particular protected matter. This takes into account the status of the species or community.
Be of a size and scale proportionate to the residual impact on the protected matter.	The EPBC Act offsets calculator will be used to determine the total offset area required for a particular protected matter. This takes into consideration the extent of the impact and habitat quality of the impact area.
Effectively identify and manage risks of the offset not succeeding.	Arrow will identify risks to the protected matter on the offset site, including risks associated with the offset not succeeding. Suitable and appropriate management measures and corrective actions will be described and implemented to reduce these risks in each approved OAMP.
Be additional to what is already required by law or agreement.	Offset outcomes will be 'additional' to what is currently required under law. For example, offsets will be legally secured on title which protects native vegetation from future clearing. Management and recovery actions will be implemented above and beyond what are currently being undertaken and required by law.
Be efficient, effective, timely, transparent and scientifically robust.	Arrow will deliver the required offsets for BGP in phases. Each phase is no more than five years. Offset sites will be identified and secured in a timely manner as permitted in EPBC approval. Management actions to be described in the OAMP's will be scientifically robust to ensure conservation outcomes are achieved. Transparent monitoring and reporting processes will be put in place to track offset progress.
Have transparent governance arrangements including to be readily measured and monitored.	Each offset site will have an OAMP prepared that clearly identifies the management measures to be undertaken, performance outcomes to be achieved, and ecological monitoring to occur. Monitoring of the offset will occur on a regular basis to measure the progress towards achieving set outcomes and inform reports prepared for submission to Commonwealth. Arrow will prepare a publically available Annual Report that summarises the impacts to EPBC Act species and communities and how they are tracking against approved disturbance limits.

2.2 Transfer of offset to subsequent phases

Annual and cumulative impacts to MNES for the BGP will be tracked against allowable disturbance limits (whole project and each phase) and reported annually. A copy of this report will be provided to the Department of the Environment and Energy (the Department) and placed on the Arrow website (as per Condition 30).

Three months prior to the end of each phase, Arrow will prepare and submit an updated OS for the next phase. This report will summarise realised impacts to MNES for the present phase and where there is any 'credit'. Predicted disturbance limits for the next phase will also be outlined in this report.

Any realised MNES impacts less than the total amount approved, and the associated 'offset area credits' will be summarised, and these will be put towards meeting offset requirements for the next development phase.

3. Staged offset delivery

Condition 13: The Offset Strategy may be prepared and submitted to the Minister for approval in stages. Each stage of the Offset Strategy must provide information in respect of the next Project Phase to commence and all earlier Project Phases.

A Project Phase must not commence until an Offsets Strategy addressing offset obligations for that Project Phase has been approved by the Minister.

Arrow is approved to develop the BGP in Project phases and the quantification and delivery of environmental offsets will correspond with each Project phase, as set out in the applicable OS.

This Phase 1 OS meets the information requirements of the EPBC Approval Condition 14 including the provision of information on the proposed development that will occur as part of Phase 1, a description of the risks and contingency measures to successfully implement this OS, and a timeline for when OS actions will be implemented.

Arrow commits that it will not commence the BGP until this Phase 1 OS has been approved. Arrow also commits to the development of offset strategies for each subsequent Project phase. These OSs will include information in respect of the relevant (next) phase to commence as well as all earlier phases. Arrow commits that each subsequent Project phase will not commence until an OS for that phase has been approved by the Department.

4. Phase 1 Offset Strategy

Condition 14: The Offset Strategy must include:

Condition 14a: A strategy to secure the minimum offsets proposed for the residual significant impacts for the next Project Phase.

4.1 Offset delivery process

The minimum offset areas required to offset the residual significant impacts for Phase 1 (as presented in Table 4.1) will be developed:

- in collaboration with the Department using the Department's offset calculator once suitable offset properties have been identified.

- after habitat condition assessments have been conducted on the offset properties and a habitat quality score out of 10 derived.
- and described in the more detailed OAMP to be submitted to the Department within 12 months of project commencement (as per Condition 17A).

The following outlines the strategy to secure the Phase 1 offsets.

Arrow proposes to take a staged approach based on the phases of the project for the implementation of offsets. This staged approach is aligned with the conditions of the BGP EPBC Act approval. The benefits of staging the project offsets are the continued focus on reducing the impacts to offset values throughout project life, and more accurate impact assessments (from more detailed design and field surveys) for the future stages being available to define the offset requirements.

Offsets will be delivered where an impact to an MNES value is assessed as being 'significant' (as defined in the EPBC Act Significant Impact Guidelines Version 1.1, 2013). Offsets will be delivered in accordance with the EPBC Act Environmental Offsets Policy, October 2012 (EPBC Act Offsets Policy). This policy outlines the Australian Government approach to the use of environmental offsets. Offsets are viewed as the third strategy to reduce potential impacts to MNES after avoidance and mitigation, which are generally referred to as on-site measures.

To ensure compliance with the EPBC Act Offsets Policy, the offsets delivered will:

- Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action.
- Be built around direct offsets but may include other compensatory measures. The proportion of direct and compensatory measures will be tailored to each EPBC Act species and communities and will be set out in the OAMP.
- Be in proportion to the level of statutory protection that applies to the protected matter.
- Be of a size and scale proportionate to the impacts on the protected matter.
- Be efficient, effective, timely, transparent, scientifically robust and reasonable.
- Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

Arrow's selection of direct offsets (those that result in a measurable conservation gain for an impacted protected matter) will be aligned with the conservation gain being able to:

- Improve existing habitat for the protected matter, or
- Create new habitat for the protected matter, or
- Reduce threats to the protected matter, or
- Avert the loss of a protected matter or its habitat that is under threat (if the risk of loss is avoided as a result of securing an offset for conservation purposes which will protect the protected matter or its habitat).

For Phase 1, Arrow will secure offsets for the disturbance of EPBC Act species and communities quantified in the column titled 'Phase 1 proposed disturbance' within Table 4.1.

Arrow plans to secure Phase 1 offsets predominantly through direct land-based offsets that may be supplemented by indirect offsets (i.e. other compensatory measures). Full details will be set out in the Phase 1 OAMP.

In regard to land-based offsets, there remain several options for Arrow to identify and legally secure the offset area/s prior to the finalisation of the offset package (e.g. collaboration with other resource companies to build on existing offsets, or securing offset areas on private property through landholder agreements including those executed through specialist trusts).

Arrow's preferred option for direct land-based offsets is collaboration with another resource company on strategic offset properties for all or a majority of the offset requirements. This could be supported by offset area/s secured through trusts where required. Arrow is in discussions with other resource companies and exploring potential collaborative offsetting opportunities in the Bowen Basin. Arrow has also identified a number of trusts (e.g. brokers) that offer to secure offsets for the relevant values through either existing secured properties or securing additional properties.

Potential offset properties that would satisfy the requirements of the EPBC Act approval have been identified and are available. In particular, Arrow undertook extensive offset property identification and assessment in 2015-2017. At that time, over 60 properties were identified from desktop analysis. This property list was refined through a ranking process that considered the ability of each property to provide for multiple MNES offset requirements, strong connectivity in the landscape and a combination of remnant and regrowth vegetation, as well as consideration of the condition of the vegetation, land use and property ownership. Twenty-two of the properties were identified for further investigation and landholder engagement, and of these nine properties appear promising (see Figure 4.1 for locations).

In identifying offset properties, Arrow has the following objectives:

- Property criteria align with EPBC Act Offsets Policy.
- On-ground confirmation of offset values.
- Wherever possible, connected in the landscape to adjacent tracts of remnant vegetation and/or riparian corridors.
- Containing a number of the required offset values with sufficient area to meet Phase 1 offset requirements and preference to have surplus areas available for future project phases and, as relevant, future Arrow projects.
- Property management aligned with principle of reduction in threats, and an increase in or maintenance of ecological condition.

These objectives will continue to be applied as Arrow works towards finalising the offset package post approval of the Phase 1 OS and then legally securing offset properties. This work will include landholder agreements and additional ground-truthing as required to confirm:

- Location of the offset area on the property.
- Management actions required.

- Performance and completion criteria for each EPBC Act species and communities.

Responsible parties for management and monitoring will also be identified. A plan / agreement will be prepared confirming the above requirements to which the landholder and Arrow (including contractors) will agree through contractual arrangements.

Based on the work to date on Arrow's preferred property options and contingency options, Arrow is confident that the full offset requirements for Phase 1 will be finalised and legally secured in a timely manner and prior to the commencement of Phase 2.

4.2 Quantification of Phase 1 residual impacts

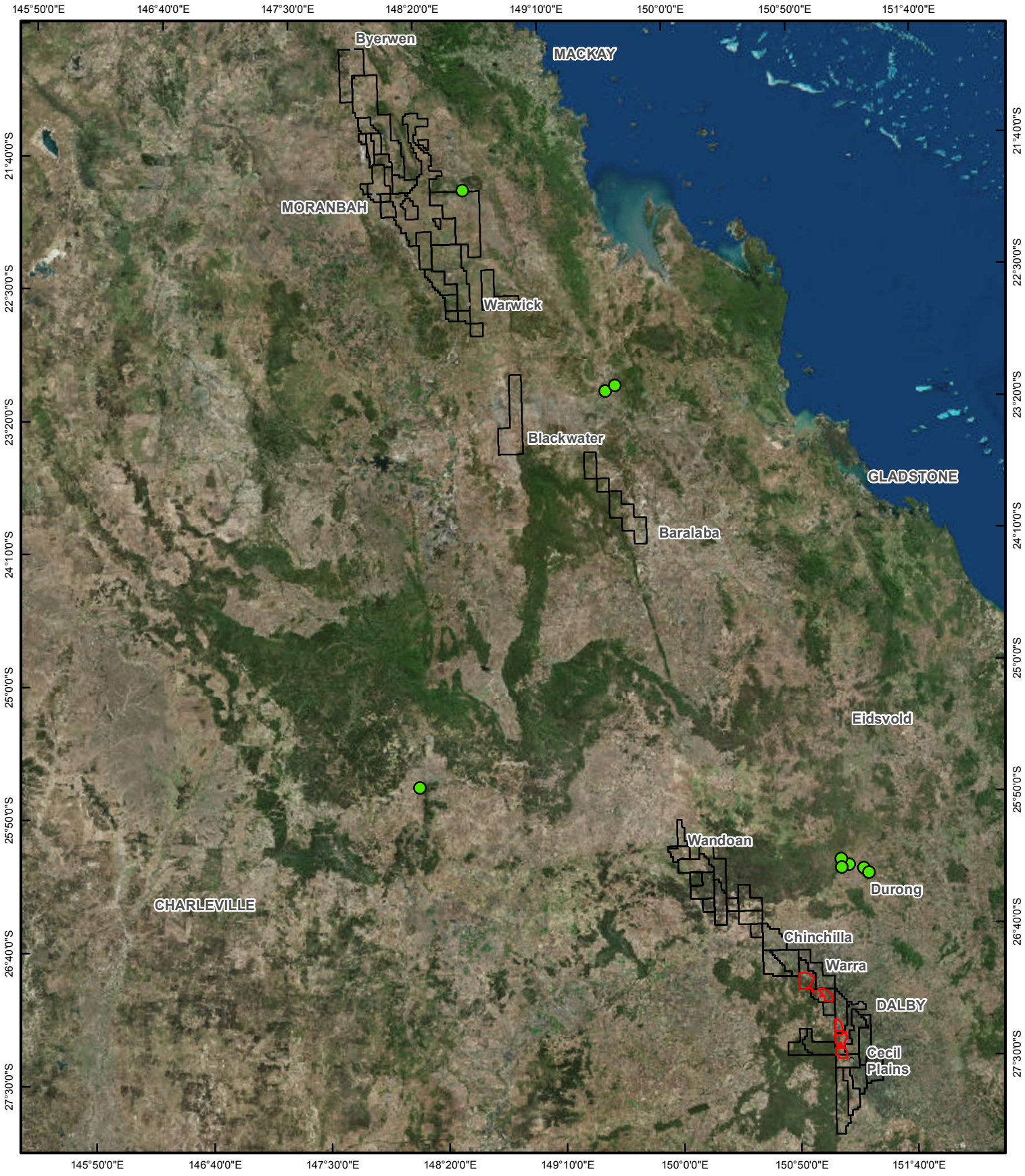
Table 4.1 shows the EPBC approval (EPBC 2012/6377) Phase 1 maximum disturbance limits as well as the proposed Phase 1 impacts for each listed species and community based on the refined infrastructure planning and habitat analysis that has occurred post approval. Note also that Phase 1 now has a much smaller footprint that the original Phase 1 used in the estimation of the Phase 1 impacts that were included in the EPBC EIS approval.

Arrow will offset the 'Phase 1 proposed disturbance' for each MNES as described in Table 4.1.

Table 4.1 - Approved Phase 1 maximum disturbance limits and proposed impacts

MNES	Phase 1 approved limit (ha)	Phase 1 proposed disturbance (ha)*
Terrestrial Species		
Black Ironbox (*Eucalyptus raveretiana*)	21.33	0
Bluegrass (*Dicanthium setosum*)	249.84	25
King Bluegrass (*Dichanthium queenslandicum*)	429.36	0
Ornamental Snake (*Denisonia maculata*)	296.20	104
Squatter Pigeon (Southern) (*Geophaps scripta scripta*)	313.10	75
Red Goshawk (*Erythrotriorchis radiatus*)	49.40	39
Koala (*Phascolarctos cinereus*)	376.59	34
South-eastern Long-Eared Bat (*Nyctophilus corbeni*)	618.12	0
Large-eared Pied Bat (*Chalinolobus dwyeri*)	723.67	0
EPBC Community		
Brigalow (*Acacia harpophylla* dominant and co-dominant)	283.92	10
Weeping Myall Woodlands	79.68	0
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	278.40	0
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	97.60	0

* Areas represent the total combined area of Core Habitat Known and Core Habitat Possible for each species.



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

N

Coordinate System: GDA 1994 MGA Zone 56

0 25 50 100
km

Figure 9.1 – Approximate location of offset properties being investigated

Issued To:M Ryan
Author: tstringer

Date: 10/07/2018

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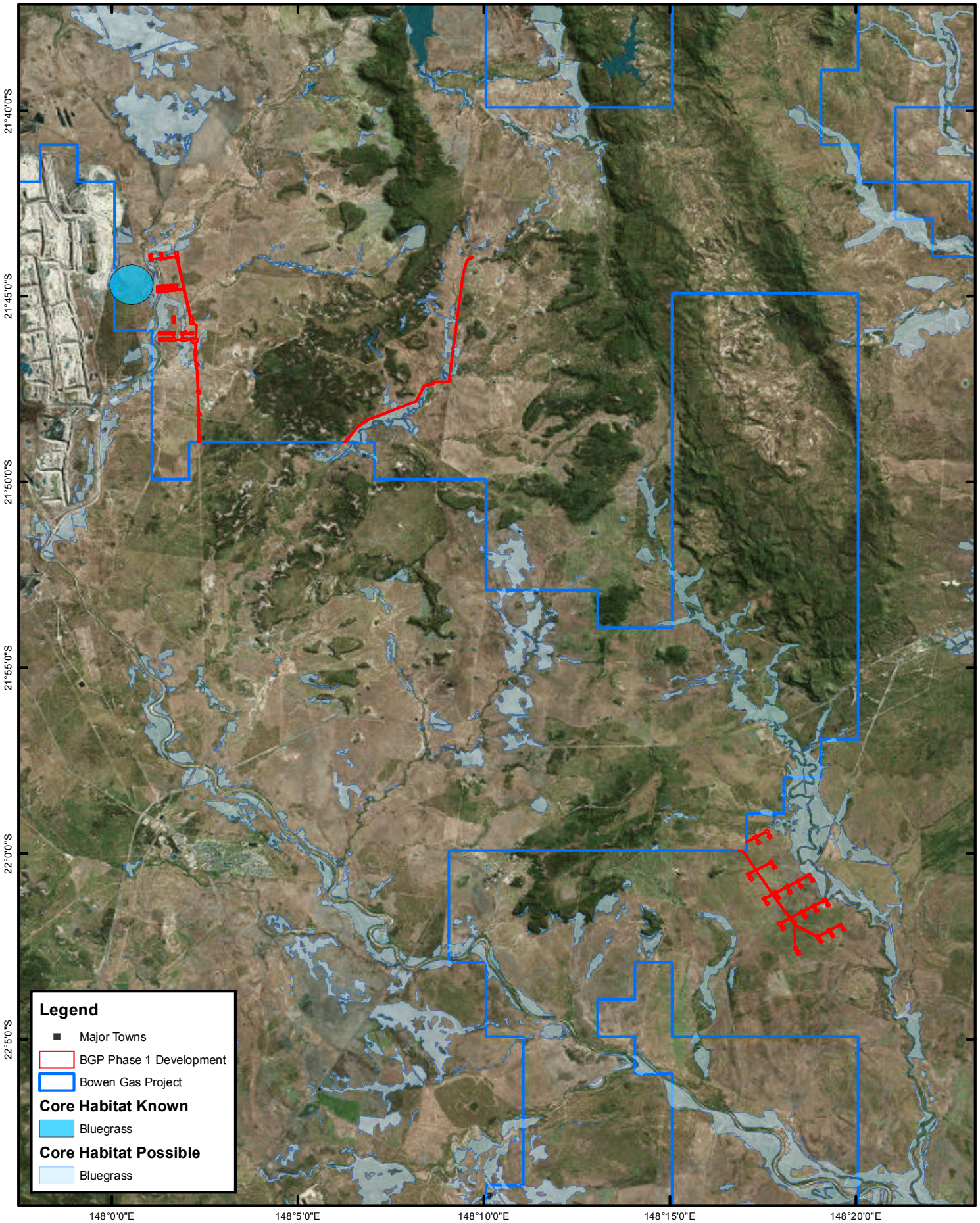

Source:
Arrow Energy Limited, Geosciences Australia
Dept. Envir. and Resource Mgmt.

N

Coordinate System: GCS GDA 1994

0 2.5 5 10
km

Figure 4.2

Bluegrass
Core Habitat Known and Possible

Date: 30/04/2018

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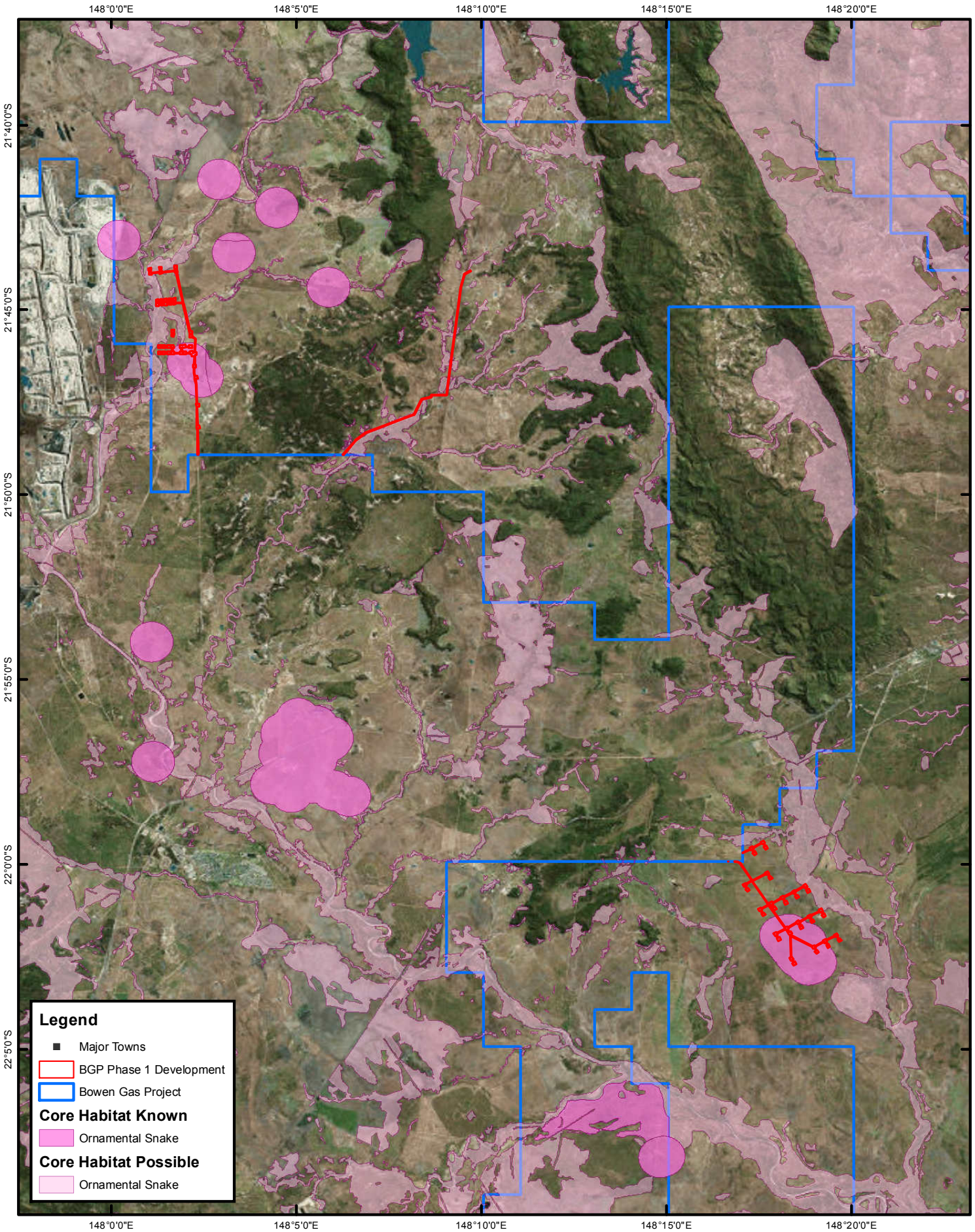

Source:
Arrow Energy Limited, Geosciences Australia
Dept. Envir. and Resource Mgmt.

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Coordinate System: GCS GDA 1994

0 2.5 5 10
km

Figure 4.3

Ornamental Snake
Core Habitat Known and Possible

Date: 30/04/2018

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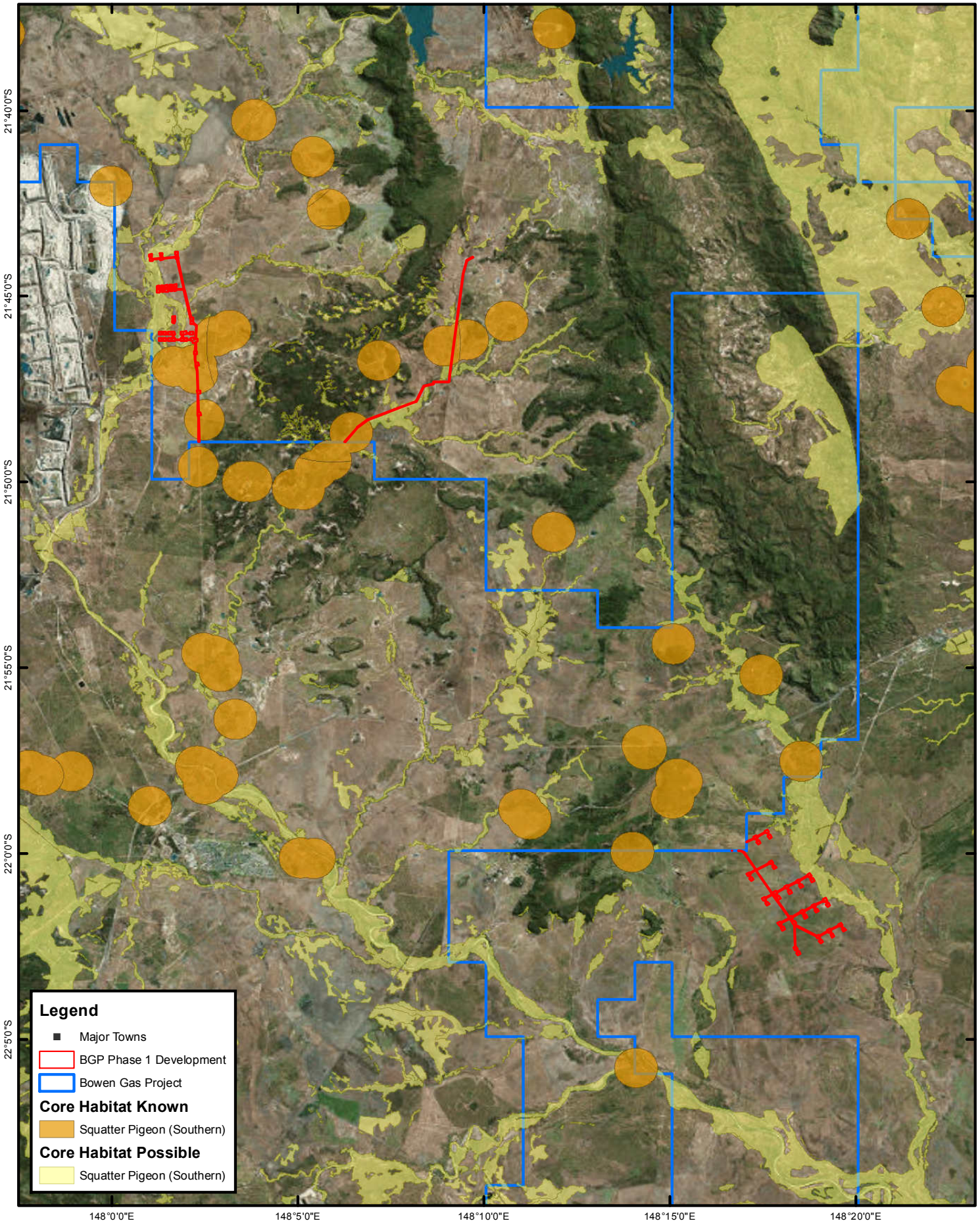

Source:
Arrow Energy Limited, Geosciences Australia
Dept. Envir. and Resource Mgmt.

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Coordinate System: GCS GDA 1994

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km

Figure 4.4

Squatter Pigeon (Southern) Core Habitat Known and Possible

Date: 30/04/2018

Document: V:\Products\Australia\Queensland\Bowen_Basin\Environment\180207_MNES_BE\mxd\BGP_Phase1_MNES_Overview.mxd

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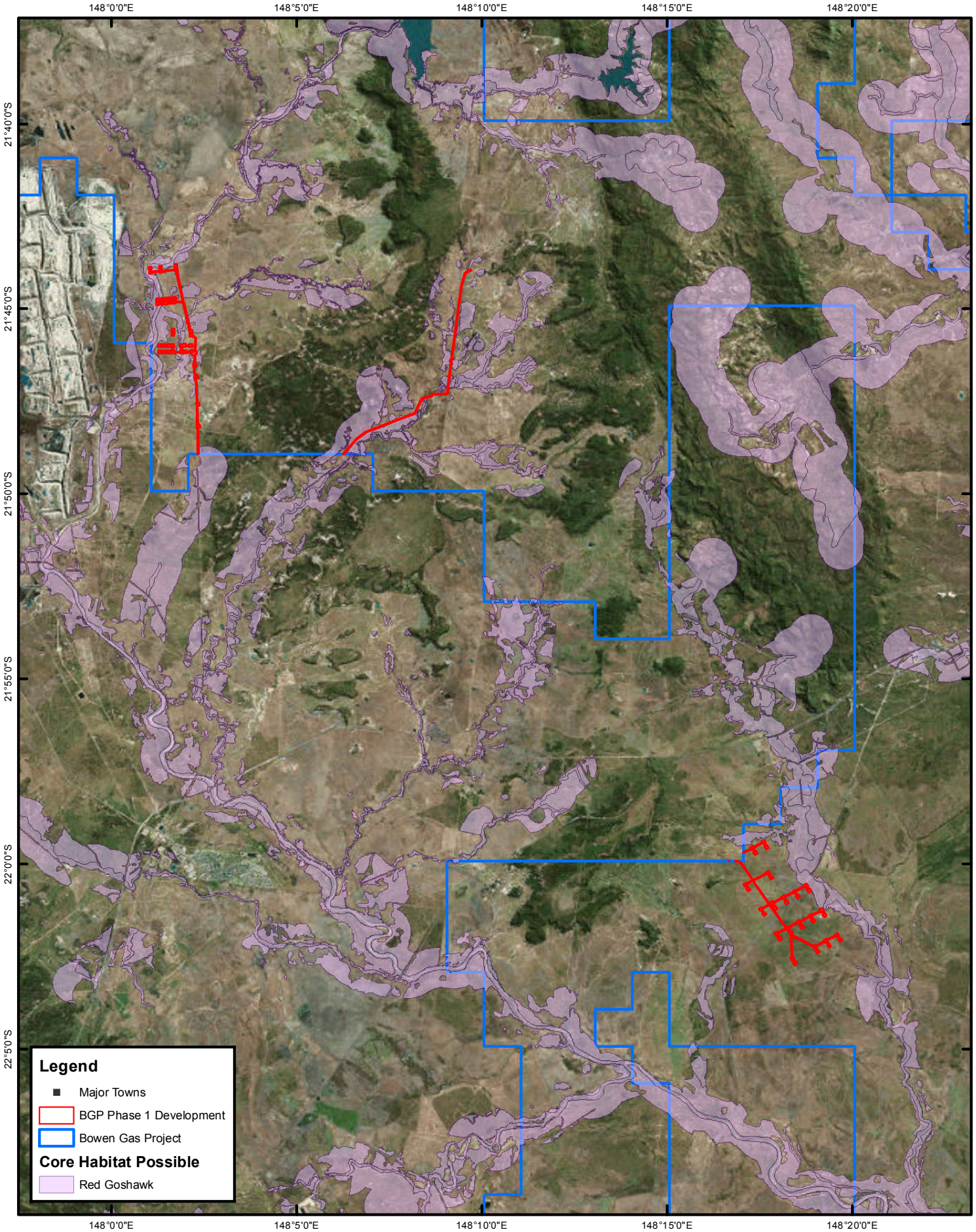

Source:

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

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Coordinate System: GCS GDA 1994

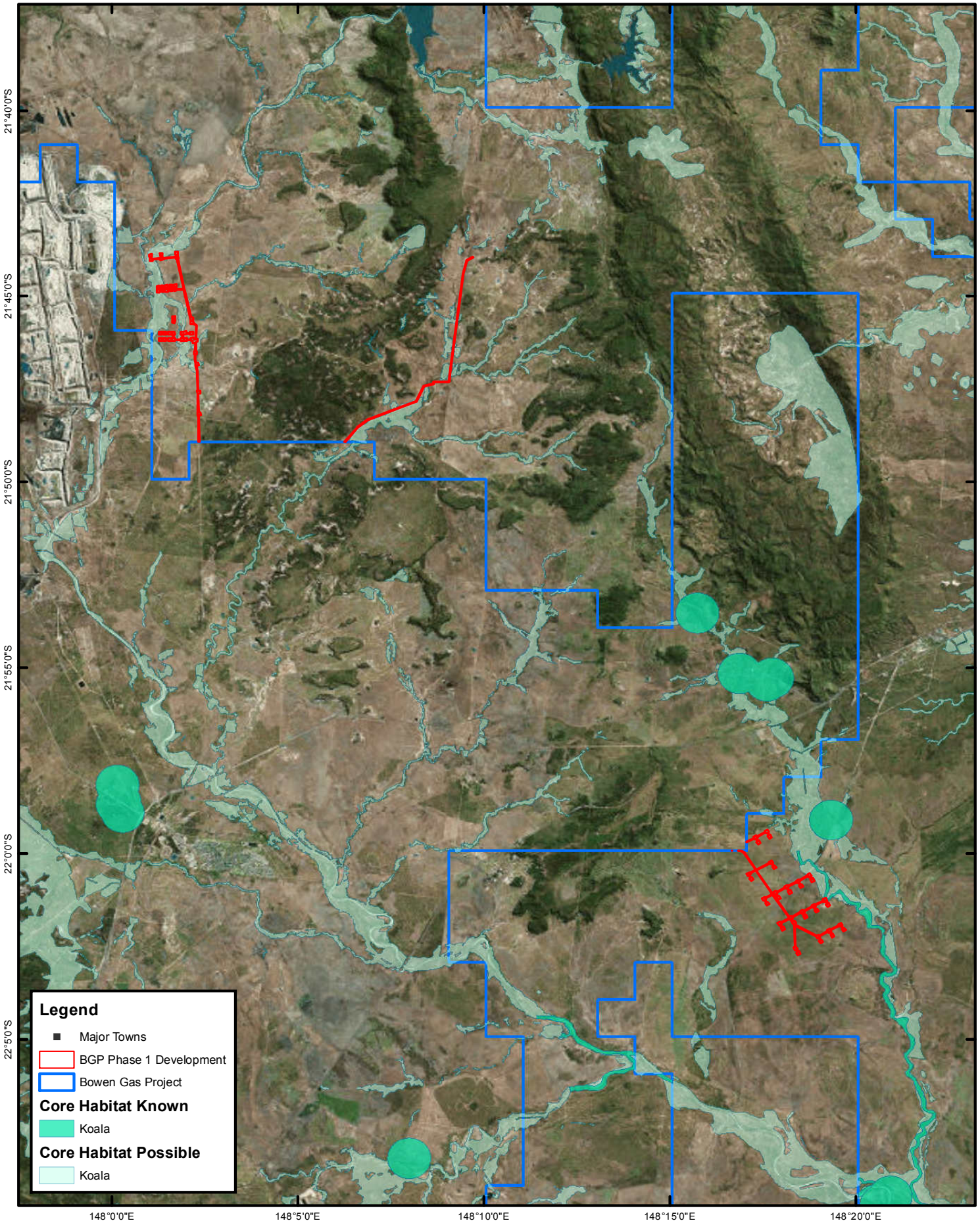
0 2.5 5 10
km

Figure 4.5

Red Goshawk
Core Habitat Possible

Date: 30/04/2018

Document: V:\Products\Australia\Queensland\Bowen_Basin\Environment\180207_MNES_BE\mxd\BGP_Phase1_MNES_Overview.mxd



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

N

Coordinate System: GCS GDA 1994

0 2.5 5 10
km

Figure 4.7

Koala
Core Habitat Known and Possible

Date: 30/04/2018

Document: V:\Products\Australia\Queensland\Bowen_Basin\Environment\180207_MNES_BE\mxd\BGP_Phase1_MNES_Overview.mxd

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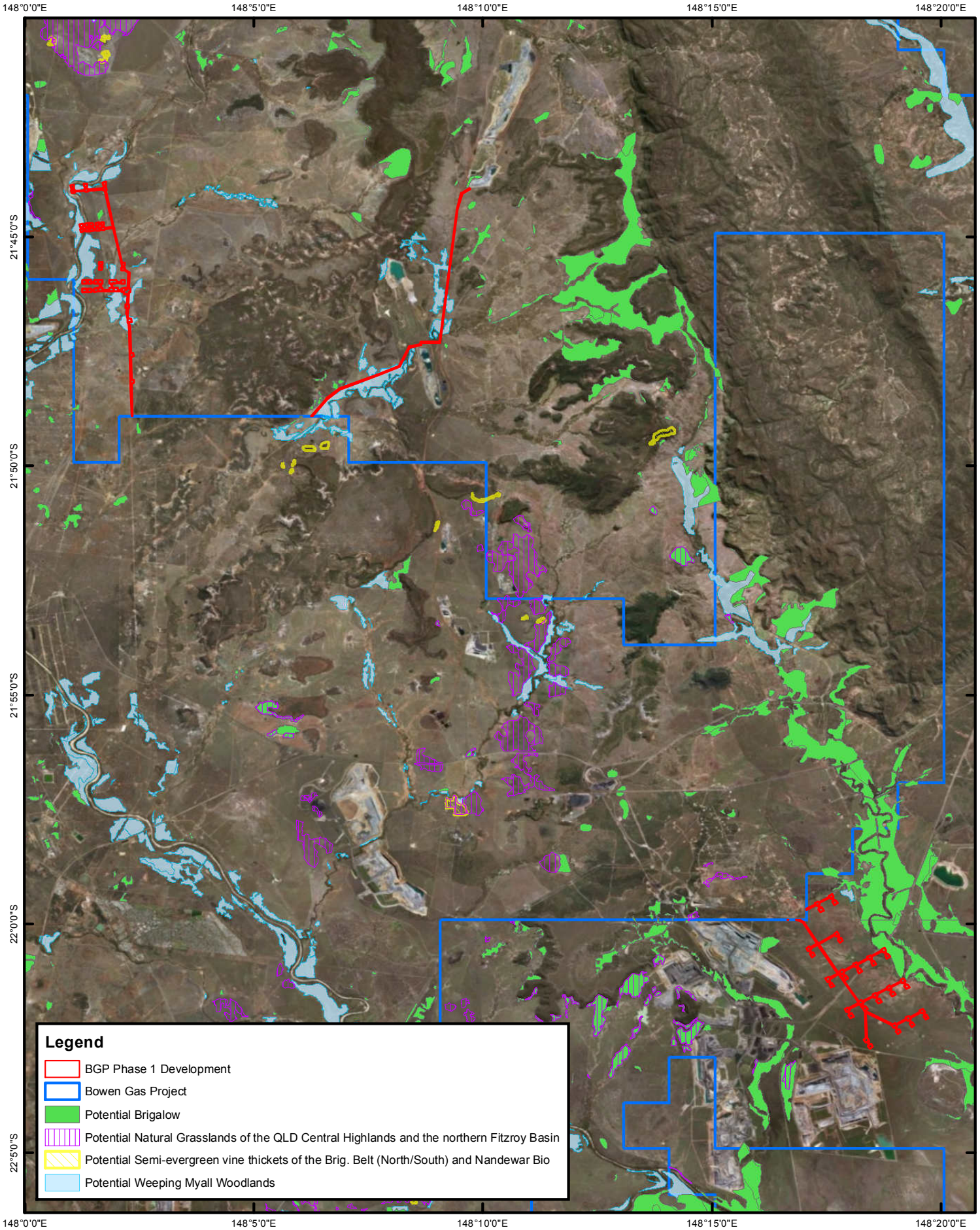

Source:
Arrow Energy Limited, Geosciences Australia
Dept. Envir. and Resource Mgmt.

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Figure 4.6

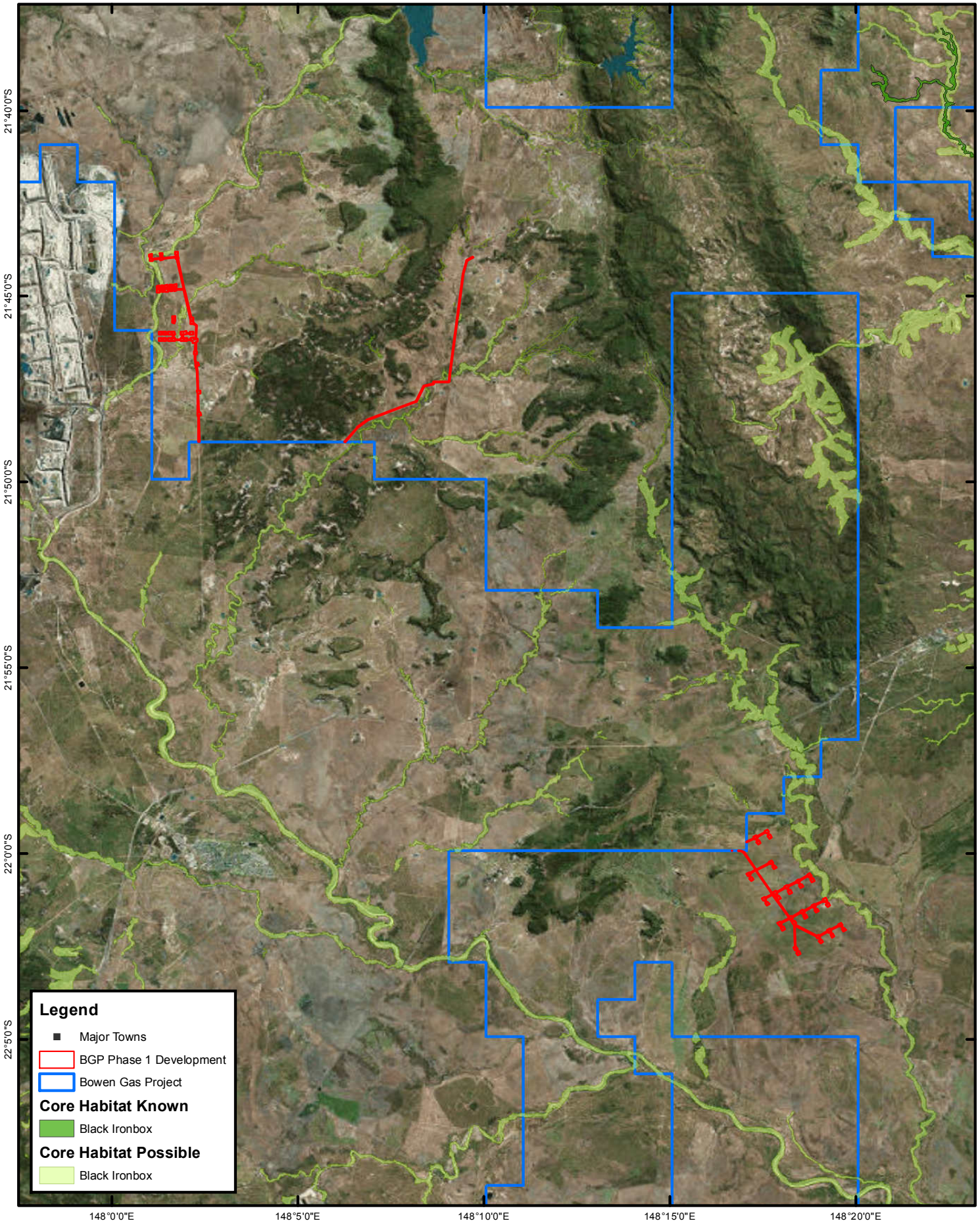
Threatened Ecological Communities (TECs)

Coordinate System: GCS GDA 1994

0 2.5 5 10
km

Date: 24/04/2018

Document: V:\Products\Australia\Queensland\Bowen_Basin\Environment\180207_MNES_BE\mxd\BGP_Phase1_TEC_Overview_.mxd



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

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Coordinate System: GCS GDA 1994

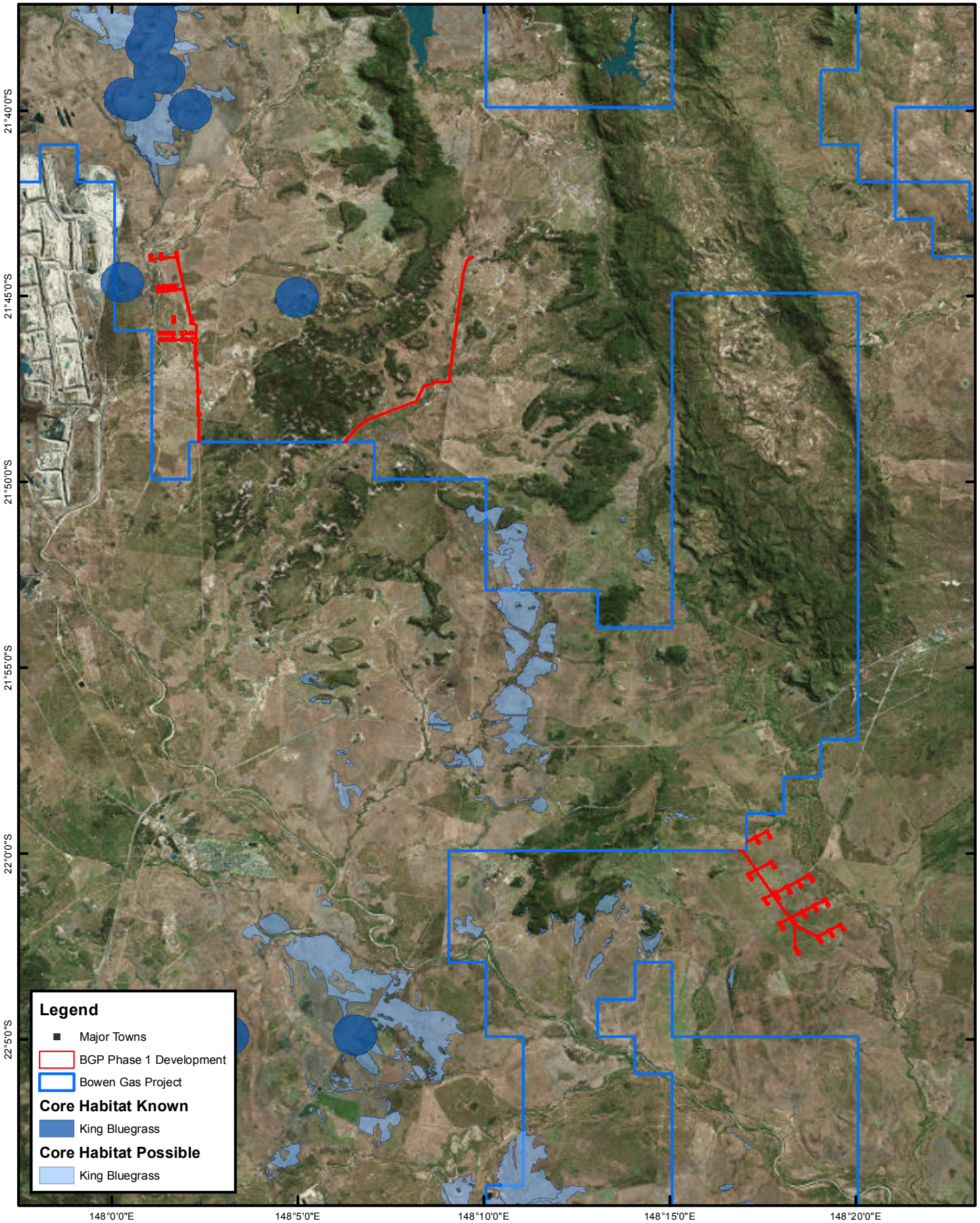
0 2.5 5 10
km

Figure 4.8

Black Ironbox
Core Habitat Known and Possible

Date: 30/04/2018

Document: V:\Products\Australia\Queensland\Bowen_Basin\Environment\180207_MNES_BE\mxd\BGP_Phase1_MNES_Overview.mxd



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

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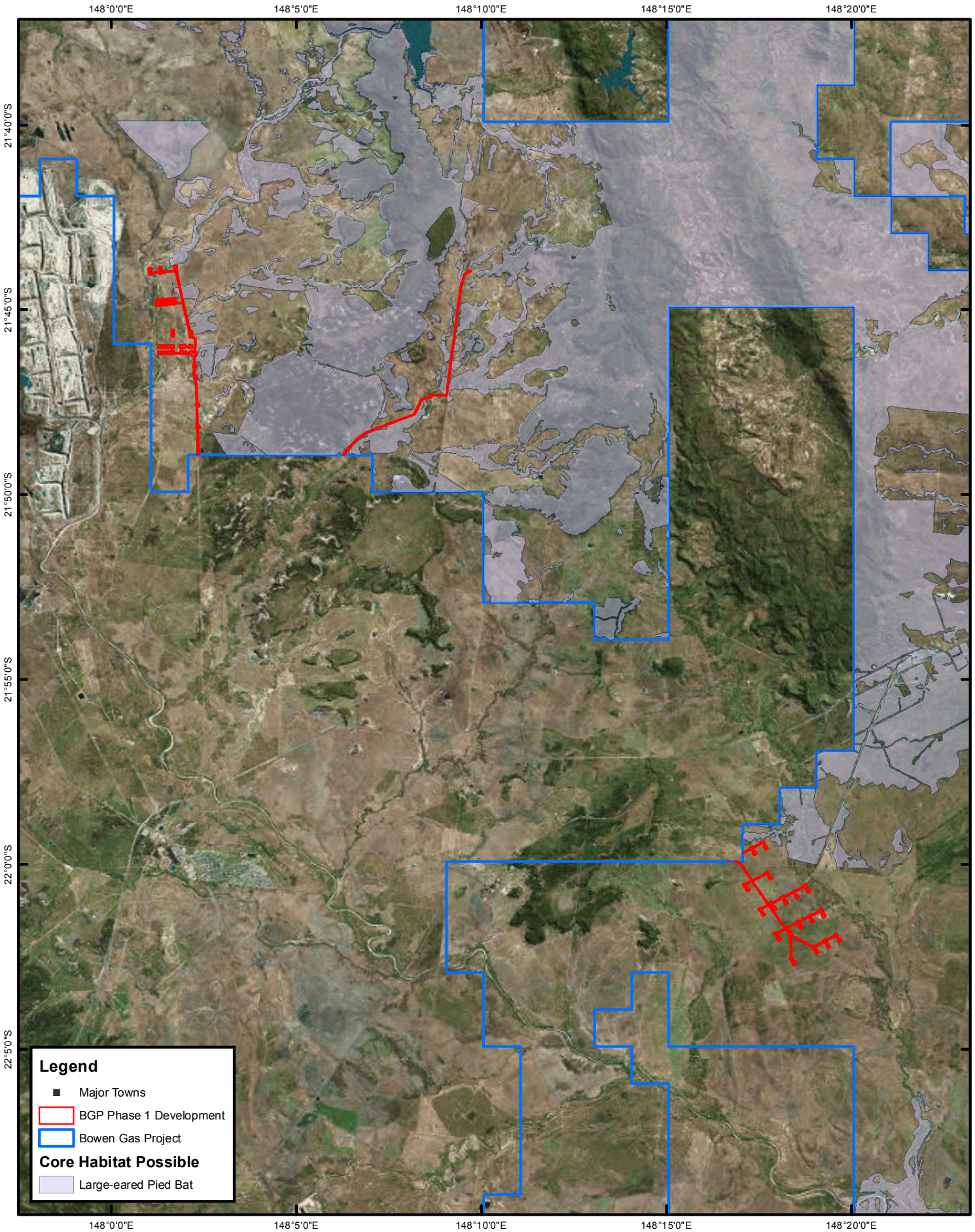
Coordinate System: GCS GDA 1994

0 2.5 5 10
km

Figure 4.9
King Bluegrass
Core Habitat Known and Possible

Date: 30/04/2018



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

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Coordinate System: GCS GDA 1994

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km

Figure 4.10

Large-eared Pied Bat Core Habitat Possible

Date: 30/04/2018

Document: V:\Products\Australia\Queensland\Bowen_Basin\Environment\180207_MNES_BE\mxd\BGP_Phase1_MNES_Overview.mxd

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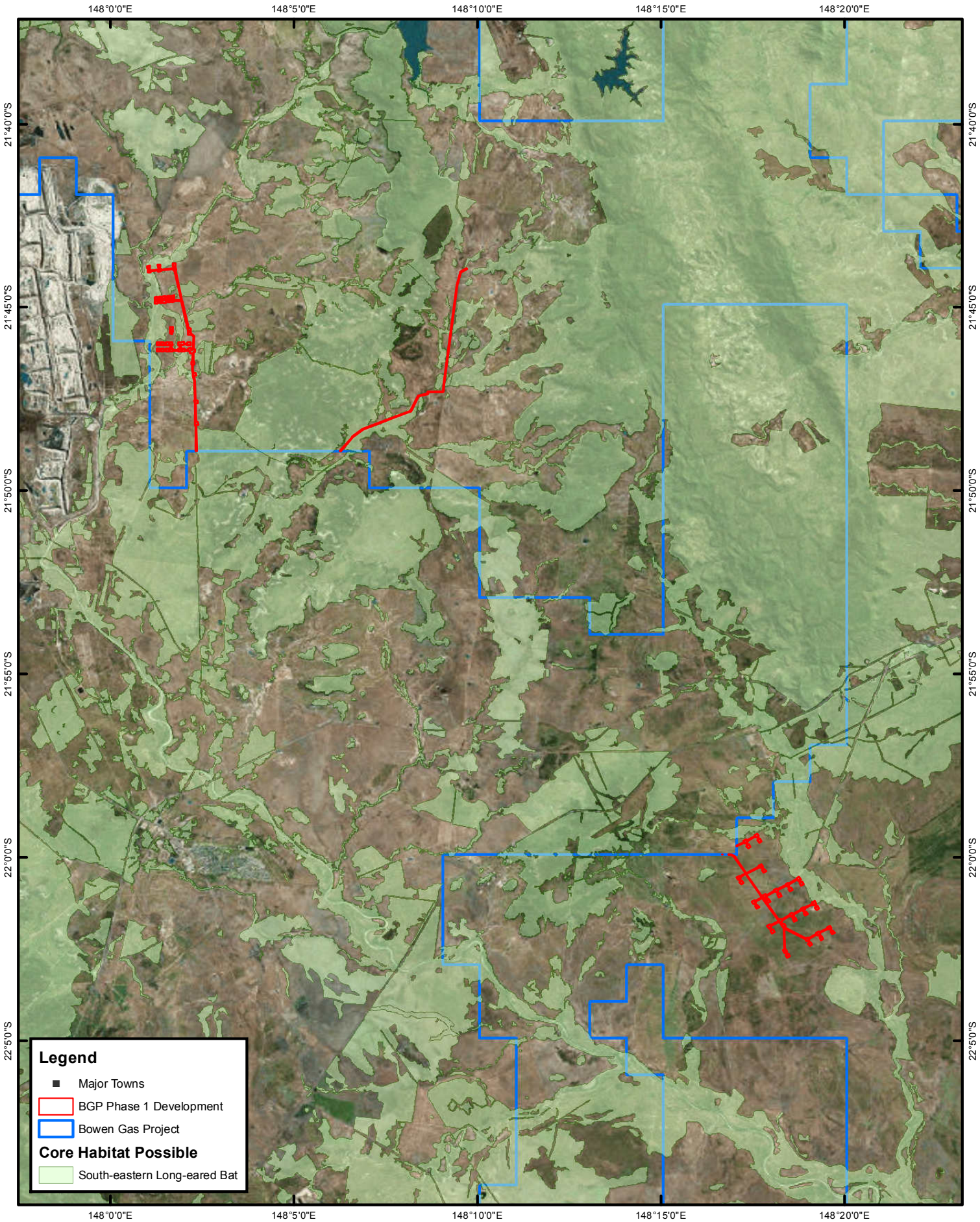

Source:
Arrow Energy Limited, Geosciences Australia
Dept. Envir. and Resource Mgmt.

N

Coordinate System: GCS GDA 1994

0 2.5 5 10
km

Figure 4.11
South-eastern Long-eared Bat
Core Habitat Possible

arrow energy go further

Date: 30/04/2018

Document: V:\Products\Australia\Queensland\Bowen_Basin\Environment\180207_MNES_BE\mxd\BGP_Phase1_MNES_Overview.mxd

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Figure 1.1 shows the location of the Phase 1 activities in relation to the whole BGP. Figures 4.2 to 4.7 show the extent of 'Core Habitat Known' and 'Core Habitat Possible' for the threatened ecological community (TEC) and each of the five EPBC Act species where impacts have been identified for Phase 1.

The mapped locations for each listed threatened species and its habitat are based on a combination of known species records, field verification mapping and Queensland Government regional ecosystem (RE) mapping. Habitat is presented with regards to 'Core Habitat Known' (being a 1 km buffer around a recent (1980+) accurate (± 500m) record of the species) and 'Core Habitat Possible' (being areas of remnant vegetation with a mapped RE known or likely to provide habitat for the particular species, or contains other environmental features that provide microhabitats). Habitat criteria have been developed for each species and community. These are defined in the *Bowen Gas Project EPBC Species Impact Management Plan* (SIMP) (Arrow 2018 and reproduced here as Appendix B). Where field verification has not yet occurred government mapping of REs and supporting desktop information such as species records have been used. This provides a conservative estimate of impacts.

There are also a number of EPBC Act species for which areas of 'Core Habitat Possible' have been mapped as present within the Phase 1 footprint, that are considered unlikely to utilise these habitats based on known species distribution records and local ground-truthing surveys undertaken to date. These species are discussed in Section 4.3.

Arrow will continue to refine the development layout for Phase 1 during FEED so as to further minimise the disturbance to threatened species and communities.

Further detail regarding the presence of EPBC Act species and communities in the Phase 1 area is provided in the EPBC BGP SIMP (Arrow 2018).

4.3 EPBC Act species and communities not applicable to Phase 1

The following provides a summary of those species and communities that no longer require a Phase 1 offset allocation. This information is provided to demonstrate the effort taken to understand whether the species or community will be impacted or not, and the process that will be implemented in the event that any of these species or communities are detected during Phase 1 construction activities.

In the event that future pre-clearance surveys or monitoring during the construction activities detect these communities or species, the approach discussed in Section 4.5 of this report will be implemented.

Black Ironbox (*Eucalyptus raveretiana*)

Black Ironbox has not been identified during any ecology surveys undertaken to date in the Phase 1 area. This readily identifiable tree species is primarily associated with riparian vegetation along rivers and ephemeral watercourses. The species prefers sites with moderately fertile soil and adequate sub-soil moisture. The alluvial soils in which it grows are sands, loams, light clays or cracking clays (Halford 1997).

Survey effort to detect this species within the Phase 1 area (focussed to date on Red Hill and Ironbark) includes:

- 131 secondary sites, 2 tertiary sites and 846 quaternary sites across dry season of 2014 and wet season of 2015 commissioned by Arrow.
- 73 secondary sites during 2005 to 2006, 30 secondary sites during 2009 surveys and 16 tertiary transects during 2011 commissioned by BMA.

Although the corresponding REs and therefore areas of 'Core Habitat Possible' have been mapped in the vicinity of Red Hill, Ironbark and Mavis Downs (see Figure 4.8), the species itself has not been recorded and is unlikely to occur in the Phase 1 area. Records are predominantly from more coastal areas, with the nearest record east of Coppabella (approximately 20 km from the Phase 1 activities at Mavis Downs). Prior to any development pre-clearance surveys will be undertaken of all areas to confirm the presence/absence of any threatened species.

In the event that future pre-clearance surveys or monitoring during the construction activities detect this species, the approach discussed in Section 4.5 of this report will be implemented.

King Bluegrass (*Dichanthium queenslandicum*)

Records of this species have been confirmed during field ecology surveys north of the Red Hill area. Several large populations of the species were found and in all cases, populations were associated with native grasslands in excellent condition (AECOM 2015). These native grassland communities consist of RE11.8.11 and are well known to Arrow, the closest being located approximately 1.5 km to the west of the Red Hill (PLA486) Phase 1 infrastructure (see Figure 4.9). The species was observed to be highly palatable to stock and is routinely grazed down to ground level in some locations.

Other records also exist approximately 5 km to the east of Red Hill (which is approximately 7 km to the west of Ironbark) and approximately 13 km to the south-west of the Mavis Downs area (see Figure 4.9).

Survey effort to detect this species within the Phase 1 area includes:

- 131 secondary sites, 2 tertiary sites and 846 quaternary sites across dry season of 2014 and wet season of 2015 commissioned by Arrow.
- 73 secondary sites during 2005 to 2006, 30 secondary sites during 2009 surveys and 16 tertiary transects during 2011 commissioned by BMA.

Arrow therefore has a good understanding of the locations of this species in the project area and no individuals or confirmed 'Core Habitat Known' or 'Core Habitat Possible' for this species will be impacted by Phase 1 activities.

In the event that future pre-clearance surveys or monitoring during the construction activities detect this species, the approach discussed in Section 4.5 of this report will be implemented.

South-eastern Long-eared bat (*Nyctophilus corbeni*)

There are no known records of the species in proximity to Phase 1 area. Very few records exist for the Northern Brigalow Belt. Approximately 30% of the total distribution of the species occurs in Queensland, with records from fewer than 30 localities, mainly from within the Brigalow Belt South bioregion (Reardon 2012).

In Queensland and New South Wales the species inhabits a variety of vegetation types, but is distinctly more common in box / ironbark / cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of New South Wales and southern Queensland (NSW OEH 2017). The species is more abundant in extensive stands of vegetation in comparison to smaller woodland patches (Turbill and Ellis 2006), suggesting its home range is probably large (Lumsden et al. 2008).

Survey effort to detect this species within the Phase 1 area (focussed to date on Red Hill and Ironbark) includes:

- Dry season fauna survey (November-December 2014) and wet season fauna survey (March 2015) commissioned by Arrow including:
    - Anabat surveys at 20 survey locations in proximity to waterbodies and suitable flyways (set to record from dusk to dawn).
    - Total of 16 harp traps were deployed at eight locations in suitable flyways.
- Fauna surveys commissioned by BMA across 2005, 2009 and 2011 included recording microchiropteran bat echolocation calls using an ultrasonic bat call detector (Anabat SD2 with a ZCAIM interface; Titley Electronics) between dusk and dawn at 11 targeted locations in woodland habitat favourable for microbats (URS 2013a).

The above mentioned survey techniques have been proven successful in detecting this species as is evidenced by Arrow's surveys in the Surat Basin where *N. corbeni* was detected on eight occasions (this data was provided to DotEE as part of the SGP EPBC Species Impact Management and Offset Plan). Although areas of Core Habitat Possible are mapped as being extensive in the Phase 1 area (see Figure 4.10), this species is considered unlikely to be present. The area is at the very northern limit of its distribution and all records are much further south of Moranbah near Cracow and the Belington Hut State Forest (approximately 550 km and 700 km respectively to the south of Moranbah).

In the event that future pre-clearance surveys or monitoring during the construction activities detect this species or a nest, the approach discussed in Section 4.5 of this report will be implemented.

Large-eared Pied Bat (*Chalinolobus dwyeri*)

Over most of its range, the Large-eared Pied Bat appears to roost predominantly in caves and overhangs in sandstone cliffs and forage in nearby high-fertility forest or woodland near watercourses (NSW DECC 2007; Pennay 2008).

Almost all records of the species are within several kilometres of cliff lines or rocky terrain, although extensive trapping and call data indicates that bats do not usually forage in

sandstone habitat. Habitat mapping based on presence-only data indicates that bats forage in fertile valleys and plains, as well as areas with moderately-tall to taller trees along water courses. The majority of records are from canopied habitat, suggesting a sensitivity to clearing, although narrow connecting riparian strips in otherwise cleared habitat are sometimes used (NSW DECC 2007).

Survey effort to detect this species within the Phase 1 area (focussed to date on Red Hill and Ironbark) includes:

- Dry season fauna survey (November-December 2014) and wet season fauna survey (March 2015) commissioned by Arrow including:
    - Anabats were used at 20 survey locations in proximity to waterbodies and suitable flyways (set to record from dusk to dawn).
    - Total of 16 harp traps were deployed at eight locations in suitable flyways.
- Fauna surveys commissioned by BMA across 2005, 2009 and 2011 included recording microchiropteran bat echolocation calls using an ultrasonic bat call detector (Anabat SD2 with a ZCAIM interface; Titley Electronics) between dusk and dawn at 11 targeted locations in woodland habitat favourable for microbats (URS 2013a).

Although the corresponding REs and therefore areas of Core Habitat Possible are mapped as being extensive in close proximity to the Phase 1 area (see Figure 4.11), this species is considered unlikely to be present. The species distribution does not extend as far south as Moranbah, with the closest record south of Mackay on the coastline (approximately 200 km to the north-east of Moranbah). Additionally, the Phase 1 infrastructure area does not support any caves or sandstone cliffs.

In the event that future pre-clearance surveys or monitoring during the construction activities detect this species or roost site, the approach discussed in Section 4.5 of this report will be implemented.

Weeping Myall Woodlands

Weeping Myall TEC has not been recorded in the Phase 1 area during ecology surveys to date. It is known to occur in the Brigalow Belt North and occurs on highly fertile and arable soils where there is significant pressure to clear for cropping (Commonwealth of Australia 2009). In Queensland, it is known to be associated with RE11.3.2 *Eucalyptus populnea* woodland on alluvial plains and RE11.3.28 *Casuarina pauper* ± *Eucalyptus coolabah* open woodland on alluvial plains and these REs are mapped as Core Habitat Possible in Figure 4.2.

Survey effort to detect this community within the Phase 1 area (focussed to date on Red Hill and Ironbark) includes:

- 131 secondary sites, 2 tertiary sites and 846 quaternary sites across dry season of 2014 and wet season of 2015 commissioned by Arrow.
- 73 secondary sites during 2005 to 2006, 30 secondary sites during 2009 surveys and 16 tertiary transects during 2011 commissioned by BMA.

No Weeping Myall TEC has been observed in the surveyed areas. In the Red Hill area RE11.3.2 has been confirmed along river banks of the Isaac River and in small patches along some smaller watercourses (URS 2013b). RE11.3.2 was not found to support *Acacia pendula* or the Weeping Myall TEC (URS 2013b). RE11.3.2 is also mapped along watercourses in proximity to the Ironbark pipeline and in the vicinity of Mavis Downs (see Figure 4.2) but is considered unlikely to contain the Weeping Myall TEC because the known distribution of Weeping Myall TEC does not extend as far north as Moranbah and the Phase 1 area (DEWHA 2008). As such, the TEC is considered unlikely to occur in the Phase 1 area.

In the event that future pre-clearance surveys or monitoring during the construction activities detect this vegetation community, the approach discussed in Section 4.5 of this report will be implemented.

Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin

The Natural Grassland TEC is known to occur in the local area and occurs on highly fertile, black cracking clay soils. In the BGP area it is represented by REs 11.3.21, 11.4.4, 11.4.11, 11.8.11 and 11.9.3. These REs are mapped in Figure 4.2.

Survey effort to detect this species within the Phase 1 area (focussed to date on Red Hill and Ironbark) includes:

- 131 secondary sites, 2 tertiary sites and 846 quaternary sites across dry season of 2014 and wet season of 2015 commissioned by Arrow.
- 73 secondary sites during 2005 to 2006, 30 secondary sites during 2009 surveys and 16 tertiary transects during 2011 commissioned by BMA.

No areas of this TEC will be impacted by Phase 1 activities. In the event that future pre-clearance surveys or monitoring during the construction activities detect this community in area of proposed disturbance, the approach discussed in Section 4.5 of this report will be implemented.

Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions

In Queensland, Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions ecological community (SEVT TEC) are known to be associated with RE11.3.11, 11.4.1, 11.5.15, 11.7.1x1, 11.8.3, 11.8.13, 11.9.4 and 11.11.18.

Based on flora surveys that have been completed, vine thicket communities have been confirmed in the vicinity of Red Hill and Ironbark. They are consistent with RE 11.8.13, comprising low, sparse and poorly formed regrowth of Brigalow emerging from a dense ground cover of buffel grass which forms an almost universal ground cover in all habitats surveyed (AECOM 2015). These areas are considered to meet the definition of the SEVT TEC (AECOM 2015).

Survey effort to detect this TEC within the Phase 1 area (focussed to date on Red Hill and Ironbark) includes:

- 131 secondary sites, 2 tertiary sites and 846 quaternary sites across dry season of 2014 and wet season of 2015 commissioned by Arrow.
- 73 secondary sites during 2005 to 2006, 30 secondary sites during 2009 surveys and 16 tertiary transects during 2011 commissioned by BMA.

There is no SEVT TEC within the Phase 1 area. Scattered patches occur further to the north-west of Red Hill and south of the Ironbark pipeline (see Figure 4.2).

In the event that future pre-clearance surveys or monitoring during the construction activities detect this vegetation community, the approach discussed in Section 4.5 of this report will be implemented.

4.4 Reconciliation of impacts

Condition 14b: A reconciliation of impacts predicted in the next Project Phase and actual disturbance in earlier Project Phases against the maximum disturbance limits set out in Table 1.

Over the development of the BGP, Arrow will record actual impacts to EPBC Act species and communities as they occur. Arrow commits to undertake a reconciliation of impacts to EPBC Act species and communities against the approved disturbance limits for that phase on a monthly basis.

Annual and cumulative impacts to each EPBC Act species and community will be tracked against approved disturbance limits (whole project and each phase) for the BGP and reported annually. A copy of this report will be provided to the Department and placed on the Arrow website as per EPBC condition 30.

At least three months prior to the end of each phase, Arrow will prepare an updated OS for the next phase. This report will summarise realised impacts to EPBC Act species and communities for the present phase, previous phases (if applicable), and if there is any balance remaining. Predicted disturbance limits for the next phase will also be outlined in this report.

Any ‘offset credits’ will be summarised, and the associated offset areas can go towards meeting requirements of future phases.

4.5 Process for offsetting impacts to EPBC Act species and communities not identified in Table 1 of the BGP approval

Condition 14c: A process to offset, in accordance with the EPBC Act Environmental Offsets Policy, any significant impact for the next Project Phase to any EPBC listed threatened species or EPBC community not identified in Table 1.

Infrastructure location planning and post-EIS flora and fauna surveys completed to date have not identified any unavoidable residual significant impacts that are additional to those identified for Phase 1 in Table 1 of the BGP approval (shown in Table 4.1).

Nonetheless, the following sets out Arrow's process to address and offset any such additional impacts should they be identified as unavoidable during the BGP's ongoing planning, construction, operation and decommissioning activities:

- When the BGP 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) 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 and the Arrow Sharepoint.

- If the above survey identifies an EPBC Act species or communities not listed in Table 1 of the EPBC approval, this information will be collated and reported to Arrow Environment Manager. A more detailed assessment will then be undertaken to identify if the new EPBC Act species or community can be avoided or the extent to which impacts can be minimised. Information on the finding and potential impacts will be prepared and notification provided to DotEE and DES.

- Arrow will notify the Department of potential non-compliance with any condition of approval as soon as practical and within no later than 10 business days of becoming aware of the potential non-compliance.

- 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.

- Prior to any ground disturbance activities, Arrow will appoint a Construction Contractor and will include in the relevant contract document the requirement for:

  - A CEMP to be prepared and submitted to Arrow for approval prior to any construction activities.

  - A key values Management Plan specific to 'Clearing' (a Clearing Management Plan or similar).

- The Clearing Management Plan will include a process for unplanned significant impact to an EPBC listed threatened species or EPBC community. The plan is to commit the Construction Contractor to the following process as a minimum:
  - Stop work at site where unplanned disturbance to an EPBC listed threatened species, its core habitat, or a TEC is encountered.
  - Notify Arrow that an EPBC Act species or community has been identified in a new area so that Arrow may notify the relevant authorities (i.e. DotEE and DES).
  - Tag/barricade the identified species/community in an appropriate manner to ensure protection.
  - Cease clearing works in the immediate area to protect the identified species/community.
  - Record species/community GPS coordinates so that it may be incorporated into the Site Environmental Map as a 'no-go zone' or recorded as an impact area.
  - Provide all relevant information to Arrow for tracking of EPBC Act species and community impacts for reporting.

- Any residual impacts to EPBC species or communities not identified in Table 1 of the BGP approval will be offset in accordance with the EPBC Act Environmental Offsets Policy, as detailed in Section 4.1.

5. Monitoring and reporting

Condition 14(d): A program to monitor and report on the effectiveness of the management measures, and progress against the performance and completion criteria.

5.1 Existing Arrow documents and procedures

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.

5.2 Monitoring of impacts upon EPBC Act species and communities

The following monitoring program sets out how Arrow will track residual impacts on EPBC Act species and communities:

- Figures 4.2 to 4.7 illustrate the location and extent of proposed Phase 1 impacts to each EPBC Act species and community.
- Prior to any clearing within these areas, Arrow will conduct pre-clearance surveys that will:
  - Validate the presence of EPBC Act species or community core habitat.
  - Record GPS coordinates of the boundary of the core habitat in relation to the proposed clearing boundaries and ensure 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.
  - For representative areas of core habitat required to be impacted, complete a Habitat Quality Assessment as per the Queensland Government Department of Environment and Science's Guide to determining terrestrial habitat quality – A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy (2017). This assessment leads to a habitat quality score out of 10 based on the following indicators:
    - site condition: a general condition assessment of vegetation compared to a benchmark.
    - site context: an analysis of the site in relation to the surrounding environment.
    - species habitat index: the ability of the site to support a species.
  - For areas mapped as core habitat for Bluegrass, the pre-clearance survey will include a targeted search for the species.
  - For areas mapped as core habitat for the Ornamental Snake, the pre-clearance survey will include active searches to confirm presence of microhabitat features including gilgai, soil cracks and ground litter and spotlighting to look for the species (consistent with Arrow's Ornamental Snake Guideline (ORG-ARW-HSM-GUI-00101)).

- For areas mapped as core habitat for Squatter Pigeon, the pre-clearance survey will validate the presence of suitable foraging and breeding habitat including open woodland dominated in the overstorey by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* species.

- For areas mapped as core habitat for Red Goshawk, the pre-clearance survey will include a targeted search for the species.

- For areas mapped as core habitat for the Koala, the pre-clearance survey will include confirmation of presence of preferred food trees, observations looking for the distinct Koala scratch marks on smooth-barked trees and/or presence of scats.

- A fauna spotter-catcher will be at the site on the day of clearing. The spotter-catcher will be a suitably qualified person as per the definition provided in EPBC 2012/6377. 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. Arrow will provide at least one spotter-catcher for every two machines and the Fauna Management Procedure (ORG-ARW-HSM-PRO-00067) will be implemented.

- The coordinates and total area of cleared core habitats and TECs will be recorded and tracked monthly against approved Phase 1 maximum disturbance limits and used for annual compliance reporting. Mapping will be updated as pre-clearance surveys are completed to confirm the presence or absence of core habitats or TECs in those areas.

5.3 Phase 1 Offset Area Management Plan and monitoring

As per Condition 17A of the BGP EPBC approval, within 12 months of project commencement or the Minister approving the OS, Arrow will prepare a Phase 1 Offset Area Management Plan (OAMP) which will identify the land that has been, or will be, legally secured to meet Phase 1 offset requirements. The Phase 1 OAMP will describe the management measures that will be implemented to maintain and/or improve the offset site(s) for the respective EPBC Act species and/or community. This more detailed Plan will discuss the monitoring program for the offset property(ies) to ensure prescriptive and measureable performance and completion criteria have been developed and will be tracked.

The Phase 1 OAMP will include:

- Description of management measures that will be implemented in each offset area for protection of EPBC listed species and communities.

- Details of how the proposed offset and OAMP meet requirements of the EPBC Act Environmental Offsets Policy (including justification for input values used to calculate the minimum offset areas).

- Results of field validation surveys and baseline description of the current condition (prior to any management activities) of the offset area(s), including existing vegetation.

- A description and map (including shapefiles) to clearly define the location and boundaries of the offset area(s), accompanied by the offset attributes.

- Information about how the offset area(s) provide connectivity with other relevant habitats and biodiversity corridors including a map depicting the offset areas in relation to other habitats and biodiversity corridors.
- Details of how proposed management measures take into account relevant approved conservation advice and are consistent with the measures contained in relevant recovery plans and threat abatement plans.
- Completion criteria and performance targets for evaluating the effectiveness of OAMP implementation, and criteria for triggering corrective actions (if necessary).
- A program to monitor, report on and review the effectiveness of the OAMP.
- A description of potential risks to the successful implementation of the offsets, and contingency measures that would be implemented to mitigate against these risks.
- Confirmation of the legal process and timeframes for securing, under legally binding instruments, the offset areas for Phase 1.

Consistent with requirements of Condition 17B Arrow will not commence Project Phase 2 until the Phase 1 OAMP has been approved by the Minister in writing.

6. Risks and contingency measures

Condition 14(e): A description of potential risks to the successful implementation of the Offset Strategy, and a description of the contingency measures that would be implemented to mitigate against these risks.

The potential risks to successful implementation of the Phase 1 OS and delivery of required environmental offsets for the BGP have been assessed and are identified in Table 6.1. Contingency measures to mitigate those risks have also been described.

Table 6.1 Risks and contingency measures

Risk	Risk Ranking	Contingency Measures	Residual Risk Ranking
Arrow is unable to identify suitable offset properties to deliver the Phase 1 offset requirements within the allocated timeframe.	Moderate	• Desktop studies have shown there are a number of potential offset properties available that contain the MNES values required to be offset for Phase 1. • Arrow has already commenced landholder engagement, preliminary ground-truthing of shortlisted properties for Phase 1 and discussion with offset brokers. • Arrow is presently in discussions with other resource companies to explore opportunities to collaborate on securing offset properties that meet both company's requirements, and conservation trusts that can assist in securing and managing offset sites. • Arrow will continue to explore and progress various options in a timely manner. • Arrow intends to have offset properties confirmed, ground-truthed and landholder agreements in place at least 3 months prior to the timeframe stimulated in the EPBC approval. • A Phase 1 OAMP that identifies the final offset areas, sites and how they meet the Phase 1 MNES offset requirements will then be submitted to the Department.	Low

Risk	Risk Ranking	Contingency Measures	Residual Risk Ranking
Commonwealth do not support offset sites proposed in the OAMP.	Moderate	• Desktop studies have prioritised identification of properties that have the ability to contain a number of the MNES required to be offset and sufficient area. • The offset properties will be strategically located and offset areas will be selected on the basis of optimising connectivity in the landscape to other remnant vegetation areas/riparian corridors etc. • A preference will be to select properties that have the ability to deliver Phase 1 offset requirements plus surplus areas for future phases. • Arrow will consult with, and seek Department feedback on the proposed offset properties prior to formal submission of the Phase 1 OAMP.	Low
Offset sites are not legally secured prior to the next phase.	Low	• Arrow will have 4 years to secure the offset after the approval of the OAMP. • Early consultation with landholders will occur to discuss available options and identify the preferred mechanism (as per available options under Qld legislation). • Voluntary declarations under VM Act will be the preferred baseline legal mechanism as it is a streamlined process and can be finalised in a short period of time. • There are various options available which provide flexibility to tailor the mechanism to landholder's needs and the offset site's characteristics.	Low

Risk	Risk Ranking	Contingency Measures	Residual Risk Ranking
Landholder and/or contractor do not meet their offset management obligations.	High	• Landholders and/or contractors will be required to sign a legal contract that identifies the management actions that must be undertaken and activities permitted on the site. • Management funds will not be released by either Arrow or the conservation trust until the management actions have been completed. Payments are generally made on an annual or biannual basis. • Frequent auditing will occur to confirm management actions have been completed as specified in the management plan and no activities outside of what is allowed have occurred. • Regular offset site monitoring will occur to evaluate the progress of the offset against the performance criteria, and determine if corrective actions are required. • If a breach of contract occurs there is the ability for Arrow to seek legal recourse and rectification of those breaches.	Moderate
Arrow fails to track disturbance to MNES against approved limits, and clearing is greater than that allowed for. Therefore additional offsets are required.	Moderate	• Arrow have procedures that will be followed which include a number of steps to ensure this does not occur (refer Section 5.2). • Steps include: – Undertake pre-clearance surveys to confirm presence of MNES in proposed disturbance areas. – Identify if impacts can be avoided or minimised. – Confirm final area of disturbance and place into internal tracking database. • The MNES disturbances will be tracked monthly against approved disturbance limits. • If total impacts are nearing maximum disturbance limits Arrow will undertake consultation with the Department and seek approval (if deemed necessary based on predicted future disturbance) for increased disturbance limits. • Arrow will then add these additional offset requirements to the next Project phase offset requirements.	Low

7. Timeline

Condition 14 (f): A timeline for when actions identified in the Offset Strategy will be implemented for each offset area.

Arrow's assessment and option selection for Phase 1 offset areas (as described in Section 4.1) will be finalised within 12 months of project 'commencement' (as defined in the EPBC Act approval) or the Minister approving the Phase 1 OS.

The details of the offset package will be documented in an OAMP. The OAMP will include the details of the direct offset property(ies), a map of the offset areas, how the property(ies) will be legally secured and the management measures that will be implemented to improve the offset site for the MNES which the offset property covers.

In summary, Arrow commits to the following timelines relevant to this Phase 1 OS:

- Project commencement – date to be confirmed.
- Arrow will advise the Department in writing of the actual date of commencement within 20 business days after the commencement of the action.
- Monthly tracking of actual impacts versus Phase 1 approved limits.
- Progress identification and finalisation of offset properties to meet Phase 1 MNES offset requirements including ground-truthing to confirm MNES, assess habitat quality, identify appropriate management actions and finalise landholder agreements.
- Phase 1 OAMP will be submitted to the Department within 12 months of project commencement or the Minister's approval of the Phase 1 OS.
- Annual and cumulative impacts to MNES for the BGP will be tracked against allowable disturbance limits (whole project and each stage) and reported annually.
- Within three months of every 12 month anniversary of the commencement of the action, and for the life of the approval, Arrow will publish the annual report on our website. Furthermore, Arrow will provide the Department, at the same time as the compliance report, documentary evidence providing proof of the date of publication and non-compliance with any of the conditions of the approval.
- Arrow will legally secure the Phase 1 offsets prior to the commencement of Phase 2.
- At least 3 months prior to commencement of each development phase Arrow will prepare and submit an updated Offset Strategy (required under Condition 17) for each subsequent Project phase, for approval by the Minister.

- Arrow will notify the Department of potential non-compliance with any condition of approval as soon as practical and within no later than 10 business days of becoming aware of the potential non-compliance.

8. Legal mechanism to secure offsets

Condition 14 (g): The proposed legal mechanism for securing the offset(s).

Condition 15: The approval holder must not commence Project Phase 1 until the Offset Strategy has been approved by the Minister in writing. The approved Offset Strategy must be implemented by the approval holder.

An environmental offset is required to be legally secured on title to ensure the MNES values within the approved offset area are protected from future development, and that this requirement is binding on current and future landowners. The EPBC Environmental Offsets Policy (2012) requires an offset should be legally secured for at least the duration of the impact, and it should be able to be monitored and enforced.

Relevant offsets for the BGP will be legally secured in accordance with options available under Queensland legislation as set out in the Queensland Environmental Offsets Policy (2014). These include:

- Environmental offset protection area under Section 30 of Environmental Offsets Act 2014.
- Area declared as an area of high nature conservation value under section 19F of the Queensland Vegetation Management Act 1999 (VM Act) where secured for purposes of an environmental offset.
- Nature refuge under Section 46 of the Queensland Nature Conservation Act 1992 (NC Act) where secured for purposes of an environmental offset.
- Protected Area under Section 29(1) of the NC Act where secured for purposes of an environmental offset.
- Statutory covenant for environmental purposes under the Queensland Land Act 1994 or Land Title Act 1994.

Arrow currently proposes that offsets for the BGP be legally secured by declaring the offset area of ‘high nature conservation value’ under the VM Act. This is achieved through submission of a Voluntary Declaration (VDec). The VDec process provides a simplified and streamlined procedure for landholders seeking to voluntarily protect native vegetation on their land. The VDec provides a permanent, binding mechanism linked to the title, with direct reference to the approved management plan that includes information on the area protected as the offset and requirements that must be met. There is also potential to build on the VDec by declaring the offset area as a nature refuge under the NC Act. This may be done at a later date in consultation with the landholder and DES.

Arrow will ensure Phase 2 does not commence until the Phase 1 offsets are legally secured.

9. References

Arrow (2018) Bowen Gas Project – Phase 1 Species Impact Management Plan.

AECOM (2015) Bowen Gas Project – Red Hill 1 and 2: Ecological Services. Prepared for Arrow Energy.

Commonwealth of Australia (2009) Weeping Myall Woodlands Policy Statement 3.17.

Department of the Environment (2013) Matters of National Environmental Significance – Significant Impact Guidelines 1.1, Environment Protection and Biodiversity Conservation Act 1999.

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008) Map of areas in which Weeping Myall Woodlands may occur.

Department of Sustainability, Environment, Water, Population and Communities (October 2012) Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy.

Halford, D. (1997). *Eucalyptus raveretiana*.Species Management Profile. Flora and Fauna Information System. Queensland Department of Natural Resources, Brisbane.

Hobson, R. (2012). 'Dunmall's Snake,' in Queensland's threatened animals. eds. L. K. Curtis, A. J. Dennis, K. R. McDonald, P. M. Kyne and S. J. S. Debus, CSIRO Publishing, Collingwood. pp. 243-244.

Lumsden L, Nelson J, Lindeman M (2008). Ecological research on the Eastern Long-eared Bat Nyctophilus timoriensis (south-eastern form). A report to the Mallee Catchment Management Authority. Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment. Melbourne, Australia.

NSW Department of Environment and Climate Change (NSW DECC) (2007). *Terrestrial Vertebrate Fauna of the Greater Southern Sydney Region: Volume 2 Species of Conservation Concern and Priority Pest Species*. A joint project between the Sydney Catchment Authority and the Parks and Wildlife Division of DECC. Information and Assessment Section, Metropolitan Branch, Climate Change and Environment Protection Group, DECC.

NSW Office of Environment & Heritage (NSW OEH) (2017). Corben's Long-eared Bat profile. Sourced from http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10568 on 15 May 2018. Last updated 01 December, 2017.

Pennay, M. (2008). A maternity roost of the Large-eared Pied Bat *Chalinolobus dwyeri* (Ryan) (Microchiroptera: Vespertilionidae) in central New South Wales Australia. *Australian Zoologist*. 34:564-569.

Reardon, T. (2012). 'South-eastern Long-eared Bat,' in Queensland's threatened animals. eds. L. K. Curtis, A. J. Dennis, K. R. McDonald, P. M. Kyne and S. J. S. Debus, CSIRO Publishing, Collingwood. pp. 386-387.

Richardson, R. (2006). Queensland Brigalow Belt Reptile Recovery Plan 2008 – 2012. Report to the Department of the Environment, Water, Heritage and the Arts, Canberra. WWF-Australia, Brisbane.

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

Turbill, C. and Ellis, M. (2006). Distribution and abundance of the south-eastern form of the greater longeared bat *Nyctophilus timoriensis*. Australian Mammalogy 28: 1-6.

URS (2013a) Red Hill Mining Lease – Terrestrial Fauna Technical Report. Prepared for BM Alliance Coal Operations Pty Ltd.

URS (2013b) Red Hill Mining Lease – Flora Survey Report. Prepared for BM Alliance Coal Operations Pty Ltd.

Wilson, S. and Swan, G. (2013). A complete guide to reptiles of Australia. Fourth Edition. Reed New Holland, Sydney.

APPENDIX A

Variation to Conditions of the Bowen Gas Expansion Project Approval

VARIATION TO CONDITIONS ATTACHED TO APPROVAL

Arrow Bowen Gas Project (EPBC 2012/6377)

This decision to vary a condition of approval is made under section 143 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Approved action

Person to whom the approval is granted	Arrow Energy Pty Ltd ABN: 73 078 521 936
Approved action	To develop, operate and decommission a coal seam gas field in the Bowen Basin, Queensland referred under the EPBC Act on 9 May 2012; and as described in the Arrow Bowen Gas Project Environmental Impact Statement (March 2013) and Supplementary Report (May 2014).

Variation

Variation of conditions of approval	The variation is: Delete conditions 11, 13, 14, 15, 16, and 17 and substitute with the conditions specified below.
Date of effect	This variation has effect on the date the instrument is signed.

Person authorised to make decision

Name and Position	Greg Manning Assistant Secretary Assessments and Post Approval Branch
Signature	
Date of decision	25 / 03 / 2018

Conditions attached to the approval

11. The **approval holder** must ensure that environmental offsets comply with the principles of the **EPBC Act Environmental Offsets Policy**. If the **approval holder** has provided an offset in respect of **impacts** predicted for a stage of the project which subsequently are not realised, such parts of the offset in excess of the obligation for that stage can be applied towards offsets required for the **impacts** of subsequent project stages.

13. The Offset Strategy may be prepared and submitted to the **Minister** for approval in stages. Each stage of the Offset Strategy must provide information in respect of the next **Project Phase** to commence and all earlier **Project Phases**. A **Project Phase** must not **commence** until an Offsets Strategy addressing offset obligations for that **Project Phase** has been approved by the **Minister**.

Continued overleaf

14. The Offset Strategy must include:

    a. a strategy to secure the minimum offsets proposed for the residual significant impacts for the next **Project Phase**

    b. a reconciliation of impacts predicted in the next **Project Phase** and actual disturbance in earlier **Project Phases** against the maximum disturbance limits set out in Table 1;

    c. a process to offset, in accordance with the **EPBC Act Environmental Offsets Policy**, any significant **impact** for the next **Project Phase** to any **EPBC listed threatened species** or **EPBC community** not identified in Table 1;

    d. a program to monitor and report on the effectiveness of the management measures, and progress against the performance and completion criteria;

    e. a description of potential risks to the successful implementation of the Offset Strategy, and a description of the contingency measures that would be implemented to mitigate against these risks;

    f. a timeline for when actions identified in the Offset Strategy will be implemented for each offset area; and

    g. the proposed legal mechanism for securing the offset(s).

15. The **approval holder** must not **commence Project Phase 1** until the Offset Strategy has been approved by the **Minister** in writing. The approved Offset Strategy must be implemented by the **approval holder**.

16. Offsets for **Project Phases** must be in accordance with the mechanism identified in the approved Offset Strategy and must be registered and legally secured in accordance with Queensland legislation prior to **commencement** of any subsequent **Project Phase**.

17. At least 3 months prior to the **commencement** of any **Project Phase** after **Project Phase** 1, the **approval holder** must submit a revised Offset Strategy required at conditions 13 and 14 for approval by the **Minister**. The updated Offset Strategy must include:

    a. a strategy to secure the minimum offsets proposed for the residual significant **impacts** to the **EPBC listed species and communities** for the next **Project Phase**;

    b. a map of the location of each **EPBC listed threatened species** and its habitat and **EPBC community** in relation to infrastructure for the next **Project Phase**;

    c. the information required for the Offset Strategy at conditions 14a to 14g for the next **Project Phase**;

    d. demonstration of how any proposed offset builds on offsets already secured and will contribute to a larger strategic offset for whole of project **impacts**;

    e. performance and completion criteria for evaluating the management of offset areas.

17. A Within 12 months of project commencement or the **Minister** approving a version of the Offset Strategy for a **Project Phase**, the **approval holder** must submit for the approval of the **Minister** an Offset Area Management Plan which includes:

    a. a description of the management measures that will be implemented for the protection of **EPBC listed threatened species and communities** in each offset area,

    b. details of how the proposed offset/s and Offset Area Management Plan meet the requirements of the **EPBC Act Environmental Offsets Policy**;

    c. a field validation survey and baseline description of the current condition (prior to any management activities) of the offset area/s, including existing vegetation;

d. a description and map (including **shapefiles**) to clearly define the location and boundaries of the offset area/s, accompanied by the **offset attributes**;

e. information about how the offset area/s provide connectivity with other relevant habitats and biodiversity corridors including a map depicting the offset areas in relation to other habitats and biodiversity corridors;

f. details of how proposed management measures take into account relevant **approved conservation advices** and are consistent with the measures contained in relevant **recovery plans** and **threat abatement plans**;

g. completion criteria and performance targets for evaluating the effectiveness of Offset Area Management Plan implementation, and criteria for triggering corrective actions (if necessary);

h. a program to monitor, report on and review the effectiveness of the Offset Area Management Plan;

i. a description of potential risks to the successful implementation of the offset/s, and contingency measures that would be implemented to mitigate against these risks.

17. B The **approval holder** must not commence the next **Project Phase** until the Offset Area Management Plan for the current **Project Phase** has been approved in writing by the **Minister**.

APPENDIX B

Habitat mapping rules

The following table sets out the core habitat mapping rules that have been applied to EPBC Act species and communities for the BGP area.

MNES	Core Habitat Known	Core Habitat Possible
All Regional Ecosystem (RE) mapping has been applied in the following order of priority: 1. Ecosmart ground-truthed REs (Phase 1 area) 2. Queensland Government RE mapping (V10) 3. Queensland Government Mature Regrowth (EPA) (as a proxy for regrowth > 15yrs)		
Black Ironbox (*Eucalyptus raveretiana*)	Any RE polygon that contains a species record (recent (1980+) and accurate (± 500m).	• Remnant vegetation on land zone 3 within 200m of watercourse • REs: 11.3.4 and 11.3.25 • Remnant vegetation should be from 0-300m AHD
Bluegrass (*Dicanthium setosum*)	Species records (recent (1980+) and accurate (± 500m)) should be buffered by a 1 km diameter. This includes remnant and non-remnant habitats.	• REs: 11.3.2, 11.3.3, 11.3.4, 11.3.21, 11.4.4, 11.4.11, 11.8.11 and 11.9.3
King Bluegrass (*Dichanthium queenslandicum*)	Species records (recent (1980+) and accurate (± 500m)) should be buffered by a 1 km diameter. This includes remnant and non-remnant habitats.	• REs: 11.3.21, 11.4.4, 11.4,11, 11.8.5, 11.8.11 and 11.9.3
Ornamental Snake (*Denisonia maculata*)	All land within 1km of a species record (recent (1980+) and accurate (± 500m))	• All remnant vegetation on land zone 3, 4, 8 and 9 • Also, remnant RE11.5.16
Squatter Pigeon (Southern) (*Geophaps scripta scripta*)	All land (remnant or non-remnant), within 1 km of a recent (1980+) and accurate (± 500 m) record	Woodlands, native grasslands and derived native grasslands REs consisting of: 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.19, 11.3.21, 11.3.25, 11.3.26, 11.4.4, 11.4.11, 11.4.12, 11.5.1, 11.5.4, 11.5.20, 11.7.4c, 11.8.2a, 11.8.11, 11.9.3, 11.9.9, 11.9.10) Mature Regrowth (EHP 2012b) is also included in the mapping assessment
Red Goshawk (*Erythrotriorchis radiatus*)	Species records (<500 m precision) should be buffered by a 1 km diameter and classed as 'core habitat known'. This includes only remnant habitats.	Remnant woodland within 1 km of permanent water. Permanent water is stream order 3 and above. Following REs were excluded: 11.1.1, 11.1.3, 11.2.2, 11.3.21, 11.3.24, 11.3.31, 11.4.11, 11.4.4, 11.5.14, 11.5.6, 11.8.10, 11.8.11, 11.9.12, 11.9.3, and 11.11.17.
Koala (*Phascolarctos cinereus*)	All core habitat possible within 1km of a species record (<500 m precision).	REs: 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.25, 11.3.26, 11.3.27d and 11.3.27f
South-eastern Long-Eared Bat (*Nyctophilus corbeni*)	Any RE polygon containing a recent (1980+), accurate (± 500 m). unless it is a heterogeneous polygon that includes >65% grasslands (i.e RE11.3.21 + 11.4.4 + 11.4.11 + 11.8.11 + 11.9.3). Such areas should be	All remaining remnant vegetation (except REs 11.3.21, 11.4.4, 11.4.11, 11.8.11 and 11.9.3)

	excluded. Note that no accurate sightings currently recorded in BGP	
Large-eared Pied Bat (*Chalinolobus dwyeri*)	Any RE polygon containing a recent (1980+), and accurate (± 500 m) record. Note that no accurate sightings currently recorded in BGP	Any RE polygon within 10km of a recent, accurate record is classed as core habitat Possible (Note there are no records currently). Cliffs (and surrounding REs) within 10 km of remnant or regrowth vegetation should be classed as core habitat possible (including vegetation)
Greater Glider (*Petauroides volans*)	All 'General Habitat' (i.e. REs: 11.3.6, 11.3.9, 11.4.13, 11.5.9, 11.5.12, 11.7.4, 11.8.4, 11.8.14, 11.9.1, 11.10.4, .11.10.5, 11.10.7, 11.11.1, 11.12.1, 11.12.2) and 'Core Habitat Possible' within 1km of a recent (1980+), accurate (± 500m) record. Note that no formal sightings currently recorded in BGP	REs: 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.25, 11.3.27 (in fringing woodlands), 11.3.36, 11.3.37, 11.4.2, 11.4.7, 11.4.8, 11.5.2, 11.5.3, 11.5.17, 11.7.6, 11.8.15, 11.9.2, 11.9.7, 11.9.9, 11.9.10, 11.9.13, 11.10.1, 11.12.12, 11.10.13, 11.11.9, 11.11.16, and 11.12.3.
Painted Honeyeater (*Grantiella picta*)	All "General Habitat" (i.e. REs: 11.5.11 and 11.7.2) and "Core Habitat Possible" within 2km of a recent (1980+), accurate (± 500m) record is classed as "Core Habitat Known". Note that no sightings currently recorded in BGP	REs and regrowth >15yrs: 11.3.1, 11.4.1, 11.4.7 and 11.4.8, 11.4.9, 11.5.16, 11.7.1, 11.8.3, 11.8.13, 11.9.1, 11.9.4, 11.9.5, 11.9.10, 11.10.3, 11.11.13, and 11.11.16
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Ground-truthed REs: 11.3.1, 11.4.7, 11.4.8, 11.4.9, 11.5.16, 11.9.1, 11.9.5. Use remnant and regrowth.	State Govt mapped REs: 11.3.1, 11.4.7, 11.4.8, 11.4.9, 11.5.16, 11.9.1, 11.9.5. Use remnant and regrowth.
Weeping Myall Woodlands	All core habitat possible within 1km of a TEC record. Note that no Weeping Myall Woodland TEC areas currently known in BGP	REs: 11.3.2, 11.3.28 Remnant only
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	Ground-truthed REs: 11.3.21, 11.8.11, 11.4.4, 11.4.11 and 11.9.3 (where ground-truthed use Best and Good)	State Govt mapped REs: 11.3.21, 11.8.11, 11.4.4, 11.4.11 and 11.9.3
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Ground-truthed REs: 11.5.15, 11.8.3, 11.8.13, 11.3.11, 11.4.1, 11.9.4, 11.11.18, 11.7.1x1 Remnant only	State Govt REs: 11.5.15, 11.8.3, 11.8.13, 11.3.11, 11.4.1, 11.9.4, 11.11.18, 11.7.1x1 Remnant only