Report
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Offset Area Management Plan- SGP PPLs

EPBC approval 2018/8223

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Declaration

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Signed:

Full name Scott Nairn
Organisation : Arrow Energy Pty Ltd
EPBC Referral Number: EPBC 2018/8223
EPBC Offset Area Management Plan
Date: 03/03/2021

Executive Summary

Arrow Energy Pty Ltd (Arrow) has been operating a strong domestic gas supply business since 2004 and we are expanding our CSG operations in the Surat Basin through the Surat Gas Project (**SGP**). Arrow lodged a Referral to the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) (the Act) for the SGP on 27 January 2010 (EPBC 2010/5344). An Environmental Impact Statement (**EIS**) and Supplementary Report to the EIS (**SREIS**) were completed in March 2012 and June 2013 respectively. The Minister for the Environment of the Australian Government provided their approval for the SGP on 19 December 2013.

On 1 December 2017, Arrow Energy and the Shell-operated QCLNG joint venture announced a Gas Sales Agreement (**GSA**) to commercialise the majority of Arrow's gas reserves in the Surat Basin. The collaboration between the parties will see the use of some existing QGC-operated infrastructure such as gas compression, processing and transmission infrastructure as well as water transport and treatment facilities. Utilising the existing upstream infrastructure reduces the land disturbance footprint of the SGP development compared to plans presented in 2013 and minimises impacts to landholders and the environment.

Using the existing QGC-operated infrastructure necessitates additional pipeline easements that were not envisaged in the SGP EIS/SREIS. These easements are required to transfer gas and water from the Arrow gas reserves to these facilities that are located off Arrow's existing tenements. An EPBC Referral (EPBC 2018/8223) to address the pipelines and associated infrastructure (Petroleum Pipeline Licence (**PPL**s)) (the Project / the action) was lodged with the Department of Agriculture, Water and Environment (**DAWE**) on 29 May 2018 and a Controlled Action decision was received on 7 September 2018. The controlling provisions for the action are Listed Threatened Species and Communities (Sections 18 and 18A of the Act) and the action required assessment by Preliminary Documentation. As such this decision required offsets to compensate for the loss of up to **65 ha of Koala (*Phascolarctos cinereus*)** habitat within the Project area. The Koala is listed as 'vulnerable' under the Act.

On 19 October 2018 the Department provided Arrow with the specific requirements to be provided within the Preliminary Documentation. This Offset Area Management Plan (**OAMP**) was one such requirement. Specifically, the purpose of the OAMP is to address the requirements of approval (EPBC 2018/8223) conditions 3 and 4, with commitments to meet the requirements of approval conditions 5, 6 and 7.

The PPL Project is located near the town of Kogan in South West Queensland (*Figure 1*), which is 93km south-west of the offset property Killara (Lot 16BO94). The Project site is shown in *Figure 2* and covers approximately 67 ha.

The primary land uses within the vicinity of the project site are coal seam gas (**CSG**) extraction projects, and cattle grazing. A gas field that forms part of the Surat Gas Project, one of Australia's largest operating CSG projects, overlies the Project site.

Field surveys of both the impact and offset areas have been undertaken. The surveys on the impact site were undertaken using the *Guide to determining terrestrial habitat quality, A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy v1.2* (Department of Environment and Heritage Protection (**DEHP**), 2017). The surveys on the offset area were undertaken using the *Guide to determining terrestrial habitat quality* (**DES**, 2020).

The impact area was surveyed by 3D Environmental and Ecosmart Ecology (2019 and 2020), who were commissioned by Arrow Energy. The broader SGP project area was surveyed in detail

during dry (September 2016) and wet (February/March 2017) seasons (3D Environmental and Ecosmart Ecology, 2017).[1] The off-tenure pipeline alignment impact areas were surveyed initially in December 2017 (3D Environmental and Ecosmart Ecology, 2018)[2] and again in December 2018 (3D Environmental and Ecosmart Ecology, 2019)[3] to give greater coverage of the various types of habitat within and adjacent to impacted easements. Arrow conducted additional BioCondition surveys (n=25) in June 2020 to combine with those conducted by 3D Environmental and Ecosmart Ecology (n=41; 2018 and 2019) to complete a robust sample of the various different types of Koala habitat within the impact area.

Field surveys of the vegetation communities on the offset area were undertaken by AECOM in 2018, and subsequently further detailed vegetation and fauna surveys were undertaken by Umwelt 16-22 June 2020. The reports are Habitat Quality Assessment- Killara Offset Area (Umwelt, July 2020), Targeted Fauna Survey- Killara Offset Area (Umwelt, July 2020). These are provided at Appendix 4, Terrestrial Ecology Reports.

An overview of the terrestrial ecology of the impact areas and the resultant offset requirements are summarised in *Table 1* and detailed in *Section 6* and *Attachment 1.2*.

The offset meets the Conditions of Approval and the offset policy requirements of a 100% direct offset. Risks to successfully achieve the objectives of the offset plan include vegetation clearing, uncontrolled fire, inappropriate grazingand drought. Management actions will be implemented as part of the plan. The risks to plan success have been rated, on the basis of current practice (before) and after the management actions have been implemented. The primary strategies (management actions) to manage the risks are outlined in the plan, and include, feral animal control, weed management, legally securing the area, fencing and managing grazing, and fire management and a monitoring regime that includes regular inspections, weed, pest animal and fuel load monitoring, and habitat quality assessments and fauna surveys.

This OAMP demonstrates that the proposed[4] offset area on Killara meets the principles of the EPBC Act Environmental Offsets Policy (**EOP**) and is a suitable offset for approved impacts resulting from the Surat Gas Project: Off-tenure Pipelines and Associated Infrastructure.

This offset area management plan has been prepared to meet the offset obligations specified in the EPBC approval 2018/8223.

[1] 3D Environmental and Ecosmart Ecology. (2017). *Surat Gas Project Terrestrial Ecology Report*. Report prepared for Arrow Energy Pty Ltd, June 2017.
[2] 3D Environmental and Ecosmart Ecology. (2018). *Surat Gas Project Off-tenement Terrestrial Ecological Assessment Report*. Report prepared for Arrow Energy Pty Ltd, March 2018.
[3] 3D Environmental and Ecosmart Ecology. (2019). *Surat Gas Project Off-tenement Terrestrial Ecological Assessment Report*. Report prepared for Arrow Energy Pty Ltd, March 2019.
[4] The proposed offset area is located on a property that has the potential to support other offsets areas for the SGP.

Table 1: Summarised project impacts vs offset area

Protected matter	EPBC Status	Impact area (ha)	Habitat quality score	Offset area (ha)	Offset area Habitat start quality	Offset area Habitat finish quality score
Pharscolarctos cinereus (Koala)	Vulnerable	65	6	Regrowth Vegetation 220ha	5	6

Part A : Project Specifics

1. Introduction

Arrow Energy Pty Ltd (Arrow) has been operating a strong domestic gas supply business since 2004 and it is expanding its coal seam gas (**CSG**) operations in the Surat Basin through the Surat Gas Project (**SGP**).

Arrow lodged a Referral to the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) (the Act) for the SGP on 27 January 2010 (EPBC 2010/5344). An Environmental Impact Statement (**EIS**) and Supplementary Report to the EIS (**SREIS**) were completed in March 2012 and June 2013 respectively. The Minister for the Environment of the Australian Government provided their approval for the SGP on 19 December 2013.

On 1 December 2017, Arrow Energy and the Shell-operated QCLNG joint venture announced a Gas Sales Agreement (**GSA**) to commercialise the majority of Arrow's gas reserves in the Surat Basin. The collaboration between the parties will enable Arrow to use some existing QGC-operated infrastructure such as gas compression, processing and transmission infrastructure as well as water transport and treatment facilities. Utilising the existing upstream infrastructure will reduce the land disturbance footprint of the SGP development compared to plans presented in 2013. It will also minimise impacts to landholders and the environment.

Using the existing QGC-operated infrastructure necessitates additional pipeline easements that were not envisaged in the SGP EIS/SREIS. These easements are required to transfer gas and water from the Arrow gas reserves to these facilities that are located off Arrow's existing tenements.

An EPBC Referral (EPBC 2018/8223) to address the pipelines and associated infrastructure (Petroleum Pipeline Lease (**PPL**s)) (the Project/the action) was lodged with the Department on 29 May 2018 and a Controlled Action decision was received on 7 September 2018. The controlling provisions for the action are Listed Threatened Species and Communities (Sections 18 and 18A of the Act) and the action requires assessment by Preliminary Documentation. As such this decision required offsets to compensate for the loss of up to 65 ha of Koala (*Phascolarctos cinereus*) habitat within the Project area.

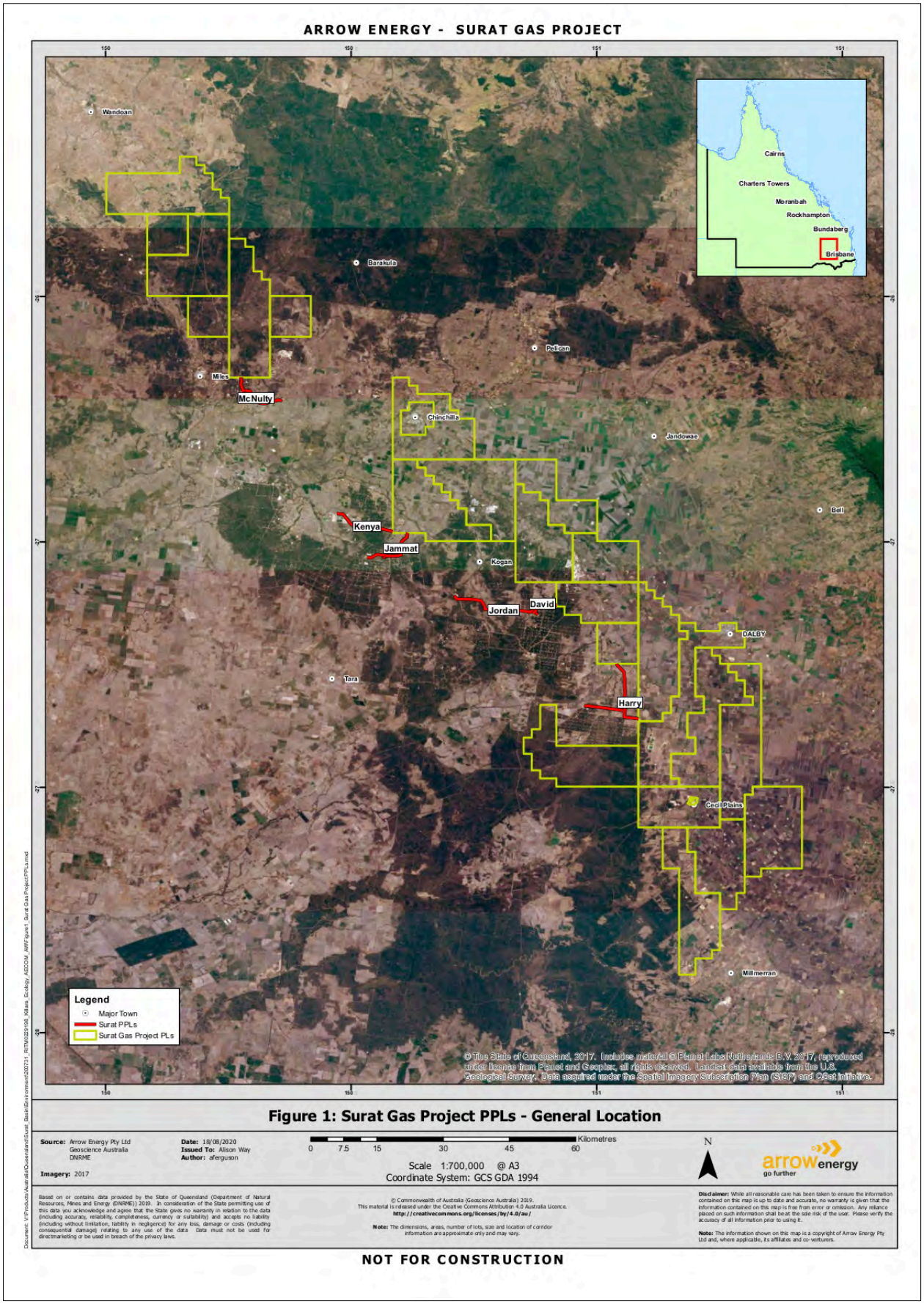
On 19 October 2018 the Department provided Arrow with the specific requirements to be provided within the Preliminary Documentation. This Offset Area Management Plan (**OAMP**) was one such requirement. The project was approved with conditions on 28 May 2020. The approval conditions also require an OAMP.

This OAMP demonstrates how Arrow will meet the requirements for approval conditions 3 to 7, and provide an environmental offset consistent with the Environmental offsets policy to compensate for the clearing 65 ha of Koala (*Phascolarctos cinereus*) for the Pipelines Project.

1.1 Location

The PPL Project is located around the town of Kogan in South West Queensland (Figure 1), within the Brigalow Belt.

Figure 1 Surat Gas Project PPLs – General Location



1.2 Purpose

The purpose of the OAMP is to address the requirements of approval conditions 3 to 4, with commitments to meet the requirements of approval conditions 5, 6 and 7. The requirements are provided in Table 2, and the reference section is also provided.

Table 2: Conditions of Approval addressed in the document

Approval Conditions	Section addressed
3. The approval holder must submit an Offset Area Management Plan (OAMP) prepared by a suitably qualified ecologist for the written approval of the Minister. The approval holder must not commence the action until the OAMP has been approved by the Minister. The approved OAMP must be implemented.	Appendix 5 sets out the experience and qualifications of those who prepared this OAMP.
4 a. details to demonstrate how the offset compensates for the clearance of 65ha Koala (*Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT) habitat in accordance with the Environmental offsets policy;	*Section 6, Tables 6 – 7*
b. a description of the offset, including location, size, condition, environmental values present and surrounding land uses;	*Section 5 and 6, Appendix 1*
c. relevant baseline data and other supporting evidence, including results from field validation surveys and quantifiable ecological data, that documents the presence of the Koala and the quality of the Koala (combined populations of Qld, NSW and the ACT) habitat within the offset area;	*Section 6, Appendix 4*
d. an assessment of site habitat quality using a method agreed to in writing by the Department;	*Table 3; Appendix 4*
e. details of how the offset area will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the Koala	*Section 5.1* and *Figure 6*
f. a description and maps (including shapefiles) to clearly define the location and boundaries of the offset areas, accompanied by the offset attributes (including physical address of the offset areas, coordinates of the boundary points in decimal degrees and the size of the environmental offsets in hectares);	*Figure 7* and shapefiles supplied with the OAMP
g. specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the habitat quality for Koala in the offset area over the period of effect of this approval;	*Section 10*
h. details of the management measures (including timing, frequency, duration and method of outcome measurement), to be carried out to meet the offset completion criteria set in condition 4.g; The management measures must specify activities that will be prohibited in the offset area(s), including (but not limited to) mining/exploration, development and alternate land uses. The management measures proposed must be consistent with the Environmental Management Plan Guidelines and the Approved conservation advice.	*Sections 8 and 9*
i. performance criteria that set targets at 5-yearly intervals for expected progress towards the completion criteria set in condition 4g;	*Section 10*
j. details of the nature, timing and frequency of monitoring to inform progress against achieving the 5-yearly interim milestones (the frequency of monitoring must be sufficient to track progress towards each set of milestones, and sufficient to determine whether the offset area is likely to achieve those milestones in adequate time to implement all necessary corrective actions);	*Section 11*
k. proposed timing for the submission of monitoring reports which provide evidence demonstrating whether the interim milestones have been achieved;	*Section 11*
l. timing for the implementation of corrective actions if monitoring activities indicate the interim milestones have not been achieved;	*Table 9*

Approval Conditions	Section addressed
m. a risk analysis and a risk management and mitigation strategy for all risks to the successful implementation of the OAMP and timely achievement of the offset completion criteria set in condition 4.g, including for if the offset fails to achieve and maintain the completion criteria; and	*Section 7*
n. the proposed legal mechanism for legally securing the offset area, such that legal security remains in force over the offset area for at least the period of effect of this approval.	*Section 12*
5. The approval holder must legally secure the environmental offset within 12 months from the date that the OAMP is approved by the Minister. The approved OAMP must be attached to the legal mechanism used to legally secure the offset area.	*Section 12*
6. The approval holder must notify the Department within 5 business days of the legal mechanism being executed.	*Section 12*
7. The legal mechanism used to legally secure the offset area must remain in force for the period of effect of this approval.	*Section 12*

1.3 Surat Gas Project Offset Acquittal

Arrow has selected a property to acquit potential offset requirements for project development associated with the Surat Gas Project. Within the offset property, an area has been selected to acquit offset requirements for the Pipeline Project. The area, 'Killara Offset Area 1' (the Offset area), is the subject of this OAMP, proposed to acquit the PPL Project.

Locating offset obligations from other Arrow projects together on the same property will improve the biodiversity value of each offset individually, and strengthen other values such as connectivity and resilience. Optimal management for each offset will be achieved where the management actions, reporting timeframes and monitoring, can be aligned, where appropriate. This will achieve efficiencies in managing many aspects of the cumulative offset area, for aspects such as weeds, feral animals, fire, and monitoring.

1.4 Structure of Report

The OAMP is divided into 2 parts – Part A (Project Details and Impact Areas) and Part B (Offset Land Management Details).

Part A contains:

- Project details of the Surat Gas Project Pipelines (Section 1.5).
- how the Offsets address the EOP and EPBC Conservation Advice (Section 2.2)
- Impact area description.

Part B contains:

- Offset Property information, including the landscape values
- Offset Regional Ecosystems (REs) and Habitat Quality Scoring (HQS)
- Risk analysis
- Offset management measures
- Completion criteria and performance targets
- Monitoring and reporting.

1.5 Description of the Pipeline Project (Impact area)

The Project involves constructing and operating off-tenure pipelines and associated infrastructure required to transfer gas and water in support of Arrow Energy's SGP (Figure 1). 'Off- tenure' relates to those areas that are not currently held under a *Petroleum and Gas (Production and Safety) Act 2004* tenure by Arrow Energy. Prior to constructing each pipeline and associated infrastructure, Arrow aims to secure tenure in these areas with Petroleum Pipeline Licences (**PPL**s). Each PPL has had (or will have) an Environmental Authority (**EA**) granted under the Queensland *Environmental Protection Act 1994* (**EP Act**).

The Project site (impact area) covers approximately 67 ha, and it includes a series of five pipelines and associated infrastructure. The pipelines illustrated in Figure 2, and described as they are located from north to south:

- **McNulty pipelines** - 4 km medium pressure steel gas pipeline from Arrow's tenement boundary to QGC's Bellevue Central Processing Plant (**CPP**) and a 14 km High Density Polyethylene (**HDPE**) raw water pipeline from Arrow's tenement boundary to QGC's McNulty pond (the first 4 km being co-located with the gas line).
- **Kenya Pipeline** – a 13 km low pressure HDPE treated water return line from the QGC Kenya Central Water Treatment Facility to Arrow's tenement boundary.
- **Jammat pipelines** - two 9.5 km low pressure HDPE gas pipelines from Arrow's tenement boundary to QGC's Jammat Field Compression Station and a 12.5 km HDPE raw water pipeline from Arrow's tenement boundary to QGC's Kenya East Pond (the first 9.5 km being co- located with the gas line).
- **Jordan pipeline** - Lynwood Export pipeline to Jordan – a 24 km medium pressure steel gas pipeline from Arrow's tenement boundary to QGC's Jordan CPP.
- **David pipelines** - two 6.2 km low pressure HDPE gas pipelines from Arrow's tenement boundary to QGC's David FCS and a 6.4 km HDPE raw water pipeline from Arrow's tenement boundary to QGC's David Pond (the first 6 km being co-located with the gas line).
- **Harry pipelines** - two 3.5 km low pressure HDPE gas pipelines from Arrow's tenement boundary to QGC's Harry FCS and a 4 km HDPE raw water pipeline from Arrow's tenement boundary to QGC's Broadwater Pond (the first 3.5 km being co-located with the gas line). Water pipe from Tipton dam to Glendower and Broadwater ponds – a 13.5 km HDPE raw water pipeline from Arrow's tenement boundary to QGC's water ponds.

The project is planned to commence once all the approvals and approval requirements have been addressed. The project is approved until 31 December 2080.

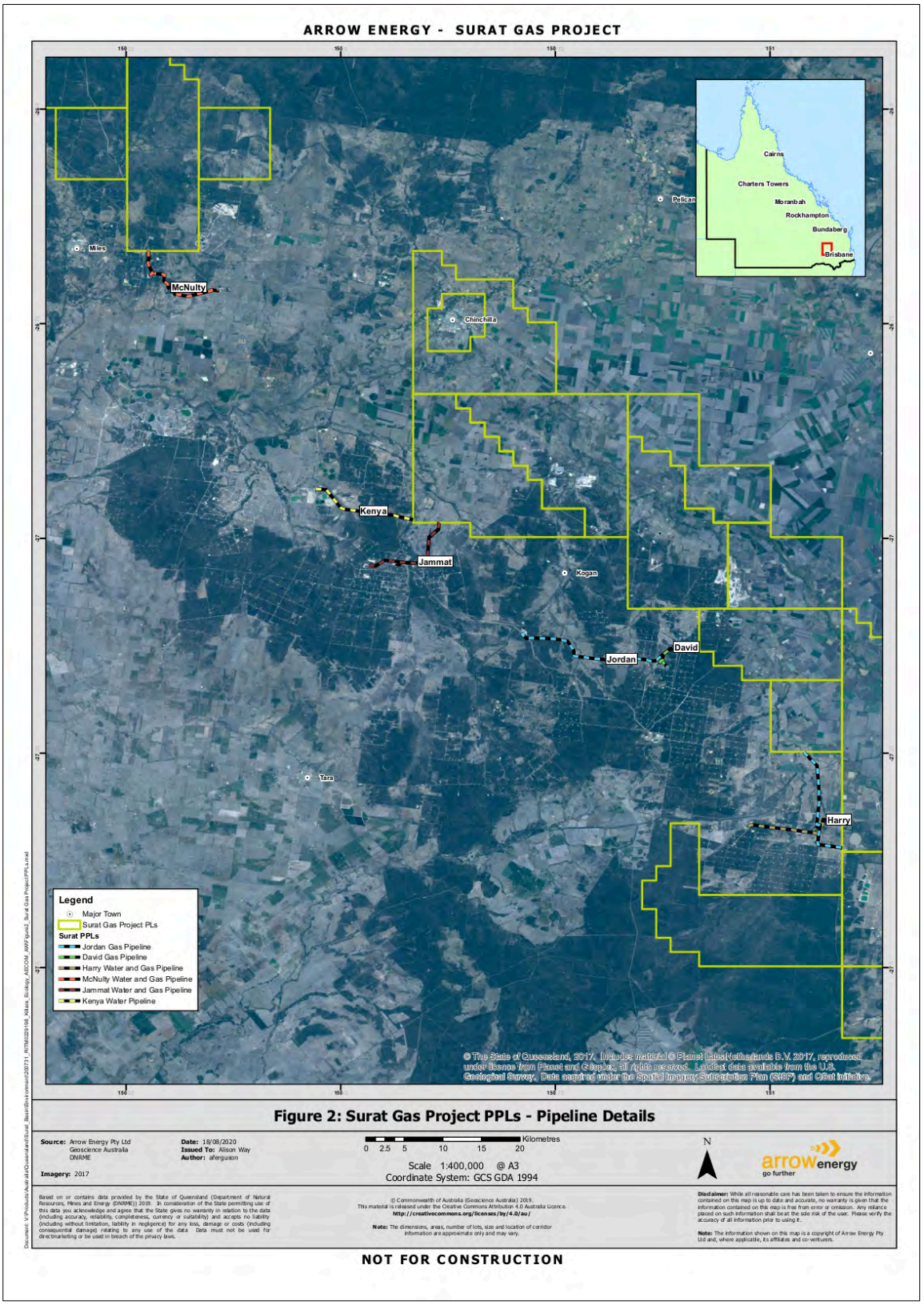
An assessment of potential MNES species was undertaken for the pipeline project. In particular, habitat for Koala was identified as an area consisting of 20 vegetation types correlating to regional ecosystems (RE): 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.25, 11.3.26, 11.3.27, 11.4.3, 11.5.1, 11.5.4, 11.5.20, 11.7.4, 11.7.6, 11.7.7, 11.9.2, 11.9.7, and 11.9.10. The vegetation may be utilised by the species for foraging, shelter or dispersal. Further description is provided in section 3.2.

Impacts to MNES have been minimised by:

- selecting pipeline alignments to avoid the values where practicable;
- seeking opportunities to co-locate pipeline RoWs with existing pipelines, and therefore reducing the width of new easements, and habitat fragmentation;
- completing field surveys in most remnant vegetation to understand the likelihood of this vegetation to provide habitat for the listed species and communities; and
- reviewing effective impact minimisation and mitigation measures based on scientific evidence for wildlife.

A range of mitigations are proposed to minimise impacts to MNES, as outlined in the Surat Gas Project Off-tenure Pipelines and Associated Infrastructure (EPBC 2018/8223) EPBC Preliminary Documentation (Rev 0.4, 13 December 2019). Specifically for Koala, measures to be implemented during construction include: retaining Koala food trees wherever possible; restricting speed limits to <60km/hour during dawn and dusk, and at night on project controlled roads; ensuring koalas have enough time to move out of the site without human intervention; clearing pipelines in stages; no clearing of habitat trees or where a habitat tree crown overlaps in which a koala is present; a fauna spotter catcher (**FSC**) will be present during clearing in Koala habitat area where Koala habitat trees have a trunk of a diameter of more than 10cm at 1.3m above ground; a FSC will conduct a pre-clearance fauna survey and operate as per Arrow's Fauna Spotter-Catcher Work Instruction (2019). Measures from the approved Surat Gas Project EPBC Species Impact and Management Plan (Arrow 2018) will be implemented.

Figure 2 Surat Gas Project PPLs –pipeline details



2. EPBC Act Environmental Offsets Policy

This section describes how the proposed offset area meets the requirements of the EPBC Act Environmental Offsets Policy (October 2012) (**EOP**).

2.1 Policy principles

The EOP sets out eight key overarching principles to be be applied to determine the suitability of an offset. *Table 3* outlines how each of the policy principles has been considered in this OAMP with a description of how the principle has been addressed and a reference to the relevant OAMP section.

Given the EOP principles in relation to the offset requirements of the Project, the selected offset area is considered to supply the values required. Consideration was also given to offset property development planning and any potential conflicting future use of the property to minimise the potential for conflicting land use pressures with the offset area.

Table 3: EPBC Act Environmental Offset Policy Principles

Policy Principle	Project Offsets
Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matters.	The offset area was selected as Koalas have been found on the site.[5] The offset for the Project will acquit over 100% of the project's required direct offsets for Koala habitat. Calculations have been undertaken based on ecological reports that included both flora and fauna surveys undertaken on both the impact and offset areas informing inputs to the Offset Assessment Guide. The Habitat Quality Assessment, Killara Offset Area and the Targeted Fauna Survey Report, Killara Offset Area (Appendix 4) identifies the following ground-verified regrowth REs that provide habitat in the offset site: • AU2 RE11.12.1a - 168 ha • AU7 RE11.5.1a - 11 ha; • AU15 RE11.12.3 - 41 ha. The proposed offset area will be managed to mitigate the risks, to increase the extent and condition of the habitat, and improve the viability of the species within the proposed offset area, as per the offset area management measures (*Table 10*).
Suitable offsets must be built around direct offsets but may include other compensatory measures.	100% of the Project's matters of national environmental significance (**MNES**) offset obligations will be acquitted by the proposed direct land-based offsets (*Table 1*).
Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.	The Koala is listed as vulnerable under the EPBC Act.The status of the impacted threatened species has been accounted for, by using the offset assessment guide to calculate the offset area required.

[5] Figure 3.4, Appendix 5, Habitat Quality Assessment, Killara Offset Area, Final, December 2020; Umwelt Australia Pty Ltd

Policy Principle	Project Offsets
Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter.	The extent of the offset has been calculated using ecological reports that include both flora and fauna surveys, for both the impact and offset areas. The reports have been used to inform inputs into the offset assessment guide. The inputs to the offset assessment guides for each of the protected matters impacted are in *Table 6* and *Table 7*.
Suitable offsets must effectively account for and manage the risks of the offset not succeeding.	The risks associated with the offset have been assessed (Section 7,*Table 8*) and appropriate management and corrective actions proposed in the Offset Area Management Measures (*Table 9)*. *Table 11* sets out the interim habitat quality criteria to be met at each 5-year intervals. Monitoring will ensure management measures are enabling the achievement of the required outcomes, including the habitat quality score increases, and progress will be reported on, as outlined in *Section 11*.
Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs.	Vegetation clearing in regulated vegetation areas as a Native Forest Practice, broadscale clearing in vegetation that is not regulated, and grazing on the offset area are activities that are not currently prohibited by legal mechanisms at either the local, state or Australian government legislative level. The area is zoned rural and has been predominantly cleared and used for timber harvesting and cattle grazing previously. Areas of the offset property have been subject to vegetation clearing[6] since the 1930s. The current regrowth vegetation in the offset area will be secured with a Voluntary Declaration (**VDEC**) that has its head of power under the *Vegetation Management Act 1999* (QLD) (**VMA**), which will prevent clearing and require that the management activities in *Table 9* are implemented. This will ensure the offset site is managed for habitat quality improvement. (Refer to *Section 12*).
Suitable offsets must be efficient, timely, transparent, scientifically robust and reasonable	The proposed offsets will be implemented efficiently and in a timely way, as this Offset Area Management Plan is required to be approved by the Minister prior to commencing the action and be legally secured within 12 months of that approval[7]. Terrestrial ecology reports for the impact and offset areas (Appendix 4) provide data on habitat quality and species presence, using an established and robust biocondition assessment methodology (Queensland's terrestrial habitat quality assessment guide (2017 and 2020) and biocondition assessment manual). The information is scientifically robust, demonstrating the level of impact, as well as the suitability of the offset for the impacted protected matter. Along with an assessment of the offset area using the EPBC Act Offset Assessment Guide, this provides transparency about the offsets' scale and suitability. Refer to *Table 6* and *Table 7* for further application of the Offset Assessment Guide.

[6] *Vegetation Management Act 1999*, Schedule dictionary
[7] Condition 3 and 5; Approval Surat Gas Pipelines, Surat Basin, Queensland (EPBC 2018/8223) dated 28th May 2020

Policy Principle	Project Offsets
Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	Monitoring and reporting, outlined in *Section 11*, will ensure that the offset management plan is being implemented by the landholder. The approval holder will have oversight of the progress of the required outcomes being attained at the offset site and any corrective actions undertaken. The approval holder will undertake annual compliance reporting, as detailed in *Section 11*, as well as any independent audits, if requested. Habitat assessments in the OAMP will be undertaken in accordance with published guidelines outlined in *Section 11*. Monitoring and reporting, detailed in *Section 11,* will assess the Offset Area Management Actions in *Table 9*, taking into consideration the start condition. The offset will be protected from clearing and secured with a VDEC that has its head of power under the VMA (*Section 12*).

2.2 Addressing relevant EPBC plans and advice

The EOP states that an offset should address key priority actions for the impacted MNES in any approved recovery plans, threat abatement plans, conservation advice, ecological character description or approved Commonwealth Management Plan. Approval condition 4h also requires that management measures be consistent with the Approved conservation advice for the Koala. *Table 4* summarises how this plan addresses the relevant Conservation Advice for the Koala, on the offset area. There is no Recovery Plan or relevant Threat Abatement Plan for this species.

Table 4: Conservation Advice addressed in the OAMP

Document	Key threats	Section addressed in documents
Approved Conservation Advice for Phascolarctos cinereus (Koala), Canberra: (DSEWPC, 2012). Threatened Species Scientific Committee (TSSC) (2012). Listing advice for *Phascolarctos cinereus* (Koala). In effect under the EPBC Act from 02-May-2012.	Vegetation clearing for cropping and pasture and grazing. Land clearing was a significant cause of mortality to Koalas, particularly in the Brigalow Belt Bioregion (Cogger et al. 2003). Habitat fragmentation may also impede post-drought recovery of Koala populations.	*Table 10*: Forestry and native vegetation - clearing not allowed. No forestry or timber harvesting activities, or clearing for cropping, pasture or grazing, during the period of the Approval (until 31 December 2080). Forestry and native timber harvesting practices in the offset area would remove large trees that provide shelter and food and may also contain hollows and deadwood from the environment. Such activities are hence considered a potential threat to the quality of the vegetation community and habitat.
	Vehicle strike Cars are one of two threats to Koalas that are closely associated with urban expansion, with exposure to both increasing as land adjacent to Koala habitat is developed and occupied. However, while these threats are most intense in the urban and peri-urban environment, both may also be threats in rural areas (Crowther et al.	*Table 10*: Access will be restricted. The offset area is on a privately owned agricultural property (*Figure 4*) with access to the area restricted to the landholders. Access to the offset area property is restricted by boundary fencing to prohibit access to the

Document	Key threats	Section addressed in documents
	2010; Senate Environment and Communications References Committee 2011).	offset area. Therefore, impacts to resident Koala populations arising from car strikes are unlikely.
	Disease The most well-known disease present in Koala populations until recently is associated with chlamydia (Natural Resource Management Ministerial Council 2009). Many Koalas carry chlamydia, but do not always show clinical symptoms (known as chlamydiosis). There is circumstantial evidence that chlamydiosis might increase in response to environmental stresses such as overcrowding and poor nutrition (Melzer et al. 2000 and references therein), although the epidemiology of chlamydiosis is not well understood. Koala Retrovirus (**KoRV**) was relatively recently identified and is thought to be responsible for a range of conditions, including leukaemia (Tarlinton et al. 2005) and an immunodeficiency syndrome. Up to 100% of Koalas in Queensland and NSW have KoRV. There is some evidence that chlamydiosis may be exacerbated by KoRV (Tarlinton et al. 2005). KoRV has endogenised in Koalas (Tarlinton et al. 2006) in Queensland and New South Wales. That is, it has infected germ line cells (spermatozoa or oocytes) and is transmitted genetically (by inheritance) from parents to offspring. Although this is a known mechanism of transmission, KoRV may also spread from Koala to Koala (horizontal spread) by close contact, and from infected mothers to their joeys via the milk, in a manner similar to the way that many other retroviruses spread (Hanger 1999). Whether KoRV can be transmitted by biting insects has yet to be determined.	There is no known treatment for disease which is prevalent in the populations naturally. The establishment of the offset area which adjoins the Boyne River, as well as buffers and increases in extent and condition of the habitat may act to reduce some of the environmental stresses that are thought to accentuate the diseases.

Document	Key threats	Section addressed in documents
	Predation by dogs Dogs are one of two threats to Koalas that are closely associated with urban expansion, with exposure to both increasing as land adjacent to Koala habitat is developed and occupied. However, while these threats are most intense in the urban and peri-urban environment, both may also be threats in rural areas (Crowther et al. 2010; Senate Environment and Communications References Committee 2011).	*Table 10*: Feral animals – monitoring and control as detailed. Existing populations of feral animals (feral cats, dogs and pigs) will be controlled within the offset areas in accordance with the *Biosecurity Act 2014* (Qld). Monthly inspections to record the presence of wallow holes, tracks and visual incidents, e.g. any injury to or predation of koalas, in the offset area will be undertaken. On being notified or becoming aware of the presence of large numbers, for example, approximately 10 feral animals or multiple tracks in the offset area at any one time, or any predation of koalas, the Landholder is to implement feral animal control measures within one month.

3. Impact site biodiversity values description

3.1 Description of the project site

The Pipelines Project is located in the Surat Basin, Queensland, approximately 230 km west of Brisbane. The northern most pipeline right-of-way is approximately 10 km west of Miles; the central pipelines are approximately 25 km west of Kogan; and the southern pipelines are approximately 50 km west of Dalby (*Figure 2*).

The Pipelines Project area is rural in nature, comprising some cultivated land including intensive farming, and low intensity grazing in the west as land suitability and rainfall declines. There are five State Forests (Condamine, Braemar, Dalby, Daandine and Kumbarilla) in the wider project area (not traversed by the proposed pipelines), which are used for timber harvesting (predominately Cypress Pine) and they are leased for cattle grazing.

The impact area was assessed by suitably qualified ecologists from 3D Environmental and EcoSmart Ecology (2018, 2019).

There are five dominant terrestrial habitats in the wider project area:

- Previously cleared or highly modified areas;
- Alluvial creek flats that contain narrow riparian strips containing mixed eucalypts (mainly *Eucalyptus tereticornis*, *E*. *populnea* and *E*. *camaldulensis*);
- Clay plains with cracking soils that contain Brigalow (*Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest);
- Narrow strips of mixed eucalypts on undulating plains (mainly *Eucalyptus populnea* and *E*. *crebra*); and
- Large stands of mixed eucalypts, cypress pines and wattles on ironstone jump-ups within State Forests.

There are two main waterways that will be traversed by the project infrastructure (Wilkie and Wambo Creeks) and numerous smaller drainage channels that feed into these creeks. The only waterbodies in the project area are man-made dams that have been constructed as part of QCLNG's coal seam gas development.

3.2 Koala habitat in the impact area

As identified by 3D Environmental and EcoSmart Ecology report (2013, 2017, 2018 and 2019), the impact area supports vegetation identified for Koala habitat. There is core habitat known and possible for Koala as defined specifically below (see also Appendix 4 and 3D Environmental and Ecosmart Ecology, 2019).

REs 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.25, 11.3.26, 11.3.27, 11.4.3, 11.5.1, 11.5.4, 11.5.20, 11.7.4, 11.7.6, 11.7.7, 11.9.2, 11.9.7, 11.9.10 are mapped as Core Habitat Possible. Regrowth and disturbed vegetation should be mapped as per their parent RE. All Core Habitat Possible within 1 km of a recent (1980+), accurate (± 500m) record is classed as "Core Habitat Known".

These mapping rules have been used for the SGP-PPLs assessments, which set out which regional ecosystems are considered core habitat for the species (3D Environmental and Ecomart (2019) report. The ground-verified remnant and regrowth vegetation that make upcore habitat for Koala which was mapped during ecology surveys of the Project area is shown on *Figure 3a*. The Koala core habitat known and possible within the pipeline assessment area is shown in *Figure 3b*. These Figures (*3a* and *3b*) include the full extent of the development footprint of 302 ha[8] for the pipelines; of which approximately 250.5 ha (or 83 %) of that area will avoid direct project impacts to vegetation and habitat. The area (65 ha) of Koala habitat impacted by the project is separated into component regional ecosystems as described in *Table 5*.

Table 5: Impact area - Koala Habitat

AU	BVG	Regional Ecosystem	Impact Total (ha)	Impact percentage
1	25a	11.3.1	1	1.5
2	17a	11.3.2*	0	0.0
3	18a	11.3.14	0	0.0
4	17a	11.3.18*	2	3.1
5	16a	11.3.25*	2	3.1
6	34d	11.3.27i*	1	1.5
7	25a	11.4.3	1	1.5
8	25a	11.4.3 - regrowth	4	6.2
9	18b	11.5.1*	13	20.0
10	18b	11.5.1 - regrowth	5	7.7
11	18b	11.5.1a	4	6.2
12	18b	11.5.1a - regrowth	1	1.5
13	18b	11.5.4*	5	7.7
14	18b	11.5.4 - regrowth	1	1.5
15	13d	11.5.20	10	15.4
16	13d	11.5.20 - regrowth	0	0.0
17	12a	11.7.4	5	7.7
18	12a	11.7.4 - regrowth	2	3.1
19	10a	11.7.6	2	3.1

[8] Referral document - Submission #3359 - Surat Gas Project Off-tenure Pipelines

AU	BVG	Regional Ecosystem	Impact Total (ha)	Impact percentage
20	12a	11.7.7	5	7.7
21	12a	11.7.7 - regrowth	1	1.5
		TOTAL	65	100%

*Regional Ecosystems identified as providing the best quality Koala habitat based on the presence of Koala feed trees

Figure 3a Ground-validated remnant and regrowth vegetation within the PPL impact area

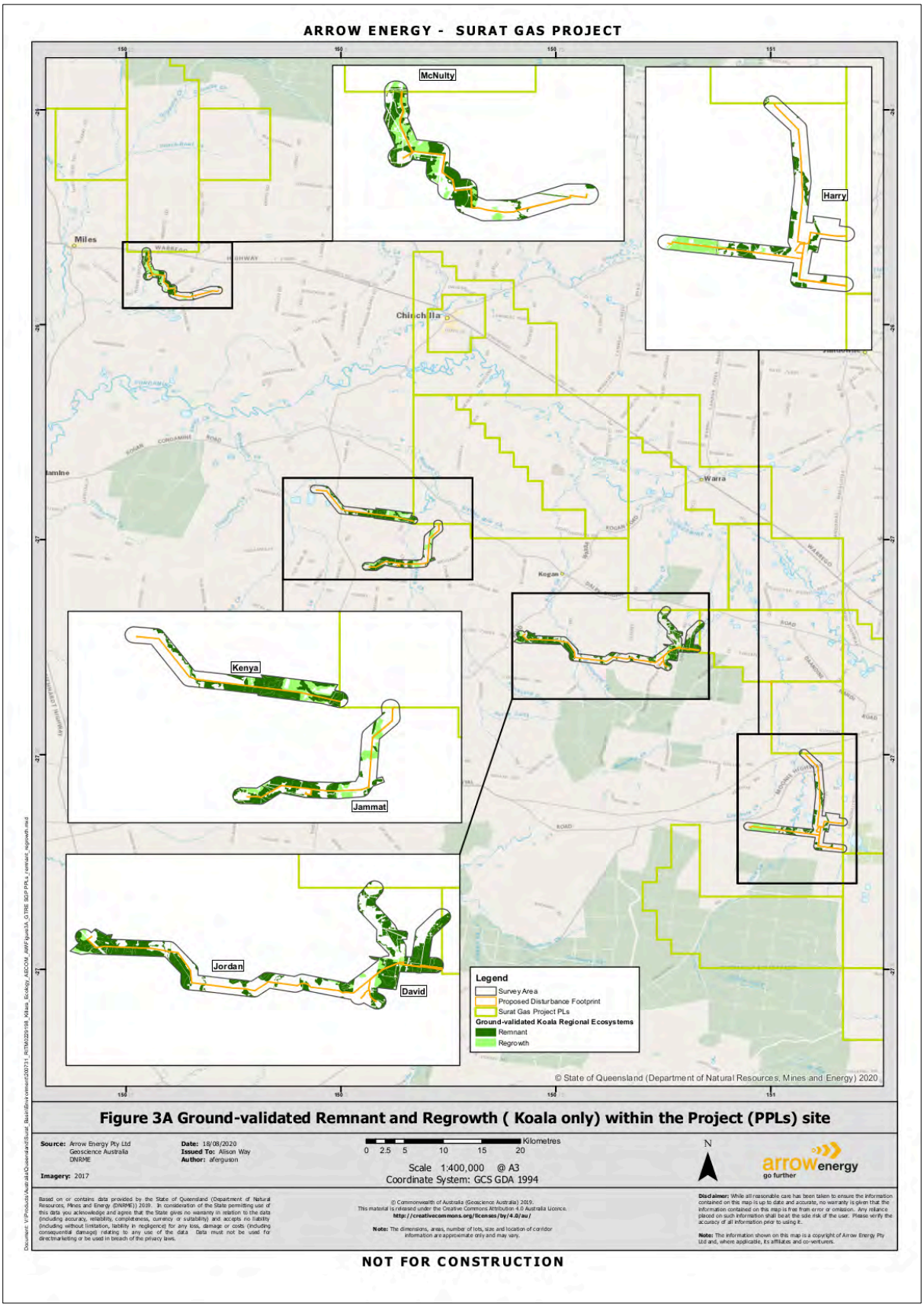
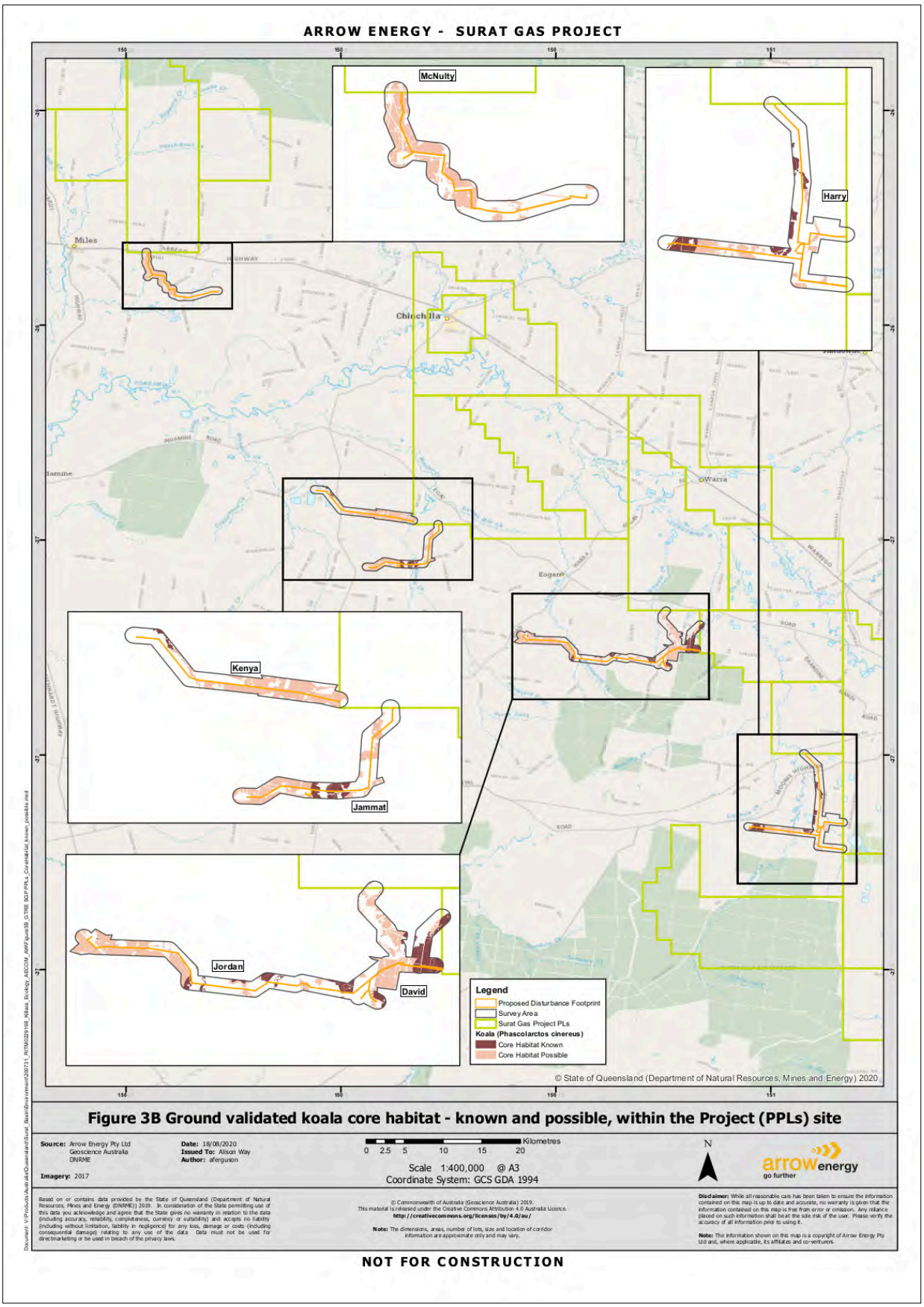


Figure 3b Ground-validated Koala core habitat known and possible habitat



Part B : Offset Land Management Plan

4. Offset property overview

The offset area for the Pipelines Project is proposed to be located on Killara (Lot 16 BO94), a property of 464ha, located approximately 94km north-east of the centre of the Project impact area (*Figure 4a*), within the Brigalow Belt bioregion. The property was selected to:

- deliver the offset because of the proximity to the impact site
- the property management objectives aligning with the offset management objectives
- suitable values present on the property, including koala records
- potential to provide future offsets on the same property for other Arrow projects.

For regional context, the property on which the offset area is proposed to be located (orange outline, *Figure 4a*), adjoins the Boyne River to the west, which is a recognised biodiversity corridor of state significance (*Figure 4b*). A regional corridor of biodiversity significance bounds the property to the east (*Figure 6*).

Additional offset areas are planned on the property, to offset other Arrow projects. Locating offsets on this property provides an opportunity to enhance and extend patches of remnant vegetation and improve connectivity in the local and regional landscape.

The property has been utilised for timber harvesting and cattle grazing since the 1930s, which has continued to the current time. The regrowth vegetation present is a growing timber resource for the current owners and as a result, displays a lack of large trees and hollows that would be present in a mature version of these regional ecosystems. The lack of these features is due to the timber harvesting that was undertaken previously (and documented to have been undertaken to 2011), to preclude the vegetation being classified as remnant status.

The offset area comprises *Eucalyptus crebra*, *E. populnea*, *E. moluccana*, *E. tereticornis*, *Corymbia citriodora* and *Acacia harpophylla* vegetation communities in both degraded remnant and regrowth condition. The regional ecosystems on the entire offset property are shown in *Figure 5*.

The farm dam contained within the offset area (visible in *Figure 5*) provides additional drinking sources for Koala in times of drought.

A detailed description of the Offset Area for this OAMP is in Section 6.2.

Figure 4a Location of Surat PPLs and 'Killara'Offset area

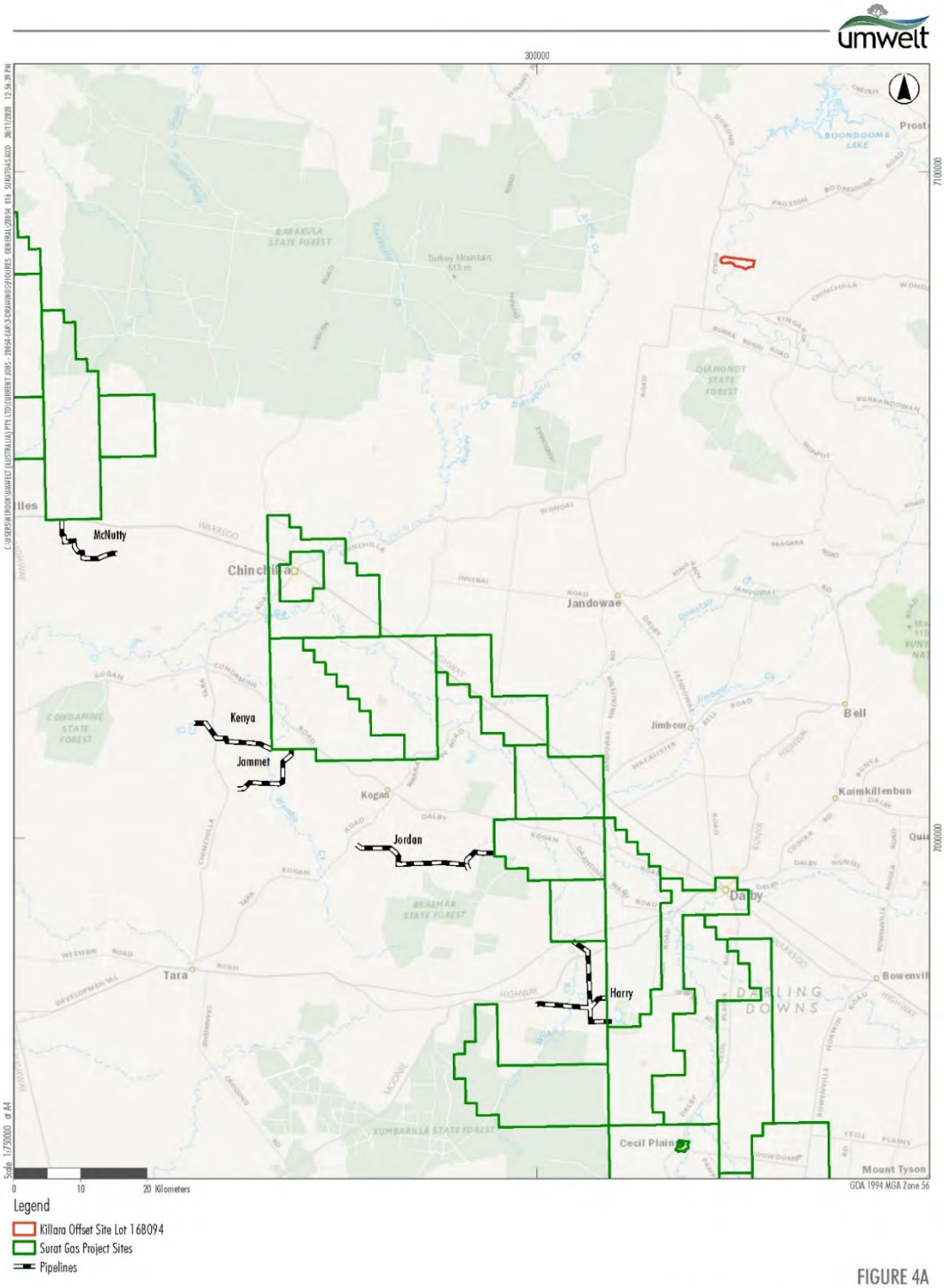
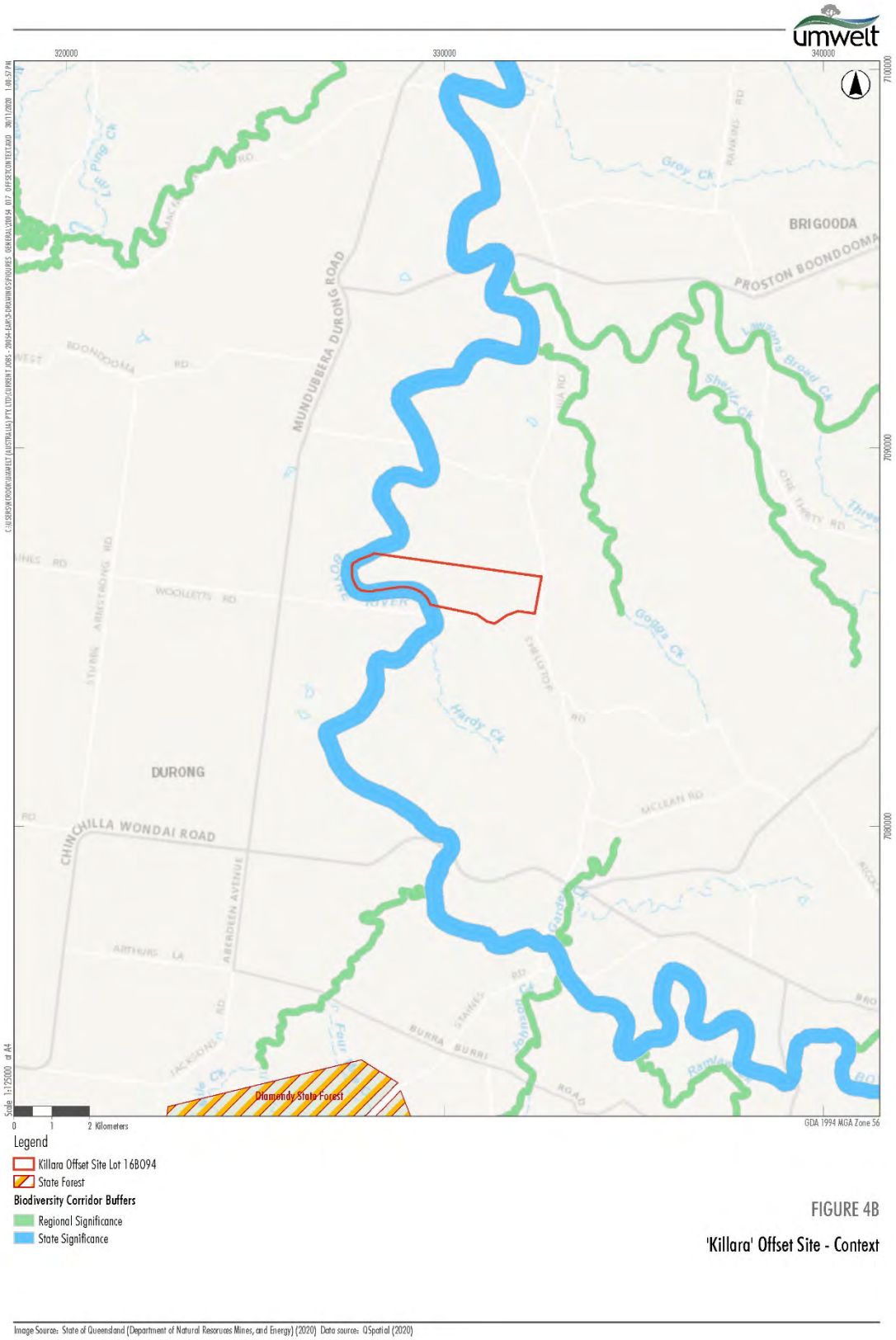


FIGURE 4A

Location of Surat Gas Project PLs (Impact Site) and 'Killara' Offset Site

Image Source: State of Queensland (Department of Natural Resources Mines, and Energy) (2020) Data source: QSpatial (2020)

Figure 4b Killara Offset area – Regional Context



5. Offset area description

5.1 Vegetation and connectivity values

The proposed offset area, on Lot 16 BO94, was selected for its potential to provide an offset for the impacted koala habitat. It meets the principles of the offset policy by:

- Once protected, increasing the current available habitat,
- Contributing to improving landscape connectivity
- Improving habitat quality to enable more frequent use by koalas

The offset area is currently composed of degraded tracts of regrowth adjoining the Boyne River.

The area selected for the offset area supports regrowth *Eucalyptus crebra* +/- *Corymbia erythrophloia* shrubby woodland, *E. melanophloia* (RE 11.12.1), *Eucalyptus crebra* and/or *E. populnea, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii* woodland (RE11.5.1), and *Eucalyptus crebra, E. tereticornis +/- Angophora leiocarpa* and *E. melanophloia* woodland, with other tree species that may be present including *Corymbia clarksoniana, C. tessellaris, C. erythrophloia, C. citriodora* and *E. exserta* (RE 11.12.3). These communities are illustrated in *Figure 5,* which provides an overview of the offset property.

Landcape connectivity is essential to maintain functional links between habitat patches and permit dispersal of organisms and thus maintain healthy, viable populations (D'Eon et al. 2002). The offset area adjoins Boyne River, part of a state bioregional corridor (*Figure 6*). Allowing the regeneration of the regrowth will improve connectivity to the riparian vegetation along the Boyne River and provide additional habitat for the Koalas that utilise the property. Although the proposed offset area does not extend to the regional corridor on the eastern side, vegetation across the property is well connected to a network of corridors of state and regional value. Furthermore, the proposed offset area contains habitat values that will have the additional benefit to other EPBC threatened species, such as improving the local greater glider habitat (*Petauroides volans*) (vulnerable) (known occurrence[9]).The ground-verified regional ecosystems on the offset property are illustrated in *Figure 5*.

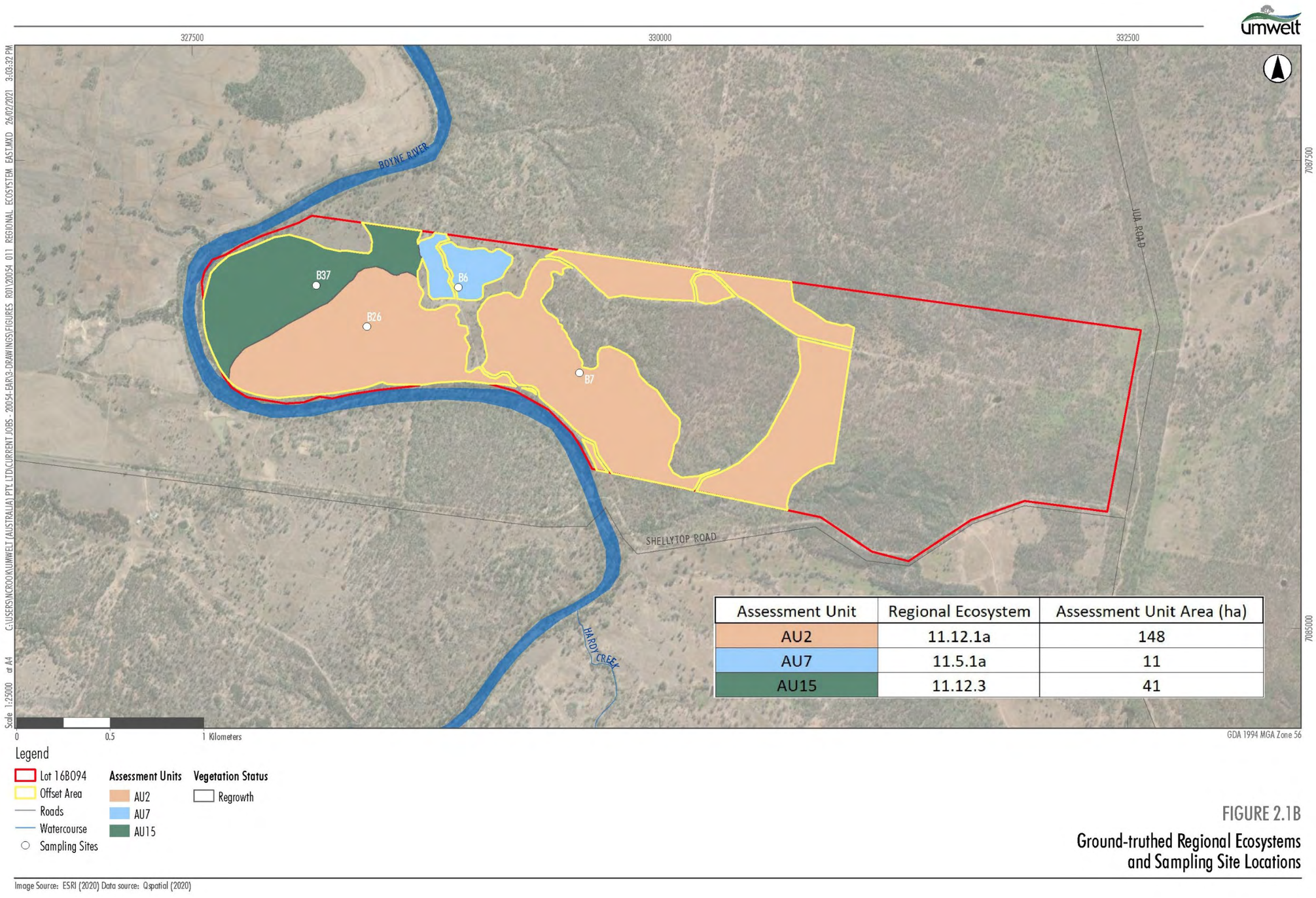
The eucalypt dominated areas have been selected for the offset area as they are preferred habitat for the Koala, which is present on the property [9]. The State Biodiversity corridors (DES, 2018) are illustrated in *Figure* 6 showing connectivity corridors adjoining the offset area to the west and to patches of remnant vegetation with regional value (*Figure 6*).

The offset site will be a benefit to Koala, as regeneration activities will enhance connectivity across the fragmented landscape. Utilising these regrowth communities as an offset will add significant value to local area by extending the area of the available Koala habitat. By implementing the offset area, patches of habitat from the Boyne River biodiversity corridor to the remnant vegetation east of the offset site will become a continuous patch of habitat for the Koala.

A detailed map of the proposed Koala offset area is provided in *Figure 7* and the offset area has been determined utilising agreed outputs from the DAWE Offsets Assessment Guide (OAG). Koala have been recorded throughout the regional area, as illustrated in *Figure 8*. Records for koala sightings in the offset area are shown in *Figure 9*.

[9] Section 3.2.1; Targeted Fauna Survey Report, Killara Offset Area, July 2020, Umwelt.

Figure 5 – Ground-validated Regional Ecosystems – Offset area



Assessment Unit	Regional Ecosystem	Assessment Unit Area (ha)
AU2	11.12.1a	148
AU7	11.5.1a	11
AU15	11.12.3	41

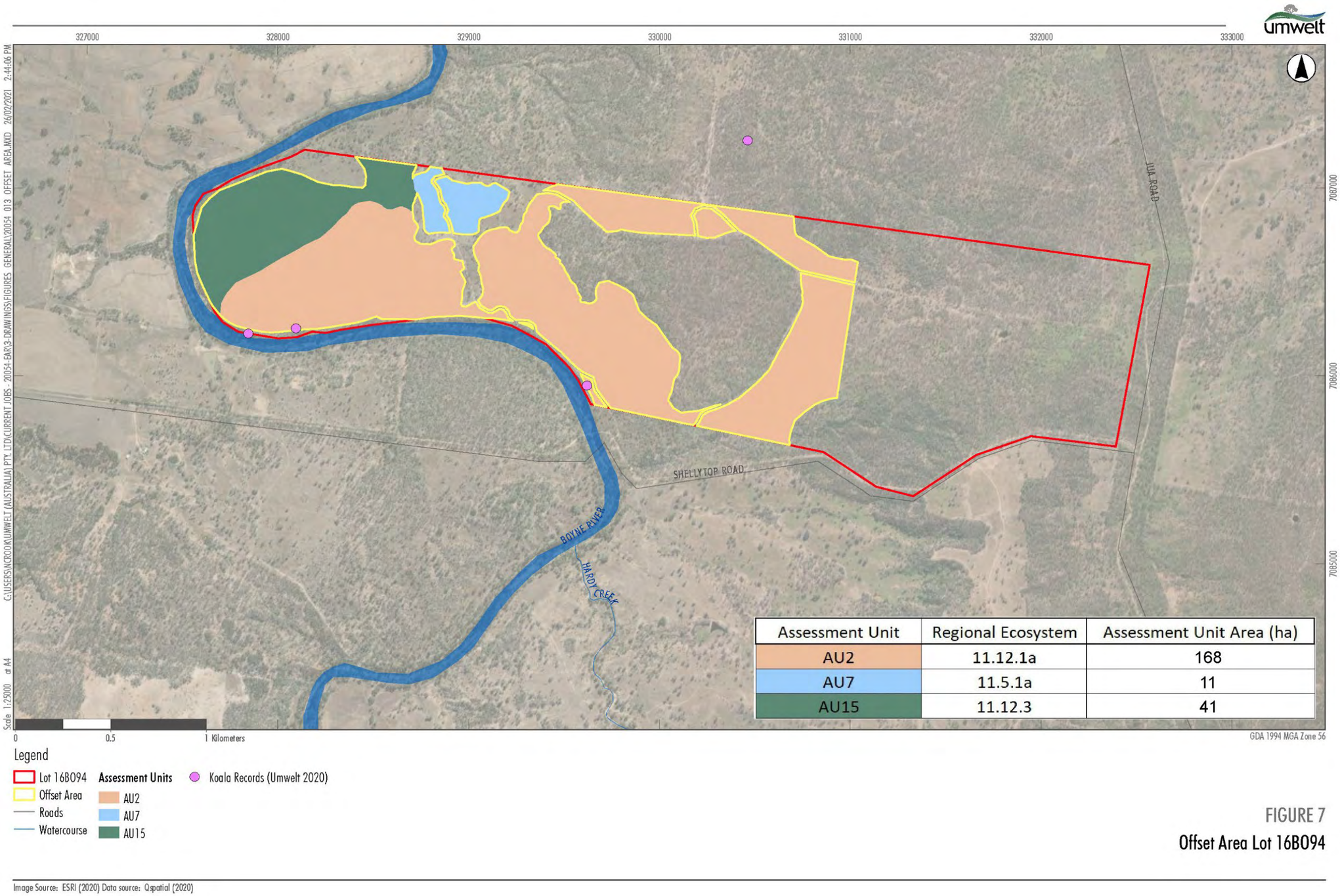
FIGURE 2.1B
Ground-truthed Regional Ecosystems and Sampling Site Locations

Image Source: ESRI (2020) Data source: Qspatial (2020)

Figure 6 State Biodiversity Corridors in relation to the Offset Area [10]

[10] DES (2018).

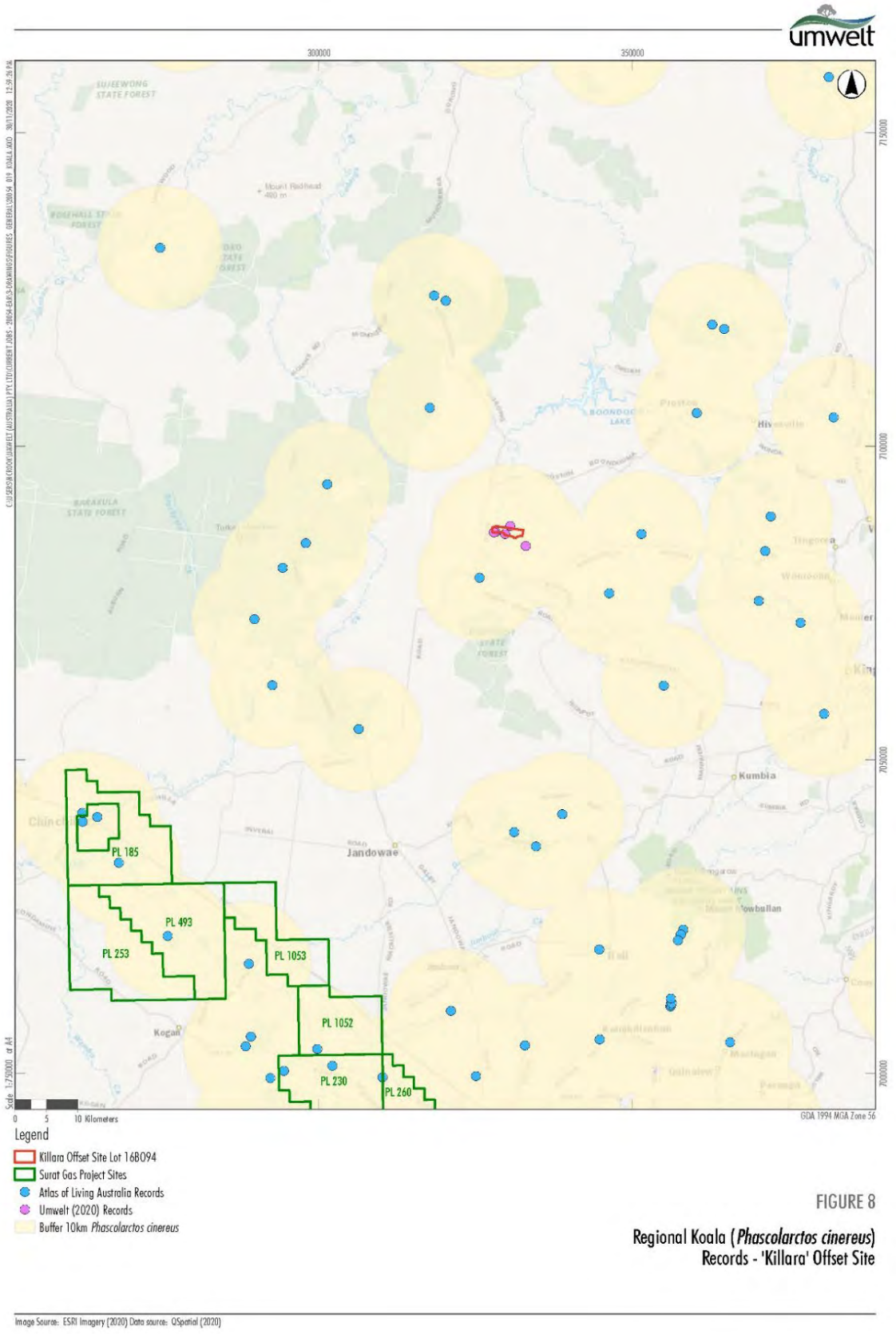
Figure 7 Offset Area (REs) for Koala for the SGP PPLs- Koala Offset



Assessment Unit	Regional Ecosystem	Assessment Unit Area (ha)
AU2	11.12.1a	168
AU7	11.5.1a	11
AU15	11.12.3	41

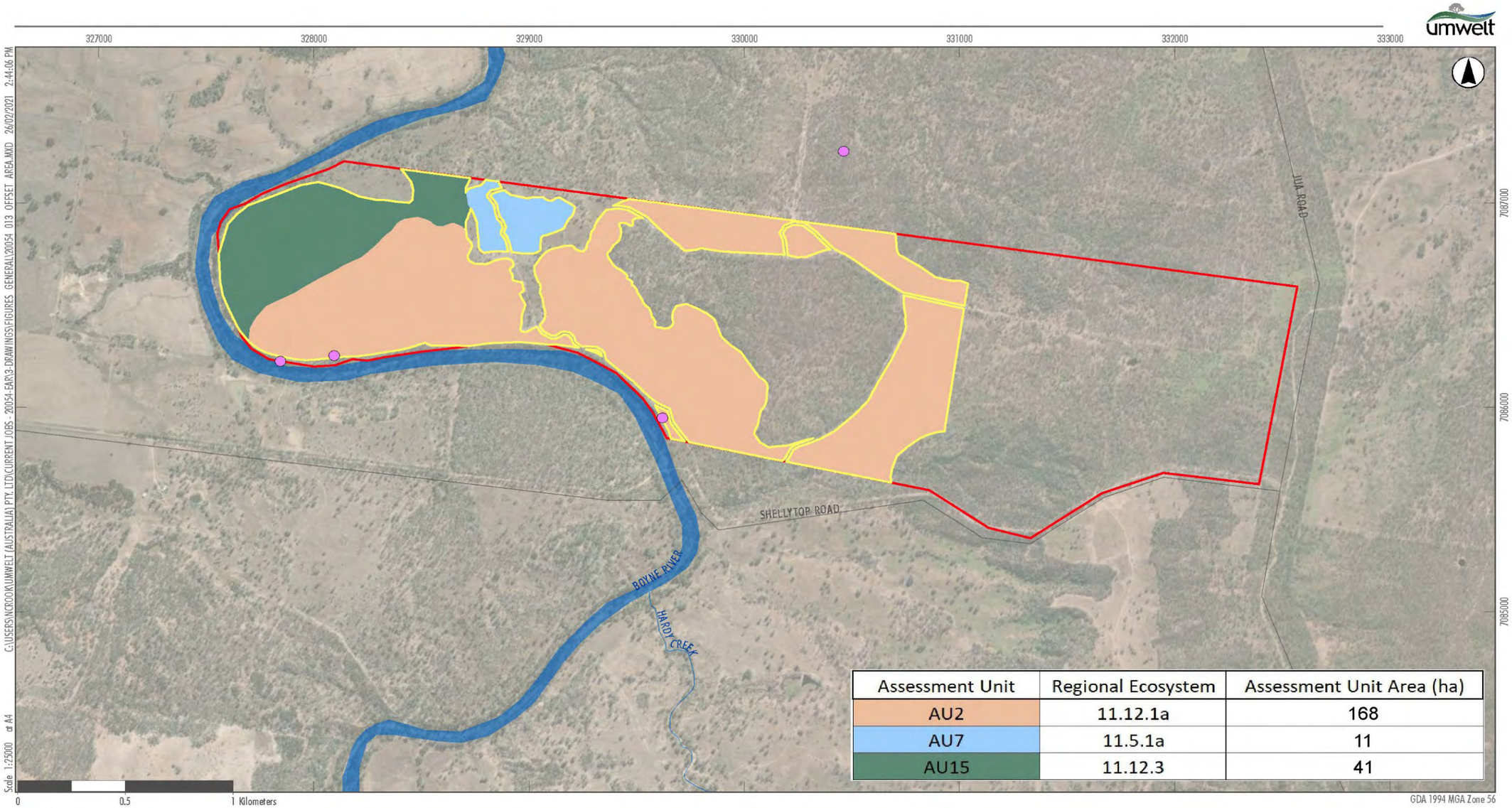
FIGURE 7
Offset Area Lot 16B094

Figure 8 Regional Koala records[11]



[11] Figure 3.3, Appendix 5, Habitat Quality Assessment, Killara Offset Area, Umwelt August 2020

Figure 9 Koala records in relation to the Offset Area



Assessment Unit	Regional Ecosystem	Assessment Unit Area (ha)
AU2	11.12.1a	168
AU7	11.5.1a	11
AU15	11.12.3	41

FIGURE 7
Offset Area Lot 16B094

Image Source: ESRI (2020) Data source: Qspatial (2020)

6. Estimating offset area required to offset impact to Koala habitat

6.1 Koala habitat requirements

The Koala is a tree-dwelling, medium-sized marsupial with a stocky body, large rounded ears, sharp claws and variable but predominantly grey-coloured fur (DAWE, 2020).

Koala populations occur in moist forests along the coast, sub-humid woodlands in southern and central Queensland, and in some eucalypt woodlands along watercourses in the semi-arid environments of the western part of the state (Melzer et al. 2000). Koalas have also been found to occur in non-riverine communities in semi-arid areas (Sullivan et al. 2004).

The greatest density of Koalas in the state occurs in south-east Queensland, and lower densities occur through central and eastern areas. For example, population densities range from moderately high in south-east Queensland and some parts of central Queensland (e.g. 1-3 Koalas per hectare) to low in other parts of central Queensland (0.01 Koalas per hectare) (Melzer *et al*. 2000 and references therein).

6.2 Koala – offset area attributes

To demonstrate the suitability of the offset area, the ecological values of the offset area have been compared to the definition of Koala habitat applied in the EPBC Act conditions of approval[12], which states:

> *'Koala (combined populations of Qld, NSW and the ACT) habitat means any forest or woodland (including remnant, regrowth and modified vegetation communities) containing species that are Koala food trees or any shrubland with emergent Koala food trees.'*

At the offset area, parts of the assessment units (**AU**s) AU2 (regrowth vegetation RE 11.12.1a), AU7 (regrowth RE 11.5.1a) and AU15 (regrowth RE 11.12.3) recieved moderate BioCondition scores due to the lack of large trees and canopy cover, although tree canopy height and canopy species recruitment was close to the benchmark for each community. The low scores can be attributed to the lack of the presence of large trees, which was a key restricting attribute for regrowth communities. BioCondition assessments further confirmed that shrub layer canopy cover was low, as was the incidence of fallen woody debris, reflecting the impact from previous timber harvesting, grazing and hot fires. Wildfire has occurred on the offset site, although its frequency/records have not been documented.

Koala habitat across the offset area consists of a variety of Eucalypt species and other known food trees.

- AU2 – RE11.12.1a (168ha) *Eucalyptus crebra* +/- *Corymbia erythrophloia* shrubby woodland. *E. melanophloia, Eucalyptus moluccana* and/or *E. microcarpa* and/or *E. woollsiana* +/- *E. crebra* woodland,
- AU7 – RE11.5.1a (11ha) *Eucalyptus crebra* and/or *E. populnea*, *Callitris glaucophylla*, *Angophora leiocarpa*, *Allocasuarina luehmannii* woodland *Corymbia citriodora* or *Eucalyptus crebra* woodlands,

[12] Approval Surat Gas Project Pipelines, Surat Basin, Queensland (EPBC 2018/8223) dated 28 May 2020

- AU15 - RE11.12.3 (41ha), *Eucalyptus crebra, E. tereticornis +/- Angophora leiocarpa and E. melanophloia* woodland.

6.3 Offset area start values

The results of the habitat quality assessments of the three different vegetation community assessment units that occur within the offset area are summarised in *Table 6.* The field data sheets are provided within the ecology report (see *Appendix 4 Attachment 1.2*).

A detailed map of the Koala offset area for this management plan is in *Figure 7,* and the known regional Koala records[13i] are in *Figure 8*. The offset area has been determined utilising outputs from the DAWE OAG (*Table 6)*.

Table 6: Koala offset area habitat quality assessment results

Assessment Unit	Regional ecosystem	Assessment Sites	Vegetation Condition score	Habitat quality score (AUs)	Habitat quality score (sampling sites)	Area (ha)	Regulated vegetation?	Contribution to offset area as a % of the final area (ha)
2	11.12.1a	B26, B7	51.5, 42	6.7; 5.9	5.8; 5.3	168	No	74%
7	11.5.1a	B6	46.5	5.3	5	11	No	5.5%
15	11.12.3	B37	36.5	4	5.2	41	No	20.5%
			Total	**6***	**5#**	**220**		**100.00**

*average across assessment units (AUs)
#average across sampling sites within offset area

The inputs used in the Offset Assessment Guide for regrowth vegetation, to calculate the area required for the offset area, are outlined in *Table 7*.

Table 7: Offset Assessment Guide inputs – regrowth vegetation

Attribute	Koala
EPBC status	Vulnerable
Impact area	65.0 ha
Impact quality	6
Time until ecological benefit	20 years
Start area (hectares)	220.0 ha
Start quality (scale of 0-10)	5
Future quality without offset (scale of 0-10)	4

[13] Section 2.1.1, Appendix 5, Habitat Quality Assessment, Killara Offset Area, Umwelt August 2020

Attribute	Koala
Future quality with offset (scale of 0-10)	6
Risk of Loss without offset	5%
Confidence in ROL Result	100%
Confidence in Condition Result	85%
% of impact offset	102.17%

7. Risk Analysis

The following risks to achieving the management objectives and outcomes (*Table 8*) have been considered for the plan:

- the risk of, and remedial actions that might result from, failure to achieve the offset completion criteria
- any real or potential risks associated with achieving the outcomes;
- the actions taken to minimise those risks; and
- remedial action that will be undertaken if any of the risks occur.

The risk matrix (below) has been used to assess the risk that the plan's objectives will not be met and identify sources of those risks and strategies for managing them.

RISK MATRIX	
Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management activities are implemented)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	
Minor	Minor incident of environmental damage that can be reversed (*e.g. short-term delays to achieving plan objectives, implementing low-cost, well-characterised corrective actions*)
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts (*e.g. short term delays to achieving plan objectives, implementing well-characterised, high-cost/effort corrective actions*)
High	Substantial instances of environmental damage that could be reversed with intensive efforts (*e.g. medium-long term delays to achieving objectives, implementing uncertain, high-cost/effort corrective actions*)
Major	Major loss of environmental amenity and real danger of continuing (*e.g. plan objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies*)
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage (*e.g. plan objectives are unable to be achieved, with no evidenced mitigation strategies*)

		Consequence				
Likelihood		Minor	Moderate	High	Major	Critical
	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Table 8: Risk analysis

Number	Risk event or description	Relevant Management Actions to Minimise Risk	Residual Risk			Trigger detection and monitoring events/activities	Remedial Actions if Risk Occurs
			L	C	RL		
1	Failure to achieve and maintain offset completion criteria	Implement the management actions of this OAMP. Monitor and report on attainment of interim environmental performance targets (*Section 11*)	**Possible**	**High**	**Medium**	Monitoring and reporting program undertaken, which includes annual reporting, vegetation and fauna assessments (Table 12)	Review and enhance active management interventions, including an option of additional plantings to improve habitat quality if not meeting interim and/or completion criteria for two consecutive ecological surveys and to consist of species, stocking rate and density to assist in achieving the regional ecosystem benchmark. Extend timeframe required to meet habitat quality completion criteria. Arrow may, at its discretion,review and vary the OAMP if, in consultation with the landholder and a Seniour ecologist with at least 5 years local knowledge and experience to enable contemporary management measures to ensure that the offset achieves completion criteria. Source additional offset, if required.

Number	Risk event or description	Relevant Management Actions to Minimise Risk	Residual Risk			Trigger detection and monitoring events/activities	Remedial Actions if Risk Occurs
			L	C	RL		
2	Alternative Land Use is undertaken on the offset sites	VDEC under the VMA used to legally secure the offset area as a Category A under the VMA. This will prevent clearing and timber harvesting.	Unlikely	Moderate	Low	Annual reporting to regulators.	If an alternative landuse is approved by the Queensland Government, and the VDEC is revoked, an alternative offset is required.
3	Koala is not detected on the offset area during surveys	Implement this OAMP to improve habitat quality for Koala. Undertake regular surveys for Koala on the offset area and in immediately adjacent properties with connecting habitat	Unlikely	High	Medium	Implement Fauna monitoring program (Table 12)	If Koala is not detected on the offset area, or fails to be detected in subsequent years during offset implementation or in immediately adjacent properties with connecting habitat, fauna monitoring program may require modifying methods and frequency. Implement enhanced active management measures to improve habitat quality for Koala.

Number	Risk event or description	Relevant Management Actions to Minimise Risk	Residual Risk			Trigger detection and monitoring events/activities	Remedial Actions if Risk Occurs
			L	C	RL		
4	Feral animals, e.g. dogs, pigs, cats, kill or injure Koalas, and/or increase habitat degradation	Feral animal control, particularly dogs, will be undertaken to reduce the risk of predation and/or injury to Koalas. Control of pigs will be undertaken to reduce the risk of habitat degradation. Other feral animal control will be undertaken, as needed, e.g. foxes, cats, rabbits, to improve habitat quality more broadly and ensure recruitment of Koala food trees Surveys of Koalas to note if any injured or dead Koalas are found	**Possible**	**High**	**Medium**	Monitoring quarterly and reported annually until the offset completion criteria are achieved **(Table 12)** Targeted surveys for Koalas every 5 years, reporting on any Koala injuries/deaths	Intensification of dog, or other feral animal control, to be undertaken to reduce numbers Biocondition assessments to record habitat quality improvements following intensification

Number	Risk event or description	Relevant Management Actions to Minimise Risk	Residual Risk			Trigger detection and monitoring events/activities	Remedial Actions if Risk Occurs
			L	C	RL		
5	Weed spread increases habitat degradation and prevents habitat quality improvements	Weed control will be undertaken as part of management actions, especially for pest plants that cause habitat degradation and impacts on habitat quality improvements, i.e. interim and final completion criteria.	**Possible**	**Moderate**	**Medium**	Monitoring quarterly and reported annually until the offset completion criteria are achieved **(Table 12)**	Intensification of weed control to reduce spread, targeted to the best time of year for maximum effect Biocondition assessments to record habitat quality improvements following intensification, including mobility for Koalas and recruitment of Koala food trees

Number	Risk event or description	Relevant Management Actions to Minimise Risk	Residual Risk			Trigger detection and monitoring events/activities	Remedial Actions if Risk Occurs
			L	C	RL		
6	High intensity fires/ *Force majeure* events passing through from the undermanaged State Forests have the potential to significantly reduce habitat quality.	Fire to be excluded wherever possible from the offset area. Any low intensity fires immediately after the wet season at a >7-year interval if advised by a Principal Ecologist with >15 years' experience in Qld. Maintaining firebreaks at appropriate widths to enable fires in adjoining areas to be prevented from entering on the offset area. Manage fuel loads through controlled grazing during the dry season. Fire control lines to be checked quarterly for condition and adequacy, and maintenance work is to be undertaken each 2 years at a minimum	**Possible**	**High**	**Medium**	Any uncontrolled fire. Fire damage to the offset area. All field monitoring (rapid and detailed) will report on any evidence of fire observed.	Destock the offset area, re-establish fire breaks and control lines and if appropriate, widen fire control lines and reassess fuel load reduction practices. Enhanced management measures, e.g. additional plantings of appropriate Koala food trees and supplementary vegetation, to consist of species, stocking rate and density to assist in achieving the regional ecosystem benchmark. to assist offset area recovery and boost food resources and shelter for Koalas in the wake of a serious fire.

Number	Risk event or description	Relevant Management Actions to Minimise Risk	Residual Risk			Trigger detection and monitoring events/activities	Remedial Actions if Risk Occurs
			L	C	RL		
7	Unauthorised land clearing. Standard forestry and native timber harvesting practices, as well as agricultural clearing, remove large trees that are food trees and shelter for Koalas from the environment and are hence considered a potential threat to the quality of the vegetation community and habitat.	Forestry and native timber harvesting, and agricultural clearing of native trees and vegetation will not occur within the offset area. Clearing is **excluded** from the offset area under the VDEC	**Unlikely**	**Moderate**	**Low**	Landholder Monitoring quarterly and reported annually until the offset completion criteria are achieved (Table 12)	Reassess access protocols for any lessees etc. and general access.

Number	Risk event or description	Relevant Management Actions to Minimise Risk	Residual Risk			Trigger detection and monitoring events/activities	Remedial Actions if Risk Occurs
			L	C	RL		
8	Grazing High density grazing destroys shrubs and native grass cover and slows the regeneration of habitat. The natural condition of the native ground cover is a moderate cover and hence any grazing undertaken is to be enable the retention of a minimum of 30% grass cover at the end of the dry season.	Low density grazing of domestic livestock will occur in the offset area only during the dry season for fuel reduction purposes with a minimum groundcover to be present at the end of the dry season of 30%. Groundcover (%) to be assessed at least once at all biocondition assessment sites during late season grazing period. Stock rotation, as required, to ensure areas within the offset are not overgrazed or otherwise damaged, e.g. watering points.	**Unlikely**	**Moderate**	**Low**	Monitoring quarterly and reported annually until the offset completion criteria are achieved **(**Table 12)	Any entry points due to fencing breaks etc. to be repaired to a stock proof condition as soon as possible and within 10 days. Re-assess duration of stock rotation in areas where damage is occurring and/or grass cover is reduced below 30%. Remove stock from areas where late season grass cover is below 30%.

Number	Risk event or description	Relevant Management Actions to Minimise Risk	Residual Risk			Trigger detection and monitoring events/activities	Remedial Actions if Risk Occurs
			L	C	RL		
9	Erosion to reduce habitat value of offset site	Maintain grass cover at levels specified in (8) above at the end of the dry season. This will ensure groundcover is high due to the presence of fallen woody debris, organic matter etc. thus minimising the risk of sheet erosion. Ensure rotation of stock when grazing in offset area, so that areas are not too heavily impacted.	Unlikely	Minor	Low	Monitoring quarterly and reported annually until the offset completion criteria are achieved (Table 12)	Further reduction of grazing levels and inspections at least four times per year to identify the cause of any point source erosion (such as illegal vehicle access), and rectifying accessibility as required.

Number	Risk event or description	Relevant Management Actions to Minimise Risk	Residual Risk			Trigger detection and monitoring events/activities	Remedial Actions if Risk Occurs
			L	C	RL		
10	Drought The risk posed by drought would also increase the likelihood of fire due to the dry conditions and accumulated fuel loads. Drought impacts the nutritional value of Koala food trees and also means Koalas will receive less moisture from the leaves. Tree deaths also mean less shelter for Koalas.	Maintain fire control lines and manage grazing levels according to the amount of grass cover. Biocondition assessments to assess habitat quality and determine any decline owing to drought conditions.	**Likely**	**High**	**High**	Monitoring program (annual) and at the end of the dry season (Table 12).	Allow offset area to recover post drought/fire, particularly through the control of weeds and removal of stock. Maintaining grass cover at levels specified in (6) above at the end of the dry season. Enhanced management measures, e.g. additional watering points for Koalas to ensure they can find water close to food sources, and additional plantings where habitat quality declines are detected through biocondition assessments for two consecutive ecological surveys, particularly of Koala food trees. These will assist to reach/maintain completion criteria and enable Koalas to persist on the offset site.

8. Offset Management measures

The Offset Area Management Measures have been prepared (*Table 9*) in accordance with the specific requirements for the Offset Area Management Plan in the EPBC Act approval conditions.

The offset area management measures include, but are not limited to, management actions required to be undertaken on the offset site to mitigate those risks identified to the Koala. The offset area measures to manage, report, and monitor will be undertaken for the period of EPBC Act approval.

The offset area will be protected by securing the offset area as Category A vegetation under the Vegetation Management Act 1999. The offset area is secured by the landholder entering a Voluntary Declaration as an Area of High Nature Conservation Value under the VMA (by a change in vegetation class protection). The Voluntary Decelaration process also lodges the Offset Area Management Plan onto the Title of the property and the implementation of the Offset Area Management Plan is therefore enforceable under the VMA.

The management actions within the OAMP specify what will and will not be permitted on the offset site, and include:

- Limiting vegetation clearing to only those areas required for maintaining fencing and fire control lines;
- Prohibiting alternative land use and activities during the period of offset management (e.g. timber harvesting, cropping, vegetation thinning, and any alternative land use that would result in loss of the offset, etc), i.e. for the duration of the approval;
- Restricting unauthorised access;
- Excluding domestic livestock from the offset area except for the infrequent low-density grazing associated with fuel reduction in dry periods;
- Controlling feral animals;
- Managing fire; and
- Controlling weeds.

The management schedule describes the actions to be undertaken on the offset site (see *Table 9*).

Regular Offset Area Reports will be prepared by the approval holder as listed in *Table 13* (see *Section 11*). They will report against each management action in *Table 9*. These management actions will enable the offset site to improve the attributes identified in *Appendix 4*, thus attaining and maintaining the prescribed completion criteria (*Section 10*). The reports will provide transparency regarding how the site management actions are being implemented, and where relevant, identify any force majeure events impacting the offset site, and trigger levels reached, corrective actions implemented as a result and the effectiveness of those actions and any non-compliance with the management plan and corrective actions taken to address the non-compliance.

The management actions in this table are consistent with addressing the risks identified in the listing and conservation advice in *Table 4* and analysed in *Table 8.* They will be implemented from the commencement date of the offset site until the Completion Criteria have been achieved. The habitat quality on the offset site will be maintained for the duration of the approval, i.e. to 31 December 2080.

8.1 Responsible parties

As approval holder, Arrow Energy, is accountable for implementing the plan. Completing the actions will be ensured through the annual reporting requirements (*Section 11*). Arrow will coordinate reporting, reviewing, inspections, auditing and any adaptive management changes to the plan. A person within Arrow will be assigned the responsibility of managing offset requirements for the company.

Arrow will enter into an arrangement with the landowner to undertake the offset management actions and day to day management of the site, including fencing, managing fire breaks, weed and feral animal management, and grazing management. The landholder will also undertake the landholder reporting as per *Table 11*.

Arrow will engage suitably qualified persons to undertake the biocondition assessments, ecological studies and Koala surveys, prepare reports and undertake inspections, as required.

Incidents identified on site will be reported by the landowner to Arrow Energy. The level of severity will dictate the necessary actions through the Company's formal incident management system. General incidents, for example, wild dog incursion, will be managed by the landowner. Responses to incidents adversely impacting habitat quality on the offset site, or Koalas directly, will be coordinated by Arrow Energy, to ensure remediation or enhanced management measures (*Table 8*) are implemented to address the incident as soon as reasonably possible.

Table 9: Management actions over the offset area

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
Degradation of habitat (relates to loss and fragmentation of habitat, which is an identified threat in the Approved Conservation Advice for Koala)	Achieve the completion criteria and habitat quality improvements for offset values, which include the habitat quality scores in this OAMP (Table 11).	Increase the habitat quality scores for each offset value as measured at each identified habitat quality assessment site (Figure 9) based on the results of baseline and subsequent biocondition assessments and monitoring events to achieve the scores in the completion criteria.	Implementation of the management actions and adaptive management framework as outlined in this OAMP.	Biocondition assessments and monitoring of offset value habitat quality scores will be undertaken in accordance with *Section 11*. The results of monitoring events will be compared against the habitat quality scores in the interim performance targets and completion criteria to determine the progress of the offset area and recorded as part of reporting (see *Section 11*).	Biocondition assessments and monitoring indicate that habitat quality scores for interim performance targets will not be achieved for one or more offset values by: • Year 5 • Year 10 • Year 15 • Year 20.	Step 1: Investigate cause of trigger: • Within one month after detection of the trigger, complete an investigation into the reasons why the interim performance targets or the completion criteria were not achieved within the specified timeframes. • Within two months after detection of the trigger, complete a re-evaluation of the suitability of the relevant management measures in the OAMP. The re-evaluation must identify appropriate corrective actions. Step 2: Implementation of corrective action/s within eight months of detection of trigger, including, as appropriate: • Approval holder and the

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
						landholder review the OAMP with assistance from offset coordinator and relevant Seniour Land Management and/or Seniour ecologists, if required, to provide input on the effectiveness of the management actions. • Increase frequency and intensity of pest animal and weed control measures and/or revise the type of measures to be implemented. • Where interim habitat quality criteria are not likely to be met in the required timeframe, the Approval Holder will notify the Commonwealth within one week and implement additional management measures,.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
						• Where final habitat quality scores are not likely to be met by year 20, the Approval Holder will notify the Commonwealth within one week and will obtain advice from senior ecologists and land managers with the aim of identifying appropriate additional management interventions, such as extending the timeframes and intensifying management measures, including plantings, to enhance habitat. This may include provision of an additional offset, if required.
Habitat or vegetation loss through unauthorised land clearing (loss of habitat identified as a threat in	Maintain the extent of habitat within the offset area by prohibiting clearing of native vegetation.	No unapproved and/or intentional clearing of vegetation	Protection of the offset area via a Voluntary Declaration under Section 19E and 19F of the VMA, as described in *Section 12*, to be	Quarterly inspections will monitor and document if there is	Any unauthorised clearing in contravention of the Voluntary Declaration.	Step 1: Investigate cause of trigger (e.g. unauthorised access) • As soon as unauthorised clearing

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
the Approved Conservation Advice for Koala)		within the offset area, except for clearing that is required for fencing, access, firebreaks and public safety. Any proposed ecological thinning requires the advice of a Principal Ecologist, and prior written agreement of DAWE.	registered within 12 months of the approval of this OAMP. Comply with the restrictions on clearing in *Table 9.* Construction and maintenance of access tracks, fencing and firebreaks will only be undertaken in accordance with the requirements of this table. If vegetation clearing is required for fencing, access, firebreaks or public safety, it must be undertaken in accordance with best practice management methods and any applicable legislative requirements.	evidence of recent unapproved clearing, including forestry or timber harvesting activities. Monthly and quarterly inspections will monitor and document vegetation clearing that has occurred for fire break, access road or fenceline maintenance. All monitoring reports will include records of any maintenance clearing required. Annual compliance		is detected, review existing access restrictions, and inspect signage and offset area fencing, within two weeks of detection of the clearing, identify how unauthorised persons[14] accessed the site and identify appropriate corrective actions. Step 2: Implementation of corrective action/s • All identified actions required to prevent recurrence of the prohibited clearing will be completed within one month of detection of the clearing. These may include (though are not limited to) additional fencing and/or signage and security for the offset area. • Biocondition assessments to record extent of damage and progress of management measures, to assess progress toward

[14] Defined in Glossary

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
				reporting to the Commonwealth Government consistent with any and all EPBC Act approval(s), as well as scheduled monitoring reports on condition of the offset		recovery and towards meeting next interim or final completion criteria • Where unathorised clearing has been extensive and habitat quality scores are reduced (based on results of biocondition assessments), additional plantings will be undertaken within six months of the most recent biocondition assessment, particularly Koala food trees, as needed.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
Degradation of habitat by overgrazing (relates to loss and fragmentation of habitat, identified as a threat in the Approved Conservation Advice for Koala).	Ensure that any livestock grazing for fire management and weed control maintains and enhances the ground cover attributes for MNES (at least 30% grass cover) and does not result in the degradation of habitat and vegetation.	Increase the richness and average % cover from the baseline measured, of native perennial grasses, as measured at each habitat quality assessment site based on the results of baseline and subsequent biocondition assessment and monitoring events.	Stock will be grazed only when required to reduce ground cover (i.e.: when groundcover exceeds 60%), and only during the dry season. The dry season is normally between April and November; however, if unseasonal rainfall should occur, then grazing may be allowed outside of this time period only if there is no evidence of moisture in the stream order one gullies to ensure that "pugging" of the soil by livestock does not occur.	Habitat quality (biocondition) assessments will be undertaken in accordance with *Section 11*. These will include assessment of percentage cover of native perennial grasses Monitoring reports shall be kept to record results of biocondition assessments and habitat quality condition of the offset area.	Detection of stock grazing outside of the dry season, or during any other exclusion period Decrease in the richness and average ground layer cover at one or more habitat quality (biocondition) assessment sites based on the results of baseline and subsequent monitoring events	Upon being notified or becoming aware of prohibited stock grazing in the offset area, the Landholder is to remove the stock from the area (if present) and assess the adequacy of fencing within 10 days. The Landholder is to undertake fence maintenance and repairs to resecure the offset area within 10 days. Stock to be kept out of affected area for as long as is required for recovery to establish (minimum two years).
Introduction, establishment and spread of non-native weeds including prohibited and restricted matter listed under the Biosecurity Act 2014 *(Qld) or as a Weed of National Significance (relates to loss and fragmentation of habitat, identified as a threat in the*	Manage invasive weed species to reduce degradation of MNES habitat	Weed cover must not exceed 10% cover in the offset area. No new prohibited or restricted matter species listed under the *Biosecurity Act 2014* (Qld) are identified at	The primary weed control method will be grazing by cattle, which will be undertaken during the dry season (that is, from April to November each year), to control buffel grass outbreaks. Weed control will be undertaken initially within the first year throughout the offset	Monitoring of this management action will be undertaken by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder	Pest plants (including buffel grass) occur in greater than 10% of the offset area. A new declared invasive weed species is identified at one or more monitoring sites, or opportunistically during any site inspection or other monitoring.	Step 1: Investigate cause of trigger Step 2: Implementation of corrective action(s) Upon being notified or becoming aware of pest plants being present in greater than 10% of the offset area, the Landholder is to implement additional weed

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
Approved Conservation Advice for Koala).		any biocondition assessment or monitoring site (based on subsequent monitoring events), or opportunistically, i.e. if noted outside of biocondition assessment or monitoring surveys.	areas and then periodically as required to treat the weeds at the optimum time in their life cycles to control and minimise the spread of the existing weed species.	at least four times annually. Weed cover is to be monitored by the same methodology and at the same time as the ground cover measurements, i.e. during biocondition assessments. Quarterly inspections will observe and record the presence of weeds and success of previously applied weed control measures. The inspection will include before and after photos of the weed control area. Quarterly inspections will be conducted		control measures within one month. These measures will include, and are not limited to: • foliar spraying; • basal bark spraying; • stem injection; • cut stump; • cut and swab; • stem scraper; and • wick applicators. All new weed species and required intensification of weed management to be reported in offset monitoring reports.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
				by the Landholder or suitable qualified person appointed by the Landholder to record the level of weed cover in the offset area.		

Predation by dogs and impacts from other pest animals (dogs are identified as a threat in the Approved Conservation Advice for Phascolarctos cinereus (Koala) *Feral dogs predate and injure Koalas, and feral pigs can degrade and damage Koala habitat, particularly along waterways or in wetter areas. Feral cats, foxes and rabbits should also be controlled to reduce pest animal numbers.*	Minimise the introduction of pest animals and control of existing populations of pest animals (wild dogs, and feral pigs, cats and foxes) within the offset areas in accordance with the *Biosecurity Act 2014* (Qld).	Detection of twelve or more feral pigs or any feral dogs during any inspection.	Implement control actions for pest animals in accordance with *Section 8*. Participate fully in, and cooperate with, any and all regional pest control programs, unless those would otherwise contravene a part of this OAMP.	Undertake monitoring for pest animals in accordance with Section 11.	Any observed evidence of feral animal presence, particularly dogs (that is, an indicator of feral animals required to be recorded as part of the feral animal monitoring requirements detailed in *Table 12*)	• Upon being notified or becoming aware of pest animal populations exceeding the threshold, the Landholder is to implement all necessary or appropriate control measures needed to reduce pest animal populations to below trigger thresholds, which is 12 feral pigs or any feral dogs. The Landholder is to have completed implementation of all necessary or appropriate pest control measures within one month of detecting the feral animals. • Where a feral dog reduction and control program is to be undertaken, this must be continued until feral dogs are eliminated from the offset area. • The Landholder may approach neighbouring landowners to discuss the increased pest animal presence and

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
						an integrated control program may be developed. If an integrated control program is considered appropriate, the Landholder will make best endeavours to reach agreement with neighbouring landowners to implement such a program. • If impacts from the pest animal populations have not naturally remediated within six months of completion of implementation of the control measures, the Landholder is to undertake and complete all works required to remediate those impacts.
Fire (relates to loss and fragmentation of habitat, identified as a threat in the Approved Conservation Advice for Koala). *The impact from uncontrolled fire would be a reduction in*	No unplanned fire in the offset area. Planned fire ('cool burns') is undertaken only to improve habitat and reduce fuel loads,	No unplanned fire in the offset area. Any 'cool burns' are managed appropriately to reduce fuel loads and	Implement fire management in accordance with all requirements in this OAMP. If one or more bushfires are current in the region and considered potentially	Monitoring of this management action will be undertaken by the Landholder or suitable qualified person	Destruction of, or significant damage to, part or all of the offset area. The occurrence of any unplanned or deliberately lit fires.	Step 1: Investigate cause of trigger • Within one month of detection of the trigger, complete an investigation into the source of the fire and how habitat quality scores, including

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
groundcover, thinning of the canopy, loss of juvenile canopy species, and slowing of the offset area achieving the completion criteria. *Fire scar mapping*[15] *products produced for the period 1986 to 2016 are derived from the Landsat satellite imagery and has been used to inform this risk. Due to the scale of the mapping products, site specific data is not available.* *Anecdotal evidence from the landholder indicates that unplanned fire is not common.*	where supported by advice from a principle ecologist with a minimum of 10 years field experience in Qld.	improve habitat, only if required and supported by advice from a principle ecologist with a minimum of 10 years field experience in Qld.	threatening to the site, coordinate with all relevant fire authorities to determine the appropriate method of protecting the site (if the relevant fire authorities advise against seeking to protect the site from a specific fire, the approval holder may comply with that advice without needing approval or agreement from DAWE). The approval holder will maintain firebreaks along all boundaries of the Killara property. Fire control lines must be inspected quarterly. Maintenance must be undertaken as required and at least once every two years. Please note: if fire damages the offset areas, it must be reported as part of the landholder and annual reports as per *Section 11*.	appointed by the Approval Holder at least quarterly. Quarterly inspections will monitor and document if there is evidence of wildfire, or prohibited burning. If fire impacts part or all of the offset area, the Landholder must notify the approval holder immediately. Any cool burns will be monitored and recorded in the annual compliance report, as well as monitoring reports for the offset area, with		Koala habitat, has been impacted. Step 2: Implementation of corrective action/s **Corrective action:** upon being notified or becoming aware of an unplanned fire in the offset area, the landholder is to reassess and implement new access protocols for any lessees etc., signage and general access within two weeks. The landholder must notify the approval holder immediately. **Corrective action:** subsequent to any unplanned occurrence of fire in the offset area, within two months, the Landholder or suitable qualified person appointed by the Landholder will: 1. inspect and repair, and widen if necessary, all firebreaks (but cannot reduce the

[15] https://www.qld.gov.au/environment/land/management/mapping/statewide-monitoring/firescar

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
			Any damage by fire to the offset area must be reported to the Commonwealth as soon as possible following the impact.	the written advice from a suitable ecological expert. Weed cover is to be monitored post-fire, utilsing the same methodology and in conjunction the groundcover monitoring (e.g. biocondition assessments). Weed control measures undertaken post a fire event to ensure weed cover is <10%. Ground cover measurements must be in accordance with		area of vegetation on the offset area); and 2. reassess fuel load reduction practices; and exclude grazing until the ground cover present at the end of the dry season of that year is at a minimum of 60% Corrective action: Where there is substantial damage to the offset area, within two months, the approval holder must arrange for a biocondition assessment to determine habitat quality loss and report to the Commonwealth on how this loss will be addressed to continue to meet the required interim or final completion criteria. This may include updating this OAMP.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
				Methodology 2B as stated in the *Land Manager's Monitoring Guide* (Department of Environment and Resource Management, 2010) (DERM)[16], or any subsequent published version of this document. The approval holder and the Landholder will keep themselves informed of any bushfires in the region. The Commonwealth must be notified immediately of any impact to part or all of the offset area from fire.		

[16] *Land Manager's Monitoring Guide: Ground cover indicator*, Department of Environment and Resource Management, 2010, Queensland Government, Brisbane, available at http://qldgov.softlinkhosting.com.au/liberty/opac/search.do#

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
Offset fails to achieve the interim performance targets and completion criteria within the anticipated 5, 10, 15 and/or 20 year timeframes, respectively (relates to loss and fragmentation of habitat, identified as a threat in the Approved Conservation Advice for Koala).	Achieve the interim performance targets and completion scores at years 5, 10, 15 and 20 years, respectively (Table 11).	The interim performance targets are achieved by year 5, 10 and 15. The completion criteria are achieved by year 20. See *Table 11*	All management actions outlined in this OAMP will be implemented to ensure that the interim performance targets and completion criteria are achieved. Biocondition assessments will be undertaken every 5 years to measure progress towards interim and final completion criteria.	Monitoring of the offset area will be undertaken in accordance with *Section 11*. The results of monitoring events (bioncondition assessments) will be compared against the interim performance targets and completion criteria to determine the progress of offset habitat quality scores and recorded as part of reporting.	Interim performance targets are not achieved by year 5, 10 or 15 Completion criteria are not achieved by year 20.	Step 1: Investigate cause of trigger • Within one month of detection of the trigger, complete an investigation into the reasons why the interim performance targets or the completion criteria were not achieved within the specified timeframes. This investigation must re-evaluate the suitability of the relevant management measures in the OAMP and must identify appropriate corrective actions. The approval holder must notify the Commonwealth that interim or final completion criteria are unlikely to be, or have not been, met. Step 2: Implementation of corrective action/s As soon as practicable, and in any case within eight months of detection of the trigger, complete implementation of the corrective actions

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
						identified under Step 1. These may include (though are not limited to): • Increasing the frequency and intensity of pest animal and weed control measures and/or revising the type of measures to be implemented. • Modifying the fire management measures, to better support enhancement of offset values. • Provide additional plantings representative of the species and densities in the regional ecosystem benchmarks to enhance habitat quality improvement • Secure an additional offset if there is no realistic possibility of meeting final completion criteria. If the investigation under Step 1 recommends changes to the management regime then: as soon as possible, and

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
						in any case within six months of detection of the trigger, implement a revised OAMP incorporating those recommended changes. The revised OAMP must be provided to the Commonwealth.
Unauthorised site access	Unauthorised persons, vehicles, and/or stock are prevented from accessing the site, and authorised stock are prevented from incurring during exclusion times	Public access to the offset area is prohibited. Access is restricted to those authorised persons required to undertake actions described in this management plan, including the landholder, and Approval Holder staff and their contractors and assigns. The offset area is not to be utilised for any purpose	Fences will be maintained around the entirety of the offset area to prevent unauthorised access and to control stock presence.	Monitoring of this management action will be undertaken by the Pastoral Manager, Landholder or suitable qualified person within 3 months of the offset area being legally secured and during quarterly inspections. Quarterly inspections will monitor and document evidence of unauthorised access to the offset area.	Evidence of unauthorised persons, vehicles, and/or stock is detected at any point. Evidence of stock is detected at any point during exclusion times. Damage is detected to any fence.	For evidence of unauthorised persons, vehicles, and/or stock; or evidence of stock in an exclusion area: Step 1: determine access method Upon being notified or becoming aware of prohibited access to the offset area, reassess access protocols for any lessees etc., as well as signage and general access within two weeks and implement repairs to fencing as requried Step 2: If there are areas that have been negatively impacted, the regeneration of those areas will be undertaken within two months of the impact and will be added to the monitoring sites at *Table 14* and monitored

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
		including recreational activities, or any other activities that deter from achieving the outcomes of this plan No evidence is found of unauthorised persons, vehicles, and/or stock is detected on site at any point. Fences and gates are erected at all necessary points and kept in good repair throughout the life of the EPBC Act approval.				during the quarterly inspections. Fencing requirements will be reassessed and fencing improvements made, e.g. change in materials, if required.

9. Offset area management and protection additional to those that currently exist

Establishing an offset area on the proposed area would add additional protection for biodiversity values from clearing[17].

In relation to clearing, as outlined in *Section 5* and *Appendix 1*, the offset area is currently not protected by the VMA or the EPBC Act (due to the exemption related to continuing use of the land) from activities such as timber harvesting, the inappropriate use of hot fires or under-sowing of exotic pasture species. Only the remnant vegetation areas are protected from broadscale clearing under the VMA (see maps at *Figures 5* and *7*). Maintaining the existing condition of regulated vegetation and land for habitat values is not addressed under the VMA.

In relation to biosecurity, the *Biosecurity Act 2014* (Qld) (the Biosecurity Act) imposes a 'general biosecurity obligation' on all Queenslanders to manage biosecurity risks for the area under their control and that they know about or could reasonably be expected to know about.[18] In practical terms, this means that:

- If you are a livestock owner, you are expected to stay informed about pests and diseases that could affect or be carried by your animals, as well as weeds and pest animals that could be on your property. You are also expected to manage them appropriately.
- If you are a landowner, you are expected to stay informed about the weeds and pest animals (such as wild dogs) that could be on your property. You are also expected to manage them appropriately.

Table 10: Biosecurity Act 2014 (Qld) obligations

Category	What is required	Examples
3	Must not distribute, be traded or released into the environment	Most invasive weeds, pest animals, noxious fish
4	Must not move	Certain weeds, pest animals, noxious fish such as feral pigs, feral deer, rabbits, Hudson pear and jumping cholla cactus,
5	Must not possess or keep	Rabbits, carp, bunny ears cactus
6	Must not feed (except if undertaking a control program)	Feral deer, wild dogs, rabbits, foxes, noxious fish (tilapia, gambusia)

Implementing the plan will increase the frequency of biosecurity management for matters such as wild dog protection and weed management, as a result of increased site inspections and monitoring, and additional feral animal and weed control, where required. The management actions in this OAMP set out obligations that are additional to these general business as usual obligations. Management actions must be undertaken on the offset area (Table 9), and any trigger for adaptive management that is met requires corrective actions, including additional

[17] *Vegetation Management Act 1999* (schedule definitions)
[18] See https://www.daf.qld.gov.au/business-priorities/biosecurity/policy-legislation-regulation/biosecurity-act-2014/general-biosecurity-obligation

management, to be undertaken. For example, there is a requirement to control feral pigs if numbers in excess of 12 are observed in any one property inspection; this is above and beyond the requirements of the Biosecurity Act, as is the reduction of weed species to 10% over the offset area over the life of the approval.

The South Burnett Regional Council identifies the offset area as Rural in their planning scheme and offers no protection for native vegetation from the current ongoing land use. The council does not have a Biosecurity Plan and only refers to the state Biosecurity Act.

10. Offset Completion Criteria and Performance Targets

Offset completion criteria have been determined based on an understanding of the specific habitat, connectivity, and other ecological values for the Koala. These criteria were initially derived from detailed ecology survey information of both the impact and offset areas utilising an approach specified in the *Guide to determining terrestrial habitat quality* (DEHP, 2017 and DES 2020). The targeted habitat quality meet guidelines published by ANZMEC (2000) stating completion criteria should be:

1. Specific enough to reflect a unique set of environmental, social and economic circumstances.
2. Flexible enough to adapt to changing circumstances without compromising objectives.
3. Include environmental indicators suitable to demonstrate that rehabilitation trends are heading in the right direction.
4. Undergo periodic review, modifying if required due to changed circumstances or improved knowledge.
5. Based on targeted research, resulting in more informed decisions.

During the management period, a set number of interim performance completion criteria have been proposed to track the trajectory of habitat quality towards the desired final completion criteria. The timing of the interim targets corresponds with the targeted species surveys and detailed ecological condition monitoring in *Table 12*.

Interim targets were derived by identifying the attributes expected to increase over the period of the approval. The values were determined by differentiating between specific, longer term metrics (e.g. species richness, tree canopy cover, number of large trees) and those where an initial benefit could be realised early (e.g. recruitment of woody species, non-native plant cover).

Completing management actions identified in *Table 9* will enable the offset area to attain the completion criteria identified in *Table 11*, and maintaining the stated completion criteria for the duration of the approval.

Annual reporting (that includes monitoring reports for the offset site) to DAWE will provide transparency regarding how the site management actions are being implemented. The reports will be prepared after the anniversary of the implementation of the offset site (proposed commencing 30 June 2021), or will be consistent with other offset site reporting dates, as it is planned that other offset sites will be established on the property. Where relevant, the report will identify any events impacting the offset area, trigger levels reached, corrective actions implemented as a result and the efficacy and success of those actions, and any non-compliance with the management plan and subsequent corrective actions taken.

Table 11: Interim targets and Completion Criteria

Protected matter	EPBC Status	Impact area (ha)	Habitat quality score	Assessment Unit	Assessment Sites	Offset area (ha)	Regional ecosystems	Habitat start quality score	Habitat quality score Year 5	Habitat quality score Year 10	Habitat quality score Year 15	Habitat finish quality score*
Koala	Vulnerable	65	6	2	B26, B7	168	11.12.1	5	5 - 5.3	5.3 - 5.5	5.5 - 5.75	5.75 - 6
				7	B6	11	11.5.1	5	5 - 5.3	5.3 - 5.5	5.5 - 5.75	5.75 - 6
				15	B37	41	11.12.3	5	5 - 5.3	5.3 - 5.5	5.5 - 5.75	5.75 - 6
				Total		**220**						

Final scores out of 10 have been calculated in the Offsets Assessment Guide (the calculator) based on the outcomes provided in *Appendix 4* (terrestrial ecology reports for the impact and offset site (sampling sites for Koala for the offset area)). It should be noted that the interim targets included in *Table 11* may need to be updated as offset management progresses .

11. Monitoring and Reporting

The monitoring methods discussed in *Table 12* will enable comparative changes in vegetation condition against baseline data collected on the offset area, as well as attainment and maintenance of the offset completion criteria (*Section 10*). Furthermore, the monitoring and subsequent reports identified in *Table 12* will measure changes resulting from the management actions and variability due to climatic conditions. This will inform the nature and frequency of management intervention required.

Arrow will prepare a compliance report for each 12-month period following the date of the commencement of the action and for the period of the Approval, as per approval condition 14.

Offset Area Management Plan reports will be prepared until the completion criteria of the management plan are achieved (noting that completion criteria must be maintained for the period of the approval, as per approval condition 4g). The monitoring schedule is outlined in *Table 12*. The reporting schedule is provided in *Table 13*.

Data will be owned, managed, stored and the responsibility of the approval holder.

Commonwealth threatened species survey guidelines used to inform the requirements of the terrestrial flora and fauna surveys included:

- Survey guidelines for Australia's threatened mammals (DSEWPC, 2011)
- EPBC Act referral guidelines for the vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DoE 2014)
- Species Profile and Threat databases for relevant EPBC Act listed species and communities
- Approved Conservation Advice and Listing Advice for the Koala (DSEWPC, 2012).

Table 12: Monitoring schedule

Monitoring	Attributes monitored	Timing	Method	Location/s
Surveys undertaken by ecologists every 5 years				
• Targeted habitat quality assess-ments of Koala habitat • Targeted surveys for Koala	• Nature and quality of habitat attributes for Koala, as defined under the EPBC Act conditions of approval (i.e. nature and health of Koala food trees, shelter for Koalas, , presence of	2025, 2030, 2035, 2040 (March – May)	Survey guidelines for Australia's threatened mammals (DSEWPC 2011), EPBC Act referral guidelines for the vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (DoE 2014)	Across the offset area

Monitoring	Attributes monitored	Timing	Method	Location/s
	threats such as dogs). • Presence of Koalas on offset area, including estimated numbers and location of sightings, scats, etc.			
Ecological condition and relevant habitat features using biocondition assessments	Recruitment of woody perennial species in EDL	2025, 2030, 2035, 2040 (March – May)	Field observations, vegetation assessment as per the *Guide to determining terrestrial habitat quality – a toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy* (DES 2020) (or any subsequent published version of this document). Data for each of the ecological condition attributes monitored will be collected at each site listed in *Table 14* and reported on and presented in a sequential manner (including previous data collected) to quantify change from the baseline condition determined June 2020. This will record the change in each attribute measured and hence the condition of the habitat, thus enabling a statistical comparison to previous years' data and tracking towards attainment of the offset interim and final completion criteria.	Sites listed in *Table 14*
	Native plant species richness – trees			
	Native plant species richness – shrubs			
	Native plant species richness - grasses			
	Native plant species richness – forbs			
	Tree canopy height			
	Tree canopy cover			
	Shrub canopy cover			
	Native perennial grass cover			
	Organic litter			
	Large trees			
	Coarse woody debris			
	Non-native plant cover			
	Quality and availability of food and foraging habitat			
	Quality and availability of shelter			

Quarterly Landholder/Authority Holder Records and monitoring (report to approval holder - end of Sept, Dec, Mar, Jun).				
Forestry Operations, Native Timber Harvesting and general vegetation impacts	Any incidence of native plant destruction	Monitored quarterly and reported annually in Offset Area Report until the offset Completion Criteria are achieved.	General observations during routine inspections	Within offset area
Unauthorised impacts to vegetation and woody debris from activities such as illegal access / camping	Vegetation, woody debris, grass cover, weed cover, feral animal damage and presence	Monitored quarterly and reported annually until the offset Completion Criteria are achieved.	Landholder or person appointed by the Landholder will undertake quarterly inspections of the offset area to observe and record grass cover levels, weeds, accessibility (i.e. condition of fencing), and evidence of fire, erosion, and feral animal incursion. The inspection records will be provided to the approval holder and serve as the primary data source for the Offset Area Report. Grass and weed cover is to be undertaken as per the Level 1 methodology described in the *Land Manager's Monitoring Guide* (DERM, 2010) (or any subsequent published version of this document). This is in addition to biocondition assessments.	Within offset area
Grazing	Cattle stocking rates Grass cover Pugging	Monitored monthly during grazing periods (dry season or as otherwise authorised) and reported annually in the Offset Area Report until the offset Completion Criteria are achieved in accordance with *Level 1 monitoring as per the Land Manager's Monitoring Guide (DERM, 2010)*		Within offset area
Unplanned fire	Occurrence, control measures implemented, timing and result of the control measures as per *Table 9.*	Monitored quarterly and reported annually until the offset Completion Criteria are achieved.		
Weeds	Occurrence, control measures implemented, timing and the result of the control measures as per *Table 9.*	Monitored quarterly and reported annually until the offset Completion Criteria are achieved	Weed cover is to be monitored by the same methodology and at the same time as the grass cover measurements.	

			This is in addition to biocondition assessments.	
Pest animals	Occurrence, control measures implemented, timing, number and type of animal/sand the result of the control measures as per *Table 9.*	Monitored quarterly and reported annually until the offset completion criteria are achieved	Quarterly inspections will involve traversing the offset area along streams, low lying areas and vehicle access tracks, to record the presence of wallow holes, tracks and any visual incidents in the offset area. If detected, these locations will be GPS'd and photographed and rechecked at the next quarterly inspection. Any evidence of predation on Koalas must be reported immediately to the approval holder and corrective actions implemented (Table 9).	

Table 13: Reporting schedule

Report Details to DAWE	Reporting period	Submission due date
Annual Offset Area Report, which contributes to the Annual Compliance Report as per approval condition 14, detailing photo point (including coordinates), implementation of management actions, any triggers for corrective actions and implementation of those corrective actions, if implemented, and offset condition outcomes, including habitat quality scores, condition of Koala habitat and results of Koala surveys, achieved for preceding reporting period. Note: the reports and results from detailed ecology survey (biocondition assessments) and monitoring events, such as Koala surveys and Koala habitat monitoring, which are required as per approval condition 4k, conducted in accordance with *Table 12*, will be provided as an Appendix to the subsequent Annual Offset Area Report.	Annual Offset Area Report - from the date of approval of this OAMP to 30 May 2021 for the first report	30 June 2021 for the first report
	1 May – 30 May annually until the offset Completion Criteria are achieved and then every 5 years for the period of effect of the approval	30 June each year as required
Compliance report detailing compliance with approval conditions under the EPBC Act, including compliance with the offset conditions, as detailed in this OAMP.	Every 12 months following commencement of the action, as per approval condition 14.	1 July every year for the duration of the approval

Table 14: Monitoring Sites

Assessment Unit	Polygon number	Monitoring site number	Regional ecosystem	VM Act Status	Latitude	Longitude
AU15	20	B37	11.12.3	Least concern	-26.32813007	151.2783124
AU7	23	B6	11.5.1a	Least concern	-26.32831969	151.2859151
AU2	18	B26	11.12.1a	Least concern	-26.33016262	151.2809906
		B7			-26.3325195	151.2923343

**Coordinate system: GDA_1994*

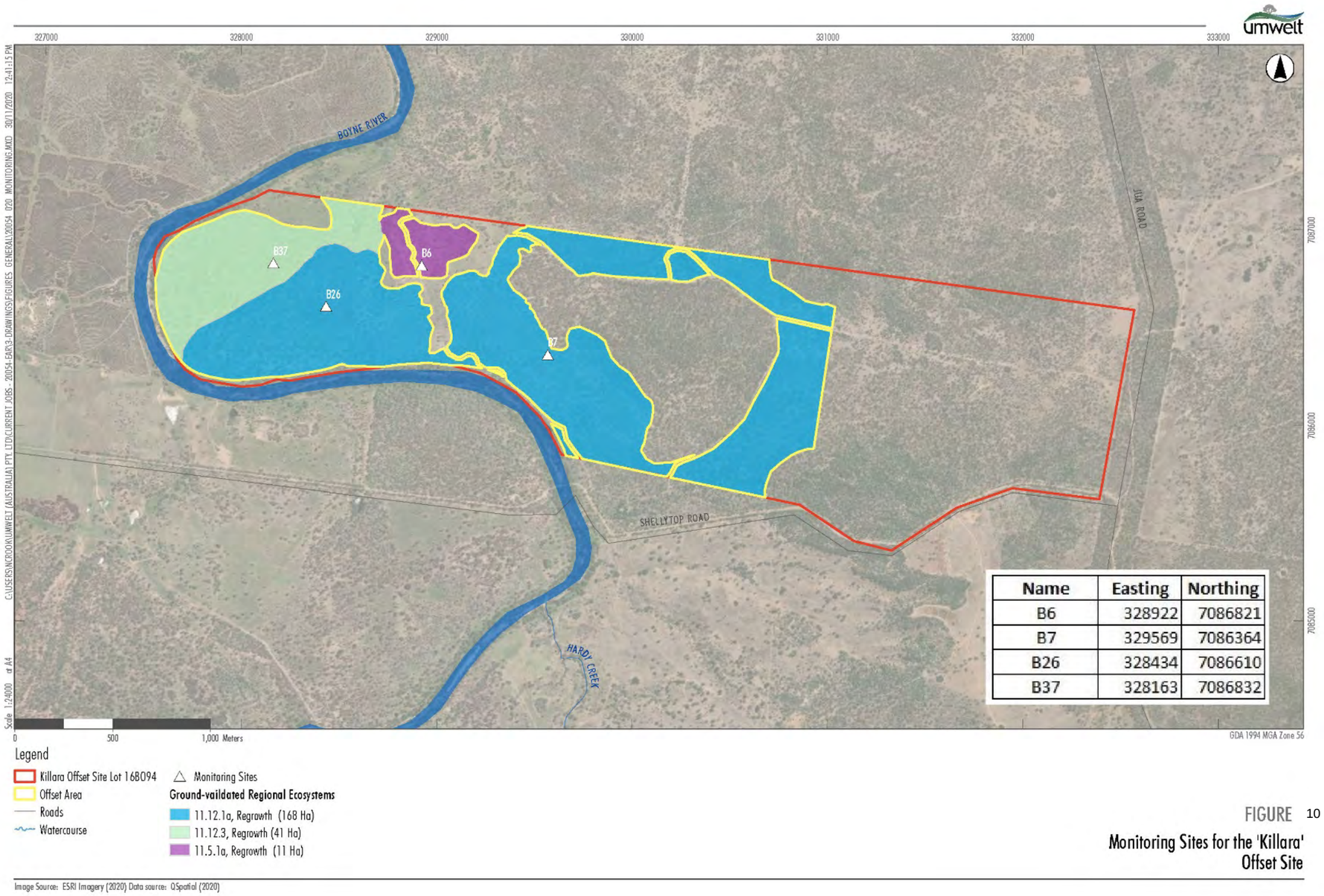


FIGURE 10
Monitoring Sites for the 'Killara' Offset Site

12. Legally binding mechanism

This offset will be secured with a voluntary declaration (VDEC) as an area of high conservation value under the VMA. Once the declaration has been registered on the title, the offset area will be a category A area on the property map of assessable vegetation (**PMAV**). Pursuant to the VMA, an area mapped as category A on a PMAV is described as an 'area subject to compliance notices, offsets and voluntary declarations'.

Once approved under the EPBC Act, the OAMP will be attached to the VDEC, further ensuring compliance of the plan. The offset area will be secured within 12 months of approval of the OAMP, as per approval condition 5.

Management and monitoring of the offset area will be undertaken in accordance with commitments in the approved OAMP. DAWE will be notified within 5 business days of the VDEC execution as per approval condition 6.

The VDEC will remain in place as the legally securing mechanism for the offset area for the duration of the approval, as per approval condition 7. The VDEC and approved OAMP will ensure the offset completion criteria are attained, and then maintained for the period of the EPBC Act approval (i.e. until 31 December 2080). Statutory protection of the offset area is maintained under the VM Act.

13. Adaptive management and plan review

This plan has been prepared to be implemented until the offset completion criteria have been achieved and monitored until the 31 December 2080, when the approval for the action ceases. Management measures will be reported on in the Offset Area Reports, and adapted, where required, if triggers are reached and corrective actions need to be implemented (see *Table 9*). If management measures need substantial adjustment, Arrow Energy may review this plan in consultation with the landholder, a Seniour Land Manager and/or a Seniour ecologist (with over 5 years local experience and knowledge) as per condition 20[19].

[19] Revision of the OAMP: 20. The approval holder may, at any time, apply to the Minister for a variation to the OAMP required under condition 3 and approved by the Minister, or as subsequently revised in accordance with these conditions, by submitting an application in accordance with the requirements of section 143A of the EPBC Act. If the Minister approves a revised OAMP (ROAMP) then, from the date specified, the approval holder must implement the ROAMP in place of the previous approved OAMP.

14. Definitions

Definitions of terms used in this standard:

Abbreviations	Definition
AU	Assessment Unit
CPP	Central Processing Plant
CSG	Coal seam gas
DAWE	Department of Agriculture, Water and the Environment (Commonwealth)
DEHP	Department of Environment and Heritage Protection (Qld)
DES	Department of Environment and Science (Qld)
DoE	Department of Environment (former; now DAWE)
EA	Environmental authority
EIS	Environmental Impact Statement
EOP	*Environmental Offsets Policy* (October 2012) (EPBC Act)
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999* (Cth)
FSC	Fauna spotter catcher
GSA	Gas Sales Agreement
ha	hectares
HDPE	High density polyethylene
HQS	Habitat Quality Score
KoRV	Koala retrovirus
MNES	Matters of National Environmental Significance
NC Act	*Nature Conservation Act 1992* (Qld)
OAG	Offset Assessment Guide (DAWE)
OAMP	Offset Area Management Plan
Offset Area	Site that has been calculated to meet the requirements to be offset for the impacts on MNES from the Project
PMAV	Property Map of Assessable Vegetation
PPL Project	Pipeline project, which is the impact area for this OAMP
RE	Regional Ecosystem
SGP	Surat Gas Project
SREIS	Supplementary Report to the EIS
The Project	Surat Gas Project: Off-tenure Pipelines and Associated Infrastructure
VDEC	Voluntary Declaration
VMA	*Vegetation Management Act 1999* (Qld)

15. Glossary

Term	Definition
Brigalow Development Scheme	In 1962 The *Brigalow and Other Lands Development Act* (Qld) was passed. Under the Brigalow Development Scheme, approximately 2 million ha was allocated in Areas I, IA and II in the Bauhinia, Taroom and Duaringa districts, with a further 2.4 million ha in the Brigalow Belt North. Properties were to be large enough to stock 1,000 cattle. State and Commonwealth governments provided loans of up to $60,000 for settlers to cover development costs, plus paying for the construction of 1,200 km of development roads. The Scheme was the first closer settlement policy that provided a combination of infrastructure, adequate financial assistance, and large enough blocks to provide a decent living. By the 1970s, most of the brigalow scrub had disappeared. Vast areas of sucker regrowth were controlled by aerial spraying with 245T and 24D, burning and mechanical means, in preparation for improved pastures and cropping. Sheep numbers declined markedly matched by a rise in cattle numbers and the area under crops. The rise in cropping was linked to a severe decline in cattle prices in the 1970s and to the more effective control of brigalow regrowth using blade ploughing, whereby the roots were cut off under the soil.
Category A vegetation	Under Queensland vegetation management legislation, Category A vegetation is an area which is: • a declared area • an offset area, an exchange area, an area that has been subject to unlawful clearing or an enforcement notice, an area subject to clearing as a result of a clearing offence OR • an area that the chief executive determines to be Category A Category A areas are colour-coded red on the regulated vegetation management map. See Vegetation Management Act 1999, s20AL.
Category X vegetation	Under Queensland vegetation management legislation, all areas other than Category A, B, C and R areas are Category X areas. Some Category X areas are also identified on a property map of assessable vegetation (PMAV) as 'locked in'. Category X areas are also known as 'exempt areas' because activity in Category X areas is not regulated by the Vegetation Management Act 1999. Category X areas are colour-coded white on the regulated vegetation management map. see Vegetation Management Act 1999 (Qld), s 20A.
Exempted development	See the Planning Regulation 2017, Schedule 24
Habitat quality scores	A score out of ten, based on BioCondition assessment plus an assessment of habitat quality.
Offset calculator	The Offset Assessment Guide spreadsheet tool as provided by DAWE

Term	Definition
Property Map of Assessable Vegetation	A map certified by the chief-executive as a PMAV for an area and showing the vegetation category areas for the area (e.g. Category C area, Category X area) See Vegetation Management Act 1999 (Qld), section 20AK.
Regrowth vegetation	Vegetation that is not remnant vegetation however meets certain criteria, native and consistent with or on track to meet RE status if managed. .
Remnant vegetation	Vegetation that: • is an endangered regional ecosystem, an of concern regional ecosystem, or a least concern regional ecosystem, and • forms the predominant canopy of the vegetation covering more than 50% of the undisturbed predominant capacity; averaging more than 70% of the vegetation's undisturbed height; and composed of species characteristic of the vegetation's undisturbed predominant canopy.
The Project	Surat Gas Project: Off-tenure Pipelines and Associated Infrastructure

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17. Document Administration

This document has been created using ORG-ARW-IMT-TEM-00005 v4.0

Revision history

Revision	Revision Date	Revision Summary	Author
0.1	18/08/2020	Draft	
0.2	29/01/2021	Draft B	Earthtrade
0	28/02/2021		

Controlled document location

[DOCUMENT CONTROL TO CREATE LINK TO KEY DOCUMENT LIBRARY ON THE RESERVOIR]

Related documents

Document Number	Document title

Acceptance and release

Author

Position	Incumbent	Release Date
Principal Projects Environment		01/03/2021

Stakeholders and reviewers

Position	Incumbent	Review Date
Principal Ecologist		04/03/2021
Environment Advisor Offsets		05/03/2021

Approver(s)

Position	Incumbent	Approval Date
Environment Manager		05/03/2021

Appendix 1: Offset area overview

Lot 16 on BO94 – vegetation clearing and property development history

Information on the development (that is, vegetation clearing) of the offset area and the broader property is provided to support the ability of the property to be managed for conservation purposes and to support requirements for approval condition 4b.

Significant development on Lot 16 BO94 was undertaken after World War 1 as part of the Soldier Settlement Scheme and then subsequently during the Brigalow Development Scheme. *Plate 1* shows the offset area on the property in 1952 when it was already subject to clearing. Initial clearing[20] within the offset area in the form of thinning of the vegetation, most likely for timber harvesting of the bluegum species between the river system, is evidenced from historical photos taken between 1962 *(Plate 2).*

The regrowth was treated in the 1950s by tordoning. Between 1967-1971, the area was heavily cleared for pasture production (*Plate 3*). Maintenance thinning for pasture production was continued between 1970 and the 1990s on a 7-10 year cycle, dependent on seasonal conditions, with wet seasons producing a faster growth rate; therefore bringing the thinning cycle earlier.

In 2007, the large trees that were left during the previous cycle were harvested for timber and a thinning program was undertaken in 2011.

Plate 1 (dated 1952) to *Plate 6* (dated 2002) demonstrate the cleared and continually thinned nature of the offset area, and the recurring regrowth maintenance therein to retain its improved pasture value, prior to and at the time of introduction of the EPBC Act in 2000. This practice supports the ability of the owners to continue the practices, especially of timber harvesting, under Sections 43B of the EPBC Act – 'Continuing Use'.

Prior authorisation and continuing use exemptions

Sections 43A and 43B of the EPBC Act exempt certain actions from the assessment and approval provisions of the EPBC Act. They apply to lawful continuations of land use that started before 16 July 2000 or actions that were legally authorised before 16 July 2000, the date of commencement of the EPBC Act. The exemptions allow for the continuation of activities that were fully approved by state and local governments before the EPBC Act came into force ('prior authorisation'), or otherwise lawful activities, which commenced before the EPBC Act came into force, and which have continued without substantial interruption ('continuing uses').

Continuing use

Under the continuing use exemption, assessment and approval under the EPBC Act is not required if:

- the action commenced before 16 July 2000; and
- the use of land, sea or seabed was lawful; and
- the action has continued in the same location without enlargement, expansion or intensification.

[20] *Vegetation Management Act 1999*, Schedule Dictionary

Plate 1: Aerial imagery of the offset area location, dated 1952

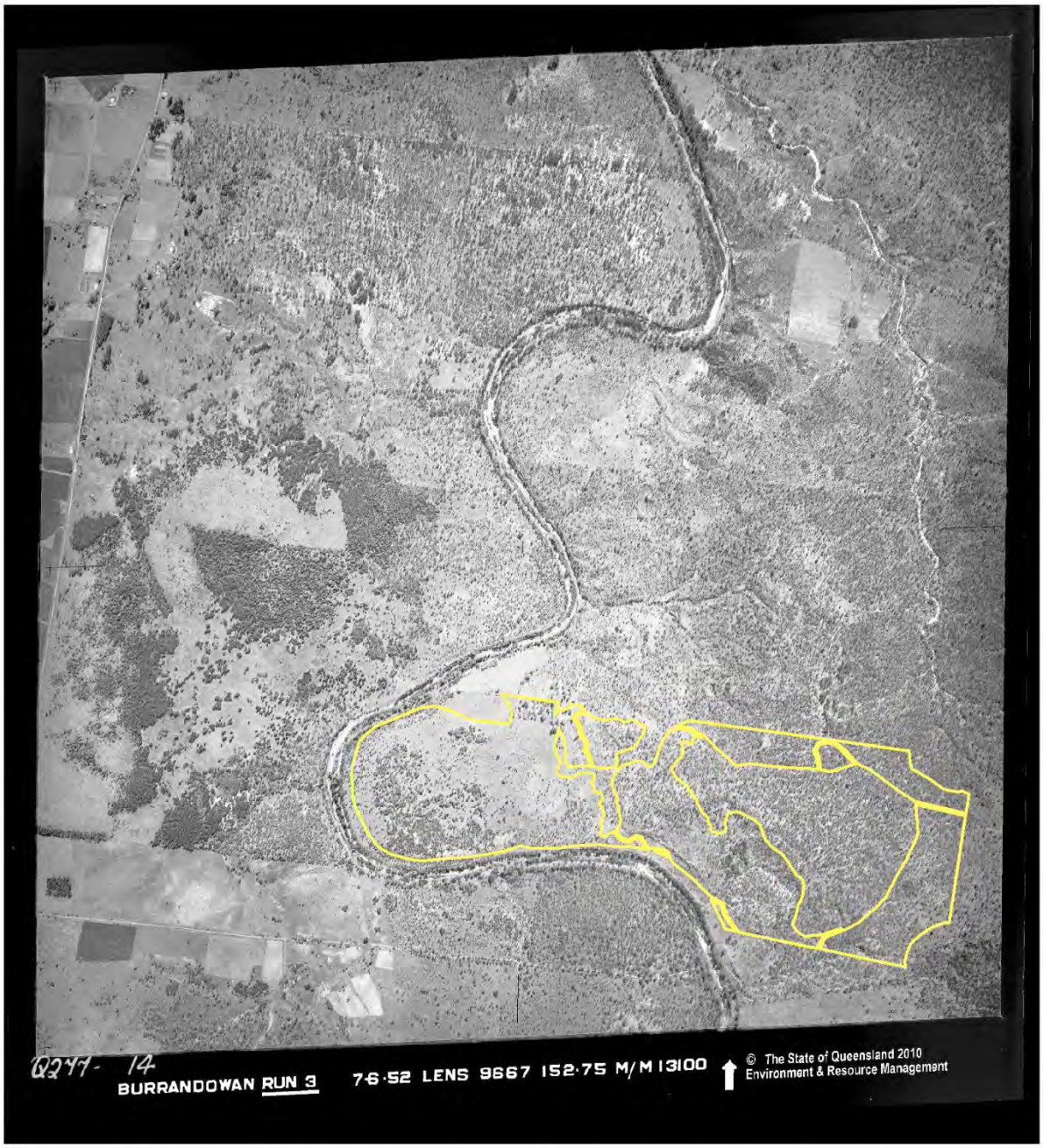

Plate 2: Aerial imagery of the offset area, dated 1963

Plate 3: Aerial imagery of the offset area, dated 1973

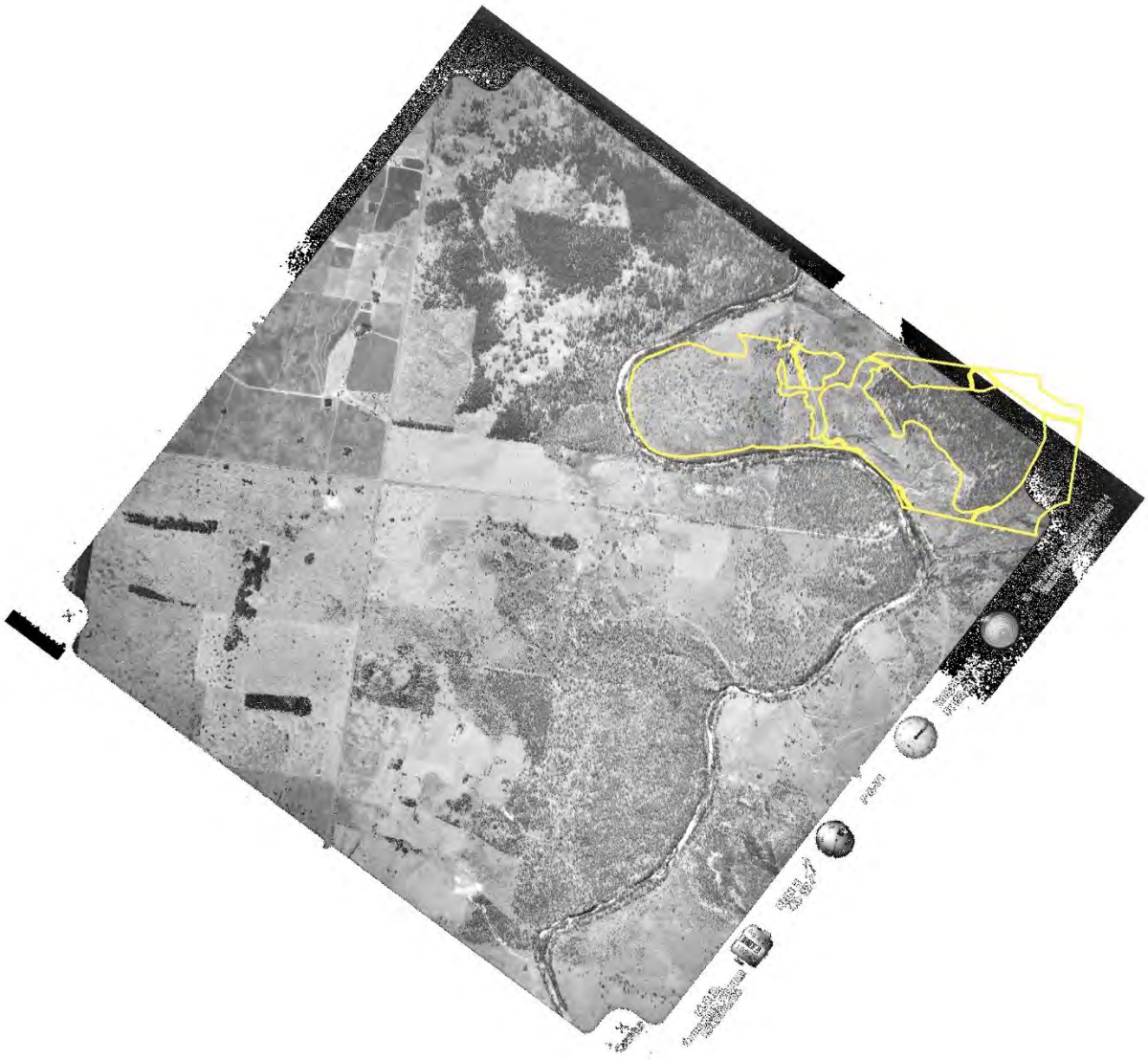

Plate 4: Aerial imagery of the offset area, dated 1984

Plate 5: Aerial imagery of the offset area, dated 1993

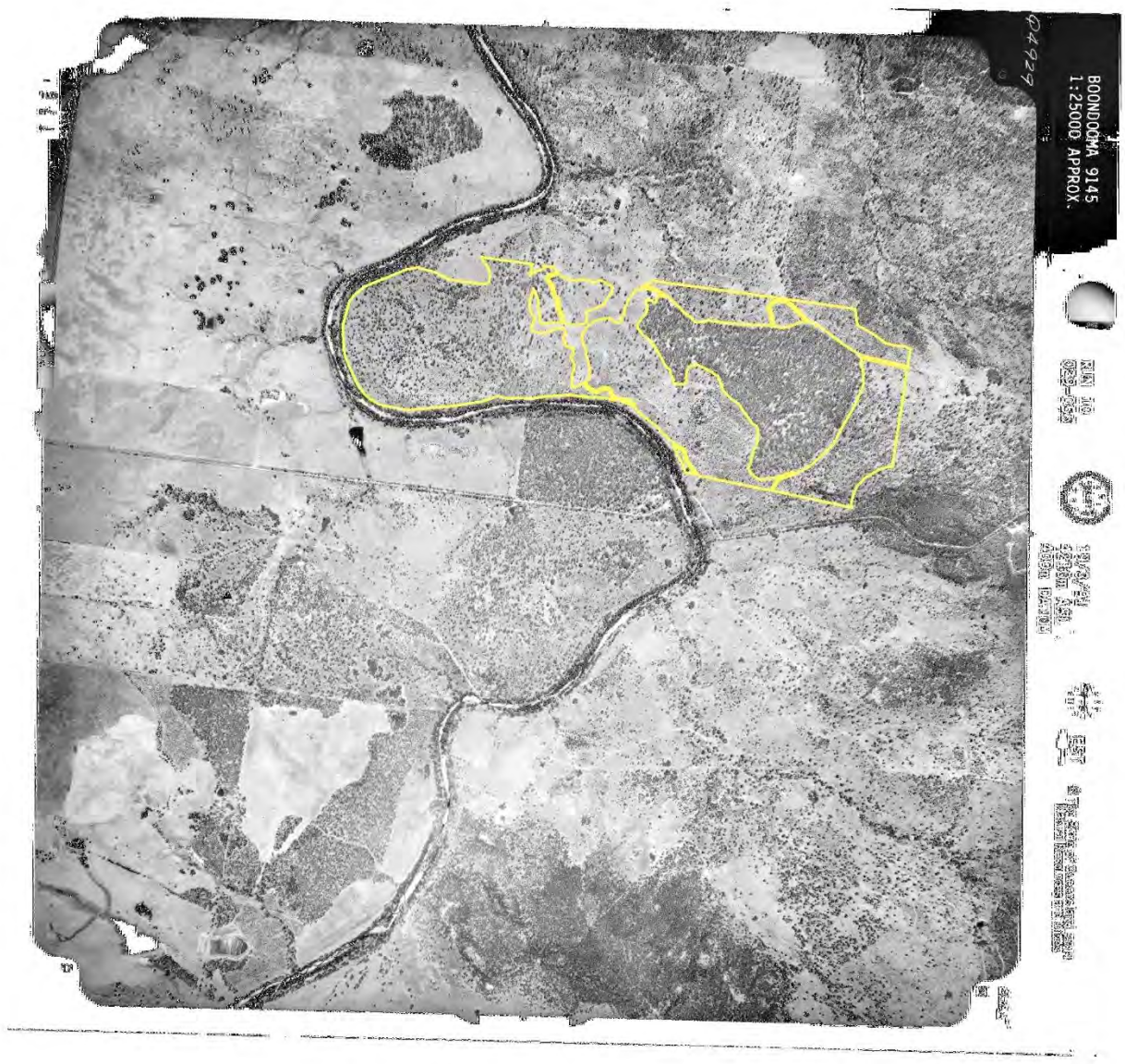

Plate 6: Aerial imagery of the offset area, dated 2002

Appendix 2: Title Search – Lot16 BO94

CURRENT TITLE SEARCH

NATURAL RESOURCES, MINES AND ENERGY, QUEENSLAND

Request No: 35615782
Search Date: 25/11/2020 10:44 **Title Reference: 13535041**
Date Created: 03/12/1962

Previous Title: 12882121
12882122

REGISTERED OWNER Interest

Dealing No: 711938918 23/09/2008

COLIN ANDREW SEILER JOAN MAY SEILER	JOINT TENANTS INTER SE	1/2
PETER ALFORD SEILER LYNNELLE EVELYN SEILER	JOINT TENANTS INTER SE	1/2
	AS TENANTS IN COMMON	

ESTATE AND LAND

Estate in Fee Simple

LOT 16 CROWN PLAN BO94
Local Government: SOUTH BURNETT

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
   Deed of Grant No. 12882121 (POR 16)
   Deed of Grant No. 12882122 (POR 16)

2. MORTGAGE No 713380272 29/07/2010 at 13:33
   SUNCORP-METWAY LTD A.B.N. 66 010 831 722

3. MORTGAGE No 718945581 23/08/2018 at 13:00
   QUEENSLAND RURAL AND INDUSTRY DEVELOPMENT AUTHORITY

ADMINISTRATIVE ADVICES - NIL
UNREGISTERED DEALINGS - NIL

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

COPYRIGHT THE STATE OF QUEENSLAND (NATURAL RESOURCES, MINES AND ENERGY) [2020]
Requested By: D-ENQ PROPERTY & TITLE SEARCH

Appendix 3: Request for VDEC

To be provided once the Offset Area has been approved

Appendix 4 : Terrestrial Ecology Reports

Terrestrial Ecology Data, Surat Gas Project: Off-tenure Pipelines and Associated Infrastructure

Impact area – desktop and field survey methodology

The methodology undertaken to assess the BioCondition of the impact areas in the Project site is described below.

The assessment consisted of a desktop analysis, including a literature review, followed by a number of field surveys. The impact area was surveyed by EcoSmart Ecology and 3D Environmental who were commissioned by Arrow Energy. The broader SGP project area was surveyed in detail during dry (September 2016) and wet (February/March 2017) seasons (EcoSmart Ecology and 3D Environmental, 2017). The off-tenure pipeline alignment impact areas were surveyed initially in December 2017 (EcoSmart Ecology and 3D Environmental, 2018) and again in December 2018 (EcoSmart Ecology and 3D Environmental, 2019) to give greater coverage of the various types of habitat within and adjacent to impacted easements. Arrow suitably qualified ecologists conducted mop up BioCondition surveys (n=25) in June 2020 to combine with those conducted by EcoSmart Ecology and 3D Environmental (n=41; 2018 and 2019) and complete a robust sample of the various different types of Koala habitat within the impact area.

The mapped locations for the Koala and its habitat are based on a combination of known species records, ground-verified mapping and Queensland Government 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 or regrowth vegetation with a mapped RE known or likely to provide habitat for the Koala, or contains other environmental features that provide microhabitats). Habitat criteria have been developed for the Koala and these are defined in EcoSmart Ecology and 3D Environmental (2019).

Prior to any clearing within the areas identified above, Arrow will conduct pre-clearance surveys that:

- Validate the presence of EPBC Act species core habitat or threatened ecological communities.
- Record GPS coordinates of the boundary of the core habitat in relation to the proposed clearing boundaries to ensure the limits of the area to be cleared are clearly marked on the ground (eg. high visibility flagging tape, hazard netting or similar) in accordance with the construction limits shown on construction drawings.
- 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 Koalas and the distinct koala scratch marks on smooth-barked trees and/or presence of scats.
- The coordinates and total area of cleared core habitat will be recorded and tracked against approved maximum disturbance limits, and used for annual compliance reporting. Mapping is updated as pre-clearance surveys are completed to confirm the presence or absence of core habitat.

Habitat quality scoring

The DAWE EOP and How to Use the Offsets Assessment Guide do not provide habitat quality survey guidelines or a methodology on how to calculate the habitat quality scores other than to state that the habitat quality score must consider site condition, site context and species stocking rate.

For the purpose of providing context to the quality of habitat assessed within the pipelines study area, the method applied in the EPBC Act Offset calculator has been completed. It is recognised that this method does not equate to impact criteria as per the EPBC Act Significant Impact Guidelines, however it does provide useful information to inform the suitability of habitat within the study area for the various MNES species. The 'Habitat Quality' from the EPBC Act Offset calculator uses three components: Site Context, Site Condition and Species Stocking Rates. Following advice from the DAWE, these components have been weighted as 30%/30%/40% respectively, resulting in an overall score out of 10 (i.e. 3+3+4), and calculated using the methodology summarised below.

Site Context

Site Context has been calculated using a subset of attributes from the Queensland '*Guide to determining terrestrial habitat quality*' (DEHP 2017). Using these attributes, the 'Site context' will score out of a maximum 56 and be converted into a score out of three for inclusion into the calculator. For example, a site context score of 44 would be converted for use in the EPBC Act calculator as 2.36; (44/56) x 3. Using the DEHP (2017) methodology, 'site context' is an estimation of the extent of remnant habitat within one kilometre of the BioCondition site. Following advice from DotEE, 'context' was modified to include both remnant and regrowth vegetation (when considered suitable for the target species) based on the a buffer distances of 20 km for Koala.

Site Condition

Site Condition has also been calculated using the attributes from DEHP (2017). Each attribute is evaluated by comparing the BioCondition data against published benchmarks for the Brigalow Belt Bioregion (Queensland Herbarium 2019). Where benchmarks are not available, BioCondition site data from the ecology assessment for the Surat Gas Project Supplementary EIS (3D Environmental and Ecosmart Ecology, 2013) was used if suitable benchmark data had been collected. Where no benchmark data was available surrogate REs were utilised and were supplemented with site-based observations of vegetation condition and disturbance. These attributes provide a score out of a possible 100 and have been converted to a score out of three for inclusion in the EPBC Act Offset calculator.

Species Stocking Rates

The Habitat Index value from the '*Guide to determining terrestrial habitat quality*' (DEHP 2017) is not directly related to the species stocking rate. Therefore, the species stocking rate has been determined separately, based on the presence of species records and usage of the site. 'Species Stocking Rates' have been evaluated as a score out of four as advised by DAWE using the following attributes:

- Presence of the species detected on or adjacent to site (out of a maximum score of 10),
- Species usage of the site (i.e. dispersal, foraging or breeding; out of a maximum score of 15), and

- The role/importance of the species population on site (out of a maximum score of 15) based on whether or not it is a key source population for breeding, a key source population for dispersal, necessary for maintaining genetic diversity and near the limit of the species range.

Impact site field survey data is in the Attached spreadsheet file titled ***2018_8223_ArrowPPL_Koala_HQS_11.08.2020 tab Impact data***

Please see file supplied separately

Attachment 1.2: Habitat Quality Assessment Report, Killara Offset Area, Umwelt; July 2020

Please see file supplied separately

Attachment 1.3: Targeted Fauna Survey Report, Killara Offset Area, Umwelt; July 2020

Please see file supplied separately