Stage 2 Offset Plan

EPBC 2012/6615

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1.0 Introduction

1.1 The GFD Project

The Gas Field Development Project (GFD Project) extends the approved GLNG Project's gas fields and will provide additional gas over more than 30 years. In addition to existing approvals, the GFD Project will continue to progressively develop the gas fields across Santos GLNG petroleum tenures in the Surat and Bowen basins, and associated supporting infrastructure in these tenures and adjacent areas.

1.2 Purpose

The purpose of this Offset Plan is to outline the management objectives, actions and outcomes necessary to fulfil Santos GLNG's statutory offset requirements. Under the Santos GLNG GFD Project approval (EPBC 2012/6615), Santos GLNG may carry out the action in project stages over time. Santos GLNG must deliver environmental offsets for residual significant impacts to Matters of National Environmental Significance (MNES) over time. This offsets plan has been prepared for Stage 2 of the GFD Project.

1.3 Scope

The GFD Project includes activities in the Maisey gas field on PL 1021 (see Figure 1). The Maisey field is located approximately 44 km northeast of Roma. For the purposes of the GFD Project approval (EPBC 2012/6615), Stage 2 of the GFD Project is associated with the development of PL 1021.

The offset obligations discussed in this Offset Plan do not include the offset obligations required by the:

- Santos GLNG Gas Fields EPBC Act approval (2008/4059);
- Santos GLNG Gas Transmission Pipeline (GTP) EPBC Act approval (2008/4096); or
- Santos GLNG LNG Facility EPBC Act approval (2008/4057).

1.4 Stage 2 Development

Petroleum activities proposed in PL 1021 will be typical of exploration, development, operational and decommissioning phases of a petroleum and gas project and will include:

- Approximately 180 petroleum production wells;
- Gas and water gathering systems / pipelines;
- Powerlines and communication lines / infrastructure (above and below ground);
- Access tracks and roads;
- Water management infrastructure;
- Temporary and permanent accommodation facilities (including sewage treatment plants); and
- Ancillary infrastructure / incidental activities.

Through the implementation of Santos GLNG's comprehensive planning and infrastructure location process, all reasonable disturbance avoidance measures will be implemented. Where unavoidable significant residual impacts do occur to any EPBC Act listed threatened species or communities, offsets will be provided.

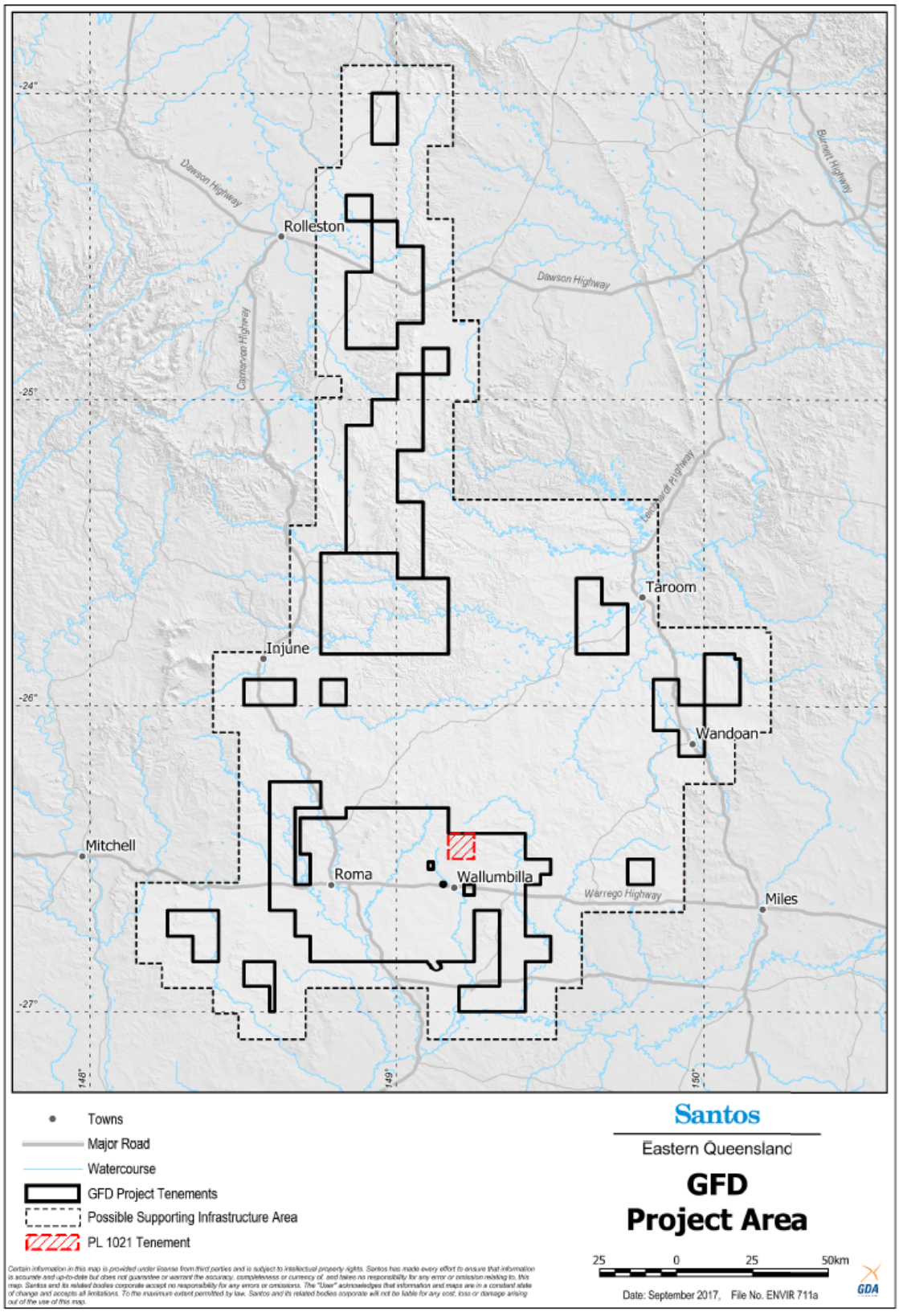


Figure 1-1 The Location of PL 1021

2.0 Legal and other Requirements

2.1 The Environmental Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)

The EPBC Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora and fauna species and ecological communities. The EPBC Act focuses Australian Government interests on the protection of Matters of National Environmental Significance (MNES), with the states and territories having responsibility for matters of state and local significance. MNES includes listed threatened species and communities.

The EPBC Act provides the primary source of environmental offset obligations for the Santos GLNG GFD Project via the EPBC Act Approval No EPBC 2012/6615. The approval conditions that relate to offsets and how they are addressed by this plan is provided in Table 2-1. This approval requires Santos GLNG to offset residual significant impacts. Specifically the EPBC Act Approval 2012/6615 states that the environmental offsets comply with the principles of the EPBC Act Environmental Offsets Policy. The overarching principles applied in determining the suitability of offsets are set out in the policy. These principles are listed below and an assessment against these principles for each matter potentially impacted is detailed in Section 4.5.

Suitable offsets must:

1. deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action;
2. be built around direct offsets but may include other compensatory measures;
3. be in proportion to the level of statutory protection that applies to the protected matter;
4. be of a size and scale proportionate to the residual impacts on the protected matter;
5. effectively account for and manage the risks of the offset not succeeding;
6. be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action, see section 7.6);
7. be efficient, effective, timely, transparent, scientifically robust and reasonable;
8. have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

2.2 Obligations Under Other Legislation

The offsets provided for in this management plan are additional to what is already required and determined by laws other than the EPBC Act. The proposed offset does not acquit any other offset or provide a carbon credit.

2.2.1 Fire Management

An application for a 'Permit to Light Fire' is made under the *Fire and Emergency Services Act 1990*. However, there are no existing land management obligations that prescribe or exclude fire for ecological outcomes. Fire Management Guidelines exist which provide information for managing fire for ecological objectives and are designed to enhance biodiversity (Queensland Herbarium 2018). However, these are guidelines only and do not form land management obligations.

2.2.2 Pest and Weed Management

2.2.2.1 The general biosecurity obligations

Under the *Biosecurity Act 2014* (QLD), a person has a general biosecurity obligation (GBO). Under the GBO, individuals and organisations whose activities pose a biosecurity risk must:

- take all reasonable and practical steps to prevent or minimise each biosecurity risk;
- minimise the likelihood of causing a 'biosecurity event', and limit the consequences if such an event is caused;
- prevent or minimise the harmful effects a risk could have, and not do anything that might make any harmful effects worse.

A Biosecurity Risk includes a risk of any adverse effect on social amenity, the economy or the environment. Grazing beef cattle on exotic pasture grasses is a key land use in central Queensland and is a key contributor to the social amenity and the local economy. The presence of economically advantageous exotic pasture species throughout central Queensland is unlikely to be considered a biosecurity risk and therefore the voluntary control of these species is considered additional to the GBO.

In addition, reasonable steps to control a biosecurity risk are unlikely to extend to the types of weed and pest control measures proposed in this plan. The programs run as part of this offset plan, including the pest fauna control program conducted in partnership with the Queensland Murray-Darling Committee (QMDC), have been entered into optionally and are not legally required

2.2.2.2 Restricted and Prohibited Matters

The exotic pasture grass species of most concern in this plan are not Restricted Matters or Prohibited Matters under the *Biosecurity Act 2014*. Several *Opuntia* spp. known throughout the region are listed as Category 5 invasive plant. A person must not keep a Category 5 invasive plant.

Restricted invasive animals include dogs, cats, foxes and pigs. A person has the following restrictions placed upon them when dealing with these invasive animals:

- The invasive animal must not be distributed either by sale or gift, or released into the environment.
- The invasive animal must not be moved.
- The invasive animal must not be fed.
- The invasive animal must not be kept.

The proposed management actions in this plan do not include any of the above listed obligations that relate to restricted and prohibited invasive plants and animals.

Table 2-1 Santos GLNG Gas Field Development Project (EPBC 2012/6615) Offset Conditions

Condition		How the conditions are met
EPBC Act approval 2012/6615		
11	The approval holder must ensure that environmental offsets comply with the principles of the EPBC Act Environmental Offsets Policy.	This plan complies with the principles of the EPBC Act Environmental Offsets as discussed in Section 2.14.5. An assessment against these principles for each of the matters potentially impacted by Stage 2 of the project is provided in Section 4.5.
12	The approval holder may carry out the action in project stages. The approval holder must deliver environmental offsets for residual significant impacts to matters of national environmental significance for each project stage.	The action will be carried out in stages. This Project Offset Plan covers Stage 2 of the GFD Project as described in Section 3.1. .
13	The approval holder must submit an Offset Management Plan for the Minister's written approval. The Offset Management Plan may be prepared and submitted to the Minister for written approval in stages. If the approval holder submits the Offset Management Plan in stages, each stage of the Offset Management Plan must correspond with a project stage.	This plan has been submitted for the Minister's written approval. This Project Offset Plan covers Stage 2 of the GFD Project as described in Section 1.4.
14	The Offset Management Plan must include: a. a method for assessing residual significant impacts to EPBC threatened species, EPBC migratory species and EPBC communities; b. results from pre-disturbance surveys and/or an alternative approved methodology (if used) for the project stage as required under conditions 4 and 5; c. details of the offset areas required to address residual significant impacts to EPBC threatened species, EPBC migratory species and EPBC communities for the project stage; d. a survey and description of the current condition (prior to any management activities) of each offset area proposed, including existing vegetation (the baseline condition). This must include a shapefile of each offset property boundary; e. information about how the offset areas provide connectivity with other relevant habitats and biodiversity corridors, including a map depicting the offset areas in relation to other habitats and biodiversity corridors;	a. The method for assessing residual significant impacts to EPBC threatened species, EPBC migratory species and EPBC communities is discussed in Section 3.2.3. b. Details of the relevant field assessment are provided in Section 3.0. c. The offset area is the Springwater Offset Area (SOA) details of the SOA are provided in Section 4.2. d. Details of the baseline surveys are provided in Section 4.0. This includes the results of the 2017 detailed monitoring assessment completed in accordance with this management plan. e. The connectivity and the landscape context of the SOA are discussed in detail in Section 4.2.3.1. f. Performance criteria, trigger levels, completion criteria and remedial actions for management activity undertaken in the SOA are discussed in Section 6.0. g. Management measures implemented for the protection of MNES, including how measures outlined take into account

Condition		How the conditions are met
	f. performance and completion criteria for evaluating the management of the offset area, and criteria for triggering remedial action (if necessary); g. a description of the management measures that will be implemented for the protection of EPBC threatened species, EPBC migratory species and EPBC communities, including a discussion of how measures outlined take into account relevant conservation advice and are consistent with the measures in relevant recovery plans and threat abatement plans; h. a program to monitor and report on the effectiveness of these measures, and progress against the performance and completion criteria; i. a description of potential risks to the successful implementation of the plan, and a description of the contingency measures that would be implemented to mitigate against these risks; j. a timeline for when actions identified in the Offset Management Plan will be implemented for each offset area; and k. the proposed legal mechanism for securing the offset.	relevant conservation advice and are consistent with the measures in relevant recovery plans and threat abatement plans are provided in Section 7.0. h. The monitoring program for the SOA is outlined in Section 8.0. i. Risks to the successful implementation of this plan are outlined in Appendix D j. An implementation Schedule is provided in Section 8.6. k. Section 4.4 details how the offset for GFD Project has been legally secured.
15	The approval holder must not commence the action until the Offset Management Plan has been approved by the Minister in writing. The approved Offset Management Plan must be implemented by the approval holder.	This offsets plan complements previous offsets plans and proposals submitted for approval. Once approved, this plan will be implemented.
16	The approval holder must register and legally secure offsets for the first project stage identified in the Offset Management Plan within two years of commencement of the action.	On 6 April 2018, the voluntary declaration was certified, thereby satisfying the legal security requirement. The SOA as an area of high nature conservation value under section 19F of the *Vegetation Management Act 1999.* See Section 4.4 for details.
17	The approval holder must register and legally secure offsets for a project stage which are sufficient to acquit the residual significant impacts of that project stage.	The offset for GFD Project is secured as an area of high nature conservation value secured for the purposes of an environmental offset under section 19F of the Vegetation Management Act 1999. See Section 4.4 for details.
18	If the approval holder submits the Offset Management Plan in stages, the approval holder must prepare and submit an updated Offset Management Plan for each subsequent project stage, for written approval by the Minister. The updated Offset Management Plan must: a. include the information required for the Offset Management Plan at condition 14 for the relevant project stage; b. include a reconciliation of actual residual significant impacts to EPBC threatened species, EPBC migratory species and EPBC communities	A new offset plan will be submitted for all subsequent stages of the project.

Condition		How the conditions are met
	against offsets secured for the previous project stage. The reconciled offset obligations may be subtracted from the obligations required for the subsequent project stage; and c. demonstrate how the offset builds on offsets already secured for previous project stages and will contribute to a larger strategic offset for cumulative project impacts.	
19	The approval holder must not commence the subsequent project stage until: a. the Offset Management Plan, updated for that project stage, has been approved by the Minister in writing; and b. the offset for that project stage has been registered and legally secured in accordance with Queensland legislation.	This management plan is submitted for the approval of the Minister.

3.0 Offset Assessment Methodology

3.1 Staging Plan

Environmental offsets for the Santos GFD project will be acquitted in stages. For each offset stage of the GFD Project an environmental offsets plan will be developed. The environmental offset plan for each stage will:

- Report on the methodology and results of the environmental assessments completed over the proposed disturbance area (e.g. desktop and field ecological assessment results).
- Report on the measures to be taken to avoid, mitigate and manage impacts to MNES.
- Details of the proposed infrastructure and land disturbance activities in relation to areas identified as MNES.
- Identify actual significant residual impacts on MNES for each stage.
- Reconcile the offsets obligations, post disturbance, against the advanced offsets provided.

An indicative flow diagram demonstrating the staging process is provided in Figure 3-1

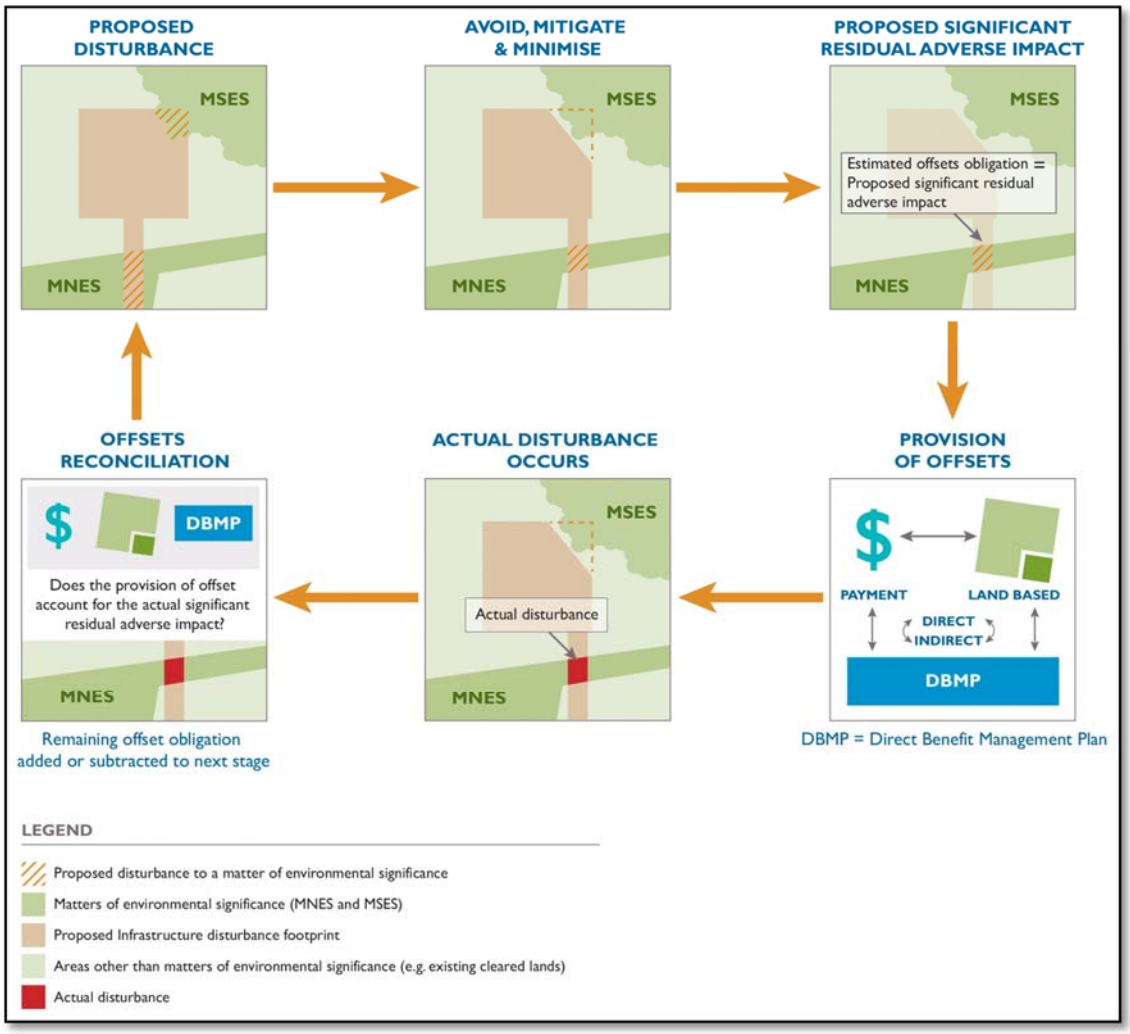


Figure 3-1 The Santos GLNG Staging Process

This offsets management plan has been written for Stage 2 of the GFD project and follows the Stage 1 Offset Plan approved by the Minister in writing on 31 October 2016. In accordance with Condition 18 of EPBC Act approval 2012/6615, Santos GLNG must prepare and submit an updated Offset Management Plan for each subsequent project stage. Each Offset Management Plan must include a reconciliation of actual residual significant impacts to EPBC threatened species, EPBC migratory species and EPBC communities against offsets secured for the previous project stage. Once reconciled, the offset obligations from previous stages (Stage 1) will be subtracted from the obligations required for this project stage (ie Stage 2). Stage 1 of the project did not incur any significant residual impacts to any MNES.

3.2 Methods for Assessment Stage 2 Impacts

3.2.1 Ecological Survey and Assessment

A targeted terrestrial ecology assessment of the Stage 2 impact area was undertaken by Boobook Ecological Consulting in March and April 2017. The assessment involved a desktop literature review and a field survey. The purpose of this assessment was to provide baseline ecological data for the GFD Project generally and to inform future offset obligations. Specifically the assessment involved identifying the following ecological values:

- Regional ecosystem (RE) mapping using the functional RE condition thresholds;
- Quantification of Threatened Ecological Communities (TEC);
- EPBC Act listed threatened fauna and *Nature Conservation Act 1992* (NC Act) listed Endangered and Vulnerable fauna general habitat mapping and assessment;
- EPBC Act and NC Act listed Endangered, Vulnerable and Near Threatened (EVNT) flora general habitat mapping and assessment;
- Searches for the presence of EPBC Act or NC Act EVNT flora, including review of the flora survey trigger map; and
- Incidental EVNT fauna observations.

A desktop assessment was conducted to inform the field survey. Sources of information utilised during the desktop assessment included Queensland State mapping sources for remnant regional ecosystems, mature regrowth and Essential Habitat; the Protected Plants Flora Survey Trigger Map; and Wildlife Online fauna and flora records. The EPBC Act Protected Matters Search Tool was also interrogated for information on potential or known presence of listed flora, fauna and threatened ecological communities.

In-field verification of desktop findings and additional findings of significance were undertaken in general accordance with the following:

- *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner et al. 2012);
- Santos *Methodology for Conducting Ecological Assessments* – GLNG Areas Rev 4.1 (Santos 2014); and
- Santos *Functional Thresholds for Assessing Regional Ecosystem Functionality* (Santos 2015).

The vegetation requiring assessment and mapping was within the entirety of the tenement however, ground-truthing of all vegetation was only possible for a series of lot/plans for which land access was available.

3.2.1.1 Regional Ecosystem and Threatened Ecological Community Assessment

Ground-truthing (and confidence level scoring) of the DSITI regional ecosystem (RE) designation was undertaken using the quaternary level of data collection as described by Neldner et al. (2012).

Assessments were undertaken within 50 m x 10 m plots (as appropriate) for the purpose of typifying the vegetation community under assessment. The number of vegetation community assessments undertaken at each property depended on the diversity of vegetation communities present at each. Plots were chosen within representative areas of each vegetation type encountered.

Vegetation community polygons were verified in accordance with Queensland RE description and biodiversity status as per the Regional Ecosystem Description Database (REDD) (DSITI 2016a) and classified as remnant RE, vegetation consistent with RE or non-remnant vegetation (Santos 2015). For each area of potential Threatened Ecological Community (TEC) an assessment of vegetation survey data was made against published TEC threshold criteria (TSSC 2001, 2008, 2013).

Vegetation community data was captured in the field and entered into Santos-specific data fields within spatial databases via Motion tablet devices. Representative photographs were taken via a Canon digital camera at each vegetation survey site and at vegetation patches as supporting evidence of the identity of the subject vegetation community where full documentation was not required. Capture and delineation of RE and TEC boundaries was undertaken using a combination of mobile GIS devices, GPS and/or delineation from imagery. A minimum mappable width of 30 m for linear vegetation corridors (e.g. road corridors and shade lines) was applied. Patches were mapped to their full extent within the Site within practical limits (including land access constraints).

For identified regrowth (i.e. vegetation floristically equivalent to an RE but not meeting structural thresholds of remnant RE) an ecosystem functionality assessment was conducted. This assessed selected vegetation characteristics against the parameters described in Santos (2015).

3.2.1.2 Threatened Species Habitat Assessment and Mapping

Microhabitat assessments were undertaken in conjunction with vegetation community surveys at each survey plot, or as required where significant variation in the type and abundance of habitat features occurred. The results of these assessments, combined with ecologist knowledge, were used to predict habitat suitability for the following species:

- *Chalinolobus dwyeri* (Large-eared Pied Bat, Large Pied Bat);
- *Dasyurus hallucatus* (Northern Quoll);
- *Nyctophilus corbeni* (South-eastern Long-eared Bat, Corben's Long-eared Bat);
- *Ornithorhynchus anatinus* (Platypus);
- *Petauroides volans* (Greater Glider);
- *Phascolarctos cinereus* (Koala);
- *Tachyglossus aculeatus* (Short-beaked Echidna);
- *Calidris ferruginea* (Curlew Sandpiper);
- *Calyptorhynchus lathami* (Glossy Black-Cockatoo);
- *Erythrotriorchis radiatus* (Red Goshawk);
- *Geophaps scripta scripta* (Squatter Pigeon (Southern));
- *Grantiella picta* (Painted Honeyeater);
- *Rostratula australis* (Australian Painted Snipe);
- *Acanthophis antarcticus* (Common Death Adder);
- *Aspidites ramsayi* (Woma);
- *Delma torquata* (Collared Delma);
- *Denisonia maculata* (Ornamental Snake);

- *Egernia rugosa* (Yakka Skink);
- *Elseya albagula* (White-throated Snapping Turtle);
- *Furina dunmalli* (Dunmall's Snake);
- *Hemiaspis damelii* (Grey Snake);
- *Rheodytes leukops* (Fitzroy River Turtle);
- *Strophurus taenicauda* (Golden-tailed Gecko);
- *Maccullochella peelii* (Murray Cod);
- *Jalmenus eubulus* (Pale Imperial Hairstreak);
- *Cadellia pentastylis* (Ooline);
- *Dichanthium setosum* (A bluegrass);
- *Homopholis belsonii* (Belson's Panic);
- *Picris barbarorum* (Hawkweed);
- *Rutidosis lanata* (Red-soil Woolly Wrinklewort);
- *Solanum stenopterum* (Winged Nightshade);
- *Swainsona murrayana* (Slender Darling-pea); and
- *Tylophora linearis* (Slender Tylophora).

These results were used to develop GIS-based mapping of potential habitat for the identified species within the Site. Additionally, further habitat assessment was performed for each assessment site using the Habitat Mapping and Assessment Tool (HMAT: Santos (2016)).

3.2.1.3 Threatened Flora Survey

Targeted surveys for threat-listed flora were informed by the desktop search results and local experience. Searches for threat-listed flora under the EPBC and/or NC Act were carried out at vegetation assessment sites and in random meanders in targeted habitat types, including remnant and non-remnant vegetation.

If detected, counts and extent of each population of threat-listed flora were made as well as structural characteristics and representative photographs taken. Data was recorded using the Santos-specific Notable Species - Flora Point or Region data capture layer.

3.2.1.4 Incidental Threatened Fauna Records

Any incidental records of threatened fauna obtained during vegetation assessments and general property traverses to and between sites (on foot and driving) were fully documented including species name, location (with site co-ordinates or area of extent), habitat and number detected.

3.2.1.5 Survey Limitations

Due to land access constraints within the Site many vegetation polygons identified within this report have not been ground-truthed. Vegetation mapping accuracy was dependent on the ability to examine areas in the field, reliability of imagery interpretation and the degree of heterogeneity within given vegetation polygons (i.e. diversity of RE present) (Neldner et al. 2012). Individual mapped vegetation polygons have been assigned a confidence level (high, moderate, low) for both boundary accuracy and vegetation attributes within the polygon. Within the spatial database confidence ratings are designated as 'A' for high, 'B' for moderate and 'C' for low. The following schema was applied to vegetation polygons:

Table 3-1 Boundary accuracy confidence ratings applied to mapped polygons

Boundary Accuracy			
Confidence	**Range of Accuracy**	**Homogenous Patches**	**Heterogeneous Patches**
High (A)	<1 - <10 m	Ground-truthed on site, or viewed at a distance	Ground-truthed on site
Moderate (B)	>10 - <50 m	Not ground-truthed (image interpretation only)	Portion ground-truthed on site
Low (C)	>50 - >200 m	nil	No ground truthing: vegetation viewed at a distance or image interpretation only

Table 3-2 Vegetation attribute confidence ratings applied to mapped polygons

Boundary Accuracy		
Confidence	**Homogenous Patches**	**Heterogeneous Patches**
High (A)	Ground-truthed on site	Ground-truthed on site
Moderate (B)	No ground truthing: vegetation viewed at a distance	Portion ground-truthed on site
Low (C)	Image interpretation only	No ground truthing: vegetation viewed at a distance or image interpretation only

In some instances vegetation communities could not be readily assigned to an RE, even when ground-truthed, as their floristics and structure reflected historical disturbance patterns such as clearing, thinning and fire history. In these cases RE have been allocated on the basis of 'best fit' with current RE descriptions.

For areas of vegetation for which land access was not possible microhabitat assessments were not performed as the presence and abundance of microhabitat features could not be assessed. As a result predictive flora and fauna habitat mapping for these areas was given a low confidence level. A conservative approach has been taken with regard to mapping of species habitat where no ground-truthing has been undertaken. That is, where patches have not been ground-truthed, relevant fauna and flora habitat features were assumed to be present and patches have been mapped as habitat until further assessments can be undertaken.

Threatened fauna searches were confined to incidental observations only (i.e. no trapping or targeted search techniques were employedAdditional survey effort would provide more detailed knowledge to complement RE- and microhabitat assessment-based predictions of EVNT fauna use of the Site.

Timing (season) and duration of the survey period during autumn and following some localised rainfall was generally favourable for identification of plants. However, rainfall varied between locations within the Site and it is possible that some herbaceous threatened flora species (e.g. Picris barbarorum) potentially present in these locations were not detectable.

3.2.2 Ecological Assessment 2018 and 2019

Between 23- 26 October 2018 and 19 – 20 February 2019, Boobook Ecological Consulting undertook a series of BioCondition and MNES fauna habitat quality assessments at selected sites within the Stage 2 impact area.

The methodology employed in these assessments is detailed below.

3.2.2.1 BioCondition Survey

To assist in the evaluation of the Site's ecological function and condition a series of BioCondition assessments were undertaken. BioCondition assessments were completed at 16 sites which were pre-selected within each mapped AU or RE type. Ground-truthed RE mapping undertaken in an earlier broad-scale assessment of the ecological values of the gas field (BOOBOOK 2017) informed site selection.

BioCondition assessments were undertaken as per the methodologies described by Eyre et al. (2011, 2015). This involved the establishment of a 100 m x 50 m transect containing five assessment areas (plots/quadrats) to record values for defined ecological attributes. These values were used as indicators to provide a quantitative measure for the performance of ecosystem function within the context of biodiversity conditions.

The following information was recorded at each BioCondition site:

- Date;
- Observers;
- Description of location (bioregion, general description, co-ordinates for plot origin and centre, plot bearing and alignment);
- General habitat description and RE type;
- Median height for canopy, emergent and sub-canopy strata;
- Slope position/slope degree and slope aspect;
- Tree species richness (within 100 m x 50 m plot);
- Native plant species richness (within 50 m x 10 m plot);
- Non-native plant cover (within 50 m x 10 m plot);
- Total length of coarse woody debris (length >10 cm diameter and >0.5 m long within 50 m x 20 m plot);
- Number and average diameter at breast height (DBH) of large eucalypt and non-eucalypt trees (within 100 m x 50 m plot);
- Recruitment of canopy species (within the 100 m x 50 m plot);
- Tree and shrub canopy cover (within 100 m transect);
- Ground cover within 1 m x 1 m plots (native perennial grass and organic litter cover in the ground layer);
- Disturbances (severity, last event and observation type).

Large tree DBH thresholds for each RE were used where benchmark documents were available, otherwise the default ≥30 cm DBH for eucalypts and ≥20 cm DBH for non-eucalypts was applied.

Site photographs were taken using a Canon digital camera in accordance with Eyre et al. (2011, 2015) (i.e. one photograph at plot origin and north, east, south and west photographs at the plot centre). Photograph numbers were recorded. Locations of BioCondition sites were determined using a handheld Global Positioning System (GPS) (Garmin GPSmap 78S) and BioCondition assessment data was captured by mobile GIS devices (Motion F5T tablet device).

Field data was recorded using the BioCondition reference site sheet template (Eyre et al. 2011) to ensure data was collected consistently for all sites regardless of whether a benchmark document was available for any particular RE or not. Canopy recruit and non-native plant cover attributes are not normally recorded on this template; however this data was added to field sheets so it could be used for calculating BioCondition scores. Site data has been presented as either BioCondition assessment or reference form templates to differentiate between sites with or without published benchmarks. Due to current and proposed land use (grazing and/or coal seam gas development) of the BioCondition site locations, permanent 0 m and 50 m markers were not established using steel fence posts as described in the methodology of Eyre et al. (2015) and Eyre et al. (2011).

Scores for BioCondition sites were calculated in accordance with Eyre et al. (2015) which compares the values obtained at each survey site with values in the benchmark document for that particular RE (DSITI 2016). Sub-scores are awarded to each site and landscape attribute then are added together and divided by the maximum possible score for that RE. This provides a numeric value along a continuum of biodiversity condition, where scores closer to 0 indicates that sites are 'dysfunctional' and those closer to 1 indicates that sites have 'functional' condition.

3.2.2.2 Fauna Habitat Quality Assessment

Habitat quality assessments were completed at the 16 client-identified sites, which were each within a mapped RE type (or AU), using the methodologies described in DEHP (2017).

Habitat quality assessment included three elements: a site condition assessment, based on the BioCondition methodologies described by Eyre et al. (2011, 2015) and above in section 2.1.1; a site context assessment of vegetation patch size and connectivity; and a fauna species habitat index score (DEHP 2017).

For the purposes of developing a weighted (i.e. patch size-corrected) habitat quality score for each AU, the Impact Area within the site must be defined. We calculated this as the summed area of all mapped remnant or regrowth RE (BOOBOOK 2017) within the Maisey construction footprint as defined by Santos.

Site Condition: Although BioCondition measures some microhabitat features, such as length of coarse woody debris, and leaf litter cover, not all fauna habitat features likely to be utilised by threatened fauna are measured under the BioCondition methodology. Presence/absence, abundance or density of habitat features was recorded within a 50 m x 50 m plot at each survey site including:

- embedded and loose rocks and boulders: (estimated % cover);
- logs (abundance);
- trees >18m height (abundance);
- logs with hollows (abundance);
- trees with hollows (abundance);
- trees and/or logs with loose bark (abundance);
- burrows, sinkholes and tunnel erosion (abundance);
- fallen bark (estimated % cover);
- shrub layer (estimated % cover);
- ground cover (estimated % cover);
- leaf litter (estimated % cover);
- termite mounds (abundance);
- mistletoe (abundance);
- rock structures (caves, overhangs and crevices);
- cliffs, escarpments and steep rocky slopes within 5km (presence);

- watercourses with permanent water, pools and riffles and abundant woody/rock cover (presence);
- cracking clays soils (presence);
- gilgai and ephemeral wetlands (presence); and
- canopy dominated by Myrtaceae species (presence).

Site Context: The value of a given patch (AU) of vegetation as fauna habitat is impacted by its size and the degree to which it is connected to adjacent habitat areas. Desktop GIS analysis was used to determine AU size and calculate connectedness and context as defined in DEHP (2017). Proximity to mapped ecological corridors was calculated by interrogation of 'Riparian' and 'Terrestrial' features in the Queensland biodiversity and vegetation offsets special features map, as per DEHP (2017).

Species Habitat Index: A qualitative index of habitat value (DEHP 2017) was derived for each of the target species through ecologist field assessment of site characteristics and knowledge of target species ecology. For each AU, a ranking was assigned for each of the following criteria: threats to species; quality and availability of food and foraging habitat; quality and availability of shelter; capacity for species mobility; and potential role of the AU in maintaining the overall population of the species.

3.2.2.3 Threatened Fauna Active Searching

No comprehensive fauna surveys, i.e. those using trapping or acoustic techniques, were undertaken under this Scope of Works. Fauna surveys were limited to active searches within each AU. They included the following:

- Terrestrial reptiles (Collared Delma, Dunmall's Snake): overturning rocks, logs, fallen bark and other ground debris and raking leaf litter, to encounter live animals or evidence of presence (e.g. characteristic sloughed skins).
- Yakka Skink: scanning logs for basking reptiles, checking large logs for evidence of occupation (active burrows scat piles ("latrines").
- Koala: scanning canopy trees for animals, examining smooth-barked trees for characteristic scratch marks.

The timing (season) of the survey period during late October and following good falls of rain was favourable for the detection of the three reptile species (DSEWPAC 2011, Eyre et al. 2012). Subsequent surveys in February 2019 occurred during an extended dry period with hot temperatures and the conditions were likely to have had restricted reptile activity. Wetland habitat potentially suitable for the Australian Painted Snipe was only encountered during the February 2019 survey period, at which time this habitat was dry and thus not available to this or other wetland fauna.

3.2.2.4 Survey Limitations

The field investigations undertaken were limited to active searching (e.g. no live trapping) during the habitat assessment field program. Additional survey effort would be required to provide a more comprehensive inventory of species, both threatened and common. Additional survey effort would provide more detailed knowledge to complement RE- and microhabitat assessment-based predictions of EVNT fauna use of the Site.

One RE occurring at the Site did not have a benchmark document available, this being RE 11.7.6. To score this AU, at least three reference BioCondition sites per unit should be sampled to generate thresholds for each RE. Survey sites should also be placed >3 km apart and within patches >5 ha (Eyre et al. 2011). This was not practical during this survey due to limited access in parts of the Site.

The field assessment included identification of remnant and regrowth regional ecosystems (RE), condition assessment (using the BioCondition methodology) and fauna habitat values assessment. 12

assessment units (AU) were surveyed resulting in completion of 16 BioCondition (one reference and 15 assessment) and habitat quality assessments sites.

Fauna habitat quality assessments were conducted for relevant threatened fauna species listed under the EPBC Act and considered potentially present or likely to be present within the gas field.

3.2.3 Significant Residual Impacts

In accordance with the EPBC Act Environmental Offsets Policy and the offset requirements conditioned by the Commonwealth Minister for the Environment, all residual impacts to MNES must be offset. Santos GLNG is finalising a standardised methodology to assess the nature and extent of an impact on species and communities protected under the EPBC Act. The methodology is designed to be consistent with the EPBC Act Environmental Offset Policy and is written to meet Condition 14a of the EPBC Act approval 2012/6615. This methodology is yet to be agreed with the Department of Environment and Energy (DEE). Once agreed the methodology will be utilised to confirm and acquit final offset obligations for each subsequent project stage of the GFD project in accordance with the approach outlined in the Santos GLNG GFD Project EIS Offset Strategy (Appendix AB).

Section 15 of the Environmental Offsets Act 2014 (Qld) restricts the imposition of offset conditions in Queensland. An offset condition may only be imposed if the same, or substantially the same, impact and prescribed environmental matter has not been assessed under a relevant Commonwealth Act (i.e. EPBC Act assessment). Because the methodology is yet to be finalised, the Queensland Department of Environment and Science (DES) require offset obligations for all disturbances, irrespective of habitat class or disturbance type.

For the purposes of this Stage 2 Offsets Plan, all disturbances to threatened species habitat and threatened ecological communities are considered residual significant impacts.

3.3 Methods for Assessing the Offset Site

Santos GLNG has identified the Springwater property as containing suitable environmental values to acquit offset obligations incurred by the development of Stage 2 of the GFD Project. Springwater is a 12,636 ha grazing property described as Lot 8 on Plan SP261936 and is located within the local government area of Maranoa Regional Council, approximately 46 km east-northeast of Injune, southern inland Queensland.

The offset management area is located in the northeast sections of the Springwater property (Figure 3) and is called the Springwater Offset Area (SOA). The SOA is bounded by the Hutton Creek in the west and the property boundary of Fairview Station in the north and the east.

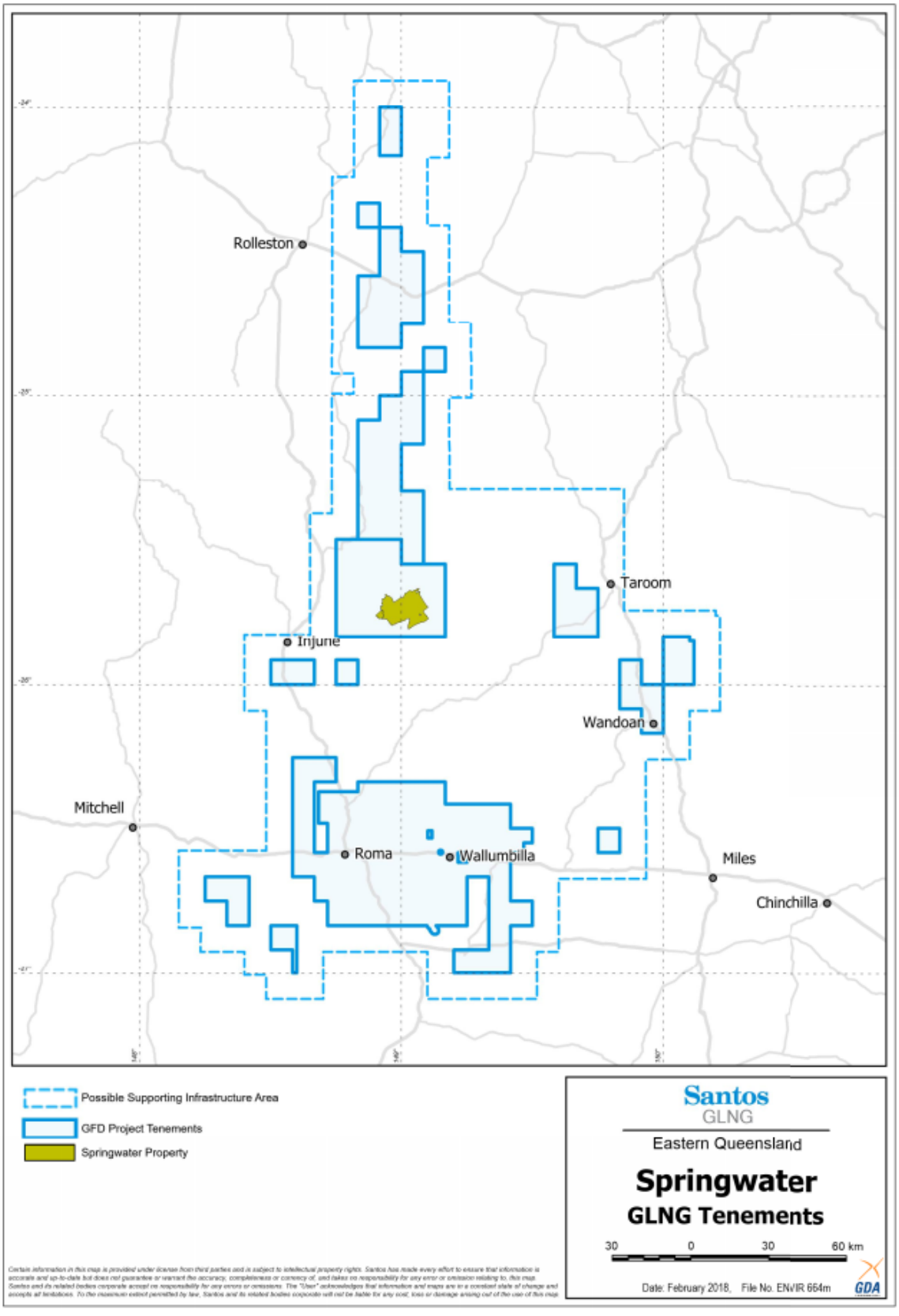


Figure 3-2 Location of Springwater Property

3.3.1 Ecological Survey and Assessment in the SOA

3.3.1.1 Detailed Assessment and Monitoring Event Spring 2017

Section 9.0 of the approved Stage 1 Offsets Plan required a detailed monitoring event to adequately assess and monitor the ecological condition of the offset. Between the 16th and 21st of October 2017, Terrestria Pty Ltd conducted a detailed monitoring event (Terrestria, 2018). The monitoring event was scheduled to coincide with the spring / early summer optimal time of year for flora and fauna surveys in the Brigalow Belt Bioregion (Eyre et. al, 2012). Details on the results of these surveys are provided in Section 5.0. The requirements for the detailed monitoring event conducted in 2017 included:

- General field assessment as outlined in Section 9.1.2 of the Stage 1 Offset Plan;
- Establishing and completing 10 BioCondition sites; one in each of the vegetation units identified in Table 4 of the Stage 1 Offset Plan as well as photo monitoring points;
- Threatened flora survey and assessment to identify the locations of any threatened flora species and to map the extent of threatened flora habitat for all Endangered, Vulnerable and Near Threatened (EVNT) species listed under either the Nature Conservation Act (1992) (NC Act) or the EPBC Act present within the SOA. All flora species observed whilst undertaking threatened flora surveys were documented.
- Fauna surveys targeting the species listed in Table 5 of the Stage 1 Offset Plan (Note: all fauna species observed during fauna surveys were documented); and
- In addition to the BioCondition canopy cover, additional canopy cover analysis was conducted to assess the two Brigalow regrowth communities (regrowth and young regrowth). This involved an additional 2 x 50m transects to assess canopy cover. The location of the start and finish were marked with flagging tape and GPS so the same transect can be assessed in 2018. Note: This assessment replaces the Geographic Information System (GIS) canopy analysis discussed in Section 9.1.1 of the Stage 1 Offset Plan.

3.3.1.2 Rapid Assessment and Monitoring Event Spring 2018

Field assessments of the SOA were conducted during spring and early summer (12 - 16 November 2018) to coincide with the optimal time of year for flora and fauna surveys in the Brigalow Belt Bioregion (Eyre et al., 2012). The location of the field assessment was informed by the results of previous site assessments (i.e. Boobook, 2015a/b). During flora and fauna surveys, fences tracks and existing gas field infrastructure were inspected to ensure access and development has been excluded from the SOA and that grazing can be properly controlled.

3.3.1.3 Rapid Monitoring Event

The field assessment was informed by the results of previous assessments. During each rapid monitoring field assessment, the following will conducted:

- Fences tracks and existing gas field infrastructure will be inspected to ensure grazing has been excluded from all of the Springwater Management Areas and access and development has been excluded from the SOA.
- An unbounded timed meander flora and fauna survey will be conducted. The survey will be conducted in accordance with the timed meander survey methodology contained within the Queensland Department of Environment and Heritage Protection's Flora Survey Guidelines. The following will be conducted:
    - An assessment of the presence and abundance of dominant flora and fauna species.
    - A dedicated flora survey of the ground layer to assess groundcover species richness and recruitment of native flora species.
    - The presence and abundance of weed species.

- The presence of pest fauna.
- Photos will be taken at designated and fixed photo monitoring points.
- General observations regarding the presence and condition of erosion, the presence and extent of any other threatening processes.

4.0 Impacts and Offsets

4.1 Impact Area

Petroleum Lease 1021 is a highly modified and fragmented landscape. Of PL 1021, 81.4% has been subjected to historical clearing for agricultural activities. Other than a large (>500 ha) patch in the North West, the remaining vegetation on PL1021 is generally described as small isolated patches lacking connectivity with other areas of suitable habitat.

BioCondition assessments have been completed at 16 locations within the Stage 2 impact area. Generally, the condition of impact area is considered to be moderate, with larger and remnant areas generally attracting a higher BioCondition score. Two BioCondition sites (MB02 and MB03) received high scores (>0.80) which indicated vegetation at these sites displayed 'functional biodiversity condition'. These sites represent examples of remnant RE 11.9.5 and RE 11.7.6. The lowest score, 0.46, was calculated for BioCondition site MB15, located in a patch of remnant RE 11.7.2. No sites received low scores (<0.40), indicating no vegetation at any site displayed 'dysfunctional biodiversity condition'. Most assessment sites had above average functional biodiversity condition. Eleven BioCondition sites achieved scores >0.60. All of these sites were within remnant vegetation except for two patches of regrowth RE 11.7.6 (MB05) and RE 11.9.10 (MB04).

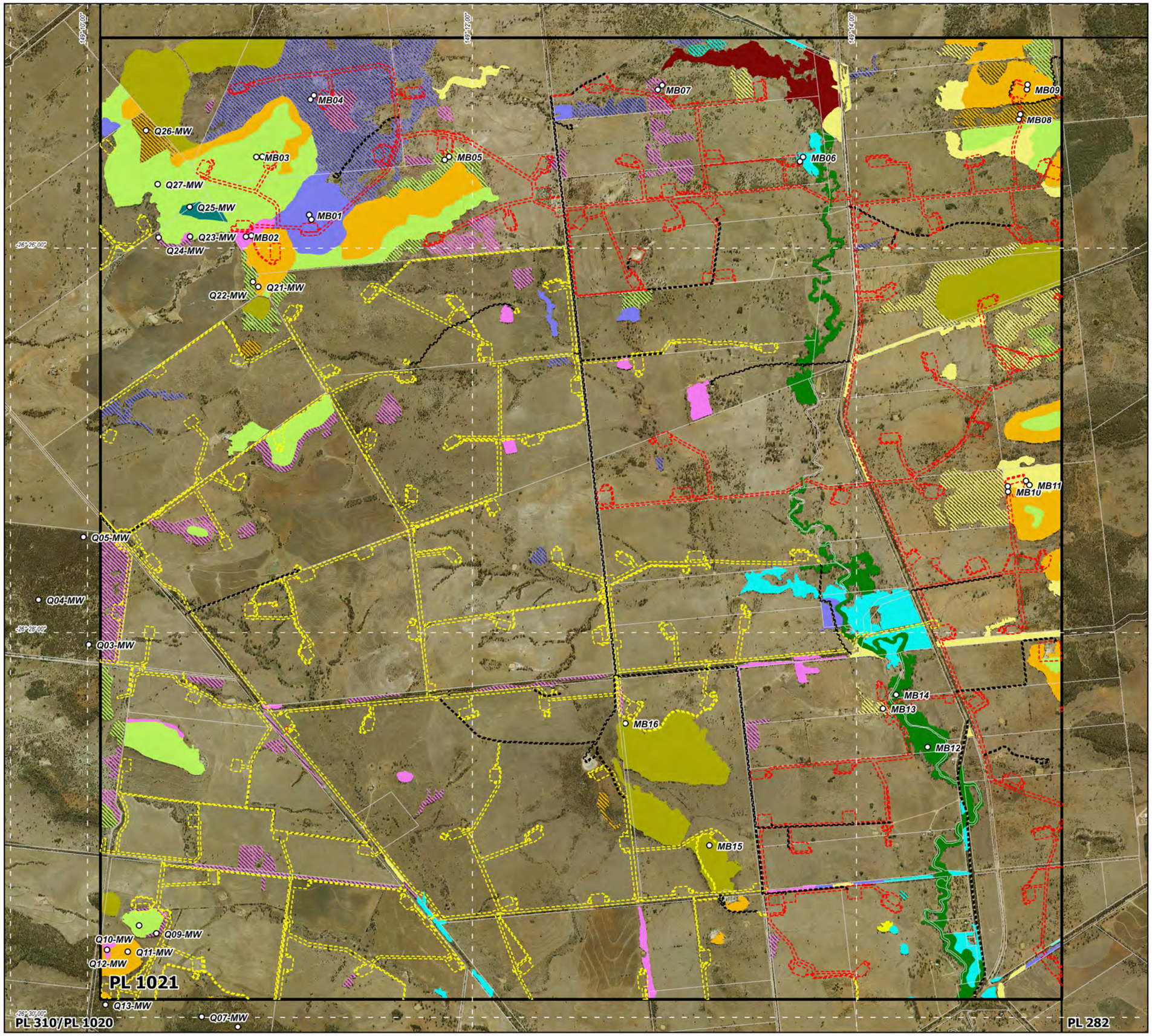
The distribution of Assessment Units and sampling locations are illustrated in Figure 4. A summary of the results for each BioCondition assessment conducted in each relevant Assessment Unit for each relevant MNES is provided in Appendix A.

4.1.1 Significant Residual Impacts

The Commonwealth Minister for the Environment requires the approval holder to ensure that environmental offsets comply with the principles of the EPBC Act Environmental Offsets Policy. In doing so, the approval holder must deliver environmental offsets for residual impacts to Matters of National Environmental Significance (MNES) for each project stage.

The EPBC Act Environmental Offsets Policy states that environmental offsets are measures that compensate for the residual adverse impacts of an action on the environment and defines residual adverse impacts as those impacts that remain after avoidance and mitigation measures have been implemented. The EPBC Act environmental offsets policy requires residual adverse impacts to be offset if the impact is considered to be 'significant' as defined by the 'Matters of National Environmental Significance – Significant Impact Guidelines Version 1.1' (DotE 2013).

Potential residual impacts to EPBC Act threatened species, EPBC Act migratory species and EPBC Act ecological communities as a result of Stage 2 of the GFD project was determined by assessing a conservative 'best guess' scenario – i.e. the maximum potential disturbance widths were applied to the most likely field development layout. This generally results in a significant over estimate of impacts, as it is rare the maximum potential disturbance widths are utilised during all construction. The conservative 'best guess' scenario of impacts to EPBC Act threatened species and EPBC Act communities is shown in Table 4-1. These values are based on maximum linear infrastructure corridor widths and larger well layouts on the most likely development layout. Consequently, proposed impacts will be greater than actual impacts.



Proposed Disturbance Footprint

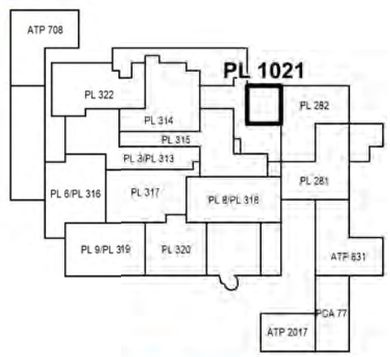
- Maisey East
- Maisey West
- Maisey Existing Road
- Assessment sites
- Cadastre boundary
- Santos tenement

Assessment Units impacted by Stage 2

Remnant Regional Ecosystem	Regrowth
11.3.2	11.7.2
11.3.25	11.7.6
11.7.2	11.9.5
11.7.2/11.7.6	11.9.7
11.7.6	11.9.10
11.9.5	
11.9.7	
11.9.10	

Other Assessment Units

Remnant Regional Ecosystem	Regrowth
11.3.2/11.3.25	11.3.2
11.3.17	11.3.2/11.3.25
11.7.2/11.5.1	
11.7.4	
11.7.6/11.7.2/11.9.5	
11.9.7a	
11.10.1	
11.10.3	
11.10.7	
11.10.11	



Santos
GLNG

Eastern Queensland

PL 1021 (Maisey) Regional Ecosystems

Figure 4-1

500 0 500 1000 m

Date: 18 April 2019 File No. PL1021 003 Rev4

GDA

Table 4-1 The conservative 'best guess' scenario impacts to EPBC Act threatened species and communities

Common Name	Scientific Name	EPBC Act Status	Distribution and Known Habitat Use	Habitat Analogous REs	Disturbance Estimate (ha)
Threatened Ecological Communities					
Brigalow (*Acacia harpophylla* dominant and co-dominant)		E	All remnant and regrowth of the relevant Regional Ecosystems as defined in the DoEE Species Profile and Threats Database.	11.9.5	6.2
Threatened Fauna					
South-eastern Long-eared Bat	*Nyctophilus corbeni*	V	The distribution and habitat preferences of this species are very poorly known; it inhabits a range of dry forest types in south central Queensland (Reardon 2012).	11.3.17, 11.3.2, 11.3.25, 11.7.2, 11.7.6, 11.9.5, 11.9.7, 11.9.10	49
Koala	*Phascolarctos cinereus*	V	This species requires eucalypt woodland and forest habitat with suitable food trees (primarily *Eucalyptus* spp.) (DoEE 2017). Woodlands containing food trees in riparian/alluvial areas are particularly favoured (Melzer et al. 2014). Potential food trees occurring within the Site include *Eucalyptus tereticornis*, *E. camaldulensis*, *E. populnea*, *E. melanophloia*, *E. orgadophila* and *E. crebra*. (Boobook 2017)	11.3.17, 11.3.2, 11.3.25, 11.7.6, 11.9.7, 11.9.10	37.5
Collared Delma	*Delma torquata*	V	Occupies a range of eucalypt woodlands and open forests; lives under surface rock and large woody debris (Wilson 2015). The Site is within the species' known range with several records from locations north-west of Roma (ALA 2017).	11.3.17, 11.3.2, 11.3.25, 11.7.2, 11.7.6, 11.9.5, 11.9.7, 11.9.10	49
Yakka Skink	*Egernia rugosa*	V	Lives in a range of woodland and open forests dominated by Eucalyptus, Acacia and *Callitris* spp.; also grassland with regrowth trees (DoEE 2017). Requires suitable soils for burrows or shelters in sinkholes, abandoned rabbit warrens or large fallen/piled woody material (Eddie 2012).	11.3.2, 11.7.2, 11.7.6, 11.9.5, 11.9.7, 11.9.10	48.2
Dunmall's Snake	*Furina dunmalli*	V	Occupies woodlands and open forests; may be reliant on presence of abundant fallen woody debris (Hobson 2012a).	11.3.17, 11.3.2, 11.3.25, 11.7.2, 11.7.6,11.9.5, 11.9.7, 11.9.10	49

4.2 Offset Area

As discussed in the Stage 1 Offset Management Plan, Santos GLNG has identified the Springwater property as containing suitable environmental values to acquit offset obligations incurred by the development of GFD Project.

4.2.1 Springwater Property Description

Springwater is a 12,636 ha grazing property described as Lot 8 on Plan SP261936 and is located within the local government area of Maranoa Regional Council, approximately 46 km east-northeast of Injune, Queensland. Figure 3 illustrates the property location in relation to the Santos GLNG tenements.

Springwater is located within subregion 24 (Carnarvon Ranges) of the Brigalow Belt South bioregion (Sattler and Williams 1999). Current land uses at the Site include cattle grazing, irrigated cropping, tree plantations and petroleum activities. The property is contiguous with large areas of remnant vegetation in the north on Beilba State Forest, 'Fairview' Holding and Expedition (Limited Depth) National Park, to the northeast on Expedition Resource Reserve, and to the south on Hallett State Forest. The Site is owned and managed by Santos.

Surface geology mapping for the Springwater property shows that it is comprised entirely of Lower Jurassic sediments (Forbes 1968). The west and much of the southeast of the Site features plateaux of the Boxvale Sandstone Member, falling to valleys and low undulating hills with sandy and clay soils derived from the Evergreen Formation. Plateaux of the Boxvale Formation are also present in the far northeast of the Site. Hutton Creek enters the Site in the central north and cuts a steep gorge eastward through the Precipice Sandstone to meet the Dawson River in the central east of the Site. Soils in this region are coarse sands with expansive areas of surface rock especially within close proximity to Hutton Creek and the Dawson River. Vegetation is dominated by dry sclerophyll Eucalyptus and Acacia woodlands with pockets of semi-evergreen vine thicket (SEVT) in sheltered south-facing parts of the plateau scarps and slopes and within gorges. The dominant land zone (Sattler and Williams 1999) in this area is land zone 10 (coarse-grained sediments) with a small areas of land zone 9 (fine-grained sediments) on slopes and valleys and land zone 3 (alluvium) along Hutton Creek and the Dawson River.

Hutton Creek and the Dawson River are part of the Fitzroy River Basin. The nearest weather station to the Site is at Injune within 46 km of the Site. Yearly average temperatures range from a maximum of 33.6°C in January to a minimum of 3.1°C in July (BOM 2015). Average annual rainfall is 636.3 mm, with the highest monthly average rainfall occurring in December (89.1 mm) and the lowest occurring in August (25.2 mm) (BOM 2015).

4.2.2 Springwater Offset Area

The offset area is located in the northeast sections of the Springwater property and is called the Springwater Offset Area (SOA). The SOA is bounded by the Hutton Creek in the west and the property boundary of Fairview Station in the north and the east.

The sandstone plateaus throughout the SOA have historically been cleared for grazing and are currently utilised for timber plantations. The steep slopes that have formed between the tops of the plateaus and the valleys and gorges associated with Hutton Creek are largely intact remnant and regrowth vegetation. These valleys and gorges as well as the waterway itself provide a natural barrier to prevent cattle access to the SOA from the north, west and east. The presence of Hutton Creek enhances the overall value of the offset area, particularly the narrow patches in the west of the SOA.

Much of the riparian vegetation associated with Hutton Creek is not part of the SOA because it falls outside of the Springwater property.

However, this vegetation together with the narrow patches of offset in the west of the SOA provides a valuable corridor on a local scale.

Infrastructure in the SOA includes gas-gathering infrastructure predominately located within the timber plantation. Within the areas utilised as an environmental offset there are minor access tracks and fire trails. A large pipeline corridor has been retained along the south-eastern edge of the SOA. This pipeline corridor has been located to ensure that the connectivity between the SOA and the larger patches of remnant vegetation to the north remains unaffected. At present, there is no immediate plans to develop the proposed pipeline and the vegetation within the pipeline corridor is being managed in the same way as the surrounding offset areas.

4.2.3 Offset Values Assessment

During 2015, Boobook Ecological Consulting were engaged to provide a detailed report of the potential biodiversity offset values at Springwater property. Ecological values of the property were assessed to determine the property's value in terms of meeting offset requirements. In October 2017, Terrestria Pty Ltd conducted a detailed offset monitoring event in the SOA in accordance with commitments made in the Stage 1 Offset Plan. The monitoring event was scheduled to coincide with spring / early summer, the optimal time of year for flora and fauna surveys in the Brigalow Belt Bioregion (Eyre et.al., 2012). The results of the 2015 and the 2017 assessments were used to identify the values and quality of the offsets in the SOA.

A summary of the BioCondition scores and other ecological input data is provided in Appendix B.

4.2.3.1 Connectivity and Landscape Context

On a continental scale the SOA forms part of the great eastern ranges (GER) corridor, identified as one of Australia's large-scale connectivity conservation areas. The GER extends more than 2,800 kilometres from the Australian Alps near Melbourne to the Atherton Tablelands near Cairns and beyond in far north Queensland. The location of the Springwater property within the GER is shown in Figure 5 and see (Mackey et al. 2010) for original.

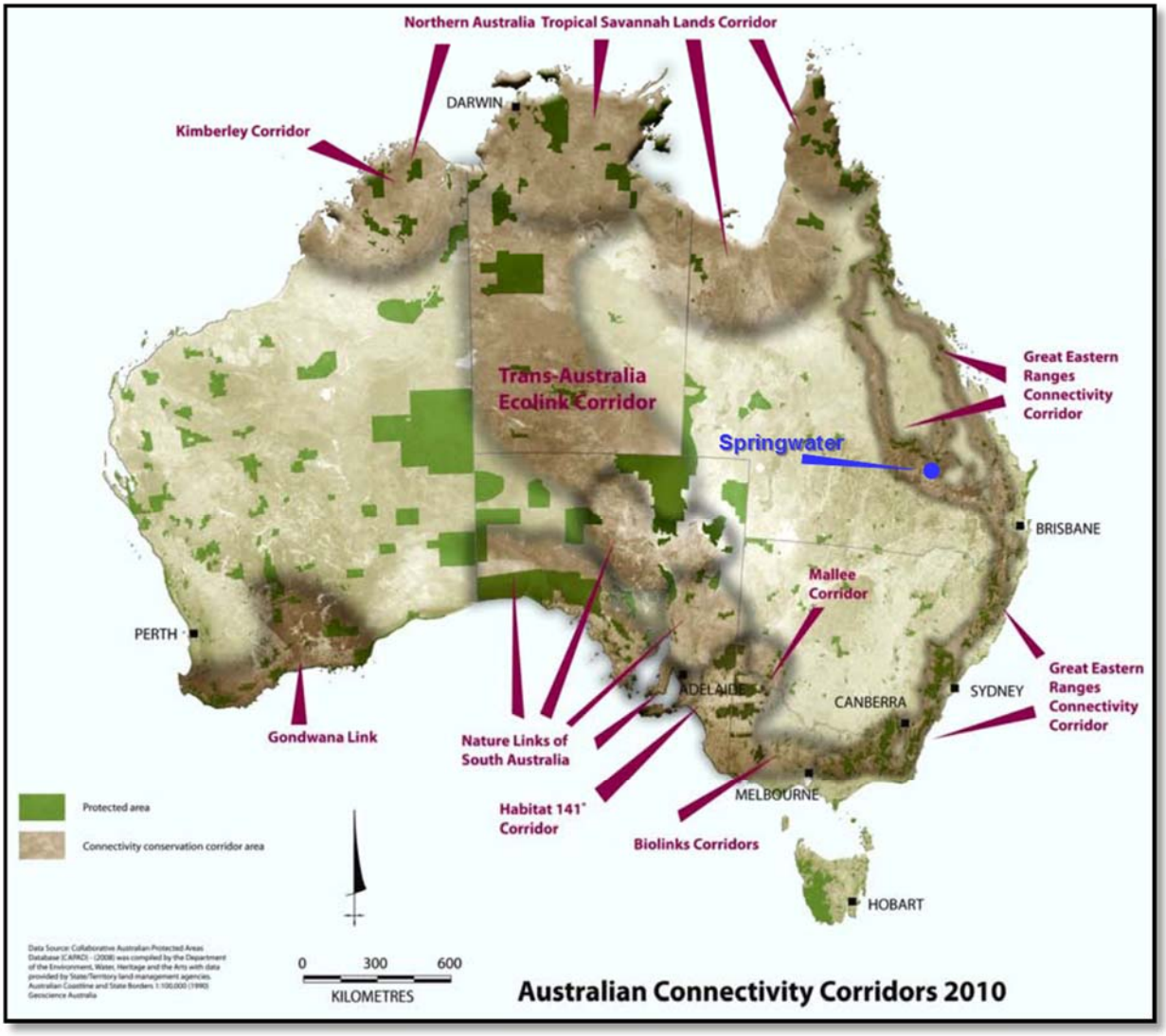


Figure 4-2 The Location of the Springwater Property within the GER

At a state and regional scale the SOA lies at the southern extent of a large patch of vegetation linking Expedition National Park in the north and Carnarvon National Park in the west. These large tracks of remnant vegetation have been identified in the Biodiversity Planning Assessment (BPA) mapping. A BPA identifies the terrestrial ecological values in a region, or bioregion, according to their conservation significance. A Biodiversity Planning Assessment (BPA) is available for the Brigalow Belt Bioregion and contains the corridors criteria (Criteria J) and the Context and Connection criteria (Criteria G):

Corridors (Criteria J) - Areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity including regrowth, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Context and Connection (Criteria G) – this criterion represents the extent to which a Remnant Unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems, and the degree to which a Remnant Unit is connected to other vegetation.

A review of this data at a regional scale shows that these large tracks of remnant vegetation have predominantly been identified in the BPA data as having “State” or “Regionally” significant corridors

(Criteria J) and having a “Very High” or “High” context and connection (Criteria G). The location of the SOA in relation to these BPA areas is shown in Figure 6 below. Any increase in extent or condition of the ecological communities within the SOA will increase the extent and quality of these significant areas of habitat and biodiversity corridors.

PL 91

PL 232

PL 92

PL 100

PL 99

-25°40'

-25°45'

149°50'

149°55'

149°00'

Bizilock Gully

Christmas Creek

Hatton Creek

Spring Creek

Box Gully

Map Area

Springwater Property

Drainage

Environmental Offsets

Corridors (Criteria J)

Regional

State

Context and Connection (Criteria G)

Very High

High

Medium

Low

Other

Property Boundary

Lot on Plan Boundary

Santos Tenement

Santos GLNG

Eastern Queensland

Springwater

Context Connection and Corridors

Figure 4-3

1 0 1 2 3 km

Date: September 2016 File No. ENVIR 664k Rev.2

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4.2.3.2 Vegetation Communities

The vegetation communities within the SOA have been classified and mapped in accordance with Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Neldner et al. 2012). In addition, the quality of the patches were divided into four categories:

- Remnant: woody vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy (Neldner et al. 2012).

Non-Remnant

- Advanced Regrowth: areas previously cleared or disturbed (e.g. by wildfire) and containing well advanced woody vegetation floristically and structurally consistent with the RE but typically <70% of the height and <50% density of the RE. Such regrowth with appropriate management will likely achieve remnant status.
- Young regrowth: areas previously cleared or disturbed (e.g. by wildfire) and containing varying densities of woody vegetation floristically consistent with the RE type. These areas may represent potential future biodiversity offset areas.
- Cleared: areas previously cleared or otherwise significantly disturbed which have little or no woody vegetation present and are currently unsuitable as biodiversity offsets.

The SOA contains five regional ecosystem vegetation communities. A summary of the vegetation communities present, the relevant BioCondition scores and whether the vegetation community is also an EPBC Act listed TEC are discussed in Table 4-2 below and shown in Figure 4-4. A detailed summary of the BioCondition scores and other calculator inputs for the offset site is provided in Appendix B.

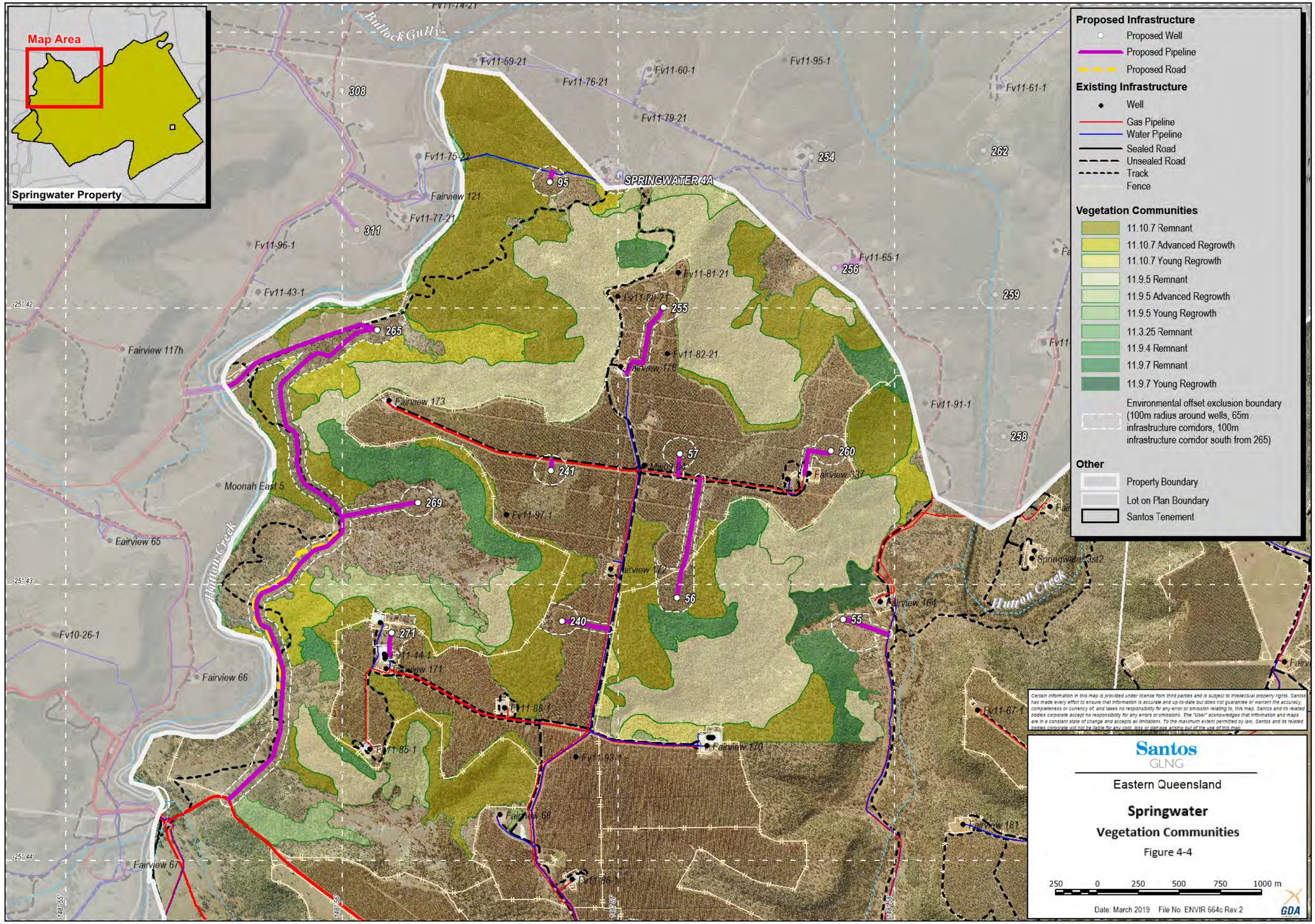
Table 4-2 Summary of Offset Values within the SOA

Veg Unit	General vegetation description	Area (ha)	Survey sites	Site Condition Score out of 80
VC1 11.10.7 Remnant	*Eucalyptus crebra* and *E. melanophloia* woodland with associated *Callitris glaucophylla*; midlayer composed of *C. glaucophylla, Acacia decora* and *A. longispicata*; shrub layer composed of *Hovea longipes, Notelaea microcarpa* and *Cryptandra amara*; grassy ground layer composed of *Aristida spp*., *Chrysopogon fallax* and *Ancistrachne uncinulata*.	342.4	BP01	45.75
			BP02	50
			BP06	51.75
			BP08	45.75
			BP15	62.5
VC2 11.10.7 Regrowth	*Eucalyptus melanophloia* low woodland; midlayer composed of *Psydrax johnsonii, Notelaea microcarpa, Eremophila mitchellii* and *Callitris glaucophylla*; grassy ground layer dominated by *Themeda triandra*.	48.6	BP12	56.75
VC3 11.10.7 Young Regrowth	*Eucalyptus crebra* and / or *E. melanophloia, Acacia longispicata* low open forest (young regrowth); sparse midlayer dominated by *Alphitonia excelsa* and canopy recruits; grassy ground layer dominated by *Aristida* spp. and *Eremochloa bimaculata*	9.1	Not assessed*	
		312.1	BP04	56.75

Veg Unit	General vegetation description	Area (ha)	Survey sites	Site Condition Score out of 80
VC4[1] 11.9.5 Remnant	*Acacia harpophylla* open woodland; midlayer composed of canopy recruits, *Eremophila mitchellii, Geijera parviflora* and *Pittosporum spinescens*; low shrub layer dominated by *Carissa ovata*; grassy ground layer composed of *Paspalidium caespitosum, Enteropogon ramosus, Ancistrachne uncinulata* and *Aristida sp*.		BP07	46.5
			BP09	68
VC5 11.9.5[1] Regrowth	*Acacia harpophylla* low open forest (advanced regrowth); very sparse shrub layer of canopy recruits; very sparse ground layer of *Paspalidium caespitosum*.	38.3	BP13	44.75
VC6 11.9.5 Young Regrowth	*Acacia harpophylla* low woodland (young regrowth); shrub layer composed of *Carissa harpophylla, Eremophila mitchellii* and canopy recruits; grassy ground layer dominated by *Cenchrus ciliaris*.	18.9	BP14	51.75
VC7 11.3.25 Remnant	*Angophora floribunda, Eucalyptus camaldulensis* and *Casuarina cunninghamiana* fringing woodland; midlayer (confined to channel edges) composed of *Melaleuca viminalis;* dense ground layer dominated by *Lomandra longifolia, Imperata cylindrica* and *Entolasia marginata.*	11.6	BP03	46.5
VC8[2] 11.9.4 Remnant	Semi-evergreen vine thicket	57.5	BP05	71.75
VC9 11.9.7 Remnant	*Eucalyptus populnea* woodland; midlayer comprised of canopy recruits, *Eremophila mitchellii, Geijera parviflora, Atalaya hemiglauca, Psydrax odorata* and *Denhamia oleaster*; shrub layer composed of *Hovea longipes* and *Carissa ovata*; grassy ground layer dominated by *Aristida* sp., *Bothriochloa decipiens, Themeda triandra* and *Chloris ventricosa*.	27	BP10	43
VC10 11.9.7 Young Regrowth	*Eucalyptus populnea* low woodland; midlayer dominated by *Eremophila mitchellii;* grassy ground layer composed of *Cenchrus ciliaris* and *Aristida* sp.	9.9	BP12	56.75

*The area and shape of VC3 (11.10.7 Young Regrowth) made locating a BioConditon site impossible. 1. VC4 and VC5 meet the condition requirements of the EPBC Act Threatened Ecological Community - Brigalow (Acacia harpophylla dominant and codominant) Threatened Ecological Community

2. VC8 meets the condition requirements of the EPBC Act Threatened Ecological Community - Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions


Map Area
Springwater Property
Bullock Gully
Hutton Creek
SPRINGWATER 4A
Fairview 121
Fairview 117h
Moonah East 5
Fairview 65
Fairview 66
Fairview 67
Fairview 68
Fairview 171
Fairview 173
Fairview 176
Fairview 172
Fairview 170
Fairview 164
Fairview 181
Springwater East2
Fairview 337
Fv11-74-21
Fv11-59-21
Fv11-76-21
Fv11-60-1
Fv11-95-1
Fv11-61-1
Fv11-79-21
Fv11-75-22
Fv11-77-21
Fv11-96-1
Fv11-43-1
Fv11-81-21
Fv11-80-21
Fv11-65-1
Fv11-82-21
Fv11-91-1
Fv11-97-1
Fv10-26-1
Fv11-44-1
Fv11-88-1
Fv11-85-1
Fv11-93-1
Fv11-86-1
Fv11-67-1
308
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-25° 42'
-25° 43'
-25° 44'
148° 55'
148° 56'
148° 57'
148° 58'
Proposed Infrastructure
Proposed Well
Proposed Pipeline
Proposed Road
Existing Infrastructure
Well
Gas Pipeline
Water Pipeline
Sealed Road
Unsealed Road
Track
Fence
Vegetation Communities
11.10.7 Remnant
11.10.7 Advanced Regrowth
11.10.7 Young Regrowth
11.9.5 Remnant
11.9.5 Advanced Regrowth
11.9.5 Young Regrowth
11.3.25 Remnant
11.9.4 Remnant
11.9.7 Remnant
11.9.7 Young Regrowth
Environmental offset exclusion boundary (100m radius around wells, 65m infrastructure corridors, 100m infrastructure corridor south from 265)
Other
Property Boundary
Lot on Plan Boundary
Santos Tenement
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Santos
GLNG
Eastern Queensland
Springwater
Vegetation Communities
Figure 4-4
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4.2.3.3 Flora Species

Habitat for MNES flora is determined by the presence of a particular species or suitable habitat and nearby records. Historically a number of ecological assessments have occurred within the Springwater and neighbouring properties including detailed flora surveys conducted in accordance with the Queensland Flora Survey Guidelines – Protected Plants (DEHP 2014). These surveys have identified EVNT flora species including a population of the EPBC Act listed Bertya (Bertya opponens).

Dedicated and targeted flora surveys were conducted as part of the SOA monitoring program. Targeted flora searches were conducted in all vegetation types in-line with the Flora Survey Guidelines - Protected Plants Nature Conservation Act (1992) (23 December 2016). The search paths and species lists for these surveys are presented in the Baseline Ecological Monitoring and Assessment Report (Terrestria 2018). No EVNT flora species were encountered during the surveys. However, habitat for Bertya opponens exists within REs 11.9.4, 11.9.5 and 11.10.7 and the presence of this species cannot be ruled out. Habitat for Xerothamnella herbacea, Acacia calantha, and Sannantha brachypoda also exists on the slopes surrounding the plateau.

4.2.3.4 Fauna Species

Fauna habitat assessments were undertaken at each of the 23 BioCondition survey sites conducted across the Springwater property in 2015 (Boobook 2015) as well as the 15 Biocondition sites conducted in 2017 (Terrestria 2018). Not all fauna habitat features likely to be utilised by threatened fauna are measured under the BioCondition methodology so additional microhabitat features were documented and used to generate fauna habitat mapping for all of the SOA. The location of MNES fauna habitat within the SOA is shown in Figure 4-5 to Figure 4-8 and the total area of offset for each MNES fauna species provided in Table 4.

Table 4-3 Area (ha) of MNES Fauna Habitat within the SOA

Species	Habitat Preferenes	Habitat Mapping Assumptions and Criteria (Boobook 2017)	Area (ha) of Habitat within the SOA
Black-breasted button-quail *(Turnix melanogaster)*	SEVT and other closed forest types with dense leaf litter and low shrubs (DoTE 2015b, Mathieson and Smith 2009). Habitat for this species is provided by RE 11.9.4	Mapped General Habitat includes all remnant and advanced regrowth RE 11.9.4 that have linkages to other woody vegetation. Young regrowth of RE 11.9.4 represents Potential Future Habitat with appropriate rehabilitation.	57.5

Species	Habitat Preferenes	Habitat Mapping Assumptions and Criteria (Boobook 2017)	Area (ha) of Habitat within the SOA
Red goshawk *(Erythrotriorchis radiatus)*	Woodlands and open forests, especially near permanent water bodies; high prey bird populations; tall trees for nest site (Marchant and Higgins 1993). Habitat for this species is provided by REs Remnant and Regrowth (ie excluding Young Regrowth): 11.3.25, 11.9.4, 11.9.5, 11.9.7, 11.10.7, 11.10.7a,	Mapped General Habitat includes all remnant and advanced regrowth of potentially suitable REs. Young regrowth of all REs represents Potential Future Habitat with appropriate rehabilitation. This species may also forage within sub-optimal and non-remnant vegetation throughout the Site.	837.3
Squatter pigeon (southern) *(Geophaps scripta scripta)*	Grassy woodlands with open areas for foraging habitat; usually nearby water source (Higgins and Davies 1996). Habitat for this species is provided by Remnant and Regrowth (ie excluding Young Regrowth) REs: 11.3.25, 11.9.5, 11.9.7, 11.10.7, 11.10.7a	Mapped General Habitat includes remnant and advanced regrowth of potentially suitable REs. Advanced regrowth of all REs represents Potential Future Habitat with appropriate rehabilitation. This species may also forage within non-remnant vegetation.	779.8
South-eastern long-eared bat *(Nyctophilus corbent)*	Forages in open forests and woodlands and roosts in adjacent caves and overhangs of cliffs and rocky hills; occasionally shelters in disused Fairy Martin nests (Hoye and Schultz 2008). Habitat for this species is provided by Remnant and Regrowth (ie excluding Young Regrowth) REs: 11.3.25, 11.9.4, 11.9.5, 11.9.7, 11.10.7, 11.10.7a,	Mapped General Habitat includes all areas of remnant vegetation and advanced regrowth that may be suitable for foraging or shelter. Young regrowth of all REs represents Potential Future Habitat.	837.3

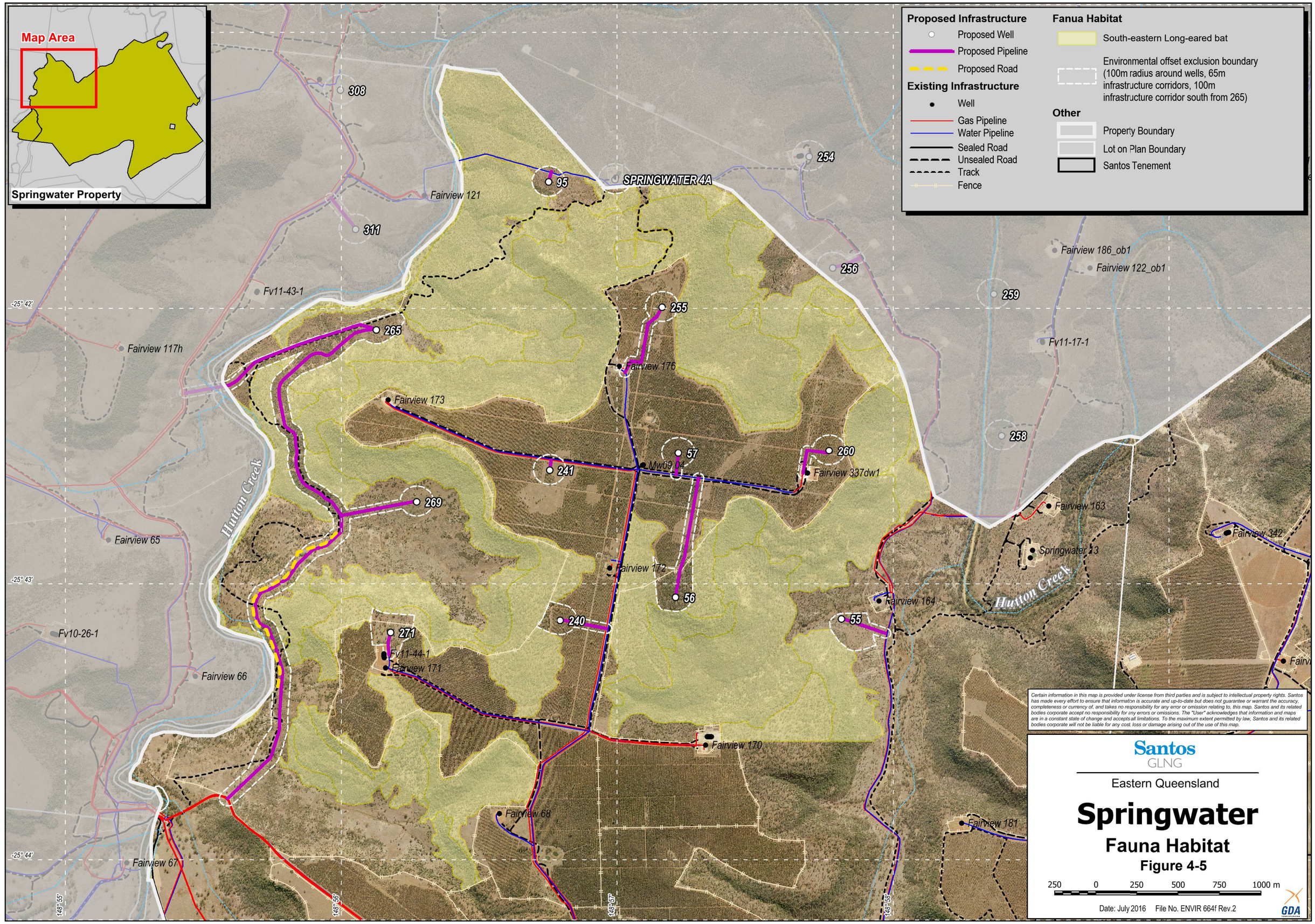
Species	Habitat Preferenes	Habitat Mapping Assumptions and Criteria (Boobook 2017)	Area (ha) of Habitat within the SOA
Koala *(Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT))	This species requires eucalypt woodland and forest habitat with suitable food trees (primarily *Eucalyptus* spp.) (DoEE 2017). Woodlands containing food trees in riparian/alluvial areas are particularly favoured (Melzer et al. 2014). Potential food trees occurring within the Site include *Eucalyptus tereticornis*, *E. camaldulensis*, *E. populnea*, *E. melanophloia*, *E. orgadophila* and *E. crebra*. (Boobook 2017). Habitat for this species is provided by Remnant and Regrowth (ie excluding Young Regrowth) REs: 11.3.25, 11.9.7, 11.10.7, 11.10.7a,	Mapped General Habitat includes all areas of remnant vegetation and advanced regrowth that may be suitable for foraging or shelter. Young regrowth of all REs containing eucalypts and corymbias represents Potential Future Habitat.	429.7
Large-eared pied bat (*Chalinolobus dwyeri)*	Eucalyptus and Callitris woodlands and roosts in tree hollows and crevices and under loose bark (DoTE 2015b). Habitat for this species is provided by Remnant and Regrowth (ie excluding Young Regrowth) REs: 11.3.25, 11.9.4, 11.9.5, 11.9.7, 11.10.7, 11.10.7a,	Mapped General Habitat includes all areas of remnant vegetation and advanced regrowth that may be suitable for foraging or shelter. Young regrowth of all REs represents Potential Future Habitat. RE 11.9.4 is included on the basis that this RE may contain potentially suitable shelter sites.	837.3
Northern quoll *(Dasyurus hallucatus)*	Shelter in crevices in rocky hills and escarpments; forage in associated woodland and forest habitats (DoTE 2015b). Habitat for this species is provided by Remnant and Regrowth (ie excluding Young Regrowth) REs: 11.3.25, 11.9.4, 11.9.5, 11.9.7, 11.10.7, 11.10.7a,	Mapped General Habitat includes all remnant and advanced regrowth vegetation (includes foraging habitat and vegetation containing potentially suitable densites). Young regrowth of all REs represents Potential Future Habitat	837.3
Collared delma *(Delma torquata)*	Occupies eucalypt woodlands and open forests; lives under surface rock and large woody debris (Wilson 2005). Habitat for this species is provided by Remnant and Regrowth (ie excluding Young Regrowth) REs: 11.3.25, 11.9.5, 11.9.7, 11.10.7, 11.10.7a	Mapped General Habitat includes all areas of remnant and advanced regrowth of all REs except RE 11.9.4. Young regrowth of potentially suitable REs has been mapped as Potential Future Habitat.	779.8

Species	Habitat Preferenes	Habitat Mapping Assumptions and Criteria (Boobook 2017)	Area (ha) of Habitat within the SOA
Dunmall's snake *(Furina dunmalli)*	Eucalyptus, Acacia and Callitris woodlands and open forests; may be reliant on presence of abundant fallen woody debris (Hobson 2012). Habitat for this species is provided by Remnant and Regrowth (ie excluding Young Regrowth) REs: 11.3.25, 11.9.5, 11.9.7, 11.10.7, 11.10.7a,	Mapped General Habitat includes all remnant vegetation and advanced regrowth of the nominated REs. Young regrowth of potentially suitable REs has been mapped as Potential Future Habitat.	779.8
Yakka skink (*Egernia rugosa)*	Woodland and open forests, also derived grassland with regrowth trees; requires suitable soils for burrows, sinkholes, abandoned rabbit warrens or large fallen woody material for shelter (Eddie 2012). Habitat for this species is provided by Remnant and Regrowth (ie excluding Young Regrowth) REs: 11.9.5, 11.9.7, 11.10.7, 11.10.7a	Mapped General Habitat includes all remnant vegetation and advanced regrowth of the nominated REs. Young regrowth of potentially suitable REs has been mapped as Potential Future Habitat.	768.1

Targeted fauna surveys were conducted to assess EVNT fauna species richness of the SOA as part of the 2017 detailed monitoring assessment. Targeted fauna survey methods focused on the relevant species that are unlikely to be detected effectively during rapid assessment surveys due to cryptic behaviour or localised habitat requirements. Targeted surveys for species are based on the ecology, habitat requirements and behavioural aspects of the species of interest. The targeted fauna surveys included the following survey techniques:

- Camera traps focused on bait stations;
- Elliot B trapping;
- Funnel trapping;
- Ultrasonic bat call detection;
- Harp trapping;
- Active daytime habitat searching;
- Spotlighting habitat searches; and
- Active Koala searches and scat analysis.

A single species listed under both State and Commonwealth legislation was recorded during the surveys. Greater Glider (Vulnerable under the NC Act and EPBC Act) was recorded in a mature Forest Red Gum adjacent to Hutton Creek. Although no other EVNT species have been recorded on site the same precautionary principles applied to the impact sites are provided to the offset site and where suitable habitat and species-specific microhabitat features are present it is assumed the species is present.



Santos
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Eastern Queensland

Springwater

Fauna Habitat

Figure 4-5

250 0 250 500 750 1000 m

Date: July 2016 File No. ENVIR 664f Rev.2

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Map Area

Springwater Property

Proposed Infrastructure
- Proposed Well
- Proposed Pipeline
- Proposed Road

Existing Infrastructure
- Well
- Gas Pipeline
- Water Pipeline
- Sealed Road
- Unsealed Road
- Track
- Fence

Fanua Habitat
- Koala
- Environmental offset exclusion boundary (100m radius around wells, 65m infrastructure corridors, 100m infrastructure corridor south from 265)

Other
- Property Boundary
- Lot on Plan Boundary
- Santos Tenement

95 SPRINGWATER 4A 254 308 311 Fairview 121 Fv11-43-1 256 Fairview 186_ob1 Fairview 122_ob1 259 255 265 Fairview 117h Fairview 176 Fv11-17-1 Fairview 173 258 57 260 241 Mw09.04 Fairview 337dw1 269 Hutton Creek Fairview 163 Fairview 342 Springwater 13 Fairview 65 Fairview 172 56 Hutton Creek Fairview 164 240 55 271 Fv10-26-1 Fv11-44-1 Fairview 171 Fairview 66 Fairview 170 Fairview 68 Fairview 181 Fairview 67

-25° 42' -25° 43' -25° 44' 148° 55' 148° 56' 148° 57' 148° 58'

Santos GLNG

Eastern Queensland

Springwater

Fauna Habitat

Figure 4-6

250 0 250 500 750 1000 m

Date: July 2016 File No. ENVIR 664i

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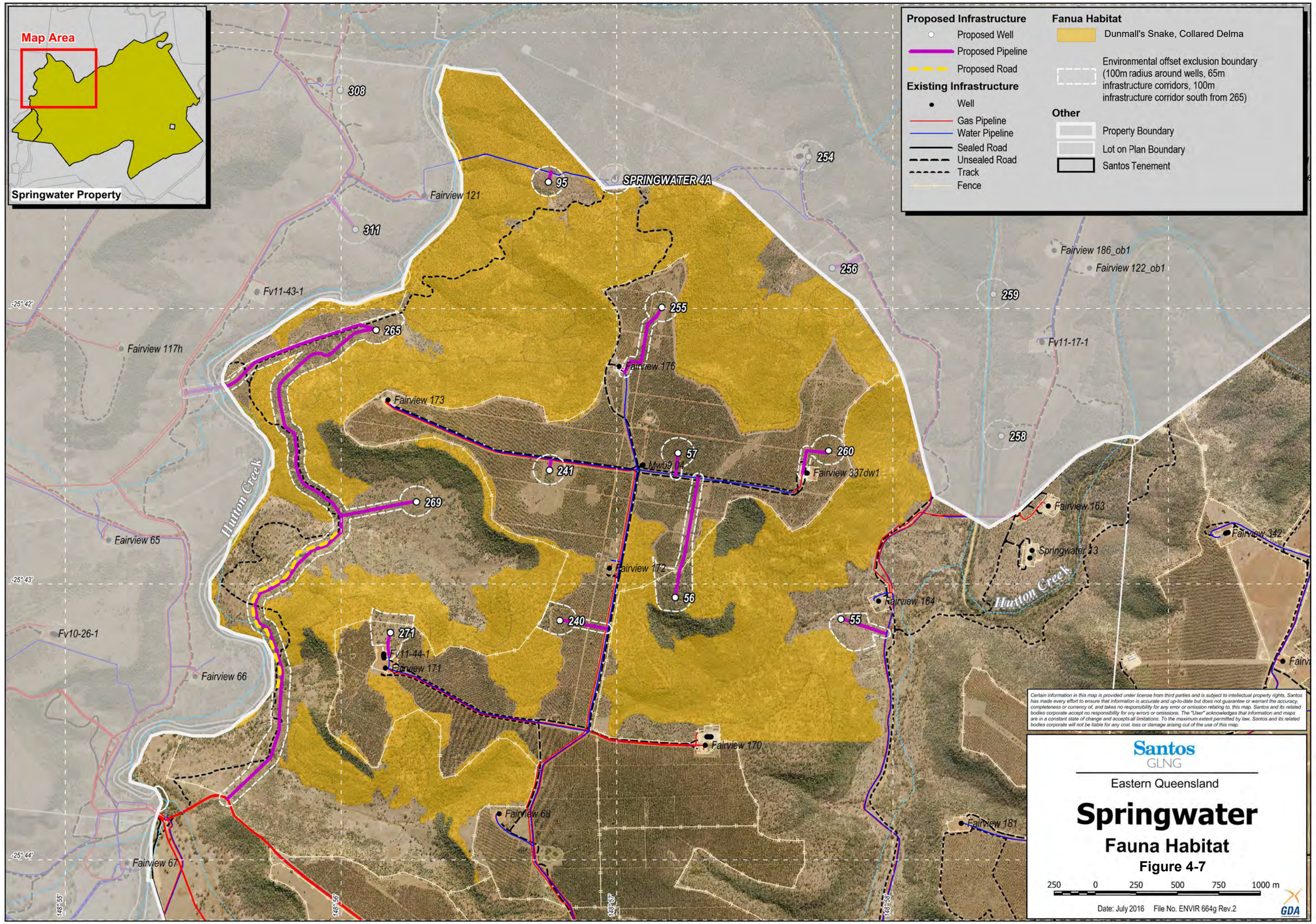


Santos
GLNG

Eastern Queensland

Springwater

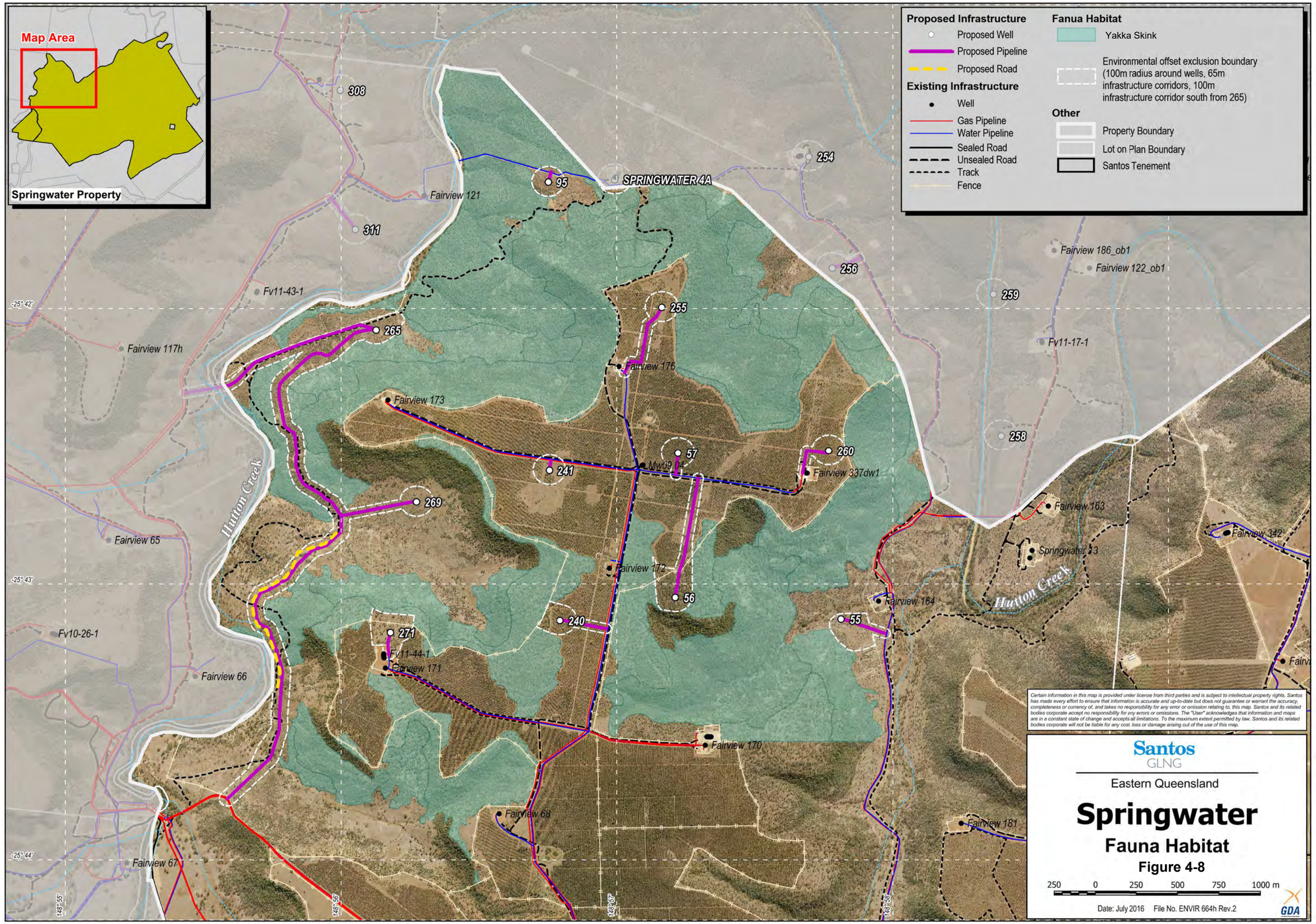
Fauna Habitat

Figure 4-7

250 0 250 500 750 1000 m

Date: July 2016 File No. ENVIR 664g Rev.2

GDA


Map Area
Springwater Property
Proposed Infrastructure
Proposed Well
Proposed Pipeline
Proposed Road
Existing Infrastructure
Well
Gas Pipeline
Water Pipeline
Sealed Road
Unsealed Road
Track
Fence
Fanua Habitat
Yakka Skink
Environmental offset exclusion boundary (100m radius around wells, 65m infrastructure corridors, 100m infrastructure corridor south from 265)
Other
Property Boundary
Lot on Plan Boundary
Santos Tenement
SPRINGWATER 4A
95
254
308
311
Fairview 121
256
Fairview 186_ob1
Fairview 122_ob1
259
Fv11-43-1
255
265
Fairview 117h
Fairview 176
Fv11-17-1
Fairview 173
258
241
57
260
Mw09.04
Fairview 337dw1
269
Hutton Creek
Fairview 163
Fairview 342
Springwater 13
Fairview 65
Fairview 172
56
Fairview 164
Hutton Creek
240
55
Fv10-26-1
271
Fv11-44-1
Fairview 171
Fairview 66
Fairview 170
Fairview 68
Fairview 181
Fairview 67
-25° 42'
-25° 43'
-25° 44'
148° 55'
148° 56'
148° 57'
148° 58'
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GLNG
Eastern Queensland
Springwater
Fauna Habitat
Figure 4-8
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GDA

4.3 Threats to the Offset Values

Table 4-4 details the key threats to the offset values identified in relevant recovery plans and threat abatement plans that will be addressed through the implementation of this Offset Plan.

Table 4-4 Summary of main threats to offset values

TEC / Species	EPBC Act Status	Threats identified in relevant conservation advices and threat abatement plans
Brigalow TEC (DEE 2019a)	Endangered	Habitat loss, clearing, fragmentation and/or modification [A]
		Fire
		Invasive weeds, particularly introduced grasses
		Pest animals, particularly feral pigs
		Inappropriate grazing regimes
Delma torquata (Collared delma) (DEWHA 2008)	Vulnerable	Habitat loss, clearing, fragmentation and/or modification [A]
		Fire
		Invasive weeds, particularly *Lantana montividensis*
Egernia rugosa (Yakka skink) (DoE 2014a)	Vulnerable	Habitat loss, clearing, fragmentation and/or modification [A]
		Pest animals, in particular predation by feral cats and foxes
Furina dunmalli (Dunmall's snake) (DoE 2014b)	Vulnerable	Habitat loss, clearing, fragmentation and/or modification [A]
		Pest animals
		Inappropriate grazing regimes
Nyctophilus corbeni (South-eastern long-eared bat) (TSSC 2015)	Vulnerable	Habitat loss, clearing, fragmentation and/or modification [A]
		Fire
		Inappropriate grazing regimes
		Invasive weeds
		Exposure to agrochemicals and nutrient enrichment [B]
Phascolarctos cinereus (Koala) (DEE 2019b)	Vulnerable	Habitat loss, clearing, fragmentation and/or modification [A]
		Pest animals
		Mortality due to vehicle strike

[A] *Including loss of feeding, breeding/nesting habitat and drinking sites, hydrological and salinity changes associated with clearing, drainage of swamps, loss of microhabitat features (e.g. hollows, wood debris and rocks) and damage to roadside plant populations associated with road/track widening*

[B] *Associated with spread of inorganic fertilisers, drift from adjacent farmland or accumulation of manure from livestock.*

4.4 Legal Security Mechanism

Under Queensland legislation, one option of a legal securing mechanism for an offset area is declaring the area of high nature conservation value under section 19F of the Vegetation Management Act 1999, where it is secured in perpetuity for the purposes of an environmental offset.

In October 2017 Santos GLNG wrote to the Queensland Department of Natural Resources Mines and Energy (DNRME) requesting that the SOA be declared as an area of high nature conservation value under section 19F of the Vegetation Management Act 1999 (a voluntary declaration). On 26 February 2018 the DNRME wrote to the Santos GLNG informing that the SOA meets the requirements of a Voluntary Declaration under the Vegetation Management Act 1999 and on 1 April 2018 Santos GLNG agreed to the offer. On 6 April 2018, the voluntary declaration was certified, thereby satisfying the legal security requirement of Condition 16.

The offset area will be mapped as a Category A area on the Property Map of Assessable Vegetation (PMAV). A Category A area on a PMAV is described as an "Area subject to compliance notices, offsets and voluntary declarations".

4.5 Assessment against the Principles of the Offset Policy

Condition 11 of the EPBC Act Approval 2012/6615 states that the approval holder must ensure that environmental offsets comply with the principles of the EPBC Act Environmental Offsets Policy. An assessment of the suitability of the proposed offset against the principles of the Offset Policy for each matter potentially impacted by Stage 2 of the project is provided in Table 5.

Table 4-5 Assessment against Principles of the Offset Policy

Principle	How the principle is met in this offset proposal
1. deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action	Section 4.2.3 summarises the area of potential offsets available on the SOA, including the offset area allocated to offset Stage 2 impacts. A positive conservation outcome for all MNES will be achieved by protecting and enhancing a suitable area of Brigalow and/or MNES species habitat within the SOA because, in the absence of the project there will be continued decline in condition the SOA principally due to agricultural grazing and poor fire management practice. The offset site was formally secured on 1 April 2018. Since then the viability of MNES within the SOA has been maintained or improved and will continue to improve/be maintained throughout the project EPBC approval period.
2. be built around direct offsets but may include other compensatory measures	The offset for all MNES is provided as a 100% direct offset, located within the SOA. Key threats to be addressed by the offset proposal include threats specified in conservation/listing advice and recovery plans, e.g. prevention of clearing, fire protection, pest animal control, weed control and removal of grazing pressure.
3. be in proportion to the level of statutory protection that applies to the protected matter	In consultation with Santos, the DoEE has identified a suitable offset area within the SOA for each MNES. The DoEE's offset assessment guide determines a suitable offset area based on a series of factors, including the level of statutory protection (i.e. whether listed as Vulnerable or Endangered)

Principle	How the principle is met in this offset proposal
4. be of a size and scale proportionate to the residual impacts on the protected matter	In consultation with Santos, the DoEE has identified a suitable offset area within the SOA for each MNES. The DoEE's offset assessment guide determines a suitable offset area based on a series of factors, including: • the site attributes of importance to the TEC/MNES habitat, and the quality/importance of that habitat or TEC; • the relative risks to the SOA without the property being under a voluntary declaration; • time to ecological benefit, that is the time to achieve future quality; • uncertainty associated with changes in habitat/TEC quality with and without offset.
5. effectively account for and manage the risks of the offset not succeeding	Threats to the offset site are managed by through the implementation of the management measures discussed in Section 5.0, Section 6.0 and Section 7.0, including: • Fire prevention and management • Weed monitoring and control • Clearing protection • Management of grazing • Restricted access Section 4.0 demonstrates that on conservative assumptions there is likely to be more than adequate offsets available on the SOA for each MNES, for acquittal of Stage 2 impacts. If the offset cannot attain and maintain the completion criteria then additional offsets will be provided to compensate for the impact and the failed offset.
6. be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action)	The SOA is additional to what is already required and determined by laws other than the EPBC Act. The SOA does not acquit any other offset or provide a carbon credit. In Queensland there are no existing land management obligations that prescribe or exclude fire. Under the *Biosecurity Act 2014* a person has a general biosecurity obligation to: take all reasonable and practical steps to prevent or minimise each biosecurity risk. The steps proposed in this plan are above reasonable and practical steps required to control feral animals and weeds in central Queensland (See Section 2.2).

Principle	How the principle is met in this offset proposal
7. be efficient, effective, timely, transparent, scientifically robust and reasonable	**Efficient/effective/reasonable**. The offset proposal is a cost-effective approach to providing a direct offset, achieved through implementing widely applied and verified management strategies (DoE 2013; Ponce-Reyes *et al.* 2016). **Timely**. The offset outcomes will be delivered progressively over 20 years, and maintained for at least the period of effective approval (ie. 31 March 2066). Legal security of the SOA occurred in advance of the impacts associated with Stage 2. On 6 April 2018, the voluntary declaration was certified, thereby satisfying the legal security requirement. All clearing, even that considered insignificant and non-referred, is not permissible without specific Queensland government approval. **Transparent/scientifically robust.** Implementation of the offset proposal will be monitored and reported in annual compliance reports and on the Santos website. There is strong evidence to demonstrate the likelihood of the offset achieving improvement in TEC and MNES habitat condition (DoE 2013; Ponce-Reyes *et al.* 2016). Fauna surveys have been conducted in accordance with best-practice guidelines, habitat/EC defined using SPRAT profile and/or peer-reviewed articles.
8. have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	The SOA is monitored every year (See Section 8.0). Monitoring in the field will occur on at least an annual basis and audit of monitoring results against approval conditions and following the production of the annual monitoring report. All annual monitoring reports will be made available to **DEE** upon request.

5.0 Approach to Management

5.1 Adaptive management

This Offset Plan is based on an adaptive management approach which involves 'flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood' (National Research Council 2004).

Adaptive management includes two key phases:

- establishment of the key components of a management framework including engaging stakeholders, developing clear and measurable objectives and performance criteria, identification and selection of potential management actions and the development of monitoring protocols which enable the evaluation of progress towards achieving objectives, and which will effectively contribute to the adaptive management decision making process.
- an iterative learning phase which involves utilisation of the management framework to learn about the natural resource system and iteratively adapt management strategies and approaches based on what is learned (Williams 2011)

The implementation of this Offset Plan will use the adaptive management framework, as illustrated in Figure 5-1, to detect changes in the condition of offset values, incorporate learnings from other similar management activities/conservation advice and inform decisions on corrective actions to ensure that interim performance targets and completion criteria are attained and maintained for the life of the approval. The offset site will be managed and monitored, as a minimum for the life of the approval and until the completion criteria have been achieved.

Section 6.0 details the overall environmental outcome of this Offset Plan, interim performance targets and completion criteria for each offset value and management objectives to be achieved as part of this Offset Plan. Attainment and maintenance of the completion criteria will be assessed based on the results of ongoing management and monitoring events and will be presented as part of compliance reporting commitments to DEE (see Section 8.2).

If an interim performance target has not been achieved, or a completion criterion (once attained) has not been maintained, or an adaptive management trigger is identified, corrective actions will be implemented. Where there is uncertainty as to the cause of the management trigger (e.g. failure to achieve the interim performance target), the event or circumstance triggering corrective action will be reviewed, and management actions in this Offset Plan may be revised accordingly.

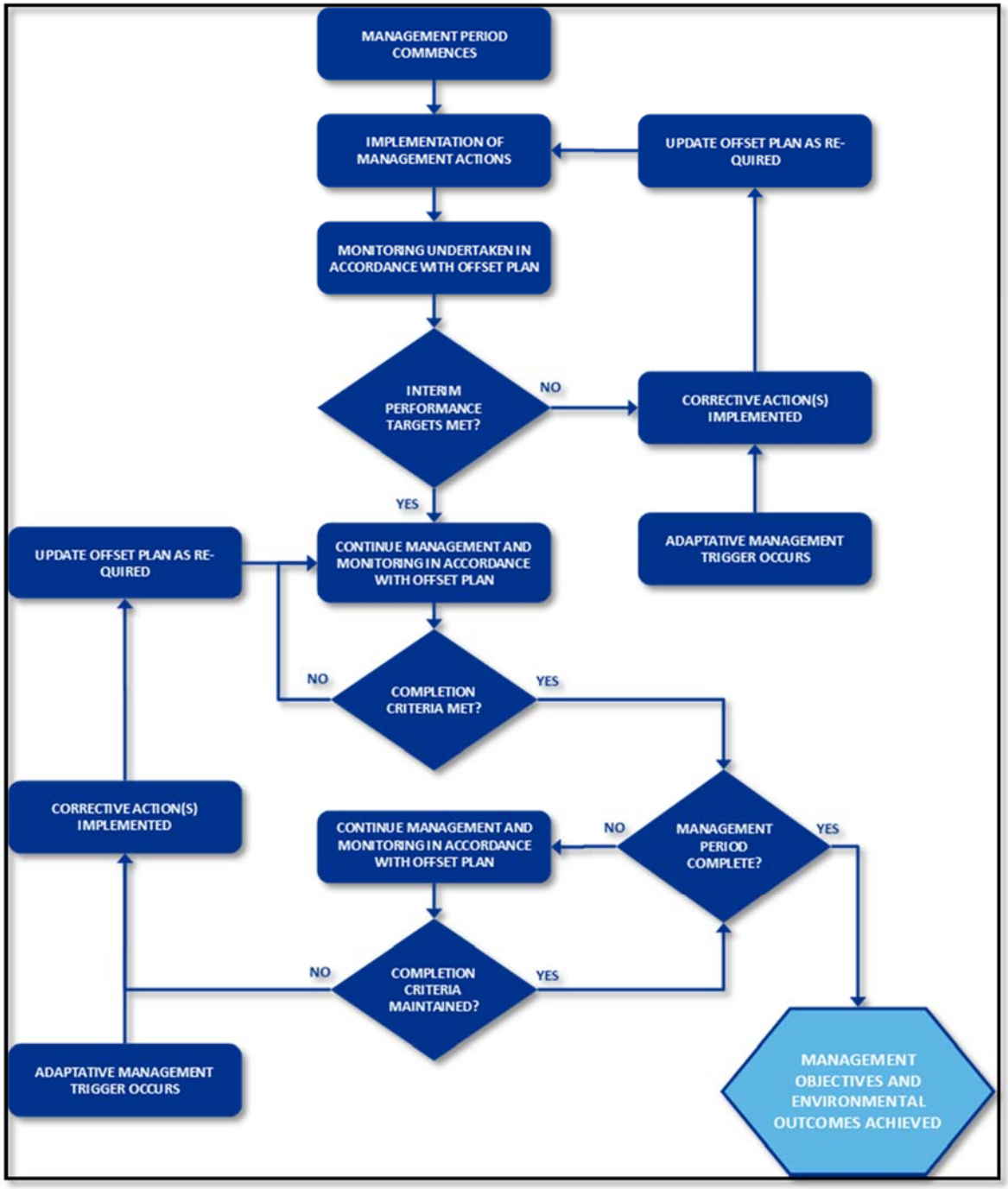


Figure 5-1 Adaptive management process for implementation of the Offset Plan

5.2 Managing uncertainty

The management of natural systems involves uncertainty which can affect the success of the management measures in achieving the objectives and performance criteria. Williams (2011) and Williams and Brown (2016) identify four kinds of uncertainty, outlined in Table 5-1, with how they have been addressed through the development of this Offset Plan.

Table 5-1 Four kinds of uncertainty (Williams and Brown 2016)

Uncertainty	Description	Addressed How
Environmental variation	**C**aused by external factors that act upon natural systems, but which are not influenced by the resource conditions and dynamics, for example variation in rainfall or temperature.	Largely outside of the control of the manager (Williams 2011). Influence is considered in the analysis of the effectiveness of the adaptive management approach, the analysis of the ability to achieve and maintain performance criteria and when considering the need for corrective actions.
Partial observability	Includes potential uncertainty arising from variation in the collection of data during monitoring events, and from being unable to completely observe the natural system in its entirety (Williams & Brown 2016).	Addressed in this OAMP through the development of a monitoring program based on scientifically tested and repeatable methods.
Partial controllability	Relates to the difference between the intended effect of the management measures to be implemented through this OAMP and the actual effect of their implementation on the ground (Williams & Brown 2016).	Address through adherence to an adaptive management approach including regular monitoring of conformance with performance criteria, assessment of adaptive management triggers, the implementation of corrective actions, review and amendments to the OAMP, and reporting to ensure that management measures are being effectively implemented on the ground.
Structural and process uncertainty	concerns a lack of knowledge or understanding regarding biological and ecological processes and relationships, and differing views regarding how natural systems respond to management (Williams & Brown 2016).	Addressed through the adaptive management approach. Following the results of ongoing management, monitoring and reporting, the OAMP will be reviewed and updated as required to incorporate learnings, updated conservation advice and best practice management techniques.

5.3 Timing for implementation of the Offset Plan

The offset area will be managed and monitored until the interim performance targets and completion criteria are achieved. It is anticipated that through the adaptive management approach, interim performance targets and completion criteria will be achieved within the proposed 20-year management period. However, if the interim performance targets and/or completion criteria for offset values have not been achieved within the anticipated timeframes, management and monitoring will continue beyond the 20-year management period in accordance with this Offset Plan until the completion criteria have been achieved. Once attained, completion criteria will be maintained for at least the life of the EPBC Act Approval.

5.4 Risk of offset failure

Appendix D presents an assessment of the risk of failure to achieve the Offset Plan objectives for the offset values.

Based on the adaptive approach to management and the proposed management and monitoring program, it is considered that the management objectives, interim performance targets and completion criteria (see Table 6-1) will be successfully achieved.

If interim performance targets are not achieved for one or more offset values by year 5, 10 or 15 for those offset values, Santos will obtain advice from suitably qualified people / groups with the aim of identifying appropriate additional management interventions.

It should be noted that unavoidable temporary perturbations such as severe drought, or insect/fungal pest invasion that may cause a temporary decrease in metrics such as canopy or shrub cover from which the community still may recover within the next 5 year period should not preclude assessment of a satisfactory increase in ecological condition by the completion date.

If it is considered that the completion criteria cannot be achieved, Santos will update this Offset Plan proposing alternative offset areas in order to acquit the required Stage 2 offset requirements in accordance with the offsets assessment guide. The revised Offset Plan will be submitted to the Commonwealth Government.

6.0 Management Outcomes

The environmental outcome sought through this Offset Plan is to improve the condition of vegetation in the SOA according to the interim performance targets and completion criteria detailed in Table 6-1, such that the habitat quality score for each MNES is improved from the baseline, as summarised in Table 7-1.

6.1 Interim performance targets and completion criteria

Table 8 details the interim performance targets and completion criteria for improving vegetation condition, and therefore MNES habitat quality, in the SOA, to demonstrate the success of the Offset Plan in achieving the overall environmental outcome.

The completion criteria align with the future habitat quality score included in the offsets assessment guides in Appendix C. Through the implementation of management and monitoring activities outlined in Section 7.0, the condition of the vegetation and offset values within the offset area will be improved from the baseline habitat quality to achieve the completion criteria within 20 years of commencement of the OAMP and be maintained for the life of the approval (i.e. until 31 March 2066).

All determinations of habitat quality will be made in accordance with the *Guide to assessing terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy (Version 1.2, April 2017)*, and converted to scores out of 10 via the spreadsheets included at Appendices A and B to the plan, unless agreed otherwise in writing by the Commonwealth Department of the Environment and Energy. The completion criteria for this plan are the offset site future state quality scores shown at Appendix B, for each metric included therein.

Table 6-1 Interim Performance Targets and Completion Criteria

Metric	Interim performance targets			Completion criteria*
	Year 5	Year 10	Year 15	Year 20
Assessment Units - Advanced regrowth REs: 11.9.5, 11.9.7 and Young regrowth REs: 11.9.5, 11.9.7, 11.10.7				
Tree canopy height	• Increased	• Increased to within 50% of remnant height	• Increased to within 75% of remnant height	• Remnant (VMA) Structure and floristics
Canopy recruitment	• Increased, or 100%	• Increased, or 100%	• Increased, or 100%	• Increased, or 100%
Tree canopy cover	• Increased	• Increased to within 50% of remnant cover	• Increased to within 75% of remnant cover	• Remnant (VMA) Structure and floristics
Shrub layer cover	• Increased	• Increased	• Increased	• Increased
Coarse woody debris	• Increased, or remains constant	• Increased, or remains constant	• Increased, or remains constant	• Increased, or remains constant
Native plant species richness	• Increased for four life forms	• Increased for four life forms	• Increased for four life forms	• Increased for four life forms
Non-native plant cover	• Decreased, or is below 5%	• Decreased, or is below 5%	• Decreased, or is below 5%	• Decreased, or is below 5%
Native perennial grass cover	• Increased	• Increased	• Increased	• Increased
Litter cover	• Increased, or remains constant	• Increased, or remains constant	• Increased, or remains constant	• Increased, or remains constant
Access and development	• Limited	• Limited	• Limited	• Limited

Metric	Interim performance targets			Completion criteria*
	Year 5	Year 10	Year 15	Year 20
BioCondition metric scores	• Have not declined as a result of fire or grazing	• Have not declined as a result of fire or grazing	• Have not declined as a result of fire or grazing	• Have not declined as a result of fire or grazing
Clearing	• No clearing has occurred	• No clearing has occurred	• No clearing has occurred	• No clearing has occurred
Weeds	• Weed control activities have prevented an increased in weed cover	• Weed control activities have prevented an increased in weed cover	• Weed control activities have prevented an increased in weed cover	• Weed control activities have prevented an increased in weed cover
Pest animals	• Decrease in Pest fauna trapped during trapping events.	• Decrease in Pest fauna trapped during trapping events.	• Decrease in Pest fauna trapped during trapping events.	• Decrease in Pest fauna trapped during trapping events.
Assessment Unit - Remnant REs: 11.3.25, 11.9.4, 11.9.5, 11.9.7, 11.10.7				
Tree canopy height	• Has not decreased	• Has not decreased	• Has not decreased	• Has not decreased
Canopy recruitment	• Increased, or 100%	• Increased, or 100%	• Increased, or 100%	• Increased, or 100%
Tree canopy cover	• Has not decreased	• Has not decreased	• Has not decreased	• Has not decreased
Shrub layer cover	• Increased	• Increased	• Increased	• Remnant (VMA) Structure and floristics
Coarse woody debris	• Increased, or remains constant	• Increased, or remains constant	• Increased, or remains constant	• Increased, or remains constant
Native plant species richness	• Increased for four life forms	• Increased for four life forms	• Increased for four life forms	• Increased for four life forms
Non-native plant cover	• Decreased, or is below 5%	• Decreased, or is below 5%	• Decreased, or is below 5%	• Decreased, or is below 5%

Metric	Interim performance targets			Completion criteria*
	Year 5	Year 10	Year 15	Year 20
Native perennial grass cover	• Increased	• Increased	• Increased	• Increased
Litter cover	• Increased, or remains constant	• Increased, or remains constant	• Increased, or remains constant	• Increased, or remains constant
Access and development	• Limited	• Limited	• Limited	• Limited
BioCondition metric scores	• Have not declined as a result of fire or grazing	• Have not declined as a result of fire or grazing	• Have not declined as a result of fire or grazing	• Have not declined as a result of fire or grazing
Clearing	• No clearing has occurred	• No clearing has occurred	• No clearing has occurred	• No clearing has occurred
Weeds	• Weed control activities have prevented an increased in weed cover	• Weed control activities have prevented an increased in weed cover	• Weed control activities have prevented an increased in weed cover	• Weed control activities have prevented an increased in weed cover
Pest animals	• Decrease in Pest fauna trapped during trapping events.	• Decrease in Pest fauna trapped during trapping events.	• Decrease in Pest fauna trapped during trapping events.	• Decrease in Pest fauna trapped during trapping events.

** For the purposes of the Completion Criteria, remnant height is 70% of benchmark community height and remnant canopy cover is 50% of benchmark community cover*

6.2 MNES habitat quality – baseline scores, interim targets and completion scores

Table 6-2 summarises habitat quality scores for each offset value in the SOA:

- Baseline habitat quality scores (calculated in accordance with the Guide to Determining Terrestrial Habitat Quality)
- Habitat quality score required at completion

Table 6-2 SOA Baseline Habitat Quality Scores

Offset Value	Baseline habitat quality score (area-weighted)	Rounded baseline quality score	Completion habitat quality score (Year 20)
Brigalow (*Acacia harpophylla* dominant and co-dominant)	6.84	7	8
South-eastern Long-eared Bat	6.15	6	7
Koala	5.66	6	7
Collared Delma	5.60	6	7
Yakka Skink	5.60	6	7
Dunmall's Snake	5.66	6	7

7.0 Offset Area Management

7.1 Overview

Figure 13 shows the three management areas in the SOA. Table 7-1 summarises management actions in each area.

Table 7-1 Summary of Management Actions in Each Management Area

Management activity	Management area(s)
Access and Development to be limited	All management areas
Fire to be Excluded	All management areas
Livestock exclusion	All management areas (with the exception of strategic grazing events)
Strategic Grazing	Management Area 1 and potentially Management Area 2 if needed.
Clearing Prohibition	All management areas
Weed Control	All management areas
Feral Animal Control	All management areas
Regrowth Thinning of Brigalow TEC	Regrowth Brigalow where thickening has occurred to >10,000 stems per hectare (Brigalow TEC only, parts of Management Area 3)

7.2 General restrictions

The general restrictions presented in Table 7-2 will be implemented to ensure the completion criteria and management objectives are achieved.

Table 7-2 Offset Area Restrictions

Restriction	Details
Access	• Access into the offset area will be restricted to authorised personnel only. • The SOA will be demarcated as an exclusion zone in the Santos GIS • Existing and new fences will be used to restrict access into offset area. Fences will be installed along southern perimeter of Hutton Creek providing a natural access barrier to the north, west and east • Signs will be installed in prominent locations (i.e. at access points into the offset area) which recognise that the areas are protected for conservation purposes. The signs will advise that access into the offset area is restricted to authorised personnel only
Weed hygiene	• Weed hygiene measures will be implemented to prevent the movement of weed material into the offset area. • All persons entering the offset area will be required to ensure vehicles and equipment are weed free. • All contractors entering the offset area must hold a current weed hygiene certificate or equivalent for all vehicles and equipment.

Restriction	Details
	• Evidence is to be provided on request to the landowner and Santos environmental advisors that vehicles, slashers or any machinery implementing management actions are clean prior to entry to minimise potential weed spread.
Vehicles	• Vehicle movement will be limited to designated access tracks in the offset area and access will be restricted to authorised personnel only. • Vehicles will travel to track conditions to minimise the risk of vehicle strike to fauna.
Vegetation clearing	• Clearing will be excluded from the offset area through demarcation and protection by means of Voluntary Declaration under the VM Act. Clearing for timber gathering and development will also be excluded. • Clearing of native vegetation will not be permitted within the SOA as part of any management and monitoring activities associated with the Offset Plan, except for clearing that is required for: o maintenance of access tracks and/or fire breaks o fence construction and maintenance and o ensure public safety or as directed by emergency management response personnel in the event of unplanned fire or other emergency or associated procedure. • If vegetation clearing is required for fencing, access, firebreaks or public safety, all activities will be appropriately planned, recorded and monitored. • Machinery will not be allowed on site after heavy or prolonged rainfall events until after the site has dried to allow for safe movement of traffic.

7.2.1 Access tracks

Existing access tracks will be utilised to facilitate necessary management, maintenance and monitoring activities as part of this Offset Plan. If existing access tracks become impassable (through erosion or vegetation regrowth), maintenance activities of these tracks (e.g. grading) will be prioritised over alternative track alignments. Gully crossings are likely to be subject to periodic, ongoing maintenance because of erosion following rain events.

Existing and new access tracks will be no wider than 5 m and vegetation disturbance will be minimised.

7.2.2 Fencing

To support strategic grazing and the exclusion of livestock at other times, fences in the SOA will be assessed and, where required to assist with livestock control for weed and fuel load management, additional fencing will be installed. To minimise imacts to birds and bats all new fences will use a sigle strand of hgh tensile steel wire on the top strand (barbed wire will not be used).

Any vegetation disturbance associated with new fence construction will be minimised in accordance with Table 11.

Regular inspections of all fencing will be undertaken in accordance with Section 8.1, and repairs to the fences will be made as required.

7.3 Fire management

Fire will be excluded from the SOA. Unplanned fire risk will be managed through:

- establishment and regular maintenance (grading) of a firebreak around the SOA
- carefully monitored and managed fuel loads

The firebreak will be maintained by grading along:

- all existing/proposed fence lines
- all existing access tracks bordering or traversing offset area
- Strategic grazing will be used to control fuel loads, where appropriate/necessary (see Section 7.4). As increasing grazing intensity is correlated with an increase in weedy cover (Franks 2002), and a decrease in native grass species richness, grazing will be permitted in the offset area on a managed and limited basis to control weeds and reduce fuel loads. Best management practices will be employed as follows:
- a minimum of 1,500 kg/ha of dry matter will be retained at the end of the dry season
- stock will only be permitted in the offset area to reduce fuel loads and reduce exotic pasture grass cover.

The suitability of conditions for undertaking a grazing event will be informed by biomass monitoring events (see Section 8.2). Following a wet season spell and prior to a strategic grazing event in pasture areas of the offset area, a feed budgeting assessment will be undertaken. The feed budgeting assessment will determine the stocking rate based on the amount of feed available within pasture areas and the amount of feed desired in these areas at the end of the grazing event.

7.4 Grazing

Livestock grazing will be excluded from all offset management areas except during strategic grazing events, which will play an important role in reducing fuel loads. As increasing grazing intensity is correlated with an increase in weedy cover (Franks 2002), and a decrease in native grass species richness (ELA 2017). Best management practices will be employed as follows:

- minimum of 1,500 kg/ha of dry matter will be retained at the end of the dry season
- stock will only be permitted in the offset area to reduce fuel loads, avoid weed seed set and reduce weed cover

To minimise erosion and subsequent impacts on water quality, strategic grazing will be excluded where rainfall causes inundated or waterlogged soils. The location and extent of grazing exclusion areas will be reviewed annually based on the results of management and monitoring events.

The suitability of conditions for undertaking a grazing event will be informed by biomass monitoring events as described in Section 8.2. Regular inspections of all fencing will be undertaken in accordance with Section 8.1 and repairs to the fences will be made as required.

7.5 Weed management

Weed management in the SOA will aim to minimise the introduction, establishment and spread of restricted and prohibited pest plants under the Biosecurity Act 2014 (Qld) and other invasive species, not regulated under the Biosecurity Act 2014, that present a threat to vegetation communities and species habitat in the offset area. Weed management will focus on reducing the extent of existing weeds as well as minimising the risk of introduction of additional weed species to the offset areas.

The presence of buffel grass and parthenium as well as other exotic weed and pasture species poses the greatest threat to vegetation communities in the offset area, with areas supporting buffel grass

contributing to a groundcover biomass up to 20 times that of similar, intact vegetation communities (Walker et al. 1981). Elevated biomass increases the risk of uncontrolled fires, particularly in Brigalow TEC (Butler & Fairfax 2003).

Reductions in the extent of buffel grass and parthenium are most effectively achieved by maximising the competitive advantage of native ground cover species. This requires native species richness and abundance to be maximised. In historically grazed environments the most effective way to ensure high species richness is through conservatively managed cattle grazing (Fensham 1998). Conservative cattle grazing requires maintenance of enough biomass to maximise grass growth and appropriate spelling to allow for native species to set seed.

Accordingly, a strategic grazing regime will be implemented to reduce the presence and biomass of exotic pasture grasses in the offset areas (refer to Section 7.4). To supplement this, weeds will be managed using chemical and/or mechanical control in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets, for the relevant weed species.

7.6 Pest Animal Management

Pest animals are present or have the potential to be present within or in the immediate vicinity of the SOA, and pose the following threats:

- predation of fauna (including South-Eastern Long-eared Bat, Koala, Dunmall's snake and yakka skink) by wild dogs, foxes and cats, and
- erosion and degradation of habitat and competition by feral pigs and rabbits.

Pest animal control activities will be conducted generally in accordance with the Biosecurity Act 2014 (Qld). Table 7-3 provides examples of approved species-specific pest animal control measures recommended by the Queensland and Commonwealth governments. Results of pest animal assessments will be reviewed following each reporting event to inform the need for, location and timing of species-specific control measures in subsequent years.

Table 7-3 Examples of Species-Specific Control Methods for Pest Animal Species

Species	Status[a]	Example control method	Reference
Wild dog (*Canis familiaris*)	Category 3,4,6	Ground baiting Foot hold traps Shooting	(DAF 2017)
Fox (*Vulpes vulpes*)	Category 3,4,5,6	Ground baiting Trapping Shooting	(DAF 2016a)
Feral cat (*Felis catus*)	Category 3,4,6	Night shooting Poisoning Trapping	(DAF 2016b)
Pig (*Sus scrofa*)	Category 3,4,6	Trapping Shooting Poisoning	(DAF 2016c)

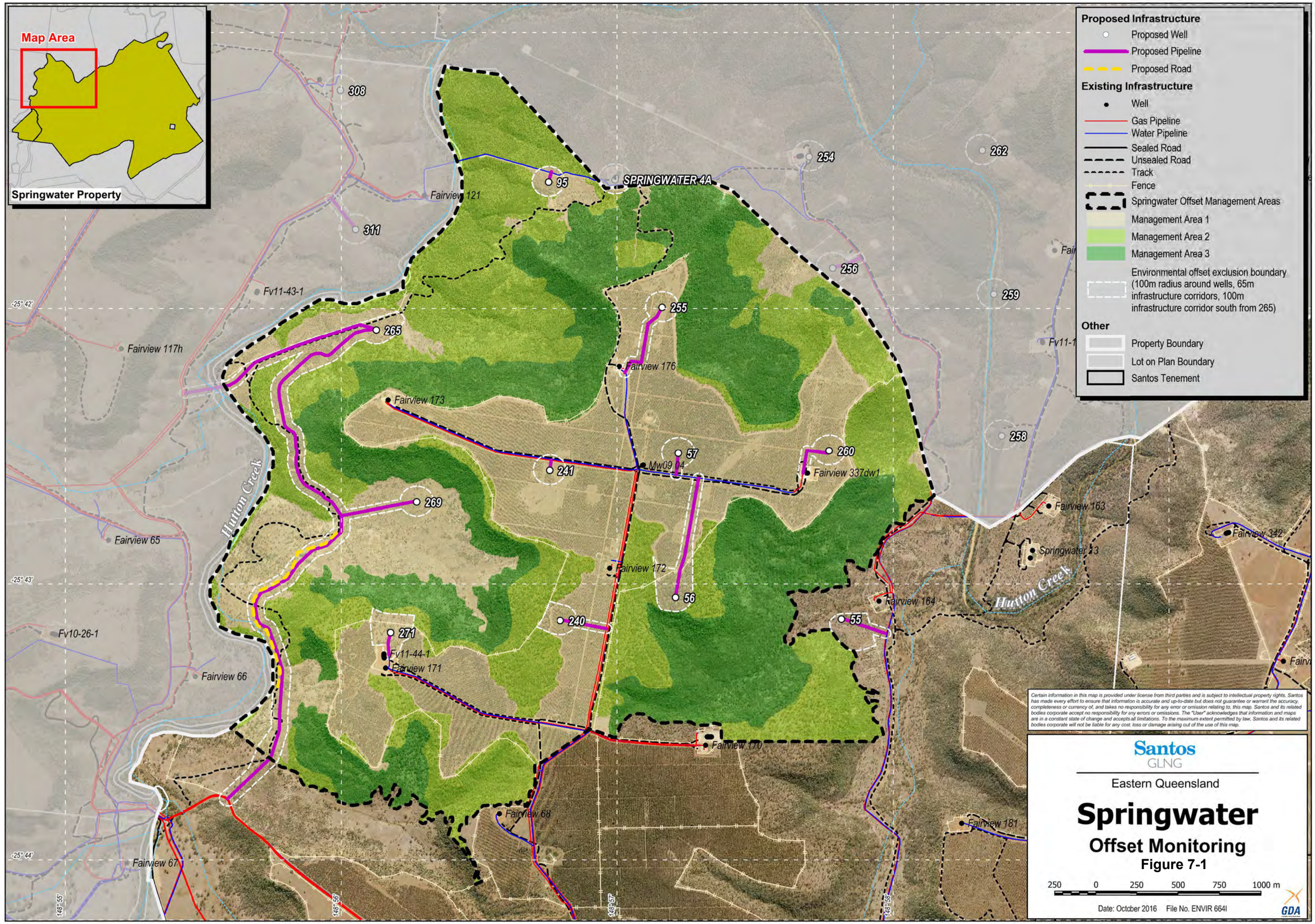
Species	Status[a]	Example control method	Reference
Rabbit (*Oryctolagus cuniculus*)	Category 3,4,5,6	Baiting Fumigation Trapping Shooting	(DAF 2016d)

[a] Status under the Biosecurity Act 2014 (Qld)

7.7 Brigalow Vegetation Management

Selective regrowth thinning of Brigalow TEC may be required where regrowth of Brigalow vegetation (RE 11.9.5) occurs at >10,000 stems per hectare. Restoration thinning using mechanical methods can accelerate structural development.

The requirement for management by mechanical thinning will be informed by monitoring events (see Section 8.5).


Map Area
Springwater Property
Proposed Infrastructure
Proposed Well
Proposed Pipeline
Proposed Road
Existing Infrastructure
Well
Gas Pipeline
Water Pipeline
Sealed Road
Unsealed Road
Track
Fence
Springwater Offset Management Areas
Management Area 1
Management Area 2
Management Area 3
Environmental offset exclusion boundary (100m radius around wells, 65m infrastructure corridors, 100m infrastructure corridor south from 265)
Other
Property Boundary
Lot on Plan Boundary
Santos Tenement
SPRINGWATER 4A
95
308
311
254
262
256
259
255
265
Fairview 121
Fv11-43-1
Fairview 117h
Fairview 176
Fairview 173
241
57
260
Mw09 04
Fairview 337dw1
269
258
Fairview 163
Fairview 342
Springwater 13
Hutton Creek
Fairview 65
Fairview 172
56
Fairview 164
240
55
271
Fv11-44-1
Fairview 171
Fv10-26-1
Fairview 66
Fairview 170
Fairview 68
Fairview 181
Fairview 67
-25° 42'
-25° 43'
-25° 44'
148° 55'
148° 56'
148° 57'
148° 58'
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Santos
GLNG
Eastern Queensland
Springwater
Offset Monitoring
Figure 7-1
250 0 250 500 750 1000 m
Date: October 2016 File No. ENVIR 664l
GDA

Table 7-4 Springwater Offset Area Management Actions

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action
Degradation of habitat	Achieve the completion criteria and habitat quality improvements for offset values, which include the habitat quality scores in this Offset Plan	Increase the habitat quality scores for each offset value at each habitat quality assessment site based on the results of baseline and subsequent monitoring events to achieve the scores in the completion criteria	Implementation of the management actions and adaptive management framework as outlined in this Offset Plan	Monitoring of offset value habitat quality scores will be undertaken in accordance with Section 8.0. Including: Offset area inspections (Section 8.1). Habitat quality assessments to determine habitat quality scores (Section 8.5). 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 (Section 8.7)	Habitat quality scores for interim performance targets are not achieved for one or more offset values by: • Year 5 • Year 10. • Year 15 or • Year 20	Step 1: Investigate cause of trigger: • Investigate reasons why the interim performance targets or the completion criteria were not achieved within the specified timeframes. • Re-evaluate the suitability of the relevant management measures in the Offset Plan. • Identify appropriate corrective actions. Step 2: Implementation of corrective action/s The appropriate corrective actions will be implemented and may include: • Third party review of the OAMP to provide input on the effectiveness of the management actions. • Increasing the frequency and intensity of pest animal and weed control measures or revising the type of measures to be implemented. • For offset values that have not achieved interim performance targets by year 15, for those offset values, Santos will obtain advice from scientific advisory groups with the aim of identifying appropriate additional management interventions. • In the very unlikely event that it is considered that the completion criteria will not be achieved, Santos will discuss the provision of additional offset options with the Commonwealth Government
Habitat or vegetation loss through land clearing	Maintain the extent of offset value habitat within the SOA	No unapproved and/or intentional clearing of habitat within the offset area, except for clearing that is required for fencing, access, firebreaks and public safety.	Protection of the SOA offset area via a Voluntary Declaration under section 19E and 19F of the VMA, as described in Section 4.4	Reporting to the Commonwealth Government consistent with any EPBC approval	Any activities in contravention of the Voluntary Declaration	Step 1: Investigate cause of trigger e.g. unauthorised access Identify appropriate corrective actions. Step 2: Implementation of corrective action/s The appropriate corrective actions will be implemented and may include additional fencing and/or signage and security for the SOA
			Comply with the restrictions outlined in Section 7.2. Construction and maintenance of access tracks, fencing and firebreaks will be undertaken in accordance with Sections 7.2 and 7.3. If vegetation clearing is required for fencing, access, firebreaks or public safety, all activities will be planned, recorded and monitored.	Compliance with restrictions for vegetation clearing associated with maintenance and establishment of access tracks, fencing and firebreaks will also be assessed as part of offset area inspections	Clearing for access, fencing, firebreaks or public safety is not undertaken in accordance with the restrictions outlined in Sections 7.2 and 7.3.	Step 1: Investigate cause of trigger • If restrictions for clearing associated with fencing, access, firebreaks or public safety are not adhered to, Santos will ensure that all clearing activities cease immediately. • Investigate the reason for unapproved or unintentional clearing. • Following clearing, the area is to be assessed by a suitably qualified ecologist/expert to determine the total clearing extent of offset value habitat. a. Identify appropriate corrective actions. Step 2: Implementation of corrective action/s The appropriate corrective actions will be implemented and may include: • Reviewing and modifying protocols for the establishment of fences, access tracks, and firebreaks. • Prior to the establishment of fences, access tracks, and firebreaks, the area to be cleared will be clearly marked out with flagging tape and checked prior to clearing. • Rehabilitation of the impacted area.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action
Degradation of habitat by overgrazing	Ensure that any livestock grazing for fire management and weed control maintains and enhances the ground cover attributes for MNES and does not result in the degradation of habitat and vegetation	Increase the richness and average % cover of native perennial grasses at each habitat quality assessment site based on the results of baseline and subsequent monitoring events	Implementation of strategic grazing to reduce fuel loads and control exotic pasture grasses in accordance with Section 7.4. Implementation of strategic grazing to promote the establishment of preferred foraging grass species including modifying the frequency, intensity and/or duration of grazing events. Excluding livestock grazing during wet periods (approximately December to March), which is typically the peak growing and flowering season for native grasses. Construct additional fencing should the current fencing be considered insufficient to manage the strategic grazing regime	Habitat quality assessments will be undertaken in accordance with Section 8.5.2. These will include assessment of % cover of native perennial grasses	Decrease in the richness and average ground layer cover at one or more habitat quality assessment sites based on the results of baseline and subsequent monitoring events	Step 1: Investigate cause of trigger • Investigate the reason for the decrease in richness and average % cover of native perennial grasses. • Identify appropriate corrective actions. Step 2: Implementation of corrective action(s) The appropriate corrective actions will be implemented and may include: • Modifying the strategic grazing regime, including modifying the frequency, intensity and/or duration of grazing events. • Constructing additional fencing should the current fencing be considered insufficient to manage livestock in accordance with the grazing regime. • Installing additional watering points for livestock to manage livestock in accordance with the grazing regime.
		Biomass levels of at least 1,500 kg/ha are retained at each of the monitoring sites at the end of the dry season.	Implementation of the strategic grazing regime to protect and maintain environmental values in accordance with Section 7.4.	Biomass monitoring will be undertaken in accordance with Section 8.1	Biomass monitoring results indicate less than 1,500 kg/ha of biomass is present at any of the monitoring sites at the end of the dry season.	Step 1: Investigate cause of trigger • Investigate the reason for the decrease in biomass at the end of the dry season • Identify appropriate corrective actions Step 2: Implementation of corrective action(s) Corrective actions will be implemented and may include the following: • Re-evaluating the strategic grazing regime to assess the suitability of grazing to ensure no less than 1,500 kg/ha of biomass is retained at the end of the dry season. • Removal of stock or spelling grazing from the offset management area in which less than 1,500kg/ha of biomass was identified. • Amending livestock management practices in the Offset Plan, including amending stocking rates, and/or duration and/or frequency of strategic grazing. • Evaluating the location of existing fencing to ensure it is enough to control livestock as part of strategic grazing and investigate if additional fencing is required to be constructed. • Constructing additional fencing to control livestock movements.
		Livestock are only observed to be in the offset management areas undertaking strategic grazing.	Existing fencing is always maintained as outlined in Section 7.2.2. Construction of additional fencing as required.	Offset area inspections will be undertaken at least twice a year (Section 8.1) and will include monitoring to assess the: • condition of fencing to identify any necessary maintenance requirements. • presence of livestock within the offset management area.	Livestock are observed within an offset management area when not permitted within that area. Damaged fencing is observed.	Step 1: Investigate cause of trigger • Investigate the reason why livestock have entered the offset area • Identify appropriate corrective actions Step 2: Implementation of corrective action(s) Corrective actions will be implemented and may include the following: • If livestock are identified in the offset management areas, notify the onsite Environmental Supervisor or relevant responsible person and remove stock immediately. • Repair fencing to ensure its condition is satisfactory to exclude livestock. • Construct additional fencing should the current fencing be considered insufficient to exclude livestock.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action
Degradation of Brigalow TEC habitat	Manage regrowth of Brigalow TEC vegetation (RE 11.9.5) to accelerate structural development	Maintenance of Brigalow TEC regrowth in accordance with interim performance targets and completion criteria.	Selective regrowth thinning of Brigalow TEC where regrowth of Brigalow vegetation (RE 11.9.5) occurs at >10,000 stems per hectare, using mechanical methods	Habitat quality assessment in accordance with Section 8.5	Brigalow TEC regrowth exceeds 10,000 stems per hectare based on previous monitoring events.	Step 1: Investigate cause of trigger Identify whether mechanical thinning is appropriate Step 2: Implementation of corrective action(s) Corrective actions including mechanical thinning of regrowth Brigalow TEC may be carried out.
Invasion of habitat by weed species, including exotic grasses	Manage invasive weed species to reduce degradation of MNES habitat	Decrease in relative abundance of weed species at 80% of monitoring sites from subsequent monitoring events. No new weed species are identified at any monitoring site (based On subsequent monitoring events	Implement weed control actions in accordance with Section 7.5 Adhere to weed hygiene restrictions.	Undertake weed monitoring in accordance with Section 8.3.	An increase in relative abundance of weed species at more than 15% of monitoring sites from subsequent monitoring events. A new weed species is identified at one or more monitoring sites.	Step 1: Investigate cause of trigger Investigate the increase in relative weed abundance Identify appropriate corrective actions Step 2: Implementation of corrective action(s) Corrective actions will be implemented and may include the following: • Reviewing adherence to weed management control measures as outlined in Section 7.5. • Amending weed hygiene restrictions. • Providing additional weed awareness training for all staff and contractors to ensure weed hygiene restrictions are adhered to. • Revising weed control methods. • Increasing the frequency and intensity of weed control. • Updating weed control methods in the Offset Plan and targeted weed control programs.
Predation by pest animals (feral foxes, cats and wild dogs)	Minimise predation risk by pest animals to threatened fauna species	Reduction in Catling* Index for the relevant pest animal from the first year of offset management	Implement control actions for pest animals in accordance with Section 7.6.	Undertake monitoring for pest animals in accordance with Section 8.4.	An increase in Catling* Index for the relevant pest animal from the first year of offset management and subsequent monitoring events.	Step 1: Investigate cause of trigger • Investigate the reason for the increase in Catling index (or relative abundance, or change in rabbit impact category) from year 1/subsequent monitoring events • Identify appropriate corrective actions Step 2: Implementation of corrective action(s) Corrective actions will be implemented and may include the following: • Reviewing adherence to pest management control measures. • Increasing the frequency and intensity of pest animal control. • Revising methods of pest animal control in accordance with Queensland Department of Agriculture and Fisheries (DAF) guidelines, and coordinate with neighbouring landowners to ensure a consistent approach. • Updating pest animal control methods in the Offset Plan and targeted pest animal control programs.
Degradation of habitat by rabbits	Minimise degradation of MNES habitat by rabbits.	Maintain rabbit impact category as 'acceptable'.	Implement control actions for rabbits in accordance with Section 7.6.	Undertake monitoring for rabbits in accordance with Section 8.4.	Rabbit impact category measured as 'monitor closely', or 'unacceptable'.	
Degradation of habitat by feral pigs	Minimise degradation of MNES habitat by feral pigs.	Reduction in mean feral pig abundance score from the first year of management	Implement control actions for feral pigs in accordance with Section 7.6	Undertake monitoring for feral pigs in accordance with Section 8.4.	An increase in mean feral pig abundance score from first year and subsequent monitoring events.	

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action
Fire	Reduce the risk of adverse impacts on MNES habitat associated with unplanned fire	No unplanned fire within the SOA Increase in habitat quality scores as a result of implementation of any fire management measures.	Implement fire management according to Section 7.3.	Habitat quality assessments to determine habitat quality scores will be undertaken in accordance with Section 8.5.	As a result of fire management measures, or an unplanned fire, there is a decrease in the habitat quality score for any offset value from baseline and subsequent monitoring events.	Step 1: Investigate cause of trigger • Investigate reasons why the fire management measures have resulted in a decrease in habitat quality scores. • Review adherence to the fire management measures. • Identify appropriate corrective actions. Step 2: Implementation of corrective action/s The appropriate corrective actions will be implemented and may include: • Increasing the frequency of biomass monitoring. • Increasing the frequency of weed control measures. • Reviewing effectiveness of firebreaks, and establishment of additional fire breaks.
Offset fails to achieve the interim performance targets and completion criteria within the anticipated 5, 10-, 15- and 20-year timeframes, respectively	Achieve the interim performance targets and completion criteria for each offset value within 5, 10, 15 and 20 years, respectively.	The interim performance targets are achieved for all offset values by year 5,10 and 15. The completion criteria are achieved for all offset values by year 20.	All management actions outlined in Section 7.0 will be implemented to ensure that the interim performance targets and completion criteria are achieved.	Monitoring of the offset area will be undertaken in accordance with Section 8.0 including: Offset area inspections (Section 8.1). Habitat quality assessments to determine habitat quality scores (Section 8.5.) The results of monitoring events will be compared against the interim performance targets and completion criteria to determine the progress of offset area and recorded as part of reporting (Section 8.7).	Interim performance targets are not achieved for one or more offset values by year 5, 10 or 15 Completion criteria are not achieved for one or more offset values by year 20.	Step 1: Investigate cause of trigger • Investigate reasons why the interim performance targets or the completion criteria were not achieved within the specified timeframes. • Re-evaluate the suitability of the relevant management measures in the OAMP. • Identify appropriate corrective actions. Step 2: Implementation of Corrective Action/s The appropriate corrective actions will be implemented and may include: • Third party review of the Offset Plan to provide input on the effectiveness of the management actions. • Increasing the frequency and intensity of pest animal and weed control measures or revising the type of measures to be implemented. • Modifying the fire management measures, to better support enhancement of offset values.

8.0 Monitoring

Ongoing monitoring is required to ensure the Offset Plan meets the performance criteria and management objectives, and ultimately attains the completion criteria. A monitoring programme has been developed, detailed in the following sections and in Table 16

The results of the monitoring program will be used to inform operational management decisions, including adaptive implementation of this Offset Plan to ensure the performance criteria and management objectives, and ultimately interim performance targets and completion criteria are met.

The monitoring results will also be used to assess adherence to performance criteria, and to determine when corrective actions are required to be implemented. The results will also be compared to those from previous monitoring events to assess change over time and to inform the ongoing implementation of the OAMP

8.1 Offset Area Inspections

The aim of offset area inspections is to enable a general assessment of the offset area to identify any potential issues that may require remedial action to be undertaken. Inspections will be undertaken at twice per year for the duration of the management period to assess the following:

- condition of fencing, gates and signs and existing gas field infrastructure
- condition of access tracks
- condition of firebreaks
- compliance with restrictions for vegetation clearing associated with maintenance and establishment of access tracks, fencing and firebreaks
- incidence of erosion within offset area, particularly around permanent and semi-permanent water bodies or areas subject to inundation or waterlogging
- damage/degradation resulting from pest animal activity within the offset area
- signs of land degradation and over-grazing
- presence of weed/invasive species
- exclusion of livestock
- incidental fauna observations and any additional risks to offset values (i.e. evidence of vehicle strike)

8.2 Biomass monitoring

Biomass monitoring for fire management will be undertaken twice a year, at the end of the wet season and end of the dry season, to:

- determine the risk of fire to the offset site and
- inform fire management strategies.

Biomass is at its greatest at the end of the wet season (around April) with fire risk greatest towards the end of the dry season (September/October). Biomass will be monitored within the offset areas using appropriate photo standards which will be used to determine dry matter yields and subsequently fuel loads. Biomass monitoring will be undertaken at the same permanent weed monitoring sites established as part of the baseline surveying.

Fuel loads will be managed through strategic grazing events (see Section 7.4) if the biomass assessment at the end of the wet season shows that biomass is greater than 1,500 kg/ha.

The stocking rate of these strategic grazing events will be determined through a feed budgeting assessment (see Section 8.2.1) undertaken prior to a grazing event in the offset area. A feed budgeting assessment is a recognised method of determining the stocking rate based on the amount of feed available and the amount of feed desired at the end of the grazing event (i.e. >1,500 kg/ha).

8.2.1 Feed Budgeting Assessment

The process for undertaking a feed budget assessment will include the following sequence of activities:

- determine the current amount of feed present (kg/ha) using appropriate photo standards available on the Future Beef website[1].
- determine the amount of feed desired (kg/ha) at the end of the grazing event.
- calculate the total useable feed (kg/ha) by subtracting the feed desired from the feed present.
- determine utilisation (i.e. the proportion of useable feed that livestock can use).
- determine the feed available for the grazing animal (kg/ha) by multiplying the total useable feed by the utilisation rate.
- calculate the safe stocking rate by:
    - determining the feed consumption per day (kg/day)
    - determining the number of days feed is required (days)
    - calculating the feed requirement per head (kg/hd) by multiplying the feed consumption per day by the number of days
    - calculating the stocking rate (ha/hd) by dividing the feed requirement per head by feed available
    - calculate the number of stock (head) by dividing the area of the paddock by the stocking rate.

The amount of feed available prior to the grazing event will be estimated using the appropriate photo standards available on the Future Beef website. The “Dry Season Feed Budget” worksheet will then be used to calculate the required stocking rate for the grazing event.

At the completion of the grazing event, photo standards will be used to assess ground cover and ecosystem biomass. Should the grazing event be required to be extended (e.g. as a result of additional rainfall and resultant grass growth and potential weed flowering), the feed budget assessment will be recalculated using the “Dry Season Feed Budget” worksheet.

8.3 Weed monitoring

Weed monitoring sites will be randomly stratified, fixed monitoring sites representative of offset values and incorporating natural variability such as aspect (e.g. a mix of north-, east-, south- and west-facing monitoring sites), community type – (e.g. woodland, riparian). There will also be fixed monitoring sites

at strategic trafficable areas (e.g. entry gates, creek crossings, stock watering points) to monitor potential introduction and/or irruptions of prohibited and restricted weed species.

The offset area will be monitored for weeds every two years (post wet season) to determine the species richness and abundance, for the duration of the management period. The results of this monitoring will inform the methods for weed treatment and control (see Section 7.5).

[1] https://futurebeef.com.au/knowledge-centre/pastures-forage-crops/pasture-photo-standards/

Non-native plant cover is also assessed as part of the habitat quality assessments detailed in Section 8.5, and the presence of weed species will also be recorded as part of the general offset area inspections (see Section 8.1), where noted.

Weed monitoring will target the declared and environmental weeds known to occur over Springwater: Buffel Grass (*Cenchrus ciliaris*), Green Panic (*Megathyrsus maximus*), Parthenium (*Parthenium hysterophorus*) and Harrisia Cactus (*Harrisia martini*).

8.4 Pest Animal Monitoring

In partnership with the Queensland Murray-Darling Committee (QMDC), Santos GLNG conduct a feral animal research, monitoring and control project across the Fairview gas field. This includes the Springwater property. The methodology employed in this program included wild dog and feral cat trapping at known hot spots and feral pig trapping and control. This will continue for the period of offset area management.

Pest animal control will occur twice annually. Each trapping program is over a two week period with the first trapping program occurring during March to April and the second trapping program occurring during October to December. This timing aligns with increased dog activity during the breeding season and avoids the colder months where cat activity and breeding is limited.

In addition to the above program, evidence of pest fauna species is documented during the offset area inspections (see Section 8.1).

8.5 Habitat Quality Assessments

The first detailed monitoring event of the SOA was completed in spring/summer 2017, including BioCondition sites established in all major vegetation assessment units.

All determinations of habitat quality will be made in accordance with the *Guide to assessing terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy (Version 1.2, April 2017)*, and converted to scores out of 10 via the spreadsheets included at Appendices A and B to the plan, unless agreed otherwise in writing by the Commonwealth Department of the Environment and Energy. The completion criteria for this plan are the offset site future state quality scores shown at Appendix B, for each metric included therein.

8.5.1 Rapid Monitoring Event

Rapid monitoring events will be carried out each year there is not full monitoring of habitat quality (BioCondition, Section 8.5.2, targeted fauna survey, Section 8.5.4 and flora surveys, Section 8.5.5).

These will be aligned with the offset area inspections (see Section 8.1), and carried out by suitably qualified ecologists during spring and early summer (September – mid December) to coincide with the optimal time of year for flora and fauna surveys in the Brigalow Belt Bioregion (Eyre et al. 2014).

During each rapid monitoring field assessment, the following will conducted:

- An unbounded timed meander flora survey will be conducted. The survey will be conducted in accordance with the timed meander survey methodology contained within the Queensland Department of Environment and Heritage Protection's Flora Survey Guidelines.
- Fauna surveys will be conducted throughout the rapid monitoring events. Early morning and late evening bird surveys will be conducted during floristic surveys and surveys for the presence of all fauna species will be conducted throughout the day by the ecologists.

8.5.2 Habitat quality assessment (BioCondition)

Vegetation condition and habitat quality for each MNES will be assessed in accordance with the Guide to Determining Terrestrial Habitat Quality, developed by the Queensland Government to measure the habitat quality of a land-based offset. The guide is based on the methodology set out in the BioCondition Assessment Manual (Eyre et al. 2015) and compared to control sites (BioCondition benchmarks), as developed by the Queensland Herbarium.

Fixed transects were established in 2017 and these will be repeated every two years for the first six years following the 2017 baseline, and then every three years thereafter.

All ecological surveys and assessments will be undertaken by suitably qualified ecologists.

8.5.3 Photo monitoring

For each BioCondition site, photo-monitoring points have been established.

Photo monitoring is a qualitative analysis technique that provides the opportunity for visual time series analysis of changes in vegetation composition, structure and integrity. In areas where active management is being undertaken, photo monitoring offers a simple and effective visual means by which to capture the response of the vegetation to management actions. Photo monitoring will be conducted at all fixed habitat quality assessment monitoring sites, in accordance with the Guide to Determining Terrestrial Habitat Quality. Timing of photo monitoring will therefore align with habitat quality assessment monitoring.

8.5.4 Targeted Fauna Surveys

Targeted fauna surveys are conducted to assess fauna species richness of the SOA. The targeted fauna survey methods will focus on the relevant specific significant species that are unlikely to be detected effectively during the rapid assessment surveys due to cryptic behaviour or localised habitat requirements. Targeted surveys for species are based on the ecology, habitat requirements and behavioural aspects of the species of interest. Methodology, search effort and timing is provided in Table 8-1.

Targeted fauna surveys will be carried out in conjunction with BioCondition surveys, every two years for the first six years following the 2017 baseline, and then every three years thereafter.

Table 8-1 Fauna Species Survey Methods

Technique	Regime	Target and method
Elliot B (Box Trap) or Cage Trap	Four per site over four consecutive nights, checked early morning, reopened late afternoon.	Baited with a mixture of oats, peanut butter, vegetable oil and sardines. Placed within suitable micro-habitat for Northern Quoll.
Funnel Trap	Six at each of five trap sites over four consecutive nights, checked early morning and afternoon.	Placed in pairs either side along a 30m drift-fence. Targeting Dunmall's Snake and Collared Delma.
Anabat	Three units overnight for four consecutive nights	Left overnight on site near entrances to possible roost sites for Large Pied Bat, if considered present, and/or along flyways and near waterbodies.

Technique	Regime	Target and method
Harp Trap	Two per night for four consecutive nights, locations chosen based on presence of suitable flyways	Targeting South-eastern Long-eared Bat, which is not identifiable by ultrasonic calls. Also Large-eared Pied Bat.
Camera Trap	10 over at least 14 consecutive nights	Focused on stations baited with a mixture of oats, peanut butter, vegetable oil and sardines. Targeting Northern Quoll and possibly Yakka Skink. (Fleming et al., 2014).
Spotlighting	Meander along watercourses.	Targeting Koala. This will also target Dunmall's Snake.
Spotlighting	Rocky areas.	Targeting Northern Quoll and Collared Delma.
Spotlighting	By vehicle along tracks.	Targeting Dunmall's Snake.
Scat Search	Conducted in habitat considered suitable for target species.	Targeting Koala and Northern Quoll. The Spot Assessment Technique (SAT), or a variation, were used to survey for Koalas within suitable habitat within the site.
Bird Survey	At waterbodies.	Targeting Australian Painted Snipe, Australasian Bittern and Squatter Pigeon.
Bird Survey	Meander along watercourses during the day.	Targeting nest sites for Red Goshawk. Includes diurnal Koala Search.
Track Traverse	By vehicle and on foot.	Targeting Squatter Pigeon.
Diurnal Herpetofauna Search	Late morning/early afternoon.	Conducted by two searchers, duration is determined by site-specific habitat quality and presence of suitable micro-habitat. Targeting Collared Delma, Dunmall's Snake and Yakka Skink.
Platelet Search	In suitable habitat.	Targeting Black-breasted Button-quail.

8.5.5 Flora Surveys and Habitat Mapping

Threatened flora surveys will be conducted throughout the SOA. Timed meander surveys are conducted in each of the vegetation units listed in Table 3 to identify and locate EVNT plants. The timed meander survey are conducted in accordance with Section 4.1 of the *Queensland Department of Environment and Heritage Protection's Flora Survey Guidelines - Protected Plants - Nature Conservation Act 1992*, located here: https://www.ehp.qld.gov.au/licences-permits/plants-animals/documents/flora-survey-guidelines.pdf

Flora surveys and habitat mapping will be carried out in conjunction with BioCondition surveys and targeted fauna surveys, every two years for the first six years following the 2017 baseline, and then every three years thereafter.

8.6 Implementation Schedule

Table 8-2 and Table 8-3 Table 8-2summarise the implementation schedule for the management, monitoring and reporting activities presented in this OAMP.

Table 8-2 Implementation of management actions

Activity		Management years ✓ Activity required • Activity to be carried out as required																				Timing	Related monitoring
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
General restrictions (Section 7.2)	Access, vehicles, vegetation clearing, weed hygiene	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	At all times	General offset inspections (see Section 8.1).
Access tracks (Section 7.2.1)	Maintenance/new tracks	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	As required	
Fencing (Section 7.2.2)	Construction of additional fencing to support livestock exclusion and strategic grazing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	As required	
	Maintenance	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
Fire management (Section 7.3)	Fire excluded	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	At all times	Biomass monitoring (Section 8.2.1).
Grazing (Section 7.4)	Strategic grazing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	As required based on the results of biomass monitoring, and informed by weed monitoring	Biomass monitoring (Section 8.2.1). Weed monitoring (Section 8.3).
Weed management (Section 7.5)	Buffel grass and other weeds	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	Control activities in addition to stratetic grazing to be undertaken as required	Weed monitoring (Section 8.3).
Pest animal management (Section 7.6)	Wild dog (*Canis familiaris*); Feral cat (*Felis catus*); Fox (*Vulpes vulpes*); Rabbit (*Oryctolagus cuniculus*); Pig (*Sus scrofa*)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	Control acfitivites to be undertaken as required	Pest animal monitoring (Section 8.4)
Brigalow vegetation management (Section 7.7).	Restoration/regrowth Brigalow vegetation (RE 11.9.5)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	Thinning to be undertaken as required, according to habitat quality assessments	Habitat quality assessment (Section 8.5)
Reporting (Section 8.7)	Annual reporting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Offset Plan audit every 5 years	Reporting (Section 8.7)
	Update Offset Plan					•					•					•					•		

Table 8-3 Offset Plan Monitoring Events

Survey or monitoring objective	Monitoring activity	Management years ✓ Activity required • Activity to be carried out as required																			Timing	Survey/monitoring guidelines	Reliability
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
Offset area inspections (Section 8.1)	Twice yearly inspections of: • fencing, gates, signs and existing • access tracks • firebreaks • compliance with restrictions for vegetation clearing associated with • incidence of erosion • damage/ degradation resulting from pest animal activity within the offset area • signs of land degradation and over-grazing • weed/invasive species • exclusion of livestock • incidental fauna observations and any additional risks to offset values (i.e. evidence of vehicle strike	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Inspections will be undertaken at least twice a year, Usually at the end of the wet season and the end of the dry season, with one of the inspections occurring prior to the submission of the annual report		General assessment of the offset management areas to identify any potential issues that may require remedial action to be undertaken within the subsequent year of management.
Biomass monitoring (Section 8.2.1)	Biomass monitoring for fire management and to inform strategic grazing regime	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Twice every year at the end of the wet season (March/April) and towards the end of the dry season (October)	Assessment against Future Beef photo standards (Section 8.2.1)	Methodology developed by the Queensland Government Department of Nation Resources.
Weed monitoring (Section 8.3)	Ongoing weed surveys to assess the effectiveness of weed control		✓		✓		✓		✓		✓		✓		✓		✓		✓		✓	Every two years including a survey in the dry season and a survey post wet season	NSW Guidelines for Monitoring eed Control and recovery of native vegetation (Auld 2009) Photo monitoring of selected sites to assess visual changes in weed species and infestations over time.	Assessment undertaken generally in accordance with guidelines developed by Bruce Auld from the NSW Department of Primary Industries.

Survey or monitoring objective	Monitoring activity	Management years ✓ Activity required • Activity to be carried out as required																				Timing	Survey/monitoring guidelines	Reliability
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
																							The use of precision unmanned aerial vehicles (drone) technology, aerial imagery and/or remote sensing.	
Pest animal monitoring (Section 8.4)	Ongoing pest animal surveys to assess the effectiveness of pest animal control	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Twice annually, according to Section 8.4	Methods as detailed in Santos partnership with Queensland Murray-Darling Committee (QMDC	
Habitat quality assessment (baseline surveys completed in 2017) (Section 8.5)	Rapid monitoring events		✓		✓		✓	✓		✓	✓		✓	✓		✓	✓		✓	✓		Every year there is no full BioCondition assessment	See Section	
	Targeted fauna and flora surveys	✓		✓		✓			✓			✓			✓			✓			✓	Every two years from the 2017 baseline, and then every three years thereafter.	Guide to Determining Terrestrial Habitat Quality (DEHP 2017) Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2018) Survey Guidelines for Australia's Threatened Birds (DEWHA 2010) Survey guidelines for Australia's threatened reptiles (DSEWPaC 2011).	Assessment undertaken in accordance with method developed by the Queensland Government and aligns with the EPBC Act Environmental Offsets Policy measure of 'habitat quality' and is intended to provide a consistent framework for environmental offsets in Queensland.
	BioCondition transects	✓		✓		✓			✓			✓			✓			✓			✓			
	Photo monitoring	✓		✓		✓			✓			✓			✓			✓			✓		Photos at each photo monitoring point will be taken in a north, east, south and westerly direction. A record of the photographs will be maintained, including GPS co-ordinates, date and time of each photograph and the direction in which the photograph was taken.	Based on best practice photo monitoring techniques, see Appendix 4 of BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2. (Eyre *et al.* 2015)

8.7 Reporting

Reports detailing the progress against the management outcomes detailed in Section 6 will be prepared by the suitably qualified ecologist responsible for conducting the monitoring, within two weeks following each monitoring event. The report will contain, at a minimum:

- A description of the monitoring conducted, when it was conducted, and by whom;
- A discussion of the weather in the lead up to and during the monitoring;
- Results of photo monitoring ;
- Site data including site description and location and results for all site based condition attributes listed in Section 5.5.
- Rapid assessment site data including site description and location and results (if relevant that year);
- An overview of the management actions that were implemented since the last report (i.e. if thinning of Brigalow occurred, or pest animal and weed control);
- Details of any triggers that have been exceeded and the remedial actions that were implemented;
- An overview of the progress of the management area in achieving the performance criteria and how any risks or threats have impacted on the area; and
- An indication of any risks or potential threats that have become apparent to the management area since the development of this management plan, and activities to be undertaken to manage these threats and/or risks.
- This plan will be reviewed and audited every 5 years and/or if the risks to the offsets success identified in Section 5.4 have been identified.
- Annual reports discussing compliance with the commitments within this plan will be published on the Santos website.

9.0 References

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Appendix A: Summary Scores – Impact Site

Condition

	11.9.10	11.9.10	11.9.5	11.9.5	11.9.7	11.9.7	11.7.6	11.7.6	11.3.25	11.3.2	11.7.2	11.7.2
	Remnant	**Regrowth**	**Remnant**	**Regrowth**	**Remnant**	**Regrowth**	**Remnant**	**Regrowth**	**Remnant**	**Remnant**	**Remnant**	**Regrowth**
Recruitment of woody perennial species in EDL	0	5	5	5	5	5	3	5	5	5	4.33	3
Native plant species richness - trees	5	5	5	2.5	5	5	2.5	5	5	5	3.50	2.5
Native plant species richness - shrubs	5	5	5	2.5	5	5	0	2.5	1.25	2.5	2.5	2.5
Native plant species richness - grasses	2.5	2.5	2.5	2.5	2.5	3.75	2.5	0	2.5	2.5	5	2.5
Native plant species richness - forbes	5	2.5	2.5	5	2.5	2.5	5	5	2.5	5	5	5
Tree canopy height (average of emergent, canopy, sub-canopy)	5	3	5	3	5	3	5	3	3	5	5	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	5	5	5	3	5	5	5	5	4	5	3.666667	3
Shrub canopy cover	3	3	3	0	3	1.5	5	5	1.5	0	0	0
Native grass cover	5	0	5	0	0	0.5	1	5	1	1	1.67	1
Organic litter	5	5	5	5	5	3	5	3	3	3	3	5
Large trees (euc plus non-euc)	5	0	15	15	5	7.5	15	15	10	0	3.333333	0
Coarse woody debris	5	2	2	0	2	1	5	0	0	0	0	0
Non-native plant cover	10	10	10	10	10	10	10	10	10	10	10	10
Final Score	**60.5**	**48**	**70**	**53.5**	**55**	**52.75**	**64**	**63.5**	**48.75**	**44**	**47**	**39.5**
Out of possible maximum	80	80	80	80	80	80	80	80	80	80	80	80
Adjusted score out of 3/out of 7	5.29375	4.2	6.125	4.68125	4.8125	4.615625	5.6	5.55625	4.265625	3.85	4.1125	3.45625

Context

Patch Size	10	10	10	0	5	2.5	10	10	5	2	4	5
Connectedness	4	2	5	0	4	1	5	2	2	2	0.67	2
Context	4	4	4	0	4	2	4	2	2	2	2.67	4
Ecological Corridors	0	0	0	0	0	0	0	0	0	0	0	0
Final Score	**18**	**16**	**19**	**0**	**13**	**5.5**	**19**	**14**	**9**	**6**	**7.333333**	**11**
Out of possible maximum	26	26	26	26	26	26	26	26	26	26	26	26
Adjusted score out of 3	2.0769231	1.846154	2.192308	0	1.5	0.634615	2.192308	1.615385	1.038462	0.692308	0.846154	1.269231
Combined score out of 6/out of 10	7.3706731	6.046154	8.317308	4.68125	6.3125	5.25024	7.792308	7.171635	5.304087	4.542308	4.958654	4.725481
AU Weighting (from Overview Tab)	0.0329246	0.121992	0.019194	0.092643	0.047294	0.057126	0.226258	0.037096	0.076588	0.054605	0.016006	0.218273
Weighted score from 6/from 10	0.2426764	0.737584	0.159645	0.433683	0.298543	0.299927	1.763074	0.266041	0.406227	0.248033	0.079367	1.031444

Species Stocking Rat	Brigalow TEC	SELE Bat	Koala	Collared Delma	Yakka Skink	Dunmall's Snake
Quality and availability of food and foraging habitat (score per DEHP Guide)	N/A	10	5	5	5	5
Quality and availability of shelter (score per DEHP Guide)	N/A	5	5	5	1	5
Role of site location to species/TEC overall population in the state (score per DEHP Guide)	N/A	1	1	1	1	1
Threats to the species/TEC (score per DEHP Guide)	N/A	7	7	7	7	7
Species mobility capacity (score per DEHP Guide)	N/A	10	1	1	1	1
Species/TEC present on site (Yes/No)	N/A	Yes - 15	Yes - 15	Yes - 15	Yes - 15	Yes - 15
Species/TEC present on adjacent properties (Yes/No)	Yes	No	No	No	No	No
Evidenced species usage of site (not habitat, dispersal, feeding, breeding)	N/A	Nil	Nil	Nil	Nil	Nil
Key source population for breeding (Yes/No)	N/A	No	No	No	No	No
Key source population for dispersal (Yes/No)	N/A	No	No	No	No	No
Necessary for maintaining genetic diversity (Yes/No)	N/A	No	No	No	No	No
Near the limit of the species range (Yes/No)	N/A	No	No	No	No	No
Species density in LGA (as a range)	N/A	Very low	Very low	N/A	N/A	N/A
Final Score	N/A	48	34	34	30	34
Out of possible maximum	N/A	65	65	65	65	65
Adjusted score out of 4	N/A	2.953846	2.092308	2.092308	1.846154	2.092308
Final Combined score, including weighted vegetation quality	5.918389423	6.314662	5.453124	5.453124	5.20697	5.453124
Final Combined score out of 10, with rounding	6	6	5	5	5	5

Appendix B: Summary Scores – Offset Site

Current State

Condition

	11.10.7	11.10.7	11.3.25	11.9.5	11.9.4	11.10.7	11.9.5	11.10.7	11.10.7	11.9.7	11.9.7	11.10.7	11.9.5	11.9.5	11.10.7
	Remnant	Remnant	Remnant	Remnant	Remnant	Remnant	Remnant	Remnant	Remnant	Remnant	Young Regrowth	Advanced Regrowth	Advanced Regrowth	Young Regrowth	Remnant
Recruitment of woody perennial species in EDL	3	3	5	3	5	5	5	5	5	5	5	5	3	3	5
Native plant species richness - trees	2.5	2.5	2.5	5	5	2.5	5	2.5	2.5	2.5	2.5	2.5	5	5	5
Native plant species richness - shrubs	0	2.5	5	5	5	2.5	5	2.5	5	5	2.5	5	5	2.5	2.5
Native plant species richness - grasses	3.75	2.5	3.75	5	1.25	2.5	2.5	2.5	5	2.5	3.75	2.5	5	3.75	2.5
Native plant species richness - forbes	2.5	2.5	5	3.75	2.5	1.25	0	1.25	2.5	1.25	1.25	3.75	3.75	1.25	2.5
Tree canopy height (average of emergent, canopy, sub-canopy)	5	5	5	5	5	5	5	5	5	5	3	5	3	3	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	2	5	5	5	5	2	5	2	2	3	5	5	2	5	5
Shrub canopy cover	5	3	5	3	3	5	3	3	3	3	5	3	5	5	5
Native grass cover	3	5	3	5	5	3	3	2	3	4	5	5	5	5	5
Organic litter	4	4	3	5	5	5	3	5	5	3	5	5	3	5	5
Large trees (euc plus non-euc)	0	0	0	0	15	10	5	5	15	0	0	0	0	5	15
Coarse woody debris	5	5	5	2	5	5	2	5	5	5	5	5	2	2	2
Non-native plant cover	10	10	5	10	10	3	3	5	10	10	0	10	3	3	3
Final Score	45.75	50	52.25	56.75	71.75	51.75	46.5	45.75	68	49.25	43	56.75	44.75	48.5	62.5
Out of possible maximum	*80*	*80*	*80*	*80*	*80*	*80*	*80*	*80*	*80*	*80*	*80*	*80*	*80*	*80*	*80*
Adjusted score out of 3/out of 7	4.003125	4.375	4.571875	4.965625	6.278125	4.528125	4.06875	4.003125	5.95	4.309375	3.7625	4.965625	3.915625	4.24375	5.46875

Context

Size of patch	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Connectedness	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Context	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Ecological Corridors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Final Score	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Out of possible maximum	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*
Adjusted score out of 3	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923
Combined score out of 6/out of 10	6.080048	6.451923	6.648798	7.042548	8.355048	6.605048	6.145673	6.080048	8.026923	6.386298	5.839423	7.042548	5.992548	6.320673	7.545673
Weighting by Size	0.078281	0.078281	0.01326	0.118922	0.065729	0.078281	0.118922	0.078281	0.118922	0.030864	0.011317	0.05487	0.043781	0.021605	0.078281
Weighted score from 6/from 10	0.475951	0.505061	0.088164	0.837517	0.549172	0.517048	0.730858	0.475951	0.954581	0.197108	0.066084	0.386422	0.262362	0.136558	0.590681

Species Stocking Rat	Brigalow TEC	SELE Bat	Koala	Collared Delma	Yakka Skink	Dunmall's Snake
Quality and availability of food and foraging habitat (score per DEHP Guide)	N/A	5	5	5	5	5
Quality and availability of shelter (score per DEHP Guide)	N/A	5	5	5	5	5
Role of site location to species/TEC overall population in the state (score per DEHP Guide)		1	1		1	1
Threats to the species/TEC (score per DEHP Guide)	N/A	7	7	7	7	7
Species mobility capacity (score per DEHP Guide)	N/A	10	7	7	7	7
Species/TEC present on site (Yes/No)	N/A	No	No	No	No	No
Species/TEC present on adjacent properties (Yes/No)	N/A	Yes - 5	No	No	Yes - 5	No
Evidenced species usage of site (not habitat, dispersal, feeding, breeding)	N/A	No	No	No	No	No
Key source population for breeding (Yes/No)	N/A	No	No	No	No	No
Key source population for dispersal (Yes/No)	N/A	No	No	No	No	No
Necessary for maintaining genetic diversity (Yes/No)		No	No	No	No	No
Near the limit of the species range (Yes/No)		No	No	No	No	No
Species density in LGA (as a range)	N/A			N/A	N/A	N/A
Final Score	N/A	33	25	24	30	25
Out of possible maximum	N/A	*65*	*65*	*65*	*65*	*65*
Adjusted score out of 4	N/A	2.030769	1.538462	1.476923	1.846154	1.538462
Final Combined score, including weighted vegetation quality	6.773518418	6.108173	5.615866	5.554327	5.923558	5.615866
Final Combined score, with adjusted weighting	6.844719778	6.151034	5.658726	5.597188	5.966418	5.658726
Final Combined score out of 10, with rounding	7	6	6	6	6	6

Future State (Completion Criteria)

Condition

	11.10.7	11.10.7	11.3.25	11.9.5	11.9.4	11.10.7	11.9.5	11.10.7	11.10.7	11.9.7	11.9.7	11.10.7	11.9.5	11.9.5	11.10.7
	Remnant	**Remnant**	**Remnant**	**Remnant**	**Remnant**	**Remnant**	**Remnant**	**Remnant**	**Remnant**	**Remnant**	**Young Regrowth**	**Advanced Regrowth**	**Advanced Regrowth**	**Young Regrowth**	**Remnant**
Recruitment of woody perennial species in EDL	3	3	5	3	5	5	5	5	5	5	5	5	3	3	5
Native plant species richness - trees	2.5	2.5	2.5	5	5	2.5	5	2.5	2.5	2.5	2.5	2.5	5	5	5
Native plant species richness - shrubs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Native plant species richness - grasses	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Native plant species richness - forbes	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Tree canopy height (average of emergent, canopy, sub-canopy)	5	5	5	5	5	5	5	5	5	5	3	5	3	3	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	2	5	5	5	5	2	5	2	2	3	5	5	2	5	5
Shrub canopy cover	5	3	5	3	3	5	3	3	3	3	5	3	5	5	5
Native grass cover	3	5	3	5	5	3	3	2	3	4	5	5	5	5	5
Organic litter	4	4	3	5	5	5	3	5	5	3	5	5	3	5	5
Large trees (euc plus non-euc)	0	0	0	0	15	10	5	5	15	0	0	0	0	5	15
Coarse woody debris	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Non-native plant cover	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Final Score	**54.5**	**57.5**	**58.5**	**61**	**78**	**67.5**	**64**	**59.5**	**70.5**	**55.5**	**60.5**	**60.5**	**56**	**66**	**80**
Out of possible maximum	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**	**80**
Adjusted score out of 3/out of 7	**4.76875**	**5.03125**	**5.11875**	**5.3375**	**6.825**	**5.90625**	**5.6**	**5.20625**	**6.16875**	**4.85625**	**5.29375**	**5.29375**	**4.9**	**5.775**	**7**

Context

Size of patch	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Connectedness	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Context	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Ecological Corridors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Final Score	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**	**18**
Out of possible maximum	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*	*26*
Adjusted score out of 3	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923	2.076923
Combined score out of 6/out of 10	7.108173	7.195673	7.414423	8.901923	7.983173	7.676923	7.283173	8.245673	6.933173	7.370673	7.370673	6.976923	7.851923	9.076923	7.108173
Weighting by Size	0.078281	0.01326	0.118922	0.065729	0.078281	0.118922	0.078281	0.118922	0.030864	0.011317	0.05487	0.043781	0.021605	0.078281	0.078281
Weighted score from 6/from 10	0.556433	0.095416	0.881741	0.585117	0.624929	0.912958	0.570132	0.980595	0.213987	0.083413	0.404427	0.30546	0.16964	0.710548	0.556433

Species Stocking Rat	Brigalow TEC	SELE Bat	Koala	Collared Delma	Yakka Skink	Dunmall's Snake
Quality and availability of food and foraging habitat (score per DEHP Guide)	N/A	5	5	5	5	5
Quality and availability of shelter (score per DEHP Guide)	N/A	5	5	5	5	5
Role of site location to species/TEC overall population in the state (score per DEHP Guide)		1	1		1	1
Threats to the species/TEC (score per DEHP Guide)	N/A	7	7	7	7	7
Species mobility capacity (score per DEHP Guide)	N/A	10	7	7	7	7
Species/TEC present on site (Yes/No)	N/A	No	No	No	No	No
Species/TEC present on adjacent properties (Yes/No)	N/A	Yes - 5	No	No	Yes - 5	No
Evidenced species usage of site (not habitat, dispersal, feeding, breeding)	N/A	No	No	No	No	No
Key source population for breeding (Yes/No)	N/A	No	No	No	No	No
Key source population for dispersal (Yes/No)	N/A	No	No	No	No	No
Necessary for maintaining genetic diversity (Yes/No)	No	No	No	No	No	No
Near the limit of the species range (Yes/No)	No	No	No	No	No	No
Species density in LGA (as a range)	N/A	N/A	N/A	N/A	N/A	N/A
Final Score	N/A	46	43	37	43	38
Out of possible maximum	N/A	*65*	*65*	65	65	65
Adjusted score out of 4	N/A	2.830769	2.646154	2.276923077	2.646153846	2.338461538
Final Combined score, including weighted vegetation quality	7.630681174	7.275529	7.090913	6.721682516	7.090913286	6.783220978
Final Combined score, with adjusted weighting	7.710892793	7.322251	7.137635	6.768404604	7.137635373	6.829943065
Final Combined score out of 10, with rounding	8	7	7	7	7	7

Appendix C: Offset Assessment Guides

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Brigalow
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	**1.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes	Brigalow TEC (Regional Ecosystem 11.9.5).	**Area**	6.2	Hectares	GFD Project EPBC Act Offset Plan Stage 2.
			Quality	**6**	Scale 0-10	
			Total quantum of impact	3.72	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	Yes	3.72	Adjusted hectares	Sprinwater Offset Area	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	53	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	95%	0.00	0.00	101.01%	Yes		
									Future area without offset (adjusted hectares)	53.0	**Future area with offset (adjusted hectares)**	53.0				3.76				
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	**7**	**Future quality without offset (scale of 0-10)**	**7**	**Future quality with offset (scale of 0-10)**	**8**	1.00	90%	0.90	0.71				
Threatened species habitat																				
Area of habitat	No				**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0				$0.00		$0.00
Area of community	3.72	3.76	101.01%	**Yes**	$0.00	N/A	$0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	South-Eastern Long-eared Bat
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	South-eastern Long-eared Bat	**Area**	49	Hectares	GFD Project EPBC Offset Plan - Stage 2
			Quality	**6**	Scale 0-10	
			Total quantum of impact	29.40	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	29.40	Adjusted hectares	Springwater Offset Area	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	340	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	90%	0.00	0.00	29.40	100.00%	Yes	
									Future area without offset (adjusted hectares)	340.0	**Future area with offset (adjusted hectares)**	340.0								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**6**	**Future quality with offset (scale of 0-10)**	**7**	1.00	90%	0.90	0.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	29.4	29.40	100.00%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Koala
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Koala Habitat	**Area**	37.5	Hectares	GFD Project EPBC Offset Plan - Stage 2
			Quality	**5**	Scale 0-10	
			Total quantum of impact	18.75	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	18.75	Adjusted hectares	Springwater Offset Area	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	217	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	95%	0.00	0.00	18.76	100.08%	Yes	
									Future area without offset (adjusted hectares)	217.0	**Future area with offset (adjusted hectares)**	217.0								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**6**	**Future quality with offset (scale of 0-10)**	**7**	1.00	90%	0.90	0.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	18.75	18.76	100.08%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Collared Delma and Dunmalls Snake
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Collared Delma and Dunmalls Snake Habitat	**Area**	49	Hectares	GFD Project EPBC Offset Plan - Stage 2
			Quality	**5**	Scale 0-10	
			Total quantum of impact	24.50	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	24.50	Adjusted hectares	Springwater Offset Area	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	284	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	95%	0.00	0.00	24.56	100.24%	Yes	
									Future area without offset (adjusted hectares)	284.0	**Future area with offset (adjusted hectares)**	284.0								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**6**	**Future quality with offset (scale of 0-10)**	**7**	1.00	90%	0.90	0.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	24.5	24.56	100.24%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Yakka Skink
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	**0.2%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes	Yakka Skink Habitat	**Area**	48.2	Hectares	GFD Project EPBC Offset Plan - Stage 2
			Quality	**5**	Scale 0-10	
			Total quantum of impact	24.10	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	24.10	Adjusted hectares	Springwater Offset Area	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	279	**Risk of loss (%) without offset**	0%	**Risk of loss (%) with offset**	0%	0.00	95%	0.00	0.00	24.13	100.11%	Yes	
									Future area without offset (adjusted hectares)	279.0	**Future area with offset (adjusted hectares)**	279.0								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	**6**	**Future quality without offset (scale of 0-10)**	**6**	**Future quality with offset (scale of 0-10)**	**7**	1.00	90%	0.90	0.86				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	24.1	24.13	100.11%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Appendix D: Risk Assessment

The following risk assessment assesses the risk of failure to achieve the Offset Plan objectives for the offset values. For each risk identified, the potential consequence of the risk (rated from 1 (no impact) to 6 (irreversible impact)) was assessed against the likelihood of that risk occurring (rated from 'remote' to 'almost certain') to determine risk rating as follows:

1. No impact to MNES
2. Small-scale impact to MNES, or potential surface or groundwater impact
3. Moderate scale impact to MNES, or localised surface or groundwater impact
4. Large-scale impact to MNES, or moderate scale surface water impact, or localised impact to groundwater with potential or known beneficial use
5. Extensive population or community scale impact to MNES
6. Irreversible impact to MNES

Risk Event	Risk Description	Initial Risk Ranking*			Management Measures / Actions	Residual Risk Ranking*			Performance Criteria	Management Triggers	Corrective actions	Monitoring Mechanism
		L	C	R		L	C	R				
Mining of the SOA	Exploration Permit Coal (EPC) 1110 was granted 28 May 2008 and includes the entire SOA.	A	VI	3	Limited mitigations measures can be implemented. Although the prospectively of the coal resource or the future plans of the coal tenure holders is unknown it seems unlikely that particular patch would be developed. The legal security over the SOA makes it known that the area is an offset. The area is now listed as Development of this is possible but offset obligations would be greater.	A	V	3	No development or mining of the offset area.	Application for a Mining Lease Any proposals or actions of development and/or mining.	Provide mining tenement holder the details of the Environmental Offset.	Annual review of mining tenements present within the SOA.
Drought	Prolonged drought may impact the natural regeneration capacity of the vegetation within the SOA. The condition of habitat and TEC is expected to decrease during periods of drought. A decrease in condition would make achievement of completion criteria impossible.	B	V	3	Limited mitigations measures can be implemented.	B	III	2	No condition loss due to drought	Drought declarations. Less than average rainfall during the summer wet season.	Extend program timeframe to allow for completion of offset criteria.	The Offset Area Report will document vegetation condition and report on drought impacts.
Timber harvesting/collection	Unauthorised access to SOA results in timber harvesting/collection.	B	III	2	Installation of signage at all vehicle accesses identifying the areas as an environmental offset Installation of fences. All field monitoring (rapid and detailed) will report on any evidence of timber harvesting.	A	III	1	No unauthorised access. No evidence of clearing within the offset area. Offset Area mapped as Category A on PMAV.	Fences are damaged and associated with vehicle tracks. Timber cutting in observed in the SOA. Removal of trees in the SOA.	Investigation into the cause of timber harvesting. Determine access route and ensure fencing is secure. Determine if the offset completion criteria will be impacted.	The Offset Area Report will document any illegal/unauthorised timber harvesting. All field monitoring will report on the presence of any unauthorised access and clearing.
Unplanned clearing	The SOA occurs within the Springwater property which is used for beef production. In addition, the SOA is located within Petroleum Leases operated by Santos. It is possible for unplanned / illegal clearing for agriculture or petroleum activities. Clearing can also occur by vehicles traversing the area off designated roads/tracks and/or illegal camping.	C	V	4	Installation of signage at all vehicle accesses identifying the areas as an environmental offset. Installation of fences. The SOA is shown as an exclusion zone within the Santos Geographic Information System. All field monitoring (rapid and detailed) will report on any evidence of clearing.	B	IV	2	No unauthorised access. No evidence of clearing within the offset area. Offset Area mapped as Category A on PMAV.	Fences are damaged and associated with vehicle tracks. Clearing observed in the SOA. Removal of trees in the SOA.	Dedicated revegetation project to re-instate cleared vegetation. Illegal clearing will be reported. Revegetation plan will be developed within two months following a fire. Reporting of clearing to Queensland Department of Environment and Science.	The Offset Area Report will document any illegal/unauthorised vegetation clearing/damage. All field monitoring will report on the presence of any unauthorised access and clearing.
Unplanned / uncontrolled fire in SOA	Unplanned burns during dry times can be sever and intense resulting in significant change in condition.	D	V	4	Fire will be completely excluded from the fire intolerant Regional Ecosystems present in the SOA (RE 11.9.5 and RE 11.9.4). Fire break will be maintained separating exotic grasses and fire intolerant Regional Ecosystems.	B	III	2	Unplanned/ uncontrolled fire in SOA. Encroachment of fire on Fire	Any uncontrolled fire. Fire damage to SOA.	Identify source of the fire and ensure encroachment pathway managed. After any unplanned fire the following will occur:	All field monitoring (rapid and detailed) will report on any evidence of fire observed.

Risk Event	Risk Description	Initial Risk Ranking*			Management Measures / Actions	Residual Risk Ranking*			Performance Criteria	Management Triggers	Corrective actions	Monitoring Mechanism
		L	C	R		L	C	R				
	Fires within intolerant vegetation communities. Given the high proportion of fire intolerant Regional Ecosystems (RE 11.9.5 and RE 11.9.4).				A firebreak will be maintained around the SOA. This firebreak will not clear or impact on MNES. Fire will not be used as a tool for regrowth management on the offset areas. Fires on site will be started accordance with the Fire management guidelines for each regional ecosystem (e.g. when there is good soil moisture). Fire break maintenance undertaken once per year in mid to late autumn or early spring to clear firebreak, remove overhanging trees or fallen debris.				intolerant vegetation communities.	All field monitoring (rapid and detailed) will report on any evidence of fire observed.	• inspect and repair, and widen if necessary, all firebreaks; • inspect and repair fences to a stock proof condition; • reassess fuel load reduction practices; • exclude grazing until the ground layer at the end of the dry season is at least 60% of benchmark groundcover; and • Weed monitoring and control will be at monthly intervals post a fire event to maintain low levels of weed cover as the natural grass cover re-establishes. Undertake firebreak maintenance. Revegetation works may be required. An independent consultant will determine if this remedial action is required and the scope of the remedial action. This determination will occur within two months of a fire.	Fire breaks will be inspected annually and inform the maintenance measures.
New infestations of invasive weed species in SOA	Infestation of previously unidentified invasive weeds within the SOA.	C	III	2	Access to the offset are will be limited. All vehicles accessing the SOA are required to have a weed declaration form confirming their vehicle is free of weeds.	B	II	1	No recruitment of new weed species in SOA.	New invasive weed species are detected during annual monitoring. Establishment of new declared weeds. Failure of previous weed control attempts.	Implement control measures within one month. Independent ecologist to determine measures in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets. Isolation of area and chemical treatment to control any outbreaks. Increase monitoring if required. Treatment of a new infestation will be completed within two months of detection and monitored following the rapid monitoring event	The annual Offset Area Report will document if any new invasive weed species are detected during annual monitoring, the weed control measures to be implemented to control the new weed species.
Expansion of existing infestations of invasive weed species in SOA	The extent of existing infestations of invasive weed species expand or the weed species become more abundant within the area.	D	III	3	Access to the offset are will be limited. All vehicles accessing the SOA are required to have a weed declaration form confirming their vehicle is free of weeds. Independent ecologists report on proposed weed management measures will be conducted as part of the annual monitoring events. Chemical and/or mechanical control of all environmental weeds in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets.	B	II	1	Locations of class 1-3 declared weed populations known and being monitored / controlled. No increase in density of WoNS Decrease in exotic pasture cover. Prevent the introduction, establishment and spread of non-native weeds. Control existing infestations of non-native weeds including	New infestation area identified. Existing infestations expand or become more abundant. Failure of previous weed control attempts. Weed cover >10%.	Implement control measures within one month. Independent ecologist to determine measures in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets. Isolation of area and chemical treatment to control any outbreaks. Increase monitoring if required. Treatment of a new infestation will be completed within two months of detection and monitored following the rapid monitoring event.	The annual Offset Area Report will document the weed presence, weed control measures and extent of grass cover during the reporting period and the relevant responsive actions.

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		L	C	R		L	C	R				
									Prohibited or Restricted pest plants under the Biosecurity Act 2014 (Qld). Non- native weeds cover less than 10%.			
Increased population of feral animals in SOA.	Populations of pest species are present on Springwater. Any increase in pest numbers may directly impact on the MNES fauna values through direct predation (e.g. Cats) or through competition for resources (e.g. Hares).	D	III	3	All field monitoring (rapid and detailed) and regional pest animal monitoring will report on any evidence of feral animals. Pest animals will be controlled in conjunction with the existing pest animal control program run by Southern Queensland Landscapes.	B	II	1	No increase in abundance or of feral animals Maintain pest animal trapping program No evidence of new pest species.	An increase in abundance or of feral animals in the offset, greater level of impact by feral animals or evidence of new pest species	Development of species-specific additional measures to manage pest animals.	The annual Offset Area Report will document pest fauna present, and develop species-specific additional measures to manage pest animals, where required.
Unauthorised grazing in SOA	Grazing will be utilised as a tool to reduce fuel load associated with exotic pasture species, particularly buffel grass. Extensive grazing can promote and exacerbate the condition decline of vegetation communities by reducing ground cover diversity.	D	III	3	Fences are in working order and allow for exclusion of cattle when needed. Signage will be installed on all major access gates to ensure the Environmental Offset Area is well signposted. gates remain utilised to excluded cattle when required. Stocking rates are not fixed as this region is subject to significant changes in grass cover with seasonal conditions. However, grazing used as required when ground cover exceeds 60% and the fire risk is high.	B	II	1	No evidence of stock damage in Management Area 3. Fences to remain in working order.	Any signs of damage to the fence cause by cattle. Evidence of waterlogged soils and pugging will result in stock exclusion within 5 days of detection.	Upon being notified or becoming aware of groundcover falling below 30% cattle will be removed within seven days. Grazing period can recommence when the ground cover is greater than 60%. Undertake fence maintenance and repairs to re-secure the offset area within 10 days.	The annual Offset Area Report will document grazing pressure and the locations in which grazing by cattle was observed.
Brigalow regrowth prejudices desired Brigalow structure	Regrowth development stalling due to stem density. This reduces the ability for Brigalow to achieve the height and cover of an undisturbed remnant patch and thus prejudices desired species habitat requirements for species that use this community.	B	IV	2	Stem density assessed during annual monitoring events. Canopy analysis will be conducted in regrowth patches during every annual monitoring event.	A	II	1	Stems/ha within appropriate benchmark range.	Brigalow regrowth with >10,000 stems/ha.	Restoration thinning and regrowth management. Undertake selective thinning where Brigalow regrowth is >10,000 stems/ha.	The annual Offset Area Report will document Brigalow canopy analysis results and stem density.