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BMC

Biodiversity Offset Management Plan

for

KEMMIS II PROJECT

and

MULGRAVE RESOURCE ACCESS PROJECT

Document Number:			
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Document History			
Revision	Issue Date	Change	Changed by:
1.0	25/06/2015	Draft for comment	T Smalley
1.1	23/07/2015	Draft incorporating DotE comments	T Smalley
2.0	24/07/2015	Final	T Smalley
3.0	14/08/2015	Final incorporating more DotE comments	T. Smalley
3.1	16/11/2015	Amend photopoint monitoring timing	T. Smalley
3.2	14/03/2016	Correct Biannual and Biennial monitoring terms	J. Bermingham

Contents

1.0 Introduction

BHP Billiton Mitsui Coal (BMC) operates two open cut coal mines in the Bowen Basin of central Queensland; Poitrel Mine (PTM) and South Walker Creek Mine (SWC). Further to these two existing operations, BMC also has an underground 'greenfield' mine project called Wards Well located near Glenden, being approximately 60km north-west of PTM. This Biodiversity Offset Management Plan relates to projects recently approved at SWC.

SWC is authorised by Environmental Authority – EPML00712313 (EA) to undertake coal mining activities on mine leases 4750 and 70131, approximately 125 kilometres south-west from Mackay (refer Figure 1). Approval for SWC predates the EPBC Act, however BMC is now progressing its operations by implementing two key projects being; Kemmis II (K2) and Mulgrave Resource Access (MRA) for which EPBC approval has been deemed to be required.

As part of the EPBC approval process for the PTM, K2 and MRA projects, an Offset Obligation (relating to potentially significant impacts to MNES) has been imposed by the Department of the Environment (DotE) or its predecessor Department of Sustainability, Environment, Water, Population and Communities (SEWPaC).

The offset obligation for PTM has previously been met through direct land offsets on one property and has been formally approved by DotE. The majority of the offset obligations for both K2 and MRA can also be met through direct land offsets on the same property as the PTM offset. For this reason a single Biodiversity Offset Management Plan (distinct from an Offset Area Management Plan) for MRA and K2 has been created to improve the outcome and the efficiencies. The existing PTM Offset Management Plan will remain unchanged and separate from MRA and K2 because it is linked to existing approvals and a Voluntary Declaration associated with the tenure.

This document provides the management requirements for all land based offsets for K2 and MRA projects. A final piece of offsets for the Mulgrave Resource Access project being for potential impacts to Ornamental Snake are being delivered on a third party property for which a separate offset management plan has been developed.

1.1 Purpose of this Biodiversity Offset Management Plan

This Biodiversity Offset Management Plan has been specifically devised to address the requirements of conditions provided within the approvals, as detailed in Table 5.

1.2 Kemmis II Project (K2)

The K2 area is located at the northern end of current mining operations and will adjoin the existing Kemmis 1 operations at SWC. The Kemmis II area is positioned on the topographical ridge that separates the Walker Creek and Kemmis Creek catchments, with only one minor drainage feature passing through the K2 area. Landuse in the area is solely cattle grazing and it is believed that some vegetation clearing has occurred to promote this landuse. Vegetation condition has been impacted by cattle grazing.

The K2 project will be undertaken in a staged manner. The first stage has commenced (13th July 2015) and will occur only on currently approved Surface Area 4 (SA4) (see Figure 3). The second stage will commence if/when Surface Areas 6, 7 and 8 and the associated Environmental Authority amendments are approved.

The activity will involve clearing of vegetation, construction of water management infrastructure, construction of haul roads and access roads, placement of top soil stockpiles, development of the open cut mining pit and rehabilitation of all disturbed lands. More information regarding the project activities can be found in EPBC application 2013/7025.

Through the EPBC Act approval process it has been determined that a significant impact to MNES is likely and an offset is required to acquit any residual impacts. This document describes the impact to MNES from the K2 project and outlines the offset requirements and management actions.

1.3 Mulgrave Resource Access Project (MRA)

The MRA project has commenced and will be carried out as a single stage involving continued development of the existing 'Mulgrave' open cut mining pit; in a west to north-westerly direction occurring on existing approved Surface Areas 2, 3 and 4 associated with ML4750. To enable efficient access to the coal resource, Walker Creek is proposed to be diverted further west than its current location and will shift its confluence with Carborough Creek further upstream.

The proposed activity will require clearing of some previously undisturbed land; the diversion of Walker Creek; continued excavation and mining of the existing Mulgrave pit; leading up to ultimate rehabilitation of disturbed lands. More information regarding the project activities can be found in EPBC application 2014/7272.

Through the EPBC Act approval process it has been determined that a significant impact to MNES is likely and for which an offset is required to acquit any residual impacts. This document describes the impact to MNES from the MRA project and outlines the offset requirements and management actions.

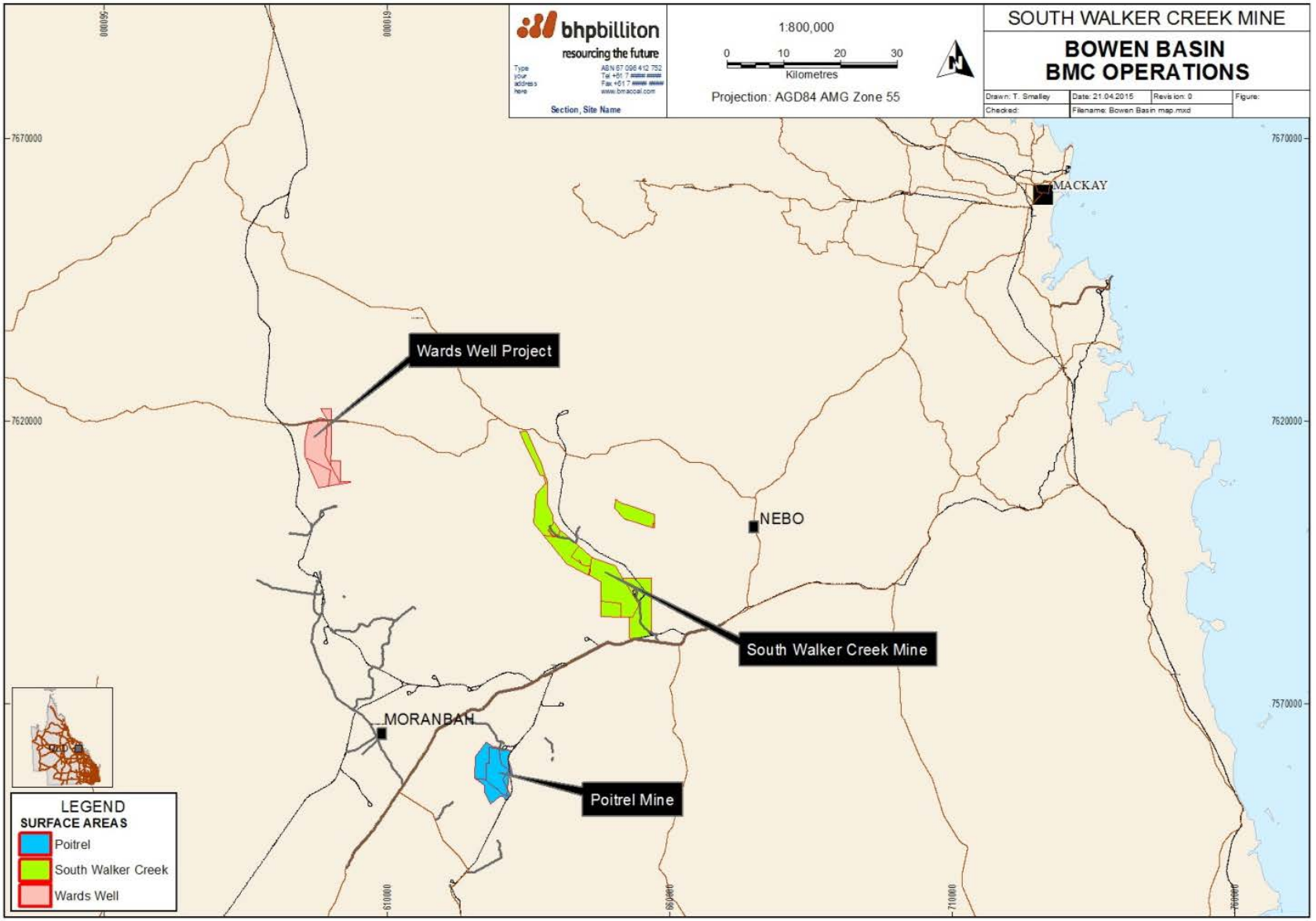

Figure 1. Location of relevant BMC mines and property.

2.0 MNES and quantified Project impact

Both the K2 & MRA projects were referred to the DotE for assessment and declared a "controlled action" under the *Environment Protection and Biodiversity Conservation Act 1999* **(EPBC Act)**. The controlling provisions for both projects, were potential impacts on listed threatened species and ecological communities. The assessment processes resulted in a quantified residual impact to threatened ecological communities or threatened species as summarised below in Table 1. A description of the MNES that are likely to be impacted is provided in section 2.1. A detailed assessment of the residual impact arising from each project is provided in section 2.2.

Table 1. Summary of MNES impact

Project	Threatened species or ecological community	EPBC status	Area disturbed
K2	Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	13.2ha
	Natural grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	31.7ha
MRA	Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	59ha
	Ornamental Snake (*Denisonia maculata*) *	Vulnerable	17.5ha

Note: * The offset for the Ornamental Snake will be provided in accordance with a separate Biodiversity Offset Management Plan.

2.1 MNES description

2.1.1 Brigalow

The ecological community known as 'Brigalow (*Acacia harpophylla* dominant and co-dominant)' was listed as Endangered in 2001 under the EPBC Act. "Brigalow" is the commonly accepted name for the species *Acacia harpophylla* and the vegetation in which this species is dominant or co-dominant, and is used in Queensland to describe the regional ecosystems/vegetation communities that correspond with the listed Brigalow ecological community.

The EPBC-listed ecological community is characterised by the presence of Brigalow (*Acacia harpophylla*) as one of the three most abundant tree species. Brigalow is usually either dominant in the tree layer or co-dominant with other species such as *Casuarina cristata* (Belah), other species of Acacia, or species of Eucalyptus. Occasionally Belah, or species or Acacia or Eucalyptus may be more common than Brigalow within the broad matrix of Brigalow vegetation. The structure of the vegetation ranges from open forest to open woodland. The height of the tree layer varies from about 9 m in low rainfall areas (averaging around 500 mm per annum) to around 25 m in higher rainfall areas (averaging around 750 mm per annum). A prominent shrub layer is also usually present in the Brigalow ecological community. In Queensland, the listed Brigalow ecological community comprises 16 regional ecosystems.

The Commonwealth Listing Advice and the Recovery plan for the Brigalow *(Acacia harpophylla* dominant and co-dominant) ecological community can be found in the SPRAT Profile on the DotE website.

2.1.2 Natural Grasslands

Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin (Natural Grassland TEC) is listed as endangered under the EPBC Act.

This Natural Grassland TEC is endemic to Queensland and broadly occurs where the Fitzroy River Basin and the Brigalow Belt North bioregion coincide. It was formerly extensive in this area but now occurs as smaller remnants within this range.

The TEC occurs on flat ground or gently undulating rises. It is generally found on soils formed from fresh basalt or on fine-grained sedimentary rocks; or where this material has been transported to form extensive alluvial plains along ancient and flood-prone watercourses.

The Natural Grassland TEC corresponds closest to the following Queensland Regional Ecosystems:

- 11.3.21 *Dichanthium sericeum* and/or *Astrebla* spp. grassland on alluvial plains
- 11.4.4 *Dichanthium* spp., *Astrebla* spp. Grassland on Cainozoic clay plains
- 11.4.11 *Dichanthium sericeum, Astrebla* spp. and patchy *Acacia harpophylla, Eucalyptus coolabah* on Cainozoic clay plains
- 11.8.11 *Dichanthium sericeum* grassland on Cainozoic igneous rocks

- 11.9.3 *Dichanthium* spp., *Astrebla* spp. grassland on fine-grained sedimentary rocks
- 11.9.12 *Dichanthium sericeum* grassland with clumps of *Acacia harpophylla* on fine-grained sedimentary rocks
- 11.11.17 *Dichanthium sericeum* grassland on old sedimentary rocks with varying degrees of metamorphism and folding.

Condition thresholds were established when the ecological community was listed to determine which patches of grassland are of particular conservation value and should receive full protection as a matter of national environmental significance under the EPBC Act. Two condition thresholds, '*best quality*' and '*good quality'*, have been defined. The condition thresholds are intended to focus protection on vegetation remnants in relatively good to best condition.

The Commonwealth Listing Advice and the Conservation Advice for the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin ecological community can be found in the SPRAT Profile on the DotE website.

2.1.3 Ornamental Snake

The Ornamental snake (*Denisonia maculata*) is known only to occur in the Brigalow Belt Region and is listed as vulnerable under the EPBC Act. It has a small, well-defined distribution range, located only in mid-eastern Queensland, and confined to the Brigalow Belt, primarily within the Fitzroy River drainage system. Within this system the Ornamental snake is known to primarily inhabit Brigalow (Acacia harpophylla) forest growing on grey cracking clays supporting gilgai formations (Footprints, 2013). This habitat preference is believed to reflect the relative abundance of its food source, principally a diet of frogs.

Ornamental snakes are nocturnally active, sheltering during the day under fallen timber, rocks, bark and in deep soil cracks (Footprints, 2013). During dry periods, when gilgai formations do not support water and the soil has shrunk to form large ground cracks, the snakes seek refuge in the cracks. Once the soils are wet and cracks have closed up, the snakes seek refuge in dense tussock grass clumps and in log piles where available.

Current ecological knowledge suggests Ornamental snake habitat requires soil landscapes that have the capacity to:

- pond shallow surface water for extended periods
- provide nutrient rich, seasonal wetland environment capable of supporting amphibious prey habitat
- dry and crack extensively on a regular basis to provide dry season refugia via surface cracks and sub-surface voids.

The Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles describe the suitable habitat for Ornamental Snake as being open-forests to woodlands associated with gilgai formations and wetlands.

The Commonwealth Conservation Advice for the Ornamental Snake provides sufficient direction to implement priority actions and mitigate key threats. This Advice can be found in the SPRAT Profile on the DotE website.

The offset for the Ornamental Snake will be provided in accordance with a separate Biodiversity Offset Management Plan.

2.2 Quantified Project Impact

2.2.1 MRA Project Impact

Based upon the definition of the Brigalow TEC (per DotE) there are three small patches of Brigalow TEC totalling 59ha that exist within the Project Area, as detailed below and shown in Figure 2. The patch sizes are:

- Patch 1 – 20 ha
- Patch 2 – 25 ha
- Patch 3 – 14 ha

All patches of Brigalow TEC are located above the coal resource and/or the optimal location of infrastructure, therefore opportunity to avoid the MNES is highly limited. Due to landform, hydrologic design reasons, and in the interest of providing a long-term stable diversion channel that functions similar to up and downstream reaches, the proposed diversion alignment passes through the TEC. Therefore, it is planned to remove 59ha of Brigalow TEC during the 15-20 year period of the activity, the majority of which will be removed in the first 2-3 years.

All patches are distinct and fragmented from each other and are surrounded by grazing lands that are subject to on-going threats of cattle disturbance, clearing, fire and weed invasion. The rehabilitation activities that arise as a result of the mining activities however, provide for opportunities to increase the extent, condition and quality of Brigalow in the long term. This is considered as a favourable outcome to the present scenario.

A summary of the ecological equivalency methodology scores are provided in Table 2.

Table 2. MRA impact attribute score – Brigalow TEC.

Attribute	Value/Score	Rationale
Area	59 ha	Area of unavoidable impact.
Quality		
Site context	5	Area of impact is made up of three separate isolated patches of Brigalow TEC. Surrounded by farming lands and existing mine operations.
Site condition	7	Good condition Brigalow vegetation with 17.5 ha of gilgai habitats present.
Species stocking rate	6	Records for threatened species on site are limited however the area is likely to support the Ornamental snake
Average of above three quality component scores.	6	
Score	6	As per Offset Assessment Guide calculations.
Net Present Value	**35.40**	As per Offset Assessment Guide calculations.

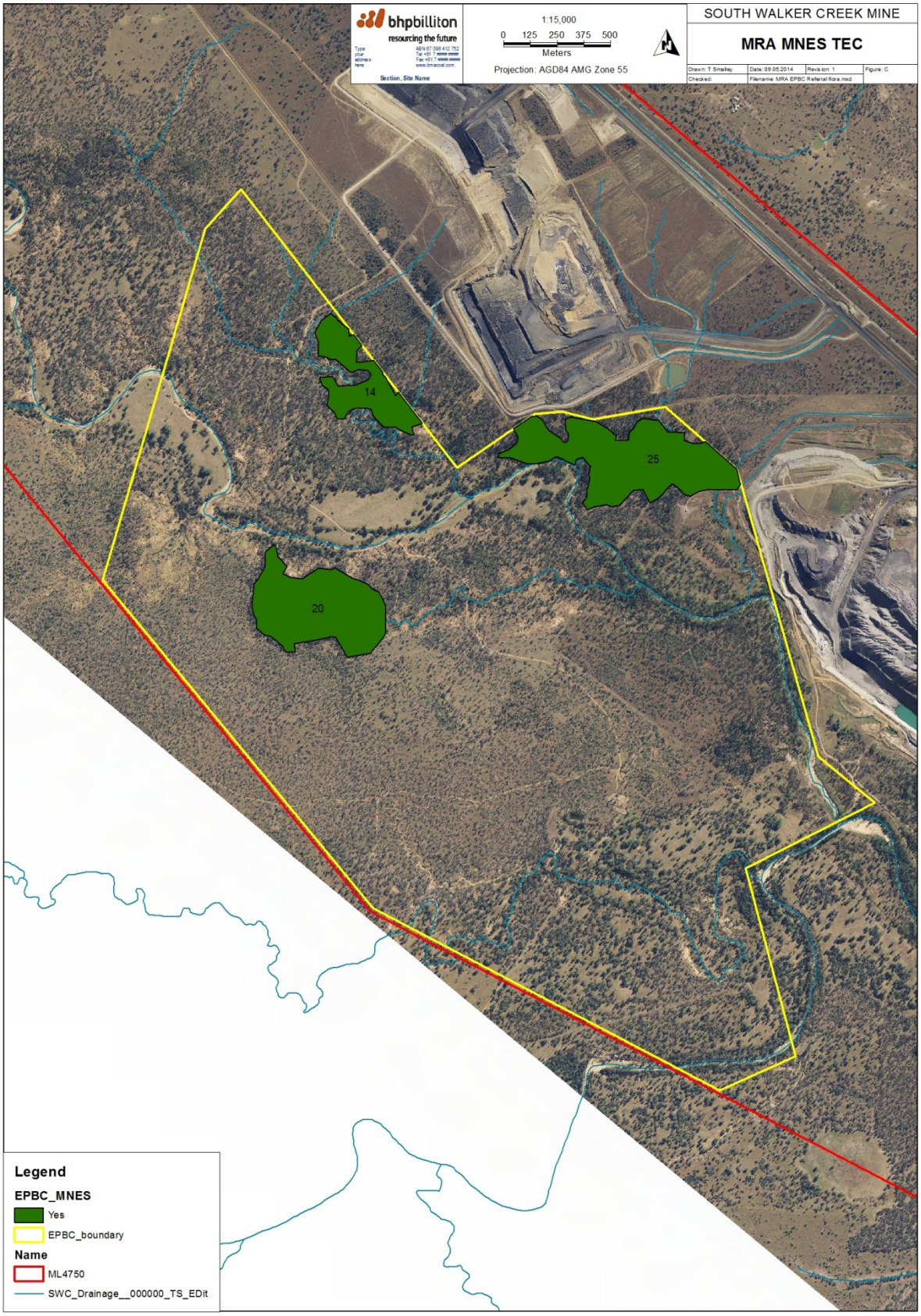

Figure 2. Brigalow TEC impacted by the MRA Project.

2.3 K2 Project Impact

2.3.1 Project Impact – Stage 1

The Stage 1 K2 project area contains one MNES for which offsets are required, being Brigalow TEC. Two small patches of Brigalow TEC with an average size 1.25ha and totalling 2.5ha exist on SA4 where stage 1 will occur, as detailed below and shown in Figure 3.

- Patch 6 – 0.6ha
- Patch 7 – 1.9ha

Both patches are distinct and fragmented from each other and are surrounded by grazing lands that are subject to on-going threats of cattle disturbance, clearing, fire and weed invasion.

The long-term viability of these patches is extremely low and they are unlikely to recover, expand or connect due to on-going land management activities. Individually and collectively these patches offer very low ecological value due to their small size, lack of connectivity and habitat values. No gilgai, threatened plants or Brigalow reptiles have been recorded in any of these patches.

Combined with Stage 2 of the project activity, a total of 13.2ha of Brigalow TEC will be disturbed. The quantified impact to the total 13.2ha of Brigalow TEC across the entire K2 project is provided below in Table 3 (as per the EPBC Offset Policy).

Table 3. K2 impact attribute score – Brigalow TEC.

Attribute	Value/Score	Rationale
Area	13.2ha	Area of unavoidable impact.
Quality		
Site context	1	Area of impact is made up of seven separate small isolated patches of Brigalow TEC. Patches are not connected to adjacent habitat or other areas of TEC. Surrounded by farming lands and existing mine operations.
Site condition	2	Degraded Brigalow vegetation with no gilgai habitats, riparian areas or creeks.
Species stocking rate	2	No threatened species have been recorded on site, may contain unlisted reptiles and occasionally be used by foraging birds.
Average of above three quality component scores.	2	
Score	2	As per Offset Assessment Guide calculations.
Net Present Value	**2.64**	As per Offset Assessment Guide calculations.

2.3.2 Project Impact – Stage 2:

The stage 2 K2 project area contains two MNES for which offsets are required: Brigalow TEC and Natural Grasslands TEC.

Brigalow TEC

Five small patches of Brigalow TEC with an average size 2.1ha and totalling 10.7ha exist within the Project Area, as detailed below and shown in Figure 3.

- Patch 1 – 4.3ha
- Patch 2 – 0.9ha
- Patch 3 – 2.1ha
- Patch 4 – 2.7ha
- Patch 5 – 0.7ha

All patches are distinct and fragmented from each other and are surrounded by grazing lands that are subject to on-going threats of cattle disturbance, clearing, fire and weed invasion.

The long-term viability of these patches is extremely low and the patches are unlikely to recover, expand or connect due to on-going land management activities. Individually and collectively these patches offer very low

ecological value due to their small size, lack of connectivity and habitat values. No gilgai, threatened plants or Brigalow reptiles have been recorded in any of these patches.

The quantified impact to the total 13.2ha of Brigalow TEC, of which Stage 2 contributes 10.7ha, is provided above in Table 3 (as per the EPBC Offset Policy).

Natural Grassland TEC

Only one patch of Natural Grassland TEC exists within the Project Area, being 31.7ha and is considered to be of 'best quality'. A secondary patch of vegetation containing diagnostic species indicative of Natural Grassland TEC exists, however this patch is only 2.9ha in size and due to weed cover and edge effects it only qualifies as 'good quality'. In reviewing the TEC criteria for this community, the 'good quality' criteria requires a patch to be at least 5ha and as such this patch does not meet the TEC criteria. Figure 3 shows the location of the Natural Grassland TEC patch.

The patch of Natural Grassland TEC will have its extent reduced by the Project Activity. The patch is in fact part of a broader 60ha patch that extends beyond the mine lease boundary. The mine planning disturbance footprint identifies that 19.7ha will be directly disturbed in the short term, while further impacts to the remaining 12ha may also occur as the mine advances and areas of disturbance increase.

Accordingly, BMC has assumed that the total 31.7ha may be lost over time. This loss is considered to be a Significant Impact and an offset has been proposed. The quantified impact to the Natural Grassland TEC to be offset (as per the EPBC Offset Policy) is provided below in Table 4.

Table 4. K2 impact attribute score – Natural Grassland TEC.

Attribute	Value/Score	Rationale
Area	31.7ha	Area of unavoidable impact.
Quality		
Site context	7	Area of impact occurs as a single 31.7 ha patch. This patch extends into neighbouring land holdings beyond the impact area. Grazing lands surrounds the broader area.
Site condition	7	Insufficient indicator species recorded to make it "best" quality using EPBC criteria, however timing of ecological survey not optimum.
Species stocking rate	6	12,000 tussocks per ha. No threatened species have been recorded on site, may contain habitat for unlisted reptiles or other species.
Average of above three quality component scores.	6.66	
Score	7	As per Offset Assessment Guide calculations.
Net Present Value	**22.19**	As per Offset Assessment Guide calculations.

3.0 Complying with Approval Conditions (offset relevant)

The MRA and K2 projects were approved with conditions by the DotE as presented in Table 5 (offset relevant conditions only). The approval conditions included development and approval of a Biodiversity Offset Management Plan (this plan) and the establishment and maintenance of land-based offsets on Dabin Holdings.

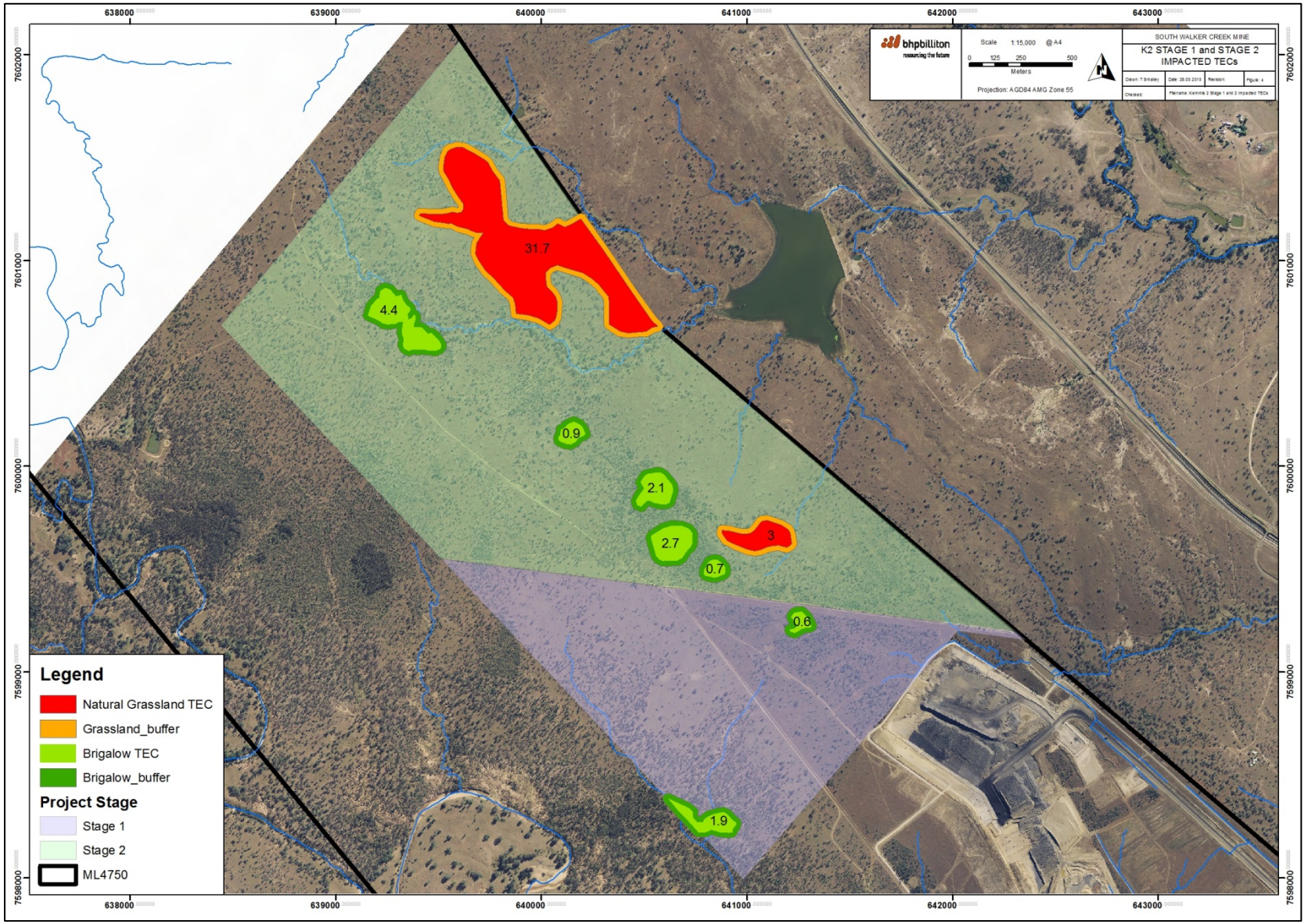

Figure 3. Impacted TEC by Stage 1 and Stage 2 of the K2 Project.

Table 5. Approval conditions extract – offset relevant

Condition		Relevant section of this report
K2 Project – EPBC 2013/7025	MRA Project – EPBC 2014/7272	
3. To compensate for authorised unavoidable impacts on MNES, the approval holder must submit Offset Management Plans to the Minister for approval. The approval holder must not undertake substantial commencement until the Minister has approved the offset management plans in writing. The approved offset management plans must be implemented.	**3**. To compensate for authorised unavoidable impacts on MNES, the approval holder must submit Offset Management Plans to the Minister for approval. The approval holder must not undertake substantial commencement until the Minister has approved the offset management plans in writing. The approved offset management plans must be implemented.	This entire document
4 The offsets must be located at Dabin Holdings (Lot2 SP214117), a property within the Isaac Regional Council, Queensland. The offsets must include at least 65ha of Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin threatened ecological community and 17ha of Brigalow (Acacia harpophylla dominant and co-dominant) threatened ecological community.	**4** The offset management plan for Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community must be located at Dabin Holdings (Lot2 SP214117), a property within the Isaac Regional Council, Queensland. The offset must include at least 125ha of Brigalow ecological community as proposed in the preliminary documentation. The Brigalow Offset Management Plan must be submitted to the Minister prior to substantial commencement of the action. The approved Brigalow Offset Management Plan must be implemented.	4.2 5.0
5. The Offset Management Plans must include, but not be limited to, the following information: a) details of the offset attributes (including maps in electronic Geographic Information System (GIS) format with accompanying shapefiles), site descriptions, environmental values relevant to MNES, connectivity with other habitat and biodiversity corridors, a rehabilitation program, and conservation and management measures for long-term protection;	**6**. The Offset Management Plans must include, but not be limited to, the following information for both Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community and Ornamental Snake (*Denisonia maculata*) (*Note, the Ornamental Snake has been addressed in a separate Offset Management Plan*): a) details of the offset attributes (including maps in electronic Geographic Information System (GIS) format with accompanying shapefiles), site descriptions, environmental values relevant to MNES, connectivity with other habitat and biodiversity corridors, a rehabilitation program, and conservation and management measures for long-term protection;	4.2 5.0 6.0 Appendix 1 (OAMP)
b) a detailed survey and description of the offset site to clearly identify baseline conditions, establish performance indicators and discuss methods for adaptive management. This must include but not be limited to: i. a description (prior to any management activities, hence a baseline) of the current condition of the extant vegetation of each offset area location of survey points (GPS reference); ii. the quantity of habitat for EPBC Act listed species or communities (in hectares), found within each offset area; iii. the condition class of habitat for EPBC Act listed species or communities found within each offset area; iv. vegetation condition mapping; v. photo reference points;	b) a detailed survey and description of the offset site, by a Qualified Ecologist, to clearly identify baseline conditions, establish performance indicators and discuss methods for adaptive management. This must include but not be limited to: i. a description (prior to any management activities, hence a baseline) of the current condition of the extant vegetation of each offset area location of survey points (GPS reference); ii. the quantity of habitat for EPBC Act listed species or communities (in hectares), found within each offset area; iii. the condition class of habitat for EPBC Act listed species or communities found within each offset area; iv. vegetation condition mapping;	4.3 Appendix 1 (OAMP)

vi. tree age class representation; vii. percentage tree canopy cover; viii. number of native plant species in ground layer; ix. percentage of native and foreign grass cover and whether the grass species are annual or perennial ; x. description of fauna habitat including condition, type and connectivity; and xi. fauna surveys (fauna assemblage and species richness) including but not limited to EPBC Act listed species.	v. photo reference points; vi. tree age class representation; vii. percentage tree canopy cover; viii. number of native plant species in ground layer; ix. percentage of native and foreign grass cover and whether the grass species are annual or perennial ; x. description of fauna habitat including condition, type and connectivity; and xi. fauna surveys (fauna assemblage and species richness) including but not limited to EPBC Act listed species.	
c) plans to improve upon the baseline condition of Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin and Brigalow listed ecological communities consistent with EPBC listing advice. These plans must include: i. a map showing areas to be managed; ii. management actions for each area and details of methods to be used. These must include: a. actions consistent with objectives stated in relevant threat abatement plans; b. management actions to improve the quality of natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin and Brigalow listed threatened ecological communities; c. clearly identified benchmarks to be achieved by management actions. The time in years to achieve these benchmarks must be used (in the "Time until ecological benefit" field of the Departments Offsets Assessment Guide) to calculate the size of offsets. The benchmarks for success of these actions for Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin must include: i. a reduction of foreign perennial weeds in the offset areas to below 5%; ii. presence of at least 4 species of indicator native grasses; iii. an average of 10,800 tussocks per hectare. The benchmarks for success of these actions for Brigalow listed threatened ecological communities must be aligned or improve upon benchmarks listed in the relevant Queensland Government BioCondition Benchmarks. iii. timing of management activity for each area; iv. performance criteria for each area; v. a monitoring plan to assess the success of the management activities measured against the baseline condition. The monitoring must be	c) plans to improve upon the baseline condition of Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community and Ornamental Snake habitat consistent with EPBC listing advice. These plans must include: i. a map showing areas to be managed; ii. management actions for each area and details of methods to be used. These must include: a. actions consistent with objectives stated in relevant threat abatement plans; and b. weed control measures to reduce/control the presence of foreign perennial weeds within Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community and Ornamental Snake habitat. iii. timing of management activity for each area; iv. performance criteria for each area; v. a set of measurable ecological indicators for detecting changes to the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community and Ornamental Snake habitat; vi. a monitoring plan to assess the success of the management activities measured against the baseline condition. The monitoring must be statistically robust and able to quantify change in the condition of the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community and Ornamental Snake habitat. This should include, but not be limited to, control sites and periodic ecological surveys to be undertaken by a qualified ecologist; vii. a description of the potential risks to successful management against the performance criteria, and a description of the contingency measures that would be implemented to mitigate these risks; viii. a process to report to the Department, the progress of management activities undertaken in the offset areas and the	5.0 6.0 Appendix 1 (OAMP)

statistically robust and able to quantify change in the condition of the Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin and Brigalow listed ecological community. This should include, but not be limited to, control sites and periodic ecological surveys to be undertaken by a qualified ecologist; vi. a description of the potential risks to successful management against the performance criteria, and a description of the contingency measures that would be implemented to mitigate these risks; vii. a process to report to the Department, the progress of management activities undertaken in the offset areas and the outcome of those activities, including identifying any need for improved management and activities to undertake such improvement; and viii. details of the various parties responsible for management, monitoring and implementing the management activities, including their position or status as a separate contractor; and	outcome of those activities, including identifying any need for improved management and activities to undertake such improvement; and ix. details of the various parties responsible for management, monitoring and implementing the management activities, including their position or status as a separate contractor; and	
d) a completed offsets assessment guide for the proposed offset site and a discussion as to how figures used to complete the Offsets Assessment Guide were derived.	d) a completed offsets assessment guide for the proposed offset site and a discussion as to how figures used to complete the offsets assessment guide were derived.	5.0
6. The approval holder must, within 2 years of commencement of construction (or as required under relevant Queensland legislation, whichever is earlier), register a legally binding conservation mechanism over the offset areas. The conservation mechanism must be approved by the Minister in the Offset Management Plan, described in conditions 3-5.	**7**. The approval holder must, within 2 years of commencement of construction (or as required under relevant Queensland legislation, whichever is earlier), register a legally binding conservation mechanism over the offset areas approved by the Minister in the Offset Management Plan, described in conditions 3-5.	6.1

4.0 Offset Property Description

4.1 Environmental Offset overview

As described and overviewed in the following sections, the eastern section of a property referred to as Dabin Holdings has been identified as being able to satisfy all of the offset relevant conditions for both MRA and K2 with the exception of Ornamental Snake.

The Poitrel Mine Offset Area has already been established on Dabin Holdings through legally binding mechanisms. The remaining offset requirements are proposed to be placed on Dabin Holdings as detailed in Table 6 below and shown in Figure 6. Of particular interest is the staging of offsets for Brigalow TEC for the K2 project which is further described in section 5.2 below.

Table 6. Summary of Offset Areas to be placed on Dabin Holdings.

Project	Threatened species or ecological community	Offset area required		Located on Dabin Holdings
Poitrel	Brigalow (*Acacia harpophylla* dominant and co-dominant)	337.5ha		Established
Kemmis II	Brigalow (*Acacia harpophylla* dominant and co-dominant)	17ha	3.2ha	Within 2 years of Stage 1 commencement
			13.8ha	Within 2 years of Stage 2 commencement
	Natural grasslands of the Queensland Central Highlands and northern Fitzroy Basin	65ha		Within 2 years of Stage 2 commencement
MRA	Brigalow (*Acacia harpophylla* dominant and co-dominant)	125ha		Within 2 years of commencement

The following sections describe the environmental value and condition on Dabin Holdings (as it relates to the required offsets) and also outline the project MNES impacts, offset attributes and equivalency calculations for the suitability of the offset locations.

4.2 Offset property and location.

All Brigalow and Natural Grassland offsets will be co-located on a single property owned by BMC. The property proposed, Dabin Holdings, is located within the Isaac Regional Council area in central Queensland approximately 48 km north-east of Moranbah and 68km north-west of Nebo. The property details are provided below in Table 7 and also graphically presented in Figure 4.

Table 7. Dabin Holdings property details.

Property Name	Lot on Plan	Tenure	Local Government Area	Total Area (ha)
Dabin Holdings	SP 214117	Leasehold	Isaac Regional Council	10,300

The EPBC Act approved offsets related to BMC's Poitrel Mine project (EPBC 2004/1770) are already located via a legally binding mechanism (voluntary declaration) on Dabin Holdings. This has numerous advantages in terms of both ecological outcomes and land management, protection and tenure security.

Dabin Holdings is adjacent to another BMC owned mining lease area, known as Wards Well, enabling regular access opportunities for active management of weeds and pest species. The areas proposed as offsets have limited mining resource potential and a low likelihood of future mining development. The sites chosen for offsets are covered by mining exploration licences held by third party entities, however, BMC has selected the property as it is understood that the coal resource in this location is deep and could only be extracted using underground mining techniques. Accordingly it is unlikely that the surface vegetation would be cleared or disturbed by future mining activity, should such actually occur in this location.

The predominant land use on Dabin Holdings is low-intensity cattle grazing. Historically the grazing of cattle has dominated land use within the region. The proposed offset property is located within the Brigalow Belt

North biogeographic region, the same biogeographic region as the Poitrel, K2 and MRA projects, and receives a sub-tropical / sub-humid climate that has hot wet seasons and cool dry seasons with a high degree of variability. Mean annual rainfall at Dabin Holdings is around 600 mm and is received mostly between November and April. About a quarter of this is received in the remaining months (Royal Geographical Society of Queensland, 2009).

The eastern section of Dabin Holdings is separated from the balance of the Dabin Holdings property by Red Hill Road and subsequently has been less impacted by clearing and grazing. It is this section of the property which has been identified as being able to satisfy the offset obligation (as stated in the approvals and as listed above). The Regional Ecosystems present in this eastern section are part of a large corridor of remnant vegetation, which extends to the west, the north and the east. Dabin Holdings is also regionally close to Homevale National Park to the east which contains Brigalow TEC. The exact location and details of the offsets on Dabin Holdings are discussed in section 4.1.

As stated in the Poitrel Mine Biodiversity Offset Management Plan by Earthtrade (2014), the remnant Brigalow communities (>15 years) ranged from fair to good condition and were determined to be relatively functional ecosystems. There is also a moderate-to-good distribution of native grass species across the site.

The BioCondition classification of Dabin Holdings was lowered due to the presence of *Pennisetum ciliare* (Buffel grass). Buffel was introduced as a pasture plant and has spread throughout central and northern Australia. The dominance of Buffel in the understorey reduces plant species richness and alters the structure of the communities which affects the overall BioCondition, however the Buffel does not currently appear to be preventing regrowth recruitment as seedlings are present in the grass sward. Some Brigalow TEC areas have also demonstrated an ability to regenerate after initial clearing 20+ years earlier. The broader site contains a mix of remnant and non-remnant woodland vegetation surrounding an ephemeral creek line.

4.3 Ecological survey of Dabin Holdings

4.3.1 Literature review and field surveys undertaken

During planning and delivery of the Poitrel Mine offset a desktop review of publically available data, including a comparison of the Queensland Government Regional Ecosystem Mapping (REMAP) against the aerial imagery available, was initially undertaken in early 2012. Following the desktop appraisal, and an initial reconnaissance of the proposed offset area, STIRD Services conducted an ecological field survey of the proposed eastern extent of Dabin Holdings between the 26th and 29th July 2012. The survey was specifically focussed on Brigalow and included BioCondition assessment sites, Quaternary assessment sites and a foot traverse of the offset area. The timing of the survey (during the dry season) provided sub-optimal conditions for vegetative vigour and inflorescence set, particularly for herbaceous and graminoid (grass) species. To overcome this, ground verification aerial photographs from 1987, 2000 and 2007 were used to compare vegetation growth and clearance over a 20 year period. Using the preliminary site visit map, RE mapping, aerial photography and on-ground analysis of vegetation composition, remapping of the ecosystems present and their distribution was able to be achieved, and a BioCondition assessment and Ecological Equivalence analysis was undertaken.

BioCondition assessment was used to allow for a replicable and repeatable means of assessing vegetation condition. The BioCondition methodology offers a framework that provides a measure of how well a terrestrial ecosystem is functioning for biodiversity values. It is designed so that individual sites can be compared to a reference site of the 'best condition available' of the same regional ecosystem. A total of 9 nine sites were selected.

For the planning and delivery of the offset requirements for Kemmis II and MRA projects a subsequent field survey of the eastern section of Dabin Holdings was conducted. This survey had a broader scope than just Brigalow condition and was conducted between the 21st and 24th October 2014.

BioCondition assessments

Both surveys used the BioCondition assessment methodology to provide a replicable and repeatable means of assessing vegetation condition. The BioCondition methodology provides an output score that can be used to group condition into four classes, as outlined in Table 8.

Table 8. Classification of BioCondition.

BioCondition Class	% value against best condition available	Description
1	>80	Good
2	>60-79	Fair
3	>40-59	Poor
4	<40	Very Poor

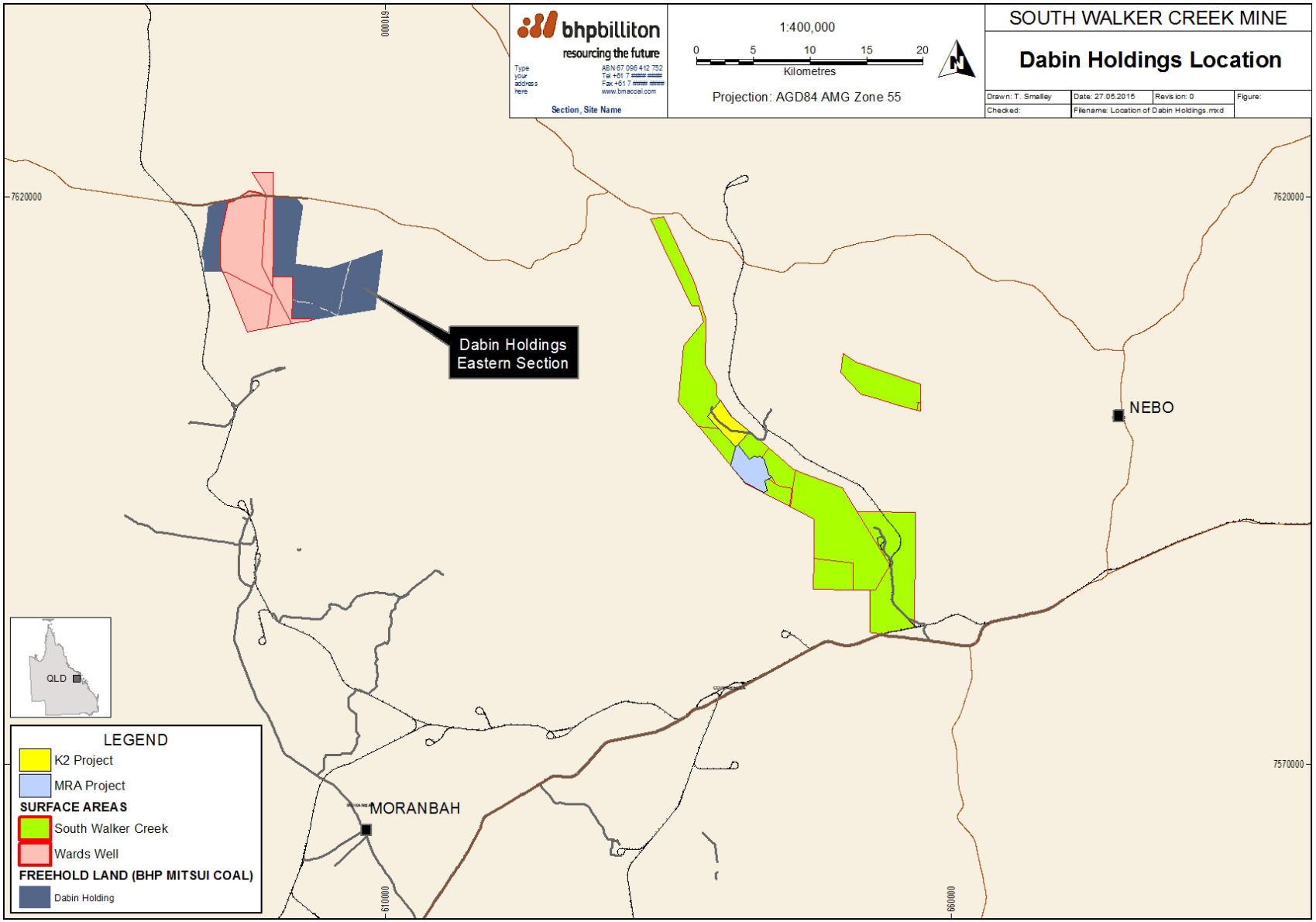

Figure 4. Location of Dabin Holdings in relation to K2 and MRA Projects.

Ecological equivalence assessments

Additional to the BioCondition assessment, an Ecological Equivalence comparison has been undertaken between the impact sites for both projects and the offset site at Dabin Holdings, as per the Ecological Equivalence Methodology.

The Ecological Equivalence Methodology **(EEM)** has been developed by the Department of Environment and Heritage Protection Queensland **(DEHP).** The EEM is used to assess the ecological equivalence between an area impacted by development (the clearing area) and an area being offered in exchange for the clearing (the offset area). Ecological equivalence measures are used to compare the ecological attributes between two sites. The EEM was used in this instance as an indicative scientific measure for the offset proposed under the EPBC Act.

4.3.2 Results of botanical field survey

Collectively the two field surveys have delivered highly accurate vegetative and ecosystem mapping of the eastern section of Dabin Holdings. A summary of the findings in relation to Brigalow and Natural Grasslands is provided below and the field verified regional ecosystem map is provided at Figure 5. The detailed ecological descriptions, Biocondition scores, field data sheets and photos from the surveys are provided as part of the OAMP and a MNES Offset Assessment Report is provided as Appendix 6 to the OAMP. The results from the ecological survey effort were transposed into the inputs for the ecological equivalence calculator (as per the EPBC Offset Policy) and are provided in the specific MRA or K2 offset sections below, showing how the proposed offsets exceed the impacts and ecological equivalence can be achieved. The results from the field assessments will also be used to identify baseline conditions, and establish performance indicators that could trigger adaptive management measures to be implemented. The survey results include:

- baseline condition of existing vegetation at the survey locations;
- the quantity of habitat for EPBC Act listed species or communities (in hectares), found within each offset area;
- the condition class of habitat for EPBC Act listed species or communities found within each offset area;
- vegetation condition mapping;
- establishment of BioCondition and quaternary monitoring points (also to be used as photo reference points);
- ecosystem condition indicators including:
  - tree age class representation,
  - tree canopy cover,
  - native plant species type, abundance and distribution,
  - weed abundance and distribution,
  - description of fauna habitat including condition, type and connectivity.

The surveys also revealed:

- the pre-clear vegetation would have historically supported vegetation which was representative of RE 11.9.5 (*Acacia harpophylla* and/or *Casuarina cristata* open-forest on fine-grained sedimentary rocks) and RE 11.3.1 (*Acacia harpophylla* and/or *Casuarina cristata* open-forest on alluvial plains).
- the proposed offset site is located on an underlying layer of Triassic arenite mudrock. There is overlying Cainozoic basalt over the western section of the site. The south-east section of the property has an overlying layer of unconsolidated sediments.

Brigalow results

Large areas of vegetation possessing characteristics of the Brigalow TEC (Regional Ecosystems 11.3.1 and 11.9.5), both of which are classified as endangered, were identified within the property. The Brigalow TEC areas on Dabin Holdings are in good condition. The remnant Brigalow communities (>15 years) are in good condition with relatively few weeds and were functional ecosystems. In some areas the condition was lowered due to the presence of *Pennisetum ciliare* (Buffel grass). Buffel was introduced as a pasture plant and has spread throughout central and northern Australia. The dominance of Buffel in the understorey reduces plant species richness and alters the structure of the vegetation (Grice 2003 and Smyth et al. 2009). The BioCondition survey results from the above assessment at the proposed offset site are included in the OAMP.

Natural Grassland results

Large areas of grassland community consistent with remnant RE 11.8.11 are present on the property. The communities are primarily devoid of woody vegetation with only a few scattered *Flindersia dissosperma* trees present. The ground layer is dominated by native grasses and occasional forbs including *Bothriochloa erianthoides*, *Rhynchosia minima*, *Heteropogan contortus* and *Panicum decompositum*. Exotic grass species, *Cenchrus ciliaris* and *Bothriochloa pertusa*, also occasionally occur along with *Parthenium hysterophorus*, which is a Class 2 Declared Weed under the LP Act.

The results of the condition assessment show that the grasslands present vary between Best Quality (BQ) to

Good Quality (GQ) across different condition indicators and between different areas. However, overall the offset area is consistent with Good Quality grasslands.

The coverage of weeds and organic leaf litter within the offset area resembles that of an undisturbed grassland community. However, floristic compositional and structural characteristics such as grass and forb species richness, and native grass cover were below expected levels for a native grassland community. This is most likely due to cattle grazing and the prevailing dry conditions, which reduced the ability to identify grass species.

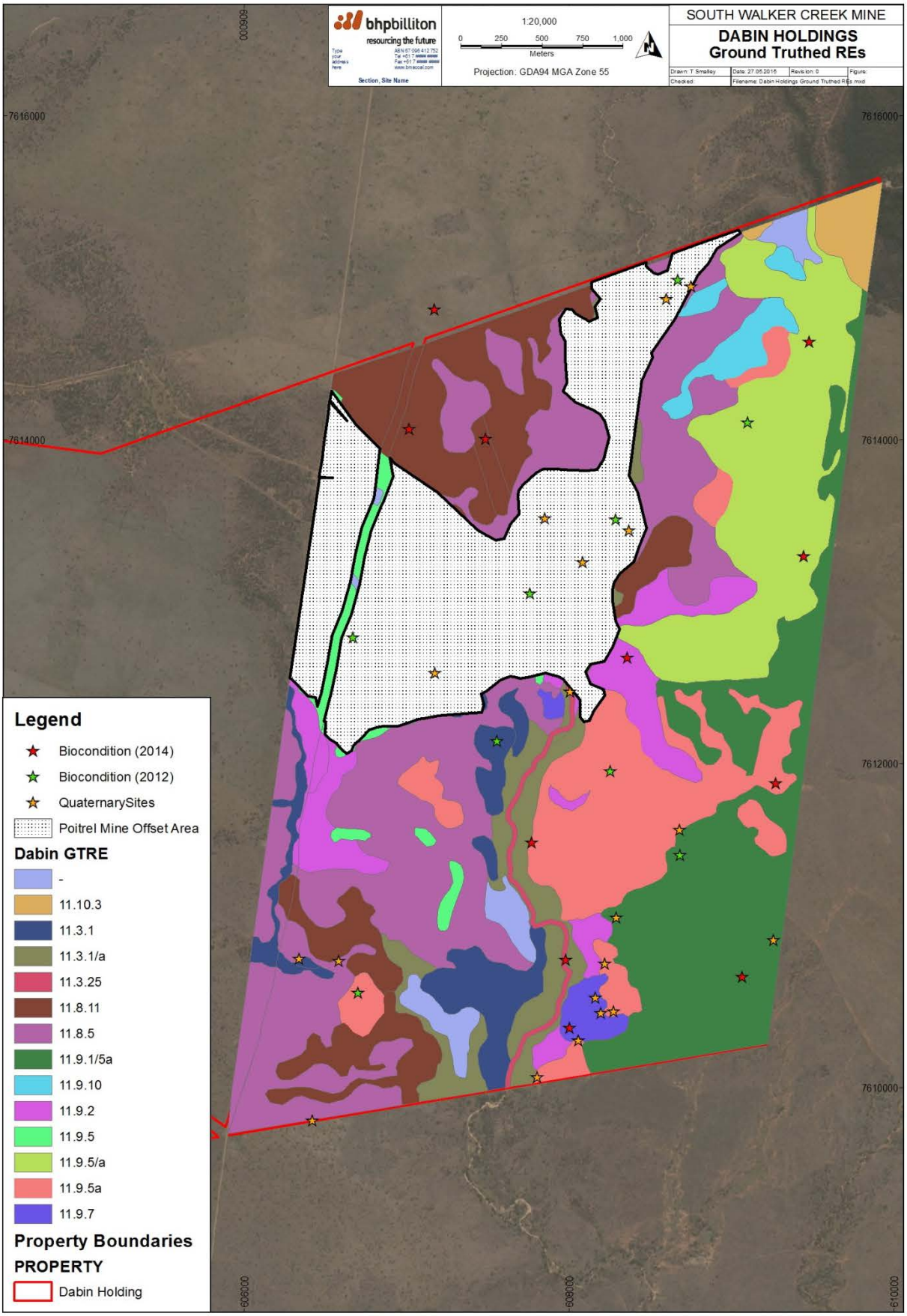

Figure 5 Field verified regional ecosystem for the eastern section of Dabin Holdings.

5.0 Offset Equivalency

5.1 MRA offset area and equivalency

A total area of 125ha of vegetation possessing characteristics of the Brigalow TEC has been identified as a suitably equivalent offset area. No suitable habitat for the Ornamental Snake exists on Dabin Holdings and an alternative offset has been sought for which a separate management plan exists.

The proposed 125ha Brigalow TEC Offset Area is located at the eastern end of the Dabin Holdings property, as shown in Figure 6. The Offset Area will be secured before 'substantial commencement' of the project which, by definition of the Approval, is extraction of coal for commercial production which is not expected until mid 2017. The Offset Area will be co-located with, and adjoining the approved Offset Area for Poitrel Mine and also proposed offsets for the K2 project (as described below in section 5.2) providing a larger overall protected and managed area. This has numerous advantages in terms of ecological outcomes, land management, protection and tenure security.

BioCondition assessment sites were chosen to reflect the variations of the Brigalow ecological communities present at Dabin Holdings. A total of 20 BioCondition assessment sites and 19 Quaternary assessment sites have been established on this parcel of Dabin Holdings. Many of these sites are located within Brigalow TECs, while 3 BioCondition sites are also located within the proposed regional ecosystem. The OAMP contains the BioCondition assessment scores. The 19 Quaternary sites were undertaken in the original assessment to verify the extent and broad condition class (ie remnant, regrowth or other) of Brigalow and Natural Grasslands, as well as other vegetation communities across Dabin Holdings. Quaternary sites are a rapid form of qualitative assessment that confirms the dominant vegetation type as well as condition, which have been sampled in detail through corresponding BioCondition assessment sites. This assists in detecting any spatial variation and is used to extrapolate the data to accurately delineate and map vegetation communities. For the purpose of the Kemmis II and MRA offset area the Quaternary sites were undertaken to determine that the data collected at the corresponding BioCondition assessment sites was representative of the entire offset area. No Quaternary sites are proposed for the Kemmis II and MRA offset areas as they do not provide a quantitative assessment method (which BioCondition does provide) and are therefore unsuitable for monitoring purposes.

As calculated below in Table 9, in accordance with the EPBC Act Environmental Offsets Policy and associated Offsets Assessment Guide, the proposed offset directly offsets over 100 per cent of the impact. As such, the proposed offset is considered to deliver a conservation outcome that will maintain or improve the viability of the Brigalow TEC.

Table 9. MRA Offset Area condition score – Brigalow TEC.

Attribute	Value/Score	Rationale
Start quality		
Proposed area	125ha	
Site context	7	Site consists of contiguous Brigalow TEC is connected to woodland to the north and south. Adjacent to another protected offset area as well as being adjacent to proposed grassland offset area.
Site condition	6	Good condition contains some areas of Buffel grass.
Species stocking rate	6	Assumed presence based on potential habitat and connectivity, including riparian areas and gilgai.
Average of above three quality component scores.	6.33	
Score	6	As per Offset Assessment Guide calculations.
Future quality without offset		
Site context	5	Potential for future clearance for grazing and loss of connectivity.

Attribute	Value/Score	Rationale
Site condition	5	Continued and potentially increased grazing pressure will likely reduce the quality of vegetation, which could impact negatively on condition. Strong likelihood of increased Buffel grass infestations.
Species stocking rate	4	Habitat value would fall as area continues to degrade.
Average of above three quality component scores.	4.66	
Score	5	As per Offset Assessment Guide calculations.
Future quality with offsets		
Site context	8	Increased connectivity to surrounding vegetation. Improved active management of weed and cattle grazing in conjunction with other combined offset areas.
Site condition	7	Reduction of grazing pressure will allow saplings and suckers to regenerate. Less trampling and increased woodier debris will provide more potential shelter habitat for reptiles.
Species stocking rate	7	Assumed density would increase due to the increase in habitat and feed items, plus reduction of predators (dogs and pigs) and cattle disturbance.
Average of above three quality component scores.	7.33	
Score	7	As per Offset Assessment Guide calculations.
Confidence in quality scores	75%	Reduction of cattle and threats from exotic weeds is a standard and simple procedure, proven to increase native ground covers and improve habitat.
Time over which loss is averted	20 years	Maximum of 20 years.
Time until ecological benefit	10 years	Estimate of 5 years for increase in plant diversity, another 2 years for increase in plant and animal abundance. Allows for 3 year lag due to unforeseeable climate variations.
Risk of loss without offset	60%	Habitat is in good condition, but the risk of further weed invasion and cattle disturbance is high. Area may also be re-cleared for farming in the future.
Risk of loss with offset	2%	Habitat would be improved with offset and area secured under a Voluntary Declaration, therefore the risk of loss is much lower.
Raw gain	2	Difference between future quality without offset score and future quality with offset score.
Confidence in result	75%	Confidence is based on habitat surveys of the site and proven management measures.
Adjusted gain	1.50	As per Offset Assessment Guide calculations.
Net present value	36.64	As per Offset Assessment Guide calculations.
Net Present Value of impact site	35.40	As per Table 2
Percentage of impact offset	**103.50%**	As per Offset Assessment Guide calculations.

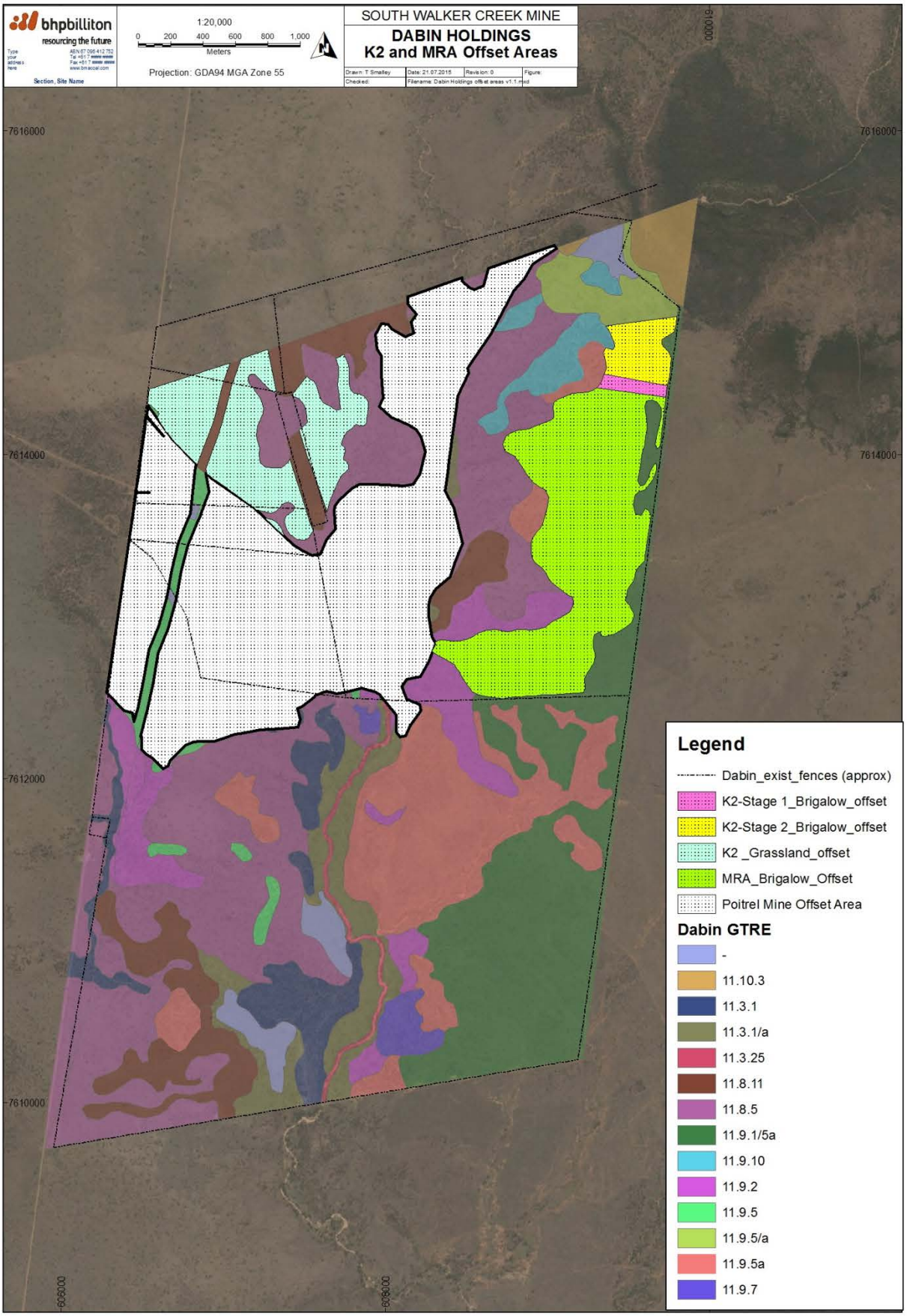

Figure 6. Offset Area location and arrangement on Dabin Holdings.

5.2 K2 Offset area and equivalency

The eastern parcel of Dabin Holdings was assessed for its ability to provide Brigalow and Natural Grassland as described in section 4.3.

As indicated above, the K2 project will be undertaken in a staged manner. Stage 1 will only impact the Brigalow TEC, while Stage 2 will impact Brigalow and Natural Grassland TEC.

A 17ha area of vegetation possessing characteristics of the Brigalow TEC, and a further 65ha of vegetation possessing characteristics of the Natural Grassland TEC, have been identified as suitably equivalent Offset Areas for both Stage 1 and Stage 2. Further, the Offset Areas will be co-located with the approved Offset Area for the Poitrel Mine and also adjoin the proposed offsets for the MRA project (see section 5.0) providing a larger overall protected and managed area. This has numerous advantages in terms of ecological outcomes, land management, protection and tenure security. Note: The proposed areas are located at the eastern end of the Dabin Holdings property, as shown in Figure 6 above.

The Offset Areas will be secured within 2 years of commencement of construction for each stage, i.e Stage 1 commenced 13th July 2015 and so the offset for Stage 1 will be secured by 13th July 2017. The Offset for Stage 2 will be secured within 2 years of that stage commencing.

Brigalow TEC

Using the preliminary site visit map, regional ecosystem mapping, aerial photography and on-ground analysis of vegetation composition, a 17ha area of vegetation possessing characteristics of the Brigalow TEC (Regional Ecosystem 11.9.5) has been selected as a suitable offset area on Dabin Holdings to equivalently offset Stage 1 and Stage 2 impacts.

Given the staged approach to the K2 project, the 17ha Offset Area will be provided and legally secured in a staged approach. As calculated, the 13.2ha impact is equivalently offset by 17ha of Brigalow TEC at Dabin. Given Stage 1 will only impact up to 18.9% of the 13.2ha (or 2.5ha over two patches) the equivalent offset area for Stage 1 is 3.2ha. The remaining 13.8ha Offset Area will be legally secured upon such time as BMC receives approval for Surface Areas 6, 7 and 8 and the mine intends to commence Stage 2. These areas are graphically represented in Figure 6.

BioCondition assessment sites were chosen to reflect the variations of the Brigalow ecological communities present at Dabin Holdings. A total of 20 BioCondition assessment sites and 19 Quaternary assessment sites have been established on this parcel of Dabin Holdings. Many of these sites are located within Brigalow TECs, while 3 BioCondition sites are also located within the proposed regional ecosystem. The OAMP contains the BioCondition assessment scores.

As calculated below in Table 10, in accordance with the EPBC Act Environmental Offsets Policy and associated Offsets Assessment Guide, the proposed offset directly offsets well over 100 per cent of the impact. As such, the proposed offset is considered to deliver a conservation outcome that will maintain or improve the viability of the Brigalow TEC.

Table 10. K2 Offset Area condition score – Brigalow.

Attribute	Value/Score	Rationale
Start quality		
Proposed area	17ha	
Site context	7	Site consists of contiguous Brigalow TEC is connected to woodland to the north and south. Adjacent to another protected offset area as well as being adjacent to proposed grassland offset area.
Site condition	6	Good condition contains some areas of buffel grass.
Species stocking rate	6	Assumed presence based on potential habitat and connectivity, including riparian areas and gilgai.
Average of above three quality component scores.	6.33	
Score	6	As per Offset Assessment Guide calculations.
Future quality without offset		
Site context	5	Potential for future clearance for grazing and loss of connectivity.

Attribute	Value/Score	Rationale
Site condition	5	Continued and potentially increased grazing pressure will reduce the quality of vegetation, which could impact negatively on condition. Strong likelihood of increased buffel grass infestations.
Species stocking rate	4	Habitat value would fall as area continues to degrade.
Average of above three quality component scores.	4.66	
Score	5	As per Offset Assessment Guide calculations.
Future quality with offsets		
Site context	8	Increased connectivity to surrounding vegetation. Improved active management of weed and cattle grazing in conjunction with other combined offset areas.
Site condition	7	Reduction of grazing pressure will allow saplings and suckers to regenerate. Less trampling and increased woodier debris will provide more potential shelter habitat for reptiles.
Species stocking rate	7	Assumed density would increase due to the increase in habitat and feed items, plus reduction of predators (dogs and pigs) and cattle disturbance.
Average of above three quality component scores.	7.33	
Score	7	As per Offset Assessment Guide calculations.
Confidence in quality scores	75%	Reduction of cattle and threats from exotic weeds is a standard and simple procedure, proven to increase native ground covers and improve habitat.
Time over which loss is averted	20 years	Maximum of 20 years.
Time until ecological benefit	10 years	Estimate of 5 years for increase in plant diversity, another 2 years for increase in plant and animal abundance. Allows for 3 year lag due to unforeseeable climate variations.
Risk of loss without offset	60%	Habitat is in good condition, but the risk of further weed invasion and cattle disturbance is high. Area may also be re-cleared for farming in the future.
Risk of loss with offset	2%	Habitat would be improved with offset and area secured under a Voluntary Declaration, therefore the risk of loss is much lower.
Raw gain	2	Difference between future quality without offset score and future quality with offset score.
Confidence in result	75%	Confidence is based on habitat surveys of the site and proven management measures to protect and manage vegetation.
Adjusted gain	7.40	As per Offset Assessment Guide calculations.
Net present value	4.98	As per Offset Assessment Guide calculations.
Net Present Value of impact site	2.64	As per Table 3
Percentage of impact offset	**188.63%**	As per Offset Assessment Guide calculations.

Natural Grassland TEC

Using the preliminary site visit map, regional ecosystem mapping, aerial photography and on-ground analysis of vegetation composition; a 65ha area of vegetation possessing characteristics of the Natural Grassland TEC (Regional Ecosystems 11.8.11) has been selected as a suitable offset area on Dabin Holdings to equivalently offset the impact at K2.

The proposed Natural Grassland TEC offset area is located adjacent to the existing approved Brigalow TEC offset for the Poitrel Mine and it also forms part of a larger patch of grassland that extends north to the boundary of Dabin Holdings and beyond. These combined areas make up a larger overall protected and managed area. The whole area will be managed consistently with the Offset Area to preserve its conservation value. The offset site location is shown in Figure 6.

Vegetation surveys in 2014 by Ecological Australia examined the condition of the Natural Grassland at this location on Dabin Holdings and provided BioCondition data for 3 survey sites from which attribute values and scores have been calculated.

As calculated below in Table 11, in accordance with the EPBC Act Environmental Offsets Policy and associated Offsets Assessment Guide, the proposed offset directly offsets over 100 per cent of the impact. Given this, the proposed offset is considered to deliver a conservation outcome that will maintain or improve the viability of the Natural Grassland TEC.

Table 11. K2 Offset Area condition score – Natural Grassland.

Attribute	Value/Score	Rationale
Start quality		
Proposed area	65ha	
Site context	8	Site is within a large area (347 ha) of grassland TEC that is adjacent to Brigalow and other woodland areas. Adjacent to an existing Brigalow TEC offset area and a further proposed Brigalow TEC offset for this project.
Site condition	7	Recent BioCondition survey.
Species stocking rate	6	Assumed presence based on potential habitat and connectivity.
Average of above three quality component scores.	7	
Score	7	As per Offset Assessment Guide calculations.
Future quality without offset		
Site context	5	Potential for future use for grazing, decreasing connectivity.
Site condition	4	Continued and potentially increased grazing pressure will reduce the quality of vegetation, which could impact negatively on condition. Further weed infestation almost certain.
Species stocking rate	4	Habitat value would fall as area continues to degrade.
Average of above three quality component scores.	4.33	
Score	4	As per Offset Assessment Guide calculations.
Future quality with offsets		
Site context	8	Continued connectivity to surrounding vegetation. Ongoing management of weed and cattle grazing in conjunction with combined offset area to the south.

Attribute	Value/Score	Rationale
Site condition	8	Reduction of grazing pressure will allow native forbs and grasses to improve in density and abundance. Active management of weeds will lead to an improvement in condition
Species stocking rate	8	Assumed density and extent would increase due to the reduction in grazing pressure and competition from weed species.
Average of above three quality component scores.	8	
Score	8	As per Offset Assessment Guide calculations.
Confidence in quality scores	75%	Reduction of cattle and threats from exotic weeds is a standard and simple procedure, proven to increase native ground covers and improve habitat.
Time over which loss is averted	20 years	Maximum of 20 years.
Time until ecological benefit	8 years	Estimate of 5 years for increase in plant diversity and sustained weed reduction. Allows for 3 year lag due to unforeseeable climate variations.
Risk of loss without offset	40%	Habitat is in good condition, so the risk that no offsets would result in loss of species/habitat is relatively low. Area may however be over grazed in the future.
Risk of loss with offset	2%	Habitat would be improved with offset and area secured under a V Dec, therefore the risk of loss is much lower.
Raw gain	4	Difference between future quality without offset score and future quality with offset score.
Confidence in result	75%	Confidence is based on habitat surveys of the site and proven management measures.
Adjusted gain	3.00	As per Offset Assessment Guide calculations.
Net present value	22.31	As per Offset Assessment Guide calculations.
Net Present Value of impact site	22.19	As per Table 4
Percentage of impact offset	**100.54%**	As per Offset Assessment Guide calculations.

6.0 Offset Management and Rehabilitation

6.1 Management Structure

The proposed Brigalow and Natural Grassland TEC offset areas for MRA, K2 stage 1 or K2 stage 2 will be legally secured via a Voluntary Declaration under the Queensland Vegetation Management Act 1999 (VMA) within 2 years of commencement of construction of the relevant Project or stage of Project. The declaration will be made by the landowners (BMC) and identify the Offset Areas as "areas of high nature conservation value". The declaration will be registered on the title of the property with an Offset Area Management Plan (OAMP) (Attachment 1) which will be binding on all current and future owners until the objective and outcomes of the OAMP have been achieved. The Offset Areas will be legally secured within 2 years of commencement of construction (of each Project or Stage of Project), as stipulated in the relevant approval documents.

Upon such time as the offset areas reach remnant status and the offset outcomes (below) have been achieved, the ecosystem condition information will be provided to the Queensland Herbarium for remapping to provide long term protection. At this time, the BOMP will no longer apply.

6.2 Offset Area management objective

The management objective of the environmental offsets for MRA and K2 is:

To conserve and enhance the environmental values of the threatened ecological communities over the long term, by working to increase the extent of both remnant and regrowth vegetation and improving its condition and management.

The management area objective is estimated to be achieved within 20 years, but ecological benefit is expected to occur within 5-10 years. It is recognised that the timeframes are subject to natural environmental and climatic conditions, while unexpected events and other potential risks are also identified in Section 9.0 Risks and risk management.

6.3 Offset Area specific management outcomes

During the EPBC approval process (for both projects) the EPBC Offset Assessment Guide was used to define an equivalent offset for the residual significant impacts. This included use of the EPBC Impact Calculator and EPBC Offset Calculator, whereby the known condition of ecosystems (impact and offset) was represented as an attribute score, through use of Biocondition Assessment data and adoption of the *Qld Guide to Determining Terrestrial Habitat Quality* (currently version 1.1). The input scores and rationale used in those calculators and the Preliminary Documentation were approved by DotE.

The scores used in the 'Future Condition with offsets' section of the Offset Calculator have been adopted as the Specific Management Outcomes for the Offset Areas.

During the course of the offset, ongoing monitoring and reporting will include measurements of Biocondition indices which will be translated into the EPBC Offset Calculator inputs through repeated adoption of the *Qld Guide to Determining Terrestrial Habitat Quality* (currently version 1.1). Upon such time as the EPBC Offset Calculator output provides the same or greater offset percentage as that stated in the final column of Table 12 below then the offset will be deemed to have been delivered.

The required future quality inputs, as per the approval process, are provided in the "future quality with offsets" section in Table 10 and Table 11 above.

The management objective will be considered to have been delivered if the Specific Management Outcomes have been achieved. As stated above, when the offset outcomes have been achieved, and by default the management objective also achieved, then this BOMP will be considered to have been delivered and will no longer apply.

Table 12. Offset equivalency and management outcome.

Project	Threatened species or ecological community	Impact area	Quantified impact score	Offset area	Offset %
K2	Brigalow (*Acacia harpophylla* dominant and co-dominant)	13.2ha	2.64	17ha	188.63%
	Natural grasslands of the Queensland Central Highlands and northern Fitzroy Basin	31.7ha	22.19	65ha	100.54%
MRA	Brigalow (*Acacia harpophylla* dominant and co-dominant)	59ha	35.4	125ha	103.5%
	Ornamental Snake (*Denisonia maculata*) *	Not part of this management plan			

6.4 Management actions to improve baseline condition

With improved and active management of the Offset Areas it is anticipated that an improvement in both the condition and the context attributes of the Offset Areas can be achieved in a relatively short timeframe (5+ years).

The OAMP is the key document that outlines the specific management actions for rehabilitation of the Offset Areas which consist of a range of management regimes involving some different components to match the two types of threatened ecosystem communities being offset. The management regimes fall under the following headings:

- Limiting disturbance
- Managing grazing by domestic and native herbivores
- Pest animal and weed management
- Fire regime management

The management actions within each management regime are consistent with

- Approved Conservation Advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community (Approved 2013)
- Recovery plan for the "Brigalow (*Acacia harpophylla* dominant and co-dominant" endangered ecological community (draft of 1 May 2007) (Butler, 2007)
- *Approved Conservation Advice for Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin* (Approved 2008)

The relevant conservation advices and recovery plans generally seek to achieve:

- survey and monitoring to improve the knowledge base
- maintenance and enhancement of degraded systems
- establishing conservation agreements for the TECs
- enhancing natural groundcover
- stock management to avoid over grazing and damage to microhabitats whilst also managing fuel load
- avoidance of pasture improvement actions, including ground disturbance.
- control of feral animals and weed species (particularly Buffel grass, pigs and wild dogs)
- soil and erosion control
- maintenance and enhancement of natural tree and shrub regeneration
- appropriate fire regime for community type and location. Otherwise exclusion of fire whenever practically possible
- avoidance of fertilisers near natural ecosystems
- maintenance of connectivity to other native vegetation areas, including other offset areas and habitat corridors that will promote fauna movement and colonisation

Table 13 and Table 14 below outline the Management Actions along with the performance objectives, timing and responsible party for delivering the action (as copied from the OAMP). A separate rehabilitation plan is not considered necessary because the management actions to improve the baseline condition deliver the same outcome.

6.5 Methods for adaptive management

The OAMP has identified current threats and potential risks to achieving management outcomes. Management actions required to be undertaken to minimise threats and risks identified are detailed. The use of quarterly inspections and photopoint monitoring (initially bi-annual) will indicate if performance is on an appropriate short term trajectory. This will be scientifically supported by five yearly BioCondition assessment monitoring which will enable a determination of trajectory for the longer term. If at any time monitoring indicates performance is not on an appropriate trajectory, then modifications to management actions can be developed and applied. Should management actions vary drastically from those detailed in the OAMP, the DotE will be informed as part of normal reporting processes.

Table 13. Brigalow Offset Area Management Actions.

Management activity	Performance objectives	Where, when and how will the activity be carried out	Who will be carrying out the activity	Monitoring method	Reporting
Limiting disturbance	The extent and condition of Brigalow TEC will be maintained or increased between each successive BioCondition assessment.	Disturbance to vegetation within the offset is not permitted, except for maintenance of vegetation for: • existing roads, firebreaks, easements and fencing. New firebreaks or fencing if required should be installed outside of the perimeter of the Brigalow community. Thinning of Brigalow to manage dense Brigalow regrowth (to promote rapid recovery of stunted Brigalow stands) may occur where canopy is >70%, stem count is >10,000 / ha, and recommended by a qualified ecologist Ground disturbance (i.e ploughing) is not permitted. Removal of groundcover and organic litter is not permitted. Vehicle and machinery movement through the offset area is to be minimised. Deliberate introduction of non-endemic species is not permitted. The use of fertilisers on the property at locations where it could move into the offset area is to be avoided.	Landowner / Land manager	All activities will be monitored through • routine inspections by the landholder and or agistee. • Landowner to develop a basic checklist for observations or actions relevant to managing the offset, including o weather conditions, o grazing intensity and stock rotation o pasture management activities such as seeding or fertilising, o pest and weed occurrence/intensity and management activities, o erosion issues and any control works, o incidents of fire and description o general property management activities such as fencing • checklist to be completed quarterly by land manager. • ongoing interactions between BMC & the landholder including landholder records and anecdotal discussions. Biannual photopoint monitoring for first 2 years, then annually for next 5 years, then biennially for remaining duration of offset.	Biocondition reporting to be undertaken ever 5 years. A detailed report will be submitted to the administering Government department at an interval not exceeding 5 years. The detailed report will compile and make an assessment of: • quarterly checklist data • photopoint monitoring data • Biocondition results The summary report will undertake recalculation of the Offset Area score (as per EPBC calculator) to determine condition trajectory and ascertain if the Offset Area has achieved the outcome.
Grazing management	An improvement in the site condition and species stocking rate scores between each successive BioCondition assessment. Natural regeneration of Brigalow species will be recorded at each Biocondition Assessment. A target stem count of 10,000/ha.	The Landowner may graze stock in the Brigalow area in the following manner: • to occur primarily for the purpose of minimising the fuel load and risk of hot fire burn. • stock are to be carried at similar stocking densities to that historically carried on the property, however the duration of grazing within the Brigalow areas is to be reduced commensurate with fuel load present, such that grazing may be more intense if the Brigalow stem count exceeds 10,000/ha. • grazing intensity should be reduced during the wet season. • cattle should not be moved into the Brigalow area if they have come from a grazing area known to contain weed species that are seeding, until the fodder has passed through their systems. • stock will be excluded from the Brigalow offset area during periods of drought. The grazing regime is to be carried out for the life of the Offset Area Management Plan.	Landowner / Land manager		

		The presence and abundance of native herbivores will be noted by the land manager and if abundance is deemed to be excessive then the landowner will encourage those species to move to other non-offset areas via noise, human activity or other nuisances.	• 5 yearly Biocondition monitoring
Weed management	Keep weed cover at or below baseline levels as determined by BioCondition surveys.	An initial weed spraying program will occur within the first 6 months of offset establishment. This will specifically target any small populations of Buffel grass or Parthenium that may be present. Thereafter the Landowner will undertake regular assessments for weed development. Should any weeds become established then additional weed control will be undertaken as early as practicable considering climatic conditions. The presence of foreign perennial weeds will be kept below 5% ground cover. Cattle should not be moved into the Brigalow area if they have come from a grazing area known to contain weed species that are seeding, until the fodder has passed through their systems.	
Pest animal management	Occurrence of pest animals is at or below levels estimated at commencement through baseline assessments.	Wild pigs pose the greatest risk to the improvement of the Brigalow offset area. Should the presence of pigs be noticed during the quarterly checklist, a pig eradication program shall be implemented within the Offset Area in accordance with the Land Protection (Pest and Stock Route Management) Act 2002 A similar program could be implemented if other pest animals become a noticeable problem. Where possible, native pest animals should be encouraged to move outside of the offset area through disturbance and nuisance activities such as noise and human presence. Anecdotal evidence (eg photos, written records) of pest animal presence and abundance should be collected.	
Fire management	Maintenance of appropriate controls to enhance biodiversity and reduce fuel loads. The occurrence of any fire in the offset area will be recorded. Biocondition assessments will make a determination of impact resulting from any fire. Allow the accumulation of fallen timber/debris and the establishment of natural undergrowth. Biocondition Assessments will be used to measure this.	Fire management is a key item in the threat abatement plan. To the extent practicable, fire is to be excluded from the Brigalow TEC Offset Area, except for ecological burns. A low intensity fire may be permitted at intervals greater than 7 years for ecological purposes if recommended by a qualified ecologist. Within 12 months from the date of this Offset Area Management Plan coming into effect a member of the Rural Fire Service Brigade (RFSB) inspect the offset area to assess the suitability of the current and proposed firebreaks. Any recommendation for improvement will be implemented within 6 months from receipt of those recommendations, provided they do not contradict this OAMP. Stock may be grazed in the Offset Area to assist in fuel reduction.	

Table 14. Grassland Offset Area Management Actions.

Management activity	Performance objectives	Where, when and how will the activity be carried out	Who will be carrying out the activity	Monitoring method	Reporting
Grazing management	An increase in the density and abundance of indicator species in the Grassland TEC between each successive BioCondition assessment. An improvement in the site condition and species stocking rate scores between each successive BioCondition assessment. The presence of at least 4 indicator native grasses, and an average of 10,800 tussocks per ha.	The Landowner may graze stock in the grassland offset area in the following manner: • focus on maintaining a good cover of perennial grasses and legumes and encourage regrowth of TEC indicator species. • Maintain a minimum of 50% ground cover at the end of the dry season. • grazing should be avoided during peak flowering and seed set period (Oct – Dec inclusive). • cattle should not be moved into the Grassland area if they have come from a grazing area known to contain weed species that are seeding, until the fodder has passed through their systems. • Stock will be excluded from the Grassland offset area during periods of drought. Existing fencing will be maintained to enable stock management in the grassland offset area. Any new water points are to be located outside the offset area where possible. Relocation of existing water points will be investigated if these are considered to have an impact upon community recovery. The grazing regime is to be carried out for the life of the Offset Area Management Plan.	Landowner / Land manager	All activities will be monitored through • routine inspections by the landholder and or agistee. • Landowner to develop a basic checklist for observations or actions relevant to managing the offset, including o weather conditions, o grazing intensity and stock rotation o pasture management activities such as seeding or fertilising, o pest and weed occurrence/intensity and management activities, o erosion issues and any control works, o incidents of fire and description o general property management activities such as fencing • checklist to be completed quarterly by land manager. • ongoing interactions between BMC & the landholder including landholder records and anecdotal discussions.. Biannual (May and November) photopoint monitoring for first 2 years, then annually (April/May) for next 5 years, then biennially	Biocondition reporting to be undertaken ever 5 years. A detailed report will be submitted to the administering Government department at an interval not exceeding 5 years. The detailed report will compile and make an assessment of: • quarterly checklist data • photopoint monitoring data • Biocondition results The summary report will undertake recalculation of the Offset Area score (as per EPBC calculator) to determine condition trajectory and ascertain if the Offset Area has achieved the outcome.
Weed management	The known and mapped Buffel grass infestation will be reduced or eradicated within 5 years of commencement. No new weed infestations will develop during the course of the offset. The presence of foreign perennial weeds to below 5%,	An initial weed spraying program will occur within the first 6 months of offset establishment with a secondary follow up to occur prior to any regrowth allowed to set seed. Thereafter the Landowner will undertake regular assessments for weed infestations as part of the routine quarterly checklist. If the presence of foreign perennial weeds exceeds 5% ground cover, then: • Subsequent herbicide spraying programs will be performed at intervals suited to regermination of Buffel grass and seasonal timing and conditions pending the findings of the regular inspections. Should the Buffel grass persist, additional targeted herbicide spraying will occur as soon as reasonably practicable until such point as the natural grassland species are able to outcompete the Buffel grass. If it becomes apparent that a large seed bank is present then the land manager may choose to plough the soil (only in the areas of Buffel grass) to promote germination so that herbicides are more effective longer term.			

		Grazing in accordance with the regime described above will encourage selective consumption of Buffel grass above other grass species. As such grazing should also be used as a tool to manage weeds. Cattle should not be moved into the Grassland area if they have come from a grazing area known to contain weed species that are seeding, until the fodder has passed through their systems. The land manager will be responsible for removing any new weed species that may occur within 6 months of first being recorded.	(April/May) for remaining duration of offset. • 5 yearly Biocondition monitoring
Pest animal management	Occurrence of pest animals remains at or below levels estimated through baseline biodiversity assessments.	Native herbivores may pose a risk to the improvement of the Grassland offset area should they reach plague proportions. Control of pest animals within the Offset Area shall be undertaken in accordance with the Land Protection (Pest and Stock Route Management) Act 2002. When required, pest animals should be encouraged to move outside of the offset area through disturbance and nuisance activities such as noise and human presence. Anecdotal evidence (eg photos, written records) of pest animal presence and abundance should be collected.	
Limiting disturbance	The extent and condition of Natural Grassland TEC will be maintained or increased between each successive BioCondition assessment. The presence of at least 4 indicator native grasses, and an average of 10,800 tussocks per ha.	Disturbance of the vegetation and soil in the offset area is to be limited to that necessary to encourage improvement in condition and extent for the duration of the offset. This will be achieved by: • No further ground disturbance or clearing of the vegetation (i.e ploughing) except : o for maintenance of existing fire breaks and fencing o in areas of Buffel grass infestation where turning of the soil may assist in weed management by speeding up seed germination to then be eradicated. o for maintenance for existing roads and easements • Avoidance of pasture improvement activities • Minimisation of vehicle and machinery movement through the community • New firebreaks and fences may be installed provided that the new construction does not reduce the extent of the Grassland offset. • No deliberate introduction of non-endemic species • No use of fertiliser at locations where it could move into the offset area	
Fire management	Maintenance of appropriate controls to enhance biodiversity and reduce fuel loads. The occurrence of any fire in the offset area will be recorded.	To the extent practicable, fire is to be excluded from the Grassland TEC Offset Area, except for ecological burns. A low intensity fire may be permitted at intervals recommended by a qualified ecologist. Within 12 months from the date of this Offset Area Management Plan	

Biocondition assessments will make a determination of impact resulting from any fire.	coming into effect a member of the Rural Fire Service Brigade (RFSB) inspect the offset area to assess the suitability of the current and proposed firebreaks. Any recommendation for improvement will be implemented within 6 months from receipt of those recommendations, provided they do not contradict this OAMP. Stock may be grazed in the Offset Area to assist in fuel reduction.	

7.0 Monitoring and reporting on offset delivery

Condition 6c.vi of the Kemmis II and MRA approvals requires, as part of the plan to improve the baseline condition, a monitoring plan to be developed to assess the success of management activities. The monitoring must be statistically robust and must be able to quantify change in the condition of the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community. This should include, but not be limited to, control sites and periodic ecological surveys to be undertaken by a qualified ecologist. The monitoring plan is described in the OAMP, and includes:

- Quarterly checklist completed by Land Manager
- Photo point monitoring to be conducted biannually for first 2 years, then annually for next 5 years, then biennial for remaining duration of offset.
- BioCondition assessment(s) will be conducted at intervals not exceeding five years.

This monitoring program will contain a sufficient number of photopoints, BioCondition and EEM monitoring points to provide for a statistically robust assessment.

Condition 6c.viii of the Kemmis II and MRA approvals requires, as part of the plan to improve the baseline condition, a process to report to the DotE, the progress of management activities undertaken in the offset areas and the outcome of those activities, including identifying any need for improved management and activities to undertake such improvement. The reporting process is described in the OAMP, and includes:

- Formal reporting on all monitoring data and submission to the administering authority to occur at intervals not exceeding 5 years.
- Biocondition reporting to be undertaken as part of formal reporting process (i.e 5 yearly).

In addition, condition 10 in the approval documents requires that a report addressing compliance with all conditions in the approval be published on the website every 12 months.

8.0 Location and boundaries of Offset Areas

For the offset area to be afforded long term protection, as required in EPBC approval conditions, the Queensland Government requires that the OAMP include:

"a clear definition of the location and boundaries of the offset areas, through maps and/or textual descriptions as well as an accompanying shapefile".

This is provided within the OAMP.

9.0 Risks and risk management

On Dabin Holdings, the highest risks to the Offset Areas are pest plant invasions, over grazing, and uncontrolled fire. However, these threats will be effectively managed by the management actions above and through the further detail provided in the OAMP.

10.0 Conclusion

The Offset Areas proposed in this Biodiversity Offset Management Plan are:

- 3.2ha of "Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community"(stage 1 Kemmis II project)
- 13.8ha of "Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community" (stage II Kemmis 2 project)
- 125ha of "Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community"
- 65ha of "Natural grasslands of the Queensland Central Highlands and northern Fitzroy Basin Threatened Ecological Community"

The areas will be secured within 2 years of commencement of construction of each Project or Stage of Project using a Voluntary Declaration under the VMA and will be managed through an Offset Area Management Plan, which addresses the requirements of the EPBC Act Approvals:

- EPBC 2013/7025 for Kemmis II
- EPBC 2014/7272 for MRA

Upon such time as the offset areas reach remnant status and the offset outcomes have been achieved, the ecosystem condition information will be provided to the Queensland Herbarium for remapping to provide long term protection. At this same time, the BOMP and this OAMP will no longer apply.

Appendix 1 – Offset Area Management Plan

See separate document