APPENDIX D

Updated Soils Results

Department of Lands

Soil Conservation Service

SOIL TEST REPORT

Scone Research Centre

REPORT NO:	SCO09/217R1
REPORT TO:	C Richards GSS Environmental PO Box 907 Hamilton NSW 2303
REPORT ON:	Thirty three soil samples Boggabri Coal Mine
PRELIMINARY RESULTS ISSUED:	Not issued
REPORT STATUS:	Final
DATE REPORTED:	28 August 2009
METHODS:	Information on test procedures can be obtained from Scone Research Centre

TESTING CARRIED OUT ON SAMPLE AS RECEIVED

SR Young
(Laboratory Manager)

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Ph: 02 6545 1666, Fax: 02 6545 2520

SOIL AND WATER TESTING LABORATORY
Scone Research Service Centre

Report No: SCO09/217R1
Client Reference: C Richards
GSS Environmental
PO Box 907
Hamilton NSW 2303

Lab No	Method	P7B/1 Particle Size Analysis (%)					P9B/2	C1A/4	C2A/3	C5A/3 CEC & ex cation (me/100g)			Colour	
	Sample Id	clay	silt	f sand	c sand	gravel	EAT	EC (dS/m)	pH	CEC	Na	ESP	Dry	Moist
1	1-1	52	14	22	10	2	4	0.07	8.1	45.6	0.8	2	10YR4/2	10YR3/2
2	1-2	53	13	16	15	3	4	0.24	9.1	45.2	3.4	8	10YR5/3	10YR4/4
3	5-1	57	17	22	4	<1	3(1)	0.17	8.8	42.1	2.2	5	10YR4/4	10YR3/4
4	5-2	37	12	23	6	22	2(1)	0.89	9.0	39.7	7.8	20	7.5YR5/4	7.5YR3/4
5	6-1	14	12	32	25	17	8/3(2)	0.03	6.6	14.1	0.4	3	7.5YR5/3	7.5YR3/3
6	6-2	15	10	31	28	16	2(2)	0.03	6.7	14.2	0.5	4	7.5YR5/2	7.5YR3/2
7	6-3	32	11	26	21	10	2(3)	0.05	7.9	23.1	1.9	8	10YR6/3	10YR3/3
8	6-4	32	7	30	27	4	2(2)	0.38	9.6	26.7	5.1	19	7.5YR5/3	7.5YR4/4
9	7-1	7	13	34	19	27	8/3(2)	0.02	5.6	9.3	0.3	3	7.5YR5/3	7.5YR3/3
10	7-2	6	7	25	26	36	5	0.04	6.7	7.2	0.2	3	7.5YR7/2	7.5YR5/3
11	7-3	31	4	15	13	37	3(3)	0.13	8.6	29.9	2.9	10	5YR5/6	5YR4/6

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Lab No	Method	P7B/1 Particle Size Analysis (%)					P9B/2	C1A/4	C2A/3	C5A/3 CEC & ex cation (me/100g)			Colour	
	Sample Id	clay	silt	f sand	c sand	gravel	EAT	EC (dS/m)	pH	CEC	Na	ESP	Dry	Moist
12	8-1	14	12	34	35	5	8/3(1)	0.04	7.0	15.1	<0.1	<1	7.5YR5/2	7.5YR3/2
13	8-2	11	8	25	23	33	8/3(1)	0.05	6.8	11.2	0.4	4	7.5YR6/2	7.5YR3/3
14	8-3	46	7	14	9	24	2(3)	0.72	7.8	25.1	7.1	28	10YR6/3	10YR5/4
15	9-1	18	18	35	20	9	8/3(3)	0.03	5.9	9.8	0.4	4	7.5YR5/3	7.5YR3/3
16	9-2	42	16	27	13	2	2(2)	0.07	8.0	23.3	1.6	7	10YR6/2	10YR4/3
17	9-3	37	31	16	15	1	3(2)	0.11	8.6	24.1	2.6	11	10YR5/4	10YR3/4
18	10-1	15	12	41	30	2	8/3(1)	0.03	5.9	12.5	0.1	1	10YR4/4	10YR2/2
19	10-2	9	6	29	26	30	2(1)	0.05	5.7	7.5	0.9	12	7.5YR7.2	7.5YR4/3
20	10-3	26	1	12	34	27	3(2)	0.42	8.3	21.1	6.9	33	7.5YR6/4	7.5YR4/6
21	10-4	28	31	22	19	<1	3(3)	0.41	9.3	25.7	9.6	37	7.5YR6/3	7.5YR3/3
22	11-1	7	5	18	26	44	8/5	0.02	6.0	9.9	0.1	1	7.5YR5/3	7.5YR3/3
23	11-2	8	6	19	23	44	3(1)	<0.01	5.3	7.7	0.3	4	7.5YR7.3	7.5YR4/6

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SOIL AND WATER TESTING LABORATORY

Scone Research Service Centre

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Lab No	Method	P7B/1 Particle Size Analysis (%)					P9B/2	C1A/4	C2A/3	C5A/3 CEC & ex cation (me/100g)			Colour	
	Sample Id	clay	silt	f sand	c sand	gravel	EAT	EC (dS/m)	pH	CEC	Na	ESP	Dry	Moist
24	12-1	18	19	34	19	10	3(2)	0.03	6.3	11.1	0.2	2	10YR6/3	10YR4/4
25	12-2	15	20	36	20	9	3(2)	0.02	5.5	6.9	0.3	4	10YR7/2	10YR5/4
26	12-3	30	5	15	36	14	2(2)	0.18	8.1	16.6	1.8	11	10YR6/4	10YR4/6
27	13-1	12	6	19	30	33	8/5	0.13	7.6	25.9	0.3	1	10YR5/3	10YR3/2
28	13-2	17	8	22	32	21	3(1)	0.04	7.4	13.7	0.2	1	10YR5/2	10YR3/2
29	13-3	15	9	23	32	21	3(2)	0.02	7.4	9.5	0.2	2	10YR7/1	10YR4/2
30	13-4	22	5	15	35	23	3(2)	0.14	4.9	10.2	0.8	8	10YR6/3	10YR4/4
31	14-1	6	3	14	18	59	8/5	0.03	6.1	15.1	0.2	1	10YR5/4	10YR3/3
32	14-2	8	8	15	21	48	3(2)	0.01	4.9	6.2	0.2	3	7.5YR6/3	7.5YR4/4
33	14-3	10	0	11	54	25	3(1)	<0.01	5.5	12.9	0.5	4	5YR6/6	5YR4/6

SR Young

END OF TEST REPORT

APPENDIX E

Revised BioBanking Calculations

MEMO

Date:	16 March 2011
To:	Ben Eastwood, Hansen Bailey
From:	Alex Cockerill
Job no:	2117128C/Me_0140
Subject:	**Revised Biobanking Calculations for the Boggabri Coal Biodiversity Offset Strategy**

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A+ GRI Rating: Sustainability Report 2009

1. Introduction

This memo has been prepared in response to comments received from Department of Environment, Climate Change and Water (DECCW) in their letter dated 7 February 2011 (issue 13 & 14) following the public exhibition of the Environmental Assessment for the Continuation of Boggabri Coal Mine (the Project). Boggabri Coal submitted an EA to support a Major Project Application to the Department of Planning (DoP) in November 2010. The EA was accepted by DoP and subsequently went on public exhibition on 15 December 2010 to 7 February 2011. The EA includes a detailed Biodiversity Impact Assessment for the Project and a proposed Biodiversity Offset Strategy to mitigate and compensate for the removal of existing remnant vegetation located within the Project Boundary.

Additional surveys have been conducted within the proposed Biodiversity Offset properties while the EA for the Project was on public exhibition. As such the results have not been previously presented within the Biodiversity Offset Strategy (Parsons Brinckerhoff 2010a) (Parsons Brinckerhoff 2010c) or Biodiversity Impact Assessment (Parsons Brinckerhoff 2010b). The additional surveys were completed on the 'Therandra', 'Merriendi', 'Myall Plains', 'Mallee' and 'Wirrilah' properties collectively referred to in this report as the 'Strategic Corridor Offsets'.

While it is considered the information and assessments previously presented within the EA are adequate, this memo provides a revised Biobanking assessment that further justifies the Projects current commitments to meeting the 'no net loss' and 'Like for Like' DECCW principles in regards to biodiversity offsets. This memo outlines the methodology of the field survey, a summary of the key results and revised Biobanking calculations.

2. Methodology

The additional field surveys were undertaken from 25 November to 2 December 2010 and in January 2011 by Parsons Brinckerhoff (PB) and EnviroKey. Both flora and fauna surveys were undertaken and a summary of the methodology is provided below.

The surveys sought primarily to verify the preliminary vegetation surveys undertaken for the EA. These preliminary surveys used desktop searches, aerial photographic interpretation and helicopter aerial surveys over the Strategic Corridor Offsets to develop the Boggabri Coal Biodiversity Offset Strategy (Parsons Brinckerhoff 2010c). The level of field surveys completed for the Biobanking assessments of the offsets varied largely depending on property access, timing and project requirements. These surveys

generally consisted of vegetation mapping, selective sampling and limited quantitative site surveys in accordance with the Biobanking Operation Manual (Department of Environment Climate Change 2009a). Boggabri Coal has recently secured 'options' for the acquisition of the Strategic Corridor Offsets which has facilitated access to these properties to undertake additional ground surveys, the results of which are presented in this report.

The additional survey effort included in this report principally assessed the extent and condition of vegetation communities and potential flora and fauna habitat, with particular consideration given to species of conservation concern, such as Threatened and Migratory species or locally significant species.

2.1 Flora

The floristic diversity and possible presence of Threatened species was assessed using a combination of random meander and plot-based surveys in accordance with the Threatened *Biodiversity Survey and Assessment: Guidelines for Developments and Activities in NSW* (Department of Environment and Conservation 2004).

Random meander surveys are a variation of the transect type survey and were completed in accordance with the technique described by Cropper (Cropper 1993), whereby the recorder walks in a random manner throughout the site recording all species observed, boundaries between various vegetation communities and condition of vegetation. The time spent in each vegetation community was generally proportional to the size of the community and its species richness.

A number of representative vegetation plots/transects were surveyed in each vegetation zone throughout the Strategic Corridor Offsets.

2.2 Fauna

Two fauna surveys were undertaken one in November-December 2010 by Steve Sass from EnviroKey and the remainder in January 2011 by Parsons Brinckerhoff. The EnviroKey surveys involved diurnal bird surveys, herpetofauna surveys, Koala spot surveys and nocturnal spotlighting surveys.

The Parsons Brinckerhoff surveys involved terrestrial Elliot A trapping, terrestrial Elliot B trapping, nocturnal spotlighting surveys, opportunistic herpetofauna surveys, funnel and pit trapping, opportunistic diurnal bird surveys, Koala spot surveys, owl call playback surveys, motion detection camera, harp trapping, Anabat echolocation and nocturnal spotlighting.

3. Survey results

3.1 Vegetation communities

The additional field surveys have confirmed the presence of fourteen vegetation communities within the offsets. These include the following:

- Yellow Box - Blakely's Red Gum grassy woodland.
- White Box – White Cypress Pine grassy woodland.

- White Box – Narrow-leaved Ironbark - White Cypress Pine grassy open forest.
- Pilliga Box – Poplar Box – White Cypress Pine grassy open woodland.
- Weeping Myall open woodland.
- White Box – Narrow-leaved Ironbark - White Cypress Pine shrubby open forest.
- White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest.
- Silver-leaved Ironbark heathy woodland.
- Dwyer's Red Gum woodland.
- River Red Gum riverine woodlands and forests.
- White Box - Melaleuca riparian forest.
- Derived Native Grassland.
- Plains Grassland.
- Heathy shrublands on rocky outcrops of western slopes.

A description of each of these communities is provided in the EA and Biodiversity Offset Strategy (Parsons Brinckerhoff 2010a).

Table 3-1 below lists the vegetation communities that are commensurate with Threatened communities listed on either the*Threatened Species and Conservation Act 1995* (TSC Act) and/or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Table 3-1 Threat-listed vegetation communities identified within the offset sites

Vegetation community	TSC Act threat-listed community[1]	EPBC Act threat-listed community[2]
Yellow box – Blakely's Red Gum grassy woodland	White Box, Yellow Box, Blakely's Red Gum Woodland (EEC)	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC)
White Box – White Cypress Pine grassy woodland	White Box, Yellow Box, Blakely's Red Gum Woodland (EEC)	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC)
White Box – Narrow-leaved Ironbark - White Cypress Pine Grassy open forest	White Box, Yellow Box, Blakely's Red Gum Woodland (EEC)	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (CEEC)
Weeping Myall open Woodland	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray–Darling Depression, Riverina and NSW South western Slopes bioregions (EEC)	Weeping Myall Woodlands (E)
Plains Grassland	Native Vegetation on Cracking Clay Soils of the Liverpool Plains (EEC)	Natural grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Qld (CEEC).
Derived Native Grassland	White Box, Yellow Box, Blakely's Red	Not equivalent to any threat-listed

Vegetation community	TSC Act threat-listed community[1]	EPBC Act threat-listed community[2]
	Gum Woodland (Condition Class 4) (EEC)	community on the EPBC Act.

Notes 1 EEC = Endangered Ecological Community (*TSC Act*).

2 = CEEC = Critically Endangered Ecological Community (EPBC Act), E =Endangered Ecological Community (EPBC Act).

3.2 Condition of derived native grassland

Field surveys have identified that the derived native grasslands are in moderate condition, containing high numbers of native species, only moderate infestations of exotic species and some evidence of natural canopy regeneration. The majority of these grasslands are likely to meet the DECCW Box Gum Woodland condition class 3 and 4 (NSW National Parks and Wildlife Service 2002a). The moderate condition of these grasslands is further demonstrated by the presence of the Threatened species of plant *Digitaria porrecta* within derived native grassland areas of the 'Therandra' and 'Merriendi' offsets.

3.3 Threatened flora

Three separate populations of the endangered *Digitaria porrecta* (Endangered on both the TSC Act and EPBC Act) were located within derived grassland areas of the 'Therandra' and 'Merriendi' offsets. This species is known to be sensitive to significant disturbances and grazing (Department of Environment Conservation and Climate Change 2008). No other Threatened flora species were recorded within the biodiversity offsets.

3.4 Threatened fauna

The results of field surveys completed for the Biodiversity Offset Strategy (Parsons Brinckerhoff 2010a) and recent surveys within the Strategic Corridor Offsets have identified 16 Threatened species. These include the following;

Threatened microbats recorded

- Yellow-bellied Sheathtail Bat.
- Eastern Cave Bat.
- Little Pied Bat.

Threatened birds recorded

- Brown Treecreeper.
- Hooded Robin.
- Painted Honeyeater.
- Grey-crowned Babbler.
- Speckled Warbler.

- Diamond Firetail.
- Varied Sittella.
- Turquoise Parrot.
- Barking Owl.
- Masked Owl.
- Little Eagle.
- Little Lorikeet.

Threatened Mammals recorded

- Koala.

In addition to the recorded species potential habitat was recorded for an additional 15 threatened species. These include the following:

- Granite Thick-tailed Gecko.
- Spotted-tailed Quoll.
- Pale-headed Snake.
- Spotted Harrier.
- Pied Honeyeater.
- Black-necked Stork.
- Swift Parrot.
- Square-tailed Kite.
- Black-chinned Honeyeater.
- Regent Honeyeater.
- Large-eared Pied Bat.
- *Eastern Falsistrelle.*
- South-eastern Long-eared Bat
- Eastern Bent-wing Bat
- Squirrel Glider

Significantly these records include a breeding roost site for the Eastern Cave Bat. This was not recorded within the Project Disturbance Boundary.

4. Revised Biobanking assessments

The Biobanking Assessment Methodology and Credit Calculator was recommended by the DECCW and DoP as a mechanism for quantifying an appropriate level of ecological offset for any residual impacts from the Project.

Following the results of the recent field surveys it was considered appropriate that a revised Biobanking Assessment be completed that more accurately reflects the credits generated by the Strategic Corridor Offsets.

4.1 Revised Biobanking credits generated for Strategic Corridor Offsets

Further to the Biobanking assessment presented within the EA, additional detailed ground truthing of vegetation types and condition along with threatened species surveys have been completed in December 2010 and January 2011 throughout the Strategic Corridor Offsets (refer to **Section 2** and **3** above). These surveys have identified a number of new populations of Threatened species and revised the vegetation community distributions and condition.

To complete the revised Biobanking Assessment of the Strategic Corridor Offsets, a Biobanking Credit to Hectare matrix, developed and provided by the DECCW Biobanking Team, was utilised to estimate the potential credits. It is considered that given the absence of detailed Biobanking site surveys and data the application of the Credit to Hectare matrix is appropriate.

The Credit to Hectare matrix provides a very clear table of definitions for the assessment of landscape improvement, and vegetation condition (refer to Table 4-1 below).

Table 4-1 Definitions of Indicative landscape improvement and vegetation condition scales (DECCW 2009)

Landscape scale	
Large landscape improvement	Vegetation extent increases by more than 100 ha, contributing to improved connectivity. BioBank site is located adjacent to a very large remnant area.
Medium landscape improvement	Vegetation extent increases by 50 ha, contributing to some improved connectivity. Biobank site is located adjacent to a large remnant area.
Small landscape improvement	Vegetation extent increases by 10 ha, contributing to some improved connectivity. Biobank site is located adjacent to a small remnant area.
Condition scale	
Vegetation in very good condition	Current site value is 89 which is predicted to increase to 100.
Vegetation in moderate condition	Current site value is 58 which is predicted to increase to 96.
Vegetation in poor condition	Current site value is 18 which is predicted to increase to 36.

4.1.1 Revised assessment of vegetation condition

The previously estimated Biobanking calculations (Parsons Brinckerhoff 2010c) identified all areas of derived native grasslands as 'low condition' as determined by the Biobanking assessment methodology and/or the Credit to Hectare matrix provided in Table 4-1. The recent surveys have identified the condition of the majority of the derived grassland communities within the Strategic Corridor Offsets are considered to be of moderate condition with relatively high diversity of native understorey species (refer to Table 4-2 below).

Table 4-2 Justification for the revised vegetation condition class

Condition scale	Condition definition	'Therandra' and 'Merriendi'	'Myall Plains', 'Wirrilah'	'Mallee'
Vegetation in very good condition	Current site value is 89 which is predicted to increase to 100.	NA	NA	Remnant vegetation contains high degree of native diversity, minor exotic infestation and some evidence of light grazing and selective logging.
Vegetation in moderate condition	Current site value is 58 which is predicted to increase to 96.	Remnant vegetation contains moderate to high degree of diversity, minor exotic infestation and a history of grazing, partial clearing and logging. Derived grassland Contains moderate to high levels of native diversity, moderate levels of exotic infestations, some evidence of canopy regrowth, affected by past clearing and grazing without pasture improvement.	Remnant vegetation contains moderate to high degree of diversity, minor exotic infestation and a history of grazing, partial clearing and logging. Derived grassland Contains moderate to high levels of native diversity, moderate levels of exotic infestations, some evidence of canopy regrowth, affected by past clearing and grazing without pasture improvement.	Derived grassland. Contains moderate to high levels of native diversity, moderate levels of exotic infestations, some evidence of canopy regrowth, affected by past clearing and grazing without pasture improvement.
Vegetation in poor condition	Current site value is 18 which is predicted to increase to 36.	Cleared lands for intensive crop production, pasture improvement not used in credit calculations.	Cleared lands for intensive crop production, pasture improvement not used in credit calculations.	Cleared lands for intensive crop production, pasture improvement not used in credit calculations.

4.1.2 Revised assessment of landscape improvement

In addition to the changes identified in vegetation condition the Biobanking calculations have also applied a revised landscape assessment. The proposed Strategic Corridor Offsets are in close proximity to one another and as such will be managed accordingly. Therefore the revised Biobanking calculations, utilised two combined landscape assessments in accordance with the requirements of the Biobanking assessment methodology (Department of Environment Climate Change 2009a).

The two combined landscapes assessment areas include one for 'Therandra' and 'Merriendi' properties adjoining the Leard State Conservation Area and a second encompassing the 'Mallee' Myall Plains' and 'Wirrilah' properties linking the Nandewar range with the Leards SF.

The revised assessment of the appropriate landscape improvement value within the combined 'Therandra', 'Merriendi' and 'Myall Plains', Mallee and 'Wirrilah' properties is likely to meet the 'Large landscape improvement' (refer to Table 4-3).

Table 4-3 Justification for the revised combined landscape class

Condition classes for Large landscape Improvement	'Therandra' and 'Merriendi'	'Myall Plains', 'Wirrilah' and Mallee
Contributing to improved connectivity	This offset will extend and strength linkages between the Leard State Conservation Area and adjoining patches of remnant vegetation	This offset area will result in the restoration of a corridor linkage between Leard SF and Nandewar Range from currently 0 - >500 metre in width.
Vegetation extent increases by more than 100 ha	Yes, Will lead to an increase in the extant of vegetation by contributing over 371.1 of remnant vegetation and over 170.1 ha of Derived grassland to be rehabilitated.	Yes, Will lead to an increase in the extant of vegetation by contributing over 2816.8 ha of remnant vegetation and over 430 ha of Derived grassland to be rehabilitated.
BioBank site is located adjacent to a very large remnant area (>500 ha)	Site adjoins extensive areas (>1000ha) of remnant vegetation.	Site adjoins extensive areas (>5000ha) of remnant vegetation.

4.1.3 Summary of revised Biobanking calculation within Strategic Corridor offsets

The recent surveys and landscape assessment have been applied to a revised assessment of the potential Biobanking credits generated. The revised summary of credits generated for the Strategic Corridor Offsets is provided below in Table 4-4.

Table 4-4 Summary of strategic offset properties

Lot	DP	Property details	Property size (ha)	Area of Remnant vegetation (ha)	Credits generated for Remnant vegetation	Area of Derived Native Grassland (rehab)[1] (ha)	Credits generated for rehab of Derived Grassland	Total credits generated
56 12 13 15, 28, 29, 37	754924 754927 754927 754927	'Mallee' Myall Plains' and 'Wirrilah'	3555	2816.8	39,555	430	7,826	**47,381**
50 1	754948 726585	'Therandra' and	510.5	371.1	6754	170.1	3095	

Lot	DP	Property details	Property size (ha)	Area of Remnant vegetation (ha)	Credits generated for Remnant vegetation	Area of Derived Native Grassland (rehab)[1] (ha)	Credits generated for rehab of Derived Grassland	Total credits generated
Part Lot A Part Lot 55	358451 754948	'Merriendi'						
Revised Total			**4065.5**	**3187.9**	**46,309**	**600.1**	**10,921**	**57,230**
Previous Total			**4,065.5**	**3,148.4**	**45,588**	**415.3**	**5,025**	**50,612.7**
Increase			**0**	**40**	**721**	**185**	**5,896**	**6,617**

1 = Areas are based on the assessments completed to date and have not been ground truthed by detailed field surveys.

4.2 Revised Biobanking credit calculations for Red Flags

The results of the recent field surveys completed within the Strategic Corridor offsets have also identified additional species credits provided for the Red Flag threatened species populations of *Digitaria porrecta* and Little Eagle (refer to Table 4-5) and increased areas of the Red Flag vegetation communities associated with Box Gum Woodland (refer to Table 4-6 below).

Table 4-5 Summary of Revised BioBanking 'Red flag' species credits generated

Red Flag Species	Population size /habitat area ha	Potential Credits generated [1]
Digitaria porrecta	>250	2,500
Little Eagle	2,000	2,721
Total Credits		**5,221**

1= Estimate based on preliminary credit calculation determined for derived grassland pilot site and previous experience.

Table 4-6 Summary of Revised BioBanking 'Red flag' ecosystem credits generated

Vegetation types (Department of Environment Climate Change 2009b)	Strategic offsets	Red flag (Type)	Initial Ecosystem Credits estimated [1]	Revised Ecosystem Credits estimated [1]	Difference
White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions [NA226]	1,262.6	Over cleared, Threatened ecological community	13,914.4[2]	19,057[2]	+5,142.6

Vegetation types (Department of Environment Climate Change 2009b)	Strategic offsets	Red flag (Type)	Initial Ecosystem Credits estimated [1]	Revised Ecosystem Credits estimated [1]	Difference
Weeping Myall open woodland of the Darling Riverine Plains and Brigalow Belt South Bioregions (Benson27) [NA219]	3.1	Over cleared, Threatened ecological community	0	46.9	+46.9
Revised Total				**19,103.9**	**+5,189.5**

1= Estimate based on preliminary credit to hectare matrix and not derived from credit calculator.

2 = Estimate based on % vegetation type of total remnant vegetation within strategic offsets.

Incorporating the above additional credits generated, a revised summary of the Projects total high conservation value 'Red flag' requirements against those generated by the Boggabri Coal Biodiversity Offset Strategy is provided in Table 4-7 below.

Table 4-7 Summary of BioBanking 'Red flag' credits calculations

	Development requirements	Mine rehabilitation	Namoi River offset	Strategic offsets	Total Offset
Red Flag Ecosystem credits	49,989	13,010	19,914	19,057	51,981
Red Flag Species credits	67	NA	6,030	5,221	11,251
Total	50,056	13,010	25,944	24,278	63,232

In summary the specific ecosystem credit requirements for all but one of the 'Red flag' vegetation types have been met by the Boggabri Coal Biodiversity Offset Strategy (Parsons Brinckerhoff 2010a). It is recognised that if the specific ecosystem credit requirements for a 'Red flag' vegetation type could not be met locally, an equal, or higher conservation value vegetation type or threatened species should be used to demonstrate the 'better' conservation outcome.

Significantly the above table 4-7 demonstrates the consolidated Boggabri Coal Biodiversity Offset Strategy will meet the upfront Red flag credit requirements, even without the additional credits provided by the rehabilitation of the mine site.

4.3 Summary of Biobanking total credit calculations

The revised estimated total quantum of ecosystems and combined species credits required by the Biobanking Assessment Methodology (Department of Environment Climate Change 2009a) to offset the Projects impacts is provided below (refer to Table 4-8 below).

Table 4-8 Summary of BioBanking total credits requirements

	Development requirements	Mine rehabilitation	Namoi River offset	Strategic offsets	Total Offset	Difference
Total Ecosystem credits	97,909	17,190	37,280	57,230	**111,700**	+13,791
Total species credits	67	NA	6,030	5,221	**11,251**	+11,184
Total	97,976	17,190	43,310	62,451	**122,951**	+24,975

5. Conclusion

The results of recent information gathered during field surveys and landscape assessments within the Strategic Corridor Offsets have subsequently been incorporated within a revised estimation of Biobanking credits (table 4-8). These surveys have validated previous assessments of the Biodiversity Offset Strategy and furthermore identified additional Threatened species values and improvements in the previously identified condition of the derived native grasslands.

The credits generated by the revised assessment of the Strategic Corridor Offsets were determined to be 62,451 ecosystem credits. This is an increase of 6,617 ecosystem credits and 5,221 species credits from earlier calculations.

The credits generated by the Development were 97,976. The revised credit calculations including the discounting provided by post mine rehabilitation will generate a total of 111,700 ecosystem credits, leaving a residual difference of +13,791 ecosystem credits.

The revised assessment also indicated that the revised credit calculations will generate a combined total of 11,251 species credits for the Black-necked Stork, Eastern Cave Bat, Little Eagle and *Digitaria porrecta.* This will provide a residual total difference of +11,184 species credits.

When the potential species and ecosystem credits are combined the Boggabri Coal Biodiversity Offset Strategy, excluding discounting for mine rehabilitation, will meet the upfront total quantum of credits required by the Biobanking Assessment Methodology to offset the impacts of the Project. With the inclusion of the mine rehabilitation the Biodiversity Offset Strategy will provide an additional 17,190 ecosystem credits.

Yours sincerely

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