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Re: Rix's Creek Continuation Project – Ecological assessment of overburden dump locations

Dear Geoff

1 Introduction

Rix's Creek Continuation Project (RCCP) is currently progressing through the approval process, recently being assessed by the Independent Planning Commission (IPC). The Department of Planning and Environment (DPE) are administering recommendations of the IPC, including recommendation 16 which states:

that the applicant prepares a trade-off study assessing the benefits of removing the western overburden emplacement area against the potential environmental impacts associated with increasing the heights of the existing North Pit Dump and South Pit Dump. Any outcomes of the trade-off study, including an assessment of any environmental impacts, would need to be submitted and considered as part of the final assessment of the Project.

The Bloomfield Group are currently preparing a multi-disciplinary analysis of two alternative dump locations. This letter report provides a comparison of biodiversity impacts of the original EIS design verses two other proposed options. This will aid the decision making process regarding the biodiversity impact of each option balanced against other impacts or benefits from the alternate options considered.

1.1 Project understanding

1.1.1 Original design

Biodiversity was originally assessed for the RCCP using the BioCertification methodology based on the assumption that the Upper Hunter Strategic Assessment (UHSA) would eventuate (Eastcoast Flora survey 2015). Owing to uncertainty regarding the UHSA, further biodiversity assessments were undertaken under the Framework for Biodiversity Assessment method (FBA, OEH 2014), which is provided in the Revised Response to Submissions - Biodiversity (EMM 2018).

A total of 5,808 ecosystem credits were required under the FBA with an impact footprint requiring the clearance of 212.79 ha of native vegetation (refer to Figure 1 and 2). A detailed breakdown of the credit requirement is provided in Table 4.1. No species credit species were detected within the RCCP or were considered likely to occur; therefore no species credits were required.

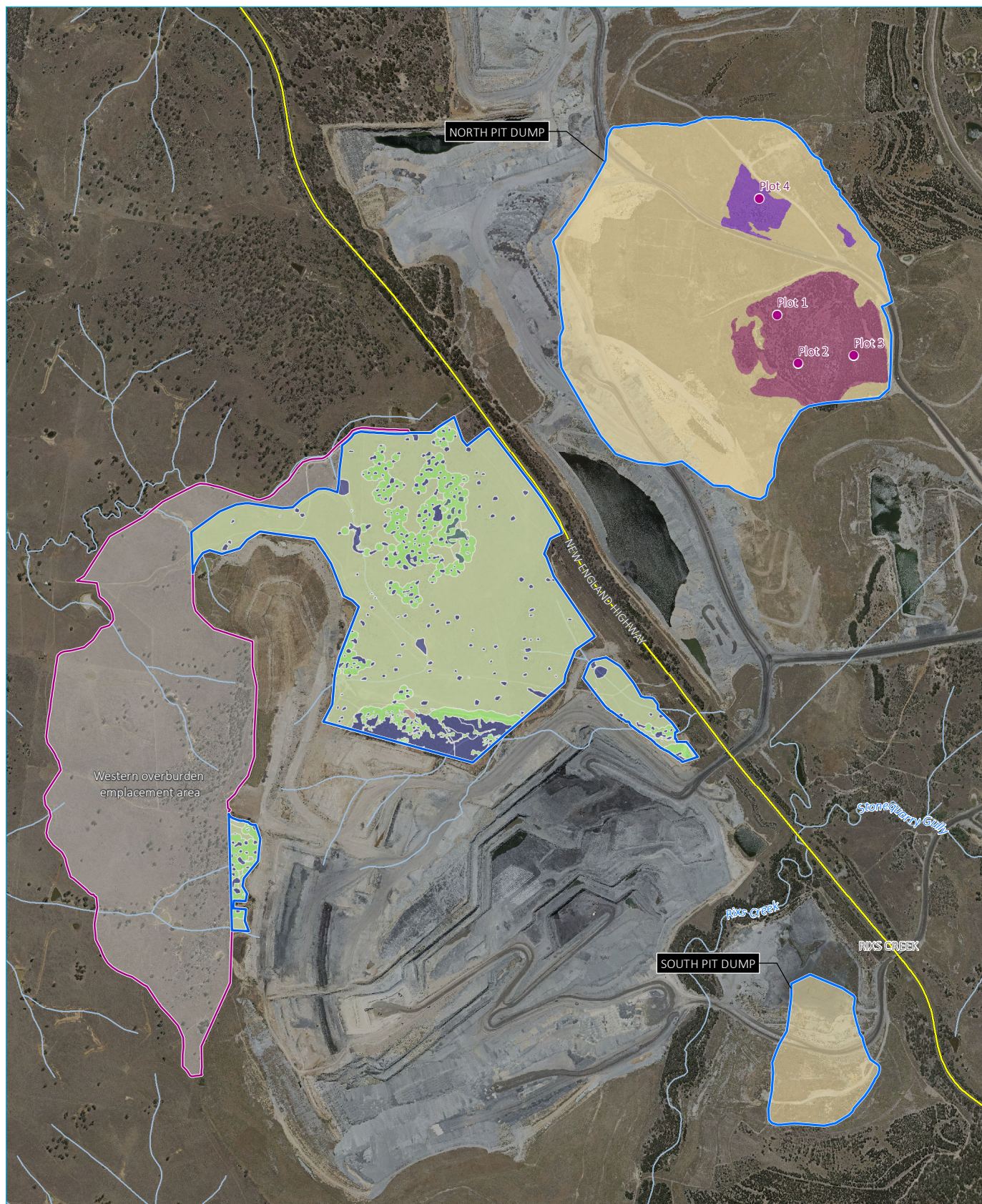
As part of the RCCP, an area was assigned to overburden storage; the western overburden emplacement area (refer to Figure 1). This is the area which will either be removed (option 1) or reduced (option 2). Note that option 1 and option 2 utilise dump areas on existing dumps and dump rehabilitated areas and that neither the South Pit dump or the North Pit dump areas were considered during the original design.

1.1.2 Option 1

Option 1 will remove the requirement for the western overburden emplacement area completely for dumping purposes but does include a small area for reshaping of an existing dump (refer to Figure 1). Instead overburden would be stored at the existing North Pit dump and South Pit dump, achievable by increasing the height of the dumps.

1.1.3 Option 2

Option 2 reduces the area required for the western overburden emplacement area, removing the southern portion (refer to Figure 1). The residual overburden would instead be placed on the South Pit dump as per option 1 with a smaller volume of overburden reporting to the North Pit dump, with avoidance of the most established planted vegetation, (in contrast to option 1).



Source: EMM (2018); DFSI (2017); LPMA (2011)

KEY

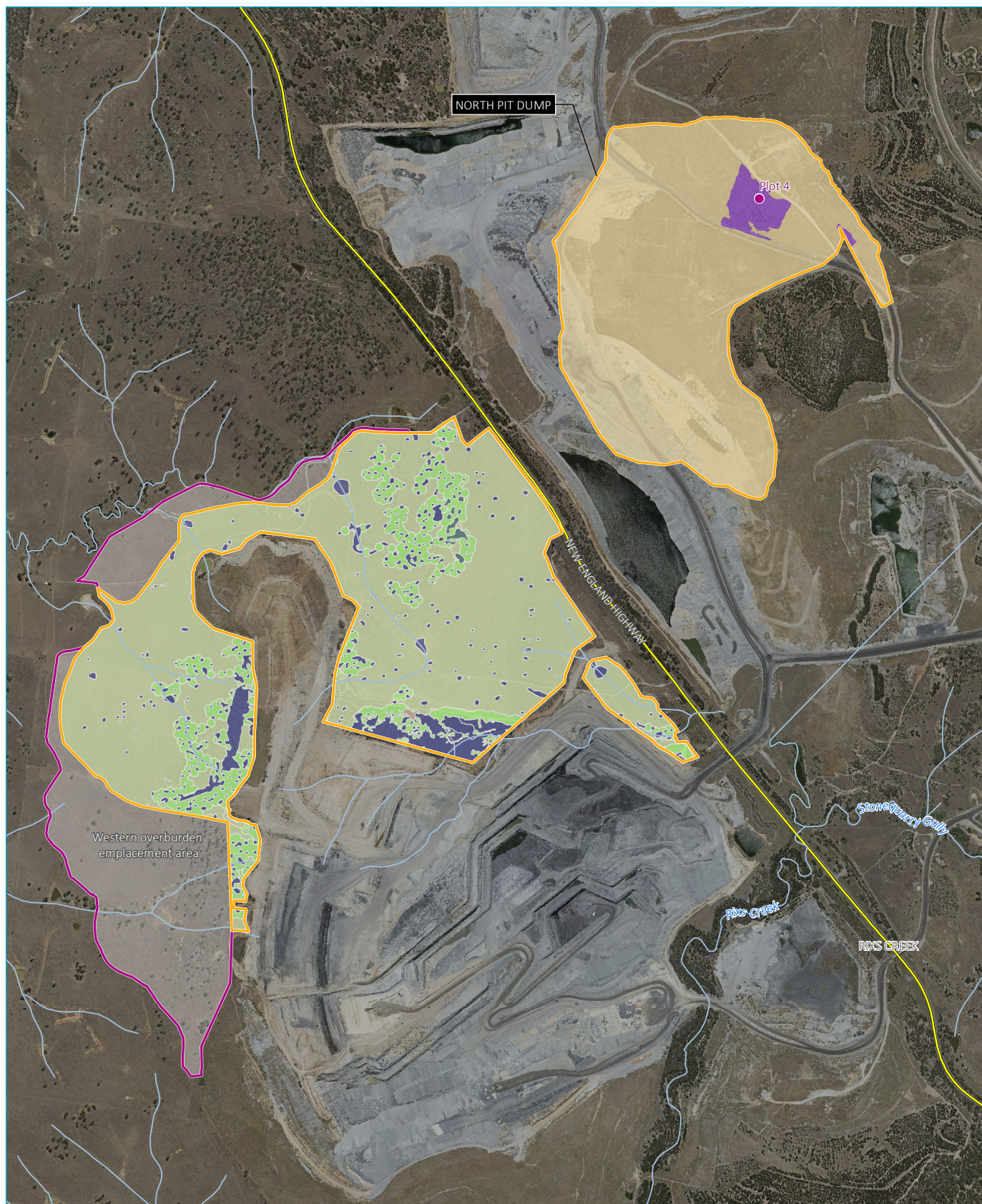
- Plot location
- Rix's Creek Continuation Project (original design)
- Option 1
- Main road
- Watercourse/drainage line

Plant community type

- Zone 2: PCT 1692 (Bull Oak grassy woodland)
- Zone 4: PCT 1605 (Narrow-leaved Ironbark - Native Olive shrubby open forest)
- Zone 5: PCT 1748 (Grey Box grassy open forest)
- Zone 7: PCT 1605 (Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter - derived grassland)
- Zone 8: PCT 1605 (Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter - other)
- Zone 9: PCT 2150/HU818 (Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter - moderate/good - established)
- Zone 10: PCT 2150/HU818 (Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter - moderate/good - young)
- Disturbed/Exotic

RCCP option 1 assessment and vegetation mapping

Rix's Creek Continuation Project
RCCP overburden option assessment - biodiversity
Figure 1



Source: EMM (2018); DFSI (2017); LPMA (2011)

KEY

- Plot location
- Rix's Creek Continuation Project (original design)
- Option 2
- Main road
- Watercourse/drainage line

Plant community type

- Zone 2: PCT 1692 (Bull Oak grassy woodland)
- Zone 4: PCT 1605 (Narrow-leaved Ironbark - Native Olive shrubby open forest)
- Zone 5: PCT 1748 (Grey Box grassy open forest)
- Zone 7: PCT 1605 (Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter - derived grassland)
- Zone 8: PCT 1605 (Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter - other)
- Zone 10: PCT 2150/HU818 (Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter - moderate/good - young)
- Disturbed/Exotic

RCCP option 2 assessment and vegetation mapping

Rix's Creek Continuation Project
RCCP overburden option assessment - biodiversity
Figure 2

2 Methods

2.1 Calculation of reduced impacts in western overburden emplacement area

A reduction of biodiversity impacts will occur as a result of removing the western overburden emplacement area completely (option 1) or reducing its extent (option 2). Initially the area of each vegetation zone was calculated for option 1 and option 2 using the vegetation mapping from the previous FBA assessments. The corresponding percentage credit reduction was calculated for both option 1 and 2.

2.2 Calculation of impacts at the north and south pit dump area

EMM senior ecologist, Eugene Dodd, conducted a site assessment on 25th October 2018. Vegetation was mapped using Collector for ArcGIS (Esri Australia), with a combination of walked location streaming and aerial imagery. Once vegetation was mapped, floristic plots and transects were undertaken using Biobanking Assessment Method (BBAM) (OEI 2014). This maintains the same method used for the original RCCP FBA assessment, therefore results will be most comparable between the various options. In order to complete the online calculator an additional plot was required for each zone. An average of the plot data was taken to complete the credit estimate. The plot and transect data were added to the online BBAM calculator, using the same parameters as the original FBA assessment, again to ensure comparability between the options.

Plot data is provided in Appendix A and Appendix B. No targeted surveys were undertaken for threatened fauna and flora species; however, habitat types were recorded to support an assessment of potential habitat for threatened species.

3 Results

This section outlines the result of the field survey from the North pit dump and the South pit dump area. A total of 4 plot and transects were completed within planted native vegetation of the North pit. No plots and transects were completed in the South Pit as the vegetation is largely exotic. Refer to Figure 1, Figure 2, Appendix A and Appendix B for the detailed plot and transect data.

3.1 North Pit Dump

3.1.1 Exotic grassland

The majority of the North pit dump (129.3ha) consists of exotic grassland dominated by Rhodes Grass (*Chloris gayana*), Narrow-leaved Cotton Bush (*Gomphocarpus fruticosus*) and Galenia (*Galenia pubescens*), refer to Figure 1. Native flora species are largely limited to cosmopolitan grasses such as Couch (*Cynodon dactylon*) and Sickle Wattle (*Acacia falcata*). Given the dominance of exotic flora species, and lack of suitable habitat for threatened species, the exotic grassland areas will not require offsetting. No further assessment for these areas is required.

3.1.2 Planted Native Rehabilitation

A total of 24 ha of planted native woodland occurs within the North pit dump. This was split into two zones reflecting the age of the plantings. A continuous patch of woodland of approximately 20 ha was planted approximately 20 years ago, with two smaller patches estimated at 5- 10 years, occupying 4 ha. A total of four floristic plots were conducted, three within the mature planted area, and one plot in the younger planted area as shown in Figure 1.

The mature plantings canopy is dominated by Spotted Gum (*Corymbia maculata*), Forest Red Gum (*Eucalyptus tereticornis*) and Narrow-leaved Ironbark (*Eucalyptus crebra*), with Swamp Oak (*Casuarina glauca*) present in some patches. The midstory is typically sparse with Sydney Golden Wattle (*Acacia longifolia subsp. longifolia*) and Sickle Wattle the dominant species. The ground cover was fairly sparse with mixture of exotic and native species present. Native species included Barbed Wire Grass (*Cymbopogon refractus*), Climbing Saltbush (*Einadia nutans subsp. linifolia*) and Purple Burr-daisy (*Calotis cuneifolia*). Prevalent exotic species included Galenia.

Given that the planted area is on a rehabilitated mined area, a Plant Community Type (PCT) was assigned based on the likely original vegetation types. This is the approach typically advised by OEH, rather than trying to assign the PCT based on the planted vegetation present.

The most abundant vegetation type mapped close to the North pit dump area is MU27 – Central Hunter Ironbark – Spotted Gum – Grey Box open forest. This vegetation mapping unit precedes PCTs, however the most appropriate is considered PCT 2150 Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter (HU818), given it shares a similar canopy composition and other landscaper attributes to MU27.

3.2 South Pit Dump

The south pit dump is composed of a tailing dam and spoil dumps which are yet to be rehabilitated. Vegetation is dominated by exotic grasses such as Rhodes Grass and exotic forbs such as Narrow-leaved Cottonbush. This area will not require offsets under the FBA given that the vegetation is dominated by exotic species and no habitat for species credit species was identified.

3.3 Fauna and Flora Habitat

The field survey did not identify any habitat which is likely to support threatened species. The relatively low floristic diversity and forest structure within the planted woodland reflects that most species will have colonised from areas outside of the rehabilitation and reduces the likelihood of threatened flora species being present, given the lack of any historically occurring seedbank.

The habitat for threatened fauna is also considered of low quality due to the relatively low age of the rehabilitation, with a lack of hollow bearing trees, fallen timber and a well-developed midstory and ground cover.

Several ponds were recorded within the North pit dump, which have the potential to be suitable habitat for the Green and Golden Bell Frog (*Litoria aurea*). The likelihood of the species occurring is very low for similar reasons as given in the original RCCP assessment and expert report; that the central/upper hunter Green and Golden Bell Frog populations are functionally extinct and there are no known populations within dispersal distance of RCCP. There is no chance of any relict Green and Golden Bell Frog populations within the rehabilitation areas given the complete disturbance to the original habitats.

For the purposes of this assessment it is assumed that no species credit species are likely to occur within either North or South Pit dump areas.

4 Impact assessment

The original design requires the highest offset quantum (5,808 credits) followed by Option 2 (4,428 credits, 24 % reduction). Option 1 has the least biodiversity impact, with 3,824 credits generated or a 34 % reduction in the overall credit requirement compared to the original design (refer to Table 4.1).

One of the largest drivers of the change is related to native grasslands. All the grassland within the original design is considered native and generates a substantial portion of the offset credit requirement. Reduction/removal of the western overburden area therefore leads to a direct reduction in the number of credits required. Conversely all the unwooded areas within the North and South pit dump areas are exotic grassland or bare ground, therefore a substantial area of the dump sites are not considered native vegetation and do not require offsets. All the offsets generated in the North pit dump area are related to the planted woodland area. Therefore, to minimise biodiversity impacts overburden should be prioritised in existing cleared and disturbed areas within the North and South pit dump areas.

No threatened species credits were generated within the original design area and it is unlikely that any threatened species credits would be required for either the North or South pit dump areas; therefore, threatened species habitat is unlikely to be a determining factor in selecting the preferred overburden dump option.

Table 4.1 Credit requirement (FBA) comparison for the original design and option 1 and 2

Vegetation zone details	Original design		Option 1		Option 2	
	Vegetation zone area(ha)	Credits required under FBA	Vegetation zone area(ha)	Credits required under FBA	Vegetation zone area(ha)	Credits required under FBA
HU812_Moderate/Good_Zone 1: Forest Red Gum grassy open forest on floodplains of the lower Hunter	0.22	13	0	0	0	0
HU906_Moderate/Good_Zone 2: Bull Oak grassy woodland of the central Hunter Valley	0.1	4	0.1	4	0.1	4
HU819_Moderate/Good_Zone 4: Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter	17.62	872	10.45	518	15.16	750
HU962_Moderate/Good_Zone 5: Grey Box grassy open forest of the Central and Lower Hunter Valley	0.76	28	0.76	28	0.76	28
HU819_Moderate/Good_derived grassland_Zone 7: Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter	164.58	4,057	78.70	1,940	116.78	2,879
HU819_Moderate/Good_other_Zone 8: Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter.	29.5	834	15.1	426	22.87	647
*HU818 Moderate/good_established_Zone 9: Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter	-	-	20.17	788	-	-
*HU818 Moderate/good_young_Zone 10: Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter	-	-	3.96	120	3.69	120
Disturbed/exotic	-	-	105.13	0	97.81	0
Total	212.79	5,808	234.37	3,824	257.17	4,428

Notes: *represents the additional offsets within North pit dump area

5 Conclusion

This assessment has been undertaken using the Framework for Biodiversity Assessment method as provided in the Revised Response to Submissions and allows the direct comparison of biodiversity impacts for overburden emplacement option 1 and option 2 compared with the RCCP submitted EIS case.

Of the three overburden footprints and alternatives considered, option 1 has the lowest credit requirement and by association the lowest biodiversity impact. A 34 % reduction of credits is achieved compared to the original design. Option 2 results in a 23 % reduction of credits compared to the original EIS design

Yours sincerely

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References

Biodiversity Assessment Method, Office of Environment and Heritage, 2016, Section 6.7 6.7 of the NSW Biodiversity Conservation Act 2016.

Eastcoast Flora Survey 2015, *Ecology Report for the Continuation of Rix's Creek Mine, Singleton LGA, Revision 4.4*. Prepared by Eastcoast Flora Survey for Rix's Creek Pty Ltd, October 2015 (the Project Ecology Assessment

EMM Consulting (2018), Report Title, [ReportSubTitle1], Prepared for Client Name

Framework for Biodiversity Assessment (OEH 2014) NSW Biodiversity Offset Policy for Major Projects.

Appendix A

Flora species and cover abundance recorded within the 20 x 20 m plots

FBA Plot Data

Family	Scientific Name	Common Name	Percentage cover and abundance							
			Plot 1	Plot 1	Plot 2	Plot 2	Plot 3	Plot 3	Plot 4	Plot 4
			Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'
Brassicaceae	<i>*Rapistrum rugosum</i>	Turnip Weed			1	5				
Aizoaceae	<i>*Galenia pubescens</i>	Galenia	3	100	40	500				
Apocynaceae	<i>*Gomphocarpus fruticosus</i>	Narrow-leaved Cotton Bush			1	10				
Asteraceae	<i>*Bidens pilosa</i>	Cobblers Pegs			1	20	1	20		
Asteraceae	<i>*Senecio madagascariensis</i>	Fireweed	10	200	3	50	1	30	1	20
Asteraceae	<i>*Sonchus oleraceus</i>	Common Sowthistle					1	1		
Brassicaceae	<i>*Lepidium bonariense</i>	Argentine Peppergrass	1	30	1	5				
Chenopodiaceae	<i>*Chenopodium album</i>	Fat Hen	2	50						
Malvaceae	<i>*Sida rhombifolia</i>	Paddy's Lucerne	10	400	5	100	5	80	1	30
Plantaginaceae	<i>*Plantago lanceolata</i>	Lamb's Tongues	1	10	1	20			1	10
Poaceae	<i>*Briza minor</i>	Shivery Grass	1	1						
Poaceae	<i>*Chloris gayana</i>	Rhodes Grass	50	500	10	300	1	10	30	200
Poaceae	<i>*Eragrostis pilosa</i>	Paddock Lovegrass			5	10				
Primulaceae	<i>*Lysimachia arvensis</i>	Scarlet Pimpernel	1	10	1	30				
Rubiaceae	<i>*Richardia humistrata</i>	Brazilian Whitlow			1	10				
Solanaceae	<i>*Solanum nigrum</i>	Blackberry Nightshade					1	5		
Fabaceae - Mimosoideae	<i>Acacia falcata</i>	Sickle Wattle							1	1
Fabaceae - Mimosoideae	<i>Acacia longifolia subsp. longifolia</i>	Sydney Golden Wattle	5	8					2	2
Fabaceae - Mimosoideae	<i>Acacia paradoxa</i>	Kangaroo Thorn							1	1
Poaceae	<i>Aristida ramosa</i>	Purple wiregrass			1	10			1	10
Chenopodiaceae	<i>Atriplex semibaccata</i>	Creeping Saltbush	3	100			15	100		
Asteraceae	<i>Calocephalus citreus</i>	Lemon Beauty-heads			1	16	2	40		
Asteraceae	<i>Calotis cuneifolia</i>	Purple Burr-daisy	1	15	1	15	1	15		

FBA Plot Data

Family	Scientific Name	Common Name	Percentage cover and abundance							
			Plot 1	Plot 1	Plot 2	Plot 2	Plot 3	Plot 3	Plot 4	Plot 4
			Cover	Abund'	Cover	Abund'	Cover	Abund'	Cover	Abund'
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak			30	30				
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	Poison Rock Fern	1	5	1	5	1	20		
Poaceae	<i>Chloris truncata</i>	Windmill Grass					1	20		
Commelinaceae	<i>Commelina cyanea</i>	Scurvy Weed			1	4				
Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum	30	20	10	25	10	20	5	3
Crassulaceae	<i>Crassula sieberiana</i>	Australian Stonecrop	1	40	1	50				
Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass	1	5	1	30	1	30		
Poaceae	<i>Cynodon dactylon</i>	Couch	1	50	1	2				
Cyperaceae	<i>Cyperus gracilis</i>	Slender Flat Sedge			1	5	1	20		
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed			1	5				
Chenopodiaceae	<i>Einadia nutans</i> subsp. <i>linifolia</i>	Climbing Saltbush	1	35	1	40	10	50		
Chenopodiaceae	<i>Einadia nutans</i> subsp. <i>nutans</i>	Climbing Saltbush			1	30				
Chenopodiaceae	<i>Enchylaena tomentosa</i>	Ruby Saltbush	1	15	1	40	10	100		
Scrophulariaceae	<i>Eremophila debilis</i>	Winter Apple			1	1			1	5
Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	3	2			5	10	1	1
Myrtaceae	<i>Eucalyptus fibrosa</i>	Red Ironbark	1	2						
Myrtaceae	<i>Eucalyptus tereticornis</i>	Forest Red Gum	3	5			20	30	30	30
Fabaceae - Faboideae	<i>Glycine tabacina</i>	Variable Glycine					1	2		
Oxalidaceae	<i>Oxalis perenans</i>	Native Oxalis	1	10	1	20	1	10		
Total Exotic Species			9		12		6		4	
Total Native Species			14		17		14		8	
Total Species			23		29		20		12	

Notes: * Indicates exotic species, where species were recorded within the plot percentage cover abundance

Appendix B

Vegetation transect data recorded within the 20 x 20 m plots

Vegetation transect data recorded within the 20 x 20 m plots

PlotName	Zone	NPS	NOS	NMS	NGCG	NGCS	NGCO	EPC	NTH	OR	FL	Easting	Northing	Zone
P1	mod_gd	14	23.7	9.7	10	0	24	32	0	1	0	324405	6402039	56H
P2	mod_gd	17	36	0	5	0	12	28	0	1	0	324482	6401859	56H
P3	mod_gd	14	15	0	0	0	28	24	0	1	0	324688	6401888	56H
P4	mod_gd_other	8	18.4	0	0	0	2	48	0	1	0	324339	6402469	56H
P5 (average of 1-3)	mod_gd	15	24.9	3.23	5	0	21.3	28	0	1	0	324688	6401888	56H
P6 (replicate of P4)	mod_gd_other	8	18.4	0	0	0	2	48	0	1	0	324339	6402469	56H