FROM:	Nick Sibbel
DATE:	28 March 2017
SUBJECT:	Valuation of Environmental Offsets for the Cooljarloo West Project via EPBC Offsets Tool

Offsets for Tronox's Cooljarloo West Titanium Minerals Project have been assessed utilising the Commonwealth Offsets calculator tool by considering the value of mine rehabilitation as well as the value of the proposed offset relative to the loss of value attributable to the impact.

Rehabilitation has been valued by entering it into the tool as an offset utilising the values set out in Table 1. This assigns a Net Present Value of 476 ha to rehabilitation which is approximately 32% of the impact (refer to Attachment 1).

To offset the impact of clearing up to 1890ha of vegetation, primarily on Carnaby's cockatoo, Tronox propose to provide funds to purchase 2.7ha for every hectare cleared. Funds will include:

- Between $500 per hectare to purchase property
- Allowance (of 6% of purchase price) for settlement and initial management costs (Develop Management plans etc) at purchase ($30/ha)
- Management cost of $10per hectare per year for 15 years ($150/ha)

This results in a total estimated costs of $1836/hectare cleared.

This offset has been valued by entering it into the tool as an offset utilising the values set out in Table 2. This assigns a Net Present Value of 1043 ha to rehabilitation which is approximately 69% of the impact (Refer to Attachment 2).

Together the Mine Rehabilitation and proposed property acquisition offsets more than 100% of the proposed impacts.

References:

EPBC Act environmental offsets policy and Offsets Assessment Guides (xls Calculation tool) Department of Sustainability, Environment, Water, Population and Communities, 2012. Available at http://www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy)

Table 1: Values applied in EPBC Offsets Calculator Tool: Mine Rehabilitation

Attribute	Value	Comment
Impact Area of habitat	1890 ha	The significant residual impact is associated with clearing of foraging habitat for Carnaby's Cockatoo. As such calculations are on an area basis and relate to the maximum limit of clearing (approval limit). Tronox propose to scale the offset provided by the area actually cleared. 30% will be provided up front, with the remainder paid annually as clearing advances beyond 30%.
Impact Habitat Quality	8	The condition of the area is excellent to pristine. It is foraging habitat only. There are no nearby nesting/breeding sites.
Offset Area of Proposed offset	1890a	The area rehabilitated will be equivalent to the area cleared.
Time horizon (years): Time over which loss is averted	20	Rehabilitation results in permanent – self sustaining vegetation
Time horizon (years): Time until ecological benefit	15	From mining to completion of rehabilitation works is on average 6 years Rehabilitation then provides substantive value as foraging habitat within 7-9 years following completion of works
Start Area (ha)	1890	The area rehabilitated will be equivalent to the area cleared
Start Quality	0	A mined area has no habitat value for Carnaby's cockatoo
Risk of loss without offset	99%	As this is considering rehabilitation of the mined area as an offset the risk of loss is certain, and future quality 0, without the offset as the ability of a mined area to self-repair (without land forming and rehabilitation) to useful foraging habitat is negligible for the vast proportion of areas.
Future Quality without offset	0	
Risk of loss with offset	20%	
Future Quality with offset	5	Experience in rehabilitating similar areas at the existing Cooljarloo Mine show that rehabilitation returns a significant proportion of taxa Carnaby's forage on. However, densities of relevant taxa generally site in the bottom quartile of those found in similar (target) undisturbed vegetation groups. Commensurately, the quality of rehabilitation is rated 5.
Confidence in results	80%	Tronox has considerable experience and demonstrative evidence for the outcomes achieve in rehabilitation undertaken at the existing and adjacent Cooljarloo Mine.

Table 2: Values applied in EPBC Offsets Calculator Tool: Purchase of Habitat

Attribute	Value	Comment
Impact Area of habitat (ha)	1890	The significant residual impact is associated with clearing of foraging habitat for Carnaby's Cockatoo. As such calculations are on an area basis and relate to the maximum limit of clearing (approval limit). Tronox propose to scale the offset provided by the area actually cleared. 30% will be provided up front, with the remainder paid annually as clearing advances beyond 30%.
Impact Habitat Quality	8	The condition of the area is excellent to pristine. It is foraging habitat only. There are no nearby nesting/breeding sites.
Offset Area of Proposed offset (ha)	5103	The area purchased will be equivalent to 2.7 times the area cleared (1890ha).
Time horizon (years): Time over which loss is averted	20	The land will be purchased and ceded to the conservation estate as such the value added by the offset is considered permanent.
Time horizon (years): Time until ecological benefit	5	It is expected a delay of up to 5 yrs may occur between the purchase, protecting, and implementation of the management measures will result in a benefit of improved habitat
Start Area (ha)	4347	The area of habitat to be purchased
Start Quality	7	The value of the habitat purchased is expected to be moderate to high
Risk of loss without offset	33%	It is considered that a 33% chance that the area will be lost or degraded within the next 20yrs due to: • clearing – unlikely but possible • inappropriate fire management – likely • grazing • disease spread (Phytophthora dieback)
Future Quality without offset	6	If the site is not protected and not lost, it is likely that the site will slightly degrade in quality due to lack of protection or management.
Risk of loss with offset	10%	With offset in place there is lowering in the risk of loss due to additional management and protection put in place. There is an allowance within the proposed offset to the development of management plan for the site, and to undertake some initial works (e.g. fencing, weed control, fire management) to improve / enhance the site by halting or managing degrading processes and then for ongoing management over a specified period (10-15yrs). This will not only lower the risk of loss but also slightly improve the quality of the site.
Future Quality with offset	8	There is an allowance within the proposed offset to the development of management plan for the site, and to undertake some initial works (e.g. fencing, weed control, fire management) to improve / enhance the site by halting or managing degrading processes and then for ongoing management over a specified period (10-15yrs).
Confidence in results	80% 70%	There is high confidence in being able to purchase and protect an appropriate area of habitat. There is similarly high, but slightly lower, confidence in being able to achieve an increase of one unit is quality through proposed protection and management actions.

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Carnaby's Cockatoo
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community Clear row	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat Clear row	Yes		Area	1890	Hectares	
			Quality	8	Scale 0-10	
			Total quantum of impact	#####	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees Clear row	No					
Condition of habitat Change in habitat condition, but no change in extent Clear row	No					
Threatened species						
Birth rate e.g. Change in nest success Clear row	No					
Mortality rate e.g Change in number of road kills per year Clear row	No					
Number of individuals e.g. Individual plants/animals Clear row	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset Future area without offset (adjusted hectares)	0.0	Risk of loss (%) with offset Future area with offset (adjusted hectares)	0.0									
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)										
Threatened species habitat																					
Area of habitat	Yes	1512.00	Adjusted hectares	1890	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	1890	Risk of loss (%) without offset Future area without offset (adjusted hectares)	99% 18.9	Risk of loss (%) with offset Future area with offset (adjusted hectares)	20% 1512.0	1493.10	80%	1194.48	940.95	476.80	31.53%	No		
					Time until ecological benefit	15	Start quality (scale of 0-10)	0	Future quality without offset (scale of 0-10)	0	Future quality with offset (scale of 0-10)	5	5.00	80%	4.00	3.34					
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	1512	476.80	31.53%	No	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Attachment 2 Valuation of Offset – Purchase and enhance (through management) Carnaby's habitat / Kwongan heath/woodlands

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Carnaby's Cockatoo
EPBC Act status	endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

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

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community Clear row	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat Clear row	Yes		Area	#####	Hectares	
			Quality	8	Scale 0-10	
			Total quantum of impact	#####	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees Clear row	No					
Condition of habitat Change in habitat condition, but no change in extent Clear row	No					
Threatened species						
Birth rate e.g. Change in nest success Clear row	No					
Mortality rate e.g Change in number of road kills per year Clear row	No					
Number of individuals e.g. Individual plants/animals Clear row	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	No				Risk-related time horizon (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset										
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0									
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)										
Threatened species habitat																					
Area of habitat	Yes	1512.00	Adjusted hectares	5103	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	5103	Risk of loss (%) without offset	33%	Risk of loss (%) with offset	10%	1173.69	80%	938.95	739.66	1042.68	68.96%	No		
									Future area without offset (adjusted hectares)	3419.0	Future area with offset (adjusted hectares)	4592.7									
					Time until ecological benefit	5	Start quality (scale of 0-10)	7	Future quality without offset (scale of 0-10)	6	Future quality with offset (scale of 0-10)	8	2.00	70%	1.40	1.32					
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	1512	1042.68	68.96%	No	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**