

Hillside Copper Mine

Mining Lease Proposal Response Document

21 February 2014

Final

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Appendix List

#	Response Title	Description	File Type	Confidential
2	Air Quality	Caterpillar Haul Road Design and Management	PDF	
4	Air Quality	Dispersion Modelling Update	PDF	
5A	Air Quality	Design of Haul Roads – Kaufman Ault	PDF	
5B	Air Quality	Design of Haul Roads – Thompson Visser	PDF	
5C	Air Quality	Waste Rock Characterisation Test Work Phase 1	Excel Spreadsheet	
5D	Air Quality	QLD Rainwater Sampling Procedure	PDF	
5E	Air Quality	Eurofins Accreditation	PDF	
7	Closure	Hydrogeological Summary Report	PDF	
18A	Geochemistry	Hillside Mineral Resource Statement	PDF	Y*
18B	Geochemistry	AMD Test Work Phase 2	PDF	
18C	Geochemistry	Summary of Ore Characterisation Study	PDF	Y*
21	Geology	Mineral Identification Report	PDF	
22	Geology	Figure 5.16-1 of the MLP	PDF	
23A	Geology	ASX and Media Release: 28 June 2013	PDF	
23B	Geology	12 Year Reserve Pit: Resource Underground	PDF	Y*
24	Geology	Geology Database: 6 June 2013	Compressed (zipped) Folder) - Excel Comma Separate Values Files	Y*
33	Noise	Noise Memo: Annoying noise character penalty	PDF	
36	Radiation	Hillside Production Schedule	Excel spreadsheet	Y*
37	Radiation	Uranium in Block Model at 80ppm and 200ppm	Compressed (zipped) - JPEG	Y*
38	Radiation	Radiation Dose Assessment Jan 2014	PDF	
39	Radiation	Baseline Radiological Assessment	PDF	
43A	Soil	Antamina's Copper and Zinc Concentrate Pipeline	PDF	
43B	Soil	Ramu NiCo Long Distance Pipeline Operation	PDF	
43C	Soil	Slurry Pipeline System: Simulation and Validation	PDF	
49	TSF	PFS TSF Design: Independent Review Report	PDF	
68	Water	Exploration Water Management Plan	PDF	
137	Geology	Fibrous Materials: HSE Cert of Analysis	PDF	
145	Native Vegetation	Acacia Rhetinocarpa: EPBC Referral	PDF	
150	Noise	Noise Memo: Noise Emissions from WRDs	PDF	

* These supporting appendices provided by Rex contain information that the broader market does not possess and are commercial in confidence. This information has been provided to the State Government for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent.

INTRODUCTION

The Mining Lease Proposal and Management Plan (MLP) for the proposed Hillside Copper Mine (Hillside) was formally submitted for assessment on 26 August 2013 and placed on public exhibition. The call for public submissions was made for a period of 6 weeks from 12 September to 24 October, and subsequently extended by a further two weeks ending on 8 November 2013. This was the formal consultation held by Department of Manufacturing, Innovation, Trade, Resources and Energy (DMITRE). During this time, it was available for viewing electronically via the South Australian Government's DMITRE website with a link on Rex Minerals Ltd (Rex) website. Hard copies of the MLP were available for viewing at:

- Rex's offices in Adelaide and Ardrossan.
- Three Yorke Peninsula District Council offices; Maitland, Minlaton and Yorketown.
- DMITRE's Adelaide office.

Submissions on the MLP were sought through the local paper, The Yorke Peninsula Country Times along with The Advertiser and the Government Gazette. Direct contact with the stakeholders during the eight week period included:

- Three Community Information Sessions at Kadina, Minlaton and Ardrossan to about 200 attendees on Sunday 3 November 2013 on the Yorke Peninsula.
- 15 site tours for the general public.
- 12 meetings conducted with special interest groups.

This Response Document to DMITRE will directly contribute to the final SA Government assessment of the Rex proposal, the decision whether or not to grant the Minerals and Extractive Minerals Leases and two Miscellaneous Purpose Licences, and if so, any conditions that would be appropriate for those leases and licences.

A total of 237 (220 without duplicated submissions) written submissions were received by DMITRE and provided to Rex for review. Of these, 126 were 'unique' submissions and 109 were 'form letters'. 27 of the submissions were marked 'confidential' and therefore have not been viewed by Rex, however these have been considered in DMITRE's assessment and request for response, totalling 264 public submissions to the State Government.

Each of the submissions received on the MLP was reviewed by DMITRE and issues were extracted and consolidated into a list of 196 technical issues for response by Rex. Rex has thoroughly reviewed all of the public submissions and has taken the view that the DMITRE summation of these submissions is a fair representation of the detail contained within each submission. Consequently Rex has prepared individual responses to the 196 questions detailed below as directed by DMITRE. The Response Document provides clarification and/or additional information required to enable a comprehensive assessment of the Hillside MLP by the State Government.

The 196 points were divided into two categories; issues raised by the State Government (from 1 – 99) and issues raised from members of the public (from 100 – 196). Many of the submissions raised the same, or similar issue(s). The key issues that were common within the submissions were grouped by Rex into 18 headings;

1. Radiation
2. Noise
3. Light
4. Visual Impact
5. Blasting and Vibration
6. Groundwater Contamination
7. Dust
8. Soil/ Site Rehabilitation
9. Rezoning
10. Marine
11. Traffic and Road
12. Flora and Fauna
13. Reduced Tourism
14. Slurry Pipeline
15. Reduced Agricultural Land
16. Rainwater Contamination
17. Inappropriate Location
18. Health Impacts

Table 1 lists each of the submissions received and the main issues with a tally of this provided in Figure 1. Table 2 presents the 18 key issues raised in the 'unique' submissions and where they have been addressed within the Response Document. Table 3 presents the broad issues raised in the 'form letters' and where they have been addressed within the Response Document.

Some of the supporting appendices provided by Rex contain information that the broader market does not possess and are commercial in confidence. This information has been provided to the State Government only for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent.

Table 1: Submissions received and the issues that were raised

Tally of Submissions	Number of Submissions	Surname	Initial	Suburb	Form letter	Unique letter	On Behalf of	Radiation	Noise	Light	Visual Impact	Blasting/ Vibration	Groundwater Contamination	Dust	Soil/Site Rehabilitation	Rezoning	Marine	Traffic/ Roads	Flora/Fauna	Reduced Tourism	Slurry Pipeline	Reduced Agricultural Land	Rainwater contamination	Inappropriate Location	Health Impacts	Other Concerns
1		Aldridge	D	Ardrossan	1																					
2		Anonymous				1					1						1							1		Food security, water usage, land and property values.
3		Armstrong	BE	Glen Waverley	1																					
4		Arney	D	Mt. Barker	1		Grain Producers SA							1	1							1		1		
5		Arthur	RJ	Pine Point	1				1					1			1						1			
6		Ayling	L	North Adelaide	1			Terrific project for South Australia, creating jobs, sparking business and generating revenue																		
7		Baeker	B	Ardrossan	1										1		1				1		1			
8		Baird	S	Ardrossan	1																					
9		Basey	D		1																					
10		Basey	I		1																					
11		Basey	R		1																					
12		Basey	S		1																					
13		Baxter	N	South Kilkerran	1									1			1		1	1		1				Negative impact on the community
14		Beer	D	Pine Point	1				1		1	1	1	1	1		1	1	1			1		1	1	Lack of community consultation
15		Bell	L	Pine Point	1				1		1	1	1	1			1	1			1	1	1	1		Opposed to the mine in general
16		Bittner	N	Curramulka	1		Naomi, Craig, Neil, Judith, Nelly, Hazel, Olive Bittner		1		1			1					1			1			1	Negative impact on the community
17		Bossenschutt	MG	Kadina	1																					
18		Boswell	G		1																					
19		Bourne	A & D	Pine Point	1						1	1			1						1					FIFO & lack of workers for other local businesses

Tally of Submissions	Number of Submissions	Surname	Initial	Suburb	Form letter	Unique letter	On Behalf of	Radiation	Noise	Light	Visual Impact	Blasting/ Vibration	Groundwater Contamination	Dust	Soil/Site Rehabilitation	Rezoning	Marine	Traffic/ Roads	Flora/Fauna	Reduced Tourism	Slurry Pipeline	Reduced Agricultural Land	Rainwater contamination	Inappropriate Location	Health Impacts	Other Concerns
20		Bowyer	P	Pt. Clinton	1																					
21		Bowyer	S	Pt. Clinton	1																					
22		Bright	G & Y	Pine Point		1			1		1			1		1	1		1	1						FIFO
23		Brokenshire	K		1																					
24		Brook	M		1																					
25		Brooks	R	Minlaton		1	District Council of Yorke Peninsula																			Lack of information
26		Brown	SN & JM	Ardrossan		1			1				1	1			1			1		1				
27		Bull	M											1	1		1		1							
28		Buttfield	F		1																					
29		Buttfield	J	Pt. Vincent		1							1		1							1				More mines in the local area & FIFO
30		Chapman	M	Klemzig		1								1			1		1	1		1		1		
31		Clift	A		1																					
32		Clift	C & A	Pine Point		1							1	1				1			1					Neighbouring residences
33		Clift	M		1																					
34		Clift	VS	Pine Point		1							1		1			1			1					Decreased property valuation & grain contamination
35		Coleman	L		1																					
36		Coleman	M		1																					
37		Correll	K & J	Port Clinton	1																					
38		Crowell	RM	Price	1																					
39		Crowell	T & R	Price		1																				Uranium mining

Tally of Submissions	Number of Submissions	Surname	Initial	Suburb	Form letter	Unique letter	On Behalf of	Radiation	Noise	Light	Visual Impact	Blasting/ Vibration	Groundwater Contamination	Dust	Soil/Site Rehabilitation	Rezoning	Marine	Traffic/ Roads	Flora/Fauna	Reduced Tourism	Slurry Pipeline	Reduced Agricultural Land	Rainwater contamination	Inappropriate Location	Health Impacts	Other Concerns
40		Darling	K	Walloo		1			1			1		1	1			1				1		1	1	
41		Davey	B		1																					
42		Davey	C	Pine Point		1			1		1			1								1			1	Uranium
43		Davey	CR	Kimba		1			1		1	1	1	1	1			1	1	1		1	1	1	1	Property devaluation & lack of community consultation
44		Davey	JH	Kimba		1			1		1	1	1	1	1			1	1	1		1		1	1	Property devaluation & lack of community consultation
45	1	Davey	JM	Sandilands		1									1							1		1		
46	2	Davey	JM	Sandilands		1									1											
47		Davey	J	Sandilands		1							1	1	1						1	1				
48		Diassinias	S		1																					
49		Dodd	MC	Pine Point		1																				
50		Duns	K		1																					
51		Dutschke	L		1																					
52		Easther	L	Ardrossan		1	LJ Hooker						1													
53	1	Eden	H		1										1							1				
54	2	Eden	A		1										1							1				
55	3	Eden	H & A		1																	1				
56		Eden	D		1									1								1		1		FIFO
57		Eden	M		1								1		1											Negative long term impact on the community
58		Eden	N		1										1											
59		Edgecombe	E	Redwood Park		1																				
60		Farrugia	L		1																					
61		Farrugia	SM	Port Pirie		1																				

Tally of Submissions	Number of Submissions	Surname	Initial	Suburb	Form letter	Unique letter	On Behalf of	Radiation	Noise	Light	Visual Impact	Blasting/ Vibration	Groundwater Contamination	Dust	Soil/Site Rehabilitation	Rezoning	Marine	Traffic/ Roads	Flora/Fauna	Reduced Tourism	Slurry Pipeline	Reduced Agricultural Land	Rainwater contamination	Inappropriate Location	Health Impacts	Other Concerns	
62		Field	DK & SJ	Torrens Park		1	PC & L Field, DJ & SE Trueman, AM & MP Field		1			1	1	1	1				1								
63		Forrest	J	Willunga	1																						
64	1	Francis	B & J	Maitland	1																						
65	2	Francis	B & J	Maitland		1																1					
66		Francis	R & K	Maitland	1																						
67		Gackle	A	Port Noaulunga		1	The Friends of Gulf St Vincent	1					1		1		1										
68		Germein	G & J	Port Clinton		1		1	1		1	1	1	1							1						CCG ineffectiveness & administration offices location
69		Gersch	B & A	Sandilands		1			1		1	1	1	1				1				1	1	1	1		Property devaluation
70		Gibson	J	Pine Point		1		1	1			1	1				1										More mines on local area (50)
71		Gill	A	Ovingham		1			1		1						1			1		1					
72	1	Glanville	F			1						1															
73	2	Glanville	F			1						1															
74	3	Glanville	F			1							1				1										
75	4	Glanville	F			1						1						1									
76	5	Glanville	F			1							1				1										Damage to coastal cliffs
77		Goodrich	C	Ardrossan	1																						
78		Goodrich	P	Ardrossan	1																						
79		Gordon	A	Lower Light		1							1	1	1						1		1				
80		Gordon	A	Lower Light	1																						

Tally of Submissions	Number of Submissions	Surname	Initial	Suburb	Form letter	Unique letter	On Behalf of	Radiation	Noise	Light	Visual Impact	Blasting/ Vibration	Groundwater Contamination	Dust	Soil/Site Rehabilitation	Rezoning	Marine	Traffic/ Roads	Flora/Fauna	Reduced Tourism	Slurry Pipeline	Reduced Agricultural Land	Rainwater contamination	Inappropriate Location	Health Impacts	Other Concerns			
81	1	Gordon	JBC	Lower Light	1																								
82	2	Gordon	JBC	Lower Light		1																1							
83		Gordon	J	Lower Light	1																								
84		Gould	K	North Haven	1																								
85		Greenslade	J	Via Maitland	1																								
86		Greenslade	V	Kingswood		1															1						General concern for the environment		
87		Griffiths MP	S	Maitland		1		1	1		1	1		1	1		1					1	1	1	1		Stress on property owners over land purchase negotiations. Concerns over future mines. Road diversions. Positive jetty upgrade. Property values.		
88		Hawes	RK	Highbury		1		1					1	1			1												
89		Hayles	N	Curramulka	1																								
90		Herd	G	Ardrossan		1								1			1		1										
91		Hibovesky	V	Ardrossan	1																								
92		Hinds	K		1																								
93		Hinds	M		1																								
94		Hinds	W		1																								
95		Hodges & Linkevics	A & R	Birdwood		1							1				1				1				1	1		Food security	
96		Jones	C		1																								
97		Jones	R		1																								
98		Jessup	J			1	SA Power Networks							1															
99		Kaempf	J	Adelaide		1	Flinders University						1				1											Increased shipping traffic	

Tally of Submissions	Number of Submissions	Surname	Initial	Suburb	Form letter	Unique letter	On Behalf of	Radiation	Noise	Light	Visual Impact	Blasting/ Vibration	Groundwater Contamination	Dust	Soil/Site Rehabilitation	Rezoning	Marine	Traffic/ Roads	Flora/Fauna	Reduced Tourism	Slurry Pipeline	Reduced Agricultural Land	Rainwater contamination	Inappropriate Location	Health Impacts	Other Concerns
100		Kakoschke	F & C	Sandilands		1								1			1	1				1	1			Lack of community consultation
101		Kakoschke	P & L	Sandilands		1	Rex & Helen Kakoschke, Peter & Lauren, Aidan, Harry & Charlie Kakoschke							1									1			Property devaluation & lack of community consultation
102		Kelly	T	Adelaide		1	Conservation Council SA							1	1				1							Climate change, greenhouse gas mitigation and electricity use
103		Kenny	M	Ardrossan		1																				
104		Kenny	MT	Greenacres		1																				
105		Kent	C			1																				
106		Kernich	T			1																				
107		Klopp	G & S	Maitland		1			1		1							1		1		1	1			Lack of community consultation
108	1	Klopp	K	Maitland		1								1			1					1	1			Rezoning
109	2	Klopp	K	Maitland		1						1	1				1		1							
110		Klopp	K	Maitland		1		1				1		1								1				Impacts on grain storage, 50 potential exploration targets
111		Klopp	P			1			1					1	1	1	1		1	1			1	1		Devaluation of properties
112		Koch	H			1																				
113		Leonard	E	Via Maitland		1																				
114		Linke	D			1																				
115		Linke	E			1																				
116		Linke	M			1																				
117		Linke	R			1																				

Tally of Submissions	Number of Submissions	Surname	Initial	Suburb	Form letter	Unique letter	On Behalf of	Radiation	Noise	Light	Visual Impact	Blasting/ Vibration	Groundwater Contamination	Dust	Soil/Site Rehabilitation	Rezoning	Marine	Traffic/ Roads	Flora/Fauna	Reduced Tourism	Slurry Pipeline	Reduced Agricultural Land	Rainwater contamination	Inappropriate Location	Health Impacts	Other Concerns
118		Linke	R		1																					
119		Linke	S		1																					
120		Lodge	C		1																					
121		Lodge	G	Ardrossan	1																					
122		Lodge	JW	Ardrossan	1																					
123		Lodge	J	Ardrossan	1																					
124		Lodge	N	Ardrossan	1																					
125		Lodge	S		1																					
126		Lodge	S			1		1	1			1	1	1	1		1	1		1	1	1			1	Impact on landowners, pressure on local services, Employment issues, property issues, camp, tailings dam and lack of consultation
127		Long	W		1																					
128		Lush	F	McLaren Vale		1								1	1		1		1							
129		Marr	J			1																		1		
130		Mason	K	Ardrossan		1									1		1			1		1	1			High rental prices
131		Mattschoos	S & N	Via Ardrossan		1						1					1	1		1		1				
132		McBride	N	Unley		1	Business SA							1	1											Supportive for economic benefits
133		McCauley	A			1																				
134		McCauley	C & N	Maitland		1						1	1	1				1								Less jobs available for other businesses
135		McCormack	E	James Well		1			1		1	1		1	1		1	1					1			
136		McGrath	D	College Park		1														1					1	
137		McManus	P	Pine Point		1																				

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138		McNab	G		1																					
139		Meany	M	Adelaide		1	Davey RH per Mellor Olsson		1			1		1				1				1		1	1	Economic impact
140		Milnes	T	Highgate		1		1					1		1						1					
141		Mitchell	G			1								1			1						1		1	
142		Murdoch	J			1																				
143		Murphy	N	Port Adelaide		1	South Australian Freight Council											1								
144		Nankivell	J & J	Maitland		1		1									1	1		1		1				SA Water supply & more mines in local area (50)
145		Nankivell	K	Maitland		1		1	1					1	1		1					1		1		Food security
146		Neale	D	Ardrossan		1																				
147		Neale	J	Ardrossan		1																				
148		Norman	PA	Belair		1			1	1				1				1				1				
149		Nyhuis	B & H	Wallaroo		1								1			1							1		
150		Oster	C			1																				
151	1	Paddick	M	Pine Point		1					1	1	1	1	1		1				1		1		1	Aboriginal sacred grounds, fault lines and re-zoning
152	2	Paddick	M	Pine Point		1		1								1	1	1								Property values
153	3	Paddick	M	Pine Point		1									1		1						1			Stress on farmers
154	4	Paddick	M	Pine Point		1											1			1						Mine short term with temporary jobs and farming land to stay in families
155		Palmer	R	Ardrossan		1			1			1	1	1				1		1		1		1	1	Extra workload for services e.g. doctors, dentists, hospitals.
156		Parker	R			1																				

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157		Parnell	M	Adelaide		1	The Greens		1				1	1								1					
158		Polkinghorne	L		1																						
159		Polkinghorne	M		1																						
160		Polkinghorne	SM	Blackwood	1																						
161		Pontifex	C	Kadina	1																						
162		Pontifex	L	Kadina	1																						
163		Pulling	A		1																						
164		Quigley	I	Goolwa		1			1		1	1		1							1		1	1			Lack of community consultation
165		Redding	MJ & CJ	Sandilands		1	Matthew & Christopher Redding							1	1	1	1	1				1	1				No benefit to local community
166		Reidy	S	Tiddy Widdy Beach	1																						
167		Ring	S			1			1		1	1						1	1		1			1			Social & demographic impact, property values & lifestyle
168		Robinson	A	Underdale	1																						
169		Robinson	C	Underdale	1																						
170		Rooke	E			1	Yorke Peninsula Landowners Group - Gilbert & Sullivan						1									1					Concerns with the tailings dam
171		Rowe	A		1				1					1								1					
172		Rowe	L		1									1								1					
173		Saint	T,E & A	Maitland		1			1		1	1		1							1		1		1		

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174		Sandercock	J	Ardrossan	1		Ardrossan Progress Association		1			1		1								1				Lack of public consultation and social impacts
175		Sandford	E	St Agnes	1																					
176		Sandford	G	St Agnes	1																					
177		Schroder	JR & SM	Ardrossan	1				1			1		1				1					1	1		
178		Schulz	A	Sandilands	1																					
179		Schulz	B	South Kilkerran	1								1				1					1		1		Negative social impacts
180		Schulz	L	Sandilands	1																					
181		Schulz	P & F	Sandilands	1				1	1			1	1	1							1	1			
182		Schulz	S	South Kilkerran	1																					
183		Schulz	T	South Kilkerran	1																					
184		Scott	PA	Mount Barker	1				1	1	1	1		1	1									1	1	
185		Seacombe	C	Payneham South	1				1		1						1	1			1	1		1		
186		Secombe	P	Stepney	1				1			1	1	1				1	1	1		1				Property devaluation and destruction of community
187		Seekamp & Zimmermann	C & W	Price	1									1			1		1			1				FIFO
188		Short	S	Via Kadina	1																					
189	1	Shuttleworth	A		1																					
190	2	Shuttleworth	A		1																					
191		Shuttleworth	S	Seacliff	1				1					1								1				
192		Sidhu	N		1									1			1						1		1	
193		Smart	G		1																					

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194		Smith	D	Ardressan		1								1								1				
195		Sparrow	B & P	Rogues Point		1			1			1		1				1					1			
196		Spencer	R	Stepney		1						1		1					1					1		
197		Stankovic	R	Dulwich		1	Arrium Mining	No objection to the proposal																		
198		Starr	S & A			1			1			1	1		1		1			1		1			1	
199		Stock	B			1																				
200		Stock	D	Maitland		1																				
201		Stock	J	Maitland		1																				
202		Stock	P	Maitland		1																				
203	1	Stockings	P			1	Community Consultation Group	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Economic impacts and impacts to Aboriginal heritage
204	2	Stockings	P			1	Community Consultation Group																			Require further clarification & request extension to consultation period
205		Sturt	A			1																				
206		Taylor	L	Glenelg South		1																				
207		Tilbrook	D			1																				
208		Tolfts	A			1																				
209		Tolfts	C			1																				
210		Underwood	J & D	Novar Gardens		1					1			1									1	1	1	
211		Van Schaik	K	Marden		1			1	1	1	1	1	1	1		1	1	1			1	1		1	Length of public consultation and population planning
212		Vandepier	J & J	Ardressan		1			1				1	1			1			1		1				

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213		Wakefield	L			1	Lynton. Alex, Craig and Deborah Wakefield.							1								1				
214		Walker	M	Price		1			1					1			1	1			1				1	
215		Wheare	J		1																					
216		Wheare	M	Pine Point		1							1	1							1					Decrease in real estate prices
217		Wheare	M		1																					
218		Whenan	M		1																					
219		White	K & DA	Ardrossan		1			1					1	1	1						1	1			Food security
220	1	Whittaker	P & T	Ardrossan		1			1	1				1				1					1			
221	2	Whittaker	P & T	Ardrossan		1																				
222		Whittaker	T			1																1		1		
223		Whittaker	V		1																					
224		Wilkinson	J & F	Hope Valley		1																				
225		Williams	A	Glandore		1	Primary Producers SA								1							1		1		Protecting farmer's rights.
226		Williams	J	Pine Point		1																				
227		Williams	R	Pine Point		1																				
228		Wissell	C & C	Ardrossan		1																1				Dramatically affect their agricultural consultation business
229		Woolford	K			1			1	1			1	1	1		1						1			Drain on services
230		Wright	D & J	McLaren Flat		1			1	1				1								1	1			No community consultation
231		Wundersitz	B	Maitland		1							1	1		1	1									Mine footprint
232		Wundersitz	C			1			1		1	1		1				1		1		1		1		Property devaluation

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233		Wundersitz	J	Marden		1			1			1		1	1					1						SA Water Supply
234		Wundersitz	J	Highgate		1			1	1	1	1	1	1	1		1			1		1				
235		Wuttke	S		1																					
236	2	Yorke Peninsula Landowners Group				1		1						1	1		1			1		1			1	Air quality, social costs, infrastructure, agricultural concerns
237		Young	T	Ardrossan		1																1				
TOTAL								15	49	7	25	34	44	78	48	7	57	35	18	36	10	69	29	33	21	

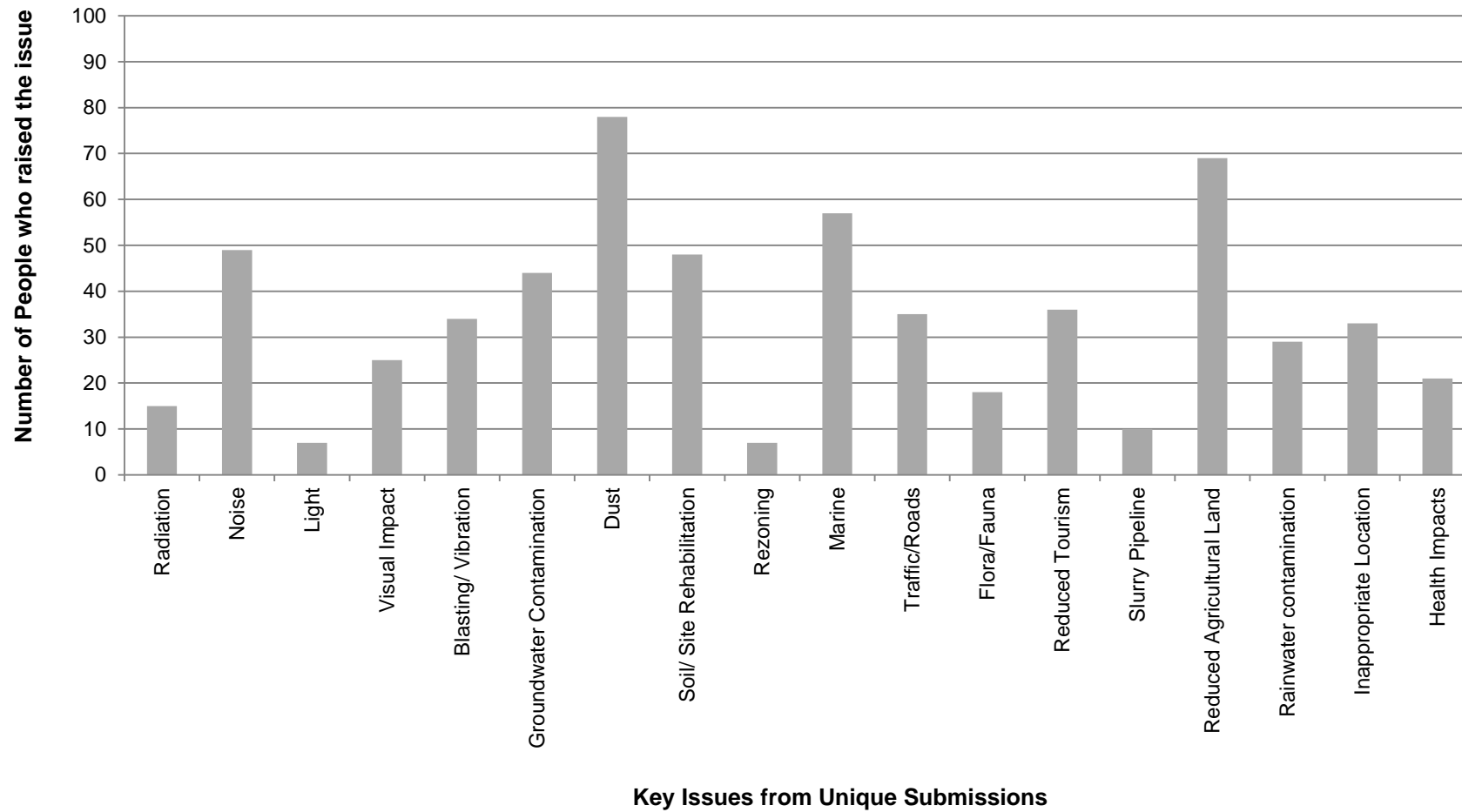


Figure 1: Number of unique submissions and the common issues raised

Table 2: Cross referencing of subjects raised in the unique submissions and the response location

Issue Raised in Unique Submissions	Response Reference	
	Issues Raised by SA Government	Issues raised in the Public Submissions
Radiation	36 – 41 & 44	112 & 151 - 157
Noise	33	100, 109, 119, 133, 143, 144 & 146 - 150
Light	<i>No further information requested by DMITRE</i>	141
Visual Impact	<i>No further information requested by DMITRE</i>	-
Blasting and Vibration	4 (part c) & 19	100, 103, 109, 110 & 159
Groundwater Contamination	7, 13, 26, 29, 39, 44, 45, 47, 48 & 51-99	129, 130 & 169 - 196
Dust	1 – 5, 12, 15, 35, 38 – 40 & 44	104 – 108, 113 – 122, 129, 130, 142 – 144, 153 & 154
Soil/ Site Rehabilitation	17, 24, 25, 42 – 44, 48 & 87	102, 115, 116, 121, 123 – 127, 153, 154, 157, 160, 161 & 167
Rezoning	<i>All issues specific to other approvals are outside of the scope of the Response Document.</i>	
Marine	7, 16, 31, 44, 83, 84 & 87	118, 129, 130, 142 & 153
Traffic and Road	<i>No further information requested by DMITRE</i>	-
Flora and Fauna	44	109, 135 & 142
Reduced Tourism	<i>No further information requested by DMITRE</i>	162 - 166
Slurry Pipeline	43 & 44	130
Reduced Agricultural Land	48	102, 103, 123, 125 – 127 & 163
Rainwater Contamination	5 (part e) & 21	122
Inappropriate Location	<i>No further information requested by DMITRE</i>	-
Health Impacts	2,5 & 44	104, 107, 118, 122 & 137
Other Concerns: Property Devaluation and Competition for Skilled Labour	<i>No further information requested by DMITRE</i>	161 - 165

Table 3: Cross referencing of subjects raised in the form letters and the response location

Issue Raised in Form Letters	Response Reference	
	Issues Raised by SA Government	Issues raised in the Public Submissions
Loss of prime agricultural land	48	102, 103, 123, 125 – 127 & 163
Detrimental impact on tourism	<i>No further information requested by DMITRE</i>	162 - 166
Inappropriateness of location of mine	<i>No further information requested by DMITRE</i>	-
Hazardous dust effecting people, crops and stock	1 – 5, 12, 15, 35, 38 – 40 & 44	104 – 108, 113 – 122, 129, 130, 142 – 144, 153 & 154
Groundwater contamination and lowering of the water table	7, 13, 26, 29, 39, 44, 45, 47, 48 & 51-99	129, 130, 160 & 169 - 196
Contamination of the St Vincent's Gulf and its marine life	16, 32, 44, 83, 84 & 87	118, 121, 129, 130, 142, 153, 184, 189 & 192
Health impacts from contaminated dust/rainwater, noise and sleep deprivation	1 - 5 (part e) & 12, 15, 21, 33, 35, 38 – 40 & 44	100, 104 – 109, 113 – 122, 129, 130, 133, 142 – 144, 146, 150, 153 & 154
Noise pollution	33	100, 109, 119, 133, 143, 144 & 146 - 150
Visual pollution	<i>No further information requested by DMITRE</i>	-
Vibration from blasting	4 (part c) & 19	100, 103, 109, 110 & 159
Inadequate provision of rehabilitation of mine site	17, 24, 25, 42 – 44, 48 & 87	102, 115, 116, 121, 123 – 127, 153, 154, 157, 160, 161 & 167
Risk that the local community will be left with a huge clean-up bill if the mine closes prematurely	<i>No further information requested by DMITRE</i>	-
Devaluation of surrounding properties including agricultural land and coastal properties	<i>No further information requested by DMITRE</i>	165
Creation of hazardous road junction at proposed Minlaton diversion at Pine Point	<i>As this relates to the loading facility, it is outside of the scope of the MPL Application and will be assessed under Section 49 of the Development Application process.</i>	
Increased heavy traffic and road damage for the life of the mine	<i>No further information requested by DMITRE</i>	164
Greatly increased traffic and road damage during construction	<i>No further information requested by DMITRE</i>	-
Lack of effective community consultation and transparency	<i>No further information requested by DMITRE</i>	166
Damage to social infrastructure	<i>No further information requested by DMITRE</i>	-
Detrimental impact on flora and fauna	5 (part r) & 44	129, 135 & 142

STRUCTURE OF THE RESPONSE DOCUMENT

Each of the 196 issues from DMITRE has been included in the main body with an answer provided below. This question and answer approach has been repeated throughout the whole Response Document. Where relevant, the response to the issue clarifies information already provided in the MLP. In some of the responses, findings from additional studies undertaken post the submission of the MLP in August 2013 and publication in September 2013.

Some of the responses state Rex's commitments for the stage two approval document which sets out the site management and reporting details to be provided in the Program for Environment Protection and Rehabilitation (PEPR) prior to the commencement of operations.

ISSUES OUTSIDE THE SCOPE OF MLP AND RESPONSE DOCUMENT

The formal consultation for the MLP is held and executed by DMITRE. As such the submissions were specifically addressed to DMITRE, rather than to Rex. Some of the submissions raised issues that are outside of DMITRE's legislation and therefore outside of the scope of the MLP and the Response Document.

Supporting approval processes have been required for the upgrades to the Port Ardrossan loading facility and Highway realignments. All issues specific to other approvals are outside of the scope of the Response Document.

A number of the submissions also stated that no mining should occur at Hillside without any commentary on the specific issues and therefore Rex was unable to address these concerns.

DOCUMENTATION ALTERATIONS, CHANGES AND ADDITIONS

Rex will continuously aim to refine and improve. Rex is currently preparing a Bankable Feasibility Study (BFS) which means that Rex are undertaking the selections for Hillside and therefore in a stage where details are being refined prior to construction and operation.

Some of the changes are in response to independent technical reviews, government feedback and community issues. The changes have not materially altered the character of the project as originally proposed. These changes that were undertaken from the initial consultation undertaken by Rex to the final version of the MLP as submitted in August 2013 were;

1. A variation to the tailings storage facility (TSF) footprint.
2. Deep groundwater drilling results.
3. Alteration to the Appendix A of Appendix 5.6-C Dust and Odour Impact Assessment Report of the MLP.
4. Alteration to the Appendix A of Appendix 6.6-A_Operational Noise Assessment of the MLP.

During the formal consultation phase, the most recent versions of the two Appendices (5.6-C and 6.6-A) as stated above were not provided to the stakeholders. The changes to these Appendices have been outlined below.

Variation to the TSF Footprint

A number of TSF options were considered for the storage of tailings as summarised in Section 6 of the MLP. An integrated waste management system (IWMS) was identified as the preferred option for tailings disposal. An IWMS – high aspect ratio TSF was the initial design presented to stakeholders. In order to confirm the suitability of the high aspect ratio TSF in the Hillside Project setting, an independent peer review was sought by Rex. This resulted in the revised design IWMS – low aspect ratio TSF. The IWMS – low aspect ratio TSF design was the subject of the MLP and was incorporated into the description of operations and risk assessment accordingly. The low aspect ratio option requires a larger footprint due to the reduced height and resulted in the need to close a portion of Redding Road to accommodate the increased footprint. The same design principles apply for both the high and low aspect IWMS.

Deep groundwater drilling results GW surplus to GW deficit

A deep drilling program was finalised after the submission of the MLP in August 2013. The deep drilling included a series of holes down to a depth of 470 m. The conservative nature of the water volume at depth as presented in the groundwater model in the MLP (Appendix 6.5-A) resulted in an estimated water surplus after year five of the operations. The information from the deep drilling reduced the amount of conservatism required, meaning that a lot less water is actually at depth than originally modelled. Therefore the consolidated groundwater report as presented in **Appendix 7**, states that for all years of operations, there will be a deficit of water, meaning that more seawater will be required.

Alteration to the Dust and Odour Impact Assessment Report

The updated Appendix B of Appendix 5.6-C (of the MLP) included the results of the second method of estimating wheel generated dust. Two methods were employed to calculate the control efficiencies for wheel-generated dust (unpaved roads) as the results identified that haul truck wheel-generated dust is the main contributor to dust concentrations at peak impact conditions. The main body of Appendix 5.6-C used sprays of hygroscopic salts such as calcium and magnesium chlorides for dust control with a control efficiency of 93% (*Rushing & Tingle, 2007*) which showed 2-3 days that exceeded the criteria (with no shutdowns or adjustment of operations to reduce emissions at critical times).

To provide a higher level of confidence in the model, the efficiencies were reduced for the purposes of a sensitivity analysis (Appendix B of Appendix 5.6-C) which employed the control efficiency factor of 83.5% (*Cowherd, Muleski, & Kinsey, 1988*). One additional day per year would exceed the air quality standard is predicted to occur using the control efficiency factor of 83.5% versus the efficiency of 93%. Hence, the two methods employed for the control efficiencies of wheel generated dust resulted in similar outputs supporting the assumptions used.

The dispersion model was updated for this MLP Response Document and is presented in **Appendix 4**. The updates of the dispersion modelling address revisions to the proposed mining operations since the previous study (Appendix 5.6-C of the MLP) and includes an increased waste rock handling rate, updates of the WRD footprint (and also the soil stock piles designated for the WRD remediation) and further extensions for the haul road routes. To clarify, the modelling updates included:

1. Updated emissions to account for the materials handling increase to 140 Mtpa (125 Mtpa waste materials and 15 Mtpa ore material).
2. Updated WRD areas (including soil stockpiles) to reflect the mine footprint as presented in Figure 6.1-2 of the MLP.

3. Extension of haul road routes to the centre of the WRD areas (see **Response_ 5. Air Quality part (i)** for further details).

No other assumptions were revised.

Alteration to the Operational Noise Assessment Report

The updated Appendix A of Appendix 6.6-A (of the MLP) included a discussion of the Noise Criteria Derivation. This provided an assessment of the *Environment Protection (Noise) Policy 2007*, in relation to the Yorke Peninsula Development Plan. Appendix A also includes the discussion of the EPA noise planning penalty. As Hillside is a planned new mine, the EPA generally require that the project be designed to meet the indicative noise level criteria less 5 dB(A) where reasonable and practicable. However, through Hillside's consultation process, it was agreed that the planning penalty does not apply in this case, with the reasoning for this outlined in Appendix A (of the MLP).

ISSUES RAISED BY SA GOVERNMENT

The following are issues that have been collated by DMITRE from the State Government departments including the Environmental Protection Authority (EPA), DEWNR, DPTI and PIRSA.

1. AIR QUALITY

Section 8.3.1

Draft outcome measurement criteria proposed are not deemed appropriate as a sampling regime for managing dust and fine particulates for a project of this magnitude. The 1 in 6 day sampling protocol is considered an insufficient frequency for this proposal.

Final measurement criteria must align with the Air NEPM standards for PM₁₀, and measurement be undertaken on the basis of continuous real-time monitoring including meteorological monitoring.

The proposed real-time monitoring (with daily averaging) for mining operations will be undertaken in line with the National Environment Protection Measure (NEPM)/ National Environment Protection Council (NEPC) requirements. The outcome measurement criteria for PM10 will align with the air NEPM Standards (*Environment Australia May, 2001*) which states that an ambient PM10 standard of 50 micrograms per cubic metre ($\mu\text{g}/\text{m}^3$) as a 24-hour average with 5 exceedances permitted per year. As no Commonwealth region (as defined by Clause 14 of the NEPM standards) meets the NEPM threshold of a population greater than 25,000, no direct monitoring is required under the NEPM protocol. However, the level of $50 \mu\text{g}/\text{m}^3$ has been adopted as best current practice in South Australia.

The specific details regarding the compliance monitoring will require further discussion with the regulators and is to be provided in the PEPR. It is anticipated that the real-time provided monitoring data will be validated on a monthly basis and reports submitted on a quarterly basis or as required by the regulator and set out in the PEPR.

2. AIR QUALITY

Section 8.3.1

The air quality impact assessment does not contemplate an increase in copper and other metal concentrations from dust deposition directly onto crops and products, or from uptake of dust deposition on soils.

Provide an assessment of the potential impacts to cropping yields and grain quality (farm crop and grain storage at Port Ardrossan) associated with these impact events including the potential for accumulation of copper and other metals.

Dust deposition on crops

As per Appendix 5.6-C of the MLP, the monitored dust deposition from December 2011 to November 2012, in grams per square metre per monthly ($\text{g}/\text{m}^2/\text{month}$) range from 0.38 to $3.66 \text{ g}/\text{m}^2/\text{month}$, with the closest third party property (monitoring location M9) experiencing an average level of $2.2 \text{ g}/\text{m}^2/\text{month}$, as shown below in Table 8.4 from Appendix 5.6-C of the MLP (baseline results). The modelled dust deposition from the proposed mine is shown below in Table 4 from **Appendix 4**. With all control measures implemented (as per Section 8.3.1.3 of the MLP), dust deposition will increase by approximately $1.5 \text{ g}/\text{m}^2/\text{month}$ on average over a full year (including summer months when crops have been harvested) on the closest cropped land to the

south-west of the open pit from the proposed mine. Therefore it is concluded that the amount of dust deposition from the proposed mine on the closest cropped land is not a significant increase when compared to background levels.

Table 8.4: Average Total Dust Deposition for each location

Monitoring Location	Average Total Dust Deposition (g/(m ² .month)) ^a
M1	3.66
M2	0.79
M3	0.71
M4	0.38
M5	1.98
M6	3.26
M7	1.54
M8	1.21
M9	2.20
M10	2.03
M11	1.92
M12	2.57
M13	1.26
M14	1.01
M18	0.63

- a. Average for all available data including duplicate results. Data greater than or equal to 2 standard deviations (15.5 g/(m².month)) were considered invalid and removed. Values of <0.1 were taken as 0.1 g/(m².month)

Table 4: Updated Predicted Dust Deposition Annual Average Concentrations

Receptor	Annual Average Dust Deposition (g/(m ² month)) ^a
1	0.1
2	0.1
3	0.3
4	0.4
5	0.6
6	0.2
7	0.5
8	1.0
9	1.3
10	0.3
11	0.4

- a. Not including background dust deposition and based on a 30 day month

Level of PM10 dust impact on crops

There are no applicable Australian Standards for dust impact on crops or vegetation. Therefore, the National Ambient Air Quality Standards (NAAQS), under the *Clean Air Act of 1963* as set out by the United States Environmental Protection Authority (US Code of Federal Regulations Chapter 40 part 50) for pollutants considered harmful to public health and the environment has been used. The *Clean Air Act of 1963* provides secondary standards for PM10 which includes potential damage to crops and vegetation. This secondary standard for PM10 is $150\mu\text{g}/\text{m}^3$ which is not to be exceeded more than once per year on average over three years.

All areas outside of the proposed mine footprint have predicted PM10 levels below $150\mu\text{g}/\text{m}^3$ at all times. Therefore the predicted PM10 level shows that there will be no impact on crops. PM10 levels will be monitored at surrounding residential receptors to demonstrate compliance with the NEPM Standard ($50\mu\text{g}/\text{m}^3$). No monitoring of PM10 for crop impacts will be undertaken as dust deposition will be monitored.

Composition of the dust

The Dust and Odour Impact Assessment (Appendix 5.6-C of the MLP) demonstrated that the main source of dust emissions from the mine and associated activities are predominantly linked to wheel dust (85 %) arising from mobile plant equipment, with blasting (4.2 %) and materials handling (7.5 %) also making contributions as in Table 7.3 (Appendix 5.6-C of the MLP).

All internal access roads in and around the processing plant area (workshops, admin blocks, entry and exit roads, etc) will be sealed (bituminised). Therefore no dust will be emitted from these roads.

The remaining haul roads will be constructed out of waste rock material as per **Appendix 2** (see Figure 2 below). The wearing surface ('fine crushed rock') will be constructed predominately out of eastern waste rock (granite). The chemical composition of the eastern waste rock (granite) is shown in Table 4 below.

There is no atacamite present (copper potentially dissolvable by water) in the WRDs (north, south, west WRDs) and therefore not present in the material used to construct haul roads. The material that has been classified as 'copper oxide' includes all of the atacamite material which will be stockpiled and managed separately (oxide stockpile), refer to **Response_21. Geology**.

The elements presented in Table 4 are all found in varying concentrations in nature, but are extremely rare within the eastern waste rock at Hillside. Therefore, the dust that will originate from the proposed mine will not contain levels of copper, other metals or toxins which could potentially accumulate in crops and products from the uptake of dust deposition on soils.

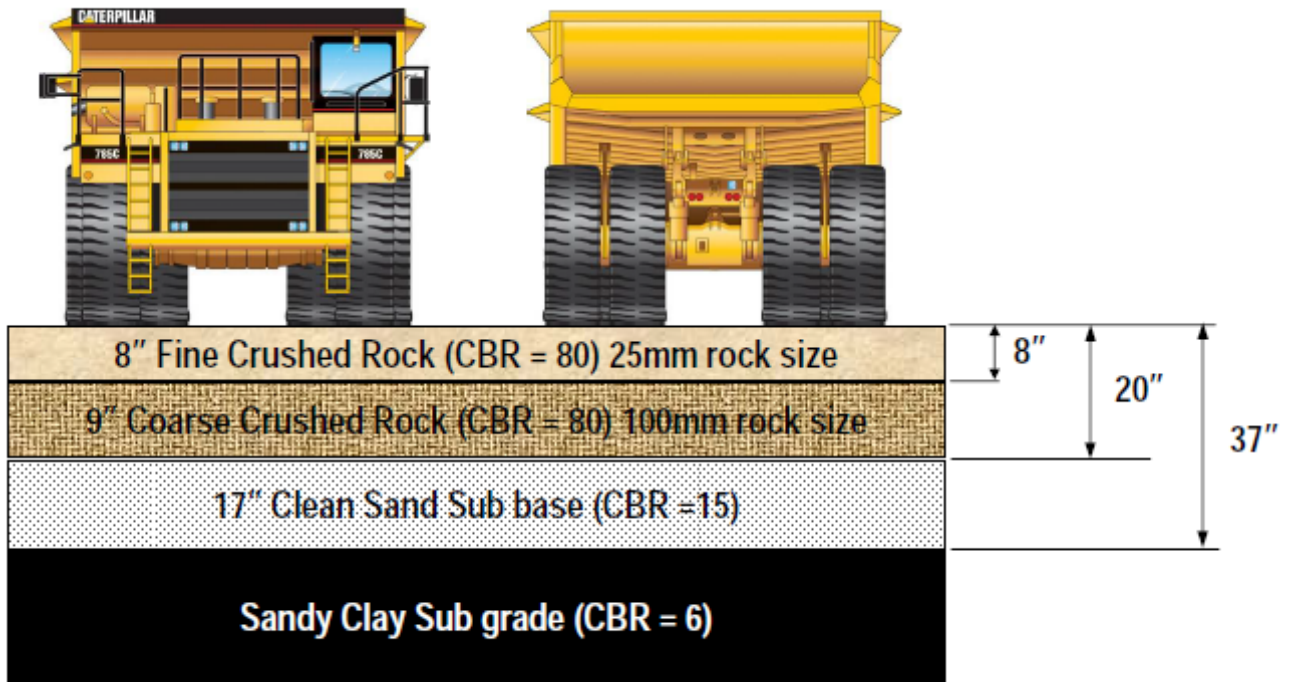


Figure 2: Design of haul roads (CAT)

Table 4: Key elemental composition of eastern waste rock

Element	Amount (ppm or %)	Eastern Waste Rock (Granite)
Cu	%	0.010
Au	ppm	0.009
U	ppm	6.853
Ag	ppm	0.368
Fe	%	3.758
La	ppm	48.460
Ce	ppm	88.956
Cl	%	0.047
As	ppm	10.294
Ba	ppm	659.334
Bi	ppm	1.336
Ca	%	2.114
Cd	ppm	0.254
Co	ppm	14.197
Cr	ppm	31.465
K	%	3.477
Mg	%	1.872
Mn	ppm	647.845
Mo	ppm	1.093
Na	%	0.718
Ni	ppm	18.923
P	ppm	410.817
Pb	ppm	6.368
S	%	0.036
Sb	ppm	2.866
Sr	ppm	39.577
Ti	%	0.264
V	ppm	63.586
Y	ppm	29.237
Zn	ppm	19.924
Al	%	6.432

Dust and grain storage

The potential impacts to the storage of grain at the Port of Ardrrossan has been described and detailed in Section 8.4.1 (MLP). The proposed dust control measures include:

- Concentrate handling conducted inside a negative pressure shed.
- Concentrate moisture content maintained above the Dust Extinction Moisture (DEM) point.
- Enclosing of all conveyors.

Therefore the potential for dust to contaminate grain stored at the Port Ardrrossan is highly unlikely. A dust monitoring system will be in place at the port facility and details will be provided in the Air Quality Management Plan.

3. AIR QUALITY

Table 8.3-6

Criteria for ML-A6: The application of 'nuisance' indicator criteria as a measure against potential crop impacts is inappropriate without further justification.

Provide evidence to support the use of nuisance criteria as a measure of dust impacts on crop yields.

Nuisance dust criteria will not be used as a measure against potential impacts on crop yields. An Air Quality Management Plan will be developed in consultation with the State Government regulators (DMITRE and EPA) which will include a detailed monitoring program including dust deposition and toxicology monitoring.

In discussion with the State Government regulators, control sites may be used to provide a comparison of the levels of dust deposition on the proposed Hillside site and dust deposition experienced in surrounding areas on the Yorke Peninsula. This will monitor that the amount of dust deposition that occurs on areas surrounding the proposed mine site (which includes land used for cropping) at Hillside will be similar to that experienced elsewhere on the Yorke Peninsula.

Furthermore, to provide certainty of the composition of dust from the proposed Hillside Mine analysis of the dust will be undertaken. Once mining has commenced, at a time agreed with the regulators, samples of airborne dust will be collected and toxicological characterisation of the dust will be carried out to demonstrate that there are no significant levels of heavy metals in the dust composition. Therefore, by monitoring the dust deposition and the composition of the dust (toxicological characterisation) all air related potential impacts related to cropped land will be recorded and reported to the regulators and the community to show that Rex are not contributing above background levels.

To reduce dust deposition on crops, the control measures outlined in Section 8.3.1.3 of the MLP will be implemented. As per **Response 2. Air Quality**, the dust that will originate from the proposed mine will not contain levels of copper, other metals or toxins which could potentially accumulate in crops and products from the uptake of dust deposition on soils.

4. AIR QUALITY

Revised dust dispersion modelling is required to support the adequate assessment of potential dust impacts. The following material limitations of the current modelling must be addressed (listed as subsections (a) to (d):

- a) The current modelling is based on an operational footprint that is significantly different from that proposed within the MLP.***

As detailed in the introduction under subsection labelled 'Documentation Alterations, Changes and Additions', in order to confirm the suitability of the high aspect ratio TSF in the Hillside Project setting, an independent peer review was sought by Rex. This resulted in the revised design IWMS – low aspect ratio TSF. The IWMS – low aspect ratio TSF design was the subject of the MLP and has been incorporated into the description of operations and risk assessment accordingly. The low aspect ratio option requires a larger footprint due to the reduced height and resulted in the need to close a portion of Redding Road to accommodate the increased footprint. The same design principles apply for both the high and low aspect IWMS.

The mine footprint was amended **after** the Dust and Odour Impact Assessment (Appendix 5.6-C of the MLP) was completed. The altered mine footprint was considered by Pacific Environment Limited (PEL) in May 2013 in relation to the predicted results. PEL did not believe that additional dispersion modelling was required to assess the implications of the proposed footprint change since it is very unlikely to significantly change the predicted level of PM10 impacts, due to the following reasons:

1. As previously discussed and presented in Figure 9.7 of Appendix 5.6-C of the MLP (dated 31 July 2013), the peak impact conditions at the receptors to the south of the mine are identified to occur on days dominated by stable, light northerly winds occurring typically overnight and in the early morning. The source apportionment results identify haul truck wheel-generated dust as the main contributor to dust concentrations at peak impact conditions. Therefore there is no component of wind erosion dust emissions/impacts in the peak PM10 concentration predictions. Hence the extent of the WRD is not relevant in relation to the peak PM10 impacts occurring in calmer conditions.
2. Receptor 5 and 6 are not closer to the site boundary than Receptor 9 for which peak impacts (of all sensitive receptors) were predicted.
3. Receptor 5 and 6 are also located further from the pit activities (compared to Receptor 9) and the intensified haul road and waste rock dumping activities which were assumed as part of the worst case scenario of impacts for the nearest receptors to the south of the mine.
4. Easterly winds are infrequent according to the site wind data.

The dispersion model was updated for this MLP Response Document and is presented in **Appendix 4**. The updates of the dispersion modelling address revisions to the proposed mining operations since the previous study (Appendix 5.6-C of the MLP) and includes an increased waste rock handling rate, updates of the WRD footprint (and also the soil stock piles designated for the WRD remediation) and further extensions for the haul road routes. No other assumptions were revised. To clarify, the modelling updates included:

1. Updated emissions to account for the materials handling increase to 140 Mtpa (125 Mtpa waste materials and 15 Mtpa ore material).
2. Updated WRD areas (including soil stockpiles) to reflect the mine footprint as presented in Figure 6.1-2 of the MLP.
3. Extension of haul road routes to the centre of the WRD areas (see **Response_ 5. Air Quality part (i)** for further details).

The results for the updated dispersion model (**Appendix 4**) identified all sensitive receptors with maximum PM10 predictions and consecutive lower predictions for around the 11 highest concentration days, as shown directly below from Table 2 of **Appendix 4**. The maximum predictions shown in Table 2 of **Appendix 4** include a background concentration of $18.1 \mu\text{m}^3$, which is the average background concentration calculated in Appendix 5.6-C of the MLP.

Percentile plots for receptors with maximum daily average concentrations over $50 \mu\text{m}^3$ have also been presented in **Appendix 4**. For the mining operations real-time monitoring (with daily averaging) in line with the NEPM/NEPC requirements will be undertaken. The outcome measurement criteria for PM10 will align with the air NEPM Standards (*Environment Australia May, 2001*) which states that an ambient PM10 standard of 50 micrograms per cubic metre as a 24-hour average with 5 exceedances permitted per year ($\mu\text{g}/\text{m}^3$). As no Commonwealth region (as defined by Clause 14 of the NEPM standards) meets the NEPM threshold of a population greater than 25,000 people, no direct monitoring is required under the NEPM protocol. However,

the level of 50mg/m³ has been adopted as best current practice in South Australia. Discussion has been provided for the receptors where the peak impacts are predicted.

Table 2: Updated Predicted PM₁₀ Maximum Impacts

Daily Concentrations for Receptors (µg/m ³) ^a											
	1	2	3	4	5	6	7	8	9	10	11
Maximum daily	28.5	32.3	47.3	50.5	43.0	42.2	58.3	97.5	98.5	60.0	77.3
2 nd highest daily	26.7	28.5	42.9	44.6	40.7	36.8	55.0	79.5	94.5	55.3	52.0
3 rd highest daily	25.3	26.9	38.9	43.5	37.2	36.7	50.1	65.5	82.0	48.0	48.1
4 th highest daily	24.6	26.2	38.3	41.7	33.3	35.2	46.5	59.4	74.3	43.0	46.2
5 th highest daily	24.5	25.3	36.2	40.7	32.8	30.8	43.8	59.0	70.9	36.2	45.8
6 th highest daily	24.2	25.1	35.3	39.6	32.6	30.4	41.1	58.4	67.8	33.2	45.7
7 th highest daily	24.0	25.0	33.2	38.9	32.3	29.3	40.9	56.6	62.2	32.8	40.2
8 th highest daily	23.6	24.7	32.9	38.1	29.1	28.4	40.8	53.8	60.9	31.7	39.0
9 th highest daily	23.1	24.4	31.2	37.4	28.4	27.6	40.3	53.4	60.5	31.4	36.1
10 th highest daily	23.0	24.2	30.7	34.3	28.4	27.1	38.4	49.9	59.1	30.6	35.6
11 th highest daily	22.8	23.5	30.6	33.7	28.4	26.9	37.0	47.2	49.5	30.1	34.3
Annual avg ^b	17.1	17.3	18.4	18.8	18.6	18.0	18.9	21.0	22.2	18.4	19.0

a. Maximum predictions including a background concentration of 18.1 µg/m³.

b. Annual average background concentration of 16.5 µg/m³ applied (calculated for the same period for Whyalla data as the 70th percentile background concentration)

b) The current modelling is based on a mining rate that is significantly (75 Mtpa vs. 131 Mtpa) less than that proposed within the MLP.

The Dust and Odour Impact Assessment Report as presented as Appendix 5.6-C of the MLP was based on the assessment of a mine processing rate of 15 Mtpa of ore and 60 Mtpa of waste rock. The waste rock handling rate was calculated as an annual average material handling rate of waste rock (based on a total of 900 MT of waste rock and the mine life time of 15 years). This approach was taken since the mine design had not progressed to the level of detail where annual waste rock handling rate information was available when the study was first undertaken. This is associated with the operating 4:1 strip ratio.

The update of the dust study is presented in **Appendix 4** and reflects the higher waste rock handling rates as proposed for the mining operations on the MLP with a peak handling of 140 Mtpa (125 Mtpa waste materials and 15 Mtpa ore material).

c) The current modelling is based on daily mine blasting versus the proposal to blast every second day presented within the MLP (i.e. less frequent but larger blasts).

The air quality modelling as presented Appendix 5.6-C of the MLP assumed that the size of an open pit blast is 500,000 tonnes and is blasted every day. This frequency was overstated to model the case scenario. This ensures that the dust impacts from blasting have been included in all daily dispersion conditions in the model. The proposed blasting schedule as stated in the MLP is for one open pit blast every two days. The size of the blasts remains the same.

d) The estimation of dust emissions from the ship loading operations is based on a transfer rate of 2,000 t/h versus the 2,400 t/h proposed in the MLP.

As this relates to the loading facility, it is outside of the scope of the MLP Application and will be assessed under Section 49 of the Development Application process.

For information only, the ship loading operations were assessed for a materials handling rate of 2,000 t/hr, which is the current standard operating capacity of the loading system. It is understood that the 2,400 t/hr materials handling rate is a reference to the peak conveyer system handling rate capacity which is part of standard design specification details. The proposed materials handling rate is 2,000 t/hr, not the peak conveyer system handling rate capacity of 2,400 t/hr.

Further to the assumptions on the ship loading it was conservatively assumed that each loading event would occur continuously over a 48 hour period despite that the total loading time requirements is closer to 24 hours but broken up in periods to account for low tide etc.

5. AIR QUALITY

In addition, further clarification is required on elements of the air quality impact assessment. Where necessary (i.e. where confirmation is not possible), revisions relating to these matters must be included in the updated model.

a) Confirmation that topography associated with the WRDs/TSF and other stockpile structures were incorporated into the dust dispersion model. No discussion is presented within the MLP to suggest this was included.

The heights of the WRD were incorporated into the modelling in terms of release heights of emissions. The topography of the WRD areas was not included in the terrain data for the meteorological modelling. Overall considering the level of detail assumed in the meteorological modelling is based on a 45 km by 45 km domain with a 300 m grid point resolution it was assumed that the topographical features of the WRD areas would not have a significant impact on the outcome of the modelling. Terrain heights entered for dispersion modelling are normally based on the average elevation within each grid cell.

b) Justification/additional support for the use of 4.3% silt content for haul roads in preference to the 8.4% originally proposed/modelled.

As per Section 8.3.1.1 of the MLP;

Two methods were employed to calculate the control efficiencies for wheel-generated dust (unpaved roads) as the results identified that haul truck wheel-generated dust is the main contributor to dust concentrations at peak impact conditions. The main body of Appendix 5.6-C used sprays of hygroscopic salts such as calcium and magnesium chlorides for dust control with a control efficiency of 93% (Rushing & Tingle, 2007) which showed 2-3 days that exceeded the criteria (with no shutdowns or adjustment of operations to reduce emissions at critical times). To test the efficiency levels of the proposed dust controls, the efficiencies were reduced for the purposes of a sensitivity analysis (Appendix B of Appendix 5.6-C of the MLP) which employed the control efficiency factor of 83.5% (Cowherd, Muleski, & Kinsey, 1988). One additional day per year would exceed the air quality standard is predicted to occur using the control efficiency factor of 83.5% versus the efficiency of 93%. Hence, the two methods employed for the control efficiencies of wheel generated dust resulted in similar outputs supporting the assumptions used.

The percentage of silt content in the haul roads was discussed in Section B.2.2.2 (see text extract below) of Appendix 5.6-C of the MLP dated 31 July 2013; *In reconsidering the haul road dust control the haul road surface silt content was also revised. The haul road surface silt content applied in the main body of the MLP report was very conservative at 8.4% (US EPA, 2006b). For this revision the surface silt content was amended to a lower available reference of 4.3% (US EPA, 1998) to reduce the level of conservatism applied. However, these surface silt contents should be viewed in consideration of recent haul road surface silt samples taken in New South Wales providing an average silt content of 2.7% across three mines (PAE Holmes, 2013). The relevance of the surface silt data for better accuracy in emissions estimation is becoming more recognised and the previous reliance on literature data for this parameter is starting to become replaced with actual data. There is, however, limited data for Australian conditions. Emission rates estimated based on the different silt contents are presented in Table B.2.2 of Appendix 5.6-C of the MLP, where they are compared to the haul road emission rates applied in the Olympic Dam Expansion dust study. As can be seen, the applied haul road uncontrolled dust emission rates for PM10 and TSP are higher, and hence more conservative, than the Olympic Dam Expansion dust study haul road emission rates.'*

It should be recognised that there is a limited amount of data available in this area and PEL's interpretation of the level of conservatism regarding the 8.4 % silt loading was made by comparing data collected by PEL and the other data quoted. Also consideration was given to the fact that the haul road construction and maintenance will have to be to a very high standard due to the haul truck weights and the rate of traffic for the proposed mining operations.

In regard to the revisions of the assumptions used in the air quality model, the dispersion modelling methodology for impact assessments should firstly apply assumptions as conservative as possible (e.g. for existing mines, site specific emissions data can be measured but that is not an option for proposed activities that have not yet commenced as this data is not available). As more information becomes available (once an operation commences) and as the study becomes more refined, the assumptions and level of conservatism can be revised. If overly conservative assumptions are retained in excess throughout an assessment the outcome of the modelling predictions become unrealistic and misleading in the interpretation of the expected level of impact and the level of controls required.

Furthermore, Rex will adopt best practice haul road construction (by reducing silt content as far as practical) and maintenance regimes, guided by the procedures indicated in **Appendix 5A** and **Appendix 5B** and a market capability search when final engineering is undertaken. Rex have recently been approached by a specialist pavement design and construction company with a view to them providing a mine haul road solution for the site that purports to exceed by significant margins all industry standard mine haul road performance criteria. Rex is excited by this possibility to again demonstrate our ongoing commitment to seeking out better solutions for all stakeholders.

Reference:

- US EPA 2006, *Unpaved Roads*, AP-42 Fifth Edition Volume I. Chapter 13.2.2, US EPA.
- US EPA 1998, *Western Surface Coal Mining - Final Section*, AP-42 Fifth Volume 1, Chapter 11.9, US EPA.
- PAEHolmes 2013, *Generation, Measurement, and Control of Dust Emissions from Unsealed Haul Roads*, ACARP Project C20023.

c) Test/sampling data indicating the likely in-situ moisture content of the waste rock and ore which is variously described as “greater than 4%”, 4.8% and 10% within Appendix 5.6-C of the MLP.

The greater than 4% in-situ moisture content was used as it is used in similar open cut mines where the ore is delivered to a primary crusher. The ore fed to the Hillside concentrator will be a mixture of direct tipped ore into the surface crusher (which will have relatively high moisture content) and blended stockpiled ore which will be drier as it may sit on the ROM pad for a few days before being treated. However, this number will likely be an under estimate as the ROM pad will be deliberately watered to suppress dust. Also the amount of tonnes that will be required to be re-handled from the ROM pad will be a low percentage.

- The number 4.8% was used for the moisture content of the waste rock and ore for emission factor equation inputs for miscellaneous transfers. This number was sourced from the US EPA upper limit of moisture content range.
- 10% was used for waste rock and ore moisture content for emission factor equation inputs for bulldozing. The 10% moisture content was derived from similar situations in an open cut mine where the ore and waste are dewatered ahead of blasting and mining with hydraulic shovels (noting that the orebody is currently under the water table and dewatering will be required). Therefore the waste rock and ore will be sufficiently damp which will assist in controlling the generation of dust within the open pit.
- It is anticipated that dewatering sumps within the open pit will supply a significant proportion of the water for the processing plant and that all benches will have dewatering holes to reduce the pore pressure at the pit walls.

d) Test/sampling results indicating the likely mineral/metals composition of ore and waste rock dust as referenced in Section 8.3.1.4 of the MLP.

The sampling results indicating the likely mineral/metals composition of ore and waste rock dust as referenced in Section 8.3.1.4 of the MLP are contained within Table 5 directly below. For further information see **Appendix 5C** for the waste rock characterisation test work (phase 1).

Table 5: Minerals/metals composition of ore and waste rock

Element	Units/ %	Ore Average	Waste Average
Cu	ppm	5207.01	313.61
Au	ppm	0.15	0.01
U	ppm	48.08	14.62
Ag	ppm	0.88	0.39
Fe (ICP)	%	12.14	6.53
Fe (xrf)	%	16.48	8.40
La	ppm	148.88	62.97
Ce	ppm	218.27	106.20
Cl	%	0.05	0.05
SiO ₂	%	47.89	57.24
As	ppm	5.96	5.56
Ba	ppm	478.01	636.74
Bi	ppm	1.98	1.36
Ca	%	3.27	2.50
Cd	ppm	0.27	0.26
Co	ppm	99.39	36.03
Cr	ppm	26.20	35.59
K	%	1.71	2.68
Mg	%	2.85	2.47
Mn	ppm	1150.59	820.56
Mo	ppm	1.73	1.33
Na	%	0.67	1.15
Ni	ppm	34.05	21.78
P	ppm	769.79	534.46
Pb	ppm	19.05	8.80
S	%	0.89	0.11
Sb	ppm	2.79	2.93
Sr	ppm	32.07	35.24
Ti	%	0.23	0.34
V	ppm	62.61	92.53
Y	ppm	21.06	17.63
Zn	ppm	77.14	48.26
Al	%	4.75	6.04

e) The results of baseline rainwater tank sampling as referenced in Section 8.3.1.4 of the MLP.

In Section 8.3.1.4 of the MLP, Rex stated; 'Sampling and testing of water quality in two rainwater tanks at James Well and Rogues Point carried out by Rex in December 2012 demonstrated that the water quality in the tested tanks is within Australian Drinking Water standards and has very low levels of minerals and metals'. This data has been provided in Table 6 below.

The rainwater tank sampling was undertaken in accordance with **Appendix 5D** as per the Queensland's State Government procedure. The rainwater analysis was undertaken by a NATA accredited laboratory, Eurofins, as per **Appendix 5E**.

Additional sampling is currently being undertaken at rainwater tanks located at James Well, Rogues Point, Pine Point and surrounding landowners totalling 18 proposed testing sites. The baseline data from the additional sampling will be included in the PEPR.

Table 6: 2012 Rainwater tank sampling baseline data

Element	Units	Rain Water Tank 1	Rain Water Tank 2	Australian Drinking Water Standards
pH	pH	6.4	6.4	6.5 to 8.5
Total Dissolved solids	mg/L	62	54	500 (Less than 80 is excellent)
Nitrate/nitrite	mg/L	0.73	0.37	3.0
Chloride	mg/L	17	16	250
Copper	mg/L	0.015	0.002	2.0
Nickel	mg/L	0.001	0.001	0.02
Zinc	mg/L	0.085	0.037	3.0
Sodium	mg/L	16	15	20

f) The results of the baseline TSP metals concentration analysis referenced in Section 5.6.2.3 of the MLP.

The results of the baseline TSP metals concentration analysis are been provided in Table 7 below.

Table 7: Hi Volume air particulate metals analysis baseline data

Sample date:	Arsenic	Cadmium	Chromium	Copper	Nickel	Lead	Zinc
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³
6/01/2013	<0.0003	<0.0003	0.0042	N/A	0.0025	0.0015	0.0233
13/01/2013	<0.0003	<0.0003	0.0044	N/A	0.0026	0.001	0.0244
18/01/2013	<0.0003	<0.0003	0.0038	N/A	0.0021	0.0011	0.0251
24/01/2013	0.0004	<0.0003	0.0069	N/A	0.0027	0.0036	0.0471
30/01/2013	<0.0003	<0.0003	0.0036	N/A	0.002	0.001	0.0272
5/02/2013	<0.0003	<0.0003	0.0039	N/A	0.0021	0.0015	0.0322
11/02/2013	<0.0003	<0.0003	0.0044	N/A	0.0028	0.0015	0.0348
17/02/2013	0.0003	<0.0003	0.005	N/A	0.0036	0.0049	0.0348
24/02/2013	0.0004	<0.0003	0.005	N/A	0.0028	0.0043	0.0349
1/03/2013	<0.0003	<0.0003	0.0024	0.0027	0.0006	0.001	0.0077
7/03/2013	<0.0003	<0.0003	0.0061	0.0068	0.0008	0.0024	0.0221
14/03/2013	<0.0003	<0.0003	0.0033	0.0021	0.0006	0.0008	0.0062
20/03/2013	<0.0003	<0.0003	0.0046	0.004	0.0011	0.0019	0.0098
26/03/2013	<0.0003	<0.0003	0.0171	0.0085	0.0052	0.0085	0.037
28/03/2013	<0.0003	<0.0003	0.0029	0.0024	0.0005	0.0008	0.0114
2/04/2013	<0.0003	<0.0003	0.0027	0.0025	0.0005	0.0011	0.0096
8/04/2013	<0.0003	<0.0003	0.0039	0.0024	0.0008	0.001	0.0142

Sample date:	Arsenic	Cadmium	Chromium	Copper	Nickel	Lead	Zinc
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³
16/04/2013	<0.0003	<0.0003	0.0035	0.0023	0.0004	0.0014	0.0113
21/04/2013	<0.0003	<0.0003	0.003	0.0017	0.0005	0.0009	0.0098
28/04/2013	<0.0003	<0.0003	0.0046	0.0022	0.001	0.0013	0.0114
4/05/2013	0.0004	<0.0003	0.002	0.004	<0.0003	0.0018	0.0217
9/05/2013	0.0007	<0.0003	0.0041	0.0044	<0.0003	0.0058	0.0211
15/05/2013	<0.0003	<0.0003	0.0018	0.0032	<0.0003	0.0006	0.0228
21/05/2013	0.0003	<0.0003	0.0033	0.0043	<0.0003	0.0131	0.028
27/05/2013	<0.0003	<0.0003	0.0028	0.0042	<0.0003	0.0026	0.0296
3/06/2013	<0.0003	<0.0003	0.0017	0.0031	<0.0003	0.0007	0.0176
8/06/2013	<0.0003	<0.0003	0.0019	0.0035	<0.0003	0.0029	0.0189
14/06/2013	<0.0003	<0.0003	0.0015	0.0036	<0.0003	0.0006	0.0154
19/06/2013	0.0008	<0.0003	0.0023	0.0045	<0.0003	0.0058	0.021
26/06/2013	0.0005	<0.0003	0.0028	0.0048	<0.0003	0.0055	0.0308
2/07/2013	<0.0003	<0.0003	0.0019	0.0024	<0.0003	0.0025	0.014
20/07/2013	<0.0003	<0.0003	0.0036	0.0023	0.0004	0.0009	0.0111
25/07/2013	0.0006	<0.0003	0.0028	0.0044	0.0006	0.0081	0.0252
2/08/2013	<0.0003	<0.0003	0.0025	0.0036	0.0004	0.0015	0.0121
6/08/2013	<0.0003	<0.0003	0.004	0.0039	0.0007	0.0007	0.0125
12/08/2013	<0.0003	<0.0003	0.0035	0.0035	0.0006	0.0007	0.0157
19/08/2013	<0.0003	<0.0003	0.0024	0.0034	0.0004	0.0008	0.015
24/08/2013	<0.0003	<0.0003	0.0037	0.0054	0.0009	0.0063	0.023
31/08/2013	<0.0003	<0.0003	0.0027	0.0033	0.0006	0.0038	0.012
5/09/2013	<0.0003	<0.0003	0.0032	0.0039	0.0007	0.0012	0.0183
11/09/2013	<0.0003	<0.0003	0.0029	0.0038	0.0006	0.0008	0.0159

g) Justification for the use of the US EPA AP-42 “Aggregate Handling and Storage Piles” emissions factors for the loading and unloading of ore and waste rock material to/from haul trucks (Sections A.1.1.2 and A.1.8 of Appendix 5.6-C of the MLP) and in preference to other emissions factors such as those for haul truck unloading of overburden and the loading of overburden with excavators/shovels presented within Table 2 of the National Pollutant Inventory Emission Estimation Technique Manual for Mining (v3.1).

The National Pollutant Inventory (NPI) Emission Estimation Technique Manual for Mining (Australian Government, January 2012) recommends using the AP-42 equation when estimating emissions from loading/unloading of ore. The NPI Manual for Mining states that;

‘The emission factors presented in this manual should be used with caution. You should always consider the range of conditions under which the factors were developed to assess whether the factors are suitable for the particular activity being considered. To assist in assessing the suitability of a specific emission factor for your particular operations, a detailed discussion of the sources of the various emission factors presented can be found in Appendix A of this manual. USEPA emission factors are published in a large number of references, and are often referred to in different ways. The most comprehensive compilation of emission factors is that in the USEPA document referred to as AP-42.’

In Section 1.2.2 of Appendix A of the NPI Manual states that; *'It should be noted that using the NERDDC (1988) equations for coal mine overburden to estimate emissions from the handling of ore may exaggerate emissions from ore handling, given that overburden is frequently weathered, and is likely to contain a higher fraction of fine material than many ores.'*

Therefore, in regards to using the Aggregate Handling and Storage Piles emission factors (AP-42) verses using emission factors for the handling of coal applied to handling of ore and waste rock, AP-42 is believed by PEL to be more appropriate for Hillside.

The model is requested *'to provide a realistic worst case (conservative) assessment'*. To provide this, careful consideration of all assumptions is required. If careful consideration is not applied and overly conservative emission factors and/or assumptions are used, then the result of the assessment is an overly conservative unrealistic model of the predicted impacts. We also discussed this and how conservatism should be applied in dispersion modelling in **Response_5. Air Quality part (b)**.

From a worst impact case perspective, the maximum material handling rate is applied continuously in the modelling assessment, even in the worst dispersion conditions. With the pro-active dust management in place adjustments will be made in the mining rate depending on what the conditions permit. Hence, PEL have applied, an in our view, appropriate emissions factor to a conservative operations pattern. To go in with an overly conservative emissions factor and a conservative operations pattern would in our view not produce *'a realistic worst case (conservative) assessment'*. In our view that would produce overly conservative predictions of the level of dust impacts.

Reference:

Australian Government, January 2012, *National Pollutant Inventory Emission Estimation Technique Manual for Mining*, Version 3.1, Department of Sustainability, Environment, Water, Populations and Communities.

h) Confirmation that the 2,000 kg/t ship loading rate referenced in Table 11.41 of Appendix 5.6-C of the MLP is a typographical error, and that the rate assumed was actually 2,000 t/h (or 2400 t/h?)

As this relates to the loading facility, it is outside of the scope of the MPL Application and will be fully assessed under Section 49 of the Development Application process.

For information, Rex confirms that the 2,000 kg/t ship loading rate referenced in Table 11.41 of Appendix 5.6-C of the MLP is a typographical error, and that the rate assumed is actually 2,000 tph.

Rex also confirms that any reference to 2,400 tph relates solely to the design specification for the conveyor - this was used so that there will be contingency within the design to handle any peak situations and ensure no spillages. The current conveying and ship-loading facility operates at 2,000 tph.

- i) Justification for limiting the location (and hence total length) of haul roads to the areas immediately surrounding the open pit and the southern extent of the Western WRD as shown in Figure 3.1 of Appendix 5.6-C of the MLP. In practice it is assumed that haul trucks will be required to travel via haul roads to tip points located all across the WRDs, potentially resulting in significantly greater haul road length than modelled and potentially broader distribution of dust impacts. Justification sought that the modelling does represent worst case scenario for receptors.***

Concentration of activity was assumed to produce worst case impacts at the nearest receptors to the south of the mine (in light northerly wind directions). As part of the modelling revision to address the increased waste rock handling rate this is also addressed (refer to **Response_4. Air Quality** and **Appendix 4** for further details). The modelling updates in **Appendix 4** include:

1. Updated emissions to account for the materials handling increase to 140 Mtpa (125 Mtpa waste materials and 15 Mtpa ore material).
2. Updated WRD areas (including soil stockpiles) to reflect the mine footprint as presented in Figure 6.1-2 of the MLP.
3. Extension of haul road routes to the centre of the WRD areas.

As stated above, part of the modelling update included revising the haul road routes to now reach into the centre of WRD areas. A central haul road end location represents the average distance travelled at the WRD since the distance is longer or shorter depending on where material is taken at any time. A central location is also a reasonable representation of operating conditions which will see constant variations in the areas of operation which also will be directed depending on the day to day conditions. An example of this is that intensive operations will not occur near a boundary in a down wind direction of a near receptor in the worst case conditions. This can be avoided by active management of the operations as per **Response_115. Air Quality**.

- j) Confirmation that the emissions estimation for wheel-generated dust included the total haul truck distance travelled per load, i.e. the distance associated not only with the loaded truck traveling to tip points on the ROM stockpile and WRDs, but also including estimates of dust generation for the return (empty) trip back to the open pit operation.***

The emission estimation for wheel-generated dust includes return trips and is calculated for the average haul truck weights (loaded and unloaded).

- k) Confirmation that wind erosion emissions from topsoil and subsoil stockpiles located adjacent to the open and surrounding the Western WRD (see Figure 6.5-12 of the MLP) were excluded from the modelling based on an assumption that successful revegetation would result in no erosion-based emissions.***

Confirmed, the soil stockpiles were not included in the modelling as described in Appendix 5.6-C of the MLP. However, for the revised modelling as presented in **Appendix 4**, includes the soil stockpiles as a part of the increased waste rock handling rate.

l) Provision of details related to the design and operation of the primary crusher enclosure to allow an assessment of the appropriateness of the nominated crusher loading emission and dust control factor to be undertaken.

For the assessment presented in Appendix 5.6-C of the MLP, a particulate total control factor of 85% was assumed for the enclosure and water sprays. The details of the specifications for required enclosures have not been considered in the Dust and Odour Impact Assessment presented in Appendix 5.6-C of the MLP.

In relation to the estimated emissions from the crusher loading, a materials handling and transfer emissions factor from AP42 was applied. This emission factor is 4.7 times higher than the truck unloading emission factor for PM10 and 5.6 times higher than the truck unloading emission factor for TSP and can as such be considered conservative.

During operations, dust emissions from the crusher (only dry part of the processing) will be continuously evaluated and if required, further mitigation measures will be investigated and implemented. Details of the primary crusher enclosure will be provided in the PEPR.

m) Justification for not including emission factors related to wind erosion for other (non-stockpile) cleared surfaces including haul road surfaces.

Wind erosion emissions from the WRD and ROM pad were included in the model presented in Appendix 5.6C of the MLP. For higher frequency trafficked haul roads it can be assumed that wind erodible dust is suspended/emitted with the wheel generated dust emissions.

The field of emissions estimation is not a fully established science with “adopted correct” methodologies for emissions estimation. It is a field that evolves as new information becomes available and depends on how information and data is interpreted. PEL does some of this development work, specifically for the Australian Coal Association Research Program (ACARP), and PEL are familiar with the process.

For haul roads with frequent traffic (in the order of one haul truck every minute as will be the case for the Hillside Project), PEL’s current understanding is that any, available to be suspended surface, dust should be suspended as haul trucks pass. Another significant differentiator between haul roads and other open spaces such as the WRD areas (where wind erosion occurs) is that haul roads will be treated much more frequently with water sprays to suppress dust. This increases the moisture content of haul road surface dust which is also favourable in terms of reduction of wind erosion potential.

Further, as discussed in the results sections of Appendix 5.6 C of the MLP wind erosion contribution is not seen in the predicted peak impact conditions since these occur in more stable conditions with wind speed conditions lower than the threshold for wind erosion to occur as discussed in ***Response_120. Air Quality.*** Therefore it is considered that the air quality model presents the worst case scenario which occurs under stable wind conditions, not high wind conditions.

n) Discussion regarding the potential for dust and saline aerosol emissions from the installation and operation of underground raise ventilation bores.

An evase will be installed so any potential dust and saline aerosol emissions will be directed into the open pit. These emissions will have no impact on surrounding remnant native vegetation or adjacent cropping land as there will be no deposition from the air emanating from the ventilation shafts as there will be no remnant native vegetation within the open pit. An example of an evase is shown below in Figure 3.



Figure 3: Example of an evase (Source; Synergy Controls
<http://www.synergycontrols.com/index.php?category=3&manufacturer=32>)

o) Justification for the failure to assess dust-related health impacts against relevant annual PM₁₀, and 24-hour and annual PM_{2.5}, criteria in accordance with the latest health science presented in the 2011 Ambient Air Quality NEPM Review Report.

The PM₁₀ modelling has been undertaken in accordance with NEPM guidelines. The potential impacts associated with air quality were assessed against the proposed assessment criteria as discussed with the regulators and presented in Section 8 of the MLP document. There was no mention of assessment requirements for PM_{2.5} in any of the extensive consultation undertaken with DMITRE or the SA EPA.

The relevance of air quality impact assessments pertaining to PM_{2.5} is limited considering that the quality of the PM_{2.5} emissions data is not as valid as for PM₁₀. The availability of PM_{2.5} background data is also limited especially for regional locations; consequently comparisons are not able to be made against any data sets in the Yorke Peninsula region.

PM_{2.5} cannot be calculated as a fixed fraction of PM₁₀ due to the various sources of dust and their varying particle size distribution. Furthermore, the bulk of the PM_{2.5} emissions from mining operations relate to diesel exhaust vehicle emissions. The majority (77%) of PM₁₀ modelled dust emissions at Hillside are generated from wheel dust from mobile equipment as per **Response_2. Air Quality**.

The value of the PM_{2.5} assessment is limited and that it is doubtful if there would be any issues that would be picked up on in a PM_{2.5} assessment that would not be highlighted in a PM₁₀ assessment (also considering that the PM_{2.5} results are more uncertain). Therefore by controlling the PM₁₀ emissions, the percentage of PM_{2.5} within the PM₁₀ will also be controlled in line with current PM₁₀ NEPM standard of 50 µg/m³.

p) Justification for the use of annual average TSP and dust deposition as measures of potential impacts to amenity in preference to averaging periods of shorter duration (hourly/daily) which may better reflect the likely conditions that will effect individuals/communities perceptions of dust.

The averaging periods for the assessment criteria as proposed were applied for the results as presented in Appendix 5.6 C of the MLP.

There is no TSP standard for amenity dust. Therefore the only practical method of measuring amenity dust is through static deposition gauges and using control sites. In discussion with the State Government regulators, control sites may be used to provide a comparison of the levels of dust deposition on the proposed Hillside site and dust deposition experienced in surrounding areas on the Yorke Peninsula. This will monitor that the amount of dust deposition that occurs on areas surrounding the proposed mine site (which includes land used for cropping) at Hillside will be similar to that experienced elsewhere on the Yorke Peninsula.

The annualised monthly average dust deposition rate results show that the peak impacts are predicted for the two closest residential receptors (receptor's 8 and 9 [as per **Response_2. Air Quality**]). Looking at time series extracted data for monthly deposition rates for the sensitive receptors the results present a similar picture. The peak impacts are predicted for receptor 9 and 8 with three months of the dust deposition rates at or above 2 g/m² month (2.0, 2.4 and 2.8 g/m² month) for Receptor 9 and one month above 2 g/m² month (2.2 g/m² month) for Receptor 8. It can be concluded that the peak deposition rates are to be expected occur for the nearest receptors, receptor 8 and 9, and that the predicted deposition rates for these two receptors are about twice the rates for some of the other receptors.

In conjunction with the monthly dust deposition monitoring, Rex will use real time PM10 monitoring to inform the control of operations to manage dust. PM10 is an indicator of TSP which in turn is an indicator of dust deposition (nuisance) dust.

q) The provision of additional information as required to give context to the modelled dust deposition rates and the toxicological properties of the dust, such as data to allow the comparison of predicted rates and concentrations against standards, guidelines and/or other sources of 'exposure-response' data for each identified potential impact to allow the likely impacts of the Project to be quantified (e.g. a comparison of the likely build-up of copper in rainwater tanks against the Australian Drinking Water Guidelines criteria for copper and/or the predicted concentration of copper in stored grain against food consumption- related criteria taking into account the rate of turnover of the grain storages).

The potential impact of build-up of copper or other metals in rainwater tanks has been assessed in Section 8.3.1.2 (MLP) in ML-A2 Human health impacts resulting from the contamination of rainwater tanks with dust from the mining operation.

Sampling and testing of water quality in two rainwater tanks at James Well and Rogues Point carried out by Rex in December 2012 demonstrated that the water quality in the tested tanks is within Australian Drinking Water standards and has very low levels of minerals and metals. Given the distance from the mine site, the low predicted deposition rates (0.2g/m²/month) at receptor three (Figure 8.3-3) and the predicted low levels of minerals potentially hazardous to human health within ore based on core samples, is not credible. Controls are not required to be implemented due to the low primary risk, however due to the amenity and health related dust emissions, controls will be implemented for other dust related impacts. Additional sampling is

currently being undertaken at rainwater tanks located at James Well, Rogues Point, Pine Point and surrounding landowners totalling 18 proposed testing sites. The baseline data from the additional sampling will be included in the PEPR along with an ongoing monitoring plan.

Supplementary question from DMITRE:

- r) Rex to describe the risk and management of erosion and dust generation from the TSF during operation and post-cessation of operations, given the potential for lengthy consolidation time before capping can be undertaken. Further comment is also sought on the risk of TSF capping being impractical to achieve.**

There is no credible risk associated with erosion of the tailings surface through stormwater as it not have any significant impact on the TSF development as tailings deposition is continuous and irregularities will be filled in as tailings deposition is cycled through the spigots around the facility.

Dust Generation from Tailings Surface Risk Assessment

Potential Impact Event

Excessive dust generated from the tailings surface causing increased dust emissions to receptors.

Control and Management Strategies

During Operations

- Elevated salinity levels of the tailings slurry will assist to form a crust on the surface of the tailings beach when allowed to dry. The crust will assist to resist the generation of dust.
- Monitor air quality monitors and weather patterns to identify high risk periods.
- Cycle through the deposition spigots at a faster rate (thinner tailings layers) during times of high risk in order to maintain a larger 'wet' beach that will reduce the potential of dust generation.
- Install wind breaks on the embankment crest or install and operate dust suppression irrigation systems during unfavourable times when excessive dust is likely to be generated.

Dust generation will be limited to the areas of the TSF where no tailings deposition is taking place. These areas will however develop a crust through drying and desiccation.

Closure Controls and Management:

- Elevated salinity levels of the tailings slurry will assist to form a crust on the surface of the tailings beach when allowed to dry. The crust will assist to resist the generation of dust.
- Monitor air quality monitors and weather patterns to identify high risk periods.
- Install wind breaks on the embankment crest or install and operate dust suppression irrigation systems during unfavourable times when excessive dust is generated.

Evaluation of Risk Levels

The likelihood of impacts of dust generated from the tailings surface is considered unlikely, but will be reduced to a risk level of low by implementing the control measures stated above. However the consequence from dust generated from the tailings surface is considered minor for the primary risk level (prior to controls).

Potential Impact	Primary Risk Level		Primary Control Measures	Residual Risk Level		Level of Risk	ALARP
	Likelihood	Consequence		Likelihood	Consequence		
Excessive dust generated from the tailings surface causing increased dust emissions to receptors.	Unlikely	Minor	Control measures as outlined above.	Rare	Minor	Low	Yes

Justification for Acceptance of Residual Risk

Dust generated from the tailing surface will not affect the surrounding residents as the level of residual risk is low (including land uses (farming), local fauna and flora and the aesthetics of the area to visiting tourists). Proven dust suppression techniques are able to minimise the likelihood.

Proposed Outcome

Refer existing air quality outcomes; no additional risk has been identified.

Draft Outcome Measurement Criteria

Refer existing air quality outcomes and corresponding draft outcome measurement criteria; no additional risk has been identified.

Monitoring Program

The air quality monitoring program will be specified in the PEPR.

Additional Information Request

Tailings Beach Slope

A beach slope is formed after tailings material has been deposited within the facility. The slope is dependent on the tailings discharge solids content, segregation threshold and rheology. The measured segregation threshold is below the expected discharge solids content, which indicates that there will be little or no segregation or sorting on the beach.

Tailings beach slopes are related to the sheared yield stress and viscosity, as well as the total flow in the tailings stream. Increases in sheared yield stress and viscosity result in an increase in the beach slope of the tailings surface. Reducing the flow in a tailings stream increases the beach slope, thus the number of tailings discharge points is an important consideration.

The beach slope design has been based on the adopted tailings discharge solids content of 58 %. Using this solids content, and based on particle size distribution, mineralogy and rheology, the test results for the bulk floatation tailings indicate beach slopes in the following ranges:

- 1 to 2 discharge points: 0.5 – 0.9 %
- 2 to 3 discharge points: 0.9 – 1.1 %

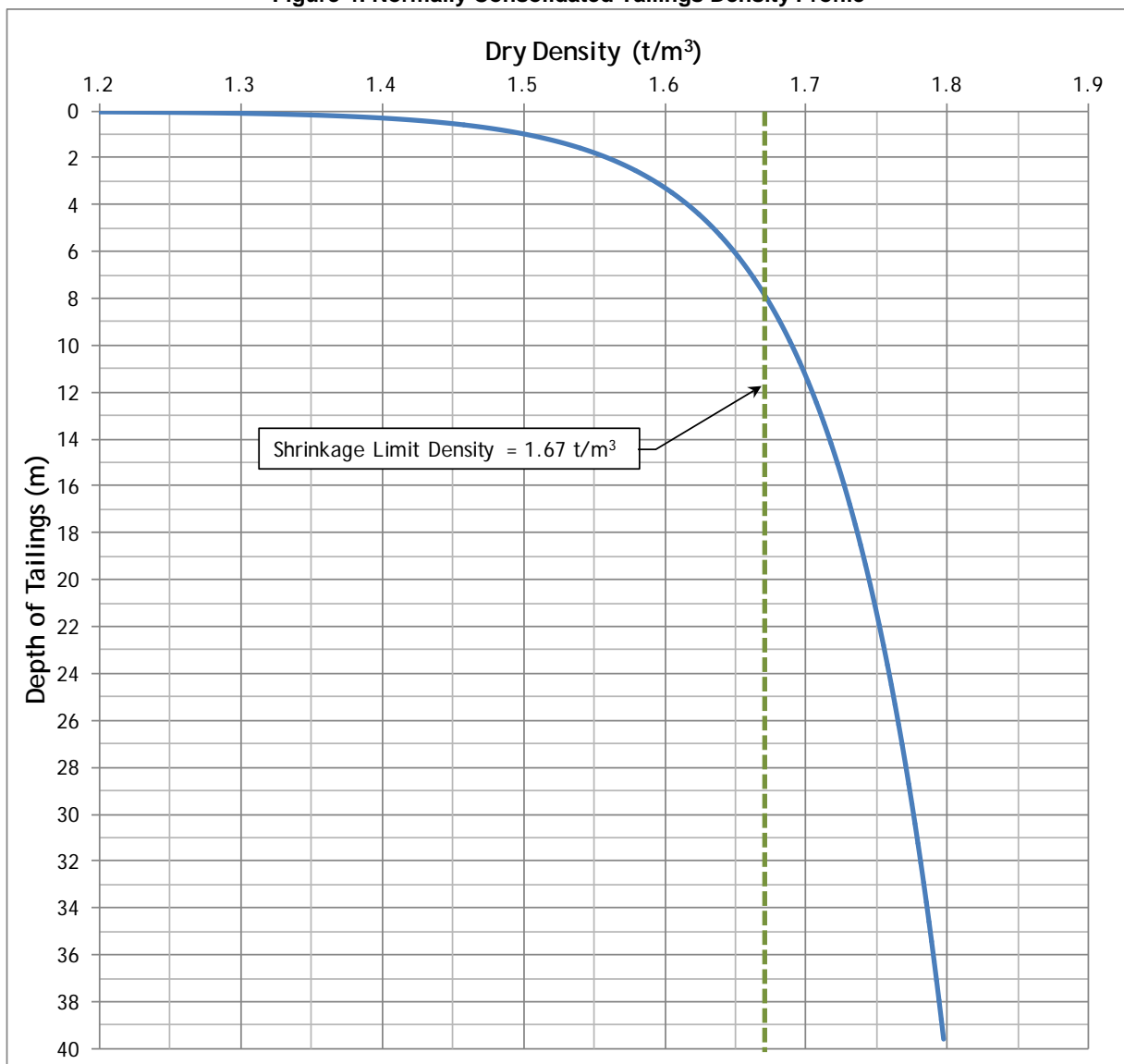
The “rule of thirds” has been applied to the overall average slope to account for a concave effect. This results in the following adopted profile, on the basis that a maximum of three discharge points operating at any one time:

- Top 1/3 of beach: 1.0 %
- Middle 1/3 of beach : 0.7 %
- Bottom 1/3 of beach : 0.5 %

Tailings Consolidation

Detailed tailings consolidation testing and modelling of the Hillside tailings has been completed. The process was studied using software developed by ATCW specifically to model large strain consolidation of tailings deposits. The results indicate that the tailings are normally consolidated or over consolidated due to desiccation. An investigation of the tailings density profile with depth was carried out and the results are summarised in Figure 4 below.

Figure 4: Normally Consolidated Tailings Density Profile



It is evident that the tailings will be at least normally consolidated during the majority of the deposition period. This is due to the expected overall low rate of rise of the deposited tailings (approximate overall average of 3 m/year) and the relatively high values of coefficient of consolidation (cv) obtained for the tailings laboratory testing (ranging from $1.11 \times 10^{-7} \text{ m}^2/\text{s}$ at 1 kPa to $1.74 \times 10^{-5} \text{ m}^2/\text{s}$ at 1,000 kPa).

The typical depth of tailings required to exceed the shrinkage limit density is approximately 8 m. Under normal operating conditions the dry beach area will develop a crust relatively quickly, and desiccation, accompanied by surface cracking, will commence.

It is important to note that the consolidation profile shown in Figure 4 neglects the desiccation effects of evaporative drying on the exposed beach. If the Shrinkage Limit Density is superimposed on the density profile, it can be expected that most of the shallow tailings will achieve a significantly higher density than the normally consolidated profile, as a direct consequence of evaporative drying.

Closure

The overall rate of rise of the TSF is in the order of 3 m/year. The consolidation testing results indicate that the tailings is likely to reach the shrinkage limit density during operation in a relatively short space of time.

It should be noted that ATCW have successfully completed upstream embankment raise designs and construction on copper tailings during operations in the past. The results of the consolidation and laboratory testing indicate that the tailings are likely to be normally consolidated and it is therefore anticipated that capping of the TSF should be able to commence over the upper portion of the beach shortly after deposition cessation. Capping the decant pond area is likely to require more time however the uncapped area can be limited during the progressive capping procedure by minimising run-off into the decant pond area where possible.

Maximum Water Storage Capacity on TSF

It is proposed that the maximum allowable volume of water contained within the TSF be limited by the following:

- The pond should be no less than 500 m from the upstream (i.e. discharge side) embankment crest (measured perpendicular at any point along the crest line) as detailed in the TSF Operations and Maintenance Manual.
- An overall pond depth limitation of 5 m above the general beach profile at the toe (but excluding possible local deeper areas directly beneath the decant location).

6. CLOSURE

Section 6.9 Mine completion

**Figure 6.9-8: The vertical units (z) are difficult to interpret for cross section A:A; B:B, C:C.
Do the units 0Z and 1000Z refer to ground level or m AHD?**

Provide clarification on the vertical units reference datum being used.

The vertical units reference datum is Australian Height Datum (AHD).

7. CLOSURE

Section 6.9.4.4

Process for closure does not identify the modelling uncertainty of pit lake water level return post closure. Provide clarification of uncertainty around the modelled rate of pit water recovery and impact this may have on the return of pit water levels post mining.

The Hillside site has been classified hydrogeologically (i.e. the groundwater geology) into four layers and a representative cross section has been shown below in Figure 5. Layer 1 is the (Cainozoic-aged) sedimentary cover which is dry (contains no groundwater) and therefore there is no unconfined aquifer present at Hillside. Layer 2 is the 'confining layer', comprising of saprolite (weathered basement rock). Any water entering the ground (seepage) will flow through layer 1 until it reaches layer 2 where depending on the volume may move along this interface to the lowest point. The groundwater at Hillside is found within a confined aquifer system comprising of layer 3 (saprock, or weathered basement rock) and layer 4 (fresh basement rock).

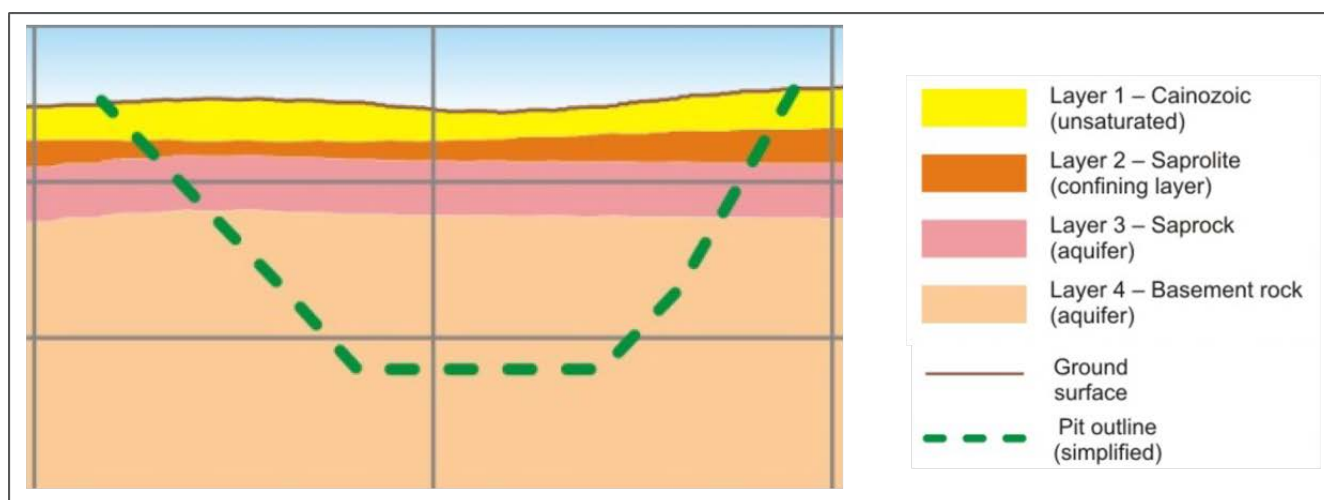


Figure 5: Representative cross section of the four hydrogeological layers

The long term pit water level recovery model was revised as presented in the updated and consolidated Hydrological Summary Report (Section 14.8 of **Appendix 7**), taking into account the revised hydraulic conductivity values derived from the Stage 4 drilling and test pumping program. This means that two long term pit water level recovery model scenarios have been run, providing in essence a sensitivity analysis to changes in K. In terms of sensitivity analysis, layer 4 K values in the revised modelling have been significantly reduced in the stage 4 modelling to represent the most likely scenario (Figure 6). Therefore, this provides outputs for relatively high K and much reduced K values. This is considered to constitute the two 'end members' of a continuum of sensitivity, with the 'worst case' (high K) values used for the scenario presented in the Appendix 5.10A of the MLP (Figure 7) and the reduced K values (most likely scenario) used for the updated modelling presented in **Appendix 7** which is based on the Stage 4 deep drilling results. The layer 4 K value is the only significant parameter resulting in uncertainty in the model for pit lake water level recovery.

The reduced K model was run for an increased time period, namely 465,000 days (approx. 1274 years) with the level of water in the pit rising as depicted in Figure 6 below, to a 'stable' maximum value of -38.5 m AHD after approximately 250,000 days (~680 years). The water elevation contours for the reduced K model has been presented in Figure 8.

The water balance associated with this modelling is presented in **Response_81. Water.**

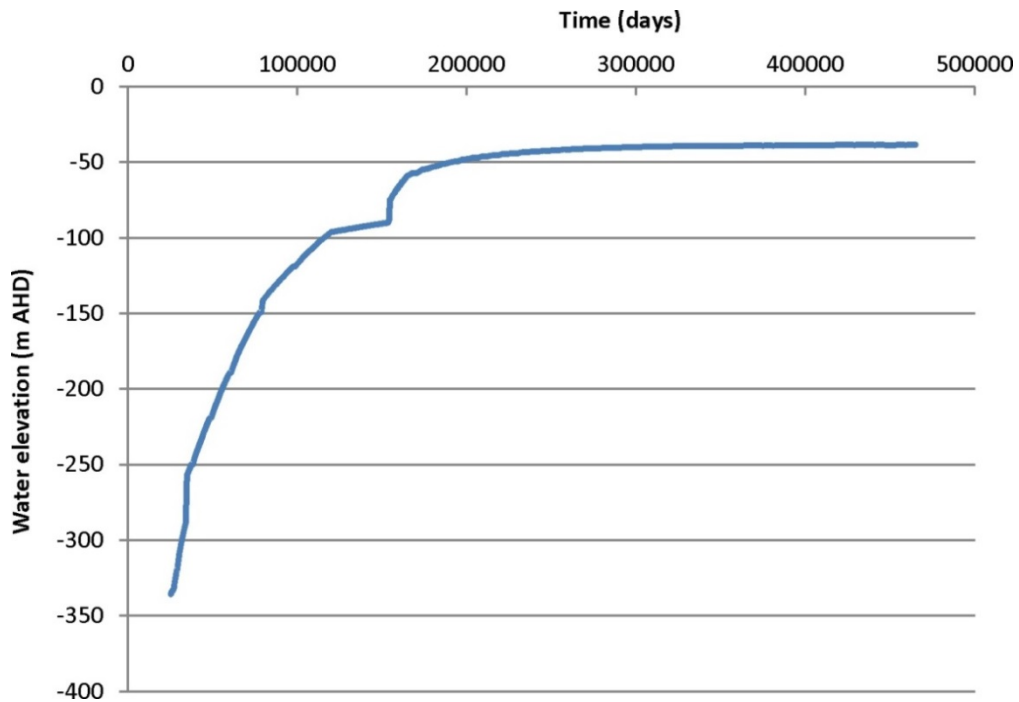


Figure 6: Pit water level recovery – water level rise versus time (most likely scenario – reduced K)

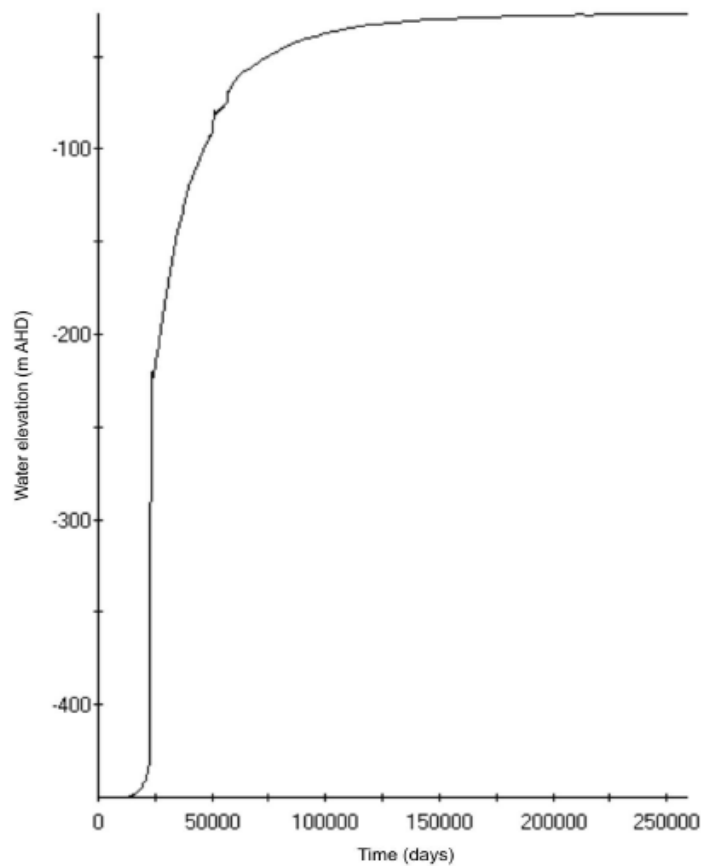


Figure 7: Pit water level recovery – water level rise versus time (worst case scenario – high K)

Groundwater elevations after 465,000 days (1274 years) are presented in Figure 8, and show that water levels in the pit stabilize at about -38.5 m AHD, some 45 to 60 m below the initial (pre development) mid-pit potentiometric surface as contoured based on January 2013 measured levels. The contours also indicate that groundwater will flow toward the pit from all directions (for layer 3 and 4), and that the pit lake will become a permanent groundwater sink, effectively precluding off site migration of groundwater, for high or low K modelling scenarios. Modelling therefore indicates that whilst changing K leads to a change in the rate at which the pit levels will recover, the overall effect remains unchanged, i.e. levels remain below pre mining water elevations and also below sea level. In addition, water sampling and analysis indicates that the salinity of groundwater at depths of about 400 m in the basement rocks on site exceeds 50000 mg/L and even 100,000 mg/L in places.

This means that the long term evaporative concentrating of water in the pit is unlikely to significantly impact groundwater at depth (layer 3 and 4), meaning that environmental consequences of the development of a 'slug' of highly saline and dense water in the pit indicates that there is no risk to the marine environment.

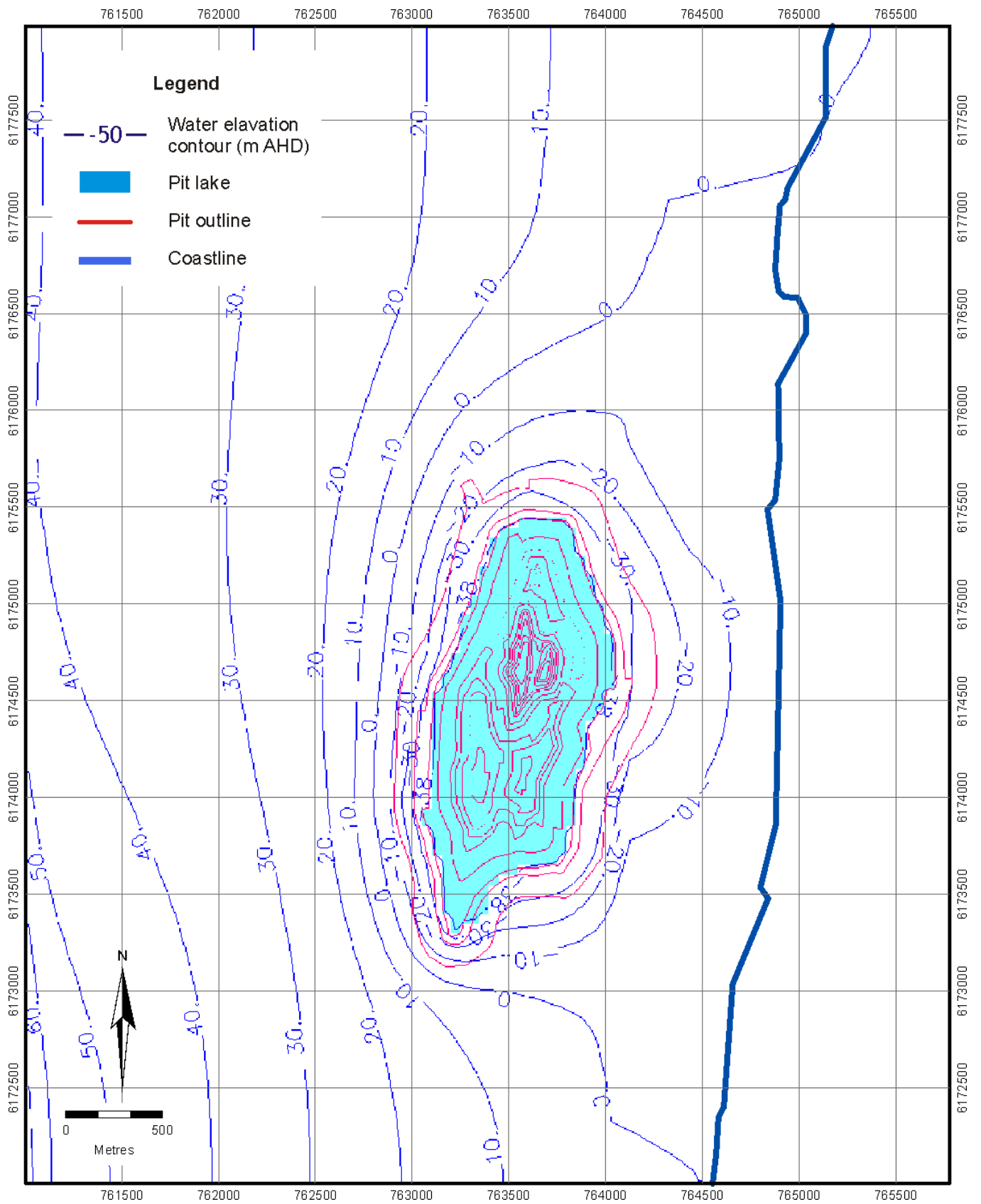


Figure 8: Water levels after 465,000 days (1274 years) of recovery (reduced K model)

Provide assessment of pit lake water chemistry post-closure.

An assessment of the expected pit lake water chemistry post-closure has been undertaken based on the chemistry of the open pit base and walls. A breakdown of the expected chemical composition of the pit wall exposures is detailed below in Table 8.

Table 8: A breakdown of the expected chemical composition of the pit wall exposures

	Cu %	Au ppm	Ag ppm	U ppm	Fe %	Co ppm	Cl ppm
Pit Walls	0.011	0.008	0.285	6.636	4.928	16.134	0.039
Pit Base	0.094	0.027	0.481	24.166	9.237	43.784	0.028
Average	0.053	0.018	0.386	15.634	7.14	30.327	0.033

Importantly for the purposed of potential acid generation, the sulphur breakdown by pit wall exposures is shown below in Table 9.

Table 9: Sulphur breakdown by pit wall exposures

	S %
Pit Walls	0.037
Pit Base	0.249
Average	0.146

The potential for the generation of acidic pit water is very low owing to the notably low levels of sulphur expected in the pit wall exposures and the acid neutralizing capacity of some of the rock types at Hillside. When analyzing the potential for acid production, total sulphur content is a recognized method. Based on information from other operating metalliferous mines, where total sulphur is less than 0.30% sulphur, acid rock drainage (ARD) is unlikely to occur. This sulphur value corresponds to a maximum of 9.2 kilograms H₂SO₄ per tonne. Additionally, given Hillside possesses carbonate minerals, this assumption is reliable.

At Hillside, metals are present as sulphides. Therefore, if the mobilisation of metals at Hillside was to occur, it would occur as the result of the oxidation of sulphidic minerals in the presence of oxygen and water. The only sulphide minerals present at Hillside in notable quantities are pyrite (FeS₂) and chalcopyrite (CuFeS₂). Minor bornite (Cu₅FeS₄) and chalcocite (Cu₂S) are present. No other metals such as lead or zinc are present. The most important factors controlling metal mobilization in aquatic systems are pH and redox conditions. Changing redox conditions and a lowering of pH can propagate the mobilization of metals. Given this, the Hillside pit lake water is expected to have a low potential for the mobilization of metals because of the following two factors:

- Generally, changes in redox conditions are caused by flooding, stratification, raising the ground water table, excess organic matter and increased biological activity due to increased nutrient supply or temperature. At Hillside, redox conditions are not expected to change dramatically over long periods as the pit lake water is isolated and not subjected to the significant changes noted above.
- At Hillside, the presence of carbonate minerals will act as a pH buffer, thus reducing the likelihood of a drop in pH.

Finally, the process of open pit mining at Hillside will create areas of fractured and blasted rock that are freshly exposed to the elements. This will likely accelerate the rate of physical and chemical weathering. It is

unlikely that any large proportions of the open pit walls will contain large proportions of sulfide minerals as the open pit walls are contained within rocks such as granite and meta-sediments which do not possess sulphide minerals. Therefore, exposure of the walls to oxygen and water should not result in the formation of acid salts and the leaching of metals from the rock. Finally, the acid neutralizing capacity of many of the waste rocks would also negate the effect of acid salts were they present.

8. **CLOSURE**

Section 6.9.5.1

It is unclear what will be used to fill the pipeline at closure.

Provide clarification

Potable water will be used to fill the pipeline at closure.

9. **CLOSURE**

Section 6.9 Mine Completion

Section 8.3.14.3 Control and management strategies (Public Safety)

Section 8.3.17.3 Control and Management Strategies (Adjacent land use)

Section 8.3.18 Protection of Third Party Property (ML)

The post closure impact to third party property has not been addressed, specifically in relation to the long term stability of the pit wall (and pit wall surface expression), and the risk of subsidence of the UG mine in the long term on the following:

- a) Third Party Property***
- b) Public Roads***
- c) WRDs post closure***
- d) TSF post closure***

Provide a detailed assessment addressing the outlined potential post closure impacts associated with geotechnical stability. The assessment should discuss any uncertainties around the residual risk for the predicted post-closure impacts.

Synopsis

Any post closure impacts to third party property, specifically in relation to the long term stability of the pit wall (and pit wall surface expression), will be assessed on an ongoing basis experience and information is gathered during the development of the Hillside Copper Mine. Rex will ensure that there are no unacceptable post closure risks to third party property.

Commencement of the final pit wall will not take place until approximately six years following the financial decision to commence the proposed Hillside Copper Mine (c2020) and the proposed operation based on the current design sees closure occurring approximately 2030.

The progressive development of the open pit through five stages will also allow Rex the opportunity to rigorously study and gain experience in the establishment and maintenance of steep, high walls prior to the developing any final wall. Rex will continuously refine its geotechnical modelling in operation and modify the pit designs as required to avoid impacting third party property.

Rex will undertake post closure an independent geotechnical audit relating to the long term stability of the final pit wall and will ensure that sufficient remediation (e.g. reshaping, meshing, cable bolting and shotcrete) is provided such that there is no risk to third party property following closure.

Summary

Rex expects the designed final pit outlines depicted in Figures 6.9-6 to 6.9-10 of the MLP, to reflect the designed long term geotechnical stable pit crest. Rex does not expect the pit crest to fail post closure.

The significant program of geotechnical data collection, expert interpretation, geotechnical stability and sensitivity analysis gives Rex a clear understanding of the geotechnical risks associated with the proposed Hillside mine. Through the rigorous early geotechnical investigations, Rex understands the management strategies and actions required to ensure the final pit and potential underground mine form a long term stable landform post closure with, zero expected impacts on third party property.

The closest third party property is located near the western edge of the pit wall. Kinematic and probabilistic geotechnical analysis indicates the current western pit wall design has <1% probability of instability with a corresponding potential depth of failure <4 m into the crest of the designed wall in this area. The current proposed final pit wall is >30 m from the nearest third party property boundary (western wall).

Operating practices planned to minimize the geotechnical risk include:

- Geological mapping to identify changes in geotechnical conditions.
- General scaling during bench excavation of locally unstable blocks.
- Pre-split & soft wall blasting.
- Follow up inspection of completed batters & scaling of identified potentially unstable blocks.
- Slope de-pressurisation management.
- Slope movement monitoring.

The progressive development of the open pit through five stages will also allow Rex the opportunity to rigorously study and gain experience in the establishment and maintenance of steep, high walls prior to the developing any final wall. Rex will continuously refine its geotechnical modelling in operation and modify the pit designs as required to avoid impacting third party property. Post closure and prior to lease relinquishment of the proposed lease, Rex will conduct a final study to confirm the expected stability of the final excavations.

Concept level studies have been conducted into the potential mine life extension through the development of an underground mine at Hillside. Although the final mining method has not been selected, Rex has a good understanding of the orebody geometries and the geotechnical conditions of the potential mine. Rex is planning to conduct further technical and economic trade-off studies into the feasibility of the underground mine. These studies will integrate with the final open pit design and combine an appropriate underground mine design, operating practices and geotechnical monitoring matched to the geotechnical conditions to ensure the long term geotechnical stability of the open pit and underground mines with zero impact on third party property.

No underground mining is planned under third party property (including land inside the proposed ML owned by third parties), thus the risk of mining related subsidence to third party property is realistically nil.

Hillside Geotechnical Data Collection, Models and Analysis

A total of 26 purpose designed and drilled geotechnical cored holes were completed at Hillside to investigate the geotechnical conditions representative of the pit walls. Data from the geotechnical drillholes were combined with data from over 700 other resource drillholes to develop the holistic geotechnical and structural models for Hillside.

The geotechnical data was separated and grouped based on domains defining areas of similar geotechnical conditions to be used to refine the details of the mine design. Rex's geotechnical consultants used the vast amount of geotechnical data to define 'Best Estimate' (BE) and 'Lower Quartile' (LQ) Rock Mass Strengths for the domains for use in geotechnical stability and sensitivity assessments.

Structural data from drill core was also collected and analysed to determine the joint set conditions for each geotechnical domain. This structural data was used for the kinematic and probabilistic stability analysis to identify the potential structurally controlled failure modes and to determine the Probability of Failure (Pf) for the pit wall designs wall for each domain.

Rex has developed a good understanding of the weathering profile at Hillside based on data collected from the extensive resource, hydrology and geotechnical drilling programs. Rex has developed wireframe surfaces that define the contact boundaries of the weathering zones for use in the mine design process.

The interpretation and modelling of the major structures at Hillside, based on the drilling data has been investigated and modelled by Rex's internal and consultant geologists. Interpreted faults include the major regional Pine Point Structural Corridor (PPSC) and eight other designated surfaces. A view of Rex's Hillside pit shell with superimposed wire-framed fault surfaces that make up the Hillside Structural Model plus the stereonet shows the attitudes of the nine fault surfaces, see Figure 9 below.

The interpreted fault surfaces in the model appear favourably positioned and oriented with respect to the current pit shell design.

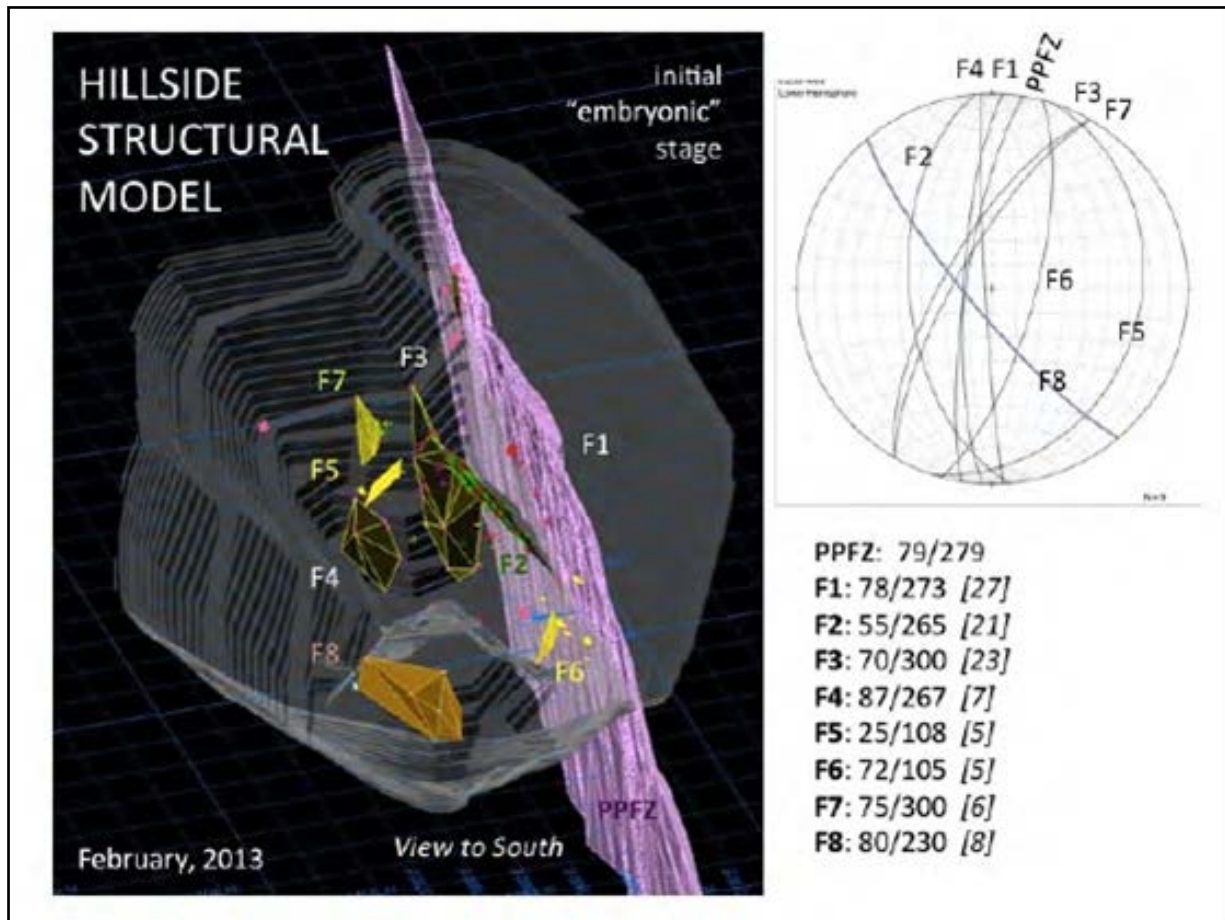


Figure 9: 3D Model depicts the brittle fault architecture of the Hillside deposit.

Open Pit Failure Mode and Sensitivity Analysis

Large scale rock mass failure has been assessed for both the west and east walls of the final pit design based on a failure mode mobilizing the shear strength of the rock mass. Best estimate (BE) and a lower quartile (LQ) rock mass strengths were estimated to reflect the range of accuracies of the method employed and test the sensitivity of this strength range on the stability of the rock mass and slope configuration.

Results of the rock mass failure analysis for the final west and east wall designs indicate stable factors of safety for both the BE and LQ estimates:

Best Estimate (BE): West Wall Factor of Safety = 1.7, East Wall Factor of Safety = 2.0

Lower Quartile (LQ): West Wall Factor of Safety = 1.1, East Wall Factor of Safety = 1.5

A summary of the identified potential structurally controlled failure modes for the key domains are shown in Figure 10.

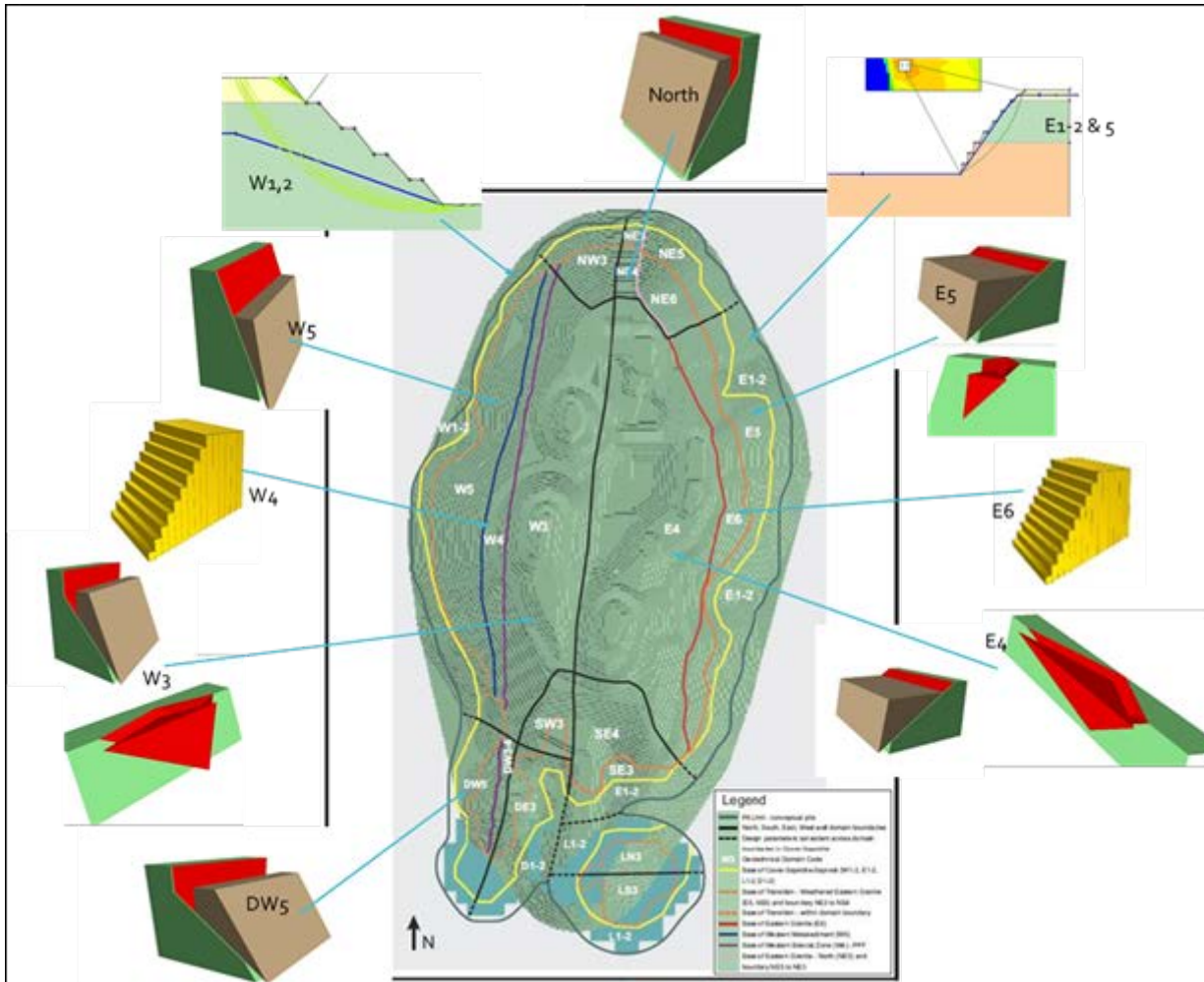


Figure 10: The Plausible failure modes identified for each of the main geotechnical domains at Hillside based on the interpretation of the current data

Kinematic and probabilistic geotechnical analyses of the identified failure modes for the current pit designs, (Table 10) indicate the following probability of failure (Pf) and depth of failure into the pit wall.

Table 10: Probability of failure (Pf) and depth of failure into the pit wall

Key Geotech Domains	Batter Scale (20m high)		Inter Ramp Scale (120 to 300m high)	
	Pf	Depth	Pf	Depth
W3*	<18.6%	<4m	4%	<17m
W5	<11.1%	<4m	<1%	<4m
E4*	<1%	<8m	<2%	<40m
E5	<1%	<8m	<1%	<40m
North	<1%	<8m	<1%	<40m
DW5	<1%	<8m	<1%	<40m

*the W3 and E4 domains are contained within the centre and base of the pit and are therefore unlikely to impact the pit crest.

Operating practices planned to minimize the geotechnical risk include:

- Geological mapping to identify change in geotechnical conditions.
- General scaling during bench excavation of locally unstable blocks.
- Pre-split & Soft wall blasting.
- Follow up inspection of completed batters & scaling of identified potentially unstable blocks.
- Slope depressurisation management.
- Slope movement monitoring.

Open pit operating strategies, geotechnical monitoring and the observational approach

Rex plans to implement a staged development of the open pit mine with 3 fully internal pit stages prior to committing to final wall design and development of the 4th and 5th stages. Given the staged development strategy of the Hillside open pit, Rex will have a high level of local operating experience in mining pit walls over 200 m high in the east wall geotechnical domain and over 160 m high in the west wall domain prior to starting the final wall excavation from year 4 of the mine's life.

The mine has planned an integrated system of continuous geotechnical monitoring to record and understand the detailed response of the surrounding rockmass to the open pit mining. The monitoring system includes rock mass pore pressure monitoring, pit wall surface movement monitoring and micro-seismic monitoring.

The proposed observational approach combining significant local operating experience plus the detailed geotechnical monitoring will provide Rex with the appropriate information and opportunity to calibrate the geotechnical models and make any required design changes prior to commencing the final wall excavations to ensure the long term stability and minimize the residual risk for the predicted post closure impacts of the mine.

Underground Conceptual Mining Studies

The current underground designs and mining method selection are at conceptual level with the underground mine development and production not planned to commence until Year 8 of the mine's life.

No underground mining is planned under third party property (including land owned by third parties inside the proposed ML).

The closest third party property to the potential underground mine is immediately south west of the orebodies. Any underground mining conducted in the southern orebodies will implement strategies to control any potential surface impact. The final underground designs and mining methods selection will ensure post closure surface stability of the land outside of the final pit outline shown in Figures 6.9-6 to 6.9-10 of the MLP.

Underground Risk Management Strategies

Underground mining method selection could potentially incorporate a stable crown pillar design, underground filling, local in pit dumping or a combination of to suit the local design requirements and minimize the residual risk for the predicted post closure impacts of the mine.

a) Third Party Property

The closest third party property is located near the western edge of the pit wall. Kinematic and probabilistic geotechnical analysis (worst case scenario) indicates the current western pit wall design has <1% probability of instability with a corresponding potential depth of failure <4 m into the crest of the designed wall in this area. The current proposed final pit wall is >30 m from the nearest third party property boundary (western wall). No underground mining is planned under third party property (including land owned by third parties inside the proposed ML). Hence there is no risk to third party property post closure.

b) Public Roads

In addition to the stable design and operating philosophy discussed above, the Hillside Project plans to relocate any public roads at risk. There will no underground operations under the public roads (realigned highway). The proposed realignment of the Yorke and St Vincent Highways will move them more than 400 m from the nearest pit crest. For the worst case scenario, there is less than a 2% probability of instability with a corresponding potential depth of failure <40 m into the crest of the designed wall in this area and hence there is no risk to public roads post closure.

c) WRDs post closure

The WRDs are offset >80m from the pit crest and do not overlie any planned underground stope development. For the worst case scenario, there is less than a 1% probability of instability with a corresponding potential depth of failure <40 m into the crest of the designed wall in this area and hence there is no risk to WRD stability post closure.

d) TSF post closure

TSF is over 2000 m from the pit crest and does not overlie any planned underground stope development. As above there is less than a 1% probability of instability with a corresponding potential depth of failure <40 m into the crest of the designed wall in this area and hence there is no risk to the TSF post closure.

Provide confirmation that the final pit outline as shown in Figures 6.9-6 to 6.9-10 represent the final pit outline at the cessation of mining - not the long term geotechnically stable pit outline post closure.

The difference between the final pit outline and the long term geotechnically stable pit outline varies between less than 4 m to a maximum of 40 m. The scale of the Figures 6.9-6 to 6.9-10 is 1:27,500 and at this scale the difference is insignificant.

WRD erodibility

The material that will be used to construct the final surfaces of the WRDs will be selected to ensure that it is an effective cover system in the long term. This selection process will involve testing the erodibility of the material for example abrasive tests such as slake durability testing (ASTM D4644-08), or tests such as Emerson crumb, PSDs (particle size distributions), geochemical tests to determine ESP (exchangeable sodium percentage), SAR (sodium absorption ratio), soil salinity, clay analysis and numerical modelling if required. This detail will be provided in the PEPR.

10. CONCENTRATE

Characterisation of the copper concentrate is not clear. Provide a full chemical composition and mineral speciation of the copper concentrate.

The copper concentrate possesses economic quantities of copper and gold which is supported by the results of the full chemical composition and mineral speciation breakdown of the copper concentrate. Uranium levels in the concentrate are not at an economic level and are well below the current statutory level of 200 ppm and well below the potential revised statutory level of 80ppm.

The full chemical composition and mineral speciation breakdown of the copper concentrate has been provided to the State Government for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent as this information has not been provided to the broader market place.

11. EDITORIAL

Section 6.4.2.1

Terms for WRDs 'Northern' and 'Southern' are used in the text but mine site layout figures (6.4-3 and 6.4-4) refer to North Eastern and South Eastern WRD. Provide clarification

The Northern WRD is the same as the North Eastern WRD. The Southern WRD is the same as the South Eastern WRD. This will be amended in the PEPR to state Northern WRD, Southern WRD and Western WRD labels only.

12. EDITORIAL

There is reference within the document and appendices of an Air Quality Management Plan and a Dust Management and Monitoring Plan – are these proposed to be separate documents with different contents?

Provide clarification

The Air Quality Management Plan and the Dust Management and Monitoring Plan are the same documents. In the PEPR it will be referred to as the Air Quality Management Plan only.

13. EDITORIAL

Section 5.10.2

Non-specific terms are used to describe groundwater well depths, salinity and quality.

Specific values for water quality, depths and ranges should be used to describe the hydrogeological setting.

The hydrogeological setting information has been updated and presented in Table 1, WaterConnect water well summary data and Table 2, WaterConnect data; pipeline corridor of ***Appendix 7***.

14. EDITORIAL

Section 6.6.6.5

Figure number missing at end of paragraph 6.6.6.5.

Provide

The figure number missing from the end of the paragraph in Section 6.6.6.5 of the MLP is Figure 6.6-4 (MLP) Site water balance at year eight of production.

In Appendix 6.7-A of the MLP:

In the executive summary (Page i) the final elevation of the TSF embankments is estimated to be RL130 m which is interpreted as equating to an overall average height of 55 m and a maximum height of 65 m. These numbers are replicated in Section 7.2 on Page 21. Then in Section 4.5.1 on Page 11 it is reported that the proposed TSF embankment has a maximum height of 110 m which appears to us to possibly relate to a previous concept.

The 110 m stated for the embankment height should refer to an RL of 130 m, which equates to approximately 55 m above the existing land surface.

In Section 8.1 (Page 24) the authors advise that the height of the WRD is envisaged to be at RL130 m around the TSF. On the other hand, the cross section of the facility on Figure 17.2 indicates that the height of the WRD will be around RL130 m east of the TSF and RL160 m west of the TSF.

Table 6.7-1 of the MLP (shown in **Response_131. Editorial**), states the volume, footprint and heights of the WRDs. All references to the WRD dimensions should be as per Table 6.7-1 of the MLP. Figure 17.2 of Appendix 6.7-A of the MLP is correct as the western WRD extends to RL 160 m on the western side of the TSF.

In Section 19.5 (Page 50) the authors refer to the ability to monitor internal water levels within the TSF in the post closure period in the decant well. As the decant facility is now shown to consist of a floating decant pump (which would appear to be a more flexible design) we can only surmise that this is a reference to a now superseded design concept for the decant.

This is an editorial error. It currently states that 'The proposed treatment involves attention to design and construction details, and monitoring of internal water level (in the **decant well**) in the post-closure period.' It should have stated that 'The proposed treatment involves attention to design and construction details, and monitoring of internal water level (in the **monitoring piezometers**) in the post-closure period.'

Table 8.1 (P 24) indicates that the TSF embankment slopes are 1:2.7 upstream and 1:3.2 (v:h) downstream whereas the batter slopes are shown on Figure 8.1 as 1:2 upstream and 1:2.5 downstream. It would appear that the data in Table 8.1 might be for the overall slopes including batters and berms.

The in Table 8.1 is for the overall slope and includes batters and berms.

15. GEOCHEMISTRY

Section 6.7 Waste

Table 6-7-3 - Classification of rock types: In the lithology column breccia (pyritic) has been classed as ACM (acid consuming).

What is the rationale for classifying this rock type as ACM, given FeS₂ minerals are present?

The potential for acid production relies on determination of total sulphur content (Tot_S), non-sulphide sulphur content (commonly described as sulphate-sulphur (SO₄_S) and where necessary, determination of sulphur in the acid insoluble minerals barite (barium sulphate) and celestite (strontium sulphate), commonly described as barite sulphur, may be undertaken.

Acid neutralisation capacity (ANC) is a measure of the natural ability of the sample to neutralise acid. Net acid generation (NAG) is a measure of the sulphur released by reaction with strong hydrogen peroxide, only determined where there is any doubt about the classification. NAG can be unreliable, giving excessively high results in the presence of organic carbon compounds and certain reduced sulphur radicals which contain non-acid generating sulphur compounds.

Calculations are undertaken to estimate maximum potential acidity (MPA) and the net acid production potential (NAPP). MPA is based on the assumption that 100% of all sulphur is acid producing (sourced from pyrite FeS₂) which as previously described is incorrect. NAPP is a calculation based on the MPA, SO₄_S (sulphate sulphur) and ANC so that value also uses the same incorrect assumption. However, with care and geological understanding, NAPP is suitable for conservative prediction of potential acid generation. NAPP over-estimates potential acidity as it does not allow for sulphur in non-acid producing sulphide minerals or in barite.

Due to the lack of reliability of the MPA calculation, the analysis concept and the ratio concept are commonly used to classify the acid formation potential of waste rock:

1. The Analysis Concept; Where Tot_S is less than 0.30%S, ARD is unlikely to occur. This sulphur value corresponds to a maximum of 9.2 kilograms H₂SO₄ per tonne. With weathered rocks in arid areas where there may be a substantial percentage of SO₄_S and some carbonate minerals present, this 'rule of thumb' is often reasonably reliable. It is commonly inaccurate in humid climates and is unsuitable for acid sulphate soil investigations.
2. The Ratio Concept; This compares the direct calculation of MPA from Tot_S and the ANC analytical measurement, then classifies samples as non-acid forming (NAF) where the ratio of ANC/MPA is greater than or equal to two and potentially acid forming (PAF) where the same ratio is less than or equal to two. This methodology has been recommended by a Western Australian governmental authority and is part of the DITR 2007 Guideline Leading Practice Sustainable Development Program for the Mining Industry; Managing Acid and Metalliferous Drainage.
 - a) This methodology does not allow for SO₄_S, or sulphur associated with barium sulphate or organic materials. For oxide to fresh rock, transitional and (supergene enriched) sulphide samples, many iron ores, most manganese ores and most zinc-copper stratiform sulphide horizons in felsic volcanic rocks, this methodology fails, often classifying incorrectly due to SO₄_S and barium sulphate content.

- b) The ratio concept is unsatisfactory for use in acid sulphate soils and in conditions of very high salinity. It will give incorrect results if applied to waste rock in stockpiles that have not been rehabilitated and where the dominant residual sulphides in the wastes are base metal sulphides. This includes the iron-bearing sulphides chalcopyrite and arsenopyrite which each have high sulphur content, but generate very little or no acid.

In Hillside's case, the ratio method is used to give a first pass indication of the likely classification for each sample. Final classification of wastes undertaken for the Hillside Project is based on the NAPP of each sample and uses the following methodology:

1. Analysis for Tot_S
2. Analysis for ANC
3. Calculation of NAPP

Table 11 below shows the NAPP Classification of ARD. The classes are substantially more conservative than either the Analysis concept or the Ratio concept methodologies described above. The PAF-LC and "uncertain" classes will commonly be classified as NAF using either of the Analysis or the Ratio concepts.

Table 11: NAPP Classification of Acid Rock Drainage at the Hillside Project

Primary Geochemical Waste Type Class	NAPP Value kgH₂SO₄/tonne*
Potentially Acid Forming (PAF)	≥ 10
Potentially Acid Forming - Low Capacity (PAF-LC)	5 - 10
Uncertain, probably NAF	0 - 5
Non Acid Forming (NAF)	- 100 to 0
Acid Consuming Materials (ACM)	< - 100

The two breccia samples in question that were classified as ACM had NAPP Values of -110.2 and <-200.69 respectively. The fresh breccia samples consist of amorphous minerals and plagioclase, with some chlorite and dolomite. With weathering samples increased in amorphous minerals, alkali and hematite and a decrease in quartz and rutile. The presence of garnet and rutile indicate metamorphism/ metamorphic rocks contained within the brecciated material.

16. GEOCHEMISTRY

Section 8.3.11 surface water

Table 8.3-45 ID ML-SW6: There is no comment in relation to the mobilisation of copper in oxidised waters.

Provide further information regarding mobilisation of copper in oxidised waters. Geochemically, what is the likely state of water that percolates through copper-oxide stockpiles? Is copper likely to be transported in oxidised runoff?

It is not envisaged that chlorine or copper from the breakdown of atacamite (~16.7% Cl) will be a problem in the oxide stockpile. The oxide ore will be stockpiled for the majority of the mine life and the broken ore will be subject to water ingress from rain. Over time, without controls, dissolved copper ions [Cu₂Cl(OH)₃] would leach under these conditions and could emerge from the base of oxide stockpiles. All the copper minerals identified except atacamite are environmentally stable.

To ensure possible atacamite leachate is contained, oxide and low grade ore material will be stockpiled on top of prepared domed clay pads. The clay base will be domed and therefore there will be no head on the clay layer at any time. The clay base will act as a barrier and divert water to the perimeter drains preventing any percolation of water through the stockpiles entering the underlying soil. All water runoff will be collected in a perimeter drain and considered to be 'dirty' water and reused as process water. Any standing water after a rainfall event that generates runoff will be pumped into a HDPE lined dam or a dam which is within the pit drawdown cone of influence and in an area where the saprolite layer slopes towards the pit (DSCP). The risk of environmental impact is deemed to be low. There is no atacamite present (copper potentially dissolvable by water) in the WRDs (north, south, west) and therefore also not present in the material used to construct haul roads.

The storage of oxide material will commence in the first year of open pit mining operation with the majority of material that will be stored there placed by approximately year four of the open pit mining operation. This stockpile will either be treated at the end of the mine life, or if it is uneconomic to treat at this time, it will be capped in a similar manner to the TSF.

The only potential for water ingress into the oxide stockpile is via rainfall and as there is no head on the clay layer, the probability of creating a water mound under the oxide stockpile is nil. Therefore, during operations there is no risk that copper in oxidised waters will reach any sensitive receptors. The risk of copper in oxidised waters at closure has been assessed below.

Risk of Copper in Oxidised Waters at Closure

Following the cessation of processing operations, if the oxide stockpile has not been treated the oxide stockpile landform will as soon as practicable following the cessation of operations will be capped to prevent the ingress of water into the oxide stockpile.

Potential Impact Event

Rainfall resulting in the mobilisation of copper seeping from the oxide stockpile and reaching the marine environment post closure.

Control and Management Strategies

- Design capping surface based on detailed modelling and field trials during operation.
- Review capping design at time of closure based on available material at the time and update design accordingly.
- Modify capping surface at closure (as there is a likelihood that the stockpile may be capped early in the mine sequence as all oxide material is mined in the first four years) if any issues arise.
- The capping layer is the primary control and it is unlikely that copper ions will leach through the constructed clay base layer of the oxide storage pad since the '*uptake of copper ions from an aqueous solution into the interlayer of anionic clays (that form the base layer of the oxide storage pad) followed by its immobilization in the form of either copper (I) oxide or copper metal within the interlayer of the anionic clay by suitable interlayer reaction*' (Arulraj 2013). Also, '*in alkaline media the clay suspension acts as a nucleation centre for hydroxy-bridged copper species, in acidic media, the adsorption capacity of the clay for cationic species increases with pH*' (Farrah & Pickering 1976). Therefore, regardless of the pH, copper will precipitate within the clays and not be transported by water. In the unlikely event that the copper ions leach through the constructed clay base layer, the underlying Cainozoic layer (Layer 1) is calcareous and will act as a natural buffer for copper ions.

The design of the oxide stockpile capping system is the same as for the TSF and is discussed in greater detail in **Response_48. TSF**.

Evaluation of Risk Levels

The probability of impacts to the marine environment is very low but will be reduced by the control measures stated above.

Potential Impact	Primary Risk Level		Primary Control Measures	Residual Risk Level		Level of Risk	ALARP
	Likelihood	Consequence		Likelihood	Consequence		
Rainfall resulting in the mobilisation of copper seeping from the oxide stockpile and reaching the marine environment post closure.	Unlikely	Minor	Control measures as outlined above.	Rare	Insignificant	Low	Yes

Justification for Acceptance of Residual Risk

The possibility of copper ions leaching through to the saprolite layer to the marine environment is extremely low and is not a credible risk. Therefore, no outcomes or assessment criteria have been proposed.

Reference:

- Arulraj, J, 2013. Intercalation of organic anions and intracrystalline reactions in anionic clays.
- Farrah, H & Pickering, W F, 1976, *The sorption of copper species by clays*, Australian Journal of Chemistry 29(6), pp 1167 – 1176.

17. GEOCHEMISTRY

Section 6.5.8.5

How has the determination that soils and subsoil stockpiles are benign been concluded? Provide clarification.

The soil covering the Hillside orebody has been utilised for grain production for more than 100 years, with wheat and barley dominating. Farming commenced in the district in the 1850s. Skeletal soils develop over the Hillside orebody especially in lower lying domains. Elsewhere soils are developed on windblown sands, Permian fluvial sands and possible Pandurra Formation.

Furthermore, a mine rehabilitation (characterisation of overburden) report (Appendix 5.14.B of the MLP) was undertaken to enable Rex to develop plans to efficiently manage placement to gain maximum benefit from materials that may be particularly well-suited for use in rehabilitation or construction for site infrastructure and to identify potential risks. The characterisation process assessed whether the overburden and waste rock in the upper 10 m was potentially useful for rehabilitation. It also assessed the potential of an adverse environmental impact or any other factors that may prevent successful re-vegetation. In Phase 1, eight elements were scanned for potentially detrimental environmental impacts and from this work it was concluded that there are not significant heavy metal concentrations, therefore these results show that soil and subsoil are benign. However, from the exploration soil samples, elevated levels of arsenic were encountered in an area that was believed to be used as sheep dip.

Prior to construction, a soil contamination survey will be undertaken. Areas of potential contamination will be targeted such as sheep dips that may contain arsenic, farm diesel refuelling areas and the proposed port facility site within Port Ardrossan. Further details will be provided in the PEPR.

18. GEOCHEMISTRY

Additional data is required to undertake an assessment of geochemical risks to the environment posed by the proposed mining project.

The following information is required: The drillhole database for waste rock and ore - in particular the raw data of sulfur and other metals that may be contained within the ore and host rocks to get a understanding on the distribution and concentration of these attributes;

The sulphur block modelling report; The geology report on the host rock and ore including mineralogy (It is noted that the ore has elevated acid neutralising capacity; but only one sample analysis has been provided. It is necessary to get a understanding of the variance in concentration of sulfides that may report to the TSF and waste rock facility).

The mine waste characterisation data from the second round of sampling - 125 samples (the report has been provided but not raw data) (waste rock data).

Rex has over 750 drillholes and a block-model that extends for over 3km (North-South) and 1km in depth. The volume of data collected is immense and Rex has removed any potential geochemical risk through this thorough and extensive analytical program by carefully domaining both ore and waste. All classified ore will be delivered to the mill, whilst all classified waste will be delivered to the waste stockpiles. All potential geochemical risks have been identified from the large volume of data collected and the rigorous standards

applied to the collection of this data. The data requested by DMITRE has been provided to demonstrate the benign nature of the host rock and ore:

1. The drillhole database is presented in **Appendix 24***.
2. The block model report is presented in **Appendix 18A***. Sulphur analysis has been detailed in Section 4.1.2 of **Appendix 18A***.
3. A report on the host rock and ore is presented in **Appendix 18C***. Further detail on the geology and mineralisation can also be seen in Section 6 of **Appendix 18A***.
4. Second round of geochemistry AMD testwork (Phase 2) is presented in **Appendix 18B**.

** These supporting appendices that have been provided by Rex contain information that the broader market does not possess and are commercial in confidence. This information has been provided to the State Government only for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent.*

In order to understand the variance in concentration of sulfides that may report to the tailings from the processing of the ore, it is essential to understand the metallurgical test work program that has been progressively undertaken to achieve the Bankable Feasibility Study (BFS) related to the Hillside Copper deposit.

During the pre-feasibility study (PFS) ore and waste intersections from 13 drill holes were rigorously tested to develop a flow sheet, the level of test work increased in the BFS with ore and waste intersections from an additional 37 drill holes encompassing all ore types and load types. A series (43 flotation tests) specifically investigating of ore variability testing was undertaken at Amdel laboratories on samples from these drill holes.

More than 210 flotation tests (both batch and locked cycle tests) have been carried out on this orebody as a precursor to establishing the metallurgical processing parameters, ore characteristics, concentrate and tailings characteristics that were used in the Pilot Plant testing of the Hillside ore.

The Pilot Plant testing was undertaken to de-risk the process from both a technical and economic perspective. The Pilot Plant produced sufficient quantities of concentrate and tailings for marketing and equipment selection and mineralogical purposes.

To ensure that the most representative samples of ore were selected for the pilot plant program (as the whole projects economic viability with respect top grades and recoveries is based on this testwork),the positions for the PQ drill holes were selected by AMEC Australia Pty Ltd (AMEC) using the outline of the Year 6 Pit shell. The hole collars were initially placed above the deepest local pit locations with each hole to be drilled vertically. Review by Rex's geologists resulted in a number of the hole collars and dip values being adjusted to match more closely the local dip of the orebody. The final holes and samples locations are shown in Figure 11 with the blue representing the FS PQ holes and yellow the HQ holes from which the PFS samples were selected. The green markers indicate PFS sample locations down the HQ holes. Note that one of the PQ holes (blue) is difficult to see in the image because it is coincident with the HQ hole in the lower right of the pit shell. The north/south section of the proposed open pit is shown in Figure 12.

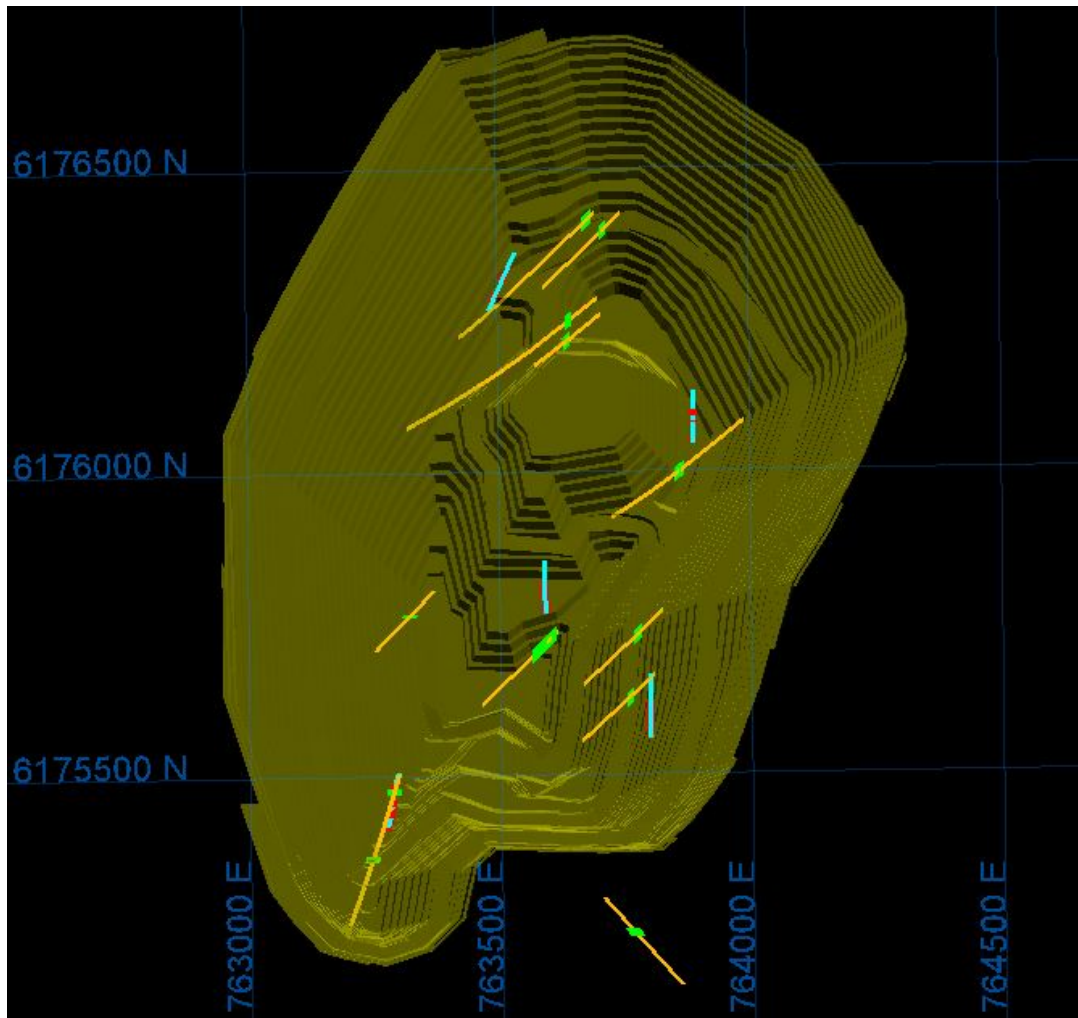


Figure 11: Sample Locations in Relation to Final Pit Shell

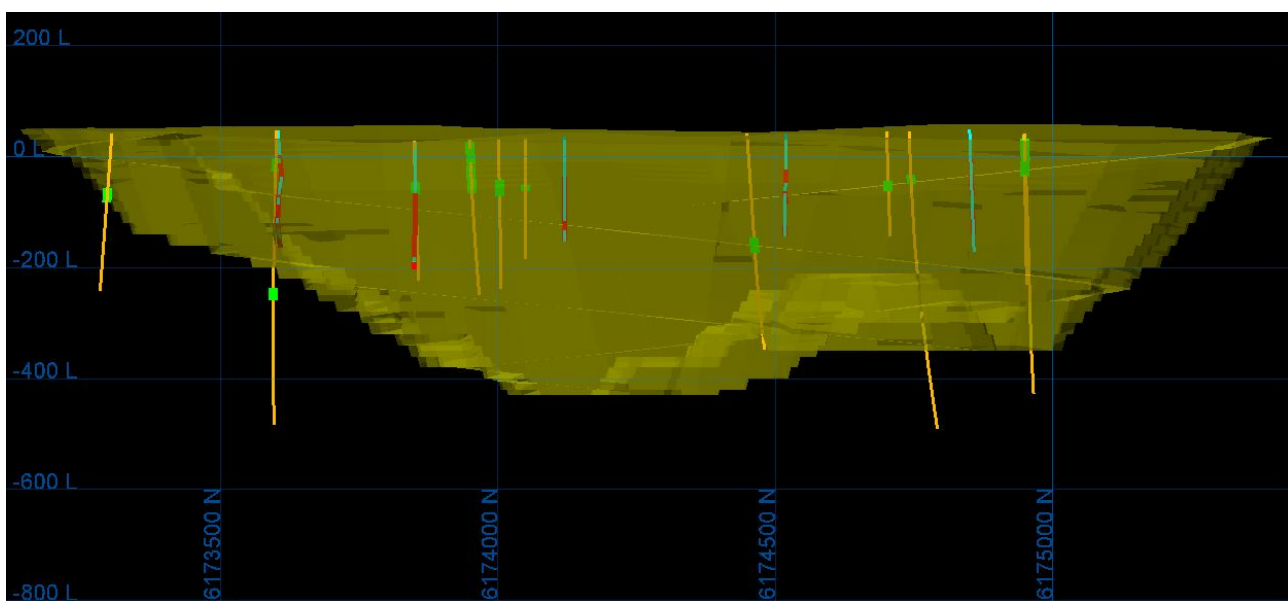


Figure 12: North/South Section of Proposed Open Pit Showing Holes and Samples

AMEC conducted pilot plant scale processing of predominantly primary sulphide ore from Rex’s Hillside Project in June and July 2013. Final and intermediate products from the pilot plant have been used in a detailed program of mineralogical analysis to provide a definitive data on the Process Mineralogy of the deposit.

The pilot-tested Hillside flowsheet consists of flotation for copper concentrate recovery and magnetic separation for iron concentrate recovery. Both final products are generated after regrinding of rough concentrates. Approximately nine tonnes of ore was processed in the pilot plant at ALS Perth laboratories. The mineralogical program was conducted by ALS Process Mineralogy Services.

The modal mineralogy as measured by QEMSCAN consists of 27 different minerals and to simplify discussions the various minerals have been grouped for all subsequent analyses. Although other samples for tailings have been produced from the batch and locked cycle test work the most definitive test work undertaken on this project is singularly the pilot plant test. Consequently the products, tailings and parameters derived from this test can be relied on as being representative of the mineralogy.

The tailings sample analysis is outlined below in Figure 13 and Table 12.

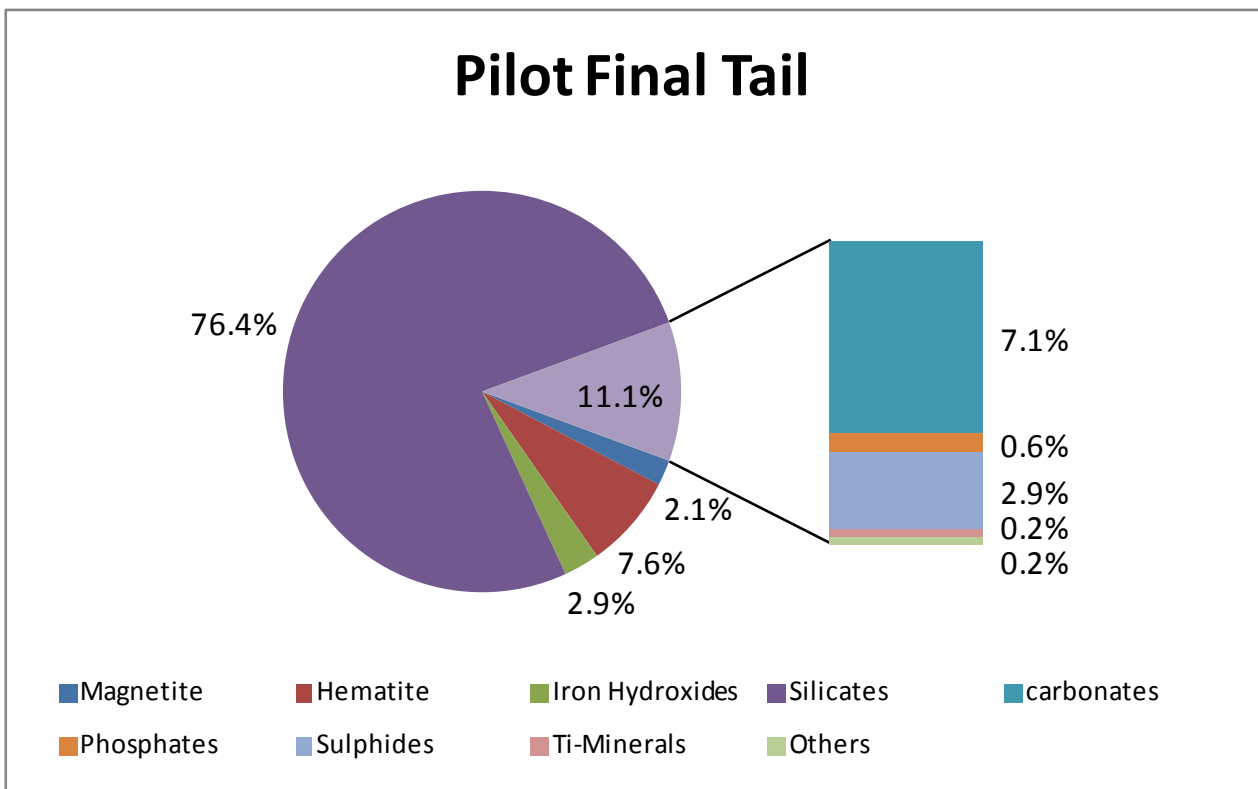


Figure 13: Simplified Mineralogical Analysis – Combined Size Fractions of Pilot Final Tail

Table 12: Modal Mineral Analysis of Pilot Final Tails

Mineral Grouping	Mass Percent
Silicates	76.4
Hematite	7.6
Carbonates	7.1
Iron Hydroxides	2.9
Sulphides	2.9
Magnetite	2.1
Phosphates	0.6
Ti-Minerals	0.2
Others	0.2
	100.0

Note that the Uranium is present as non-floating uraninite and will report to the tailings. Since the uranium is on average 57 ppm in tails it represents 0.00057% of the 0.2% in the *Others Mineral Grouping* in the Table 12 above.

A copy of ALS Metallurgy AMD Test certificate for the Pilot Plant Tails is detailed below in Table 13.

Table 13: ALS Metallurgy AMD Test certificate for the Pilot Plant Tails

PROJECT	A15185 - REX MINERALS - Hillside Project
COMPOSITE ID	Combined Final Tails - (Vendor Sample)
DATE	Aug-13

Analyte	Unit	Combined Final Tails (ALS Met - XRF)	Combined Final Tails (ALS Met - ICP)
Cu	ppm		400
Fe	%	12.7	
SiO ₂	%	50.0	
%S	kg H ₂ SO ₄ /t	0.91	
ANC	kg H ₂ SO ₄ /t	226	
NAG	kg H ₂ SO ₄ /t	-8.70	
TAPP	kg H ₂ SO ₄ /t	27.8	
NAPP	kg H ₂ SO ₄ /t	-198	
pH		8.77	
Cond	ms/cm	0.55	
SG		2.856	



- a) ANC- Acid Neutralizing Capacity. A measurement of the capacity (if any) of the ore to neutralize sulphuric acid. Units are in kg H₂SO₄ per tonne of ore
- b) NAG- Net Acid Generation. A measurement of the actual net acid produced by the ore under oxidizing conditions. The ore is oxidized by the addition of Hydrogen Peroxide with heat. ANC figure would have reduced the acid produced hence the “Net”AG Units as above
- c) TAPP- Total Acid Production Potential. A calculated figure based on the total sulphur assay. (Some laboratories use only the sulphide sulphur figure). Units as above.
- d) NAPP- Net Acid Production Potential. Sort of a worst case scenario of TAPP - ANC. Units as above.

An analysis of the final tailings composition is information that the broader market does not possess and is commercial in confidence. This information has been provided to the State Government only for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex’s prior written consent.

19. GEOLOGY

Section 5.8.1.2

Faults: Given the deposit is in a major structural corridor, what is the potential for fault movement / seismicity related to blasting and stress redistribution as a result of the open pit mining and sublevel stoping?

Further information to be provided on the potential for fault movement / seismicity related to blasting and stress redistribution as a result of the open pit mining and sublevel stoping?

Based on experience gained across similar large open pit and underground mines in similar operating conditions to the Hillside Project, it is expected that the proposed mining at Hillside will result in some low magnitude mining induced seismicity. This will occur as the natural pre-existing stress field is redistributed around the mining voids. It is highly unlikely these events would be noticed by members of the public or the on-site workforce. It is expected there would be little, if any damage to the mine or onsite infrastructure. Given the distance to public and offsite infrastructure it is expected that there will be no damage to offsite infrastructure.

Due to the staged development of the open pit and the underground mine, it is expected that any seismological effects of the stress redistribution due to mining will be dissipated as small incremental events matched to the gradual changes in the shape and size of the mine. The small and incremental release of seismic energy is the natural response to the gradual development of the mine. This incremental release of energy reduces the potential for large energy storage and release required to initiate significant fault movement typical of natural occurring crustal seismicity that result in a noticeable seismic events (earthquakes = Richter Scale events >4).

Research has been conducted and budget provisions have been made for the potential installation of a micro seismic monitoring system to help Rex understand the source, location and drivers of seismicity within the rock mass.

Stress field modelling and reporting will be conducted as part of the PEPR documentation, if required.

20. GEOLOGY

Section 5.8.3

The terminology in the 4th paragraph is too general i.e. leachate testwork on samples from Hillside indicate that the leachate from samples is relatively benign, and that waste rock leachate is unlikely to present a significant risk to the environment.

What are the key parameters that are lacking that would allow a more definitive statement?

For a project of this size, an accurate and detailed understanding of all mine wastes is crucial to minimising the site's potential environmental impact as part of planned mining activities. As such, Rex ensured that the waste rock analysis sampled all rock types identified within the Hillside orebody. These samples were taken to get a representative spread of data. That is, the data collection process was designed to reflect the characteristics of the waste rock material. It was from this extensive and detailed work that Rex identified that the majority of the waste rock associated with the Hillside Project is acid consuming in nature and the long term WRDs will likely exhibit alkaline conditions.

Importantly, most metals are less mobile under alkaline conditions, with the exception of metals that form oxyanions such as molybdenum and arsenic. Hillside is fortunate to have only trace amounts (in analytical chemistry "trace" indicates the presence of a material in a sample, but in quantities approaching the limit of detection of the analytical method, and therefore too small to be accurately measured of these metals) (see Table 5 in **Response 5. Air Quality part (d)**), and as such, they pose no environmental hazard or risk. A long term monitoring program will take this into consideration.

21. GEOLOGY

Section 5.8.3 (5th paragraph)

(5th paragraph): The risk associated with atacamite's solubility in rainwater is not described? How will the oxide stockpile be managed to contain this risk?

Additional information to be provided on the risk associated with atacamite's solubility in rainwater, and how the oxide stockpile will be managed to contain this risk?

It is not envisaged that chlorine or copper from the breakdown of atacamite (~16.7% Cl) will be a problem in the oxide stockpile. The oxide ore will be stockpiled for the majority of the mine life and the broken ore will be subject to water ingress from rain. Over time, without controls, dissolved copper ions [Cu₂Cl(OH)₃] would leach under these conditions and could emerge from the base of oxide stockpiles. All the copper minerals identified except atacamite are environmentally stable.

Atacamite is a relatively rare mineral, only occurring in extremely arid terrains or on the sea-floor (black smokers). Its presence in the Hillside orebody probably does not exceed 0.5% on average according to the extensive chlorine data obtained by Rex. That data (in excess of 21,000 analyses) indicates a median chlorine concentration of 920 ppm and this concentration diminishes rapidly with depth. Chlorine from sea spray deposited over thousands of years may well be flushed downwards into the upper levels of the oxide zone. Clay minerals (e.g. kaolinite and smectite) are also known to hold chlorine and all analysed chlorine need not reside in atacamite. The presence of kaolinite and smectite may also act as a "sink" for chlorine in the oxide stockpile. X-ray diffraction analysis of oxide zone samples (see **Appendix 21**) indicated that these clay minerals enclose or are intimately associated with atacamite.

Further information including an impact assessment of the oxide stockpile is presented in **Response_16. Geochemistry.**

22. GEOLOGY

Section 5.16.4 geological monuments

There are two listed coastal geological monuments listed as on the coast, adjacent to the proposed development site. These are Harts Mine (YK5) and Muloowurtie Formation (YK6).

Confirm the presence of both of these sites on a plan (currently Section 5.16.4 does not mention Muloowurtie Formation).

Four geological monuments, Horse Gully, Muloowurtie Formation, Harts Mine and Pines Point were identified during the MLP process and illustrated on Figure 5.16-1 of the MLP. This figure has been amended to include labels identifying the different geological monuments (refer to **Appendix 22**).

23. GEOLOGY

Section 6.2 reserves, products and markets

The resource to be accessed with underground development is not shown in the proposal.

A plan is required to show the reserve and resource limits in relation to the proposed pit outline and underground workings and the ore reserve statement provided in the MLP.

See Figure 1 and Figure 2 within **Appendix 23A** which was provided to the Australian Securities Exchange (ASX) by Rex on 28th June 2013 for an outline of the Ore Reserve and Mineral Resource limits with regards to the open pit. See **Appendix 23B*** for a long section showing the underground workings in relation to the Mineral Resource.

** This supporting appendix has been provided by Rex and contains information that the broader market does not possess and is commercial in confidence. This information has been provided to the State Government only for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent.*

24. GEOLOGY

No information is provided to assess any sterilisation of potential resource areas under waste dump, TSF or other infrastructure areas. Exploration drilling may have established that no potentially economic mineralisation is present in these areas but the relevant drilling information has not been presented. Evidence that potential for sterilisation has been minimised through exploration drilling.

The mineralised component of the Hillside orebody lies with the Pine Point Structural Corridor (PPSC). The location of the WRDs, TSF and other infrastructure lie well outside the location of the PPSC and as such, Rex believes there to be no potential copper mineralisation in these areas. To support this assumption, Rex has completed four holes west of the PPSC in the area of the proposed WRDs and TSF and no economic quantities of copper mineralisation have been identified.

These holes are HWDD-001, HWDD-002, HDD-007 and HDD-007A and the results of these holes can be seen in **Appendix 24***.

Finally, a sterilization program consisting of 36 drillholes for a total of 5400 m has been planned to further confirm the lack of any copper mineralisation in the areas of planned infrastructure. These will be drilled prior to the construction of any infrastructure.

Infrastructure areas east of the fault include the low grade stockpile, oxide stockpile, NERSF (North-RSF), SERSF (South-RSF) and sub-soil and top-soil stockpiles, see Figure 14 below. The sub-soil, top-soil, SERSF, low grade stockpile, oxide stockpile and the southern part of the NERSF (North-RSF) have all previously been drill tested as part of the Mineral Resource definition program of over 750 drill holes. Accordingly, no copper of economic quantities has been identified close to the surface within these areas. To ensure the untested area of the NERSF (North-RSF) is fully sterilised, the planned sterilisation drilling program of 36 drillholes does include this area. No other areas east of the fault need to be sterilised as they have already been sterilised by the Mineral Resource drilling program.

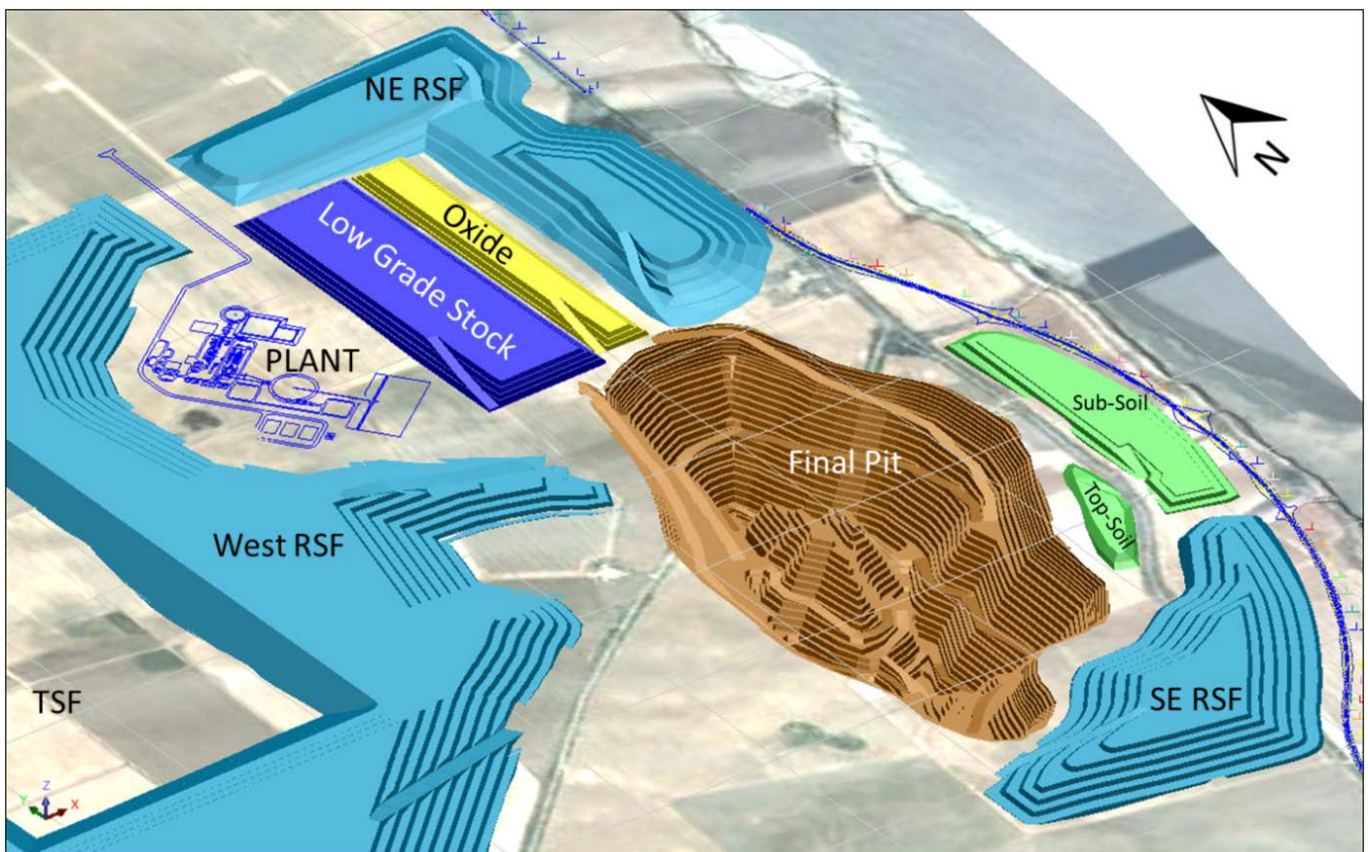


Figure 14: Hillside Site Plan showing Life of Mine Rock Storage Facilities (RSF) and Stockpiles

** This supporting appendix has been provided by Rex and contains information that the broader market does not possess and is commercial in confidence. This information has been provided to the State Government only for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent.*

25. GEOLOGY

Section 6.2 geological environment

Description in the MLP of the post Proterozoic geology is very brief and interspersed. It is difficult to undertake an assessment of geotechnical risks based on the information provided.

Further detailed interpretation is required about post-Proterozoic geology of the area.

The post Proterozoic geology of the Hillside area is dictated by the PPSC where numerous sub-basins develop, each containing potentially different ages of sedimentation. The oldest sequence of sediments is considered to be an equivalent to the ~1450Ma Pandurra Formation. The sequence is dominated by red grits and sands which often contain green 'reduction' spotting. The sequence has been derived from the weathering of Gawler Range Volcanic equivalents. This sequence could also possibly be a basal Cambrian unit. Cambrian dolomites uncomfortably overlie these grits. Clean fluviatile Permian sands also are located in small sub-basins. These sands contain ice rafted pebbles and boulders. The various sequences are considered to be present in various sub-basins developed along the PPSC with windblown sand and soil developed over the sequences. A more detailed description and figures of the post-Proterozoic geology of the area is provided **Appendix 7** Section 4.1.3 Rex site sourced geological information.

As per Section 5.8.1 of the MLP there are no landslips or karst features have been identified and with exception to the Pine Point fault, as discussed below, no other faults are interpreted to exist within the proposed ML and MPL areas.

5.8.1.1 Landslips

No landslides have been recorded within or immediately adjacent to the proposed ML or MPL areas (GA 2000a). The area within the proposed ML and MPLs is characterised by gently undulating topography with low relief and slope gradients. The coastal precinct to the east of the proposed ML area is characterised by steep cliffs up-to 15 m in height. Whilst these coastal cliffs are gradually being eroded by natural processes, coastal land slip events are rare (Davey, pers comm, 26 February 2013) and have not been systematically recorded. No impacts (direct or indirect) to this cliff environment are anticipated as a result of activities proposed within this proposed ML, and conversely any activities proposed within the ML will not be impacted by natural erosion processes experienced along the coastal cliff precinct.

5.8.1.2 Faults

The Hillside deposit is hosted within a prominent north-south oriented fault zone referred to as the Pine Point fault. At Hillside, this fault zone is comprised of several parallel elements over a width of 600 m, with a near vertical dip on the fault plane. The fault zone is characterised by brittle fractures with small scale offsets (<1 m), through to zones comprising extensive rock flour and clay, inferring significant displacement across these elements. There is no surface expression of this fault zone, although it is interpreted to extend nearly the entire length of Yorke Peninsula based upon interpretation of geophysical datasets (gravity and magnetic data). The kinematics of this fault zone are poorly understood due to the near absence of outcrop and surface expression, although on this basis it is concluded the fault has not experienced any recent movements. There is a poor correlation between the known and inferred position of the Pine Point fault and recorded locations of seismic activity over the preceding 120 years, reinforcing this view that it is not currently experiencing any movement.

Other faults are interpreted to exist on Yorke Peninsula, although very few are confirmed due to an almost complete lack of basement rock outcrop. No other faults are interpreted to exist within the proposed ML and MPL areas.

5.8.1.3 Karst

Potential for karst features exists within Cambrian–age limestone units on Yorke Peninsula, namely the Parara Limestone and Kulpara Formations within the Normanville Group. Karst formations are known to occur at and around Curramulka, approximately 20 km south-west of the proposed ML. Drilling within the Hillside deposit footprint has not intersected any of these Normanville Group rock units.

Exploration drilling at the northern limits of the proposed ML area, due north and along strike of Hillside deposit footprint has intersected Kulpara Formation, although this is interpreted to be within the Pine Point fault zone. The proposed MPLs also traverse the Pine Point fault zone. The Kulpara Formation observed in this drilling did not contain cavities or dissolution features typically associated with karst. This fault-constrained occurrence of the Kulpara Formation continues northwards to Ardrossan, where this unit is exploited for dolomite by Arrium Mining at their Ardrossan operation. Weakly developed dissolution cavities have been noted within the open pit. The frequency of occurrence is considered very rare and the cavities do not present a hazard requiring precautions or control measures for mining operations (Smith, pers comm, 27 February 2013). The variable dolomitisation of this unit may in part explain the apparent lack of karst formation.

No karst features are observed at the land surface within the proposed ML and MPL areas, and farming of the land over several generations has not suggested the occurrence of near-surface karst features.

26. GEOLOGY

Section 8.3.12.4

The document (Page 8-176 and Page 8-174) appears to provide contradictory statements regarding the competency of the coastal granites and therefore the barrier to seawater ingress.

Clarify the competency of the coastal granites and the potential fractures or faults within them.

The Hillside deposit occurs within the NNE-SSW trending PPSC, bound on the west by the Pine Point Fault and on the east by a significant stock/pluton of granite. Limited large scale faulting and jointing has been observed in drill sections in the Eastern granite in the eastern part of the deposit (see Figure 15 below).

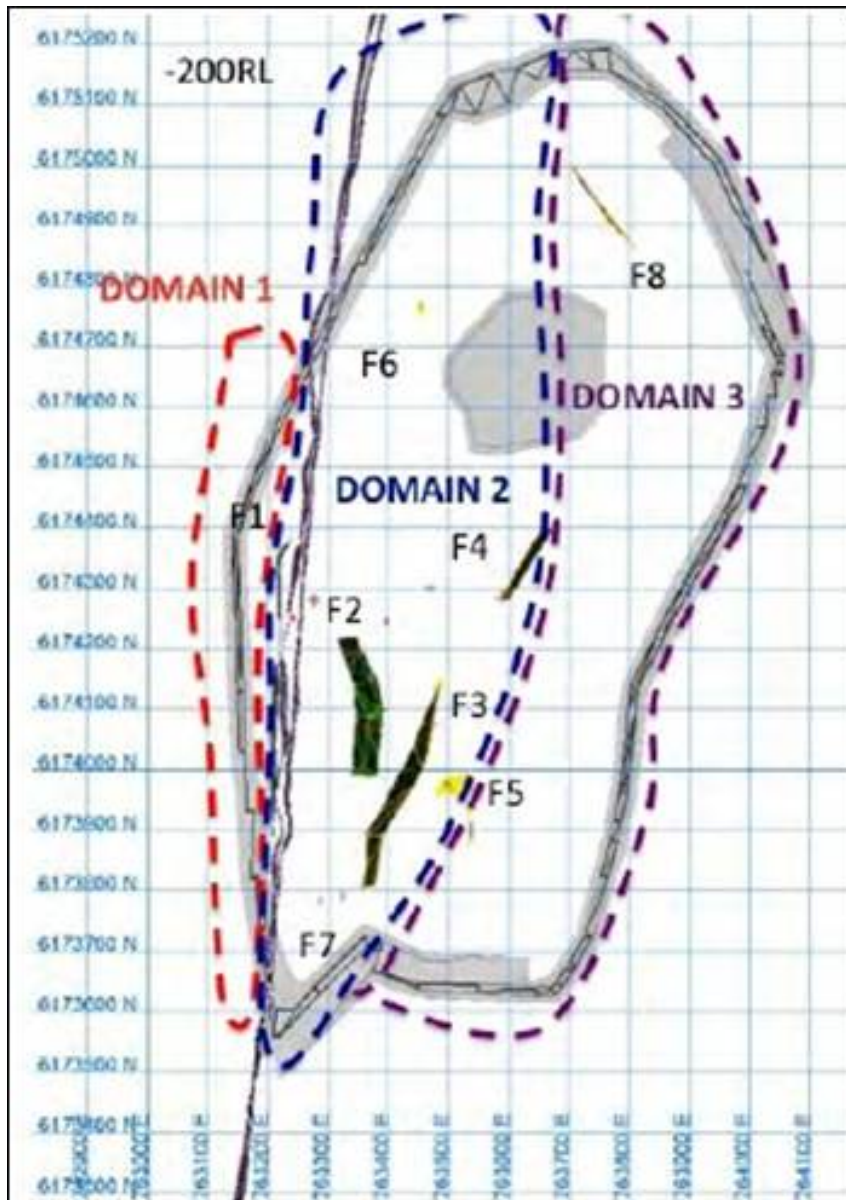


Figure 15: Geotechnical domain map based on major fault pattern and distribution

Although no local stress measurements have been conducted or modeling completed, it is the opinion of our geotechnical consultant (Mine Technics) based on experience that the pre-mining in situ stress conditions are not likely to be at a level to cause significant issues to the stability of the Hillside open cut mine. There may be some micro seismic events related to the mining as pre-mining stress fields are re-aligned around the open pit excavation. This will most likely take place deep (50 – 100 m) within the pit walls on large fault structures such as the Pine Point Fault. The effects of such events on the stability of the mine will be negligible and similar to the effects of the large blasting events within the pit operations. Importantly, the location of the Pine Point Fault is within the western wall whereas the Eastern Granites lie within the eastern open pit wall. The Eastern Granite has been shown to be competent (see Figure 16 and Table 15 below) and a thorough management program to ensure wall stability will be implemented by Rex across all open pit walls. This program will include regular scaling, pre-split blasting, structural/geotechnical mapping and radar monitoring.

The movement of water into the pit will occur by seepage at low rates during open pit dewatering within the coastal granites. This has been demonstrated as already occurring at very minor levels given the

groundwater quality in these granites approaches that of sea water (being even more saline at some locations). That said, as noted above, the impact of this is already demonstrated as negligible as the eastern granites contain limited large scale faulting or jointing. The eastern granite domains include domains E5 and E6 and joint sets for these domains is shown in the Figure 16.

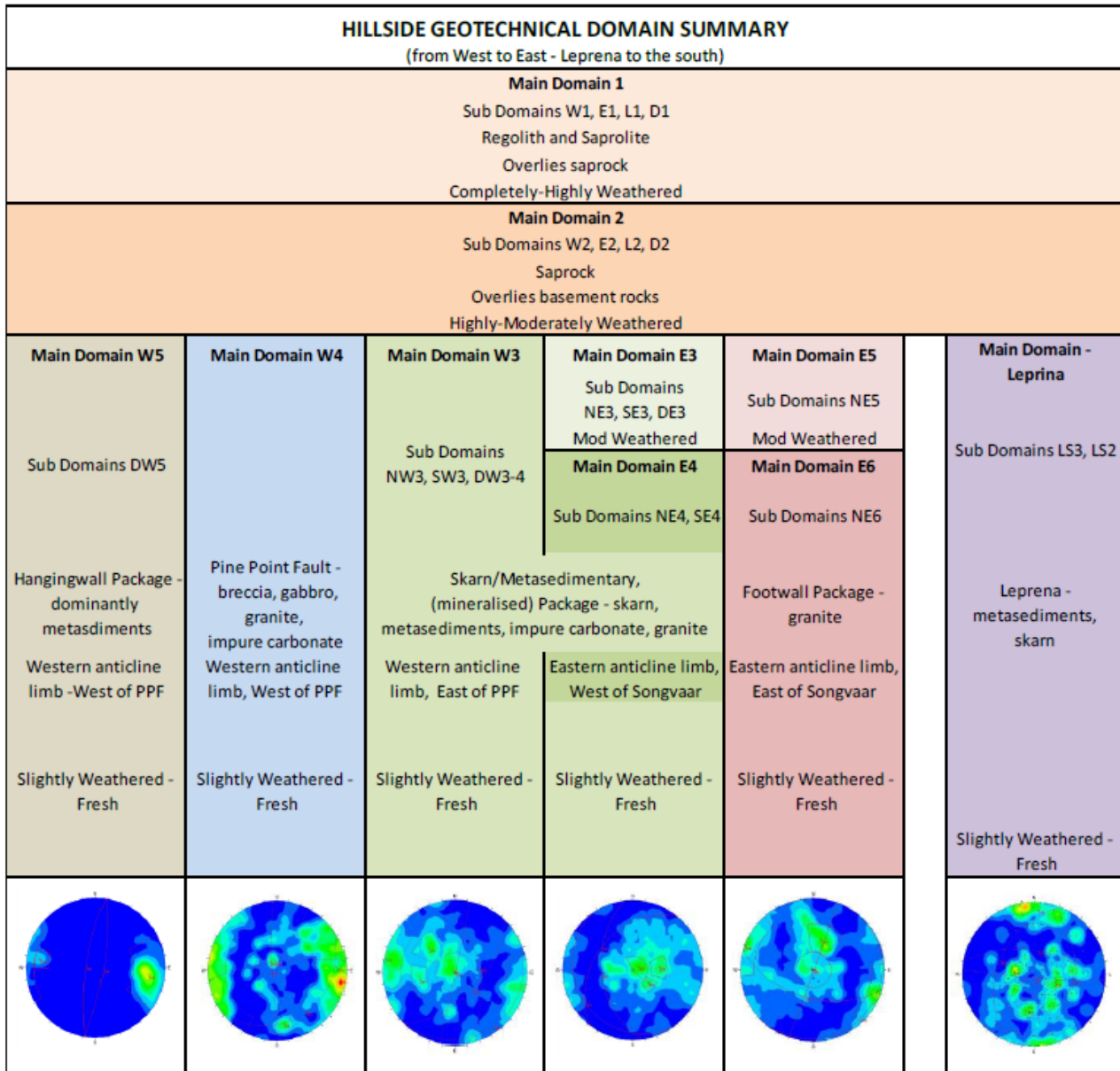


Figure 16: Hillside geotechnical domain summary

Rex has also made an assessment of the stability of the open pit walls and the evidence of the stability of the eastern granites is demonstrated by analyzing the estimated probability of failure for the coastal granite geotechnical domains (E5 and E6). This work suggests there is a very low probability of failure for a 20 m high batter within a range of batter angles and orientations (see Table 15 below). Therefore, it is Rex's opinion (based on the extensive geotechnical analysis completed to date) that the competency of the coastal granites is good to fair. There are some instances of faulting and fracturing but no major occurrences of faulting or fracturing are noted that would otherwise pose a geotechnical or stability risk. Hence the potential for large volumes of seawater ingress is very low.

Table 14: Estimated probabilities of failure per geotechnical domain

GT Domain	Failure Mode	Regime	Batter Angle	Berm Width (m)	Inter-Ramp Slope Angle (o)	Estimated Probabilities of Failure (Pf) for a 20m high Batter with a range of Batter Angles & Orientations (Dip Directions)													MAX Pf
						180	210	240	270	300	330	0/ 360	30	60	90	120	150		
W2	P=45/089	A, B, C	50	5	37	0								0	0	0	0	0	
W3	P=52/134	A	60	10	43	0.025								0	0.029	0.075	0.075	0.075	
		B	65	10	46	0.033								0	0.039	0.138	0.138	0.138	
		C	68	10	48	0.039								0	0.051	0.186	0.186	0.186	
W3	P=52/079	A	60	10	43							0	0.017	0.075	0.075	0.042	0	0.075	
		B	65	10	46								0.029	0.131	0.138	0.058	0	0.138	
		C	68	10	48								0.032	0.174	0.186	0.082	0	0.186	
W3	W (2,3) 48->106	A	60	10	43									0	0.059	0.062	0	0.062	
		B	65	10	46									0	0.129	0.121	0	0.129	
		C	68	10	48									0	0.181	0.173	0	0.181	
W4	T1= 87/270	A	60	10	43										0			0	
		B	65	10	46										0			0	
		C	80	8	60										0			0	
W5	P=77/099	A	60	10	43									0	0	0	0	0	
		B	70	8	53									0	0	0	0.004	0.004	
		C	80	8	60	0.036								0.086	0.036	0.052	0.111	0.111	
E4	P=42/263	A	60	10	43	0	0	0	0	0	0							0	
		B	70	8	53	0	0	0	0	0	0							0	
		C	80	8	60	0	0	0	0	0	0							0	
E4	W(2,3) 32->309	A	60	10	43				0	0.001	0	0						0.001	
		B	70	8	53				0	0.004	0	0						0.004	
		C	80	8	60				0	0.004	0	0						0.004	
E5	P=43/299	A	60	10	43				0	0	0	0	0					0	
		B	70	8	53				0	0	0	0	0					0	
		C	80	8	60				0	0	0	0	0					0	
E5	W(1,3) 27->242	A	60	10	43				0	0	0	0						0	
		B	70	8	53				0	0	0	0						0	
		C	80	8	60				0	0	0	0						0	
North	P 52/182	A	50	10	37	0	0	0										0	
		B	60	8	46	0	0	0										0	
		C	70	8	53	0	0	0								0	0	0	
E6	T1= 89/110	A	60	10	43										0			0	
		B	70	8	53										0			0	
		C	80	8	60										0			0	
D2	P=49/146	A, B, C	60	5	50	0	0							0	0	0	0	0	
DWS	P=58/126	A	60	10	43	0								0	0	0	0	0	
		B	70	8	53	0								0	0	0	0	0	
		C	80	8	60	0								0	0	0	0	0	

Also refer to Section 4.1.3 and Section 7 of **Appendix 7** for further information.

27. GEOLOGY

Section 1.2

The mining rate of 15 Mt/annum has been projected for ~15 years giving a total mass extracted of 225 Mt. How does this relate to the stated resource of 337 M/t which would extend the operation to ~22 years?

Clarification is to be provided on the total reserve to be mined, proposed production rates and mine life.

The total Ore Reserve to be mined is 180 Mt. This provides Rex with 12 years of production at production rate of 15 Mt per annum. The stated Mineral Resource of 337 Mt is a Mineral Resource and according to JORC Rex cannot discuss or talk about growth beyond the Ore Reserve without clarifying what that potential (refer to ASX release provided in **Appendix 23A**). A summary of the JORC compliant exploration and growth potential is detailed directly below. This summary does not talk about 22 years of mine life as it is simply not realistic to assume that the entire Mineral Resource could be converted to an Ore Reserve as per JORC requirements. It is Rex's intention to convert as much of the Mineral Resource to an Ore Reserve as possible, but this will require further drilling and analysis over the coming years.

The Pre-Feasibility Study (PFS) examined an **upside case** for the inclusion of Indicated and Inferred resources (beyond the Ore Reserve) in the optimisation process for the Hillside project. This resulted in Indicated and Inferred resources being included in 225+Mt (>15 years) of material capable of being processed. This was noted on page 9 of Rex's ASX release dated 31 October 2012 which is available to download from Rex's website (<http://www.rexminerals.com.au/investor-relations/asx-releases/>). Rex believes that with further exploration this material should upgrade to higher classifications and be capable of conversion to Ore Reserves later in the mining schedule.

Underground Mining Options

The Life of Mine (LOM) plan is predominately based on the Measured and Indicated Mineral Resource (which a large component of, has now been converted to Reserves), defined at Hillside, and allows for extensions that are currently in the Inferred category. As such, the Mineral Resource at Hillside has identified a substantial amount of copper (classified as either Indicated or Inferred) extending beyond the maximum extents of the planned open pit mine design. This mineralisation was assessed for its ability to be effectively mined using underground mining methods. Due to the higher costs and lower mining rates of the underground mining options considered (longitudinal and transverse sub-level caving), a higher cut-off grade was used for the underground mining options.

The results again showed an upside case for the inclusion of some Indicated and Inferred resources in the underground mine plan and this resulted in 31 Mt of material capable of being processed. Rex considers it likely on the basis of past exploration success and resource category upgrades with additional drilling, that these Inferred and Indicated Resources should upgrade to higher classifications and be capable of conversion to Ore Reserves at the end of the mining schedule.

28. GEOTECHNICAL

Section 8.3.13.2

It is not clear if potential structural / geotechnical issues due to TSF seepage have been assessed. Provide information on the influence of base seepage from the TSF on the stability of the open pit

The TSF will be located over 2000 m to the northwest of the final open pit and underground mine. Any potential seepage will be accounted for as part of the pit dewatering and is therefore unlikely to significantly influence the overall pit stability (see pit drawdown discussions in **Response_48. TSF** and **Response_169. TSF** for further explanation).

Rex will install a ring of pore pressure monitoring piezometers around the open pit to provide insight to the potential for elevated pore pressures. Response plans for elevated pore pressure within the open pit-walls include ex-pit intersection bores, in-pit horizontal wall depressurisation bores or underground drainage galleries. The specific locations of the piezometers and monitoring requirements will be further detailed in the PEPR.

29. GEOTECHNICAL

General

Additional data is required to undertake a complete assessment of geotechnical risks to the environment posed by the proposed mining project.

Provide:

- (i) All available technical reports relating to: mine geology • groundwater • open pit geotechnical conditions • open pit wall and mine design (including pit wall angles) • underground geotechnical conditions • underground development and stope design.***
- (ii) Core logs, core photographs and borehole survey data for geotechnical boreholes.***
- (iii) Borehole survey data for other boreholes in mine area (i.e.: collar locations)***
- (iv) 3D wireframes or string files for: topography • base of saprolite • base of oxidation • base of transition • ore lodes • geological contacts • Pine Point Fault and any other major faults • starter pits, pushback 1 pit, pushback 2 pit, final pit • waste dumps and tailings storage • underground development and stoping layout • proposed surface layout, including lease boundary, processing plant, road deviations.***

These files should be provided in Surpac or DXF formats.

Geotechnical studies over the Hillside project have been completed by Ground Control Engineering (GCE) and Mine Technics (MT). Both groups were engaged by Rex for differing reasons, however the combined investigation from both groups was designed to conduct a Mining Geotechnical Study for the Hillside Project and formed part of the overall mining study. The work program included a geotechnical investigation and evaluation of the deposit and surrounding rockmass with respect to open pit and underground mining.

This supporting information has been provided by Rex and contains information that the broader market does not possess and is commercial in confidence. This information has been provided to the State Government only for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent.

30. GEOTECHNICAL

Section 8.3

There is mention in the document that the proposed underground mining method, sub-level caving works under the action of mining induced stresses and gravity. However there appears to be no mention of mining-induced seismicity apart from this. There is mention of blast monitoring, but not of continuous vibration monitoring within or outside the mine. This is a very large open cut, two underground mines and TSF in a relatively closely settled region.

Provide an assessment of the potential risks associated with seismic events induced by proposed mining activities. Provide clarification on whether continuous vibration monitoring is proposed.

As per **Response_19. Geology**, based on experience gained across similar large open pit and underground mines in similar operating conditions to the Hillside Project, it is expected that the proposed mining at Hillside will result in some low magnitude mining induced seismicity. This will occur as the natural pre-existing stress field is redistributed around the mining voids. It is highly unlikely these events would be noticed by members of the public or the on-site workforce. It is expected there would be little, if any damage to the mine or onsite infrastructure. Given the distance to public and offsite infrastructure it is expected that there will be no damage to offsite infrastructure.

Due to the staged development of the open pit and the underground mine, it is expected that any seismological effects of the stress redistribution due to mining will be dissipated as small incremental events matched to the gradual changes in the shape and size of the mine. The small and incremental release of seismic energy is the natural response to the gradual development of the mine. This incremental release of energy reduces the potential for large energy storage and release required to initiate significant fault movement typical of natural occurring crustal seismicity that result in a noticeable seismic events (earthquakes= Richter Scale events >4).

Research has been conducted and budget provisions have been made for the potential installation of a micro seismic monitoring system to help Rex understand the source, location and drivers of seismicity within the rock mass.

A comprehensive risk assessment will be carried out prior to undertaking any underground mining activities which is anticipated to be in year 6 of the proposed mining operation.

Stress field modelling and reporting will be conducted as part of the PEPR documentation, if required. Continuous vibration monitoring will be undertaken in line with the blast monitoring program (the vibration monitors required for blasting continuously monitor vibration and are not turned off in-between blast events).

31. MARINE

Section 8.3.9 Marine Environment

No information provided on the potential for bio-fouling of seawater intake pipework and the resultant processes to remove any bio-fouling. Outline proposed solution to remove bio-fouling and outline risks and management strategies to ensure marine environmental impacts are addressed.

Rex has made a commitment to implement the use of a cover which is to be placed over the seawater intake screens when it is not in use. This will stop build-up of any growth on the screens. This method of management was recommended by the SA EPA and was included as a control measure in Section 8.4.8.3 of the MLP.

As per Section 6.6.6.5 in the MLP, if there is a build-up of organic material on the intake screen, provisions have also been made for a hoist crane to be installed to facilitate cleaning and maintenance. There will be no chemicals used in the cleaning process.

32. NATIVE VEGETATION

Section 6.8 Supporting Surface Infrastructure

The proposed location of the mining camp is close to an area of remnant vegetation. Potential weed and pest impacts to the vegetation are increased with a camp in close proximity and ideally access should be restricted.

Detail potential risks and management strategies associated with the camp location in relation to the remnant vegetation.

The location of the camp as per Figure 6.1-2 (MLP) was diagrammatic only. The camp will not be located at such close proximity to the remnant vegetation as portrayed on Figure 6.1-2 of the MLP. If required, the patch of remnant vegetation will be fenced to restrict access. The camp will also be included as part of the pest plant and animals management program to minimise the potential weed and pest impacts.

33. NOISE

Section 8.3.2 Noise (and App 6.6-A)

The Indicative Noise Level calculated within the MLP differs from that calculated by the EPA due to both zoning land use category differences and annoying character penalty application. How do the proposed risk mitigation strategies manage the application of a lower noise criteria than that proposed in the MLP.

If real time noise and weather monitoring is the proposed principle strategy to ensure management of noise levels within compliance limits then further detail outlining the suitability of this system should be provided.

Refer to **Appendix 33** for AECOM response (as summarised below).

From AECOMs analysis of the likely noise sources onsite at Hillside and the distance to receptors, AECOM believe that it is not necessary to apply a noise character penalty to the predicted noise levels given that annoying characters are not likely to dominate the overall noise impact of the Hillside project. Note that the Noise Environmental Protection Policy (EPP) requires an annoying noise characteristic to be fundamental to the nature and impact of the noise, and is applied during compliance measurement as appropriate.

In consideration of this issue, Rex plan to proactively minimise the potential for noise characters to occur through appropriate selection of mobile plant as well as operational management utilising the feedback provided by a real-time noise monitoring system. The noise monitoring system will incorporate sophisticated alarm trigger points in addition to audio to enable the identification of potential annoying characteristics. Should a potential noise annoyance character in context with an overall noise emission that is also approaching the project noise goals be identified (e.g. through the trigger of an automated alarm), logged in a register which provides detail on complainants (i.e. contact details, reason for complaint, time, date and location of traffic issue) and how the issue was addressed. Records will show that all complaints received have been investigated, responded to within 2 working days and appropriately actioned as soon as practically

possible. Details are to be confirmed with the regulators in conjunction with other stakeholders as part of the PEPR. Rex, with the support of AECOM, believes that this is the best approach, rather than adding a noise character penalty to the noise prediction scenarios which is already sufficiently conservative.

The noise controls as presented in Section 8.3.2.3 of the MLP as are follows:

Construction strategies

During construction activities, all reasonable and practicable measures will be taken to minimise noise resulting from the activity to minimise its impact. This includes (but is not limited to) the following measures to the extent practicable:

1. Using off-site or other alternative processes that eliminate or lessen resulting noise
2. Locating noisy equipment or processes so that their impact on neighbouring premises is minimised
3. Ensuring that noise reduction devices such as mufflers are fitted and operating effectively.
4. Shutting or throttling equipment down whenever it is not in actual use.
5. Ensuring that equipment is not operated if maintenance or repairs would eliminate or significantly reduce a characteristic of noise resulting from its operation that is audible at noise-affected premises.
6. Operating equipment and handle materials so as to minimise impact noise.
7. Scheduling particularly noisy activities to commence after 9.00am where reasonable and practicable to do so.

Design strategies

8. Locate/orientate plant away from noise-sensitive receptors where practical.
9. Distribute the waste rock and stockpiles to assist with noise shielding.
10. Purchase haul trucks with appropriate noise attenuation fitted.
11. Measure the noise emissions from the chosen mobile plant models prior to purchase. This is to ensure that no unusual noise characteristics are present that may lead to increased annoyance.

Operational controls and management strategies

12. Ensure fixed plant is maintained such that noise emissions do not increase above the specified levels over the lifespan
13. Monitor mine real-time noise emissions in context with audio, prevailing weather conditions and time of day.
14. Modify operations to minimise noise impacts where practical e.g. limit use of higher gears in dozers during the night (less track slap), use an alternative waste rock dumping location or minimise mobile plant traffic.
15. Not mixing the operation of attenuated and non-attenuated haul trucks on the southern WRD haul routes to minimise noise annoyance associated with alternating noise characteristics.
16. Regularly liaise with the community to obtain feedback on the operational noise and any suggested improvements for Rex to consider.

17. Noise treatment installed at sensitive receptors if deemed an appropriate response to minimise long term annoyance.

Further detail will be provided in the Noise and Vibration Management Plan.

34. **PROCESSING**

Section 6.6.4

There is insufficient evidence to support that a 6hr residence design time is satisfactory for the process pond.

Provide justification for design.

The purpose of the process pond is to act as a buffer water storage capacity for the process plant and as such is not related to the water balance of the site.

A six hour residence design time is ample live storage for operating the plant as the process pond is directly fed from the seawater intake pumps, the concentrate and tailings thickener overflows, the TSF pontoon pumps, open pit dewatering and the Decant, Storage and Collection Pond (DSCP) pumps. This means that Rex is able to control the amount of water within the process pond from a number of sources (i.e. less water or no water can be brought in by the seawater intake pumps). The process pond can also draw water from the event pond if any water is in it.

The design of the process pond is based on the current water balance and process water requirements; the process water pond has been designed to allow for 6 hours storage and a live volume of 29,600 m³. The operating height of the pond is designed at 4.5 m, with a total design height of 5.0 m.

The Event Pond, which is located adjacent to the Process Water Pond, has been designed to accommodate a 1:100ARI 72 hours storm event to capture runoff from the process plant and administration areas.

35. **PROCESSING**

Section 6.6.3

What is the fate of the Collector and Frother chemicals?

Provide details of ultimate fate of these chemicals.

It is generally accepted in the mineral processing industry that the flotation reagents used in the process predominantly report with the flotation concentrate (solids), with negligible reagent concentrations reporting to the TSF. Water is reclaimed back from the TSF as part of the overall site water management strategy. The concentrate at the port will be washed prior to shipping and this water will return to the process stream through the 'return water' pipeline.

Frother - Sodium Metabisulphite Methyl Isobutyl Carbinol (MIBC)

MIBC is a clear, colourless liquid. MIBC does not cause adverse health or environmental effects at levels typically found in the workplace or in the environment. MIBC can enter the environment as emissions from its manufacture and use as a frother. 94% of MIBC is biodegraded and occurs within 20 days.

Potassium Amyl Xanthate (PAX)

Xanthates readily decompose to carbon disulphide with a half-life of approximately 90 days. Xanthates may persist for several days in water, hydrolysing slowly in the neutral environment. Bioaccumulation is unlikely to occur.

The reagents used in the floatation of the concentrate (PAX) are not acutely toxic and are not considered to be hazardous at the concentrations likely to occur with the tailings, provided that the water remains contained with the TSF. The addition of PAX is expected to be 0.02kg/t and at these rates, concentrations of <0.5mg/L are expected in the TSF. The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000a) quote levels of 0.2 – 1.2 mg/L. From this it is expected that at the levels of PAX projected for the TSF water, the likelihood of birds consuming sufficient PAX to result in fatalities or disruption to their life cycle, should they land in the TSF is unlikely.

Sodium Metabisulphite

Is a nonhazardous solid used as a waste water de-chlorination agent. High concentrations will contribute to elevated chemical oxygen demand in aquatic environments. It is soluble in water and rapidly undergoes biological decomposition.

36. RADIATION

Section 8.3.19.3

Further information is required to enable Radiation Licencing level to be determined.

Provide detailed information on proposed maximum mining rate / mine schedule for radioactive ores.

Extensive test work both of the orebody and the waste rock characteristics have shown that the uranium levels within the deposit are relatively low. The proposed mining schedule for the Hillside open pit operation is presented in **Appendix 36*** which further reduces the uranium level and presents annual levels that are well below the current statutory licencing threshold of 200 ppm and below the potential revised licencing threshold of 80 ppm for all but 2 years. It is Rex's intention to optimize the open pit schedule to ensure that U levels are reduced below 80 ppm for all years. Exploratory drilling has identified discrete areas where uranium concentrations are higher than this, although as noted, these areas are small and well defined. This can be achieved by blending strategies in-pit to ensure that areas of 80 ppm are processed in sufficiently small quantities to minimize the concentrations carried through into concentrate and waste streams including the TSF. It is also important to note that not all of the uranium minerals report to the copper concentrate.

** This supporting appendix has been provided by Rex and contains information that the broader market does not possess and is commercial in confidence. This information has been provided to the State Government only for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent.*

37. RADIATION

Section 8.3.19.3

Further information is required to enable Radiation Licencing level to be determined.

Provide detail on uranium distribution within the ore body through the presentation of an updated block model identifying uranium distribution at 35kBq/kg (200ppm) cut off and 1Bq/g uranium natural (80ppm) showing pit and underground areas from three points of view (plan, looking east and north).

Images showing the distribution of uranium in the orebody at 80 ppm and 200 ppm cut-offs within the open pit and underground are shown in **Appendix 37***. Uranium is predominantly concentrated on the eastern mineralised domain (Songvaar). When all Resource assays (>230,000 m) are averaged against their length (weighted), the average grade intersected to date during Rex's drilling program is approximately 24 ppm. It was determined from analytical results that less than 5% of the total core samples in the Resource contain more than 200 ppm of Uranium.

The average Uranium concentration for the LOM is approximately 57 ppm as per schedule presented in **Appendix 36***.

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38. RADIATION

Section 8.3.19.4

Further information is required to enable Radiation Licencing level to be determined.

Provide estimates of radiation doses for the periods in which workers will be handling radioactive ore.

All living organisms are exposed to ionising radiation on a continuous and daily basis. This type of exposure is referred to as background radiation. The international unit of radiation dose is called the sievert (Sv). A sievert is a large unit of dose and the unit most in use is the millisievert (1000 mSv = 1 Sv). The sources of background radiation include radioactive materials and their decay products in the natural environment, in building materials and from outer space.

There is considerable variation in the background radiation levels throughout the world. The world average is 2.4 mSv/year and the average Australian background radiation dose is around 2 mSv each year. Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Radiation Protection Series 'Recommendations for Limiting Exposure to Ionizing Radiation (1995) and National Standard for Limiting Occupational Exposure to Ionizing Radiation (republished 2002)' describes Australia's system for radiation protection and includes an occupational exposure standard. In general, an occupational dose limit of 20 mSv per year applies, and for members of the public a 1 mSv per year dose limit applies.

Extensive testwork has been completed which estimates and evaluates the radiation dose to the Hillside workforce. Owing to the low levels of uranium in the orebody, assessments have shown that workers would

receive less than the member of the public limit of 1 mSv per year. An assessment of doses to the public has been conducted for two sensitive receiver locations as presented in **Appendix 38**.

The average uranium grade of the mineralised material is approximately 57 ppm (see **Appendix 38** for breakdown table) which equates to approximately 0.7 Bq/g. At this concentration, the mineralised material does not trigger the definition in the National Directory (*Australian Radiation Protection and Nuclear Safety Agency, 2011*) for classification as a radioactive material.

The highest uranium grade zone (named the Songvaar copper-gold ore zone geological domain) in the mine averages 81 ppm uranium, which is equivalent to 1 Bq/g, just triggering the classification. Exploratory drilling has identified discrete areas where uranium concentrations are higher than this, although as noted, these areas are small and well defined.

Occupational Radiation Doses

Open Pit Mine Workers

A summary of the estimated doses was derived from first principles and is outlined in **Appendix 38**. The analysis also took into account the impacts from both dust and stable air (inversions) occurring within the open pit. Doses are low due to the low uranium content of the mined material. Note that miners usually work in air conditioned cabins therefore it can be assumed that the calculated doses are conservative.

Underground Mine Workers

Assessment of doses for the underground miners is based on published doses from the Olympic Dam underground mine.

The average reported uranium ore grade at Olympic Dam was 500 ppm. For the Hillside deposit, the average reported mineralised uranium grade is 57 ppm. Therefore, using a ratio, the doses for underground mine workers at the Hillside deposit could be expected to be approximately 8 times less than the Olympic Dam doses.

Processing Plant Worker Doses

The proposed processing plant consists of:

- A crushing, grinding and flotation circuit (concentrator).
- A final products loading and shipment facility (port facility).
- A tailings storage area (TSF).

For the purposes of this assessment, it is assumed that doses will be similar for workers in all work areas. Two methods of dose assessment have been used. The first method uses the conservative dose factors provided by the IAEA. The second method uses published data from the Olympic Dam processing plant. To remain conservative in the dose assessment, the average of the IAEA and the Olympic Dam figures has been used to estimate the plant workers doses at 0.5mSv/y.

Summary of Radiological Impacts

Predicted Work Place Dose:

The assessment has shown that the radiological impacts of the proposed project will be low. Conservative estimates show that doses to all workers will be less than 1mSv/y, compared to the annual limit of 20mSv/y. A summary of the worker doses can be seen in Table 16.

Table 15: A Summary of the worker doses

Work Group	Average Annual Dose (mSv/y)			
	Gamma	RnDP	Dust	Total
Open Pit Miner	0.2	0.09	0.06	0.35
Underground Miner	0.2	0.4	0.03	0.63
Processing Plant Worker	N/A	N/A	N/A	0.50

Predicted Public Dose

Public doses are expected to be well below the public dose limit of 1mSv/y and a summary of the doses can be seen in Table 17.

Table 16: A summary of the public doses

Sensitive Receptor	Dose From Pathway (mSv/y)			
	Inhalation of RnDP	Inhalation of Dust	Gamma Radiation	Total Dose
Southern Project Boundary	0.056	0.011	0	0.067
Port	0.004	0.008	0	0.012

Rex has committed to the development of an operational Radiation Management Plan (RMP) to ensure that radiation exposure of workers and the public is low and well controlled. An exploration RMP is already in existence and has provided appropriate guidance for radiation protection for the drilling program to date. The operational RMP would be subject to approval by the appropriate regulatory authority

Rex has detailed the metallurgical testing regime that was undertaken in order to determine the optimum process plant circuit in **Response 18. Geochemistry**. The Pilot Plant testing was undertaken to 'de-risk' the process from both a technical and economic perspective. The Pilot Plant produced sufficient quantities of concentrate and tailings for marketing and equipment selection and mineralogical purposes and provided certainty with respect to the process outcomes of a commercial plant.

To ensure that the most representative samples of ore that will be treated during the mine life on the basis of both feed grade and ore type variability were selected for the pilot plant program (as the whole projects economic viability with respect top grades and recoveries is based on this test work).

The process plant has been designed to only process ore is a relatively tight copper feed range (~0.3%Cu to ~0.7%Cu), with the average grade being 0.52% Cu, consequently the plant will rely on a blending strategy that will revolve around the copper and uranium feed grade (so as to ensure that at all times a marketable copper concentrate is produced – this concentrate will, at all times, have a uranium level significantly below the transport level of concern). The iron in the feed blend will, to some extent is allowed to vary through the

use of an iron reclaim system – when the iron feed is too high for the circuit iron is stored and when it is too low so that the circuit is not fully utilised the stored iron is reclaimed.

This blending strategy will ensure the optimum feed grade enters the plant as this is required to ensure marketable copper concentrate is produced.

Process Mineralogy of Uranium

The only significant uranium species identified in the QEMSCAN analysis on pilot plant products is Uraninite (UO_2), a non-floating oxide. Uraninite is 88% uranium so its presence or absence will strongly influence uranium grade in a stream. The major issue determining the recovery or rejection of uraninite in cleaner flotation is its association or liberation from copper sulphides, especially chalcopyrite. If uraninite is associated with NSG or pyrite then its only means for recovery to final copper concentrate is via the low probability process of entrainment.

Uranium is present as non-floating uraninite but there is a strong association between uraninite and chalcopyrite. When the uraninite is free of chalcopyrite at its surface it is able to be rejected during cleaner flotation using columns and wash water. It is possible to reduce the uranium reporting to the copper concentrate by grinding to fine sizes and re-cleaning. This is one of the fundamental principles behind the two stage cleaning circuit that has been adopted for treating the Hillside ore.

Since uranium is not associated with the magnetite the uranium in magnetite concentrate is very low of approximately 10 ppm.

The full chemical composition and mineral speciation breakdown of the copper concentrate has been provided to the State Government for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent as this information has not been provided to the broader market place.

Reference:

Australian Radiation Protection and Nuclear Safety Agency, 2011, *National Directory for Radiation Protection*, Radiation Health Committee, <http://www.arpansa.gov.au/Publications/codes/rps6.cfm>, viewed on 30 December 2013.

39. RADIATION

Section 8.3.19.1

Further information is required to enable Radiation Licencing level to be determined.

Provide details and results of background radiation monitoring.

Rex has employed an independent consultant (Trevlyn Radiation and Environment) to undertake an extensive background radiation monitoring program. Hillside's open pit terrestrial gamma levels have been derived from a ground gamma survey that was conducted in 2012. Airborne radon concentration and radon emanation measurements were conducted and the dust radionuclide activity concentration was measured for the inhalation pathway. Ingestion information was also gathered biota samples being collected from the local area and analysed for radionuclides and the concentration factors calculated.

A summary of the results have been presented below:

- The results from the background gamma radiation survey from the proposed open pit area state that there were **no areas of above background radiation levels** measured during the gamma surveys (the annual average radon activity concentration in the air at the Hillside project area was determined to be $18.65 \text{ Bq}\cdot\text{m}^{-3}$ which is well below the Australian reference level of $200 \text{ Bq}\cdot\text{m}^{-3}$ for all sites measured across the entire project area at Hillside).
- Radon flux densities from emanation data collection using charcoal cups are low with total radon flux from the site amounts to $11.34 \text{ Bq}\cdot\text{m}^{-3}$. **The values returned by analysis are low**, and are comparable to average values for Australia of $22 \pm 20\% \text{ mBq}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ (Schery et al 1989).
- The gamma spectroscopy analysis of the airborne **dust samples for the dust inhalation pathway were low, or below detectable levels.**
- For the ingestion pathway biota samples have been collected during 2012 from the REX site and surrounding areas. An array of biota samples including meat (fish, rabbit, beef and lamb) and crops (canola, wheat and barley) were collected from the surrounding farms and sent for analysis to Australian Radiation Services laboratories for radionuclide analysis. The levels of **radionuclides in foodstuffs grown in the local area are generally low and close to the level of detection.**
- The Australian Drinking Water Guidelines recommends guideline values for Radium-226 are both 0.5 Bq/L . **Only four from the twelve groundwater samples were below the recommended drinking water guideline values for ^{226}Ra .**

Rex's background radiation monitoring is further detailed in **Appendix 39** the Baseline Radiological Assessment of Hillside. The background monitoring results are presented in Appendix A of **Appendix 39**.

40. RADIATION

Section 8.3.19.4

Further information is required to enable Radiation Licencing level to be determined.

Provide quantitative prediction of environmental concentrations of radionuclides and doses to members of the public.

Members of the public

An assessment of doses to the public has been conducted for two sensitive receiver locations and is discussed in **Response 38. Radiation** and detailed in **Appendix 38**. For the public dose assessment, results of the air quality modelling were used to inform the assessment for inhalation of radionuclides in dust and for radon decay product exposure. The public dose assessment also used a conservative estimate of radon emission rates combined with factors provided by the International Atomic Energy Agency.

The first location is a hypothetical location adjacent to the southern boundary which was the area of largest impact as identified by the air quality modelling (Appendix 5.6_C of the MLP). The second location is the proposed port area within Port Ardrossan. Results of the dose assessment (**Appendix 38**) indicate that public doses are expected to be low and less than approximately 7% of the recognised public dose limit of 1mSv/y at the project boundary and approximately 1% of the public dose limit at the port.

It is noted that this is a conservative assessment and ongoing monitoring will be conducted during operations.

Environmental

For environmental impacts, the dust deposition results from the air quality modelling were used to make an assessment of impact.

The assessment of radioactive dust dose was based on an estimated total suspended dust concentration in the mine workings of $1\text{mg}/\text{m}^3$ and the conservative assumption that all dust is mineralised dust containing 57 ppm uranium (which is grossly conservative as the majority (85%) of dust emissions was modelled to be wheel generated dust from hauls roads that only have a uranium concentration less than 7 ppm (as per Table 4 in **Response_2. Air Quality**).

Table 6 of **Appendix 39** shows that there is varying concentrations of U^{238} and Ra^{226} in the soil where agricultural land practices are currently undertaken. The natural variation for U^{238} ($6.4 - 9.9 \text{Bqkg}^{-1}$) and Ra^{226} ($8.4 - 29.4 \text{Bqkg}^{-1}$) in the soil is approximately 17% and 43% respectively. The modelling was conducted for a duration of 20 years and shows that the operation will increase U^{238} and Ra^{226} soil concentrations, by 12% and 5% respectively at the southern project boundary (closest non Rex owned boundary). Therefore this addition is well within the variation that occurs naturally at Hillside and therefore is not expected to affect crop quality, growth or yield.

41. RADIATION

Section 6.6.3.5

Further detail is required to assess risk of radioactive scale that may affect the plant.

Provide further information

Extensive test work of the orebody has shown that the uranium levels within the deposit are relatively low as per **Response_36. Radiation**. As such, no radioactive scale will affect the plant.

This is only present in uranium plants where care is required in removing lime scale where potential daughter products from leaching can precipitate in the scale. It is not applicable to the Hillside Copper Mine for the following reasons:

1. No dangerous concentrations of Uranium
2. Uranium stable and no dissolution to release daughter products
3. No lime, sodium metabisulphite (SMBS) unlikely to produce scale.

42. SOIL

Section 8.4.4 (MPL) Soil Disturbance

A potential impact of the pipeline project is disturbance of coastal acid sulphate soils during any excavation that may be required.

Provide an assessment of the risk of exposing coastal acid sulphate soils.

The Rex Port facility Option 1 was the only option where coastal acid sulphate soils would require excavation. Option 2, as detailed in the MLP (Figure 6.6-7 of the MLP) is the preferred port location option for Rex and the current Port Ardrossan lessee. Rex will only include Option 2 in the PEPR. Therefore there is no potential impact of exposing coastal acid sulphate soils.

If acid sulphate soils are encountered during the pre-construction contamination survey, a management plan will be developed to ensure that acid sulphate soils are appropriately managed. The buried pipeline track will also not be in areas of acid sulphate soils, however if preconstruction soil tests along the route indicate acid conditions, the portion of buried line will be coated and wrapped for external corrosion protection.

43. SOIL

Section 6.6.5.2

Examples of successful use of the proposed leak detection approach would assist in understanding the operation of the system.

Provide suitable comparable examples

Leak detection and pipeline monitoring systems for long distance concentrate pipelines are part of the scope of supply of all major engineering companies involved in this area. Originally the system was introduced by PSI (Ausenco) who named their system 'Pipeline Advisor' which can be combined with a 'Simulator' system. All major long distance concentrate/tailings pipelines designed by PSI are executed with this system. Concentrate pipeline references are limited in Australia. However, the Iron ore concentrate line and water return line at Sino iron are both executed with a leak detection/'Pipeline Advisor' system.

An Australian example is the Savage River Mine which is a copper and iron ore mine in north-eastern Tasmania owned by Ivanhoe Mines and ABM Mining Limited. The Savage River Mine transports concentrate in the form of slurry via an 83-kilometre pipeline, from the Savage River Mine its bulk-loading terminal at Port Latta as shown below in Figure 17. The pipeline track includes a 366 m bridge span at 167 m above the Savage River as shown in Figure 18. Construction specifications for the pipeline were based primarily on accepted pipeline practices using API 1104. An analysis of the costs of an above-ground versus buried pipeline indicated them to be essentially equal. Although it could have been argued that an above-ground installation would appear to be less expensive than burying, it was concluded that the safety and line stability aspects were the controlling factors, and a decision was made for a buried line with minimum cover.



Figure 17: Savage River Mine 83 km pipeline (Source http://www.turquoisehill.com/s/news_releases.asp?ReportID=375242, viewed 27 December 2013))



Figure 18: Savage River Mine slurry pipeline 366 m bridge span at 167 m above the Savage River (Source http://www.highestbridges.com/wiki/index.php?title=Savage_River_Pipeline_Bridge, viewed 27 December 2013)

Antamina (**Appendix 43A**) and Ramu Nickel (**Appendix 43B**) and pipeline simulation (**Appendix 43C**) papers discuss the leak detection / Pipeline Advisor / Pipeline Expert system.

Reference:

The Australian Pipeliner, 2011, *The Savage River Slurry Pipeline*,
http://pipeliner.com.au/news/the_savage_river_slurry_pipeline/054155/, viewed 27 December 2013.

44. TOXICOLOGICAL

There is no assessment of the toxicological risks of mine-related dust and contaminated surface runoff to the receiving environment. Provide an assessment of the risk of potential toxicological impacts on the following receptors:

- ***Public***
- ***Native fauna or livestock***
- ***Native flora (including seed)***
- ***Marine environment***

Evidence to support the above assessment is required. With reference to humans and fauna this should not be limited to inhaling fugitive dust but also sensitivity and tolerance to contaminants deposited in water or food sources and include potential cumulative effects. Assessment of marine impacts should include dispersion mechanisms within the Gulf of St Vincent.

The potential pathways for impacts to the public, fauna (native or stock), flora and the marine environment are through air (via dust) and/or surface water.

The results of the groundwater investigations identify that the groundwater (layer 3 and 4) is highly saline, there are no third party users (groundwater not used by landowners as per **Response_60. Water** and there are no groundwater dependant ecosystems as per **Response_91. Water**) and that the gradient is towards the open pit (i.e. as the open pit acts as a 'sink' drawing groundwater (from layer 3 and 4) from the surrounds towards it as per **Appendix 7**). See Figure 5 of **Response_7. Closure** for a representative cross section of the four hydrogeological layers.

All potential seepage from the TSF will be captured. Some of the potential seepage (eastward flowing) will be captured by the open pit as the confining layer (saprolite layer [interface between layer 1 and 2]) slopes towards the open pit. For any potential seepage (westward flowing) that is not captured by the open pit, monitoring bores will be installed to record the extent (if any) of any seepage that may mound around the TSF. If this monitoring indicates that seepage has occurred onto any portion of the saprolitic layer that slopes away from the open pit, then that water will be pumped from the bores located within the area to the process water circuit (i.e. TSF or DSCP).

The potential impacts to soil would be via either the air or surface water pathway. Therefore only the primary pathway has been assessed. If the primary pathway is controlled, then the potential impact to the secondary pathway (e.g. including the uptake of dust deposition by the crops or contaminated surface water entering the marine environment) is eliminated.

Air Pathway

As per **Response_3. Air Quality**, control sites may be used to provide a comparison of the levels of dust deposition on the proposed Hillside site and dust deposition experienced in surrounding areas on the Yorke Peninsula. This will monitor that the amount of dust deposition that occurs on areas surrounding the proposed mine site (which includes land used for cropping) at Hillside will be similar to that experienced elsewhere on the Yorke Peninsula.

As per **Response_2. Air Quality**, The *Clean Air Act of 1963* provides secondary standards for PM10 which includes potential damage to crops and vegetation. This secondary standard for PM10 is 150µg/m³ which is not to be exceeded more than once per year on average over three years. All areas outside of the proposed mine footprint have predicted PM10 levels below 150µg/m³ at all times. Therefore the predicted PM10 level shows that there will be no impact on crops. PM10 levels will be monitored at surrounding residential receptors to demonstrate compliance with the NEPM Standard (50µg/m³). No monitoring of PM10 for crop impacts will be undertaken as dust deposition will be monitored.

As per **Response_2. Air Quality**, the dust that will originate from the proposed mine will not contain levels of copper, other metals or toxins which could potentially accumulate in crops and products from the uptake of dust deposition on soils.

A summary of the assessment results of the baseline radiation monitoring can be viewed in **Response_39. Radiation**, and states that the radiation levels are generally low and/or close to the level of detection.

Furthermore, to provide certainty of the composition of dust from the proposed Hillside Mine analysis of the dust will be undertaken. Once mining has commenced, at a time agreed with the regulators, samples of airborne dust will be collected and toxicological characterisation of the dust will be carried out to demonstrate that there are no significant levels of heavy metals in the dust composition. Therefore, by monitoring the different types of dust (PM10 and dust deposition) and the composition of the dust (toxicological characterisation) all air related potential impacts will be recorded and reported to the regulators and the community to show that Rex are meeting the appropriate criteria.

At the port site, all dust generation will be effectively eliminated by maintaining 'wet' concentrates, the use of the slurry pipeline, fully enclosed conveyors with dust extraction at all concentrate conveyor transfer points and a fully negative pressurised concentrate storage shed, as per **Response_130. Copper Contamination**.

Therefore all potential impacts related to the public, fauna (native or stock), flora and the marine environment through air (via dust) have been considered and addressed.

Surface Water Pathway

All surface water that comes in contact within the mine site footprint will be retained on site and directed to holding ponds for reducing sediment loads, and used to supplement process water. Overflow from the internal drainage system will be directed to the pit, which will provide temporary storage during major storm events. This design will result in zero discharge of surface water from the mine.

Dissolvable copper (atacamite) will only be present in the oxide stockpiles and this will be managed as described in **Response_21. Geology**. An impact assessment has been undertaken for this potential impact

and is presented in **Response_16. Geochemistry** which concluded that the possibility of copper ions being able to leach through to the saprolite layer (interface between layer 1 and layer 2) to the marine environment is extremely low and therefore not a credible risk. Therefore all potential impacts related to the public, fauna (native or stock), flora and the marine environment through surface water have been considered and addressed.

All dust generation at the port site will be effectively eliminated through maintaining 'wet' concentrates, the use of the slurry pipeline, fully enclosed conveyors with dust extraction at all concentrate conveyor transfer points and a fully negative pressurised concentrate storage shed. **Thus there are no potential pathways to surface water.**

45. TSF

Figure 6.4.8

The IWMS is to be constructed such that WRDs are to abut the TSF. What monitoring systems are to be implemented to detect any 'leak' failures of the TSF?

The TSF is a highly engineered structure that is designed to contain all contents and water which encompasses risk mitigation strategies. Construction of the controlled compacted zones within the embankment will be carried out by a competent contractor engaged through a tender and acceptance process. Tender documentation will request proof of previous project completed in order to demonstrate the contractor is competent to undertake the construction works. The construction process will be monitored by a suitably qualified engineer. Monitoring of the construction process will be carried out to ensure the embankments are constructed in accordance with the project specifications. In order to achieve construction sign-off by any engineer would require as a minimum proof of the following:

- Approved compaction and moisture content test sheets indicating all layers have been constructed in accordance with the project specification. ATCW generally specify the use of a NATA accredited laboratory to complete the compaction and moisture testing for construction work.
- Acceptance by the engineer that all zoning within the embankment has been constructed to the specified layer tolerances.
- Photographic proof of construction throughout the construction process.
- Inspection of the works at predetermined hold points as set out in the project specifications.
- Approval of the overall construction of the embankment and associated ancillary works to ensure construction has been carried out in accordance with the project specification and generally accepted Australian Standards construction practices.

Given the integrated WRD, how would remediation activities (if warranted) be effected?

In the highly unlikely event of a 'leak' failure, remediation is possible. However the extent of the remediation activities required is highly dependent on the location, the size and potential impact of the 'leak' failure and would of necessity require onsite investigation and remediation strategies being developed that are appropriate to the particular failure mechanism. The remedial work can be completed using the following methods:

- Cut-off trenching (cement bentonite slurry) and pumping to contain and manage seepage.
- Intersection drilling and pumping to manage seepage.

- Relining the facility where possible.
- Chemical grouting to contain further seepage.

Monitoring boreholes and piezometers will be installed around the TSF and DSCP in order to detect any potential seepage and migration thereof. Piezometers will be installed at various stages of construction to monitor the phreatic surface within the TSF. These piezometers will be placed around the entire TSF. Piezometers will only be installed on completion of the stage 2 embankment raise if required and locations will be finalised at the time of the stage 2 design. Further details will be provided in the TSF Operation and Maintenance Manual in the PEPR.

Refer to **Response_50. TSF** for further information.

Provide clarification of systems proposed to monitor wall leakage and base leakage including monitoring of groundwater quality. Provide details on how any remediation activities for detected TSF base liner failures would be carried out.

With regard to seepage from the TSF during operations, its design is such that the base and side slopes will be lined with a low permeability material, acting as a barrier to the surrounding natural environment. Potential seepage water will therefore report to an underdrainage system.

An underdrainage system is included below the operating decant pond within the TSF as well as the inclusion of a sand layer on the slopes of the embankment immediately below the low permeability facing in the area of the decant pond which has been detailed in Appendix 6.7-A of the MLP. Both systems will remove potential seepage to the DSCP via an underdrainage network.

A downstream toe drain will be installed around the TSF for each stage in order to further assist with potential seepage collection and will be collected in the DSCP.

The various controlled compacted layers have been designed to be at least 6 m thick in order to remain operational if differential settlement of the embankment does occur. Survey monuments will be located around the TSF embankment to monitor potential movement and settlement of the embankment.

Monitoring boreholes and piezometers will be installed around the TSF and DSCP in order to detect any potential seepage and migration thereof. If excessive seepage is detected, water samples can be tested to determine the effects on the surrounding natural groundwater quality. The tailings have been identified as acid consuming and are therefore unlikely to adversely affect the surrounding groundwater quality. In the event of seepage occurring, it will be possible to pump this seepage back into either the TSF or the DSCP using a submersible pump.

The results of the groundwater investigations identify that the groundwater (layer 3 and 4) is highly saline and that the gradient is towards the open pit (i.e. as the open pit acts as a 'sink' drawing groundwater (from layer 3 and 4) from the surrounds towards it as per **Appendix 7**). As per **Response_44. Toxicological**, all potential seepage from the TSF will be captured. Some of the potential seepage (eastward flowing) will be captured by the open pit as the confining layer (saprolite layer [interface between layer 1 and 2]) slopes towards the open pit. For any potential seepage (westward flowing) that is not captured by the open pit, monitoring bores will be installed to record the extent (if any) of any seepage that may mound around the TSF. If this monitoring indicates that seepage has occurred onto any portion of the saprolitic layer that slopes away from the open

pit, then that water will be pumped from the bores located within the area to the process water circuit (i.e. TSF or DSCP).

46. TSF

Appendix 6.7 (Integrated Waste Management TSF Design Report Pg 25)

The permeability test work on the in-situ base capping is presented only for deionized water not saline as proposed. The difference in performance is noted and the report highlights this work has been completed.

Provide results of studies on permeability of TSF low permeability base using saline water.

Two permeability tests were completed on reconstituted samples using deionised water. The results are summarised as follows:

1. 4.4×10^{-10} m/s
2. 1.9×10^{-10} m/s

Seven additional permeability tests were completed both on in-situ and reconstituted samples using saline water, the results of which are summarised as follows:

1. 1.5×10^{-10} m/s
2. 3.0×10^{-10} m/s
3. 2.1×10^{-10} m/s
4. 9.0×10^{-10} m/s
5. 2.0×10^{-10} m/s
6. 1.2×10^{-10} m/s
7. 3.5×10^{-11} m/s

It can be seen that there is not a significant difference between the results using deionised and saline water, however the permeability's used in the detailed design have been reduced by at least an order of magnitude in order to take into account variance in the material and long-term effects of salt on the material.

47. TSF

Section 8.3.13.2

Groundwater is not identified as a receptor for the TSF. Clarify why not.

The results of the groundwater investigations identify that the groundwater (layer 3 and 4) is highly saline, there are no third party users (groundwater not used by landowners as per **Response_60. Water** and there are no groundwater dependant ecosystems as per **Response_91. Water**) and that the gradient is towards the open pit (i.e. as the open pit acts as a 'sink' drawing groundwater (from layer 3 and 4) from the surrounds towards it as per **Appendix 7**).

As per **Response_44. Toxicological**, all potential seepage from the TSF will be captured. Some of the potential seepage (eastward flowing) will be captured by the open pit as the confining layer (saprolite layer [interface between layer 1 and 2]) slopes towards the open pit. For any potential seepage (westward flowing)

that is not captured by the open pit, monitoring bores will be installed to record the extent (if any) of any seepage that may mound around the TSF. If this monitoring indicates that seepage has occurred onto any portion of the saprolitic layer that slopes away from the open pit, then that water will be pumped from the bores located within the area to the process water circuit (i.e. TSF or DSCP).

48. TSF

Section 8.3.13

The TSF risk assessment does not consider the risk of leakage leading to groundwater mounding under the TSF subsequently impacting on adjoining land uses.

Provide an assessment of risk to adjacent farming due to groundwater mounding under the TSF.

The TSF underdrainage system (blanket drain and finger drains below the decant pond area) has been designed to remove seepage from below the decant pond. The sizing of the underdrainage system is based on the flows identified from seepage modelling assuming the system is fully saturated (i.e. worst case scenario).

As per **Response_44. Toxicological**, all potential seepage from the TSF will be captured. Some of the potential seepage (eastward flowing) will be captured by the open pit as the confining layer (saprolite layer [interface between layer 1 and 2]) slopes towards the open pit. For any potential seepage (westward flowing) that is not captured by the open pit, monitoring bores will be installed to record the extent (if any) of any seepage that may mound around the TSF. If this monitoring indicates that seepage has occurred onto any portion of the saprolitic layer that slopes away from the open pit, then that water will be pumped from the bores located within the area to the process water circuit (i.e. TSF or DSCP).

Figure 19 below identifies the TSF location in relation to the saprolite layer (interface between layer 1 and 2). If seepage were to reach this interface, the following can be noted:

- All potential seepage from the DSCP will report to the open pit.
- For any potential seepage from the TSF (below the decant pond):
 - Eastward flowing seepage will be captured by the open pit as the saprolite layer slopes towards the open pit.
 - For any westward flowing seepage, monitoring bores will be installed to record the extent (if any) of any seepage that may mound around the TSF.

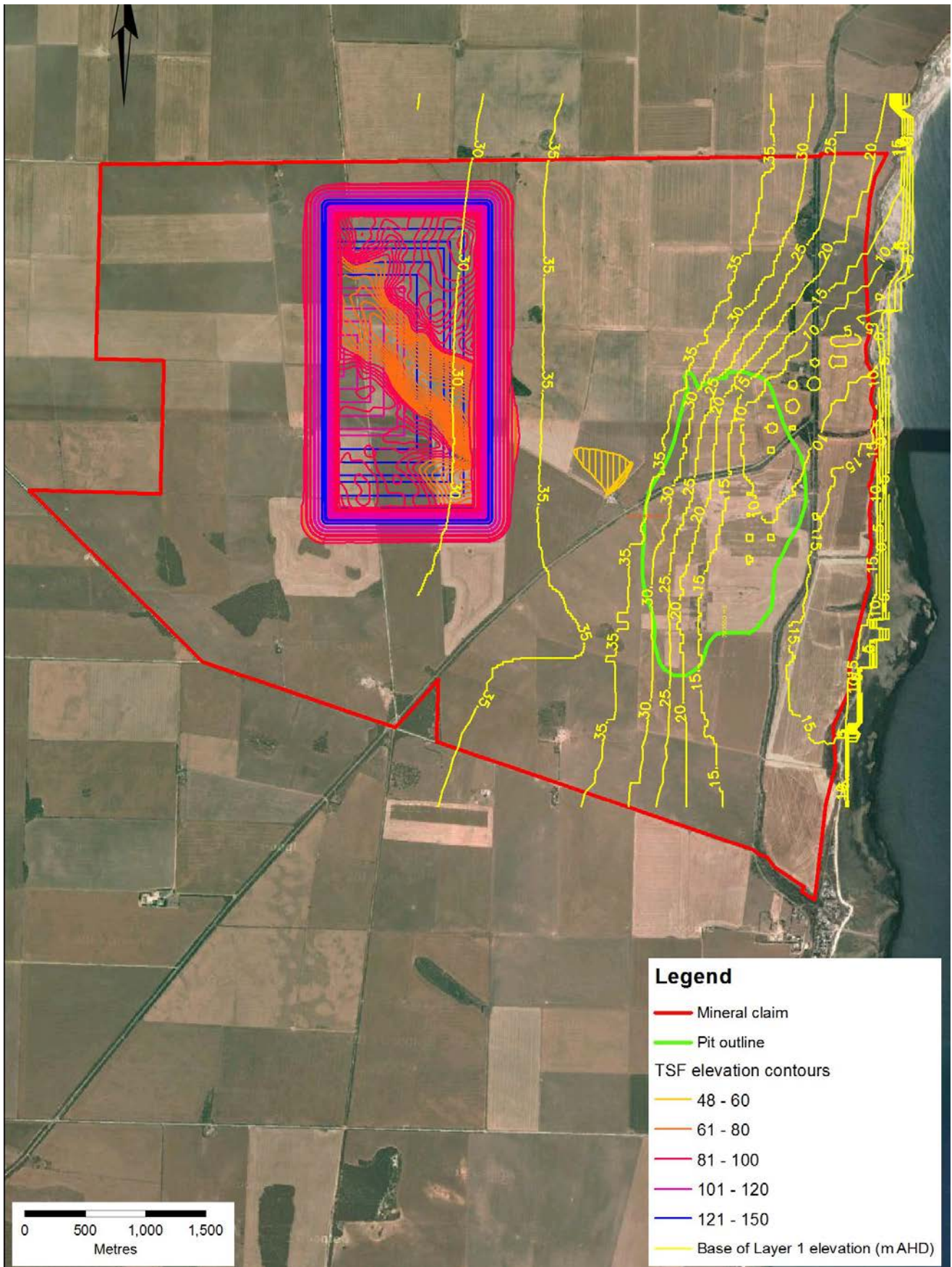


Figure 19: TSF location in relation to the base layer 1 (overburden / saprolite interface)

To further assist in the capture and prompt removal of collected seepage from within the TSF, the following design inclusions have been allowed for:

- An embankment filter zone immediately below the low permeability facing in the area of the decant pond. This filter zone will be connected to the central outlet drain that discharges into the DSCP.
- A downstream embankment toe drain in the area of the decant pond that will capture seepage not collected within the embankment filter zone (i.e. a second seepage collection barrier).

Once the TSF becomes inactive (i.e. the processing plant is no longer producing tailings) the TSF will rapidly dry out due to evaporation and capillary rise. The TSF underdrainage system will still operate to the decant pond until the tailings produce no more 'free' water. Also the TSF will be capped preventing infiltration and hence recharge of the TSF, consequently any potential seepage from the TSF will cease. This is as per **Response_169. TSF**, estimated seepage from the final capped surface (based on current closure modelling) is less than 3 mm/year or less than 10 % of incident rainfall.

A risk assessment is scheduled to be carried out post completion of the detailed design of the TSF. This will address any relevant regulatory outcomes.

Adjacent land uses are predominately agriculture with patches of remnant native vegetation. The existing groundwater quality is saline and therefore not used for agriculture or by native vegetation. An impact assessment for possible impacts to adjacent land use is presented below.

Tailings Mounding During Operations Impact Assessment

Potential Impact Event

Seepage from the TSF reaches the saprolite layer (interface between layer 1 and 2) and mounds and salinizes agricultural land.

Control and Management Strategies

During Operations:

- Placement of low permeability clay liner to TSF base and embankment slopes.
- Seepage collection system above low permeability liner in the decant pond area to collect seepage and direct it to the DSCP.
- Construction of a filter zone immediately below the low permeability embankment zone in the area of the decant pond.
- Inclusion of a downstream toe drain in the area of the decant pond for the stage 1 embankment to capture seepage not collected by the underdrainage system and the embankment filter zone.
- Installation of monitoring wells in the Cainozoic cover around TSF to monitor possible ponding and mounding of seepage below the TSF.
- Removal of water at the base of the Cainozoic cover (if present). The pumping rate will be designed to always be greater than the seepage rate.
- Review and update the TSF water management strategy when required.

Evaluation of Risk Levels

The probability of impacts to adjacent farming / land users is low but will be reduced by the control measures stated above.

Potential Impact	Primary Risk Level		Primary Control Measures	Residual Risk Level		Level of Risk	ALARP
	Likelihood	Consequence		Likelihood	Consequence		
Seepage from the TSF reaches the saprolite layer (interface between layer 1 and 2) and mounds and salinizes agricultural land.	Unlikely	Minor	Control measures as outlined above.	Rare	Insignificant	Low	Yes

Justification for Acceptance of Residual Risk

The possibility of mounding causing an impact to agricultural land is extremely low. The control and management strategies will eliminate the risk.

Proposed Outcome

All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained.

Draft Outcome Measurement Criteria

Quarterly water level monitoring using observation wells around the TSF will demonstrate that no mounding occurs which could salinize third party agricultural land.

Monitoring Program

The monitoring program will be specified in the TSF operations manual.

Tailings Mounding at Closure Impact Assessment

Following the cessation of processing operations the TSF landform will continue to drain through the engineered underdrainage via gravity to the DSCP until all seepage ceases. As soon as practicable following the cessation of operations the TSF will be capped, this will prevent further water ingress into the tailings.

Potential Impact Event

Seepage from the TSF post closure reaches the saprolite layer (interface between layer 1 and 2) and mounds and salinizes agricultural land.

Control and Management Strategies

- Design capping surface based on detailed modelling and field trials during operation.
- Review capping design at time of closure based on available material at the time and update design accordingly.
- Modify capping surface if already in place to operate successfully.

- Retention of the DSCP and underdrainage system post operations until seepage is noted to be zero.
- The design of the TSF capping system is discussed in greater detail in **Response_ 16. Geochemistry.**

Evaluation of Risk Levels

The probability of impacts to adjacent agricultural land is low but will be reduced by the control measures stated above.

Potential Impact	Primary Risk Level		Primary Control Measures	Residual Risk Level		Level of Risk	ALARP
	Likelihood	Consequence		Likelihood	Consequence		
Seepage from the TSF post closure reaches the saprolite layer (interface between layer 1 and 2) and mounds and salinizes agricultural land.	Unlikely	Minor	Control measures as outlined above.	Rare	Insignificant	Low	Yes

Justification for Acceptance of Residual Risk

The possibility of mounding post closure causing an impact to agricultural land is extremely low. The control and management strategies will eliminate the risk.

Proposed Outcome

All soil disturbed or impacted by mining operations will have pre-mining quality and quantity maintained.

Draft Outcome Measurement Criteria

Monitoring of seepage to the DSCP will indicate when the TSF has de-saturated and that the capping system that has been installed is working effectively.

Quarterly water level monitoring using observation wells around the TSF will demonstrate that no mounding has occurred which could salinize third party agricultural land.

Monitoring Program

The monitoring program will be specified in the TSF operations manual.

49. TSF

Section 8.1.3.6

Rex has identified that an independent expert peer review was undertaken of the revised TSF risk assessment.

Provide a copy of the additional TSF peer review to provide further confidence in the IWMS design.

Rex provided DMITRE a copy of the additional TSF peer review on the 24th of October 2013. This documented has been included as **Appendix 49**.

The conclusion of the independent review of the pre-feasibility level design is that stakeholders can be assured that when followed through to detailed design, construction and operation with the same professional approach employed to date, the proposed Integrated Waste Landform (IWL) TSF design:

1. Will be technically sound and considered leading practice for the proposed application.
2. Would result in the construction and operation of a TSF with acceptably low residual risk in all potential consequence types. The consequence category rating system presented in the Australian National Committee on Large Dams (ANCOLD) guidelines to outline the recommended design requirements and care required to reduce the risk of failure to an acceptable level in line with the related consequences. The consequence category is determined by considering the following categories as a result of a dam failure:
 - o Population at risk.
 - o Natural environment impacts.
 - o Associated cost.
3. Will achieve the required MG5 outcome; "Tailings and TSFs are to be managed to provide safe, stable and economic storage of tailings in a way that complies with all legislative requirements, and presents negligible public health and safety risks and acceptably low social and environmental impacts both on and off site during operation and indefinitely post closure."

The IWL TSF design is suitable for the intended purpose, and the detailed design and risk management processes that will be followed in the later project design phases (listed in ATC Revised PFS Report, May 2013) together with consideration of the recommendations made in this report, will ensure an appropriate level of design that is capable of managing all associated construction, operation and closure risks to the satisfaction of all stakeholders.

Reference:

Australian National Committee on Large Dams (ANCOLD), 2012, *Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure*, ANCOLD.

50. TSF

Section 6.7.2

Do the toe drains report to the central blanket drain and then ultimately to the DCSP? Clarify

All seepage capturing infrastructure will be connected and all 'free' water will be removed from the TSF via the underdrainage system to the DCSP. The underdrainage has been modified as discussed in **Response_45. TSF**.

The underdrainage system has been upgraded to include a blanket drain below the DSCP to further assist with the capture and removal of potential seepage from the TSF and direct it to the DSCP. The underdrainage system includes the following:

1. Blanket drain below the estimated maximum decant pond area.
2. Blanket drain down the main valley over which the TSF is constructed.
3. Associated finger drains to connect the decant pond blanket drain and the valley blanket drain.

The downstream embankment toe drains remain in the design to further assist potential seepage capturing during operations. As per Section 6.7.1.4 of the MLP, water falling directly on the WRDs will be contained within temporary drains established as the WRDs develop. The drains will carry any water to water storage dams located on site. These drains will be linked to the valley blanket drain which will ultimately report to the DSCP. The placement of erosion resistant material at the toe of the embankment will be provided if necessary.

As per **Response_45. TSF**, to further assist with capturing potential seepage, a 6 m wide filter zone has been included on the upstream embankment face in the area of the decant pond (filter zone located immediately below the Zone 1 low permeability material). The potential seepage from this filter zone will report to the DSCP.

51. WATER

Section 5.10.3.1

An understanding of the drilling methodology utilized is required. Clarify drilling method

Well construction permits were obtained for all wells and drilling was carried out by licensed water well drillers, using blade/air and down hole hammer/air methods. Refer to Section 8 of **Appendix 7** for further detail.

52. WATER

Table 8.3-49

Outcome and measurement criteria ML-GW2 states spills greater than 20L will be reported. Consideration of the consequence dependent on the nature of the spilt material should be given.

Provide justification for selection of 20L as the reporting criteria.

Rex agrees that the draft outcome measurement criteria ML-GW2 outlined in the MLP is not appropriate. This will be reassessed as part of the PEPR process.

53. WATER

Executive Summary

The water use volumes outlined do not match with the volumes stated in Table 6.10-5. Specifically, the SA Water pipeline capacity will deliver an additional 1.5 GL/annum to the Hillside mine, yet Table 6.10-5 indicates a potable use of 0.631 GL/annum. In another Section the SA Water upgrade is reported to deliver an additional 800 kL/day for public use (total of 0.292 GL/yr), yet the executive summary states 0.5 GL/yr will be made available.

Clarification as to which potable water figures are the correct ones is to be provided.

Rex in conjunction with SA Water has already upgraded and commissioned approximately 43 km of the pipeline from Upper Wakefield (near Auburn) to Pt. Wakefield (known as Stage 1), this upgrade provided an additional 2 GL/annum capacity in the line. It is proposed at Rex's expense to extend this line with 2 GL capacity to Ardrossan (Stage 2) and then take a smaller line to site (Stage 3) and to Pine Point (Stage 4). SA Water may elect to upsize Stage 3 & 4 in order to fulfil their projected future demand south of Ardrossan.

Rex has been extremely conservative in all of its projections throughout this project, rather than overpromise and under deliver we have indicated that at least 0.5GL/annum will be available for public use (this has been agreed with SA Water), however in reality the amount of water available for public use is likely to far exceed this capacity. The 800 k/L/day (0.292 GL/year) was an estimate calculation only and was an editorial oversight, which should have stated 0.5GL/annum. As shown in Table 6.10-5 (MLP) the projected potable water requirement of 0.631 GL/annum is much lower than what Rex are bringing to the Yorke Peninsula.

This overestimation is due to the current level of variability of the Hillside Project water demand. Rex has provided within its actual potable water available sufficient contingency capacity if any unforeseen issues were to arise.

54. WATER

Section 5.9 - Figure 5.9-1 is missing. Provide Figure 5.9-1

Figure 5.9-1 which was missing in the MLP has been provided below.

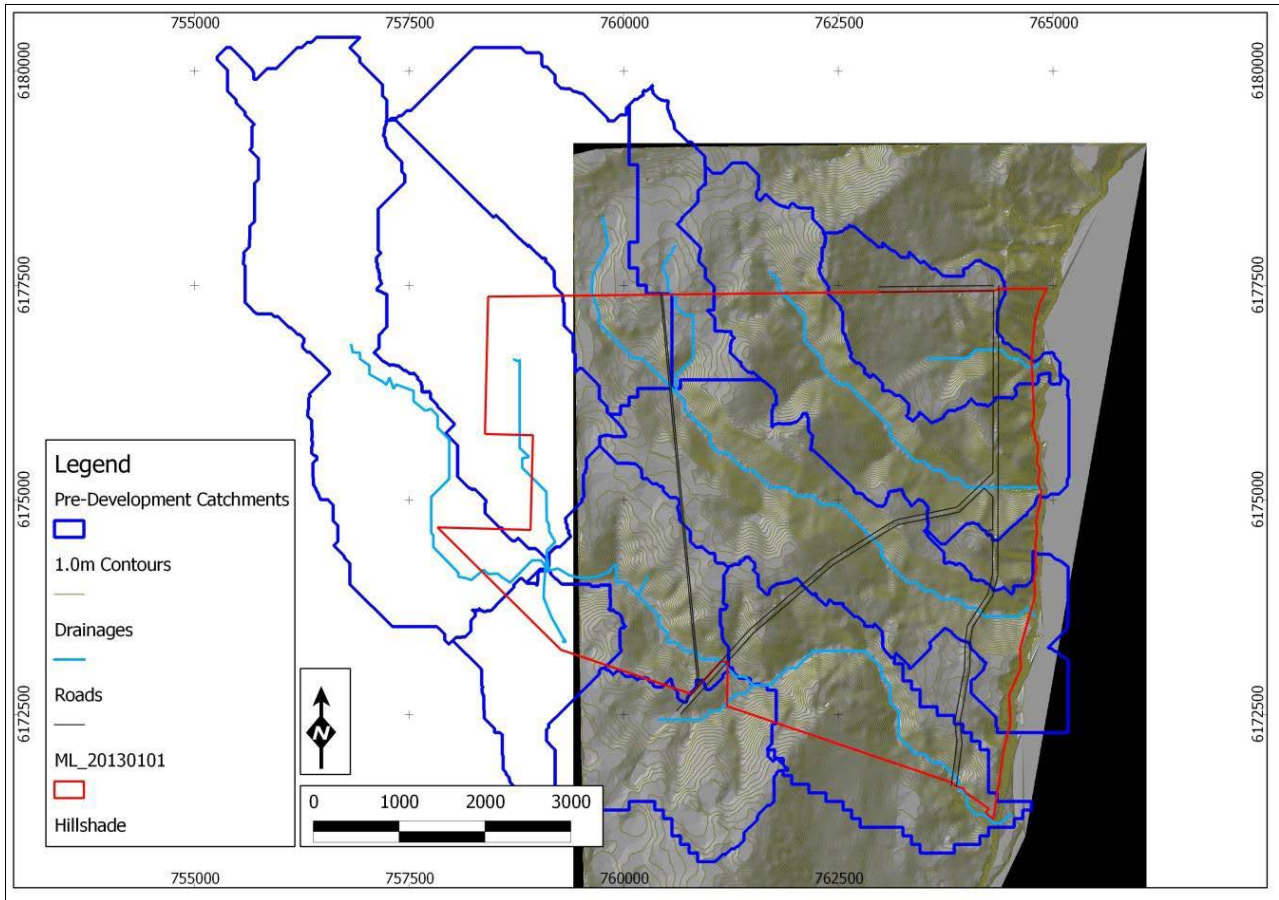


Figure 5.9-1: Drainage of the Hillside Project Area and Pre-development Sub-catchments

55. WATER

Groundwater Reports

The reports have not sufficiently documented the hydrogeology surrounding the mine site and at a regional scale (the data provided is focused on the immediate mine site).

Provide an overview of the regional hydrogeological setting, including identification of all (registered and unregistered regional groundwater users (including GDEs).

Refer to Section 5 and 6 of **Appendix 7**.

56. WATER

Section 5.10.1

1st paragraph:

- **Has groundwater been recorded in Cainozoic sediments during site investigations?**
- **Have any wells been completed in the shallow sediments? What is the basis for excluding these units as aquifers and is there quantitative data to confirm this?**
- **It is noted that 3rd party wells (i.e. WaterConnect wells) contain shallow groundwater but its occurrence has not been indicated within or adjacent to the ML. There is also no information provided on surface water – ground water interactions with this layer.**

Provide confirmation information as requested. Detail what contingency measures will be put in place to manage any perched groundwater present at the Hillside site. Provide an assessment of surface and groundwater interactions with the Tertiary (Cainozoic) layer.

The Hydrogeological Summary Report (December 2013) presented as **Appendix 7** states that saturated conditions were not encountered in the Tertiary / Quaternary age sediments in any of the wells drilled (refer to Sections 8.1, 8.2, 8.3, and 8.4 of **Appendix 7**). This means that no unconfined aquifer (layer 1) was intersected at any location on site and that groundwater occurs only in the underlying basement rocks. This is the reason for excluding the Cainozoic sedimentary cover (layer 1) as an aquifer.

Appendix 7 also includes information from the WaterConnect database in Section 5 (Regional Hydrogeology). This information indicates that wells to the west of the Hillside site are 6428-21 (drilled to 60.96 m), 6428-22 (drilled to 78.33 m) and 6428-23 (drilled to 54.86 m). The drilling depths imply that these wells are completed in the basement aquifer. If a shallower aquifer was present at these locations, it is likely that they would have been completed at depths less than 40 m.

WaterConnect wells at Pine Point are 6428-36, 6428-37, 6428-38, 6428-39, 6428-40, 6428-41, 6428-42, and 6428-43. All were drilled to depths of less than 5 m. They are shown in Figure 11 of **Appendix 7** to be located on the flats below the cliff and are likely to be completed in shallow alluvium at cliff base. This is not considered to be hydraulically connected to the (unsaturated) Quaternary/Tertiary age sediments at Hillside. Well 6428-19 was drilled to 36.58 m. The aquifer of completion is not known. However, this well is located about 4 km south of Hillside, rather than in close proximity.

Wells at Black point are even further away and are well outside the model domain.

With regard to surface water, ground water interactions with this (shallow) layer, since no aquifer was identified in layer 1, no aquifer is considered to exist, so surface water, groundwater interactions between the land surface and any Quaternary/Tertiary aquifer cannot occur.

It is however possible that infiltration through the land surface may occur. At Hillside, there is a significant excess of evaporation over rainfall for the majority of the year, and months in which rainfall exceeds evaporation are those which coincide with the main cereal growing season (winter and spring). Therefore, infiltration to the base of the sedimentary sequence is likely to be nil to very low. Very low permeability saprolite (layer 2) occurs below the Cainozoic age sediments (layer 1) (see Figure 5 of **Response_7. Closure**), and it is considered that it will effectively preclude recharge from occurring to the basement rock aquifer system below.

If water flows in ephemeral watercourses during periods of heavy rainfall, some of it could infiltrate as stream losses and migrate through the Quaternary/Tertiary age sediments (layer 1) to the top of the saprolite (layer 2). As no water was encountered during drilling in the Quaternary/Tertiary age sediments (layer 1), it is concluded that infiltration to the base of these sediments (layer 2) is nil.

No contingency measures are considered necessary because 41 wells were drilled within and adjacent to the pit area, with none of them encountering a Cainozoic aquifer (layer 1) (i.e., an intensive drilling program failed to encounter such an aquifer and its absence can be stated with a high degree of confidence). However, if perched water in the Quaternary / Tertiary age sediments (layer 1) was encountered, it would only be done so during excavation of the pit. This water (if present) would be managed / removed in the same manner as proposed for the water in the deeper fractured rock aquifer (layer 3 and 4); that is by the use of drains and sumps with pumping to the processing circuit or for use in dust suppression etc.

57. WATER

Section 5.10.1

2nd paragraph:

- **What is the approximate thickness of the single confined to unconfined aquifer?**
- **How does the aquifer relate to the geological cross section schematic (Figure 5.10.1)**

Provide information as requested. Clarification is needed to identify where the basement aquifer is considered confined or unconfined.

The basement rock (layer 3 and 4) is considered to be a confined aquifer (refer to Section 8, **Appendix 7**). No unconfined or water table aquifer (layer 1) was identified on site during both PFS and DFS investigations (including at WBTH 039 to the west of the site).

In Section 13.1 of **Appendix 7**, Figure 90 shows the thickness of the different layers varies throughout the deposit. The lowest layer (Layer 4) was set to extend down to -900 m AHD, i.e. a depth at which the base of the layer would not impact the modeling outcomes.

58. WATER

Section 5.10.3.1

The assumption leading to the location of the 30m AHD contour is not clear given no data is presented to the west of the contour.

Clarify and provide additional data. If data is not included in the contour plan, this should be highlighted.

The potentiometric surface map was updated in March 2013 (refer to Figure 20).

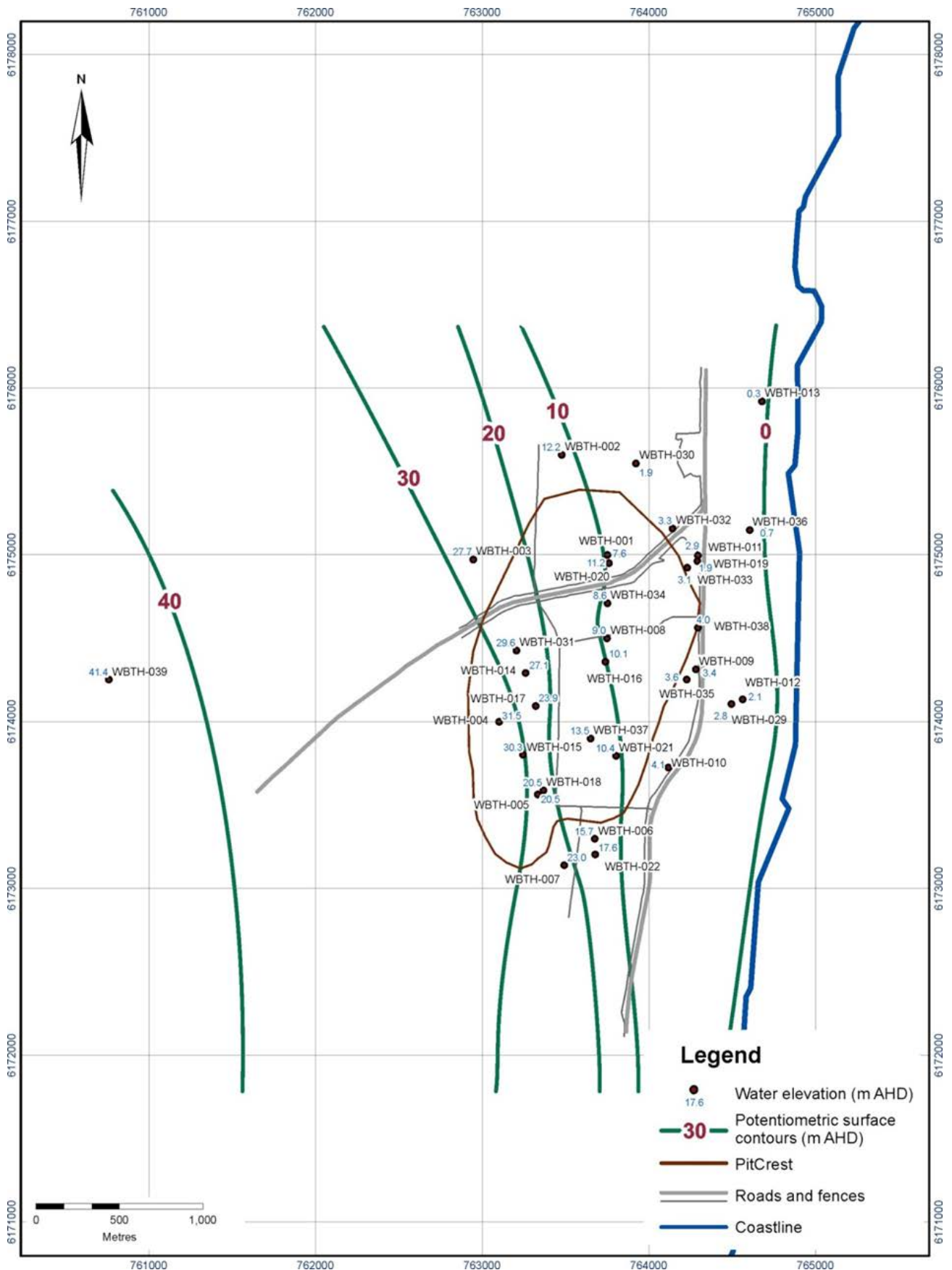


Figure 20: Potentiometric surface map - basement aquifer March 2013

59. WATER

Section 5.10.1 (Figure 5.10.1)

- *The Figure is generalized and does not indicate saprolite thickness, (the confining unit), the saprock zone, or groundwater level elevation (mAHD)*
- *The cover sequence legend item is missing (and as it stands it could be interpreted as copper intersections).*
- *where is the location of the cross section in plan view?*
- *more than 1 cross section/long section should be presented that represents the conceptual hydrogeological model across the ML and surrounding area. This will provide an understanding of the conceptual hydrogeological model which is somewhat lacking in the document (and appendices).*
- *does RL in the y-axis represent m AHD?*

Sufficient cross sections are to be provided which accurately represent the conceptual hydrogeological model across the ML and surrounding area. The location of cross sections is to be provided in a plan view, and include the additional information as requested.

Cross and long sections from the groundwater model are presented below in Figures; Figure 21 to Figure 27. A section location plan is also presented in Figure 28. A potentiometric surface map for the basement rock aquifer is presented in Section 9 of **Appendix 7**. Potentiometric surface traces for the basement rock aquifer are also shown in the cross sections. Recharge mechanisms are stated in Sections 7, 12 and 13 of **Appendix 7**, i.e. recharge is by lateral throughflow from the west. The discharge mechanism is stated in Section 7 of **Appendix 7** - 'Groundwater flow is from west to east, i.e. from the Hillside Deposit to Gulf St Vincent', this is also indicated by the potentiometric surface contours.

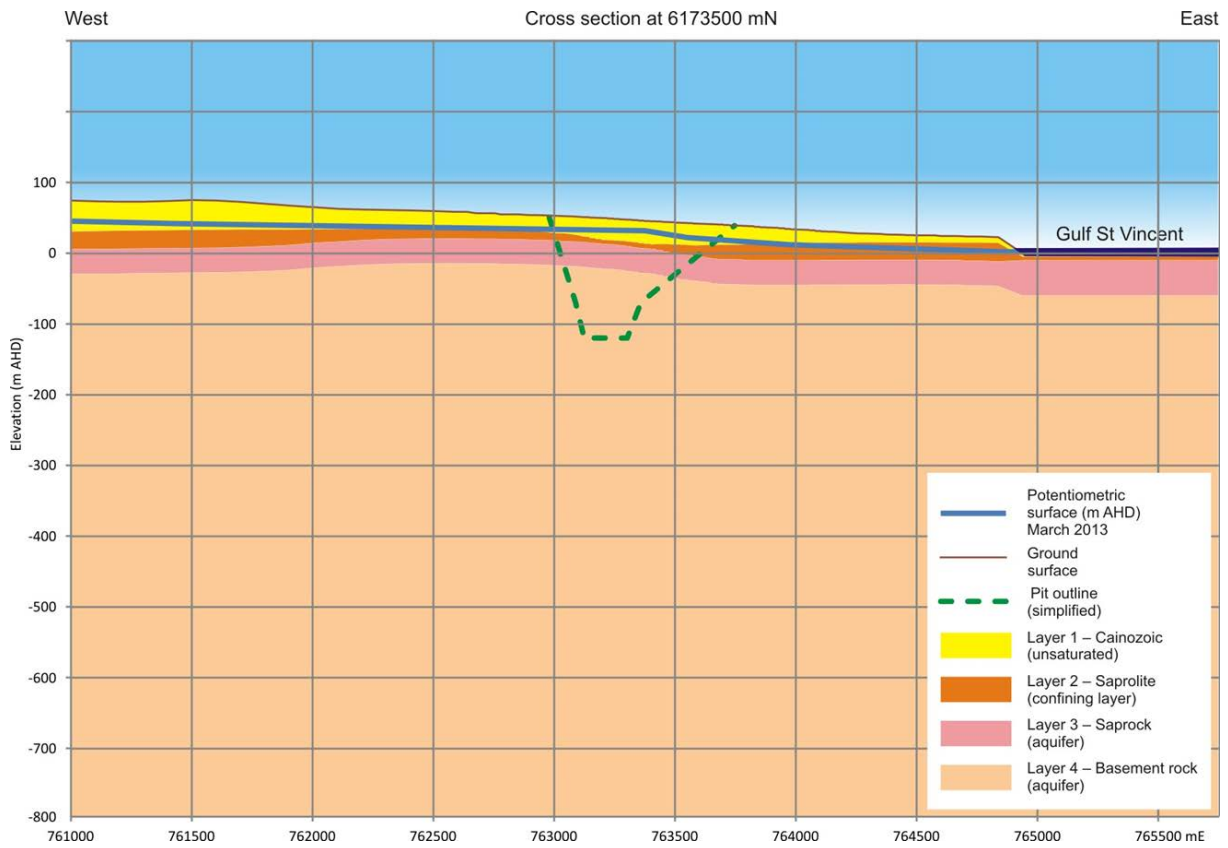


Figure 21: Cross Section at 6173500 m N

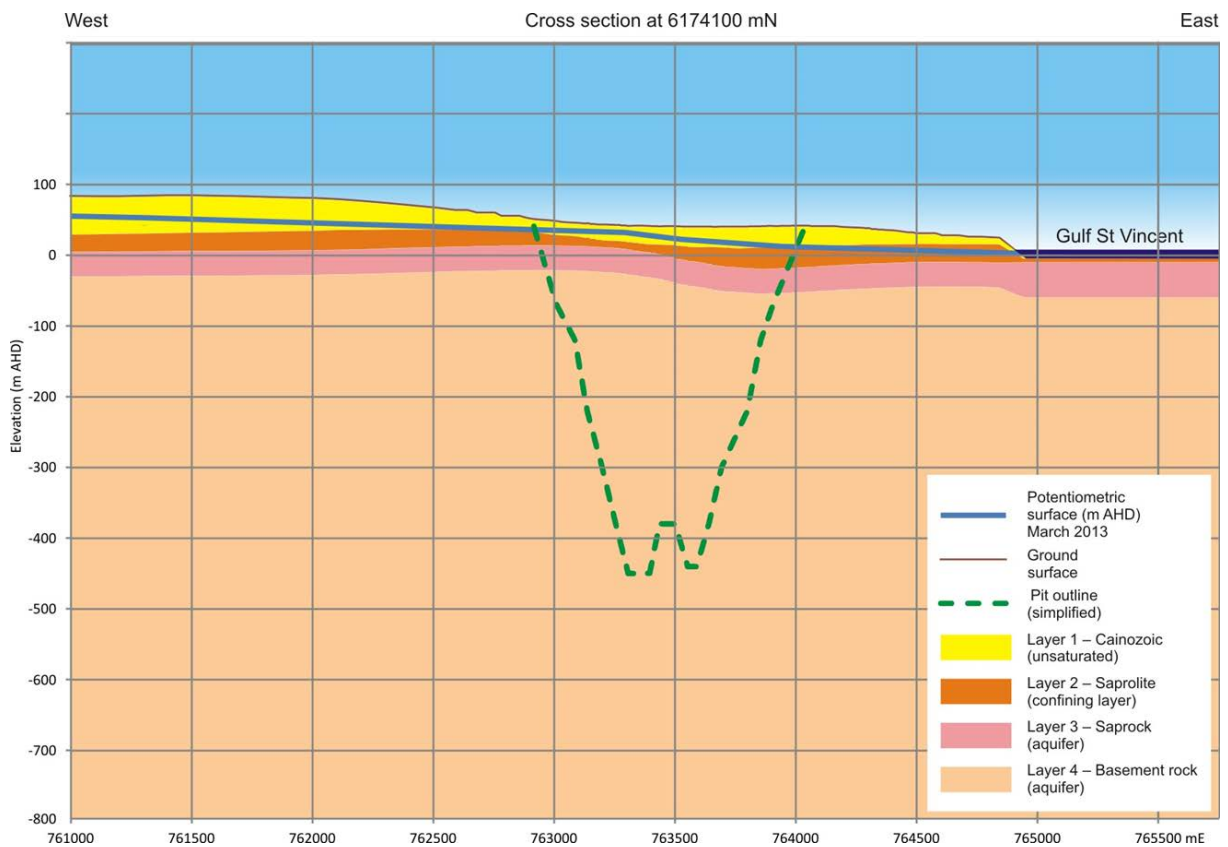


Figure 22: Cross Section at 6174100 m N

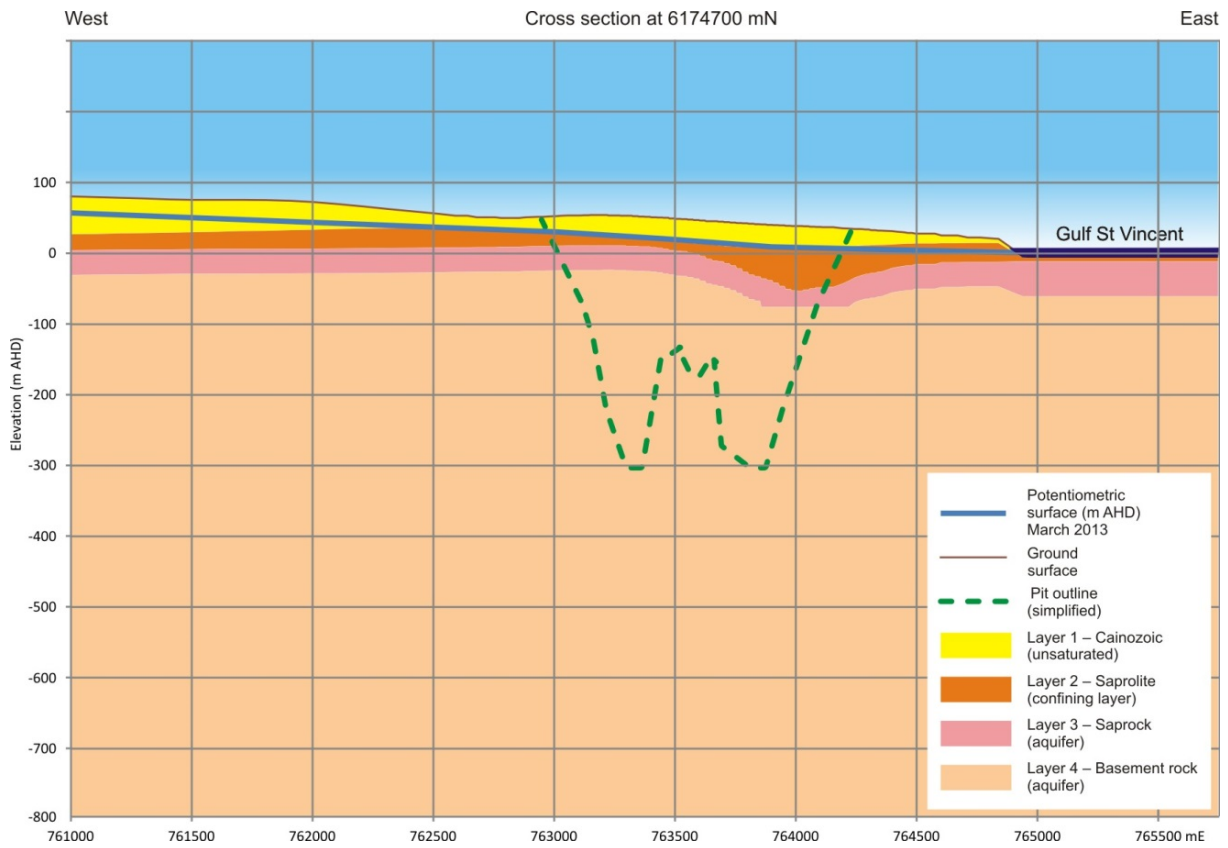


Figure 23: Cross Section at 6174700 m N

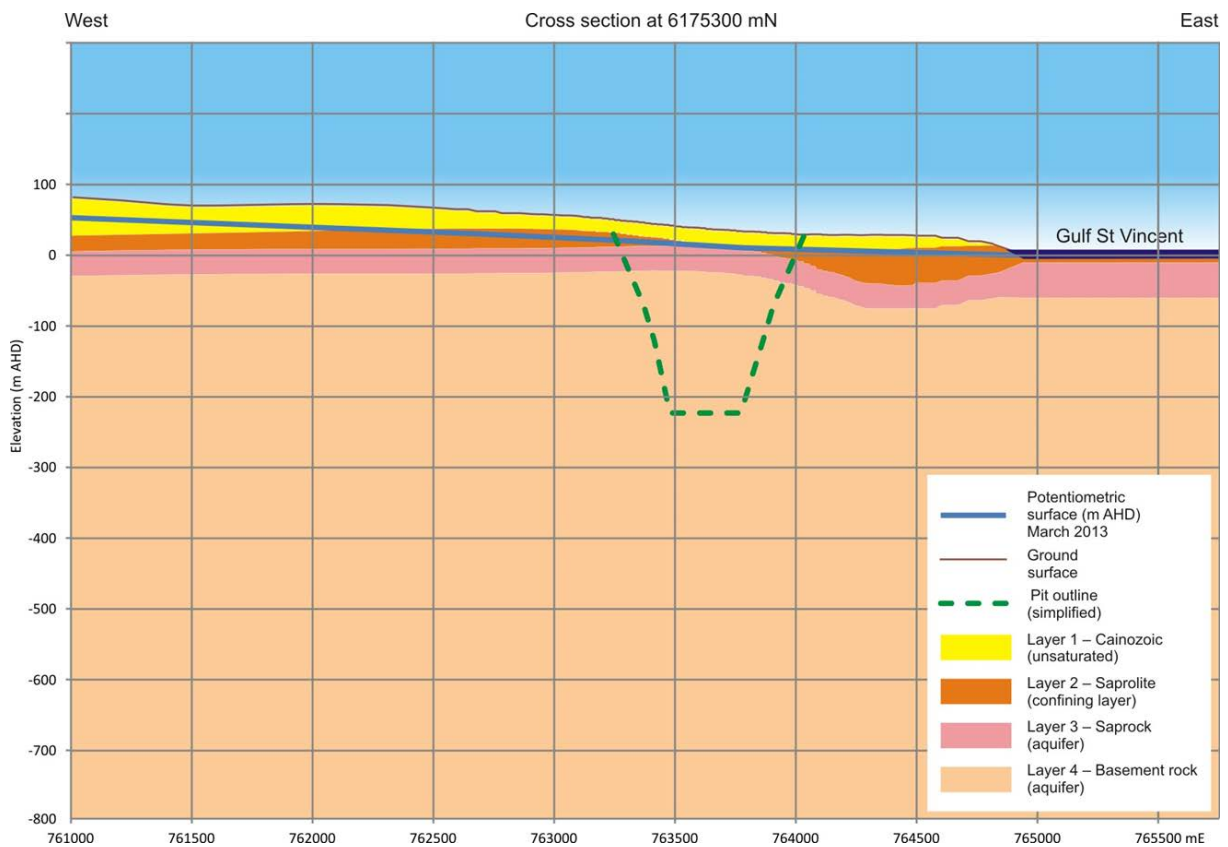


Figure 24: Cross Section at 6175300 m N

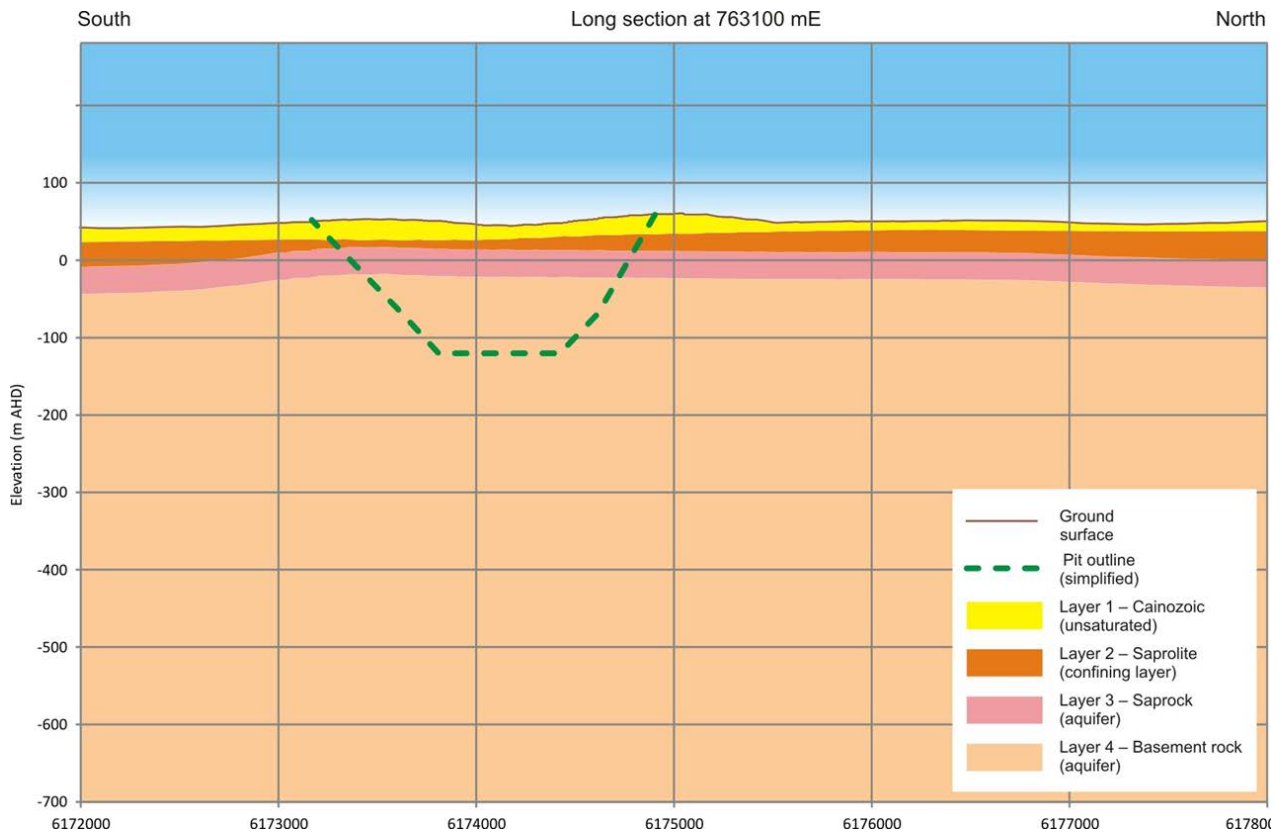


Figure 25: Long Section at 763100 m E

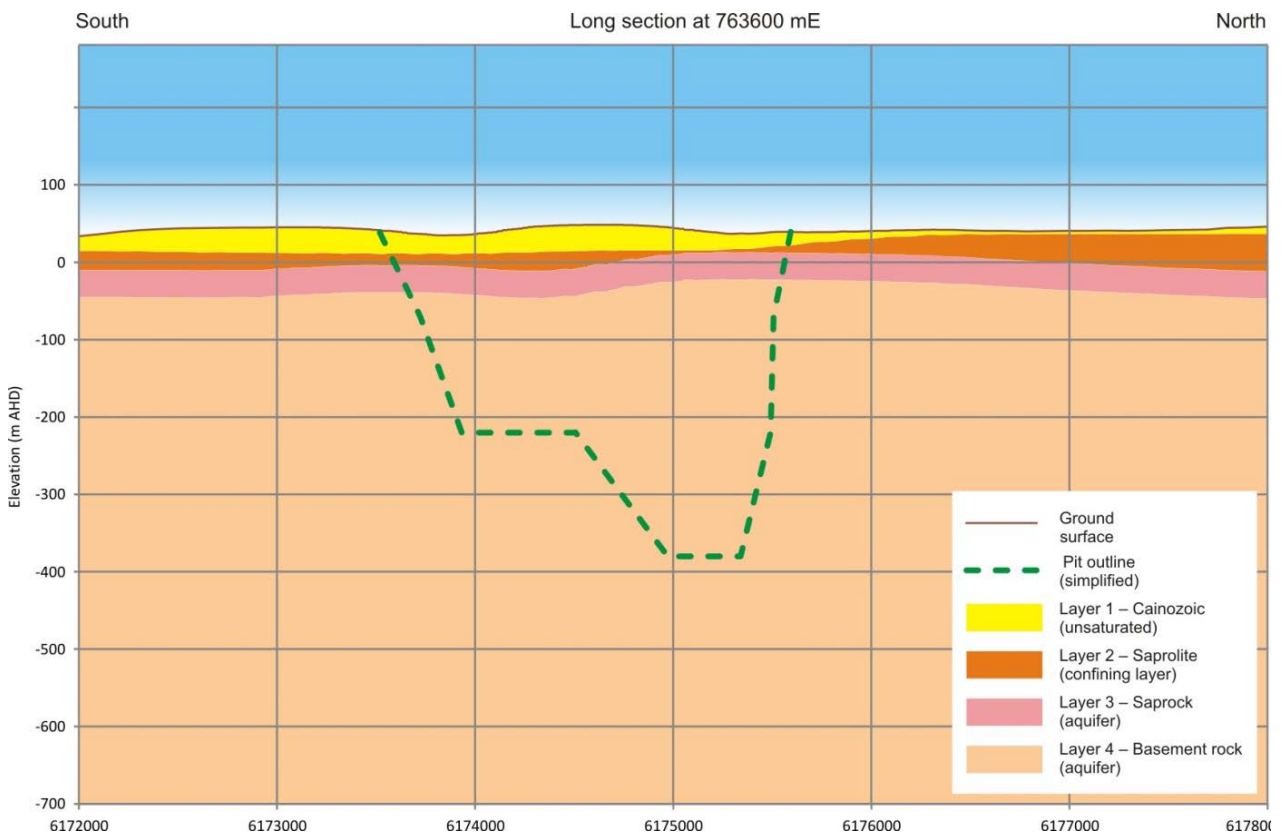


Figure 26: Long Section at 763600 m E

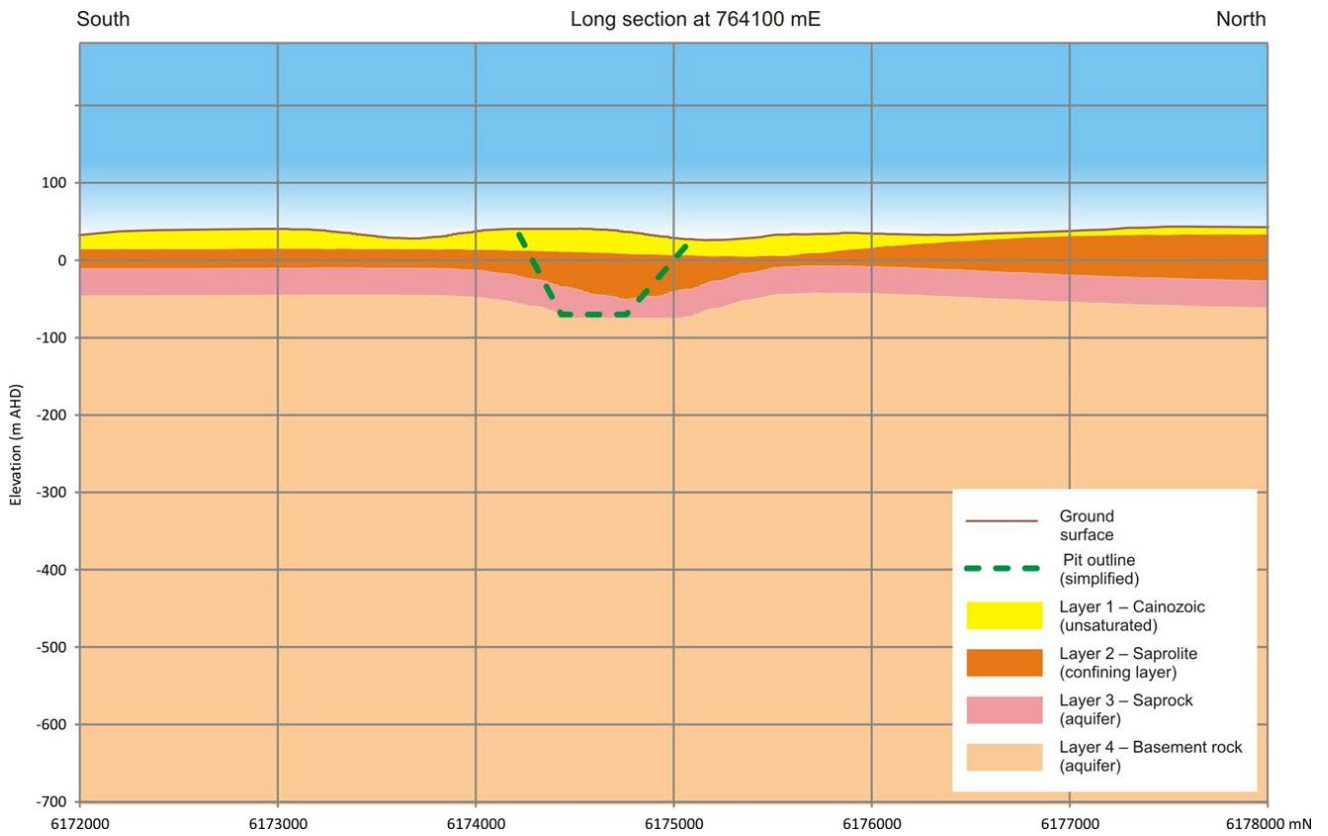


Figure 27: Long Section at 764100 m E



Figure 28: Section Location Plan

60. **WATER**

Section 5.10.2

Information on 3rd party users is limited and is not up to date. Information should reflect water well surveys validating information presented from DEWNR WaterConnect database.

Provide clarification on the following in relation to Table 5.10-2:

- What aquifer are the wells completed in?**
- The dates in the SWL and yield column have been cut off, and do not indicate the actual date readings were taken.**
- Some unit number digits have been cut off**
- What is the status of the wells (i.e. operational, abandoned, backfilled)?**
- Parameters at each well have not been updated for SWL, salinity, total depth etc.**
- Was a water well survey conducted to locate wells presented in the above Table? Were adjacent landowners consulted regarding groundwater use?**
- Well 6428-23 is located on the proposed ML. Has this well been located and what is its current status?**

It is recommended that there be a consolidated section on existing users to confirm statements that groundwater is not currently used as a resource.

A groundwater users survey was conducted in December 2013 for the area within the red rectangle in Figure 29 below.

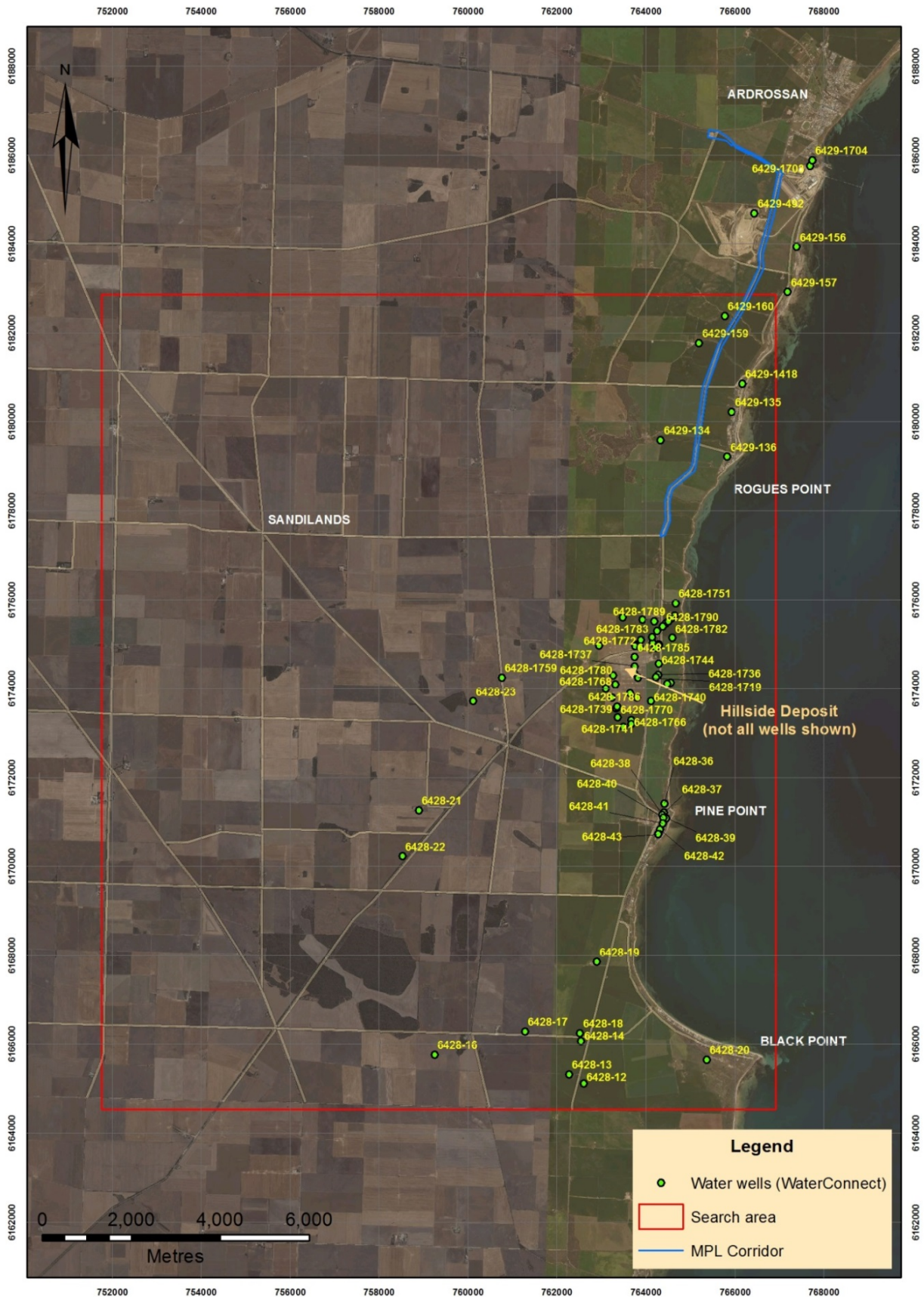


Figure 29: WaterConnect database wells

Rex personnel contacted all landholders of property on which the 'WaterConnect' database had indicated a water supply well was located. Information collected included:

- Land Holder
- Date Visited
- Condition of well head
- Infrastructure (pumps, windmills, pipework)
- Well Depth
- Depth to water
- Status
- General information such as driller, aquifer (rock, slate, sand) decommissioning date, usage details.

Of the 24 wells within the surrounding area (located approximately within a 10 kilometre radius from the proposed mine site) only one well is operational (6428-13). This operational well is over 8 kilometres south of the Hillside. The WaterConnect database indicates that this well was drilled to 39.62 m, has a recorded salinity value of 11657 mg/L and was used for stock watering. At this depth (39.62 m) it is likely to be completed in a perched aquifer which is not connected to the aquifers (layer 3 and 4) present at Hillside. Summary details are presented in Table 18 below.

Table 17: Groundwater users survey

Unit_No	Land Holder	Date Visited	Condition of well head	Infrastructure	Well Depth (m)	Depth to water (m)	Status	General information / comments
6428-12	M.J Arbon	12/12/2013	Well head is still visible, it is a steel casing which is concreted in and protrudes .26 m above the ground	Wind mill present but not operational, there are no pipes entering the well. Old concrete tank near windmill.	-	22.44	Abandoned	The landowner stated that this has not been used since he took over land ownership in 1981.
6428-13	M.L Germein - leased by A. Clift	Phone Call 13/12/13	Unknown	Well currently has a windmill and tank on it	-	-	Operational	The landowner informed Rex that he believes this well is the most northern operational well. The lessee stated that it is used for stock water, but has told Rex he will not allow Rex to look at the well until he is available to attend. This is likely to be in the new year post harvest.
6428-14	M.L Germein	12/12/2013	N/A	N/A	N/A	N/A	Backfilled	No visible sign of well, location recorded is in the middle of a cropped paddock which currently has been reaped and there are no visible wells in 90m from fenceline. The lessee also confirmed he is not aware of the well on the phone.
6428-16	Brooklen Pty Ltd A Clift Leases	13/12/2013	N/A	N/A	N/A	N/A	-	A phone call made to the farmer which leases this property informed us that he is not aware of any bores on the Brooklen property. He said once harvest is completed Rex can attempt to visit these locations.
6428-17	A. Clift	12/12/2013	N/A	N/A	N/A	N/A	Backfilled	A visit and inspection from the road side didn't indicate that there was any visible well in this location. A phone call to the property owner revealed that he was not aware of any wells in the area. Landowner stated Rex may be able to visit the locations after harvest in Jan.
6428-18	R.J. Webb	12/12/2013	Well head is visible it is concreted into the ground and has a cap in it. It is a steel casing well head. As seen in picture 6428-18.	Old stone tank.	N/A	N/A	Abandoned	Well is no longer in use and within a un-worked area of the paddock and not used for any purpose.

Unit_No	Land Holder	Date Visited	Condition of well head	Infrastructure	Well Depth (m)	Depth to water (m)	Status	General information / comments
6428-19	K.A Webb	12/12/2013	N/A	N/A	N/A	N/A	Not located	Rex visited the house located directly to the west of the location of 6428-19, the man who lives here was called Kevin and he informed us that he had lived there for 6 years, I asked him if he had or knows of any water bores in or around the house. He said he is not aware of any wells all water is supplied through the mains to the house and stock troughs in the paddocks. A visual inspection from the house yard revealed that the paddock was in crop and there was not well visible in the paddock from 80m away.
6428-20	M.J Arbon	11/12/2013	Well not visible	Old windmill has fallen over, old stone tank in the location,	N/A	N/A	Abandoned	Not operational.
6428-21	Mulara Pty Ltd B. Germein	11/12/2013	Well head has been filled in.	There are old stone tanks at this location there is evidence of an old steal casing in concrete which appears as though it has been filled in with concrete	N/A	N/A	Backfilled	Not operational.
6428-22	Mulara Pty Ltd B. Germein	11/12/2013	N/A	N/A	N/A	N/A	Not located	Landholder says that he is not aware of any wells being constructed in this location. In his time on the property he has never seen one in this location.
6428-23	G. Dodd land leased by Redding	12/12/2013	Not Located	Not Located	N/A	N/A	Not located	Spoke with long term lease holder of this property and he said that there is no ground water being used on their property or the leased property. At the location shown to the landowner on a map he said there are no bores. He mentioned that there was a piece of casing sticking out of the ground to the east of this which they have put wood into and this is not used.
6428-36	N/A	10/12/2013	Not located	Not located	N/A	N/A	Not located	At GPS location there is a bitumen road. No visible sign of any water wells in nearby house yards. See picture 6428-36
6428-37	N/A	10/12/2013	Not located	Not located	N/A	N/A	Not located	At GPS location there is scrub and trees. No visible sign of any water wells in nearby house yards. See picture 6428-37
6428-38	N/A	10/12/2013	Not located	Not located	N/A	N/A	Not located	At GPS location there is scrub and trees. No visible sign of any

Unit_No	Land Holder	Date Visited	Condition of well head	Infrastructure	Well Depth (m)	Depth to water (m)	Status	General information / comments
								water wells in nearby house yards. See picture 6428-38
6428-39	N/A	12/12/2013	Not located	Not located	N/A	N/A	Not Located	Site is on council lands and could not locate the well, looked in yards surrounding area and could not locate.
6428-40	Tomic	12/12/2013	Not located	Not located	N/A	N/A	Not located	Rex spoke with lady who lives at parcel A30 and she informed us that there was no Water bore in her back yard and that the house next door has recently been built. She was not interested in us having a look for the well.
6428-41	D. Moulds	10/12/2013	Depression in ground with corrugated iron over it.	No Infrastructure	N/A	N/A	Not used/ Backfilled	The well is not used the depression just over the fence in his neighbours property is where it was. See picture 6428-41
6428-42	N/A	10/12/2013	Not located	No Infrastructure	N/A	N/A	Not located	At GPS location there is scrub and trees. No visible sign of any water wells in nearby house yards. See picture 6428-38
6428-43	N/A	10/12/2013	Not located	No Infrastructure	N/A	N/A	Not located	At GPS location there is scrub and trees. No visible sign of any water wells in nearby house yards. See picture 6428-38
6429-134	S. Brown	12/12/2013	Not located	Not located	N/A	N/A	Not located	Rex spoke with the land owner and he was not aware of any water wells or bores on his property.
6429-135	S. Brown	12/12/2013	Not located	Not located	N/A	N/A	Not located	Rex spoke with the land owner and he was not aware of any water wells or bores on his property.
6429-136	F. Fundak	10/12/2013	2 inch Steel pipe with steel cap on it	No infrastructure	N/A	N/A	Not used	There is a steel pipe located in the council reserve around 500m to the east of landowner's property. This was the original well for the town and stock. It has since had a wooden barrier built around it and all infrastructure removed.
6429-159	A. Rowe	10/12/2013	Steel pipe 150mm diameter on concrete	Steel collar	44	-	Not used	No water recorded in well dip meter hit moist dirt at 44 meters
6429-1418	District Council Yorke Peninsula Land	10/12/2013	Open Well - 1.5m diameter	Windmill with old tank, this well is part of the James Well monument.	2.2	1.9	Not used	-

61. **WATER**

Section 5.10.3 Site Investigations

Table 5.10-2:- salinity data has not been presented.

Salinity data is to be provided or indicate if unavailable.

Salinity data has been presented in Section 11 *Groundwater Sampling and Analysis* of **Appendix 7**.

62. **WATER**

Section 5.10.3 (Figure 5.10.4 and Figure 5.10.5)

- Well unit number 6428-12 (identified in Table 5-10-1) could not be located on the maps.

- Are the shallow wells at Pine Point operational, and if yes what are they used for?

Provide missing and additional requested information.

Well unit number 6428-12 is now visible in Figure 29. Information on wells in Pine Point are detailed in **Response_60 Water**.

63. **WATER**

Section 5.10.3 Site Investigations

Site investigations focus on the basement/fractured rock aquifer, however there is no indication as to whether the Tertiary sediments at the ML contain groundwater.

Further information and discussion is to be provided on the potential presence of groundwater within shallow Tertiary sediments within or adjacent to the ML, and the characteristics of the shallow aquifer.

There was no unconfined or water table aquifer (layer 1 in the model which is the shallow Tertiary sediments) identified on site during both PFS and DFS investigations (including at WBTH 039 to the west of the site).

See **Response_56. Water** and Section 8 of the Hydrogeological Summary Report (**Appendix 7**) for further information.

64. **WATER**

Section 5.10.3 (2nd Paragraph)

- The 2nd paragraph on page 5-76 states that limited localized recharge may occur at Hillside by seepage through the saprolitic confining layer, but there is no indication as to where this may occur or its significance (given limited information presented for the cover sediments).

Provide clarification

See **Response_56. Water** and refer to Section 12 and 13 of the Hydrogeological Summary Report (**Appendix 7**) for further information.

Recharge to groundwater was not included in the model. This is because there is no unconfined or water table aquifer (layer 1 in the model) identified on site during both PFS and DFS investigations (including at WBTH 039 to the west of the site).

Since there was no layer 1 (Cainozoic cover sequence) aquifer present, it has been assumed that water is not available to move by vertical leakage through the confining layer (layer 2, saprolitic zone) and into the main fractured rock aquifer (layer 3 and 4).

65. WATER

Section 5.10.3 Site Investigations

Figure 5.10-7: Data points for standing water levels do not all correspond with the contour value indicated on the potentiometric surface e.g. WBTH-31 plots within the 20-25 m contour interval, yet reports at RSWL of 30.8 mAHD.

Clarify the rationale for this.

Contour values indicated on the potentiometric surface have been amended. Refer to Figure 20 of **Response_58. Water.**

66. WATER

Section 5.10.4 Environmental Value

Section 5.10.4.1 – Environmental Value: The threshold salinity value of ‘industrial’ (i.e. value in mg/L) should be incorporated into the paragraph to make the statement more quantitative.

Provide a threshold salinity value for the ‘industrial’ category of environmental value.

The Australian Water Quality Guidelines for Fresh and Marine Waters as set by the Australian and New Zealand Environment and Conservation Council (ANZECC) recommends for the following environmental values;

- Drinking water.
- Aquatic ecosystems.
- Recreation and aesthetics.
- Primary industries (irrigation and general water uses, stock drinking water, aquaculture and human consumption of aquatic foods).
- Industrial water (no water quality guidelines are provided for this environmental value).
- Cultural and spiritual values (no water quality guidelines are provided for this environmental value).

Accordingly other than industrial, the highest beneficial use is for primary industries. The maximum for stock use is 13 000 mg/L and only for sheep that eat lush green feed. Water sampling and analysis indicates that groundwater on site and in the vicinity of the Hillside Deposit is of high to very high salinity and neutral pH. The water sampling and analysis indicates that the salinity of groundwater at depths of about 400 m in the basement rocks on site exceeds 50 000 mg/L and even 100 000 mg/L in places which is much greater than the maximum of 13,000 mg/L for stock.

Table 4.3.1 Tolerances of livestock to total dissolved solids (salinity) in drinking water^a

Livestock	Total dissolved solids (mg/L)		
	No adverse effects on animals expected	Animals may have initial reluctance to drink or there may be some scouring, but stock should adapt without loss of production	Loss of production and a decline in animal condition and health would be expected. Stock may tolerate these levels for short periods if introduced gradually
Beef cattle	0–4000	4000–5000	5000–10 000
Dairy cattle	0–2500	2500–4000	4000–7000
Sheep	0–5000	5000–10 000	10 000–13 000 ^b
Horses	0–4000	4000–6000	6000–7000
Pigs	0–4000	4000–6000	6000–8000
Poultry	0–2000	2000–3000	3000–4000

a From ANZECC (1992), adapted to incorporate more recent information

b Sheep on lush green feed may tolerate up to 13 000 mg/L TDS without loss of condition or production

Refer to Section 11 of **Appendix 7** for further information.

Reference:

ANZECC 2000, *Australian Water Quality Guidelines for Fresh and Marine Waters*, Australian and New Zealand Environment and Conservation Council, Kingston

67. WATER

Section 5.4.10.2 Groundwater Dependent Ecosystems

The BOM website indicates the potential presence of vegetation dependent on groundwater near the coast, presumed to be within shallow alluvium. Land surface contours indicate the vegetation systems correspond to the bottom end of a drainage line that will be disrupted by the open pit.

Was this vegetation patch inspected and is there an associated impact from reduction in surface runoff or shallow through-flow during pit development?

The portion of remnant native vegetation in the gully line east of the proposed open pit was surveyed by COOE and classified as *Eucalyptus gracilis* Mid Mallee Woodland and *Eucalyptus porosa* Mid Mallee Woodland Mid Mallee as per Table 5.12-1 (MLP) and corresponding Figure 5.12-1 (MLP).

This patch of vegetation will be subject to clearance due to the location of the proposed highway realignment and will therefore be required to be offset in the native vegetation management plan (NVMP). The NVMP will be undertaken in consultation with the Native Vegetation Council.

68. WATER

Section 6.3.1.1 Exploration Activities

What is Rex's independent water supply?

Provide information on the mentioned independent water supply.

Rex's independent water supply of groundwater for the exploration activities is detailed in **Appendix 68**, Exploration Water Management Plan.

69. WATER

Sections 6.3.2.1 and 6.3.2.2 Exploration Activities

Rehabilitation of drillholes: Proposed decommissioning of drillholes is not in accordance with M21 document. Existence of multiple aquifers is presented in Section 5, yet not acknowledged in this section.

Provide information to demonstrate that drillhole rehabilitation is in accordance with Guideline M21.

As stated in **Response_56. Water** and Section 8 of the Hydrogeological Summary Report (**Appendix 7**) there is a single aquifer only. On this basis decommissioning of drillholes has been carried out in accordance with the appropriate provision of the Guideline M21.

70. WATER

Section 6.5.7.1 Expected Pit Inflows

The second paragraph second sentence is not clear.

Provide clarification the message being conveyed is - that in the 2nd half of year 5 dewatering volumes will exceed the processing requirements which are 166 L/s.

In Section 6.5.7.1 of the MLP, there has been a surplus of water identified as per Figure 31 in **Response_71. Water**. The updated July 2013 modelling that used the deep water drilling results resulted in a deficit of water for all years of less than 166 L/s as per Figure 30 as shown below as per Section 15.2 of **Appendix 7**.

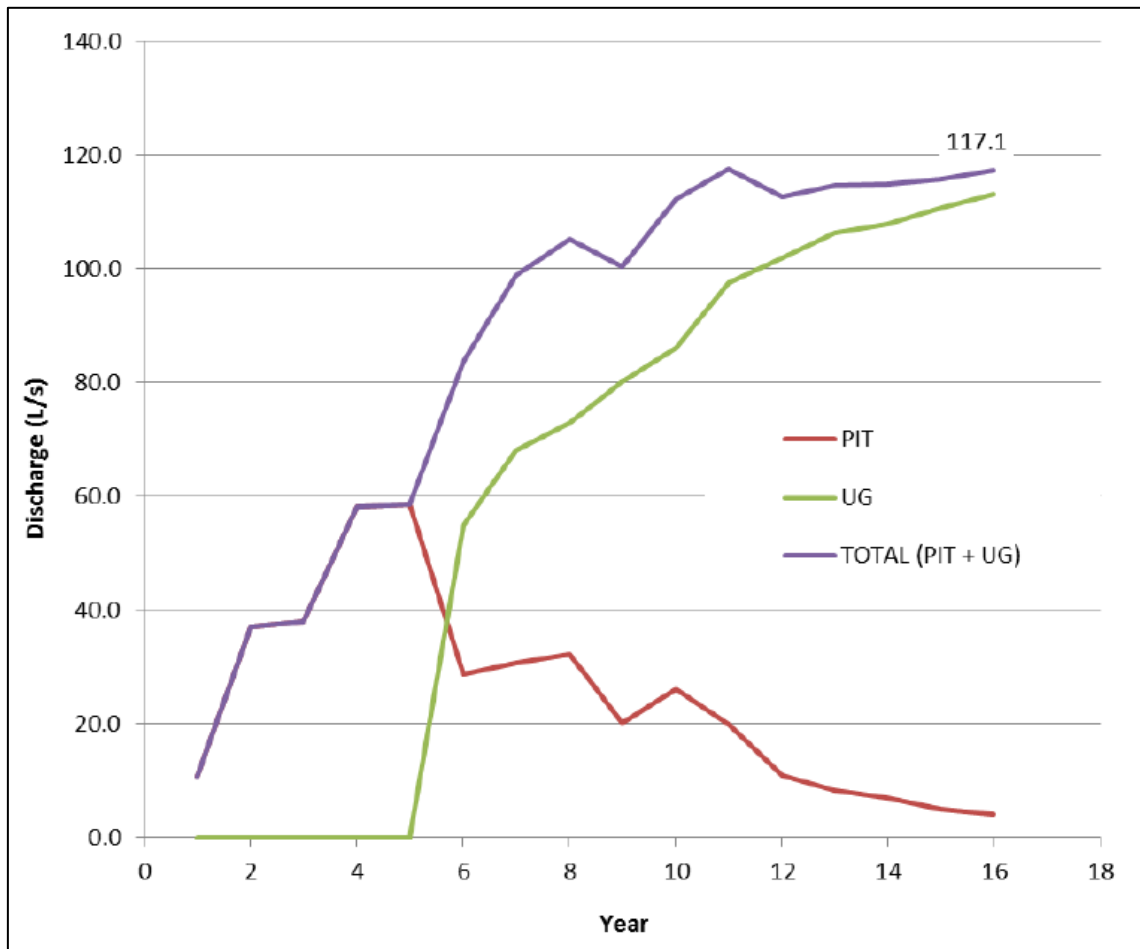


Figure 30: Modelled discharge rates (Based on the July 2013 model)

71. **WATER**

Table 6.6-1

Reconciliation of the units t/h with other data in the report (e.g. Figure 6.5-10) is not provided. Clarify the t/h units and provide their equivalence to the units in Figure 6.5-10.

Modelled dewatering outflows for open pit, dewatering wells and underground during the life of mine is shown in Figure 31 below. This model has been superseded by the July 2013 model presented in **Response_70. Water.**

However reinjection is a contingency if any surplus water is encountered as presented in Appendix 6.5-B_Groundwater Injection Disposal Modelling Report, of the MLP.

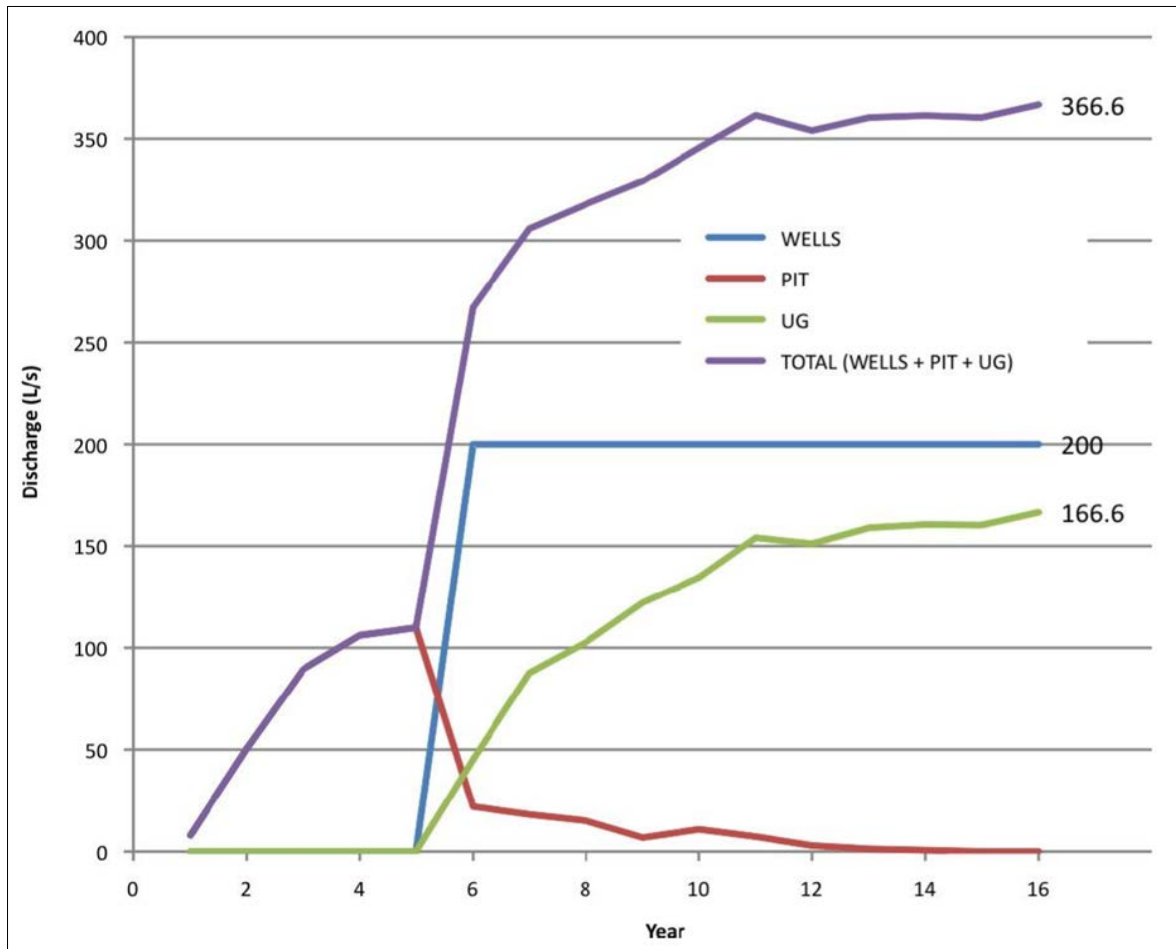


Figure 31: Modelled dewatering outflows for open pit, dewatering wells and underground during the life of mine (based on the MLP Model – April 2013)

Table 6.6-1: Site water balance at year eight of production (based on the MLP Model – April 2013)*

Water in	Tonnes/hour (t/h)	Megalitres/day (ML/d)	Water out (usage)	Tonnes/ hour (t/h)	Megalitres/ day (ML/d)
Mine water (groundwater from dewatering)#	436.4	10.2	Evaporation from tailings dam	-134.1	-3.1
Cut-off well water [groundwater]	720.0	16.8	Cu Concentrate cake	-4.0	-0.1
Seawater (from seawater intake [if required])	0.0	-	Mags Concentrate cake	-13.0	-0.3
Potable water (SA Water)	70.8	1.7	Consolidated Tailings Solids	-571.9	-13.3
Total water in	1227.2	28.6	Total Water Supply to Plant (Water Usage)	-723.0	-16.9
Total surplus to be reinjected	504.2	11.8			

*the conversion from tonnes/hour to megalitres/day has taken into account the density of the water.

#this includes surface water from storm events.

72. WATER

Table 6.6-2

This table should be re-formatted to report standard volume units (e.g. kL/day or ML/day). It is difficult to make comparisons for annual water use in the current format. Reformat this table as described.

Table 6.6-2 as presented directly below, has been updated to include t/h and ML/d. Please note that the conversion from tonnes/hour to megalitres/day has taken into account the density of the water.

Table 6.6-2: Process water balance (based on the July 2013 Model)

Water Source	Year 3			Year 8			Year 11		
	t/h	ML/d [#]	Cl g/L	t/h	ML/d [#]	Cl g/L	t/h	ML/d [#]	Cl g/L
Water from mine dewatering (groundwater)	331.5	7.7	15.3	436.4	10.2	15.3	597.9	13.9	15.3
Seawater (from seawater intake)/ Cut-off well water (groundwater) [net of reinjection]	321.4	7.5	22	216.3	5.0	22	54.6	1.3	22
Potable water for make-up	<i>Not applicable as chloride levels are balanced</i>								
Potable water for Filters and reagents [Potable water (SA Water)]	70.6	1.6	0.068	70.8	1.7	0.068	70.9	1.7	0.068
Chloride in process water									
Total Water Supply to Plant (water usage)	-	-	16.1	-	-	15.1	-	-	13.7
Cut-off Well Field (amount pumped out)	723	16.9	-	723	16.9	-	723	16.9	-
Seawater (from seawater intake)	321	7.9	22	720	17.8	22	720	17.8	22
Total Rejected (into cut-off well field) [surplus water]	0 ⁺	-	-	0	-	-	0	-	-
Total Site water balance	0	0	-	504	12.4	22	665	16.4	22

+ Seawater (from seawater intake) is only proposed to be used from years 0-3 in this conservative scenario when a deficit is experienced (Figure 6.5-10).

[#]the conversion from tonnes/hour to megalitres/day has taken into account the density of the water.

Table 6.5-5: Water balance (pit dewatering included)

Water Make-up	Year 3		Year 8		Year 11	
	(t/h)	ML/d [#]	(t/h)	ML/d [#]	(t/h)	ML/d [#]
Mine water (groundwater from dewatering)	332	7.7	436	10.2	598	13.9
Seawater (from seawater intake)/ Cut-off well water (groundwater)	321	7.4	216	5.5	54	1.3
Potable water (SA Water)	71	1.7	71	1.7	71	1.7
Total Make-up	723	16.9	723	16.9	723	16.9

[#]the conversion from tonnes/hour to megalitres/day has taken into account the density of the water.

73. WATER

Section 6.10.3.2 Water Sources (Table 6.10.5 Water Sources)

Table 6.10.5 – Water Sources

Table is to be updated with units reported in kL/day / ML/day.

Table 6.5-10 as presented directly below, has been updated to include t/h and ML/d. Please note that the conversion from tonnes/hour to megalitres/day has taken into account the density of the water

Table 6.5.10: Expected annual average water usage by source (based on July 2013 Model)

Water Source	Water Flow (t/h)	Water Flow (ML/d [#])	Water flow (GL/a)
Mine water (average between peak and minimum) (*)	409.5	9.6	3.26
Seawater	169.6	4.0	1.35
Potable (SA Water)	53.4	1.3	0.42
Potable water for ablutions	9.4	0.2	0.073
Potable water allowance	17.8	0.4	0.138

Note(*): Mine water will vary between a minimum of 4.2 ML/d to a peak of 14.3 ML/d. Seawater intake and potable water requirements for make-up will vary accordingly.

[#] the conversion from tonnes/hour to megalitres/day has taken into account the density of the water.

74. WATER

Section 6.10.3.2 Water Sources

Have technical risk factors (e.g. clogging) been incorporated into the design of the injection disposal wellfield? What contingency measures are proposed if the wellfield does not operate efficiently and another discharge is required?

Provide clarification

As per **Response 70. Water**, the water outflows are in deficit for the processing water requirements for the LOM. Reinjection has been included as a contingency option only. The reinjection modelling has been detailed in Section 14.7 of **Appendix 7**.

75. WATER

Section 8.3.12 Groundwater

Offsite movement of contaminated groundwater from the mine at closure - As modelled the pit will become a sink post mining and will slowly increase in salinity due to evaporation.

Is there potential for migration of a salinity/contaminant plume off site via diffusion? What would be the consequence of this (if any) in the long term?

Pit water level recovery modelling indicates that the water level in the open pit is to remain lower than the surrounding groundwater surface. Groundwater elevations after 465,000 days (1274 years) are presented in Figure 172 of **Appendix 7**, and show that water levels in the pit stabilize at about -38.5 m AHD, some 45 m

to 60 m below the initial (pre development) mid-pit potentiometric surface as contoured based on January 2013 measured levels. As a result, there will always be a hydraulic gradient towards the pit.

Molecular diffusion is the dominant solute transport mechanism only when flow velocities are negligible, which (due to the ongoing flow toward the pit) will not be the case at Hillside. Diffusion, being controlled by concentration gradients, would be most important in a static groundwater system e.g. if a large difference in concentration exists between the pit water and native groundwater. However, at Hillside, whilst large concentration differences may occur between the aquifer and pit lake at some late time, any resultant diffusive flux will be negated by flow (hydraulic gradient driven advective flux) toward the pit.

Figure 32 below shows a plot of particle movement versus time for advective flux (into the pit) and diffusion (if occurring) out from the pit. This plot is based on the diffusive flux equation of Crank, (1956) and clearly shows that advective fluxes into the pit are about 2 to 3 orders of magnitude greater than diffusion driven fluxes (for Cu as sulphate ; $D = 7.14 \times 10^{-10} \text{sqm/sec}$) out of the pit into the aquifer.

Hence, the advective fluxes will effectively negate the potential growth of a diffusion driven excursion from the pit into the surrounding groundwater.

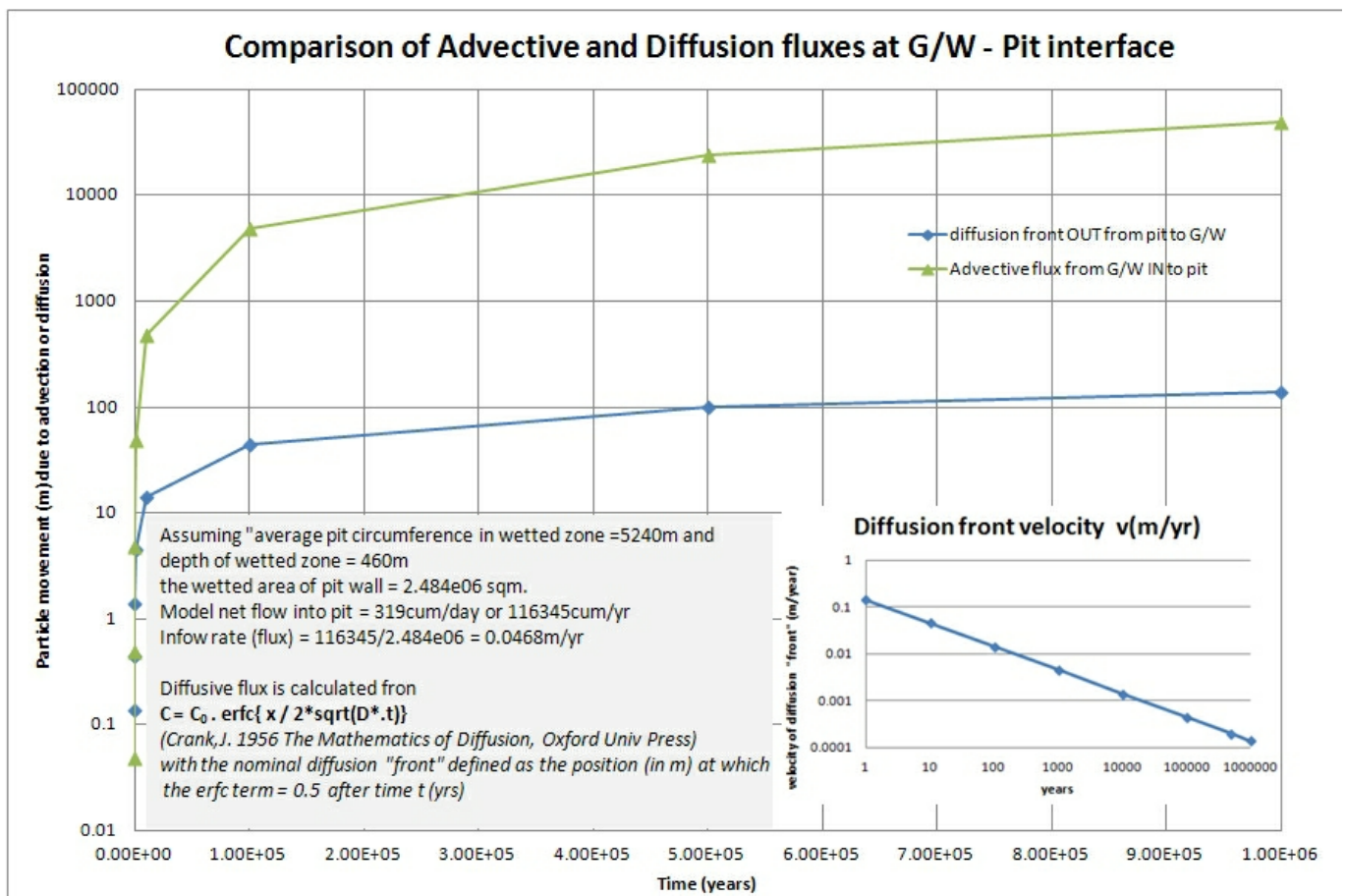


Figure 32: Plot of particle movement versus time for advective flux (into the pit) and diffusion (if occurring) out from the pit

76. **WATER**

Appendix 5.10A Hydrogeology Report (Figure 1-2)

- The potentiometric surface map does not reflect water levels presented in the figure. Can an explanation be presented as to why specific data points e.g. WBTH 7, WBTH 22, WBTH 8, WBTH 20, WBTH 16 have been plotted outside of their respective contour domains?

Provide clarification

The potentiometric map has been updated. Refer to Figure 20 of **Response_58. Water**.

77. **WATER**

Appendix 5.10A Hydrogeology Report

- Further to the above, the potentiometric surface should be updated with new data points collected from drilling of wells WBTH 22-42.

Provide updated potentiometric surface map as requested.

The potentiometric map has been updated, refer to Figure 20 of **Response_58. Water**. This figure does not include WBTH 040, 041 and 042 labels as they are very close to other wells.

78. **WATER**

Appendix 5.10A Hydrogeology Report

Figure 5-7: The Kh value for the footwall granite is missing.

Provide the Kh value as requested – update this figure.

The Kh value for the footwall granite is 0.031. The figure has been updated, see Figure 33 directly below.

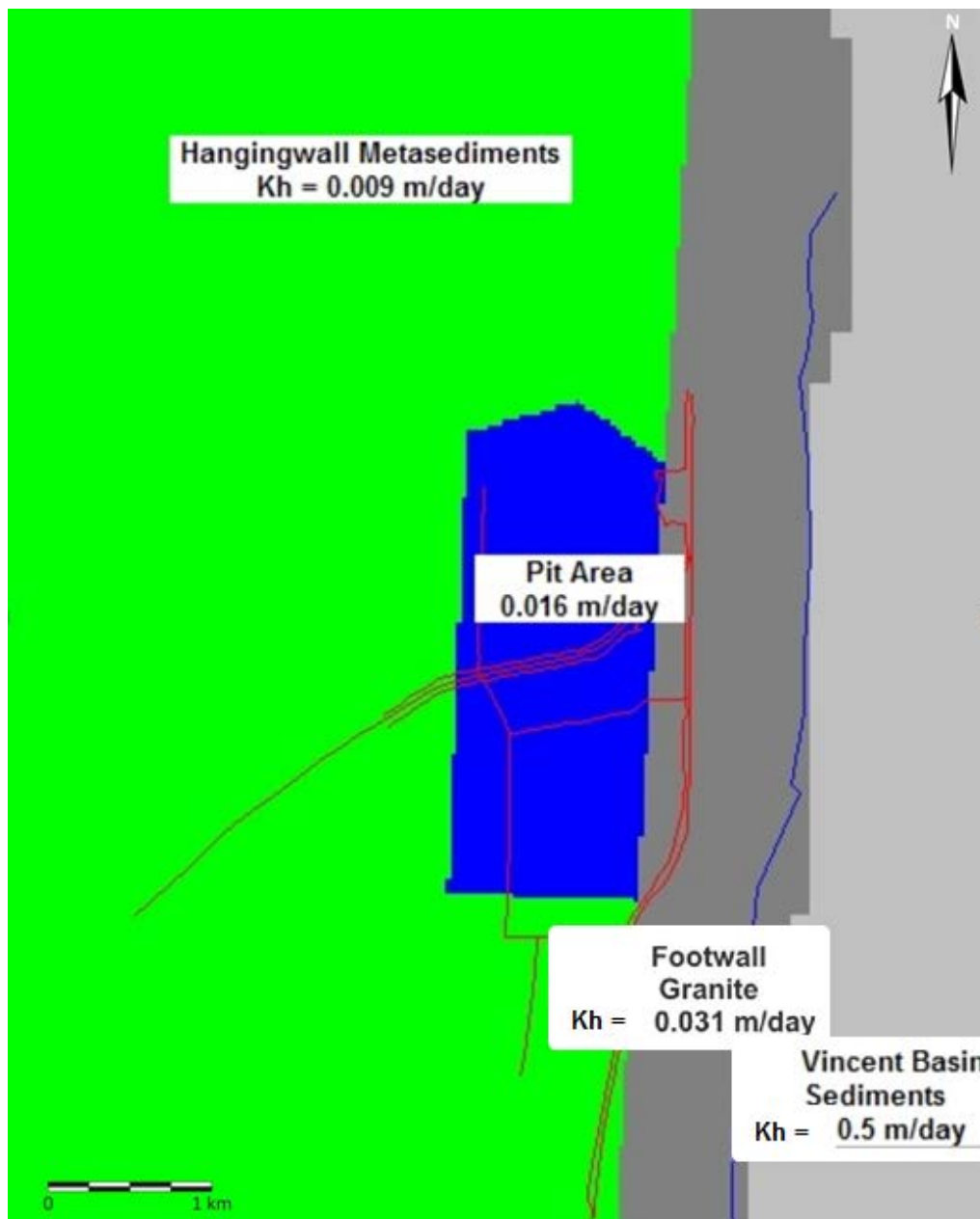


Figure 33: Groundwater model - Kh values in Layer 3

79. WATER

Appendix 5.10A Hydrogeology Report

Figure 5-8: It is presumed the general head boundaries on the western extent of the model domain (where monitoring data is unavailable) are a subdued representation of topography? If not, what is the rationale for the heads selected as representing these boundaries?

Provide clarification

Initial heads (water elevations) for all layers were set as shown in Figure 92 of **Appendix 7** but the geometry of the base of layers 1 and 2 results in areas where both units are dry. The heads were controlled by General Head Boundary (GHB) cells (shown as yellow in that figure), whose head values were varied until a

reasonable approximation of the observed heads and west to east hydraulic gradient across the pit was obtained.

The blue area in the east of Figure 92 in **Appendix 7** is the model representation of the Gulf St Vincent at sea level which is modelled using the “reservoir” package (dark blue in that figure), effectively a constant head source but with limited vertical connectivity with the underlying layer, for the purposes of water balance recording. The model reservoir is present only in layer 1. In other layers the shoreline is represented by a line of GHB cells set at 0 m AHD.

GHB cells were included in all layers at the locations shown in yellow in Figure 93 of **Appendix 7**, i.e. on the western boundary of the model domain (set to heads of 87 m AHD in the southwest corner to 42.5 m AHD in the northwest corner) as well as a line of similar cells at 0 m AHD defining the model coastline apart from layer 1 where the gulf waters are represented by the reservoir package with the head set to 0 m AHD. These head values lead (in the model) to the generation of a set of initial heads that are similar to those obtained from the field program.

The line of GHB cells representing the model shoreline also defines the western extent of the St Vincent Basin sediments which is believed also to coincide with the position of the Ardrossan Fault (Drexel and Preiss, 1995).

80. WATER

Appendix 6.5-A Groundwater Investigations Report

The 2013 report is inadequately structured as it does not provide information about the revised model and parameter values used in the tests. The 2012 model is mentioned in the report, but no details are provided and the 2012 report is not referenced.

It is understood that recent further water drilling has occurred and an updated model produced. The updated model must be provided for review.

Refer to **Appendix 7** for the revised model and parameter values.

81. WATER

Appendix 6.5-A Groundwater Investigations Report - Provide the items of missing information

The following information was missing from the modelling report:

- Clear documentation of the intent of the modelling exercise

Refer to Section 2 (Introduction) of **Appendix 7**.

- Conceptual model (explain hydrogeology and include cross-sections)

Refer to Section 7 for the model and Section 13.1 for the Model Set-up of **Appendix 7** which includes the cross sections.

- Water balance to support the model inputs and outputs

Water balance information is presented in Table 23 'Water budget July 2013 model' of **Appendix 7**.

- Summary (Table and Figure) of inputs for the tests (e.g. k values for the tests)

Refer to Section 14.1 Changes to model K distribution (sensitivity analysis) of **Appendix 7**.

- Summary of the outputs and evaluation of the model outputs

Sections 14 and 15 of **Appendix 7** detail the model outputs and evaluation.

- Quality of the Figures (e.g. scale, unit and labels) needs improvement.

Figures presented in **Appendix 7** have been revised and improved if possible.

82. WATER

Appendix 6.5-A Groundwater Investigations Report

The report states that 'Lack of long term water level observations in the vicinity of the proposed Hillside pit means that transient model calibration at the scale of the study area is not possible'.

Provide an explanation on the implications of not being able to calibrate the model using long term water level data (e.g. sensitivity analysis).

Refer to Section 14.3 Model Calibration of **Appendix 7**.

83. WATER

Section 8.3.12

It is not clear that a potential change in model inputs has been considered in the risk assessment of post-closure pit water levels and the potential for groundwater to move into the marine environment pg 8-175.

Provide a sensitivity analysis around the groundwater modelling inputs post-closure.

As per **Response_7. Closure**, the long term pit water level recovery model was revised as presented in the updated and consolidated Hydrological Summary Report (**Appendix 7**). This took into account the revised hydraulic conductivity values derived from the Stage 4 drilling and test pumping program. This means that two long term pit water level recovery model scenarios have been run, providing in essence a sensitivity analysis to changes in K. In terms of sensitivity analysis, layer 4 K values in the revised modelling have been significantly reduced in the stage 4 modelling. Therefore, this provides outputs for relatively high K and much reduced K values. This is considered to constitute the two 'end members' of a continuum of sensitivity, with the 'worst case' (high K) values used for the scenario presented in the Appendix 5.10-A of the MLP and the reduced K values used for the updated modelling presented in **Appendix 7** which is based on the Stage 4 deep drilling results.

Refer to **Response_7. Closure** and Section 15.3 of **Appendix 7** for further information on the revisions to long term pit water level recovery model.

84. WATER

Section 6.10.3

Pg 6-186 states any water discharged will be as per EPA Water Quality Policy.

Clarify if this refers to only re-injection bore discharge or potential for a marine discharge? If marine discharge is to be contemplated supporting information on eco-toxicity testing will be required to support the assessment of this aspect. This should be done in consultation with the Marine branch of the EPA.

On page 6-186 of the MLP it has been stated that any water discharged will be as per EPA Water Quality Policy. Rex confirms that this only refers to the re-injection bore discharge contingency and there will be no discharge into the marine environment.

85. WATER

Section 6.5.7

Is there clear indication that the disposal mechanism using a re-injection bore field is likely to be successful given high presented volumes (19.6ML /day).

Provide additional information indicating the likelihood of achieving the required disposal volumes.

As per **Response 70. Water**, the water outflows are in deficit for the processing water requirements for the LOM. Reinjection has been included as a contingency option only and the injection modelling has been detailed in Section 14.7 of **Appendix 7**.

86. WATER

Section 6.7.2

Where does the spillway from the DCSP report to? Clarify if it reports to the pit or an alternative location.

The DCSP spillway reports to the open pit. The DCSP has been sized to contain an average recurrence interval (ARI) storm event of 1 in 100 (72 hour storm) as per Figure 7.6 of Appendix 6.7-A of the MLP. Therefore it is unlikely that the spillway will be used, however any overflow from a greater than 1 in 100 year storm event will report to the open pit and will not leave the proposed mining lease.

87. WATER

Section 6.7.4.5

Has the disposal of wastewater (treated sewage) been considered a potential impact on groundwater or marine environment?

Provide clarification

Allowance has been made for a suitable sewage collection and disposal plant incorporating gravity sewer lines, rising main pump station and treatment plant at the main Hillside plant and port.

At the Hillside mine site and port, a simple environmental septic and irrigation system (Biocycle system) has been allowed for to the administration and processing areas along with the emergency camp. These systems efficiently separate and digest solid wastes and treat the wastewater in a series of controlled biological process to produce irrigation water which will be classified as Class B irrigation water suitable for purposes as per Figure 34 below. This water will be used to irrigate topsoil and revegetated areas, and as the water is classified as class B irrigation water, it will not potentially impact groundwater. There will be no release of water into the marine environment. A risk assessment on the potential impact, *contamination due to incorrect management of sewage plants* (ML-W2) has been detailed in Section 8.3.16 of the MLP.

All sanitary plumbing and drainage associated with the connection of the sanitary fixtures to the waste control system will be installed in accordance with the Standard for the Construction, Installation and Operation of Septic Tank Systems in South Australia, National Plumbing and Drainage Code AS3500-2, Sanitary Plumbing and Sanitary Drainage and any SA Health Commission variations prescribed by the Public and Environmental Health (Waste Control) Regulations and South Australian Water Corporation amendments.

Class	Overview of recycling process	Permitted Uses (Fit-for-purpose)
A	This is the highest quality of recycled water and is achieved after a tertiary treatment process combined with pathogen removal. Class A recycled water is classified as safe for use on irrigation for food plants - including those eaten raw. Indicative objectives: < 10 E.coli org/100 mL, Turbidity < 2 NTU, < 10 / 5 mg/L BOD / SS, pH 6 – 9.5 and 1 mg/L Cl ₂ residual (or equivalent disinfection). In addition to this the guidelines for dual pipe recycled water scheme indicate that 7-log removal of viruses and 6-log removal of protozoa with helminth control if required (EPA Vic 2005, Table 5.1)	<ul style="list-style-type: none"> residential garden watering closed system toilet flushing process/cooling water for industry fire protection stores and reticulation systems irrigation of municipal parks and sports grounds water for contained wetlands or ornamental ponds food plants that are consumed raw all of the uses listed for classes B, C and D
B	A secondary treatment process, combined with some pathogen reduction is used to produce Class B recycled water. Indicative objectives: <100 E.coli org/100 mL, pH 6 – 9.5, < 20 / 30 mg/L BOD / SS and Helminth control required for cattle grazing	<ul style="list-style-type: none"> irrigation of dairy cattle grazing fodder livestock drinking water (not including pigs) wash down water for dairy sheds and stockyards (not including milking equipment) urban (non-potable) uses with restricted public access closed industrial systems all of the uses listed for classes C and D
C	A secondary treatment process combined with minor pathogen reduction is used to produce Class C recycled water. Indicative objectives: <1000 E.coli org/100 mL, pH 6 – 9.5, < 20 / 30 mg/L BOD / SS and Helminth control required for cattle grazing	<ul style="list-style-type: none"> cooked/processed human food plants selected (raw/unprocessed) plants not directly exposed to recycled water (e.g. apples) grazing/ fodder for cattle, sheep, horses, goats etc. grazing for dairy cattle (subject to a five day withholding period after irrigation) urban (non-potable) uses with restricted public access closed industrial systems all of the uses listed for Class D
D	A secondary treatment process is used to produce water of this quality. Indicative objectives: <10000 E.coli org/100 mL, pH 6 – 9.5 and < 20 / 30 mg/L BOD / SS	<ul style="list-style-type: none"> non food plants such as woodlots, turf growing and flowers

Source: EPA Victoria 2003, p 20

Figure 34: Classes of recycled water (Victorian EPA)

88. WATER

Section 6.8.8.2

It is not clear how uncontaminated water is being defined - does this include suspended solids?

Provide clarification

Uncontaminated water is defined as surface water which has not come into contact with the mine infrastructure (i.e. WRDs, TSF, haul roads, process plant infrastructure and pipeline tracks). In storm events that generate surface water runoff, the upstream natural surface water flows will be diverted around the operational areas and redirected to local drainages to assist in maintaining natural runoff characteristics of the catchments. Suspended solids in this uncontaminated water will be controlled through catch drains and silt retention ponds designed to temporarily store inflow particularly for reduction of flow velocity in order to control sedimentation.

Further details will be provided in the Surface Water Management Plan.

89. WATER

Section 6.8.8.2

How is captured runoff being assessed as not contaminated?

Provide clarification

All water that comes in contact within the mine site footprint will be retained on site and directed to holding ponds for reducing sediment loads, and used to supplement process water. Overflow from the internal drainage system will be directed to the pit, which will provide temporary storage during major storm events. This design will result in zero discharge of surface water from the mine.

Upstream natural surface water flows will be diverted around the operational areas and redirected to local drainages to assist in maintaining natural runoff characteristics of the catchments. This water is classified as 'not contaminated' as it has not come into contact with mine infrastructure. Key water quality indicators will be monitored in the natural drainage diverted away from the mine to verify that the control measures are working. The key indicators can be easily measured by trained staff and calibrated instruments.

The parameters to be measured may include:

1. pH, EC and Turbidity,
2. total suspended solids and flow rate,
3. Visual assessment for evidence of mine derived matter (for example plastic debris, hydrocarbon sheen or discoloration).

Further detail will be provided in the Surface Water Management Plan which will be provided as part of the PEPR. Monitoring of the non-contaminated water will be included as outcome measurement criteria in the PEPR as agreed with the State Government regulators.

90. WATER

Section 6.8.8.2

Clarify treatment standard proposed and disposal location for captured runoff. Provide clarification

All water that comes in contact within the mine site footprint will be retained on site and directed to holding ponds for reducing sediment loads, and used to supplement process water. Overflow from the internal drainage system will be directed to the pit, which will provide temporary storage during major storm events. This design will result in zero discharge/disposal of surface water from the mine to the receiving environment.

All upstream natural surface water flows diverted around the operational areas will be monitored opportunistically to verify the natural runoff characteristics of the catchments are maintained (refer to **Response_89. Water**). Further detail will be provided in the Surface Water Management Plan.

91. WATER

Section 8.3.11.2

Has the impact of potential clearance of native vegetation and the resultant reduced vegetative cover been considered in the evaluation of impact on downstream erosion of water ways?

Clarify if this has been considered.

The southern drainage line (Pine Point drainage line) is the only drainage line that will continue to flow as per pre-mining conditions. The surface water has been modelled with the proposed infrastructure without any surface water drainage controls illustrating the volumes and flood extents as shown below in Figure 6.8-6 (of the MLP). This will not result in increased high flows of surface water at downstream waterways (Figure 6.8-6 of the MLP) when compared to uncontrolled pre-mining conditions (Figure 5.9-2 shown below). An increase in erosion of downstream water ways would only occur if there was an increase in the surface water flow and excessive clearance of native vegetation (which is not planned by Rex).

The two northern drainage lines will be altered due to the placement of the mine infrastructure and the realignment of the highway. As per Section 8.3.11.2 of the MLP '*as the native vegetation within these drainage lines is likely to rely predominantly on localised rainfall*', there will be minimal clearance of vegetation in the gully lines except from where culverts under the realigned highway will be placed. The construction of the northern roadway will require surface water management as per the application submitted to Development Assessment Commission (DAC) under s 49 of the Development Act.

The two northern drainage lines that will be altered will no longer receive any runoff from the pre-mining catchments west of the realigned Highway. As per Section 5.9.1 of the MLP, the combination of the existing conditions at Hillside means that significant runoff is unlikely to be generated due to:

- The low average annual precipitation.
- The flat terrain.
- The relatively high infiltration capacity of the soil.

Vegetation field surveys (COOE 2012) indicate that no groundwater dependant ecosystems occur on or near the proposed ML. This coupled with the very low frequency of storm events that generate surface water

runoff, indicates that the remnant vegetation within the drainage lines are likely to be solely dependent on localised rainfall and runoff. Therefore the Hillside Project activities will not likely result in the decline of remnant native vegetation in the two northern drainage lines due to changes in surface water flow regimes.

Surface water flows that will change as a result of the placement of the mine infrastructure will be managed as per the Surface Water Management Plan.

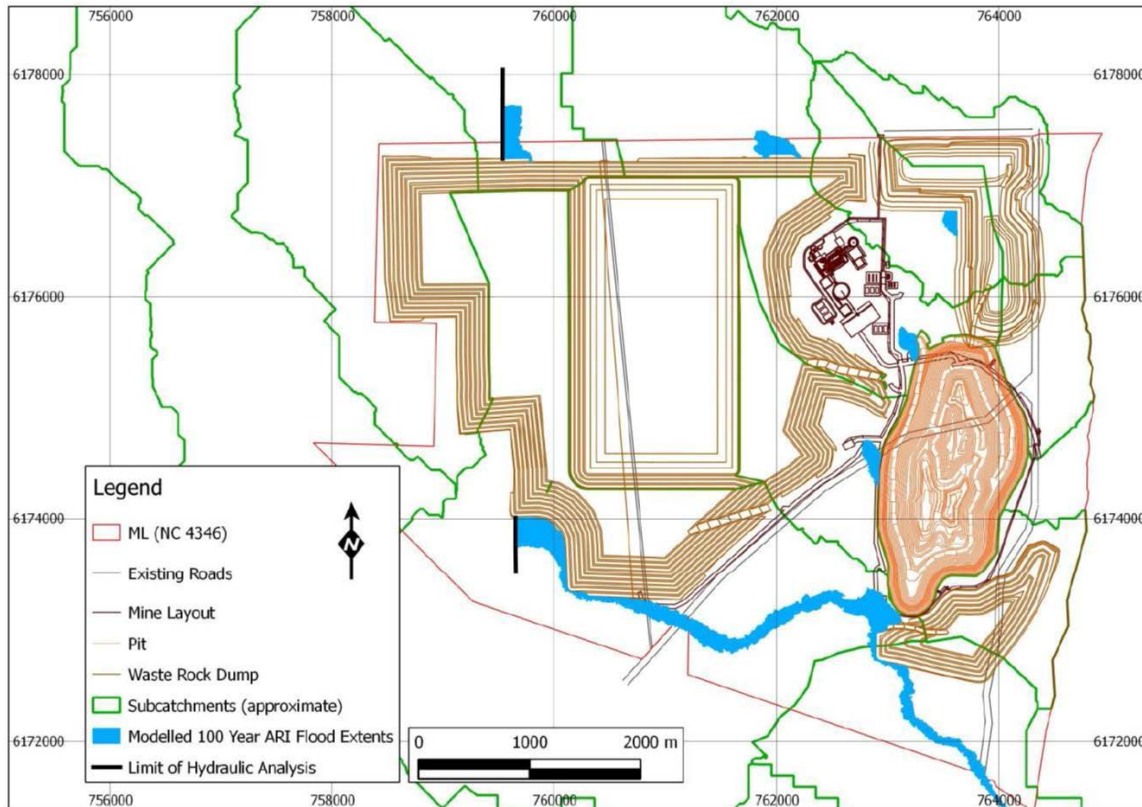


Figure 6.8-6: Estimated 100 year ARI flood extents with proposed infrastructure

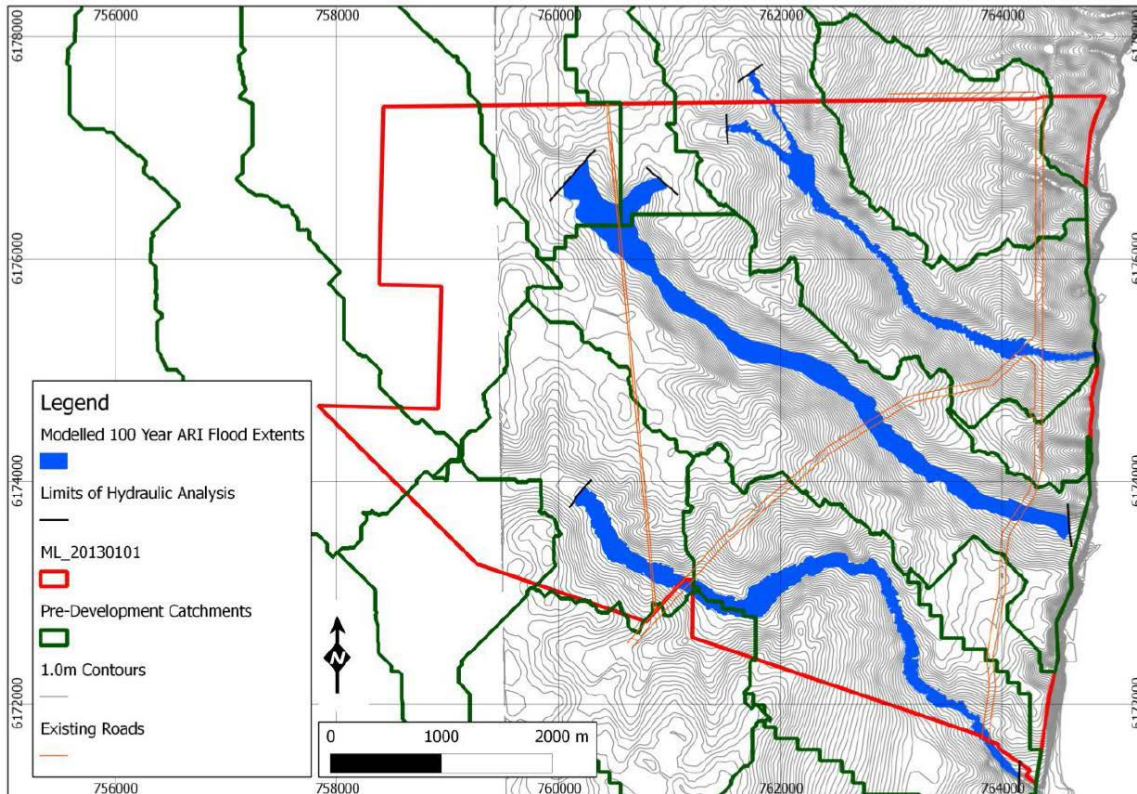


Figure 5.9-2: 100 year ARI peak flood estimation for existing catchments

92. WATER

Section 8.3.11.3

The impact of any surface water discharge (whether reduced or not) to the surrounding environment and the constitution of that discharge has not been described.

Provide consideration of risk regarding contaminated runoff leaving site.

As per **Response 89. Water**, All water that comes in contact within the mine site footprint will be retained on site and directed to holding ponds for reducing sediment loads, and used to supplement process water. Overflow from the internal drainage system will be directed to the pit, which will provide temporary storage during major storm events. This design will result in zero discharge of surface water from the mine. Upstream natural surface water flows 'clean' water, will be diverted around the operational areas and redirected to local drainages to assist in maintaining natural runoff characteristics of the catchments. This water is classified as 'not contaminated' (clean) as it has not come into contact with mine infrastructure.

93. WATER

Section 8.3.12.3

The acceptance criteria for reinjection water quality are not specified.

Clarify these criteria are as per section 6.10.3 and align with EPA Water Quality Policy.

Reinjection of groundwater into the aquifer is contingency if surplus water is encountered at the Hillside mine as per **Response 70. Water**. If re-injection is required, water will be monitored prior to injection to ensure water quality is in compliance with the current Environmental Protection (Water Quality) Policy. This will be undertaken in compliance with the State Governments requirements.

94. **WATER**

Section 6.6.4

Water balances have not been provided for each year of operation.

Clarification is to be provided on why annual water balances have not been provided.

The process water balance has been undertaken for all years. Variations in mine dewatering and seasonal precipitation are managed by storage capacity and the ability to pump seawater or potable water into the circuit.

Examples of the water balance with these varying inputs for year 3, year 8 & year 11 were provided as per Table 6.6.2 – Process Water Balance as shown in **Response_96. Water**. These years were chosen to be representative of the process water balance instead of presenting all of the years in the Table 6.6.2. Figure 6.5-10 in the MLP shows the modelled dewatering outflows for open pit, dewatering wells and underground during the life of mine on an annual basis.

95. **WATER**

Section 6.6.4

Strategies to manage variations to the predicted water balance are not discussed.

Provide clarification on verification process for the water balance, and managing variations to the water balance.

The water balance is fundamental to the process plant and site design. A mass balance is determined by mathematical modelling for all process streams within the plant from the commencement of crushing through concentrate production and tailings water return, this provides a process water demand for the projected plant feed tonnage. This process water balance is then integrated into the site water balance which encompasses climatic conditions and mining dewatering projections. A large amount of conservatism has been built into the dewatering projections coupled with a hierarchy of contingency mechanisms defined within the document (as per Section 6.5.7.1 of the MLP) to deal with excess water in the unlikely event of significant variations. For situations where less water is being produced from dewatering than projected, it will simply require more pumping of sea water to supplement operations water requirements.

Minor variations are managed in the surge capacity of the various dams. There can be upwards of 20% additional storage capacity on the designed live capacity.

96. **WATER**

No chloride balance is provided for when the site is operating on seawater.

Provide a site water chloride balance for routine operations using seawater.

Water balance is developed to maintain a maximum Chloride (Cl) balance of 18 g/L to the plant (shown in the grey boxes below in Table 6.6.2) continuously by alternating potable, seawater and mine dewatering flows. This chloride water balance was provided in Table 6.6.2 (of the MLP) *Process Water Balance*, updated from the MLP using the July 2013 results.

Table 6.6.2 – Process Water Balance (Based on the July 2013 Model)

Water Source	Year 3			Year 8			Year 11		
	t/h	ML/d [#]	Cl g/L	t/h	ML/d [#]	Cl g/L	t/h	ML/d [#]	Cl g/L
Water from mine dewatering (groundwater/storm water)	331.5	7.7	15.3	436.4	10.2	15.3	597.9	13.9	15.3
Seawater (from seawater intake)/ Cut-off well water (groundwater) [net of reinjection]	321.4	7.5	22	216.3	5.0	22	54.6	1.3	22
Potable water for make-up	<i>Not applicable as chloride levels are balanced</i>								
Potable water for Filters and reagents [Potable water (SA Water)]	70.6	1.6	0.068	70.8	1.7	0.068	70.9	1.7	0.068
Chloride in process water									
Total Water Supply to Plant (water usage)	-	-	16.1	-	-	15.1	-	-	13.7
Cut-off Well Field (amount pumped out)	723	16.9	-	723	16.9	-	723	16.9	-
Seawater (from seawater intake)	321	7.9	22	720	17.8	22	720	17.8	22
Total Reinjecting (into cut-off well field) [surplus water]	0 ⁺	-	-	0		-	0	-	-
Total Site water balance	0	0	-	504	12.4	22	665	16.4	22

+ Seawater (from seawater intake) is only proposed to be used from years 0-3 in this conservative scenario when a deficit is experienced (Figure 6.5-10).

the conversion from tonnes/hour to megalitres/day has taken into account the density of the water.

97. WATER

Section 6.8.7

The location and number of the interception dewatering wells is not clear.

Provide clarification

Appendix 7 includes sections on dewatering, firstly without cut off (interception) wells (Section 13.3 and Sections 14.2, 14.3 and 14.4), and then with cutoff (interception) wells (Sections 14.5 and 14.6). Cutoff wells were used when dewatering rates were calculated by the model as configured at that stage of the project to be very high (greater than 200 L/s). Figure 35 below is from Section 14.5 of that report and shows the preferred cutoff wellfield configuration at that stage of the investigation. Other cut off wellfield configurations were also simulated, some of which are documented in other supporting hydrogeology reports.

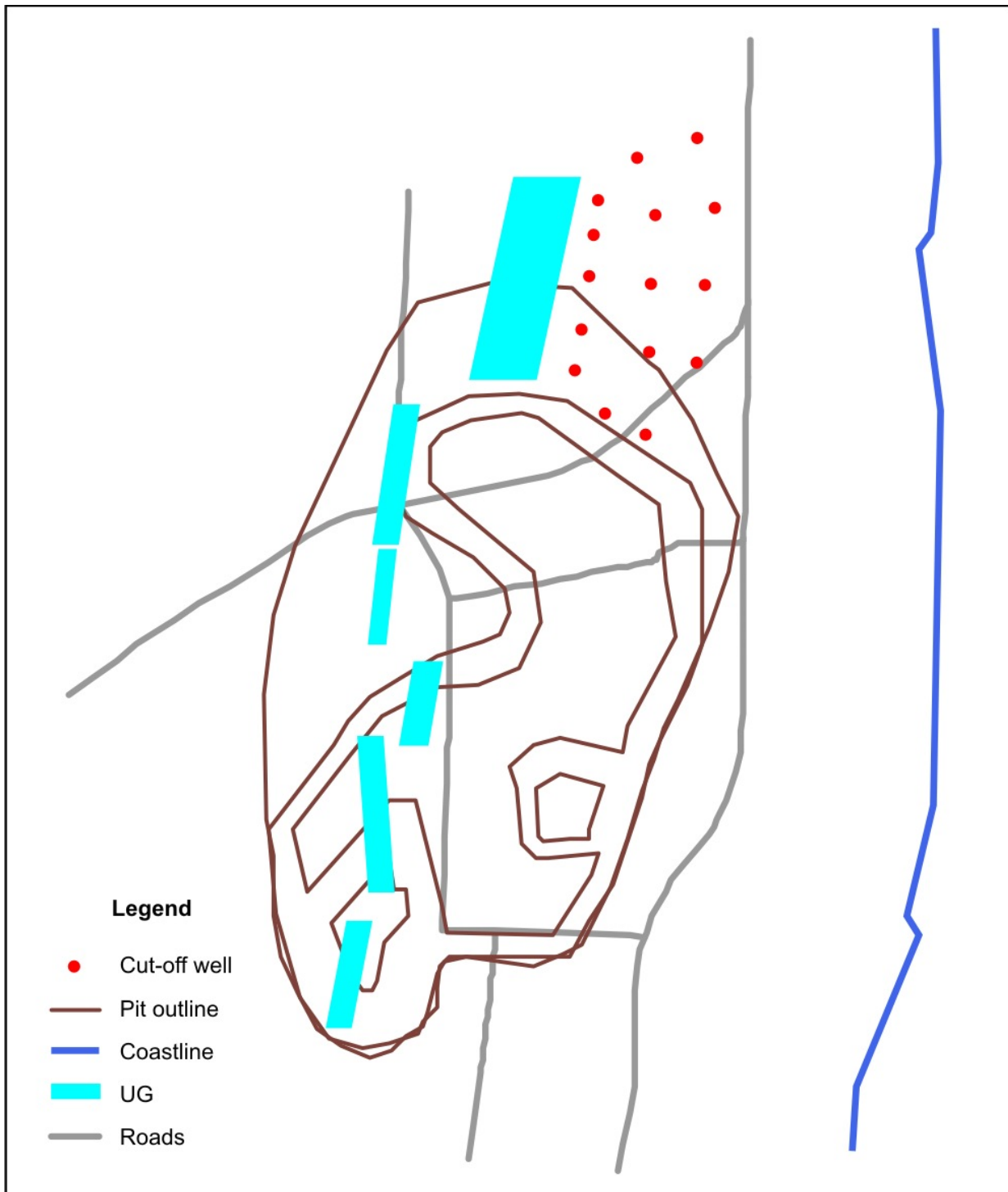


Figure 35: Initial Cut-off Well field Array (April 2013 Model)

Subsequent to this (PFS) modelling, the pit geometry, underground void geometry and mining schedule were altered, leading to the need to rerun the model, taking these revisions into account. This is documented in Section 14.6 of **Appendix 7**. Dewatering using cutoff wells was also simulated with the revised model, with a new cutoff wellfield configuration being documented. This revised array is shown in Figure 149 of **Appendix 7** and is presented in Figure 36. Other configurations were also trialed but not reported.



Figure 36: Revised Cutoff Wellfield Array (July 2013 Model)

Subsequent deep drilling and test pumping led to another set of revisions to the model, as documented in Section 15 of **Appendix 7**. Changes in hydraulic conductivity of layer 4 in the model resulted in calculated discharges reducing significantly, to below the projected site water use requirements for much of the duration of mining. This meant that as modelled, cutoff wells would not be required. They have therefore not been included in the Stage 4 documentation (Section 15 of **Appendix 7**).

98. WATER

Section 8.3.12.4

The likelihood of seawater ingress impacting the quality of existing groundwater is proposed as rare. Justify the selection of this likelihood.

Modelling in Section 14.8 of **Appendix 7** indicates that the pit lake is a permanent groundwater sink, effectively precluding off-site migration of groundwater. This means that the water in the open pit will not be able to move off-site as the groundwater movement will be toward the open pit, not away from it.

The open pit will not impact shallow aquifers because such aquifers do not occur at this location.

99. WATER

Section 6.6.2.13

The detail of the operation of the event process pond is not clear and details on design are not included. Clarify use and design of event process pond.

The event pond is designed to catch a 1 in 100 year, 72 hour flood event. Overflow from the process water pond and stormwater drains will report to the event pond.

ISSUES RAISED IN THE PUBLIC SUBMISSIONS

The following are issues that have been collated by DMITRE from the submissions sent in by interest groups and members of the public.

100. 3RD PARTY INTERESTS

Evidence sought to assess the impacts to livestock from continual or prolonged exposure to mining activities (including, but not limited to, short term transient vibration levels and blasting overpressure), to substantiate that the consequence in PRL for ML-BV5 and ML-BV6 is Minor, and an explanation of how a baseline for monitoring of impacts would be established.

There is significant evidence of successful grazing and bloodstock activities in close proximity to large scale mining sites across Australia. In Australia the examples include the Hunter Valley and Bowen Basin regions which contain operations such as Ravensthorpe, Cadia, Northparkes and Woodlawn. The Hillside operation will be monitored and controlled to human comfort standards and therefore it is expected that there will be no measurable consequences to livestock from any mining or related activities at Hillside.

In the Hillside Project Blast Impact Assessment (Appendix 8.3-B of the MLP) SAROS (blasting and vibration consultants) explained that through their experience at numerous mining and extractive industry sites which are located immediately adjacent to rural properties, the vibration levels of the magnitude predicted from the Hillside Project blasting activities will not adversely affect animals and livestock. This includes investigations of blasting impacts from an open pit mine in central NSW which is situated immediately adjacent to a large wetlands lake. Compliance limits imposed on the critical breeding areas of the lake are in line with the AS2187.2 guidelines. Monitoring at this site shows that there has been no noticeable disturbance to waterbird activity during blasting.

Appendix 8.3 of the MLP, assessed the blasting impacts in the context of the pre-existing environmental conditions. In order to demonstrate the influence of environmental factors on overpressure levels, Saros undertook a study over a 1 month period by correlating wind speed measurements with peak overpressure levels recorded at an adjacent location. Over the 1 month monitoring duration, in excess of 370,000 overpressure measurements were obtained as illustrated in Figure 8 of Appendix 8.3 of the MLP (as shown below) - Wind speed vs overpressure measurements over a 1 month period. More than 4,500 (>1%) non-blast related events exceeding the 115 dBL level, with a maximum level in excess of 135 dBL.

The grazing of livestock is also known to occur next to airports, under airport flyways, railways and adjacent to highways which are subject to vibration and overpressure from sources such as planes and trucks. To put this in context, a plane flying overhead emits approximately 100 dB. A road train passing on a highway emits approximately 90 dB when standing in a paddock 50 m away. As per Figure 4 of Appendix 8.3 of the MLP, the closest paddock will experience a range of 115 dB to 120 dB from an open pit blast.

In the context of the existing regional noise level the consequence to livestock will be negligible.

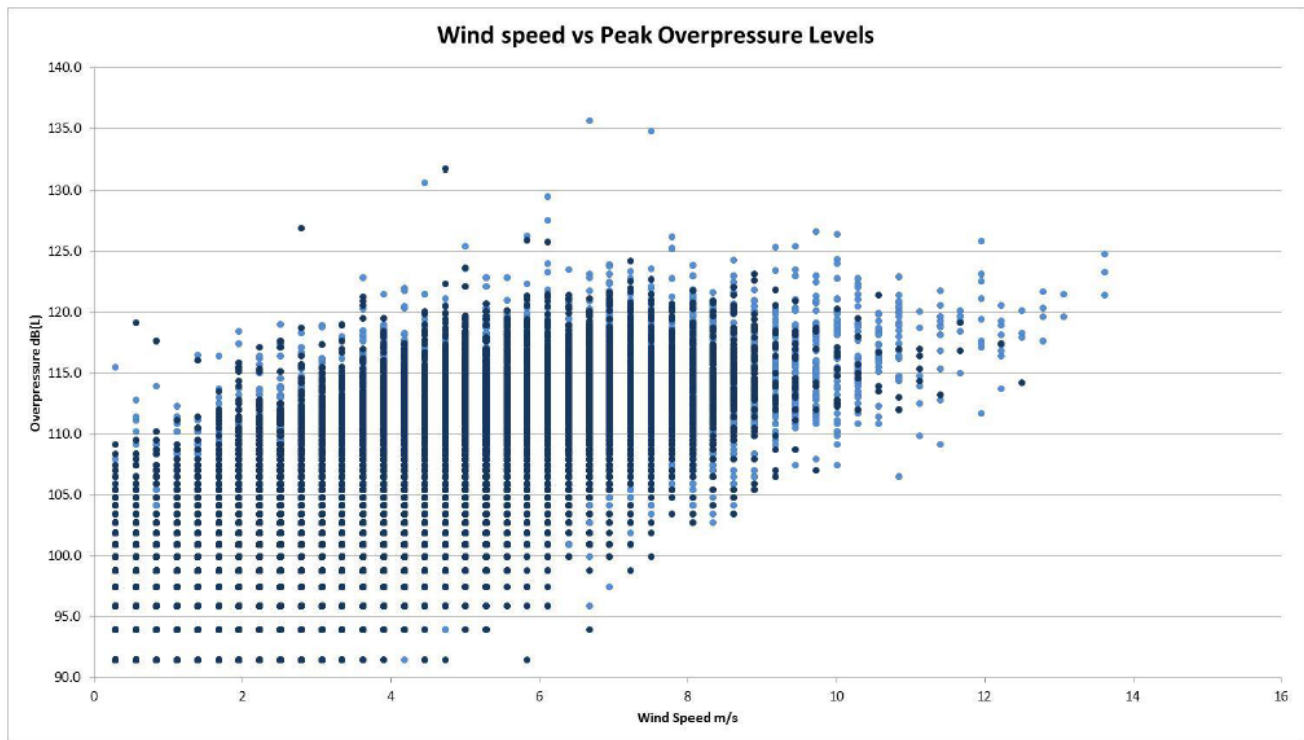


Figure 8: *Wind speed vs overpressure measurements over a 1 month period*

There is further evidence of cattle co-existing within 2km of the Mt Arthur Coal Mine. Edderton is a 1,500 hectare property that includes a heritage listed homestead. It was bought by Mt Arthur Coal in 1992 and they now lease the land to Trevor and Narelle Petith for their beef business 'HV Wagyu'. The homestead there was built in 1908 and has been used as a pastoral holding for sheep and cattle since 1914. Edderton is now home to a herd of 400 Angus cattle and 30 full-blood Wagyu cows. The Edderton property is just two kilometres from the Mt Arthur Coal mine, the largest coal mine in NSW, but HV Wagyu owner (Trevor and Narelle Petith) doesn't think the mine is impacting the business. As per the article 'Cattleman and coal mine unearth the formula for shared success, June 22, 2013' on the NSW Miners 'World Class Miners' website. When blasting is at full production, exposure to blasting impacts will equate to approximately a few seconds every other day. The overpressure limit at the nearest residential receptor of 115 dBL is equivalent to wind speeds of up to 16 km/hr which are frequently experienced on the Yorke Peninsula. The tight regulations imposed on mines also mean ground vibrations cannot exceed 5 mm per second at the nearest residential receptor. To put this into perspective, a person jumping nearby causes vibrations of 7 mm per second.

As there is no legislation or guidelines regarding nuisance vibration and noise levels to livestock, blasts will be monitored against human nuisance level of vibration and noise as per Australian Standard 2187.2 - 2006 *Storage and use – use of explosives* for an operation lasting longer than 12 months or more than 20 blasts (Table 8.3-14 of the MLP as presented below).

Table 8.3-14 (MLP): Summary of ground vibration and air overpressure limits to minimise human discomfort from long term blasting activities at a sensitive site (adapted from Table J4.5(A) and J5.4(A) – AS2187.2 -2006)

Category	Type of blasting operations	Parameter	Peaks Level
Sensitive site*	Operation lasting longer than 12 months or more than 20 blasts	Ground vibration	5mm/s for 95% blasts per year, 10mm/s maximum unless agreement is reached with the occupier that a higher limit may apply
Sensitive Site*	Operations lasting longer than 12 months or more than 20 blasts	Air Overpressure	115dBL for 95% blasts per year, 120dBL maximum unless agreement is reached with the occupier that a higher limit may apply
*A sensitive site includes houses and low residential buildings, hospitals, theatres, schools etc, occupied by people			

Every blast will be monitored, reported to the regulators and the results made publicly available. They will then be analysed and methods put in place to minimise impacts even further. These methods include restricting blasting times, designing detonation to minimise vibration, or avoiding blasting during bad weather conditions that could worsen vibration.

Reference:

<http://www.worldclassminers.com.au/news/environment/cattleman-and-coal-mine-unearth-the-formula-for-sh/>

101. 3RD PARTY INTERESTS

It is unclear that existing access to properties will be maintained. Clarification is sought that existing access for surrounding landowners will be maintained

The scope of the Hillside MLP includes the closing of public access to two key existing roads, namely the Yorke Highway (between St Vincent Highway and Pine Point Road) and a portion of Redding Road. Rex is aware that the landholder to the south of this Section of Yorke Highway has an existing access point (gate) to their paddocks from this road. Rex will enable this landholder to continue this access, until such time as a permanent arrangement is decided through due process required under the roads closing process (under the Roads (Opening and Closing) Act, 1991). Rex maintains a commitment to working with this landholder to negotiate an outcome acceptable to all parties.

Rex is currently in negotiations to acquire all land adjacent to the section of Redding Road affected by the closure.

102. 3RD PARTY INTERESTS

What proportion of agricultural land will be lost to road re-alignments and haul roads? Estimation of agricultural land that will be lost to road re-alignments and haul roads sought.

The total amount of agricultural land to be used for the purposes of new road realignments is estimated at approximately 26 hectares. The Pine Point Road (to become Yorke Highway) realignment will result in 4.7 hectares of agricultural land being consumed by road development. It is anticipated that the parts of this 60 m-wide road corridor not required for road construction will continue to be available for cropping or other agricultural pursuits. The entire 60 m-wide road corridor for the St Vincent Highway realignment will not be

available for cropping or agriculture and will impact 21.4 hectares of existing cropped land. The parts of this land not directly impacted by the new road construction will be revegetated with native vegetation in conjunction with Rex's Rehabilitation Management Plan and in consultation with the District Council of Yorke Peninsula, who will be the ultimate custodian of this land.

A breakdown of agricultural land that will be lost has not been provided, as this impacted land is considered as part of the total site disturbance, estimated at approximately 2080 hectares. No haul roads outside of the proposed mining lease have been assessed as part of the MLP. Rex may explore in future, however there are as yet no other mining targets identified.

103. 3RD PARTY INTERESTS

In 8.3.3.2 and 8.3.17.2 the impact to land users resulting from the blasting and aviation exclusions zones are identified and in 8.3.3.3 and 8.3.17.3 strategies are specified however those strategies are directed towards the notification of agricultural land users rather than mutual agreement with landholders in achieving a blasting scheduling which minimizes impact to adjacent land users. Explanation is sought on the management of the impact that an aerial exclusion zone will have on neighbouring farming activities, particularly the ability to undertake crop dusting.

There is required to be a Notice to Airmen (NOTAM) over the proposed open pit to a certain height. This is common where a danger or alert area which usually relates to mining or quarrying sites, and to special aviation activities such as fixed training areas or aerobatic areas. It may be prudent to avoid such areas, but there is no restriction on entry. Other special use areas, for example those for hang-gliding or radio-controlled model aircraft flying, are also symbolically marked on aeronautical charts as a warning device, but there are no details available for these in any publication. Similarly, mines and quarries marked on charts, but not within a danger area, should only be overflown at a safe height to avoid blasting debris.

Blasts are scheduled to occur once every other day during full production. As the Hillside mine site is outside of the controlled airspace, Rex will maintain contact with local airports to notify of upcoming blasts. The blast schedule will be developed in consultation with the nearest residents to reflect the needs of the neighbouring land uses (including crop dusting) and where possible blast at a consistent time. Notification of near landowners will occur in advance of blasts using an agreed notification protocol. Where blast clearance zones encroach on neighbouring rural paddocks inside the proposed ML, a clear plan indicating the blast location, proposed time and extent of blast clearance area will be provided to facilitate planning and timing of activities within the exclusion zone. Further details will be provided in a Communication Management Plan which will be developed in consultation with the surrounding land owners and will be reflected in the blast clearance protocols.

This potential impact has been assessed in Section 8.3.17 of the MLP in ML-AL1, *blast exclusion zone restricting access to adjacent land user for normal farming activities and aerial spraying*. The blast exclusion zone is almost certain to impinge on a small area of adjacent agricultural land use and restrict access for aerial spraying having a minor consequence resulting in a high primary risk. The control measures include, as stated in Section 8.3.17.3;

1. A blasting schedule to reflect needs of neighbouring land uses.
2. Where possible minimise number of blasts and blast at a consistent time.

3. Reduce the area, duration and timing and severity of the impact through the Drill and Blast Management Plan and Communication Management Plan.

With implementation of the control measures above, it is likely that the consequence will be negligible and that any potential inconvenience would be limited to a small area and short timeframe for aerial spraying resulting in a moderate residual risk.

Further to this, alternative arrangements for crop dusting (i.e. use of helicopters instead of fixed wing aircraft) will be agreed upon the impacted landowner. This will be formalised as part of the Communication Management Plan.

104. AIR QUALITY

Section 8.3.1

Significant releases of dust from the mine site may impact on the SA Power Networks 33kV and 19kV SWER lines in the area. An assessment sought on the risk of dust impacts on nearby electricity lines.

Dust will be controlled for both health and nuisance impacts to surrounding residents throughout the life of the Hillside project. These control measures have been detailed in Section 8.3.1.3 of the MLP. Based on the air quality assessment it is unlikely that SA Power Networks 33KV and 19kV SWER lines will be impacted to any extent than they are currently impacted from background dust levels. The 33kV line will be relocated greater than 400 m to the east of its current position along the proposed relocated Yorke Highway and the majority of the 19kV SWER lines within the proposed ML will be removed.

An Air Quality Management Plan will include a detailed monitoring program including PM10, TSP, dust deposition and toxicology monitoring. Results will show control measures are working as designed and will be reported as part of the outcome measurement criteria as demonstration of the lease condition as set by DMITRE.

105. AIR QUALITY

Section 8.3.1

Deposition of fugitive dust (from mining activities) on solar panels in the surrounding localities, and the subsequent impacts to power output and performance of the panels is not discussed in the MLP. What are the impacts of dust deposition on the performance of solar panels in surrounding areas?

The impacts of dust deposition are predicted to be minimal (less than 1.3 g/m²/month) at the nearest potential sensitive receptors (there are currently no existing solar panels used at the closest residential receptors), with the control measures outlined in Section 8.3.1.3 of the MLP in place, it is unlikely there would be any impacts to power output and performance of solar panels given the existing level of dust deposition at surrounding residential receptors is between 0.38 and 3.66 g/m²/month (this includes winter and summer months).

Mekhilef et al. (2012) concluded that dust, humidity, temperature and air velocity go hand in hand in affecting the performance of PV cells and each should not be studied separately in estimating the cell efficiency ignoring the effects of the other.

Dust settlement mainly relies on the dust properties (chemical properties, size, shape, weight, etc.) as well as on the environmental conditions (site-specific factors, environmental features and weather conditions). The surface finish, tilt angle, humidity and wind speed also affect the dust.

The literature suggests Mani and Pillai (2010), that **all** solar panels located in Mediterranean climates should be cleaned at least every second week to ensure that they maintain their peak output as is indicated in Table 19 below;

Table 18: Recommendation of mitigation measures against (likely) impact of dust accumulation on PV performance

Climatic zone and characteristics	Conditions influencing PV performance and dust deposition	Recommended cleaning cycle to mitigate impact of dust
Mediterranean climate Temperature range: 10–40°C Annual precipitation: 42cm Latitude range: 30° to 50° N and S	High latitudes require high tilt in PV system; a lower fixed tilt angle is recommended to optimize year-round solar gain. Dust generally tends to fall off with the increase in the tilt angle	Cleaning is recommended once in a week or 2 weeks depending upon the rate of dust accumulation on the surface.

If the home owners are complying with the cleaning requirements outlined above to ensure their solar panels are operating at optimum performance then there will be no impact on their solar performance due to mine generated dust.

If however any resident with solar panels does not regularly clean their PV panels then the literature suggests for similar Mediterranean climates that there will be a reduced impact vis;

- There have been different studies conducted to investigate the effect of dust on solar cells. A wide range of reduction in performance have been reported including average reduction of 1% with a peak of 4.7% in a two-month period in United States (Hottel and Woertz).
- A recent performance analysis conducted by Kymakis, et al. (2009) on a grid connected PV park in Crete (which has a similar Mediterranean climate) attributes the power loss due to soiling (dust deposition) to the type of dust, the length of time since the last rainfall and the cleaning schedule. The analysis, indicates an annual soiling (dust deposition) loss of 5.86%, with the winter losses being 4–5% and 6–7% in summer (M. Mani, and R. Pillai).
- Kaldellis and Kokala (2010) found that with a mean dust deposition density of the order of 1 g/m² the PV-panels' energy production may be reduced up to approximately 6.5% (in comparison with a clean panel).

Hence, if a mean dust deposition density of the order of 1 g/m² the PV-panels' energy production was reduced up to approximately 6.5%, then if Rex Minerals was contributing 0.5 g/m²/month (at closest receptor with panels at Pine Point [receptor 7]) then on a horizontal panel, without rain washing the dust off, it would take 2 months of operation to accumulate 1 g/m² over the panel. Since the vast majority of panels are inclined in South Australia and it does rain in the majority of months the impact will be negligible. This equates to approximately 13 watts per 200W PV panel in lost energy.

To put the effect of dust in perspective the effect of temperature has been studied Alshakhs (2013) (a study was conducted on a PV module with solar tracker in Dhahran- east of Saudi Arabia) and the results were compared based on daily peak power output. It was determined that the PV module efficiency decreased from 11.6% to 10.4% when module temperature increased from 38°C to 48°C, which corresponds to 10.3% losses in efficiency and a temperature coefficient of $-0.11 \Delta E/\%^\circ\text{C}$.

As the impacts of dust deposition are predicted to be minimal at the nearest sensitive receptors, with the control measures outlined in Section 8.3.1.3 of the MLP in place, it is unlikely there would be any impacts to power output and performance of solar panels.

Reference:

- Mekhilef, S., Saidur, R. & Kamalisarvestani, M. 2012, *Effect of dust, humidity and air velocity on efficiency of photovoltaic cells*, Renewable and Sustainable Energy Reviews, Ed16, pp.2920– 2925.
- Hottel, H & Woertz, B, *Performance of flat-plate solar-heat collectors*, Transactions of the American Society of Mechanical Engineers (USA) 1942:64.
- Mani, M & Pillai, R, 2010, *Impact of dust on solar photovoltaic (PV) performance*, Renewable and Sustainable Energy Reviews 14, pp.3124–3131.
- Kaldellis, J.K & Kokala, A, 2010, *Quantifying the decrease of the photovoltaic panels' energy yield due to phenomena of natural air pollution disposal*, pub Elsevier Ltd. Energy 35, pp 4862-4869.
- Alshakhs, M, 2013, *Challenges of Solar PV in Saudi Arabia*, <http://large.stanford.edu/courses/2013/ph240/alshakhs2/>, viewed on 8 February 2014.
- Kymakis E, Kalykakis S, & Papazoglou TM, 2009, *Performance analysis of a grid connected photovoltaic park on the island of Crete*. Energy Convers Manage, Ed 50, pp. 433–8.

106. AIR QUALITY

Appendix 5.6-C

According to the model, compliance with the NEPM criterion of 50 ug/m³ is predicted at receptors 1 – 7 (including Rogues Point) on all days of the year. Given the dust to be generated by the mine, confidence is sought that at Rogues Point there will be no days on which full compliance with NEPM criteria cannot be met.

Receptor 3 (Dust and Odour Impact Assessment Appendix 5.6-C of the MLP) is within Rogues Point. No additional exceedences of the NEPM criterion of 50 ug/m³ beyond those which occur naturally or are expected for the area (currently six times a year). This means that approximately six times a year NEPM criterion of 50 µg/m³ is exceeded from influences/activities already within the localised region on the Yorke Peninsula.

Background concentrations will be based on upwind PM10 monitoring data collected simultaneously to downwind data. Where Rex's real time monitoring system triggers an alert, the contribution from the mine will be determined and appropriate control and management strategies will be implemented as per the Air Quality Management Plan.

107. AIR QUALITY

Appendix 5.6-C

The baseline monitoring work referred to above showed low PM₁₀ concentration averages across all months at the monitoring stations, varying from 8.4 to 21.1 depending on the time of the year (Table 8.1 MLP 8.2, 25). How much more PM₁₀ and TSP dust will local communities (notably Pine Point, Rogues Point, James Well and Black Point) as well as surrounding farms actually experience compared with the baseline situation? More specifically: On how many days will PM₁₀ concentrations approach or actually reach the maximum 24 hour levels depicted for Rogues Point in Figure B.5.4? On how many days will increased levels of TSP and PM₁₀ (compared with pre-mining days) be experienced? What is the average level of PM₁₀ concentrations that we can expect? On how many days will that average be exceeded?

The percentile plot presented in Figure 9.5 of Appendix 5.6-C of the MLP and Figure 37 (shown directly below) of **Appendix 4** of this Response document show the distribution of predicted PM₁₀ concentrations (from highest to lowest predicted concentrations) for Receptor 8 (the closest residential home).

The peak impacts (greater than 50 µg/m³) are predicted for a few days and after that the predicted concentrations dramatically taper off. As shown in Figure 37 (presented below) of **Appendix 4**, the dispersion modelling predicts that the NEPM air quality standard (**yellow line** which shows the 50 µg/m³) would be exceeded in the order of nine days per year at one of the nearest receptors (Receptor 8) if full production, without any limitation to the operations with a background level (not from Rex's operations) of 18.1 µg/m³, was in place.

It is estimated that there will be a contribution to background concentrations approximately 40% of the time for these receptors if the background level was set at the average of 18.1 µg/m³. This means that approximately 146 days a year Rex would add dust to the background level of 18.1 µg/m³. This means that from this prediction that there will be no impacts on top of background conditions for 60% of the time which equates to approximately 219 days a year. Therefore for approximately 219 days a year the air quality model shows that the Hillside operation will not add anything above the background level of 18.1 µg/m³.

The 40% of time that Rex are modelled to contribute to background concentrations of dust, will be managed through trigger levels for the PM₁₀ real time monitoring which will be established as part of the Air Quality Management Plan. If these trigger levels are reached, it will show that dust levels are trending towards NEPM 2003 criteria, resulting in an alarm being sounded to alert the environmental department that further mitigation strategies require implementing. Meteorological data obtained from the continuous weather recording station will be utilised to assist with this process. An SMS alarm could be sent to Mining Supervisors when wind speeds average over a certain wind speed e.g. 8.8 m/s for a 30 minute period.

The percentile plots show the predicted concentrations ranked from the highest to the lowest. The additional impacts from the mine are shown as the concentrations that are higher than the applied background concentration (**green line**). The percentage of time there are elevated concentrations above the average at a receptor is a function of wind direction frequency which varies for the different receptors in different location in relation to the mine.

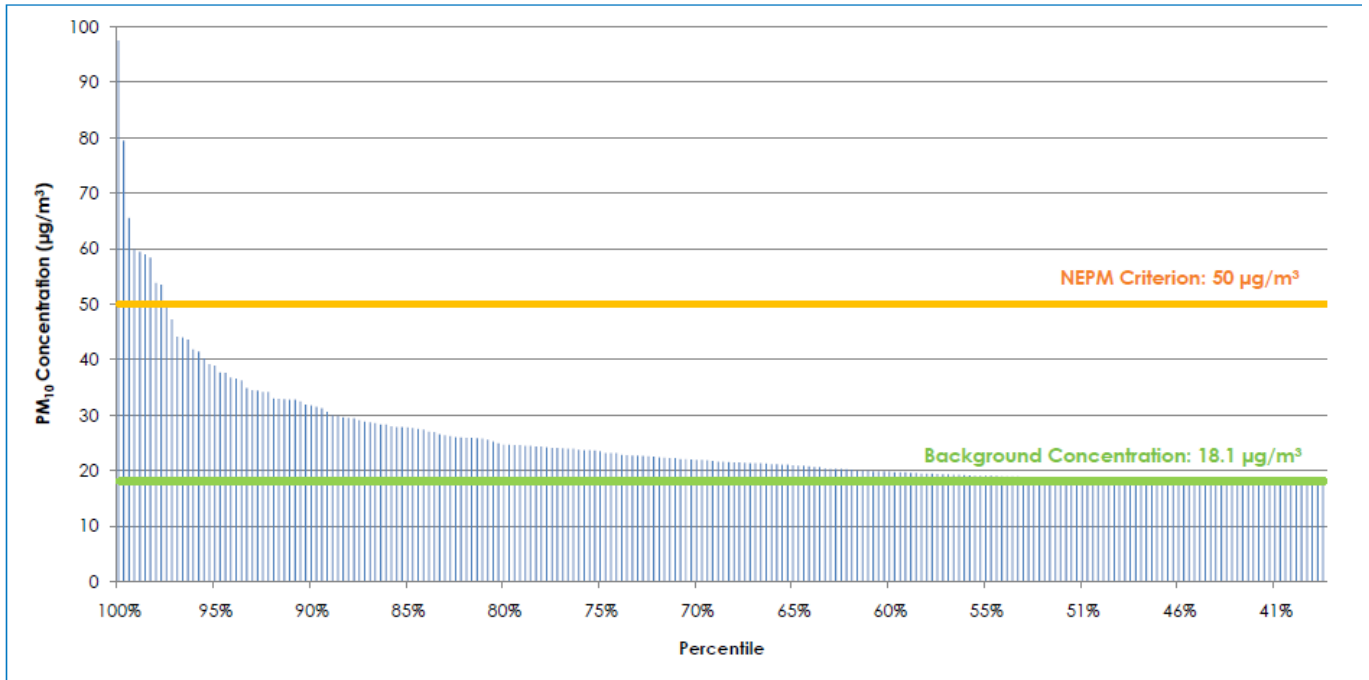


Figure 7: Daily PM₁₀ Concentrations at Receptor 8

Figure 37: Percentile Plot Showing the Daily PM₁₀ Concentration at Receptor 8

The representative percentile plot for Pine Point (receptor 7) is shown below in Figure 38. Black Point is greater than 5 km from the southernmost point of the proposed mine operation area, therefore any potential impacts are much less than those experienced at Pine Point.

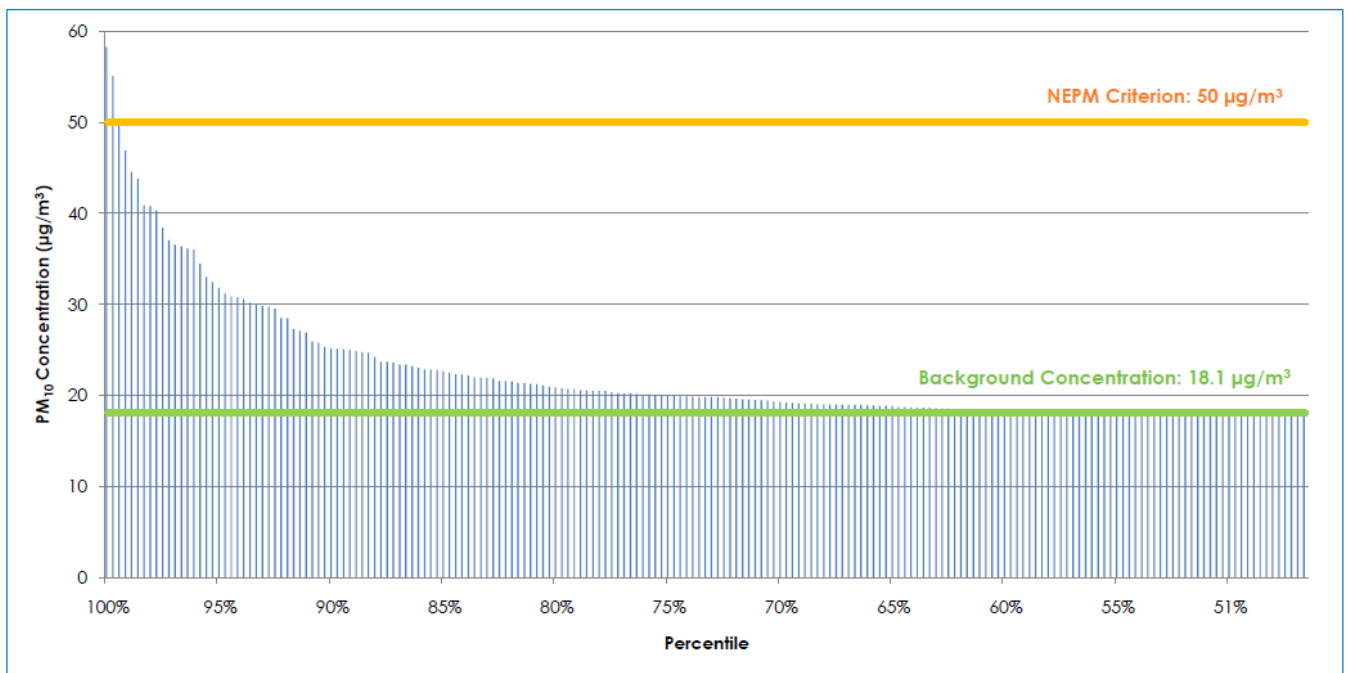


Figure 6: Daily PM₁₀ Concentrations at Receptor 7 (Pine Point)

Figure 38: Percentile Showing the Daily PM₁₀ Concentration at Pine Point Township (receptor 7)

The representative percentile plot for James Well/Rogues Point (receptor 3) communities is shown below in Figure 39.

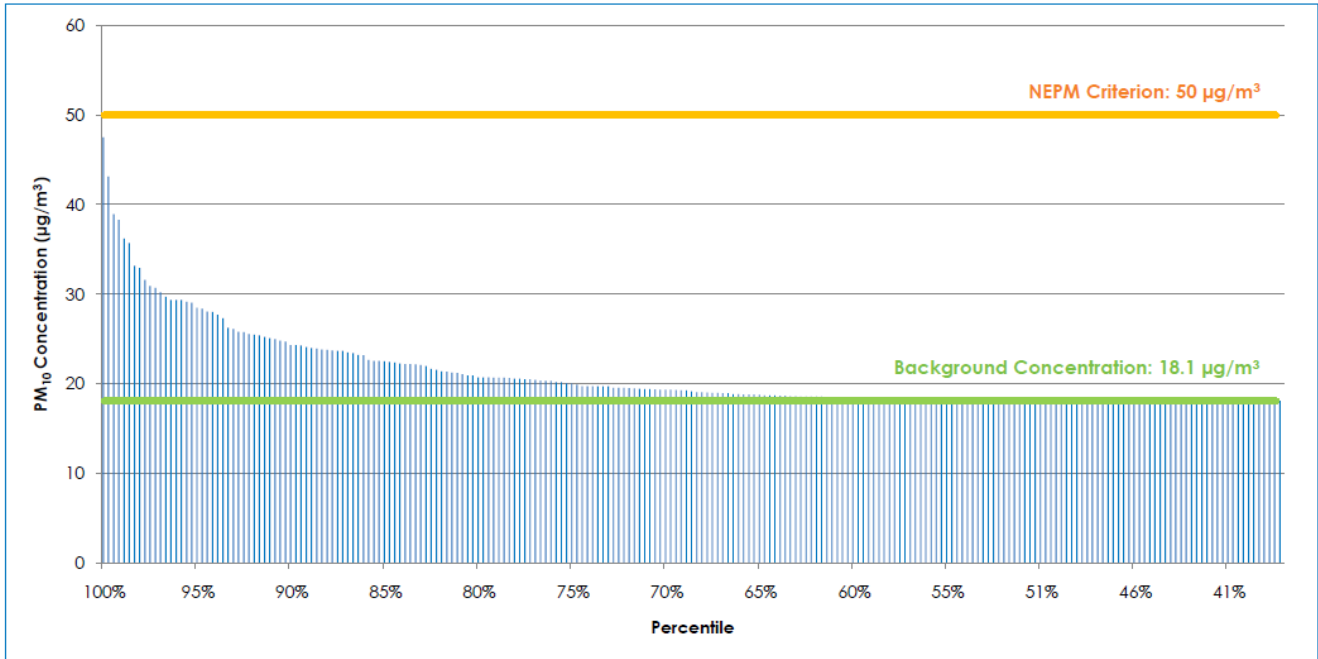


Figure 4: Daily PM₁₀ Concentrations at Receptor 3 (Rogues Point)

Figure 39: Percentile Plot Showing the Daily PM₁₀ Concentration at James Well/Rogues Point (receptor 3)

In conclusion at the local communities (notably Pine Point, Rogues Point, James Well and Black Point communities) no impact to public health will occur, even if the average PM₁₀ is increased, as the proposed Hillside Copper Mine will through the implementation of the management strategies as per the Air Quality Management Plan will ensure that the results will achieve the NEPM standard.

108. AIR QUALITY

Section 8.3.1

The MLP does not provide detail of the potential environmental impact the quantities of diesel fumes generated in the course of a 24 hour operation of the mine, and what is the accumulative impact on adjacent and nearby communities taking into consideration the local meteorological conditions. An assessment sought on potential risks posed by diesel exhaust emissions associated with mining activities.

Assessments of diesel emissions from mining activities in the Hunter Valley in NSW have shown that diesel related emissions will not have an impact on air quality from a community perspective (Pacific Environment, 2013). The reference was provided as an available reference to what was seen by PEL from working in the Hunter Valley where this question has been asked previously.

Rex believes that the Hunter Valley example in NSW is applicable to Hillside because diesel emissions are not identified as a specific issue in the Hunter Valley where the level of mining operations far exceeds (more than 700 large trucks currently operate in the Hunter Valley which is an order of magnitude larger than the number of trucks at Hillside) what is proposed for the Hillside Project on Yorke Peninsula, with approximately

30 mines in the Upper and Lower Hunter Valley areas (New South Wales Minerals Council, 2012). Similarly to the Yorke Peninsula, the Hunter Valley is a tourist destination and is relatively more highly populated. Therefore it is very unlikely that it would be an issue for the Hillside Project.

Reference:

- Pacific Environment, 2013, *Bulga Optimisation Project*, Bulga Coal Management Pty Ltd.
- NSW Mining, 2012, *A Snap Shot*, New South Wales Minerals Council Ltd
<http://www.nswmining.com.au/NSWMining/media/NSW-Mining/Publications/NSW-Mining-2012-A-Snapshot-FINAL.pdf> viewed on 2 January 2014.

109. AIR QUALITY

Section 8.3.2

An assessment of the impacts from noise and vibration on livestock is sought, reflecting that the mine will operate 24/7 and unlike native fauna livestock are unable to relocate when faced with adverse conditions. What are the expected impacts to livestock in adjacent land, and how will this be managed?

The existing levels of noise and vibration from activities that currently occur on the Yorke Peninsula and other grazing areas have not been shown to have an impact on livestock.

The grazing of livestock is known to occur next to airports, under airport flyways, railways and adjacent to highways which are subject to noise and vibration from sources such as planes and trucks. Some parcels of land used for grazing within the local area are adjacent to portions of the St Vincent and Yorke Highways and experience vibration, particularly during periods of high volumes of heavy traffic such as harvest. St Vincent Highway between Ardrossan and Port Giles is gazetted to carry road trains, which are used predominantly to cart grain between Viterra's Ardrossan grain storage facilities to Port Giles grain export facility.

Grazing of livestock also occurs in paddocks adjacent to local quarries on the Yorke Peninsula where blasting occurs, be that at a smaller scale when compared to Hillside. Further to this, the Port Wakefield Proof and Experimental establishment is situated across Gulf St Vincent and contains an active proof range and it can be frequently heard and felt along the eastern side of the Yorke Peninsula.

Further to this, noise emanating from mining operations is regulated through the EPA noise policy. This policy includes human nuisance noise levels, taking into consideration the proposed activity, land use zoning and potential receptors. While there are no regulatory levels related to nuisance noise levels to livestock, Rex will remain compliant with the EPA noise policy through construction and operations. Noise control measures which will be implemented have been discussed in 8.3.2.3 of the MLP. Rex will be regulated against these standards. Further detail will be provided in the Noise and Vibration Management Plan.

Vibration has been discussed in ***Response_100. 3rd Party Interests.***

110. AIR QUALITY

Section 8.3.3

The mine design proposed in the MLP has been devised on the assumption that Rex will negotiate waivers in order to undertake operations on land within the blast exclusion zone but does not discuss how mining operations will be impacted if waivers are not negotiated. Clarification sought on how blasting would be managed if Rex are unable to negotiate access to all land within the blast exclusion zone? (Including management of risks to adjacent sensitive receptors and property).

Rex acknowledges that all cropped land within the proposed mining lease is classified as exempt land as defined under the Mining Act. This acknowledgement and discussion on how this matter will be managed is provided in Section 2.3 of the MLP; *When access is required for these areas, agreements will be reached with respect to required waivers (Table 1 in the MLP) and access and compensation, which may include future land acquisitions if the relevant landowners are agreeable.*

111. AIR QUALITY

Solar thermal influences of the open cut mine for the displacement of diesel exhaust emissions or for any Radon gas flows through convection currents lifting and spilling diesel exhaust and Radon gas is sought. This could lead to flows across the highway and down onto Billy Goat Flat where it may be trapped for a significant period of time amongst the residential housing area.

The *Impacts of Stable Atmospheric Conditions* are presented on page 4 of **Appendix 38**. BHP Billiton's Environment Impact Statement for the proposed Olympic Dam Expansion (ODX) in 2009, provides an assessment of doses for open pit mine workers includes consideration of doses under "inversion conditions". This takes into account the effects of very stable atmospheric conditions which can lead to a build-up of radon in the pit. There are two factors that need to be considered;

1. The ventilation rate of the mine.
2. The equilibrium factor (since RnDP have a longer period to grow into equilibrium with the radon concentration).

For this assessment, it has been assumed that stable atmospheric conditions result in the mine open pit being ventilated only once every 12 hours, (equivalent to approximately 0.08 air changes per hour and simulating a build-up in radon in the pit every night). It has also been assumed that the equilibrium factor is 1. Substituting these factors into the above equations gives an annual RnDP dose of 96uSv/y for full year exposure under inversion conditions.

If it is assumed that the mine workers are exposed to "normal" exposure conditions for half of the year and "inversion" conditions for the other half of the year (for example on night shift), then the estimated total dose would be;

$$0.5 \times 4\text{uSv/y} + 0.5 \times 96\text{uSv/y}, \text{ giving } 0.50\text{uSv/y} \text{ or } 0.05\text{mSv/y}$$

Radon decay products can only present an exposure risk if they are allowed to accumulate in a sealed area or location with little or no air movement. In open spaces, natural convection currents and wind all ensure that exposure is minimised. In the case of the existing Hillside site, radon decay product hazards only exist where there are sealed sample storage areas. Rex currently has one sealed shipping container used for storage of core samples. A Standard Operating Procedure (SOP) mandates a ventilation period of 15 minutes prior to entry, which is considered sufficient control for any potential build-up of radon and its decay products

from the relatively low grade ore samples that will be stored there. If higher grade core should be intersected and stored in the container in significant volumes, monitoring will be undertaken to determine any further controls that may be required.

As is the case with radon gas, diesel exhaust emissions only pose a risk if they are allowed to accumulate in an enclosed area and humans are isolated in that enclosed area for long periods of time. This will not be the case at Hillside as the proposed operation is an open pit and as such, diesel emissions will be vented to the atmosphere. Furthermore, assessments of diesel emissions from mining activities in the Hunter Valley in NSW have shown that diesel related emissions will not have an impact on air quality from a community perspective (Pacific Environment, 2013). The reference was provided as an available reference to what was seen by PEL from working in the Hunter Valley where this question has been asked previously as per **Response_108. Air Quality.**

Reference:

- BHP Billiton, 2009, Olympic Dam Expansion Draft Environmental Impact Statement, BHP Billiton.
- Pacific Environment, 2013, *Bulga Optimisation Project*, Bulga Coal Management Pty Ltd.

112. AIR QUALITY

The passive solar radiation heating cool air in the open pit can cause the denser than air layers of diesel exhaust emissions and Radon gas to be raised and ejected from the pit. An assessment of impacts is sought for the west wall of the mine which may receive morning solar radiation during periods when a temperature inversion can predictably form on the eastern coastline across the Billy Goat Flat residential areas.

The west wall of the open pit will be situated within barren metasediments. These metasediments lie west of the PPSC, and do not contain any ore minerals or radon emitting particles. Concerns over radon gas and diesel emissions are discussed and answered in question **Response_111. Air Quality.** Temperature inversions are discussed in **Response_113. Air Quality.**

113. AIR QUALITY

The potential impact of mining activity pollution in relation to the seasonal climate events of temperature inversion specific to the Hillside site and coastal region has not been described. Information sought on localised climatic events and associated influence on emissions from the mine.

Contrary to the above statement all meteorological data pertaining to the site has been used in the modelling of dust, odour and noise, in Section 6 "Meteorological data used in the assessment" of Appendix 5.6 (Dust and Odour Impact Assessment) and in Appendix 6.6-A (Operational Noise Assessment) of the MLP.

The primary meteorological parameters involved in modelling plume dispersion are wind direction, wind speed, temperature, turbulence (atmospheric stability) and mixing height (depth of turbulent layer), has been assessed.

Specifically, outlined in 6.2 Stability (Appendix 5.6 of the MLP);

“Atmospheric turbulence is an important factor in plume dispersion. Turbulence acts to increase the cross-sectional area of the plume due to random motions, thus diluting or diffusing a plume. As turbulence increases, the rate of plume dilution or diffusion increases. Weak turbulence limits plume diffusion and is a critical factor in causing high plume concentrations downwind of a source, particularly when combined with very low wind speeds.

Turbulence is related to the vertical temperature gradient, the condition of which determines what is known as stability, or thermal stability. For traditional dispersion modelling using Gaussian plume models, categories of atmospheric stability are used in conjunction with other meteorological data to describe atmospheric conditions and thus dispersion.

The most well-known stability classification is the Pasquill-Gifford scheme, which denotes stability classes from A to F. Class A is described as highly unstable and occurs in association with strong surface heating and light winds, leading to intense convective turbulence and much enhanced plume dilution.

At the other extreme, class F denotes very stable conditions associated with strong temperature inversions and light winds, which commonly occur under clear skies at night and in early mornings.

Under these conditions plumes can remain relatively undiluted for considerable distances downwind. Intermediate stability classes grade from moderately unstable (B), through neutral (D) to slightly stable (E). Whilst classes A and F are strongly associated with clear skies, class D is linked to windy and/or cloudy weather, and short periods around sunset and sunrise when surface heating or cooling is small.

As a general rule, unstable (or convective) conditions dominate during the daytime and stable flows are dominant at night. This diurnal pattern is most pronounced when there is relatively little cloud cover and light to moderate winds.

The frequency distributions of stability classes in the CALMET meteorological file are presented in Figure 6.5 (as shown below). The data shows a high frequency of occurrence of D class stability which is typical for coastal and windy locations.”

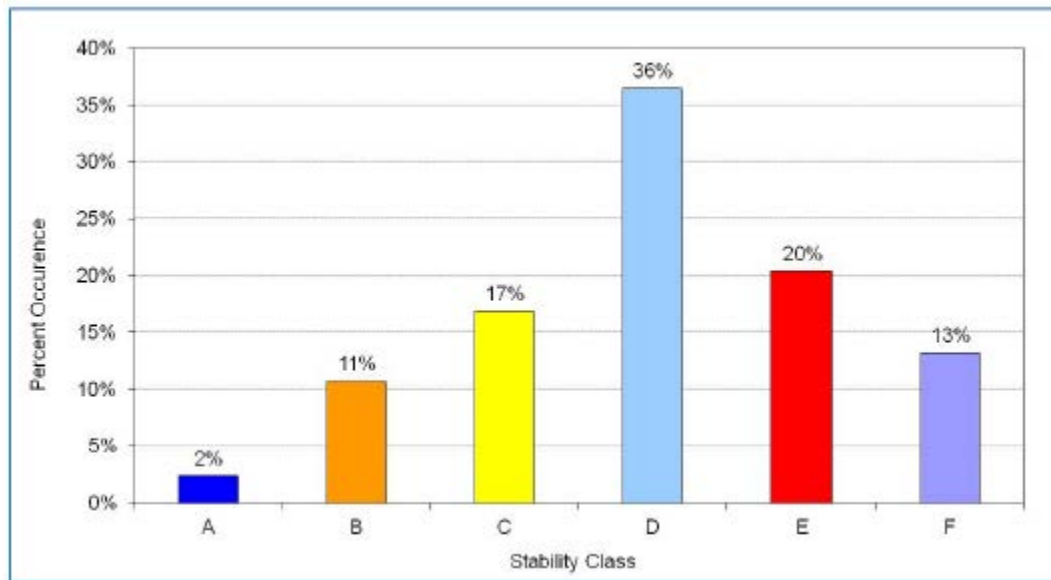


Figure 6.5: Frequency distribution of the estimated stability classes at the Rex Minerals mine site

Thus, despite stable inversion conditions being experienced 13% of the time, the modelling has shown that dust/odour/noise levels will still meet relevant EPA standards.

114. AIR QUALITY

Appendix 5.6-C

All current air modelling focuses on PM10 and TSP. Little consideration appears to have been given to PM2.5 which may become the new industry measurement standard. An explanation for why PM2.5 was not included in the study and or modelling is sought.

See the *Response_5. Air Quality part o.*

115. AIR QUALITY

Appendix 5.6-C

The predicted maximum 24 hour PM10 concentration shown above reflects the dust levels expected with all dust control measures in place. Rex is placing considerable reliance on their dust suppression methods – confidence in the adequacy of these measures is sought.

Dust suppression is an integral aspect of mining operations and there are many proven ways of suppressing and monitoring dust levels. Rex will employ a range of controls that will include the use of water trucks to keep haul roads and disturbed surfaces moist, progressive rehabilitation of open areas and stabilisation of soil stockpiles (i.e. through the planting and establishment of annual grasses), along with a real-time monitoring systems to inform when additional dust suppression, adjustment or shutdown of the operations if required. These dust control measures, as presented in **Response_2. Air Quality** from Section 8.3.1.3 from the MLP, are industry best practice.

Under what specific conditions will reduction or shutdown of operations occur?

Continuous real time weather and dust monitoring program will be linked to an alarm system to facilitate rapid implementation of mitigation activities, operational controls, restrictions and shut down procedures. Restricting or ceasing dust-generating activities during adverse meteorological conditions for example when wind speeds average over 8.8m/s (as per wind roses in Appendix 5.6-C of the MLP) for a 30 minute period.

The meteorological monitoring at Hillside will consist of real-time monitoring of meteorology with alarms sent to relevant staff in the event of high winds for a period of time (e.g. >8.8m/s). Whilst this is an acceptable reactive measure, it does not aid in the proactive management of dust from the mine plan level. The following measures may be implemented from a proactive monitoring perspective:

1. Hillside personnel distribute a daily weather forecast notification via email to inform relevant mine planning personnel of the current and predicted meteorological conditions for the next 5 day period. The notification would detail the predicted temperature, winds (including warnings) and the likelihood, and amount, of rainfall for the next 5 day period. In addition to the meteorological monitoring, it is the intention of Rex to implement a forecast monitoring system to enable the incorporation of the dust control measures into the daily mine planning activities. The forecast system would provide the following information:
 - Forecast off-site dust concentrations for periods of up to 3 days ahead of time. This will be based around forecast meteorology and expected normal mine operations (based on an approved mine plan).
 - Ability for the mine to scale back or modify operations to a degree to which impacts are not expected to occur or expected to occur at an acceptable level.
 - A display of the expected dust contours around the mine for the forecast period.

This system would be automated and will provide predictions at the start of each working day for analysis by environmental representatives. All data will be saved for validation purposes.

Monitoring compliance

Monitoring of PM10 compliance will occur as per Australian standards (AS 3580.9.11.2008) and results will demonstrate compliance with NEPM 2003 criteria of 50 µg/m³ (daily average) or have “no additional exceedances” of the daily average criteria beyond those which occur naturally or are expected for the area. Compliance with the NEPM criteria will show that the dust control measures are working as designed. This criterion will be further detailed as part of the PEPR process and will be regulated by the State Government.

What criteria will be used to determine when such measures need to be implemented?

Trigger levels for the PM10 real time monitoring will be established as part of the Air Quality Management Plan. If these trigger levels are reached, it will show that dust levels are trending towards NEPM 2003 criteria, resulting in an alarm being sound to alert the environmental department that further mitigation strategies require implementing.

Meteorological data obtained from the continuous weather recording station will be utilised to assist with this process. An SMS alarm could be sent to Mining Supervisors when wind speeds average over a certain wind speed i.e. 8.8m/s for a 30 minute period.

And how will the waste rock piles be “shut down” given that no control measures will be in place for each one while they are in active use?

The WRD (or otherwise known as ‘waste rock piles’ or ‘rock storage facility’) can be shut down if required by ceasing tipping activity on the active face of the WRD and utilising extra water trucks to suppress dust movements.

It should be noted that as Rex will have access to water from the seawater intake, therefore additional water for dust suppression is possible.

Control efficiencies

The control efficiencies have been based on the USA EPA Metallic Minerals Processing as stated in Appendix A (Estimation of Emissions) of Appendix 5.6-C of the MLP.

116. AIR QUALITY

Further information sought on the contamination of crops and livestock in the area from long term dust exposure from mining activities.

Detail sought on the effects of mining on agricultural activities in the region including expected effects to cropping pasture and livestock from dust including; reduced photosynthetic activity, contamination of crops and cropping products from deposition of dust directly onto physical surfaces as well as uptake and acquisition of metals into plant tissue from the soil following dust deposition on to soil, effects to livestock exposed to prolonged periods of increased dust and effects on livestock feeding on plants and plant materials subject to dust and plants which have potentially been affected by dust products.

There is some evidence that dust can inhibit light transferral to leaves, and therefore slow the rate of photosynthesis and plant growth. As per Appendix 5.6-C of the MLP, the monitored dust deposition from December 2011 to November 2012, in grams per square metre per monthly ($\text{g/m}^2/\text{month}$) range from 0.38 to $3.66 \text{ g/m}^2/\text{month}$, with the closest third party property (monitoring location M9) experiencing an average level of $2.2 \text{ g/m}^2/\text{month}$, as shown in Table 8.4 from Appendix 5.6-C of the MLP (baseline results) in **Response_2. Air Quality**.

The modelled dust deposition from the proposed mine is shown in Table 4 from **Appendix 4**. With all control measures implemented (as per Section 8.3.1.3 of the MLP), dust deposition will increase by approximately $1.5 \text{ g/m}^2/\text{month}$ on average over a full year (including summer months when crops have been harvested) on the closest cropped land to the south-west of the open pit from the proposed mine. Therefore it is concluded that the amount of dust deposition from the proposed mine on the closest cropped land is not a significant increase when compared to background levels.

As per **Response_2. Air Quality**, The Dust and Odour Impact Assessment (Appendix 5.6-C of the MLP) demonstrated that the main source of dust emissions from the mine and associated activities are predominantly linked to wheel dust (85 %) arising from mobile plant equipment, with blasting (4.2 %) and materials handling (7.5 %) also making contributions as in Table 7.3 (Appendix 5.6-C of the MLP).

All internal access roads in and around the processing plant area (workshops, admin blocks, entry and exit roads, etc) will be sealed (bituminised). Therefore no dust will be emitted from these roads. The remaining haul roads will be constructed out of waste rock material as per **Appendix 2** (Figure 2). The wearing surface

('fine crushed rock') will be constructed predominately out of eastern waste rock (granite). The chemical composition of the eastern waste rock (granite) is shown in Table 4.

There is no atacamite present (copper potentially dissolvable by water) in the WRDs (north, south, west WRDs) and therefore not present in the material used to construct haul roads. The material that has been classified as 'copper oxide' includes all of the atacamite material which will be stockpiled and managed separately (oxide stockpile), refer to **Response_21. Geology**.

The elements presented in Table 4 are all found in varying concentrations in nature, but are extremely rare within the eastern waste rock at Hillside. Therefore, the dust that will originate from the proposed mine will not contain levels of copper, other metals or toxins which could potentially accumulate in crops and products from the uptake of dust deposition on soils.

There are no applicable Australian Standards for dust impact on crops or vegetation. Therefore, the National Ambient Air Quality Standards (NAAQS), under the *Clean Air Act of 1963* as set out by the United States Environmental Protection Authority (US Code of Federal Regulations Chapter 40 part 50) for pollutants considered harmful to public health and the environment has been used. The *Clean Air Act of 1963* provides secondary standards for PM10 which includes potential damage to crops and vegetation. This secondary standard for PM10 is $150\mu\text{g}/\text{m}^3$ which is not to be exceeded more than once per year on average over three years. All areas outside of the proposed mine footprint have predicted PM10 levels below $150\mu\text{g}/\text{m}^3$ at all times. Therefore the predicted PM10 level shows that there will be no impact on crops. PM10 levels will be monitored at surrounding residential receptors to demonstrate compliance with the NEPM Standard ($50\mu\text{g}/\text{m}^3$). No monitoring of PM10 for crop impacts will be undertaken as dust deposition will be monitored.

Furthermore, as per **Response_44. Toxicological**, to provide certainty of the composition of dust from the proposed Hillside Mine analysis of the dust will be undertaken. Once mining has commenced, at a time agreed with the regulators, samples of airborne dust will be collected and toxicological characterisation of the dust will be carried out to demonstrate that there are no significant levels of heavy metals in the dust composition. Therefore, by monitoring the different types of dust (PM10 and dust deposition) and the composition of the dust (toxicological characterisation) all air related potential impacts will be recorded and reported to the regulators and the community to show that Rex are meeting the appropriate criteria.

An Air Quality Management Plan will be developed in consultation with the State Government regulators (DMITRE and EPA) and which will include a detailed monitoring program including dust deposition and toxicology monitoring.

117. AIR QUALITY

The dust modelling has been undertaken based on previous mine design including waste dump heights and dimensions. Clarification sought on how changes in mine design have affected the modelled dust generated from mining activities.

See the responses provided for item **Response_4. Air Quality** subsections (a) and (b).

118. AIR QUALITY

Information sought to allay concern over:

- *the validity of the sampling and modelling provided for this particular region, particularly in regard to the potential toxicity of copper and uranium dust emissions and their long term impact on health and the environment*
- *the validity of (or as necessary, provide updated) information and modelling specific to the concentrations of copper, uranium and other potential toxic components of dust proposed to be produced on site and describe any long term effects on the region including all terrestrial and marine ecosystems, local resident health and livestock.*

Refer to **Response_2. Air Quality** for full details. The dust that will originate from the proposed mine will not contain levels of copper, other metals or toxins which could potentially have a long term impact on local resident health, environment (terrestrial and marine ecosystems) or livestock.

The validity of (or as necessary, provide updated) information and modelling specific to the concentrations of copper, uranium and other potential toxic components of dust proposed to be produced on site and describe any long term effects on the region including all terrestrial and marine ecosystems, local resident health and livestock.

Refer to **Response_2. Air Quality** for full details. The dust that will originate from the proposed mine will not contain levels of copper, other metals or toxins which could potentially have a long term impact on the region including terrestrial and marine ecosystems, local resident health or livestock.

119. AIR QUALITY

The proposal maps that depict noise and air modelling do not reflect changes in the mine and pit design – information is sought on the impact from those changes, and why new modelling is not necessary.

See the responses provided for item **Response_4. Air Quality** Subsections (a) and (b).

120. AIR QUALITY

Modelling has determined the associated risks is based on ‘three windy days’ a year, anecdotal evidence is contrary to this with many more windy days Explanation sought for ‘three windy days per year’ in terms of long term seasonal data sets of the local weather conditions.

Based on official weather data and modelling in Appendix 5.6-C of the MLP, Rex predicted three “extreme” weather days a year when very low wind speeds are experienced. During these days, very small invisible dust particles (PM10) that are generated by Rex’s mining activities can stay suspended in the air and concentrate within the proposed ML. Therefore the ‘three windy days’ is an incorrect interpretation of the PM10 modelling results as peak PM10 impacts are predicted to occur in more stable low wind speed conditions.

If PM10 levels trend towards the compliance limits, Rex’s real-time dust monitoring will send “live” notifications that will allow Rex to respond rapidly by either increasing dust control measures or scaling back operations. Ultimately the real-time dust monitoring system will inform the operations when additional control and management actions will be required. However, limitations on operations/active dust management in very high wind speed events would likely also be required to manage nuisance dust.

Modelling shows three extreme days per year, as presented in Appendix 5.6-C of the MLP. Updated modelling as presented in **Appendix 4**, states that the extreme conditions will occur on approximately 10 days per year, as per **Response_4. Air Quality**.

121. AIR QUALITY

Currently premium malting barley is grown for local and international brewers adjacent the proposed mine site. There are concerns that dust contamination of the soils and crops will prevent our ability to continue to produce this type and yield of crop. Evidence is sought demonstrating how crops will be protected from particulate and soil contamination due to the proposed mine site.

Evidence demonstrating how crops will be protected from particulate and soil contamination from dust due to the proposed mine site has been detailed in **Response_2. Air Quality**, **Response_3. Air Quality**, **Response_44. Toxicological** and **Response_116. Air Quality**.

The dust that will originate from the proposed mine will not contain levels of copper, other metals or toxins which could potentially have a long term impact on the region including terrestrial and marine ecosystems, local resident health or livestock.

122. AIR QUALITY

Concerns regarding rainwater supplies and health given the constant exposure to elevated dust levels. Provide evidence as above.

Refer to **Response_5. Air Quality (q)**.

123. CLOSURE

The Federal Governments best practice guide 'Landform Design for Rehabilitation' in the South-Eastern states of Australia, any slope over about 8 degrees is unsuited to cropping given the risk of soil erosion if it is regularly cultivated. From Rex's proposal, the slopes on the rehabilitated waste rock stacks will range from 10 to 20 degrees which would appear unsuitable for cropping. Further explanation sought on proposed post-rehabilitation outcomes.

As per **Response_125. Closure**, the WRD slopes of 15° or less will be suitable to support agricultural pursuits. The slopes of 10° or less are proposed for cropping in line with current land use methods. Section 2.2 of the *Landform Design for Rehabilitation* states that 'slopes above 8° (14%) are generally unsuited to regular cropping due to high erosion hazard'. However cropping of these slope angles occur throughout the Yorke Peninsula. Situated in cropping land close to Hillside, there are slopes that are cropped on land of a slope greater than 10°. In Figure 40, shown below, the slope average is 10.99° over a 19.56 m long interval. These slope angles have been verified by DGPS and laser level (and tape) techniques.

Instability of final landforms post closure leading to the erosion of soil has been identified as a potential impact in Section 8.3.5 of the MLP. Utilising methods such as zero tillage/no tillage or similar compared with conventional tillage practices, which has become mainstream practice since the publication of *Landform Design for Rehabilitation* (1998), will reduce the hazard of high erosion, allowing cropping at higher angles than the stated 8°.

An internal review of the maximum safe working angles of machinery (i.e. tractors) has identified a limit of 15 - 20 degrees.



Figure 40: Cropping land on slopes greater than 8 degrees on the Yorke Peninsula. This slope was measured to have a slope of 11°.

124. CLOSURE

How does the proposed rehabilitation soil profile (500mm subsoil & 300mm topsoil) compare to the current soil profile on site.

As described in Section 5.14.1 Soil Profile of the MLP, the current soil profile is described below:

- Topsoil (the organic or A horizon), which can be non-existent around rocky outcrops to an average of 0.5 m within the proposed ML.
- Subsoil (B and C horizons), which based on the ASRIS description range 0 m to 2 m deep.

The proposed rehabilitation soil profile (500mm subsoil & 300mm topsoil) is based on industry best practice and on average will be similar to the current profile.

125. CLOSURE

The assertion that arable land can be reclaimed from the stockpile and tailings area is questioned. The overburden stockpiles are mostly granite and gabbro which are igneous rocks and not soils that will support future farming. Does the description of the post-mine land use as ‘arable’ mean that it will be suitable only for grazing?

As described in Section 6.9.4 of the MLP, rehabilitation of WRDs will consist pushing back the batters to three slope angles of 20°, 15° and 10° each with a 5 m back-sloping berm at each change of slope. The WRDs will be covered with subsoil of approximate depth of 0.5 m and topsoil to a depth of approximately 0.3 m on all surfaces with a slope of 15° or less, hence the soil will be suitable to support farming. The steeper slopes (20°) of the WRDs will be covered with a mix of topsoil and rock to minimise erosion and the loss of topsoil and stabilised with a dominant native shrub vegetation (refer to Figure 41). As the TSF slopes will be incorporated into the WRD, closure requirements will be as above.

The desired outcome at relinquishment is to hand over a physically and chemically stable landform with native vegetation trending towards self-sustainability and rehabilitated pastures where the new landowner can continue agricultural pursuits (not only grazing) with minimal inputs to the remnant native vegetation.

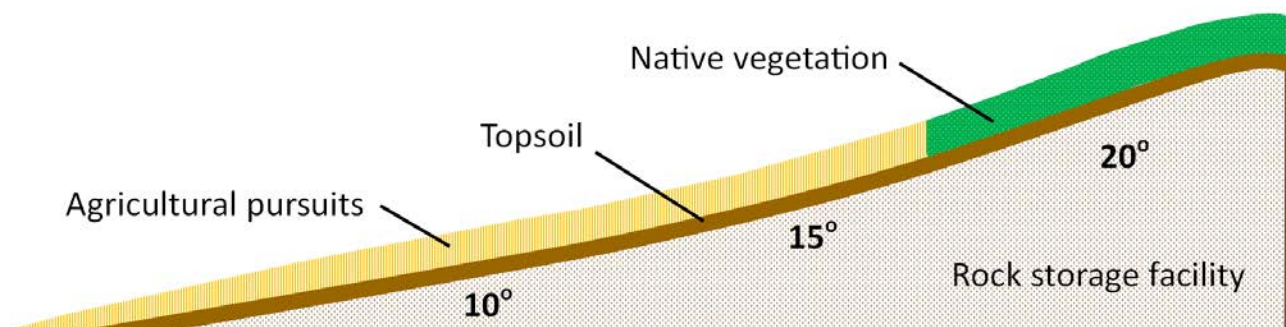


Figure 41: Typical section of WRD cover sequence at closure

126. CLOSURE

The proposal to cover much of the site with the original topsoil is questioned. Further explanation sought on whether there will be sufficient topsoil available?

Topsoil and in some cases sub-soil (under the TSF and from the open pit) will be removed from the areas in the disturbance footprint (approximately 2080 ha). In addition, the topsoil that is removed from the area where the open pit will be available to use in the rehabilitation of the WRDs as it is not required for rehabilitation of the open pit. The open pit is approximately 225 ha, resulting in approximately 675,000m³ (topsoil at an average depth of 30 cm) of additional topsoil available for rehabilitation of the WRDs. Calculations have been undertaken to ensure that there will be sufficient topsoil for rehabilitation.

The risk of topsoil degradation (loss of productive capacity) during the period prior to rehabilitation; and how much of the mine site will be returned to cropping land which was the primary agricultural pursuit across the site prior to mining?

The topsoil stockpiles will be monitored throughout operations to ensure the quality is maintained. If required, the topsoil will be remediated, which may include the use of nutrients or other additives to retain, replenish and improve the soil after it is respread over the reshaped WRDs. The processing plant areas and WRD

slopes 10° or less (lower third) are planned to be returned to cropping land. The slopes of the WRDs between 10° to 15° will be returned for other agricultural pursuits. As indicated in **Response_123. Closure** cropping has been undertaken in the region on slopes greater than 10 degrees.

127. CLOSURE

Rehabilitation includes leaving the TSF and WRDs in place returning the topsoil and planting grasses – questions raised about the level of investigation that has been undertaken regarding risks and benefits of backfilling the site and encapsulating any toxic waste rock in a way that will not affect the site into the future, as well as return the site to viable farming land and not leaving the site open and exposed.

Backfilling the open pit with the WRD and TSF material is not a viable option. If backfilling occurred it would cut off access to the underground component of the operation as the underground is to be accessed via the walls of the open pit. Also the amount of double handling required to move the waste material back into the open pit once production has ceased, is uneconomical and will also contribute unnecessary environmental emissions (e.g. dust). However, Rex has undertaken thorough investigations and risk assessments on the potential impacts associated with the WRDs and the TSF. All potential risks associated with the TSF have been identified and detailed in Section 8.3.13 of the MLP.

As described in Section 8.3.11 of the MLP, less than 1% of the tested waste rock samples showed the potential for acid formation and the reports (Appendix 5.8-A and Appendix 5.8-B of the MLP) concluded that the potential for forming AMD is very limited, due largely to the relatively high abundance of carbonate minerals within the Hillside system. Leachate test work on samples from Hillside indicates that the leachate from samples is relatively benign, and that waste rock leachate is unlikely to present a significant risk to the environment. Geochemistry test work has indicated the tailings as not acid generating (Appendix 6.7-A of the MLP). PAF rock will be encapsulated in ACM to minimise potential for ARD.

Results of the waste rock sampling and analysis indicate a relatively benign waste rock character associated with the Hillside project and mineralogical analyses show no presence of asbestos or asbestiform minerals (refer to **Response_5 Air Quality**, subsection d), requiring the placement of these materials back in the open pit.

The WRDs will be rehabilitated so they are returned to native vegetation and agricultural land (refer to **Response_125. Closure** and **Response_163. Socio-Economic**) so the entire site is not left open and exposed.

128. COPPER CONTAMINATION

Sections 6.6.5.2 & 8.4.10.4

The MLP indicates that leak detection for the pipeline will occur via comparison of the flow rates, pressures, and densities at the start and end of the pipeline and indicates that in the event of a change in process flow conditions an inspection team will be dispatched to investigate the suspected area. Explanations sought regarding whether flow process conditions are able to indicate a small failure, and if not, whether visual inspection will be able to identify a small failure given the depth which the pipe is buried and length of the pipeline; How small failures which do not provide any

surface indication could be identified and managed along the 11km stretch of pipeline (including during rainfall events when surface may be saturated)

As per Section 6.6.5.2 *Leak Detection System* in the MLP:

1. The objective of a leak detection system is to spot system leaks, predict their location as well as issue warnings to operators. Detection is expected within two to 10 minutes of an occurrence depending on the size and the location of the leak.
2. The HDPE liner represents an additional level of leak prevention to the environment, acting as a secondary containment measure for the system. A leakage between liner and pipe will initially be detected resulting in an immediate shut down of the pipeline preventing wear of the outer steel pipeline and possible leakage to the environment.
3. The industry standard leak detection system is based on two methods:
 - o mass balance (MB) monitoring
 - o section characteristic parameter (SCP) monitoring
4. The more reliable SCP is defined as $Q^2/(dh/dL)$, with Q representing the local flow rate and (dh/dL) representing the slope of the hydraulic gradient (head loss) in the monitoring section. The MB method alone would create false alarms when the pipeline is in transient conditions.
5. The principles of leak detection are a comparison of the flow rates, pressures, and densities at the start and end of the pipeline based on current steady state flow regime in the line and considering position of the pipeline valves. A leak would be recognised by the departure from established norms for these parameters.
6. The on-line monitoring of data provides operating personnel instant access to information about process flow conditions. This access to information allows safer operation and better maintenance of the pipeline. If there is an indication of a leak, the flow will be terminated and an inspection team will be dispatched to the suspected area.

129. COPPER CONTAMINATION

Section 8.3.9 Marine Environment

Although copper is an essential element for both plants and animals, it is only required in small amounts and is toxic in higher concentrations. Copper is readily bio-accumulated in plants and animals (ANZECC 2000). Assurance is sought that the following the potential toxicological impacts of mine generated dust, and mine contaminated waters will be avoided:

- ***Damage to the physiology of fishes (including the gills, and olfactory sense);***
- ***Mortalities among marine invertebrates, fishes and algae, particularly if exposed to copper;***
- ***Potential reduction in biodiversity in coastal marine sites;***
- ***Reduction in seagrass cover;***
- ***Sedimentation; or***
- ***Concentration of metals in filter-feeding organisms.***

The potential pathways for impacts to the marine environment are through air (via dust) and surface water. The results of the groundwater investigations identify that the groundwater (layer 3 and 4) is highly saline, there are no third party users (groundwater not used by landowners as per **Response_60. Water** and there are no groundwater dependant ecosystems as per **Response_91. Water**) and that the gradient is towards the open pit (i.e. as the open pit acts as a 'sink' drawing groundwater (from layer 3 and 4) from the surrounds towards it as per **Appendix 7**). See Figure 5 of **Response_7. Closure** for a representative cross section of

the four hydrogeological layers. As per **Response_44. Toxicological**, all potential seepage from the TSF will be captured.

The potential impacts to marine would be via either the air or surface water pathway. Therefore only the primary pathway has been assessed. If the primary pathway is controlled, then the potential impact to the secondary pathway (e.g. contaminated surface water entering the marine environment) is eliminated.

Refer to **Response_2. Air Quality** which explains that the dust that will originate from the proposed mine will not contain levels of copper, other metals or toxins which could potentially impact the surrounding marine environment.

All surface water that comes in contact within the mine site footprint will be retained on site and directed to holding ponds for reducing sediment loads, and used to supplement process water. Overflow from the internal drainage system will be directed to the pit, which will provide temporary storage during major storm events. This design will result in zero discharge of surface water from the mine.

Dissolvable copper (atacamite) will only be present in the oxide stockpiles as per **Response_21. Geology**. For the management of the low grade ore stockpile (where atacamite will be stored) see **Response_16. Geochemistry**.

130. **COPPER CONTAMINATION**

Section 8.10.4.2

In 8.4.10.2 under subheading ‘Surface water contamination from chemical...’ explanation is sought on why potential surface water contamination from copper concentrate dust has not been identified as an impact given the close proximity to the marine environment, and whether this is based on an assumption that dust will be managed in its entirety? Discussion sought on the potential impact (including cumulative) of surface water contamination including pathways to the receptor (marine environment, surface vegetation and groundwater) and consequences in the event dust is not adequately managed. An explanation sought on the residual risk post implementation of any control strategies proposed.

Section 8.4.10.2 of the MLP is in relation to Rex’s proposed processing facilities at Port Ardrossan. All dust generation will be effectively eliminated at the port site through maintaining ‘wet’ concentrates, the use of the slurry pipeline, fully enclosed conveyors with dust extraction at all concentrate conveyor transfer points and a fully negative pressurised concentrate storage shed. Primary and secondary controls for dust at the port processing facility have been included in the design. **Thus there are no potential pathways to surface water.**

As with the Hillside Copper Mine site, surface water within the Port Facility will be internally draining. Surface water will be diverted to an internal pond and reused within the Rex Port facility. No surface water runoff from within the Rex Port facility will be discharged.

The potential risk of groundwater contamination; *Contamination of groundwater as a result of seepage from the raw water and process water pumping pond at the port facility and eventual discharge into the marine environment (MPL-GW1)* has been discussed in Section 8.4.11.2 of the MLP and it was concluded that the risks were low.

The potential risk to native vegetation, ‘*Reduced native plant growth or abundance resulting from increased dust and particulate deposition arising from port operations (MPL-A3)*’, has been discussed in Section 8.4.1.2 of the MLP, which indicates that there are no significant risks to remnant native vegetation.

131. EDITORIAL

Section 6.7 Waste

Table 6.7-1 - the total footprint of the three areas listed in Table area adds up to 1435 hectares rather than 1200 hectares – clarification sought on the total area of WRDs.

The total area of the WRDs is 14,348,673 m². Table 6.7-1 from the MLP has been revised below.

Table 6.7-1: Total area of the WRDs

WRD	Volume (m ³)	Footprint (m ²)	Final RL	Height (m)	Comments
Western	430,871,990	12,112,790	160-170	70-112	Incorporates the integrated tailings facility and within western WRD. WRD has been designed so it retains a 100m buffer from the proposed lease boundary which provides sufficient space for any diversion drainage and a perimeter access road.
North	28,048,697	1,238,673	90	20- 45	Will help screen the plant from road users.
South	30,992,941	997,210	100	50- 83	Will assist in shielding the pit from the road and residences and reduce any visual impact of the open pit.
Total	489,913,628	14,348,673			

132. EDITORIAL

Section 5.3.1

Justification is sought re Page 5-22 5.3.1 Residential Dwellings - states two dwellings on Redding land (quarter of Rex land) are unoccupied, these are occupied but not considered as sensitive receptors.

As per Section 5.3.1 (MLP) within the proposed ML, there are five dwellings located within the proposed ML that are not owned by Rex. Negotiations are underway for Rex to purchase or relocate the two dwellings (one previously believed to be unoccupied) on Redding land (see Section 2.3 of the MLP).

The proposed footprint of the mine infrastructure (TSF and WRDs), as set out in the MLP, would not be possible without owning this land. Therefore, for the purposes of assessing potential social and environmental impacts, the two dwellings on Redding’s land have not been considered as sensitive residential dwellings.

133. EDITORIAL

Concerns raised that many of the technical reports in the MLP documentation were based on a project design that has significantly changed, and significant issues raised by CCG and community with the proponent not adequately answered and or considered. Provide clarification on difference in mine design and implications this may have on relevant technical reports.

See ‘Documentation Alterations, Changes and Additions’ in the introduction for further information.

A review of the TSF prompted Rex to amend the original design that was presented to the majority of the stakeholders during consultation (Section 6.1.3 of the MLP). This resulted in lowering the overall height of the TSF and therefore increasing the footprint. The original western and far western WRD were combined to form one WRD (western) with the TSF encompassed. The TSF has still been constructed as high as possible to try to maintain the smallest footprint as safely practical as which was the preference presented by the community consultation group (CCG).

The noise model was updated to include this change in project design (Appendix 6.6-A of the MLP). The visual amenity assessment which was completed prior to the change was based on the worst case scenario. Therefore this assessment was still considered valid for use in the MLP impact assessment after the TSF was altered. A notable change will be at viewpoint 3 as the WRD will be approximately 1200 m closer to the viewpoint location however, the WRD will be lower than originally presented. The dust model was not updated as part of the MLP, but has been updated for this Response Document as stated in **Response_4. Air Quality**. Outputs of this model have been included **Appendix 4**.

134. EMISSIONS

Section 6.10.2 Energy Sources

The greenhouse impact of electricity use is larger than the component that must be acknowledged under NGER Reporting. It is apparent from the greenhouse gas emissions associated with electricity use that Rex has used only the scope 2 emissions factor. It is suggested that Rex should use both the scope 2 and 3 components of emissions associated with electricity use (as per the 2012 NGA Emission Factors) in defining the greenhouse impact of the project, and clarification sought on the greenhouse reduction commitment that Rex will make in relation to its electricity use.

Section 6.10.2 Energy Sources

All of the electricity used by Rex for Hillside will be purchased through an electricity retailer. All power will be provided to site (i.e. metered at the mine gate), with Rex not being responsible for any subsequent transmission of power. No on-site generation of electricity is contemplated by the MLP. Accordingly, Rex is of the belief that all of the greenhouse gas emissions related to electricity consumption fall within scope 2 of the Green House Gas (GHG) Protocol.

Rex has made various commitments relating to greenhouse reductions relating to electricity use. These are outlined in Section 6.10.2.3 of the MLP, and restated below:

1. Mining scheduling will be optimised to ensure selective blasting and processing of higher grade ore to maximise comminution efficiency, thereby reducing power usage.
2. Variable speed drives have been specified for electric motors where possible.
3. Power correction factors will be installed on all major switchboards to bring load power into unity.
4. The plant will be operated on a continuous basis at as close to peak throughput as possible to maximise efficiencies
5. Implementation of comprehensive integrated Quality, Environmental and Health & Safety Management System, to assist with embedding energy efficiency into corporate and site management operating practices.

135. FAUNA

Section 8.3.13

Fauna interactions – further explanation sought regarding the potential for birds to be attracted to and then impacted by the liquid TSF, and monitoring contingency plans. Clarification sought on appropriate control measures for managing the risk of fauna injuries and deaths caused by the TSF, as the primary control measures listed in Table 8.3-52 for fauna interactions are suggested as inappropriate for this impact event.

The design of the process plant (no cyanides, low levels of PAX and thickened tailings) has resulted in relatively benign tailings and tailings supernatant water (free water that floats on top). Whilst there is a risk of birds contacting the water in the TSF it is unlikely that they will remain on the water surface as there will not be any food source available. The thicken tailings process will create as small as possible decant pond area, which will reduce the attractiveness to birds. Also as the tailing sizing has a P_{80} of 125 μ it is unlikely that they will become stuck in the tailings. If required, Rex will research bird deterrent activities in collaboration with other mine e.g. Olympic Dam and may include the following:

1. Trial of sound identification software to determine its efficacy at identifying water bird species and its potential use as part of an on-demand deterrent system (BHP Billiton 2009).
2. Monitoring of bird behaviour to gain a better understanding of water bird movements.

Consequently the likelihood of fauna injuries or deaths is considered to be exceeding low. However the residual consequence and impact level is viewed as moderate as fatalities are not expected, but have a very low potential of occurring. This has been assessed and controls applied as per Section 8.3.13.4 of the MLP.

136. GEOCHEMISTRY

“the waste rock from the Hillside project exhibits very limited potential to generate acid” (MLP, 6-99), the report by the consultants, Mining Plus, warns that “Given the large volume of waste rock associated with the project, further sampling may be required”, the only indication that further sampling was undertaken is a reference in the MLP (p 5.8.3 5 - 62) that a “second round of sampling was undertaken where 125 samples were analysed to further evaluate the uncertain classifications from Phase 1. Reports sought from the phase 2 sampling which evaluates the uncertain classifications from Phase I of the waste rock acid generation testing.

Refer **Response_15. Geochemistry** and **Response_18. Geochemistry** for results. A report detailing the Phase 2 sampling which evaluates the uncertain classifications from Phase 1 (**Appendix 5C**) of the waste rock acid generation testing is seen in **Appendix 18B**.

137. GEOLOGY

Further information and clarification sought regarding the fibrous characteristics of the ore body and waste rock and risks associated with its release and potential exposure to receptors.

The ore and waste at the Hillside Cu-Au-REE deposit have been investigated for the presence of “asbestiform” phases. Detailed investigations of hundreds of polished thin sections from all the mineralised domains and adjacent waste rock has been ongoing since late 2009 and will continue. Various amphibole minerals have been observed at Hillside however no chrysotile asbestos has been noted. Investigations using

transmitted light microscopy, scanning electron microscope and the electron microprobe have been undertaken. In addition, detailed drill-core logging (in excess of 500 diamond drill-holes) has failed to note any fibrous “asbestiform” phases.

The materials called asbestos tend to be amphibole minerals or the serpentine mineral chrysotile. The amphibole minerals are the tremolite-actinolite and anthophyllite-gedrite solid solution series as well as magnesio-riebeckite and riebeckite (blue asbestos). “Amosite” or brown asbestos gets its name from “Asbestos Minerals of South Africa”, and is a cummingtonite-grunerite solid solution series mineral. The serpentine mineral chrysotile (white asbestos) develops in fibrous form.

Within the Hillside Cu-Au deposit there are no known occurrences of anthophyllite-gedrite solid solution amphiboles. Similarly there are no occurrences of magnesioriebeckite or riebeckite. Tremolite-actinolite develops as a retrograde skarn mineral which usually replaces diopsidic clinopyroxene. In rare instances the length to width ratio of tremolite replacing clinopyroxene can be high (>20:1) but these acicular grains are often encased in quartz. Where observed, this acicular tremolite makes up less than 2% of any sample. In some diopside-rich skarns radiating sprays of fibrous amphibole (see GTD8-214.55m in **Appendix 137**) can be observed. This amphibole is tremolite and acicular grains up to 1 cm have been noted. The dominant prograde skarn amphibole is a hastingsitic variety which is alkaline containing considerable potassium and sodium. It should be noted, however, that amphibole skarns are rare occurring predominantly in the Leprena Zone of the deposit. Serpentine may replace diopsidic clinopyroxene in clinopyroxene skarns but is not fibrous and overall is rare in the deposit.

Mr. Mike Van Alphen, a past employee of Rex, is currently completing a PhD at Adelaide University, Adelaide. He is investigating the compositions of asbestos phases world-wide and has worked with asbestos monitoring firms in the Occupational Health and Safety sphere. Mr Van Alphen has also not observed any asbestiform phases at Hillside. Mr Van Alphen suggested, however, that test work be carried out with HSE (Health, Safety Environment) Australia Pty Ltd.

This group, based in Adelaide, has testing equipment which documents and reports fibres/m³ in dust generated by drilling, crushing and mining. They carry out work Australia wide documenting hazardous sites which contain asbestiform phases. In October 2010 this company was awarded the “Best Solution to an Identified Workplace Health and Safety Issue - Private Sector Award” by SafeWork SA for identifying a screening method which identifies the presence of respirable size fibres in soils.

Test work was carried out on seven samples from Hillside Deposit which contained various “fibrous-like” amphiboles considered to be the only sample types which could create concern. The seven samples (~1-2kg) of crushed drill-core residue from analytical investigations were forwarded to HSE Australia for testing. Discussions with Mr. David Cooper of HSE Australia were undertaken prior to sample arrival and the test work was supervised by Ms Ly Huor Ly.

The samples included acicular tremolite with high length to width ratios and examples of other amphibole-bearing rock-types. As mentioned, the acicular tremolite grains tended to be encased in quartz with tremolite-quartz-calcite replacing diopsidic clinopyroxene. It was this particular sample type that was considered to be potentially a problem with regard to fibre generation. It did not generate fibres however. The outcome of the

HSE test work is in **Appendix 137** This work confirmed petrological, SEM and field based studies which indicated that no asbestiform minerals are present in the Hillside ore deposit.

138. GEOLOGY

The MLP indicates that karst geological formation exists in the area however local ephemeral springs, sinkholes and doline have been recorded and utilised by local landholders and there is recorded history of large cavernous appearances along the edge of the adjoining highway, which is within the Hillside boundary. Clarification sought on potential presence or absence of Karst and related formations in regard to other identified local features and an assessment of the potential for impact by the proposal.

During the planning of the proposed mining activities the potential for karst formations within the mine lease was considered. This is discussed in Section 5.8.1.3 of the MLP and presented in **Response_25. Geology**. Information gained during drilling activities undertaken since 2008 has shown the presence of rock units with the potential to develop karst formations (e.g. limestone, dolomite).

Rex has consulted with the landholders within the proposed ML where there is considered potential for karst formations to develop. These landholders have held the land in their families for several generations and none were aware of any evidence that may lead to the suggestion of karst formations (e.g. sinkholes, landform depressions, ephemeral springs or disappearing water courses).

Indeed, where lithologies that may develop karst formations have been mined further north (Ardrossan dolomite mine, Arrium Mining), there is no evidence for the development of karst formations beyond occasional weakly developed dissolution cavities which do not present any concern for mining.

139. GEOLOGY

East/west cross-section graph or diagram identifying the hydrogeology through the MLP and MP area that included the coastal region is sought so that any vertical recharge characteristics might be identified.

Refer to Figures 6, 7 and 8 of **Appendix 7** which represent east-west cross sections but do not include the coastal region as no drilling was undertaken in these areas. The model cross section in Section 13.1 (Figure 90) of the **Appendix 7** shows the sea. See **Response_59. Water** for further information.

140. GEOLOGY

Consideration sought regarding issues pertaining to slope stability in the event of a substantial depth of Permian or other unconsolidated sediments being present in the pit area – including design consideration for the open pit to manage this issue.

In **Response 29. Geotechnical**, geotechnical studies over the Hillside project have been completed by Ground Control Engineering (GCE) and Mine Technics (MT). Both groups were engaged by Rex for differing reasons, however the combined investigation from both groups was designed to conduct a Mining Geotechnical Study for the Hillside Project and formed part of the overall mining study. The work program included a geotechnical investigation and evaluation of the deposit and surrounding rockmass with respect to open pit and underground mining.

As a result of this study it is highly unlikely that substantial depth of Permian or other unconsolidated sediments being present in the pit area. The current Hillside geological and geotechnical models are based on information gathered from over 700 drill holes. It is unlikely that there will be surprises in the depth of Permian or unconsolidated sediments within the pit area. However, given the staged mining strategy to be employed at Hillside, if conditions experienced in the early stages of the mine development are different to those expected then changes in mine design parameters can be made prior to commencing the final pit walls. Rex will have local operating experience in mining pit walls over 200 m high in the east wall geotechnical domain and over 160 m high in the west wall domain prior to starting the final wall excavation in year 4 of the mine's life. Geotechnical mapping of exposed faces will be undertaken through development of the mine to confirm the geotechnical structures and rock mass characteristic. This will enable review and re-assessment if required and ensure continuous improvement of the design slopes throughout the life of the mine.

See **Response_59. Water** for further information on drillholes.

141. **LIGHT**

An assessment sought on the potential impacts of light spill on livestock is required.

There is significant evidence of successful grazing and bloodstock activities in close proximity to large scale mining sites across Australia for example there are many in the Hunter Valley and Bowen Basin operations, Ravensthorpe, Cadia, Northparkes, Woodlawn.

The grazing of livestock is also known to occur next to airports and adjacent to highways which are subject to light spill from fixed lighting and headlights. Some parcels of land used for grazing within the local area are adjacent to portions of the St Vincent and Yorke Highways and experience lightspill, particularly during periods of high volumes of heavy traffic such as harvest. St Vincent Highway between Ardrossan and Port Giles is gazetted to carry road trains, which are used predominantly to cart grain between Viterra's Ardrossan grain storage facilities to Port Giles grain export facility.

An assessment of the impact of mobile light sources on residents near the Hillside was undertaken as part of the MLP (See Appendix 8.3-C of the MLP). Rex will design fixed night lighting to achieve minimal light spillage by using luminaries and light sources that efficiently direct the light where required, thereby minimising energy and light wastage (or spill) in accordance with Australian standards (AS 4282-1997 control of the obtrusive effects of outdoor lighting).

This standard is based on the nuisance light on humans as there is no standard which takes into consideration light impacts on livestock. Rex will be regulated against these standards and therefore will indirectly mitigate the potential impact of light spill on livestock.

142. **MARINE**

Evidence sought for conclusions in the MLP impact assessment (ML-A7, ML-SW1,2,3,4) stating marine and coastal dust impacts are of minor consequence. Section 5.11.1 of the MLP implies a possibly continuous influx of mining-related pollutants into the upper Gulf St. Vincent marine park however existence of northward flow along the western coast of upper Gulf is confirmed in one of the few oceanographic studies that have been undertaken in the study region. Further explanation sought on: how the flow pattern and slow flushing (hence ability of the water body to disperse effluents) of

this region has been adequately considered in the risk assessment for air quality and marine impacts; what the level of toxicology of the built up dust is expected to be; what scientific evidence is available to demonstrate that marine flora and fauna would not be impacted by dust deposition and toxicology (both short term and cumulative impacts).

Refer to ***Response_129. Copper Contamination*** and ***Response_44. Toxicological.***

143. METEOROLOGICAL

Explanation sought on the expected impact to wind patterns and subsequent effect on the dispersion of fugitive dust and noise carry from mining operations resulting from the development of the Ceres Wind Farm, and whether this could influence modelling predictions in relation to sensitive receptors and compliance with noise criteria and NEPM.

A wind farm development has no potential to alter wind patterns in any significant way as to affect how dust is dispersed from a nearby mine. A wind turbine works on the principle of transferring wind power to electricity. Winds are not increased or diverted by wind farms.

144. METEOROLOGICAL

Evidence sought to underpin claims in relation to noise, dust and odour that meteorological conditions associated with high odour potential conditions such as calm and early morning temperature inversions are not commonly experienced in the proposed ML and MPL areas.

Temperature inversions occur in the most stable atmospheric conditions such as F class stability, as per Section 6.2 of Appendix 5.6-C of the MLP. From the evaluation in Appendix 5.6-C of the MLP, the frequency of E and F class stability occurs as expected given the location. To specifically evaluate how mixing heights (and lower temperature inversions) are predicted compared to actual conditions site specific upper air data is required. This however is typically only available for larger airport locations with manned meteorological stations.

As per Section 9.1 of Appendix 6.5-C of the MLP, *It is our experience (PEL) that odour emissions from mining activities from processing plants and TSFs are very limited. In most situations there is no detectable odour over TSFs or only the very lowest level of detectable odour present. The predicted odour impacts are presented in Figure 9.1 and demonstrate compliance for all receptors.*

Further to this, the predicted meteorology for the mine site used in the dispersion modelling included a 0.65% frequency of calm winds (<0.5 m/s) and an annual average wind speed of 4.53 m/s. The onsite weather data from observations from the proposed mine location show a 0.15% frequency of calm winds (<0.5 m/s) and an annual average wind speed of 5.16 m/s. This shows that:

1. The frequency occurrence of calms in the assessment is overestimated compared to the actual conditions.
2. The annual average wind speed in the assessment is under estimated compared to the actual conditions.

This contributes to conservative predictions. The predicted atmospheric stability (see Section 6.2 of Appendix 5.6-C of the MLP) shows a high frequency of D class stability which is typical for near coastal and windy locations. E and F class stability (the higher stability classes) are predicted in a lower frequency than what is normally seen for inland conditions.

145. **NATIVE VEGETATION**

Concern raised about the management during operation of impacts on the Spider Club Orchid - further information sought on how the proponent would identify areas where the species exist and make adequate and suitable provisions to ensure its long term survival.

As per Section 5.12.1.4 of the MLP, an Environment Protection and Biodiversity Conservation (EPBC) referral to Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) was submitted on 19 June 2012. Rex was subsequently advised on the 11 September 2012, that the Hillside Project was not a controlled action, if undertaken in a particular manner. The particular manner in which the Hillside Project must be undertaken involves measures prescribed by SEWPaC to prevent significant impacts on the Neat Wattle (*Acacia rhotinocarpa*) and the Large-club Spider-orchid (*Caladenia macroclavia*).

The following measure must be taken to avoid significant impacts on listed threatened species and communities (Section 18 and 18A) manners in which proposed action must be undertaken are:

- In order to prevent significant impacts on the Neat Wattle (*Acacia rhotinocarpa*) and the Large-club Spider-orchid (*Caladenia macroclavia*), the Pine Point Road/Main Street diversion must be undertaken to avoid patches of remnant native vegetation, as shown in **Appendix 145**.
- Patches of remnant native vegetation located immediately to the north and northwest of the Pine Point Road/Main Street diversion, which contain *A. rhotinocarpa*, must be avoided and protected during construction by installing flagging rope or similar, in location indicated in **Appendix 145**.

Management of species will be included in the Native Vegetation Management Plan, developed in consultation with DEWNR.

146. **NOISE**

Commitments sought regarding the provision of noise mitigation treatments for home owners such as double glazing.

Rex will meet the EPA noise policy requirements at all sensitive receptors. However if a noise issue remains for individual receptors, Rex will consider appropriate noise mitigation measures through discussion and agreement with the individual homeowner, for example double glazing or ceiling fans.

147. **NOISE**

Explanation sought for why Map 1.2 does not take into account the noise from haul trucks traversing the north-eastern WRD.

Map 1.2 of Appendix 6.6-A of the MLP does not take into account the noise from haul trucks traversing the north (incorrectly referred to as the north-eastern) WRD. The 'worst case' scenario for potential noise impacts occurs when the trucks travel around the outer perimeters of the WRDs and the haul truck roads as close as possible to the receptors (since noise dissipates the further that the noise sources is from the receptor). Therefore haul trucks travelling around the outer perimeter of the WRDs have been modelled. Hence, if this noise of traversing the dumps was instead used, it would decrease the noise model outputs.

148. NOISE

Appendix 6.6-A

Explanation sought for why in the Operational Noise Assessment it appears noise levels stop abruptly at the coast line and then resume across St Vincent's Gulf.

The reason why the noise appears to stop at the coast line, then resume across St Vincent Gulf is due to the natural topography of the cliff line along the coast. The cliff line results in a 'shadow' at the base of the cliffs where the noise level modelled is equal to or less than 40 dB(A). The dark blue contour shows the range from 40 dB(A) to 43 dB(A).

149. NOISE

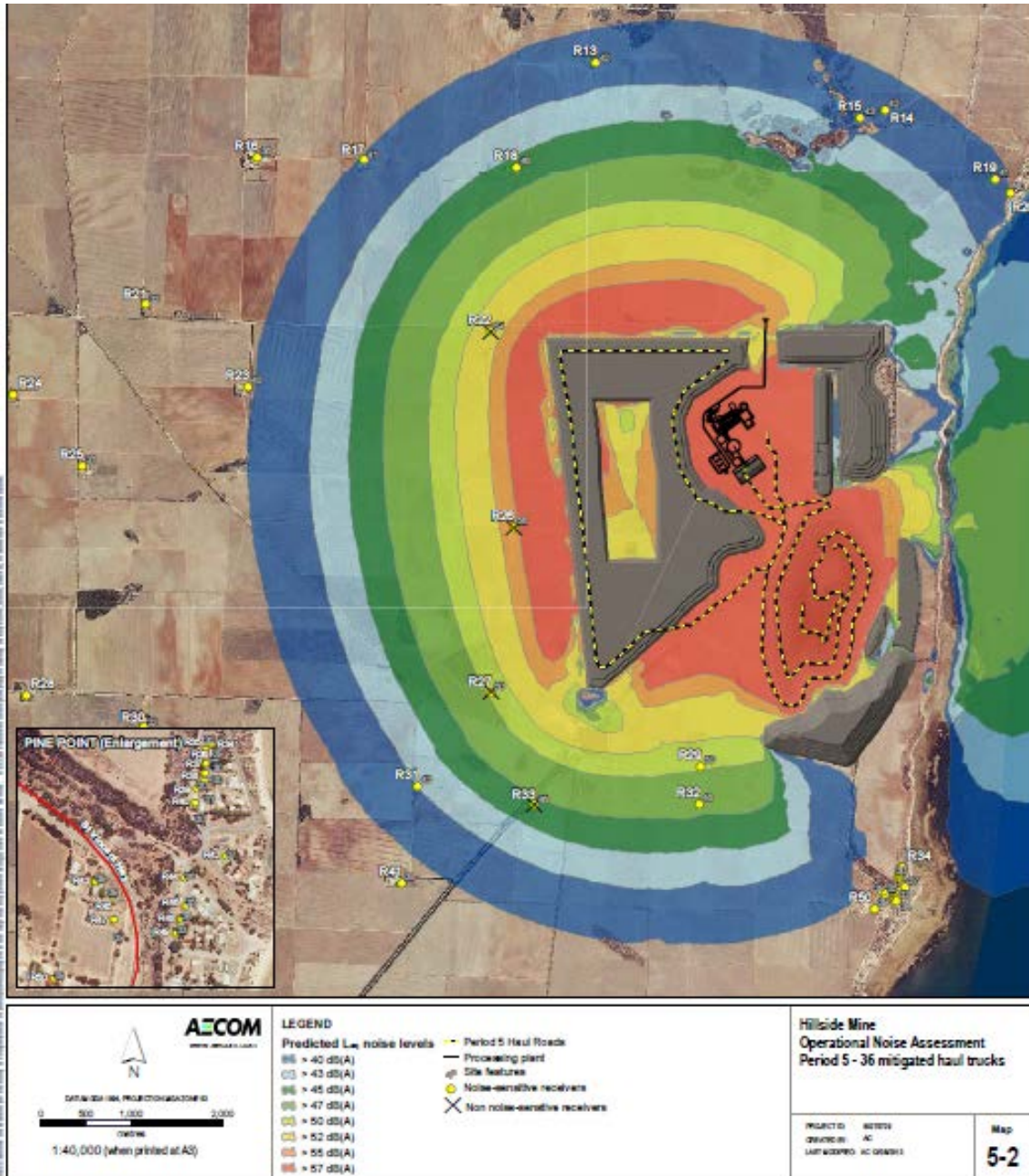
Appendix 6.6-A

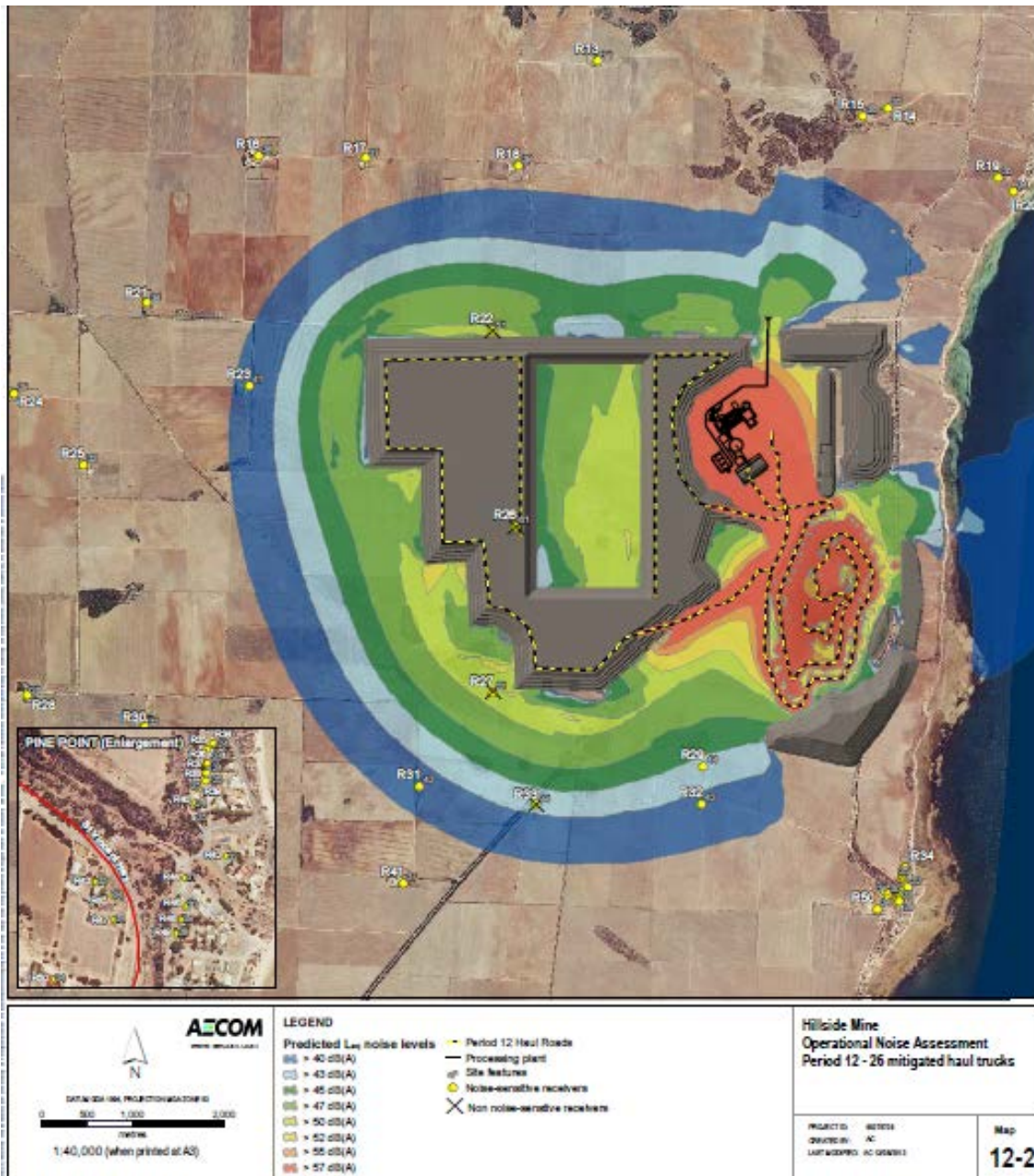
Explanation sought for why the tailings dam becomes much bigger in year 12 from year 5 in Figs. 7 & 8 on pgs. 16 & 18 in the Operational Noise Assessment. Does the noise modelling reflect the proposed design?

The noise model was initially undertaken using a 'high aspect ratio TSF'. In order to confirm the suitability of the 'high aspect ratio TSF' for the Hillside Project, an independent peer review was sought by Rex. Due to constructability issues, this resulted in lowering the overall height of the TSF after 'year 5' (therefore increasing the footprint) and revising the initial design named the 'low aspect ratio TSF'.

The noise model considers the change of the TSF from a high aspect to a low aspect as shown below in Figure 12-1 from Appendix 6.6-A of the MLP. 'Year 5' was modelled using the 'high aspect ratio TSF' as shown below in Figure 5-2. This was assessed by AECOM and considered to be representative of the operational footprint in year 5, regardless of the change to the height of the TSF. 'Year 12' was modelled using the 'low aspect ratio TSF' see Figure 12-2 presented below. The low aspect ratio TSF design for period 12 is the maximum TSF footprint as presented in the MLP. This modelled scenario is the worst case scenario for noise.

The worst case scenario is based on predicted noise levels that assume worst case meteorological conditions for noise propagation, corresponding to CONCAWE (Conservation of Clean Air and Water in Europe) Meteorological Category 6. This assumes emissions in the night time period and that there is less than 50 per cent cloud cover, with a light wind blowing (2-3 m/s) toward the receptor from the noise source direction and moderately stable atmospheric conditions, see Appendix 6.6-A of the MLP for further detail.





150. NOISE

Appendix 6.6-A

Explanation sought for why there is no noise emitted from the north & east of the northeast WRD and northeast of the southern WRD in Map 1-2 in the Operational Noise Assessment.

Map 1-2 is the Operational Noise Assessment presented in Appendix 6.6-A of the MLP for Period 1 with mitigated haul trucks, as shown below. No noise is emitted above 50 dB(A) from the north or east of the northern WRD due to the level of 'shielding' provided by the WRD due to the height of the dozers on the WRD. The effect of shielding is explained further below. Period 1 is the modelled snapshot that shows the north WRD at 30 – 60 m high with haul trucks operating generally at the upper extremities to provide a worst case scenario.

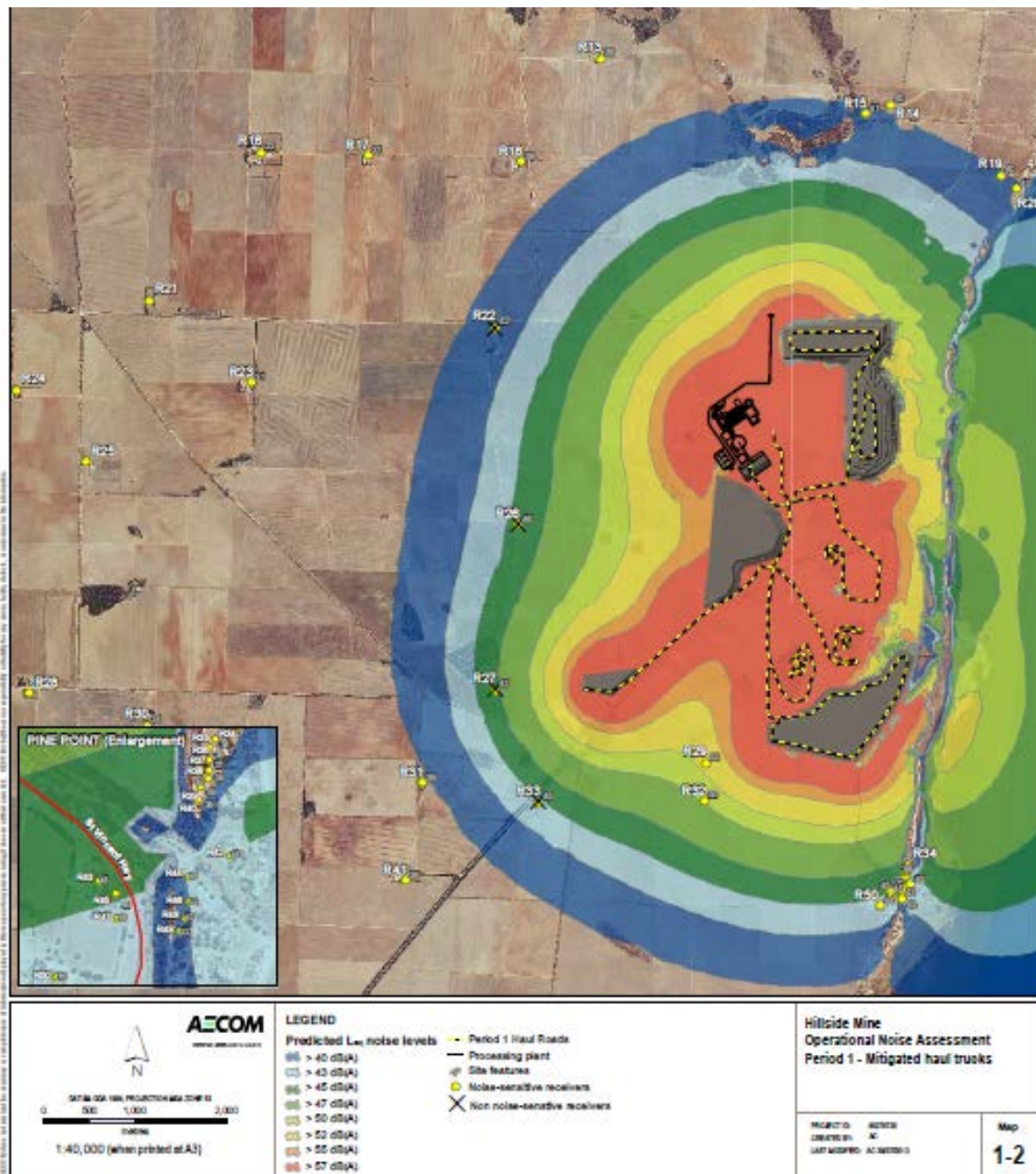


Figure 42 below shows that there are 2 dozers modelled (blue dots on the SW face of northern WRD) that are shielded by the WRD. Note the northern WRD generally provides shielding from the processing and other ground level mobile plant noise as well as the southern and western haul roads on the northern WRD due to the height of the WRD above the ground.

The MLP noise report (Appendix 6.6-A) indicates the northern receptors (i.e. R14, 15, 19, 20) to be below the adopted criteria by typically 5 dB(A) with standard trucks and 10 dB(A) with mitigated trucks in Period 1. This is why there is a greater effect of shielding observed with the noise contours to the north and east of the northern WRD in Appendix 6.6-A of the MLP, Figure 1-2 (mitigated trucks) versus Figure 1-1 (standard trucks)

given that the mitigated trucks results in the northern WRD haul trucks having reduced influence on the overall noise emission propagating to the north-east of the site.

During construction of the northern WRD, the level of shielding provided by the WRD with the addition of dozers working on the northern extremities is likely to elevate the received noise levels at the northern receptors. In the opinion of AECOM, it is likely that the predictions will indicate compliance. To provide further reasoning, note that Figure 43 below shows 3 dozers modelled on the southern WRD extremities, in addition to the southern WRD providing negligible shielding from other mobile and fixed plant sources. The southern side of the site also has greater mobile plant activity, which increases the likely noise emission potential at southern receptors. In the opinion of AECOM if this scenario was translated to the northern WRD, compliance with the criteria would still occur given that the distance to the nearest northern receptors in comparison to the southern receptors from the southern WRD is greater.

Furthermore, the modelled periods (i.e. 1, 5 and 12) with associated plant scenarios provides a representative snapshot of the noise footprint for planning purposes. The modelling carried out to date quantifies the potential noise risk, which in turn allows consideration of plant selection and the development of a noise management plan (including real-time noise monitoring) to mitigate the residual risk.

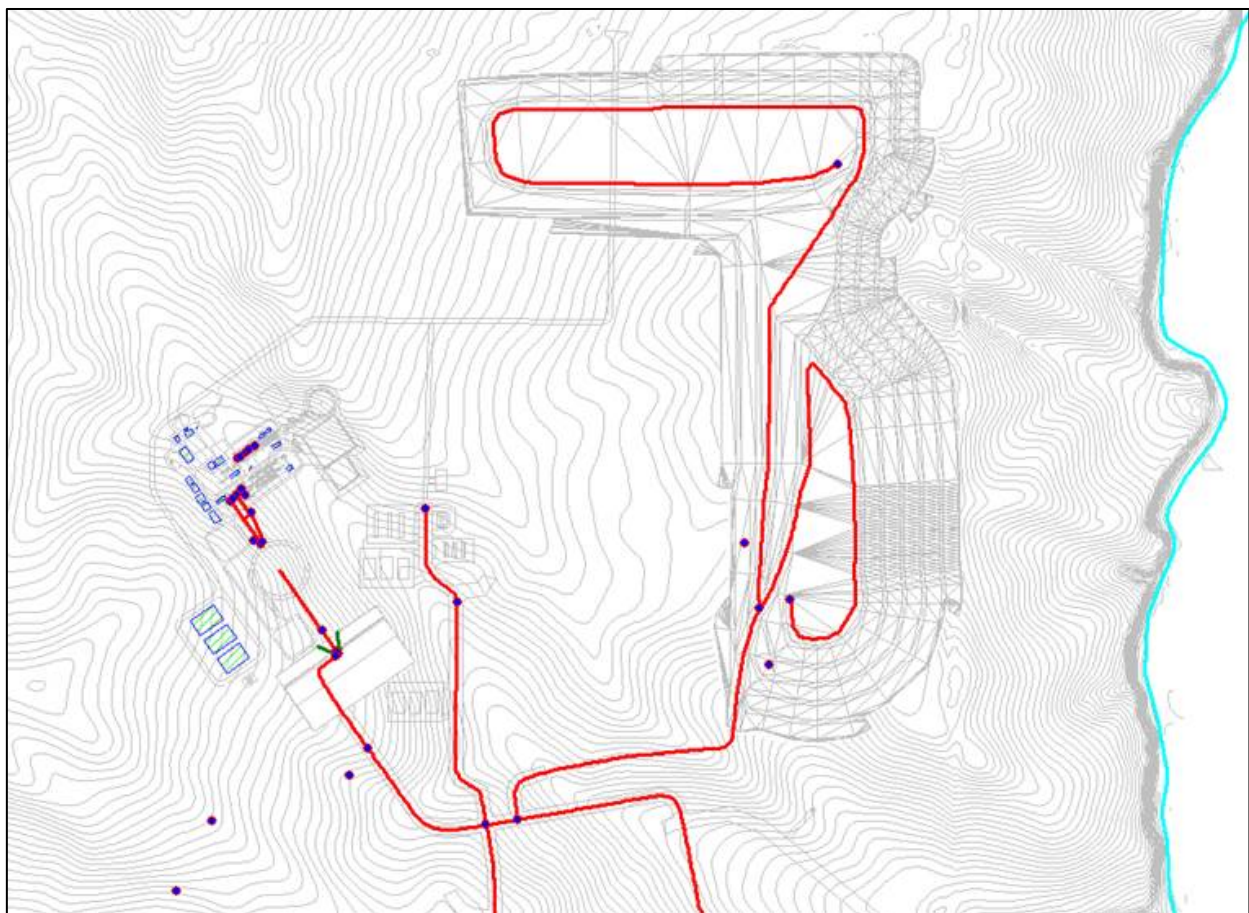


Figure 42: Modelled noise sources as blue dots at the northern section of site

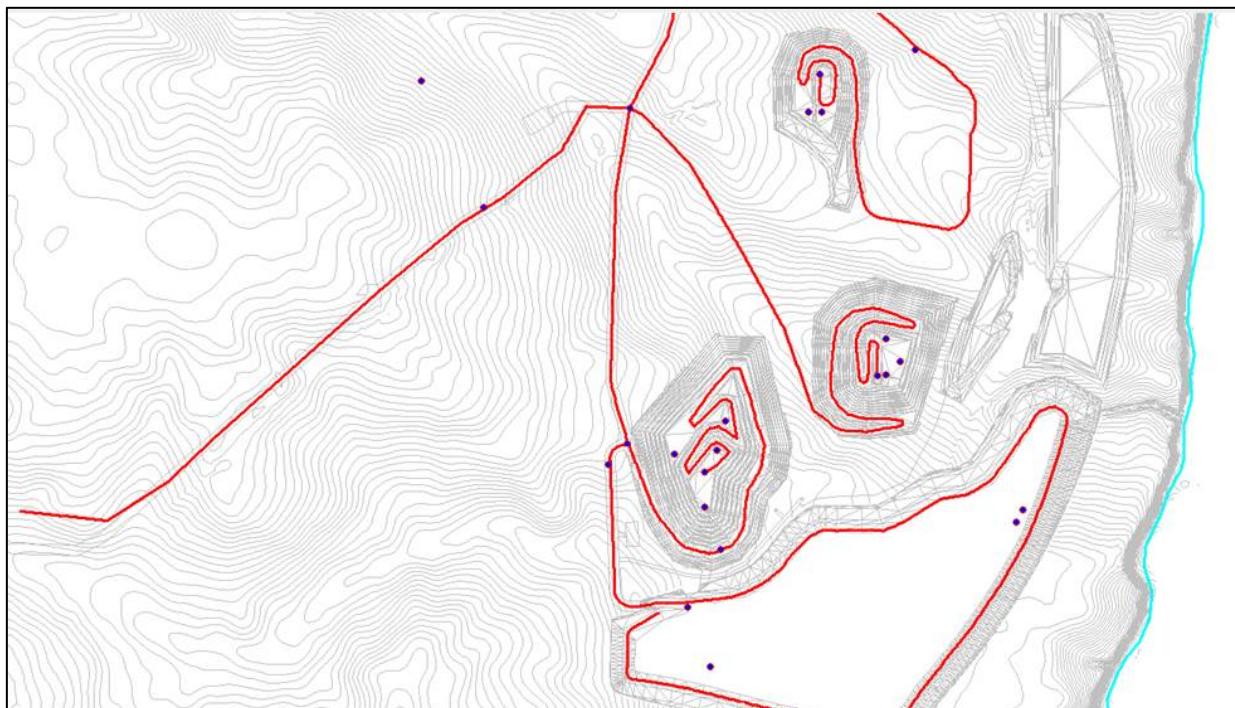


Figure 43: Modelled noise sources as blue dots at the southern section of the site

151. RADIATION

Explanation sought for how the blending of material described at 5.8.2.1 and 8.3.19.3 will be practically undertaken to achieve sufficient dilution (<200ppm) for the milling circuit and WRDs. Further explanation sought regarding the quantum of contaminants (e.g. uranium, heavy metals, waste processing chemicals) within ore body and WRDs, including the basis for the conclusion and the representativeness of samples in relation to the entire ore body.

This question is answered in **Response_36. Radiation** and **Response_37. Radiation**.

152. RADIATION

Further detail sought on the identification and management considerations for Uranium radiation concentration are only provided on 'averaging' of readings. There are no specific radiation readings of individually identified sites. Drill sites and the proposed mine site are not identified. Core sampling radiation readings have only been presented from selected drill sites and from limited depth selections as preference by the proponent. Records of volume and intensity of Radon gas radiation readings have been omitted. There is no transparency in radiation records upon which hazard and management criteria can be determined.

Uranium is predominantly concentrated on the eastern mineralised domain (Songvaar). When all Resource assays (>230,000m) are averaged against their length (weighted), the average grade intersected to date during Rex's drilling program is approximately 24ppm; core samples containing more than 200 ppm, determined by the use of a handheld scintillometer, comprise less than 5% of total core trays.

Questions relating to radon gas have been addressed in **Response_111. Air Quality**.

Management of radiation is detailed in **Response_38. Radiation**, **Response_39. Radiation** and **Response_40. Radiation**.

Specific levels of uranium have been recorded for every hole drilled at Hillside and these data are contained within **Appendix 24***.

Images showing the distribution of U in the orebody at 80 and 200ppm cuts within the open pit and underground are shown in **Appendix 37***.

** These supporting appendices have been provided by Rex and contain information that the broader market does not possess and are commercial in confidence. This information has been provided to the State Government only for consideration in their assessment and is not for public viewing or disclosure to any third party without Rex's prior written consent.*

153. **RADIATION**

MLP does not consider leaching of uranium (and associated radionuclides) into Gulf St Vincent. Provide an assessment of the potential sources, pathways and receptors.

The potential pathways for impacts to the marine environment are through air (via dust) and surface water. The results of the groundwater investigations identify that the groundwater (layer 3 and 4) is highly saline, there are no third party users (groundwater not used by landowners as per **Response_60. Water** and there are no groundwater dependant ecosystems as per **Response_91. Water**) and that the gradient is towards the open pit (i.e. as the open pit acts as a 'sink' drawing groundwater (from layer 3 and 4) from the surrounds towards it as per **Appendix 7**). See Figure 5 of **Response_7. Closure** for a representative cross section of the four hydrogeological layers. As per **Response_44. Toxicological**, all potential seepage from the TSF will be captured.

The potential impacts to marine would be via either the air or surface water pathway. Therefore only the primary pathway has been assessed. If the primary pathway is controlled, then the potential impact to the secondary pathway (e.g. contaminated surface water entering the marine environment) is eliminated.

Refer to **Response_2. Air Quality** which explains that the dust that will originate from the proposed mine will not contain levels of copper, other metals or toxins which could potentially impact the surrounding marine environment.

All surface water that comes in contact within the mine site footprint will be retained on site and directed to holding ponds for reducing sediment loads, and used to supplement process water. Overflow from the internal drainage system will be directed to the pit, which will provide temporary storage during major storm events. This design will result in zero discharge of surface water from the mine. Refer to **Response_89. Water** for further details.

Dissolvable copper (atacamite) will only be present in the oxide stockpiles and this will be managed as described in **Response_21. Geology**.

Response_40. Radiation provides a quantitative prediction of environmental concentrations of radionuclides and doses to members of the public. **Response_40. Radiation** states that;

- Results of the dose assessment (**Appendix 38**) indicate that public doses are expected to be low and less than approximately 7% of the recognised public dose limit of 1mSv/y at the project boundary and approximately 1% of the public dose limit at the port.
- There is varying concentrations of U^{238} and Ra^{226} in the soil where agricultural land practices are currently undertaken and that any addition from the proposed mine is well within the variation that occurs naturally at Hillside and therefore is not expected to affect crop quality, growth or yield.

154. **RADIATION**

Further explanation sought on the risks associated with the production of Radon in WRDs and tailings, and the mitigation strategies to prevent risk associated with it.

Radon is a naturally occurring element, produced from the decay of uranium. There is already naturally occurring radon at the Hillside location, which has been the subject of research work undertaken by the SA Geological Survey (Fabris, 2010). The average concentration of uranium in the WRDs is expected to be 16 ppm, which is comparable to the concentration of uranium within some naturally occurring granite's on Yorke Peninsula (14 ppm).

The potential for material with this concentration of uranium to generate quantities of radon gas that would be considered hazardous is very low. Furthermore, radon gas primarily presents a hazard when it is contained and concentrated. See **Appendix 38** for further details.

The WRDs and TSF are open facilities, with any very low levels of radon emissions being readily diluted and dispersed in the same way existing naturally occurring radon is dispersed.

Reference:

- Fabris A J, 2010, *Investigation into the use of radon and soil sampling in exploration at the Hillside copper-gold deposit*, South Australia. South Australia. Department of Primary Industries and Resources. Report Book 2010/00018.

155. **RADIATION**

As uranium has been found at Hillside in concentrations up to 10,100 ppm, explanation sought for why Uranium production is not proposed, given relatively high results compared with some other current Uranium operations.

Most ore deposits of uranium worth mining are in the order of 0.1% U (1000ppm) to 2% U (20,000 ppm), however some ore bodies in the Athabasca Basin, Northern Saskatchewan, Canada far exceed those grades (ranging from about 0.5% to over 20%). For example, the McArthur River mine is the highest-grade uranium mine in the world, averaging about 22% uranium.

When compared to many other existing copper mines, Hillside has very low levels of radioactivity (approximately nine times less than Olympic Dam). The average for the ore body is approximately 57 ppm and concentrates produced will average less than 45 ppm and the WRDs will average approximately 16 ppm as per below Table 20. The naturally occurring level of uranium in granites on the Yorke Peninsula is

approximately 14 ppm on average. Rex will manage, monitor and publicly report to the community that our rock storage facilities are blended to levels of approximately 16 ppm on average, similar to the background level of the granites.

Table 19: Summary of average Uranium concentrations from Hillside zones

Zone or product	Uranium concentration
Orezones (combined)	57ppm
Orezone (highest average – Songvaar domain)	81ppm
Mined waste (overburden)	16ppm
Copper concentrate	30ppm
Magnetite concentrate	11ppm
Tailings (average)	25ppm

In one metre out of 230,000 metres of test drilling, Rex identified a small pocket of Uranium (U) at 1.01% U (10,100 ppm). This one meter represents a very small percentage of the volume of material and this small percentage in isolation does not present an accurate picture of the grade and volume of uranium at Hillside. The question regarding why Rex are not planning to mine uranium is a valid, but given the overall concentration of uranium at Hillside is very low (refer **Response_10. Concentrate**), it is simply not in economic quantities to do so.

The Rex geological team has spent a lot of time modelling the uranium distribution, and although uranium was identified early on in the life of the project as being present, the overall quantity of the uranium is in very low quantities. This is also the case at the Prominent Hill copper orebody in South Australia, and is not uncharacteristic for copper projects of this type.

156. RADIATION

Explanation sought for why blending to reduce uranium concentrations is intended to achieve no more than 200 ppm U rather than the potential changed leading-practice standard of 80 ppm U?

The current statutory level for uranium concentrations for transport is set at 200 ppm. It will be in the interest of Rex to blend well below 200 ppm as there will be a requirement to limit the uranium content in our concentrate products for buyers. Therefore, Rex will be aiming at blending as close as possible to the expected average mill feed grade of 57 ppm, well below even the potential standard of 80 ppm.

157. RADIATION

Appendix 5.8-A

Explanation sought as to:

- **Whether the operators in the open cut mine and in the concentrator plant will be exposed to radiation.**
- **Could elevated levels of uranium end up in the concentrate streams which will be slurried to the port and exported?**
- **Could elevated levels of uranium end up in the tailings and the waste rock piles?**
- **How will the mine be safely managed and rehabilitation completed effectively to ensure there are no radiation hazards?**

Appendix 38 shows that workers doses will be low and well controlled. This is mainly due to the low average uranium grade of the mineralised material as per:

1. It will not be possible for elevated levels of uranium to end up in the concentrate streams which will be slurried to the port and exported as Rex will be required to maintain our levels of uranium below the statutory limits. The current statutory level for uranium concentrations is set at 200 ppm. It will be in the interest of Rex to blend well below 200 ppm as there will be a requirement to limit the uranium content in our concentrate products for buyers. Therefore, we will be aiming at blending as close as possible to the expected average mill feed grade of 57 ppm, well below even the potential standard of 80 ppm.
2. Elevated levels of uranium will not end up in the TSF or the WRD as all of the higher concentrations of uranium lie with the copper minerals and thus will be sent to the plant. These will then be blended to further reduce uranium levels. The average uranium content for the entire ore body is 24 ppm uranium, well below the criteria for classification as a radioactive material.
3. Rex will develop a comprehensive RMP for operations which will be integrated into the site Safety Management Plan. The RMP may be subject to approval by the appropriate regulatory agencies and cover the following areas:
 - Establishment of a dose constraint of 1mSv for the project.
 - Rex will retain the services of a qualified radiation safety adviser.
 - The area immediately surrounding a work site (including mine, processing plant, WRD and TSF) will be designated a supervised area, with restricted access and workers will be required to change into work clothes before work and out of work clothes at the end of their shift.
 - For any underground operations, a ventilation plan will be developed with specific focus on control of radon.
 - A routine occupational and environmental radiation monitoring program will be developed.
 - Specific procedures will be developed to conduct the radiation monitoring commitments,
 - As part of their induction, all workers will receive radiation safety information.
 - As part of its occupational health and safety systems, the company maintains a Job Safety Analysis (JSA) system. A JSA is a small task specific risk assessment that must be completed for work that does not have a dedicated SOP. Radiation will be included as one of the parameters for consideration as part of the JSA system.
 - Housekeeping and personal hygiene are an essential part of any radiation protection system. Good housekeeping and hygiene controls help to minimise occupational exposure through ingestion and inhalation of radioactive materials.

- Appropriate personal protective equipment will be provided.
- All workers will receive training in the proper use of all issued Personal Protection Equipment (PPE).
- Specific procedures have been developed in exploration for higher grade core. These procedures will continue into operations and apply to higher grade mineralisation
- All radiation signs used by the company on their operational sites will conform to the requirements of AS 1319-1994 - Safety signs for the occupational environment and/or the radiation label and placard requirements of the Code of Practice Safe Transport of Radioactive Material 4.
- Rex will have a closure plan (that would need regulatory approval).

158. **SEISMICITY**

Assessment of the likelihood and potential impact of mining induced seismicity.

Based on Mine Technics Pty Ltd experience gained across similar large open pit and underground mines in similar operating conditions to the Hillside Project, it is expected that the proposed mining at Hillside will result in some low magnitude mining induced seismicity. This will occur as the natural pre-existing stress field is redistributed around the mining voids. It is highly unlikely these events would be noticed by members of the public or the on-site workforce. It is expected there would be little, if any damage to the mine or onsite infrastructure. Given the distance to public and offsite infrastructure it is expected that there will be no detectable damage to offsite infrastructure.

Due to the staged development of the open pit and the underground mine, it is expected that any seismological effects of the stress redistribution due to mining will be dissipated as small incremental events matched to the gradual changes in the shape and size of the mine. The small and incremental release of seismic energy is the natural response to the gradual development of the mine. This incremental release of energy reduces the potential for large energy storage and release required to initiate significant fault movement typical of natural occurring crustal seismicity that result in a noticeable seismic events (earthquakes = Richter Scale events >4).

Research has been conducted and budget provisions have been made for the potential installation of a micro seismic monitoring system to help Rex understand the source, location and drivers of seismicity within the rock mass.

Stress field modelling and reporting will be conducted as part of the PEPR documentation, if required.

159. **SEISMICITY**

Explanation sought regarding the potential risk of blasting activities impacting on the integrity of coastal cliffs and an increase in risk of landslips, and how this will be managed.

The potential impact of blasting on coastal cliffs has been outlined in Section 8.3.3 under potential impact ML-BV8, *disturbance to geological monuments from blasting activities*. The blasting impact assessment is presented in Appendix 8.3-B of the MLP.

The closest portion of cliff is between the 10 mm/s and 5 mm/s modelled vibration zone for the open pit blasting as modelled by SAROS (Figure 5.16-1 of the MLP). Desktop research was undertaken to identify any outstanding natural features of the environment in the vicinity of the Hillside Project identified four geological monuments (SARIG 2012). One of the three coastal geological monuments is located within this area of cliff between the 10 mm/s and 5 mm/s modelled vibration zone. This geological monument is referred to as "Harts Mine". As per the Australian Standard 2187.2-2006 guidelines for blasting in Section J4.2 Ground vibration, '*Vibration transmitted through the ground may cause damage to structures and architectural elements or discomfort to their occupants. The vibration levels at which people become annoyed are well below vibration levels at which damage occurs.*'

Frequency independent and frequency dependent guide levels are described in both British Standard BS 7385-2 and the United States Bureau of Mines (USBM) RI 8507. The levels specified are peak component particle velocities, and the methodologies used for assessing the frequencies are similar in both documents. These guidelines relate to damage and cover light residential and reinforced commercial structures. Limits are frequency based and range from 15 mm/s to 50 mm/s. The risk of damage to the geological monuments and cliffs is low as they are located between the 10 mm/s and 5 mm/s modelled vibration zone which is below the lowest level of 15 mm/s.

Continuous vibration monitoring will be undertaken in line with the blast monitoring program.

160. **SLURRY PIPE**

Explanation sought for rationale for buried vs above ground slurry pipe construction, and justification for not removing the pipe as rehabilitation. Specifically:

- ***Justification for why a pipeline carrying potentially toxic product should not be above ground so that they can be inspected regularly to ensure there are no visible leaks;***
- ***be appropriately banded to contain any spills; and***
- ***be fitted with leak detection systems to register catastrophic failure and shutdown pumping systems.***

By burying the pipeline by 800mm it significantly reduces the risk of damage to both the pipeline and the environment from any spill caused by an external impact. It is also aesthetically more appealing (minimised visual impact) and enables cropping on the ground above to continue. The pipe will not be removed at closure to minimise land disturbance, however, the pipeline will be flushed prior to sealing to ensure all residues on slurry concentrate have been removed.

As per Section 6.6.5.2 *Leak Detection System* in the MLP:

1. The objective of a leak detection system is to spot system leaks, predict their location as well as issue warnings to operators. Detection is expected within two to 10 minutes of an occurrence depending on the size and the location of the leak.
2. The HDPE liner represents an additional level of leak prevention to the environment, acting as a secondary containment measure for the system. A leakage between liner and pipe will initially be detected resulting in an immediate shut down of the pipeline preventing wear of the outer steel pipeline and possible leakage to the environment.

3. The industry standard leak detection system is based on two methods:
 - o mass balance (MB) monitoring
 - o section characteristic parameter (SCP) monitoring
4. The more reliable SCP is defined as $Q^2/(dh/dL)$, with Q representing the local flow rate and (dh/dL) representing the slope of the hydraulic gradient (head loss) in the monitoring section. The MB method alone would create false alarms when the pipeline is in transient conditions.
5. The principles of leak detection are a comparison of the flow rates, pressures, and densities at the start and end of the pipeline based on current steady state flow regime in the line and considering position of the pipeline valves. A leak would be recognised by the departure from established norms for these parameters.
6. The on-line monitoring of data provides operating personnel instant access to information about process flow conditions. This access to information allows safer operation and better maintenance of the pipeline. If there is an indication of a leak, the flow will be terminated and an inspection team will be dispatched to the suspected area.

161. **SOCIO-ECONOMIC**

Further discussion sought on impacts on available/current workforce for local businesses, and how the proponent will manage their workforce without having significant effect on local business, farming and local government agencies though competition for limited employee pool.

One of the frequently asked questions to Rex is 'How will other industries keep their workers?'. Rex recognises that with the required workforce for the Hillside Project, Rex will contribute to the competition for skilled labour. This has the potential to increase average wages and/or deplete other industries of skilled workers. However, this will be balanced by the potential positive impact from the increase in new residents to the area, as stated in Rex's Socio-Economic Impact Assessment (SIA) presented in Appendix 8.1-A of the MLP. This assessment was prepared by an independent consultant.

One of Rex's proposed strategies to minimise the potential impact of workforce reductions on local communities is to offer non-mine employees the opportunity to participate in training and education programs in order to increase the 'pool' of skilled labour available to other businesses/industries. Other strategies include supporting the Connecting Aboriginal People with Mining program developed through Skills for All, a Government of SA vocational education and training initiative. Furthermore, Rex will continue to work closely with the Narungga people to ensure a mutually beneficial working relationship. Such benefits could include the employment of a heritage officer, indigenous student scholarships and early and ongoing involvement in site rehabilitation.

In addition to this, Rex has and will in the future provide opportunities for students from the local area schools and TAFE along with tertiary vacation students to develop broad skills relevant to the resource sector e.g. environmental management and electricians through work experience and placements.

The SIA presented in Appendix 8.1-A of the MLP also states that the increase in employment from Hillside will increase the demand for other goods and services, potentially prompting further investment and profitability in other industries. Given that the workers will be encouraged to be based in the surrounding communities, it can be assumed that they will spend part of their incomes on local goods including food, accommodation, recreation, transport and services. Therefore this will strengthen the viability of local businesses and may

even create the environment for the introduction of new businesses supplying goods and services to the region. Rex has and will continue to procure goods and services for Hillside from within the region, where possible, in order to maximise the local economic benefit. Rex is currently preparing a Local Business Development Plan that will include engagement with agencies, local government and businesses.

Further strategies will be developed with the assistance of the community regarding workforce planning. Rex has via an information article in the Yorke Peninsula Country Times on Wednesday 29 January 2014 inviting anyone interested in joining a future working group to contact Rex. The working group and the CCG will be involved in the development and review of the Local Employment Plan.

This commitment has been formalised in Section 8.2 of the MLP, which states that an overarching Social Management Plan will be formulated in consultation with the relevant stakeholders (CCG). This will include a Local Employment Plan as outlined in Table 8.2.1 of the MLP containing the following key aspects;

1. Set targets for employment of people with the relevant skills or experience from the primary study area and Goyder SED region that is considerate of both the desire to maximize the economic benefits of the Project without depleting the region of skilled workers in other industries/businesses.
2. Provide opportunities to non-mine employees to participate in training and education programs in order to increase the 'pool' of skilled labour available to other businesses/industries.
3. Set strategies to minimise the potential impact of workforce reductions on local communities (as discussed directly above).
4. Include a policy of consistency with other regional employers in the setting of wages and conditions, such as flexible rosters to allow for agriculture seasonal peak times, for mine workers.

162. SOCIO-ECONOMIC

An independent assessment sought on the proposed mine in relation to impacts on the economy of the local YP region and the state in both the long and short term, including all aspects of the regions current economy (i.e., recreation and tourism, commercial fishing, as well as agricultural practices).

An independent assessment conducted by DMC was undertaken on the socio-economic baseline characterisation to describe the current socio-economic environment in the Project area and the region more broadly (Appendix 5.1-A of the MLP). It is against this baseline that an assessment of socio-economic impacts was conducted. An independent assessment in relation to potential impacts of the proposed mine on the local economy was also undertaken by DMC as part of the MLP (Appendix 8.1-A of the MLP). The potential socio-economic impacts on economy have been detailed in Section 8.2.7 of the MLP. See ***Response_164. Socio-Economic*** for further information.

The socio-economic impact assessment (SIA) uses the same study area defined in the socio-economic baseline characterization. It used a two-tiered study area recognising that while the majority of potential impacts (positive and negative) would be felt locally, the Project would also have an effect on the region more broadly. The definitions of each study area from the socio-economic baseline characterization are stated in Section 1.3 of Appendix 8.1-A of the MLP.

An independent assessment conducted by DMC assessed the impacts on the economy of the local Yorke Peninsula region and the state in both the long and short term (see Appendix 5.1-A of the MLP for further

details). Throughout the impact assessment, tourism, agricultural practices and other industries (i.e. commercial fishing and seasonal agricultural labour) have been included as receptors for the following aspects:

1. Land use
2. Employment
3. Local population
4. Health and wellbeing
5. Community services and facilities
6. Infrastructure
7. Housing and accommodation
8. Economy

The SIA identified 27 potential socio-economic impacts. Eight were assessed as having a potentially moderate negative rating, relating to land values, accommodation and housing, regional competition for skilled labour and local population. There were no potential impacts that received a negative residual rating of major or extreme. Some impacts which have been rated negatively also have a potentially positive aspect and where this occurs, this has been indicated in the impact rating tables (Table 7 to 14 of Appendix 8.1-A of the MLP). Seven solely positive potential impacts were identified in the areas of employment, community participation and local economy.

The key impacts on the economy as per the SIA are presented below as excerpts (Section, Table and Figure references in the excerpts below all relate to the SIA):

Changes to land value and industry types within region

The extent to which the Project will change land values within the region is likely to have an impact on the economy, the effects will extend across the region and are likely to be medium to long term. The magnitude has therefore been determined as medium. The sensitivity has been determined to be medium because communities have resilience to adapt to this impact and there are already some signs of this impact in the community. This results in an overall residual impact rating of moderate. In some instances this impact may be negative, while in others, a positive effect may result, as described in Section 2.1.3 Changes to land value and industry types within region.

Increased employment

The effect of this impact will be positive.

Increase in regional employment

The effect of this impact will be positive.

Increase in regional competition for skilled labour

The Project will increase regional competition for skilled labour to the extent that the Project and other businesses may be unable to source skilled labour for some positions from within the region. This effect is likely to be medium- to long-term. The magnitude has therefore been determined as medium. The sensitivity

has been determined to be medium because the community will likely have some resilience to change (in accepting newcomers and increasing the overall skill pool) and exposure to this impact is already evident in the region with other mines and industry already competing for skilled labour across the State. This results in an overall residual impact rating of moderate. There is also the potential for positive impact from increasing the overall skilled labour pool through training and education and with the relocation of new residents to the area, as described in Section 2.2.3 Increase in regional competition for skilled labour. See **Response_161. Socio-Economic** for further details.

Increase in local population

The extent to which the Project will modify the local population will impact on the regional economy and affect the region for the medium- to long-term. The magnitude has therefore been determined as medium. The sensitivity has been determined to be medium because there are already some signs of exposure to this impact evident in the region. This results in an overall residual impact rating of moderate. In some instances this impact may be negative, while in others, a positive effect may result, as described in Section 2.3.1 Increase in local population.

Increased population requirements for housing and accommodation

The extent to which the Project will increase housing and accommodation needs will be felt across the region and have, potentially, a notable impact on the economy for the medium- to long-term. The magnitude has therefore been determined as medium. The sensitivity has been determined to be moderate because some signs of exposure to this impact have already evident during peak tourism times. This results in an overall residual impact rating of moderate. This impact will also have some positive effects for landlords and providers of temporary accommodation, as described in Section 2.7.1 Increased population requirements for housing and accommodation.

Reduction in availability of housing and accommodation

The extent to which the Project will reduce the availability of housing and accommodation will be felt across the region and have, potentially, a notable impact on the economy for the medium- to long-term. The magnitude has therefore been determined as medium. The sensitivity has been determined to be moderate because some signs of exposure to this impact have already evident during peak tourism times. This results in an overall residual impact rating of moderate.

Reduction in housing and accommodation affordability

The extent to which the Project will reduce the affordability of housing and accommodation will be felt across the region and have, potentially, a notable impact on the economy for the medium- to long-term. The magnitude has therefore been determined as medium. The sensitivity has been determined to be moderate because some signs of exposure to this impact have already evident during peak tourism times. This results in an overall residual impact rating of moderate.

Effect on economy

The effect of this impact will be positive.

As discussed in Section 8.2 of the MLP, a Social Management Plan will be formulated in consultation with the relevant stakeholders. This will include a Local Business Development Plan as outlined in Table 8.2.1 of the MLP containing the following key aspects:

- Engage with agencies (such as Regional Development Authority), local government and other employers to plan, on a regional scale, to maximize the regional business opportunities.
- Identify goods and services provision capacity in the region and develop and implement a policy of regional procurement including identifying and promoting opportunities for indigenous businesses.
- Conduct training and awareness sessions for small businesses in the region to assist them to understand the potential supply opportunities to the Project and the Project's procurement requirements.
- Engage with agencies, local government, industry associations and other businesses to develop strategies to mutually benefit industries in the region.
- Consultation with the Regional Development Authority and CCG on the development of the Local Business Development Plan.

Further to this, the submission from Business SA states that Business SA has surveyed all its YP based members with regards to the proposed Hillside Mine and makes comments regarding economic contribution below based on the evidence established from our survey; *Business SA members recognise the economic contribution, including job creation, which the Hillside Mine will make to the YP and to the State economy at large. This is reflected by 71% of our survey respondents who believe there will be substantial benefit for Yorke Peninsula based businesses from the mine's construction and operations.*

See Figure 44 for an illustration of the relationship between revenue and land use on the Yorke Peninsula based on ABS data 2006 National Profile Yorke Peninsula and Yorke Peninsula Regional Tourism Profile, 2008.

163. **SOCIO-ECONOMIC**

Clarification sought on the impact the proposed operations will have on the total area of productive agricultural cropping land available on Yorke Peninsula, impacts on adjacent land use, and the potential reduction of economic output from the agricultural sector, and the potential/impact of additional satellite sites being established by Rex on the Yorke Peninsula.

Development of land for mining is widely accepted as delivering significant economic benefits at the local, state and national level. The amount of land within the proposed ML is approximately 3030 hectares and only approximately 2080 hectares of this will be disturbed for mining. This disturbed land equates to less than 0.3% of agricultural land on the Yorke Peninsula. At mine closure it is envisaged that the final land use will involve a mix of agricultural pursuits and native vegetation, with all efforts made to maximise the amount of land returned for agriculture.

Impacts on adjacent land use from the Hillside Copper Mine have been assessed in Section 8.3.17 (mine site) and Section 8.4.15 (infrastructure corridor and port site) of the MLP.

A new copper operation could provide an enormous economic benefit to the region and have a direct positive impact on the Yorke Peninsula in addition to the existing industries of agriculture and tourism as illustrated in Figure 44. The revenue presented in Figure 44 is based on publically available data from the Prominent Hill copper mine, which is expected to be similar to that of the Hillside Copper Mine. The land use size and

revenue for tourism and agricultural is based on 2006 ABS data presented in the 2008 National Profile Yorke Peninsula and Yorke Peninsula Regional Tourism Profile. There will be a potential minor reduction of economic output from the agricultural sector post closure as all of the final landforms (i.e. open pit is 225 ha) in the disturbed area (2080 hectares) will not be able to be returned for agriculture. The potential benefits post closure could increase tourism through such drawcards as a lookout.

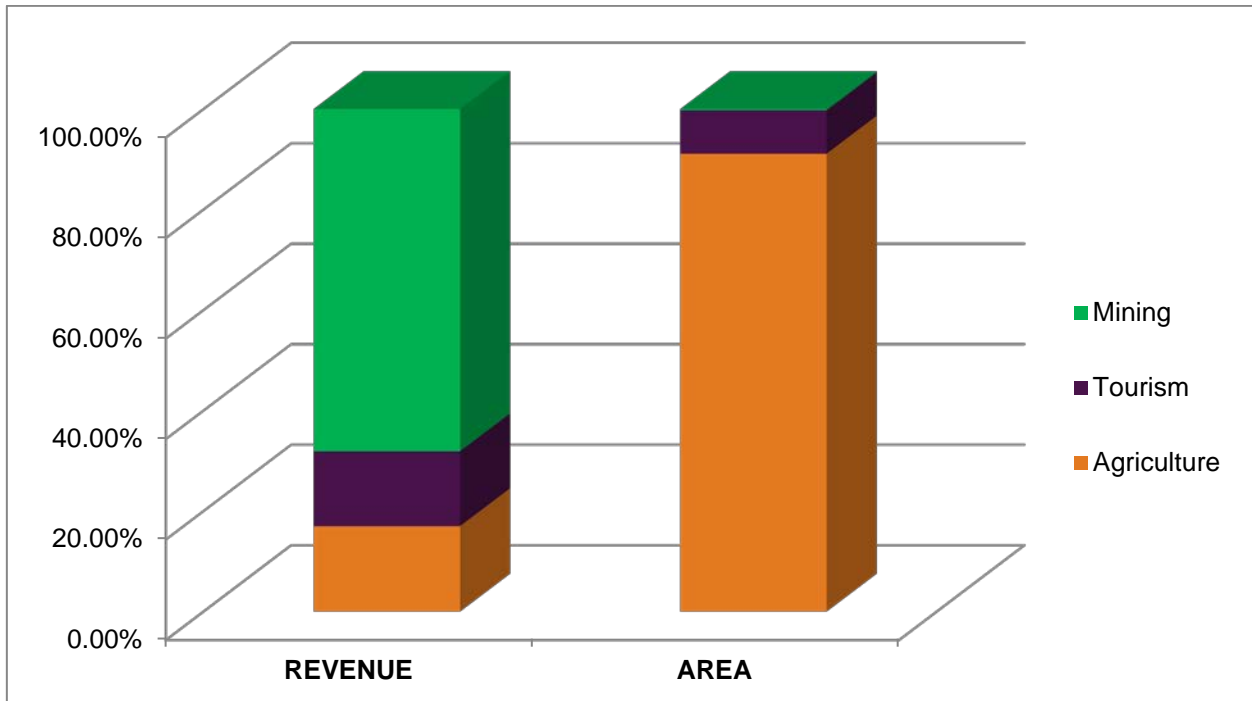


Figure 44: Rex presentation slide used to illustrate the relationship between revenue and land use on the Yorke Peninsula*

*Source, ABS data 2006 presented in 2008 National Profile Yorke Peninsula and Yorke Peninsula Regional Tourism Profile.

No satellite sites are proposed as a part of the impact assessment as set out in MLP.

164. SOCIO-ECONOMIC

Clarification sought on the impact on the tourism industry in the vicinity of the proposed mining operations, and the benefit of mining operations relative to potential losses to already established industries.

Impact on the Tourism Industry

A wide range of sporting clubs, local groups and festivals exist in the Yorke Peninsula region, providing a varied range of recreational pursuits in addition to the opportunities available from the coastline surrounding Yorke Peninsula. Many clubs are actively seeking new members to maintain their viability. An increase in population in the region will result in greater numbers of people accessing leisure facilities and participating in sporting teams and events or their coordination and administration. The introduction of mine related tourism opportunities such as mine tours, tourist information and viewing facilities during mining and opportunities for recreational pursuits post mining will complement the existing mining heritage tourist attractions of Yorke Peninsula (i.e. Moonta Mines Museum).

Rex have also made a commitment to the District Council of Yorke Peninsula to support the 'Walk the Yorke' program along the stretch of coastline owned by Rex. Currently there are approximately 60 km of coastal trails constructed and signposted on the Yorke Peninsula. Opportunity exists to link these trails and form one continuous leisure trail that circumnavigates the peninsula. The 'Walk the Yorke' concept is a 500 km continuous coastal trail around Yorke Peninsula, South Australia, and has the potential to become an "iconic" South Australian tourism experience. The benefits include:

- Attract visitors.
- Generate significant economic benefits to the region.
- Make a significant contribution to the lifestyle, health and social wellbeing of South Australians.
- Increase recreational opportunities.

The effect on increased traffic on tourism has been identified and detailed, see Section 8.2.5 of the MLP for details.

Impact on Other Established Industries

In Section 2.3.1 of the Social Impact Assessment (Appendix 8.1-A of the MLP) changes to land value and industry types (including tourism) within the region was discussed as detailed below;

Whilst much exploration activity occurs on the Yorke Peninsula and a dolomite mine (now operated by Arrium Mining), operates less than three kilometres south of Ardrossan, the Rex project signals the first new major mining project on the Yorke Peninsula since the operation of the Moonta copper mines on the west coast and greater diversification of industry types in the region.

Expansion of mining on the Yorke Peninsula will add diversity to the industrial profile of the area. Given the existence of heavy industry on the peninsula already, the expansion of mining is not expected to have a negative effect on tourism in the region and may be perceived to provide greater opportunities in the form of industrial tourism.

Furthermore, as per **Response_161. Socio-Economic**, the Socio-Economic Impact Assessment presented in Appendix 8.1-A of the MLP states that the increase in employment from Hillside will increase the demand for other goods and services, potentially prompting further investment and profitability in other industries. Given that the workers will be based in the surrounding communities, it can be assumed that they will spend part of their incomes on local goods including food, accommodation, recreation, transport and services. This is likely to strengthen the viability of existing goods and services and may even create the environment for the introduction of new goods and service providers, increasing the product options available and possibly even the competitiveness of prices for regional residents.

Rex has and will continue to procure goods and services for Hillside from within the region, where possible, in order to maximise the local economic benefit. Rex is currently preparing a Local Business Development Plan that will include engagement with agencies, local government and businesses.

Reference:

- REIA, 2009, *Property Values in Mining Boom and Bust Towns*, REIA News.

165. SOCIO-ECONOMIC

Values Explanation sought regarding potential decrease in property values due to the proximity of the mine and long-term price inertia on its completion; and regarding potential for competition for rental and purchase of properties leading to a decrease in the affordability of properties in the area due to competition for property sales or rentals.

The potential socio-economic impacts on housing and accommodation are identified in Section 8.2.6 of the MLP, including draft controls and management strategies. The control and management strategies include;

1. Develop and implement the Local Employment Management Plan.
2. Develop and implement the Communication Management Plan.
3. Temporary camp accommodation provided for employees and contractors during operation and construction.

As per Section 8.2.6.4 Justification for Residual Impact Rating of the MLP; The extent to which the Project will result in increased population requirements for housing and accommodation will be felt across the region and have, potentially, a notable impact on the economy for the medium- to long-term. The magnitude has therefore been determined as medium. The sensitivity has been determined to be moderate because some signs of exposure to this impact have already evident during peak tourism times. This results in an overall residual impact rating of moderate. This impact will also have some positive effects for landlords and providers of temporary accommodation.

The extent to which the Project will reduce the affordability of housing and accommodation will be felt across the region and have, potentially, a notable impact on the economy for the medium to long-term. The magnitude has therefore been determined as medium. The sensitivity has been determined to be moderate because some signs of exposure to this impact have already evident during peak tourism times. This results in an overall residual impact rating of moderate.

As discussed in Section 8.2 of the MLP, a Social Management Plan will be formulated in consultation with the relevant stakeholders and include an accommodation strategy outlining the residential workforce objectives and tactics to ensure accommodation preparedness.

Land values are likely to change as a result of the Hillside Project: precedence across Australia suggests that towns and cities near to major mining and resources regions experience a general increase in land values (as demand meets or outstrips supply, refer to Section 2.7 Housing and accommodation (Appendix 8.1-A of the MLP))(REIA 2009). The effect on values of agricultural properties immediately adjacent to mining projects (generally) has not been conclusively demonstrated to be either negative or positive (but rather seems to depend on the nature of the mining operation, its land and water management practices, visibility and the effect is has on nearby amenity and impact on the agricultural productivity of the land rather than determined by the industry generally). Nevertheless, adjoining landholders may perceive that their property value is decreased as a result of the Project.

166. SOCIO-ECONOMIC

Further discussion is sought regarding the consultation process undertaken by Rex, including the validity and effectiveness of the CCG, information distribution, and the validity of the Community Perceptions Survey have also been raised.

Rex has been, is and will continue to engage with local stakeholders re the Hillside project. This allows us to hear and answer their questions, listen to issues and concerns related to the project and seek to keep them updated through a range of communication channels. Whilst we have seen an escalation in interest and concern, and a higher level of negative comments of late, it is worthwhile covering off some of the more general views that have been supportive of the project. These have come through a range of channels and over a period that has included extensive opportunities of engagement.

It can always be difficult to assess the level of support for a project, given most people who are positive are either ambivalent and do not comment or only pass on their support verbally. Some examples of this have been summarized below.

At the moment we have a total of 1,010 registered as seeking employment on the project. Of these 836 are from SA and 427 of these are from YP and near Mid North (out to Pt Broughton, Clare & Two Wells). Clearly these people are supportive of the project.

We have provided a number of engagement opportunities and there has been much positive support and comment. Some of the engagement that has occurred over the last 6 months (**since April 2013**) has been listed below:

1. Site Tours & Open office in Ardrossan: 15 site tours to the general public.
2. CCG: 7 CCG meetings (including attendance from DMITRE and EPA at one meeting).
3. Presentations:
 - o 3 Community Information Sessions.
 - o James Well/Rogues Gully Progress Association.
 - o Rotary Club.
4. Council: Monthly meetings with Council, plus presentation to the 4 Councils. I have attended two council meetings and have received a great deal of positive comment re the project (albeit pre their recent submission during the period of public consultation).
5. Heritage: Multiple meetings with Narrunga representatives including workforce planning with Tauondi College and a site tour.
6. State Government: Multiple meetings with government agencies including DMITRE, EPA, DEWNR, DPTI, RDA (Regional Development Australia), NRM Board & SA Water.
7. Other:
 - o Ongoing dialogue with representatives of the YPLOG, surrounding landowners & local business owners.
 - o Multiple meetings with Steve Griffiths.
 - o Paskeville: Over 250 people directly engaged over the 3 days, with 90% positive mostly positive (11 people who requested further information were responded to via phone or email)

The consultation opportunities from late 2010 – April 2013 (last 2.5 years) have been documented in the MLP in Section 7. The following are direct excerpts from Section 7 and discuss the process and intention of the Community Perceptions Survey:

Site tours in December 2012 and January 2013 were designed to enable the maximum access to those temporary visitors and landowners from across Yorke Peninsula. The site tours were facilitated to assist stakeholders' understanding of the Hillside Project, explain its size and potential impact, timelines and to provide an opportunity to raise issues they may have. These issues were obtained in the form of a short survey (feedback form) and were added to the issues register if they had not been previously identified. An overview of the percentages of attendees related to the target stakeholder groups of temporary visitors/landholders and landholders from across Yorke Peninsula showed that:

1. 33% were from areas within proximity to the Hillside Project including the coastal settlements.
2. 48% were from or owned property from either the Copper Coast or central and southern parts of Yorke Peninsula.
3. 19% were visitors from outside the region, who did not own land in Yorke Peninsula.

The feedback from the site visits have been positive with respect to information provided and opportunities to ask questions and raise issues. The feedback was captured via a short survey and suggested improvements have been implemented where possible and issues raised are included in the issues register (see Section 7.5 of the MLP).

The CCG land form perceptions survey was conducted in November 2012 with 14 of the CCG members. The results were presented to the CCG for comment and discussion. The CCG are a representative group of the broader community and include such stakeholder group as detailed in Table 7.3-1 below:

Table 7.3-1: Stakeholder groups and representation

Stakeholder group	Stakeholder type	Level of impact	Representation on Hillside Project CCG	Engagement opportunities
Landowners (Farmers) within proposed ML and MPL areas	Primary	1	✓	37
Communities in small settlements neighbouring the proposed ML and MPL areas Including nearby landowners	Primary	1	✓	52
Local government (DCYP)	Primary	1	✓	27
State Government and agencies such as DMITRE, EPA, DPTI, SA Water, SA Power Networks, DPC, PIRSA, SafeWork SA	Primary	1		35 +
Indigenous peoples of the area (Narungga)	Secondary	2	✓	30
Regional development groups	Secondary	2	✓	21
Regional education and training groups	Secondary	2		6
Interest groups including Environmental groups (NRM, COOTS, TPAG, land care groups) farm groups agricultural groups (YP farmers group, Soils groups etc.)	Primary	3	✓	22
Small business including tourism within the region including contractors	Primary	3	✓	23
Emergency and services	Primary	3	✓	23
Local Members of Parliament	Primary	3		5
Community members in the region	Secondary	4	✓	36
Landowners (Farmers) in the region	Secondary	4		6
Other special interest groups (volunteer, recreation, service groups etc.)	Secondary	4		7
Other agencies	Secondary	4		8
Australian Government agencies	Secondary	4		4
Media local	NA			As required
Mining industry (SACOME)	NA			As required
Rex (Board, employees and shareholders), Investors and shareholders	NA			As required

Also a targeted survey was undertaken by Rex to Rex's Community Consultative Group (CCG) on July 2 2012 to review accommodation options and preferred mine footprint and end land use objectives along with other key issues.

The CCG was initiated in September 2011 at a dinner hosted by Rex that included representation from those stakeholders identified through stakeholder mapping. Expressions of interest were sought at the dinner, and more widely, to form a steering group to establish the Hillside Project CCG. The steering group, comprising 11 people met first in December 2011, where an independently facilitated workshop was held to determine key representation objectives based on interest groups and attributes of the region. This meeting established the CCG and expanded the membership to include all those interest groups identified. The first formal CCG

meeting was held in February 2012 and the group met initially bi-monthly, increasing in frequency to monthly in July 2012.

The CCG devotes time each meeting to discuss issues raised by the segments of the community they represent. For these discussions Rex also provides issues that have arisen independently from the CCG through its other consultation activities such as site tours, presentations and other communications. The issues are compiled on an issues register and are discussed. Additional information is provided by Rex and expert consultants to help clarify issues, and suggestions and expectations put forward as to how to manage such issues. Both positive and negative issues are recorded (see Section 7.5).

The CCG formed an environment focus group and a social /infrastructure focus group in July 2012 to facilitate working through issues in more detail. Issues were prioritised and segregated into either environmental or social/infrastructure issues. At each subsequent meeting the focus groups discussed relevant issues identifying levels of community concern, expectations about how these could be managed to deliver outcomes the community would expect. This approach has meant that through the CCG the community has had significant input on the planning, development and management of the Hillside Project.

The current CCG have expressed that they (as a group) would like to continue to be a reference group throughout the life of the mine. Rex is very much in support of this.

167. SOIL

Section 8.3.5

Further explanation sought regarding the longer-term impacts of the saline water use across the various suppression and disposal activities on site, including a total site estimate of the salt released should be provided.

Saline water will only be used within proposed ML disturbance footprint (approximately 2080ha), predominately on the haul roads, where no surface water discharge into the surrounding environment will occur. At closure, saline affected soil will be removed and appropriately disposed of in the TSF or open pit, prior to rehabilitation as described in Section 6.9.4.1 of the MLP (see below);

The exposed ground will be tested for potential contaminants. If the soil is contaminated it will be remediated in situ or removed and disposed in an appropriate manner. After contamination clearance, the ground will be ripped to 0.3m covered with 0.1m to 0.3m of topsoil and stabilised with appropriate vegetation applicable to agricultural production.

168. TSF

Explanation sought regarding the contents of the tailings dam and in what concentrations i.e. Heavy metals, uranium, waste processing chemicals etc.).

Based on the pilot plant test work – the predicted tailings characterisation is outlined in Figure 13 and Table 12 in **Response_18. Geochemistry**, heavy metals are not present as free ions rather they are found as components of naturally occurring mineral complexes in the forms of silicates, hydroxides, sulphides and carbonates etc. (e.g. the copper in the tails assays 0.02% Cu and is mainly present from mineralogical analysis as a chalcopyrite grain encapsulated by silica, hence non-floatable).

As per **Response_18. Geochemistry**, the Uranium is present as non-floating Uraninite and will report to the tailings. Since the uranium is on average 57 ppm in tails it represents 0.00057% of the 0.2% in the *Others Mineral Grouping* in Table 12.

It's generally accepted in the mineral processing industry that the flotation reagents used in the process predominantly report with the flotation concentrate (solids), with negligible reagent concentrations reporting to the TSF. Water is reclaimed back from the TSF as part of the overall site water management strategy.

169. TSF

Explanation sought for why double poly liners were not used but rather a clay lined tailings system.

A double liner system has not been included for the following reasons:

1. The tailings are acid consuming and hence do not pose a threat to the surrounding environment if seepage does occur.
2. The natural groundwater has high salinity (ranging from 18,600 mg/l to 37,900 mg/l), the tailings decant water is also likely to have high salinity (21,000 mg/l to 29,000 mg/l), however this will not adversely affect the groundwater.
3. The TSF is located within the open pit dewatering draw-down area of influence and hence will have little effect on the surrounding environment in the unlikely event that any seepage occurs.
4. The low permeability material located on site has been demonstrated suitable for use as a low permeability liner based on the results of the permeability testing. (In Section 5 of Appendix 6.7-A of the MLP, a summary of the geotechnical investigation including the test pits and logs. The 'Geotechnical Investigation Report' June 2013 (111278.03R05) includes all of the supporting information from which the summary in Section 5 of Appendix 6.7-A of the MLP is based and can be provided on request).
5. An underdrainage system will be located beneath the TSF decant pond to further assist removal of water from the TSF. The intention is to maintain the TSF decant pond as low as practicable. The volume of water within the DSCP is likely to remain relatively low as it is anticipated there will be a water deficit for large portions of the year as identified in the water balance. This is supported by the regional climate data (i.e. evaporation is significantly higher than rainfall values).
6. Estimated seepage from the TSF following installation of the final cap (based on current closure modelling) is less than 3 mm/year or less than 10 % of incident rainfall based on an annual rainfall of 350 mm.

170. WATER

The interrelationship of surface and groundwater flows has not been included.

Explanation sought for the exclusion of interrelationship.

The interrelationship of surface and groundwater flows has been detailed in Section 12 of **Appendix 7**.

The 'Hydrogeological Summary Report' (December 2013) presented in **Appendix 7**, states that saturated conditions were not encountered in the Tertiary / Quaternary age sediments (layer 1) in any of the wells drilled (refer to Sections 8.1, 8.2, 8.3, and 8.4). This means that no unconfined aquifer (layer 1) was intersected at any location on site and that groundwater occurs only in the underlying basement rocks. This is the reason for excluding the Cainozoic sedimentary cover (layer 1) as an aquifer.

With regard to surface water – ground water interactions with this (shallow) layer (layer 1), since no aquifer was identified, no aquifer is considered to exist, so surface water – groundwater interactions between the land surface and any Quaternary/Tertiary aquifer (layer 1) cannot occur. It is however possible that infiltration through the land surface may occur. At Hillside, there is a significant excess of evaporation over rainfall for the majority of the year, and months in which rainfall exceeds evaporation are those which coincide with the main cereal growing season (winter and spring). Therefore, infiltration to the base of the sedimentary sequence is likely to be nil to very low in periods when evaporation exceeds rainfall and in periods when rainfall exceeds evaporation, uptake by vegetation will occur and significantly reduce recharge. Since no unconfined aquifer (layer 1) was encountered, it is concluded that infiltration past the root zone must be negligible.

Also, there are no watercourses on site, just small ephemeral drainage channels. It is concluded that losses from these channels during periods of high rainfall intensity must be very small and are taken up by vegetation as no unconfined aquifer was identified at Hillside.

Recharge to the basement aquifer (layer 3 and 4) is considered to not occur at Hillside due to the presence of the saprolite (confining layer 2). See Figure 5 of **Response_7. Closure** for a representative cross section of the four hydrogeological layers.

171. WATER

Section 6.6.4

Further explanation sought on exactly how and where surplus water will be re injected, what potential impacts it might have, and how re-injection will be achieved and effectively managed.

Updated modelling has shown that there will no longer be issues with surplus water (refer to **Response_70. Water**), however, re-injection will remain as a contingency option. Injection modelling has been detailed in Section 14.7 of **Appendix 7**.

The disposal of water from the pit and underground was an option considered during the PFS phase and part of the DFS phase of the study. However, the Stage 4 drilling and test pumping results indicated that the hydraulic conductivity of layer 4 of the model is significantly lower than used in modelling to the end of the Stage 3 program (see Section 15 of **Appendix 7**). When the revised hydraulic conductivity values were used in the model, pit and underground discharges reduced to below that required for onsite uses. This meant that there was no need to include an injection well field, so locations and methods of injection are not at this stage being considered.

172. WATER

Further explanation sought regarding the basis for the 'relatively slow' pit refill rates including the modelled pit volume, whether the recharge rates are diminished after the initial years, and a post-mining operations water balance that shows the key flow assumptions.

As per **Response_7. Closure**. See Section 14.8 of **Appendix_7** for full details of the Long term pit water level recovery modelling.

The rate at which water levels in the pit will recover depends on the hydraulic conductivity of the aquifer (inflow), and evaporation and rainfall rates. Drilling and test pumping in the Stage 4 investigations indicate

that the aquifer at depth is of very low hydraulic conductivity. This means that water will enter the open pit much more slowly than if it was excavated in a high hydraulic conductivity aquifer, even though the hydraulic gradient is very high.

Evaporation exceeds rainfall on an annual basis, so recharge by rain falling on the pit lake will be exceeded by evaporative losses from the pit lake.

As time progresses, water from the aquifer will fill the underground voids and then flood the floor of the pit. The pit water level will then rise relatively rapidly at first due to a high hydraulic gradient and the small pit lake surface area. As the water level in the pit rises, the hydraulic gradient decreases (as the difference between the pit water level and the potentiometric surface in the aquifer lessens), reducing the rate at which water will move from the aquifer to the pit. Also, the surface area of the pit lake increases as water levels rise because the pit is wider and longer higher up (i.e. at shallower depths). These factors will lead to a reduction in the rate of water level rise in the pit. Changes in the shape of the pit level recovery curve are due to changes in pit geometry and the reduction in recharge rate due to changes to hydraulic gradient and pit lake surface area. Eventually, the rate of water loss due to evaporation will equal the rate of water ingress and the pit water level stabilises at an equilibrium level.

173. WATER

The open pit appears to be approximately 1 km from the sea. The groundwater in the pit zone currently is highly saline and the groundwater elevation level is not dis-similar to mean sea level. None of the cross sectional diagrams of the pit show this proximity.

The model cross section in Section 13.1 (Figure 91) of the Hydrogeological Summary Report (**Appendix 7**) includes Gulf St Vincent. Additional cross sections are presented in **Response_59. Water** in Figures; Figure 21 to Figure 27 with a section location plan is presented in Figure 28.

The document does make reference to 'self-healing' conditions due to clays etc, but does not indicate how quickly 'self-healing' may take place following any geological events, including any minor seismic activity potentially triggered by digging the pit and removing groundwater.

'Self-healing' will occur when clays are present. When no clay is present, any potential pathways that occur in the highly unlikely event of sufficient seismic activity movement will be localised and minuscule in size. This means that no pathways will be created that would allow a change in seawater ingress rates. To provide a safe working area, dewatering holes are drilled into the pit walls to prevent wall failure (movement).

See **Response_158. Seismicity** for further information regarding the likelihood and potential impact of mining induced seismicity.

174. WATER

Section 8.3.13

Further detail sought on potential impacts on adjacent farming due to reinjection, groundwater mounding under the TSF, or TSF leakage.

Updated modelling has shown that there will no longer be issues with surplus water (refer to **Response_70. Water**), however, re-injection will remain as a contingency option. Injection modelling has been detailed in Section 14.7 of **Appendix 7**.

The number of wells selected was done so in part to enable injection heads to remain sufficiently low to avoid the potential for breaching of the confining layer, thereby providing a mechanism to protect surrounding farming land from harm due to injection. For further detail refer to Section 14.7 of **Appendix 7**.

Monitoring would be undertaken to record the extent (if any) of the groundwater mounding around the TSF and if necessary extraction bores could be installed to maintain an acceptable level. A risk assessment is scheduled to be carried out post completion of the detailed design of the TSF. This will address any relevant regulatory outcomes. For further information refer to **Response_48. TSF**.

Monitoring wells will be installed around the TSF to enable seepage losses to the Cainozoic age sedimentary cover (layer 1) to be identified. If occurring, this seepage would be collected by wells and pumped to the seepage collection pond. When the capping is in place and functional as per design, seepage will reduce to zero and groundwater mounding will reduce through pumping or by attenuation/dissipation. At closure wells will be monitored to indicate that seepage from TSF has ceased, if any occurred during operations.

As a consequence of the results obtained in the Stage 4 groundwater assessment, the reinjection of water won by dewatering is not expected to be required.

175. WATER

Potential impact event ML-GW5 discussed reduced groundwater quantity for native vegetation as a result of mine de-watering - impact description of associated risk assessment and management of reduced quantity of groundwater available for adjacent land users is sought, including what strategies will be implemented to prevent impact to surrounding groundwater users.

The results of the groundwater investigations identify that the groundwater (layer 3 and 4) is highly saline and there are no third party users (groundwater not used by landowners as per **Response_60. Water** and there are no groundwater dependant ecosystems as per **Response_91. Water**)

Reduced groundwater quantity available for native vegetation as a result of mine dewatering was assessed in Section 8.3.11 of the MLP under potential impact ML GW5 as below:

'Mining activities require that the aquifer be dewatered. This will result in a cone of depression forming within the aquifer with groundwater flowing from all directions towards the pit. This will include water being drawn toward the pit from the surrounding aquifer. This aquifer is confined by a significant thickness of low permeability saprolite forming an effective barrier between it and the Tertiary sediment sequence (cover sequence) on which the native vegetation exists.'

Groundwater investigations indicate that there is no unconfined aquifer within these cover sediments. Therefore, dewatering will not impact native vegetation. In addition, vegetation field surveys (COOE 2012) indicate that no GDE's occur on or near the proposed ML.

Given that mine dewatering for the Hillside Project occurs beneath the saprolite, there is no unconfined aquifer present onsite and no identified GDE's, it is **unlikely** that negative impacts to native vegetation would occur. The consequence of mine dewatering on native vegetation is **negligible**. As the resulting primary risk is **low**, no control measures are required.'

176. WATER

Potential impact event ML-GW2 describes groundwater contamination from AMD and leakage from water storages - description sought of the potential for leaching of contaminants (heavy metals) contained within the ore body and subsequent groundwater contamination, and what strategies will be adopted to reduce contamination of groundwater from heavy metals.

Potential for leaching of contaminates has been addressed as per:

1. As described in Section 8.3.11 of the MLP, less than 1% of the tested waste rock samples showed the potential for acid formation and the reports (Appendix 5.8-A and Appendix 5.8-B of the MLP) concluded that the potential for forming AMD is very limited, due largely to the relatively high abundance of carbonate minerals within the Hillside system. Leachate test work on samples from Hillside indicates that the leachate from samples is relatively benign, and that waste rock leachate is unlikely to present a significant risk to the environment. Geochemistry test work has indicated the tailings as not acid generating (Appendix 6.7-A of the MLP). PAF rock will be encapsulated in ACM to minimise potential for ARD.
2. The waste rock characterisation material test results are presented in **Response_5. Air Quality (d)**. As stated in Section 6.7.1.3 (MLP) results of the waste rock sampling and analysis indicate a relatively benign waste rock character associated with the Hillside Project and mineralogical analysis show no presence of asbestos or asbestiform minerals as per Appendix 5.8-B (MLP).
3. **Response_21. Geology** provides detail on atacamite management.
4. **Response_169. TSF** provides detail on the TSF liner and underdrainage system.
5. As indicated in MLP Section 8.3.13.4 Evaluation of Risk Levels (as the pH will be alkaline [approximately pH 9 to pH 9.5], only a minimal amount of the heavy metals can be absorbed into the water as they form hydroxide complexes which are insoluble and precipitate with the tailings).
6. Further, the clay liners at base and sides of TSF and the underlying saprolite would attenuate heavy metals that were not precipitated due to adsorption onto the clay minerals.

With regards to the leaching of contaminants from water storages, groundwater contamination will not occur even if leakage occurred because there is no unconfined aquifer (layer 1) on site and the confined aquifer (layer 3 and 4) is protected by the saprolite confining layer (layer 2). As per **Response_44. Toxicological**, all potential seepage from the TSF will be captured. See Figure 5 of **Response_7. Closure** for a representative cross section of the four hydrogeological layers.

177. WATER

Groundwater modelling based on drill depths to 200m however underground mining planned to 700m; hydrogeological considerations of geological faults and fractures generating restriction of groundwater transmissivity flows cannot be equated and therein supports modelling extrapolations to an additional 500m. Explanation sought on why drill depths for modelling have not extended to 700m to inform risk assessment for underground mining operations.

Stage 4 involved the installation of an additional 3 groundwater investigation wells (WBTH 040, WBTH 041, and WBTH 042) to pit floor depths plus test pumping. It has been assumed that aquifer properties below 400 m will be similar to those in the interval 200 m to 400 m vertical depth. The dewatering model was then modified, taking the results of that investigation into account. For further detail refer to Section 8.4 of **Appendix 7** for information on stage 4 drilling.

178. WATER

Test pumping for groundwater volume that was undertaken was during the driest months of the year when the unconfined aquifer would predictably be dry/not saturated. Explanation sought on the appropriateness of timing of the pump testing.

Test pumping was carried out as soon as practicable following the completion of each stage of well installation. Water table aquifers do not occur on or near site, and all tests were conducted on wells completed in the basement (confined) aquifer so seasonal influences are not considered likely to have been significant.

Drilling was conducted in all seasons, with no groundwater (saturated conditions) being encountered in any hole. As no water was encountered during drilling in any season, it is concluded that test pumping need not have occurred with reference to seasonality.

179. WATER

Justification sought for the use of airlift techniques for test pumping to define groundwater volumes given concerns over accuracy of this method.

The air-lift method was not used for test pumping. All aquifer tests were carried out using submersible pumps.

180. WATER

Records of rates of recharge and standing water level are absent as data sets for the cone of depression.

Refer to Section 14.3 Model Calibration of **Appendix 7**. Section 13 provides additional information on the use of standing water level information.

The justification for excluding recharge was identified in Section 13.2 of **Appendix 7** and stated below; *Recharge to groundwater was not included in the model. This is because no unconfined or water table aquifer (layer 1 in the model) was identified on site during both PFS and DFS investigations (including at WBTH 039 to the west of the site).*

Since there was no layer 1 aquifer present, it has been assumed that water is not available to move by vertical leakage through the confining layer (layer 2) and into the main fractured rock aquifer. A cone of depression will occur only in the basement rock aquifer.

181. WATER

Additional surface water modelling sought which includes current mine design and proximity to local drainage lines and runoff paths.

Section 6.8.8.2 of the MLP includes surface water modelling, including the current mine design and proximity to local drainage lines and runoff paths.

A detailed Surface Water Management Plan will be developed and key monitoring details will be included in the PEPR.

182. WATER

Confidence sought that following mine completion and pit flooding, there will be no leakage of pit water into the aquifers, and ultimately into the Gulf waters, over the next 500 plus years.

The modelling shows that groundwater will flow toward the open pit in perpetuity. Refer to Section 15.3 of **Appendix 7**.

183. WATER

Explanation sought for not placing and encapsulating contaminated tailings and rock into the pit and backfilling.

Refer to **Response_127. Closure**.

184. WATER

Clarification sought on the level of contamination in the pit water post closure, and what will be the consequences if it leaches into the Gulf and or surrounding shallow groundwater.

As stated in Section 14.8 of **Appendix 7**, modelling indicates that as groundwater will always be drawn toward the pit, impacts to other users cannot occur. In addition, seawater is less saline than groundwater at some locations on site so impacts to groundwater quality are unlikely to be significant.

Also, contaminants in the pit will not be able to move off site because groundwater movement will be toward the pit, not away from it. Refer to **Response_7. Closure** for further details. In addition, the possible movement of contaminants from the pit by diffusion will be negligible compared with the movement of water toward the pit.

185. WATER

Explanation sought regarding assumptions and risk relating to potential for the 'seasonal perched Quaternary aquifer' to be impacted by mining, given this was not targeted by drilling, and could be a water source for stock etc.

Drilling has shown there is no perched Quaternary aquifer (layer 1), refer to Section 8 of **Appendix 7** for further detail. See Figure 5 of **Response_7. Closure** for a representative cross section of the four hydrogeological layers.

186. WATER

Clarification sought on apparent focus of Wells for test pumping targeting only the deeper aquifer (represented by groundwater model Layer 3) and only on attaining estimates of likely inflow to the pit wall.

Drilling has shown there is no Cainozoic age/perched aquifer (layer 1), refer to Section 8 of **Appendix 7** for further detail. Layer 4 has also been more recently assessed, the results of which are documented in **Appendix 7**. See Figure 5 of **Response_7. Closure** for a representative cross section of the four hydrogeological layers.

187. WATER

The sole long-term pump test (conducted at well WBTH005, reported in Appendix A 9.7) is neither reported nor included in the tabulation in Section 4 of the body of the DFS report. The test indicates an acceleration of drawdown with time. Further discussion sought on the implications of this test, other than that it was conducted to gain an appreciation of the pumping effects on the fractured aquifer zone.

Refer to Section 10.3 of **Appendix 7** in which it is stated that 'Well WBTH 005 was test pumped (commencing 20 February 2013) to gain an appreciation of the possible effects of pumping on fractures that contain appreciable amounts of water. All previous tests had been conducted over periods of less than 30 hours (1800 minutes). This well was pumped for 6.7 days (9656 minutes) at 4.3 L/s, with drawdown being monitored in it and well WBTH 018 located nearby. The test data were analysed using Clarke software, resulting in a transmissivity of 16 m²/d being calculated as shown in Figure 65 of **Appendix 7**. No evidence of possible recharge boundaries were detected in the drawdown response, indicating that the fractures at this location is likely to be readily dewatered.' The 'acceleration of drawdown with time' should make it easier to maintain dry pit floor conditions.

188. WATER

Hydraulic parameters from test pumping were used to inform the Groundwater model. Recharge and groundwater levels were not used as inputs. Clarification sought.

Refer to Section 13.2 and Section 14.3 of **Appendix 7**. Section 13 provides additional information on the use of standing water level information. Recharge was not included (apart from throughflow from the west in the basement aquifer) because the Quaternary/Tertiary age sediments are dry (i.e. unsaturated [layer 1]) so there is no aquifer that recharge could be applied to.

189. WATER

Justification sought for validity of model given lack of baseline data including groundwater hydrographs (i.e. groundwater level fluctuations with time) available to calibrate the model.

There is sufficient baseline data obtained via the pumping tests (carried out on the 41 groundwater wells drilled) which is considered suitable when assessed against the Australian groundwater modelling guidelines (Sinclair Knight Merz 2012). The Hillside model has been considered to have a suitable level of confidence in accordance with these guidelines.

Why baseline data over a minimum of one complete year and preferably years that included drought-dominated regime and a wetter year was not obtained?

In order to calibrate a numerical model there must be an observed data set that can be compared with model simulation results to assess the degree of fit between model and observed data. A good fit is regarded as providing confidence in the model results within the range of stresses simulated during the calibration process.

Most numerical models use rainfall recharge to a shallow unconfined aquifer as a basis for steady-state calibration in which the simulated water table is compared with a water table produced in a steady-state model run. The Hillside project area has no water table aquifer (layer 1) and, it is believed, no significant rainfall recharge within the model domain. A drought dominated regime or otherwise is irrelevant to the calibration of the Hillside model. **Therefore, a steady-state calibration is neither meaningful nor possible.**

Transient model calibration requires a time series data set of aquifer response to stresses such as pumping, seasonal recharge/discharge, or surface water/groundwater interaction. There is no such dataset (hydrographs, pumping figures) for the project area due to the highly saline nature of the deep groundwater (layer 3 and 4) and absence of a shallow (layer 1) aquifer system. See Figure 5 of **Response_7. Closure** for a representative cross section of the four hydrogeological layers. The Hillside basement rock aquifer is a complex system with both fracture and matrix permeabilities. The only potential surface water / groundwater interaction appears to be between the granites to the east of the deposit and the Gulf St Vincent in the form of some observed tidal fluctuations in wells near the coast. **It was considered that, in view of the complexity of the geology in and around the mineralised area, the best (and only feasible) calibration process was the simulation of the short term pumping tests for which observation well readings were available.**

For calibration, 5 test sites were assessed, with 2 in the coastal (eastern) granite and 3 in the pit area. Calibration was carried out by running the model with Ss set to 10-03 and 10-06 in separate runs and comparing the drawdowns obtained at the test pumping locations with the recorded field data. Kh was then varied until the resultant drawdown curve matched the measured drawdowns. Using this method, it was found to not be possible to calibrate the model when Ss was set to 10-03, but when Ss was changed to 3.0-06 in layers 3 and 4, calibration could be achieved with some modifications to Layer 3 Kh values and additional minor modifications to Ss. Refer to Section 14.3 of **Appendix 7** for full details of the model calibration.

190. WATER

Justification sought for limited duration of test pumping activities

Limited duration of test pumping activities was associated with water disposal problems. This has been discussed in Section 10 of **Appendix 7**.

As a result of time and cost constraints, disposal of test water was to dams and storages on site, with subsequent use for drilling and dust suppression. The storage capacity was therefore limited to the volumes available in the dams plus daily water use volumes and meant that tests could only be conducted when storage volume was available. This resulted in tests being conducted for relatively short durations, although it should be pointed out that most tests were carried out for approximately 1000 minutes, which is considered to be sufficient duration to enable hydraulic parameters at the test sites to be determined.

191. WATER

Clarification sought on whether wells were installed in all hydrogeological zones (per the PFS), given no details of wells targeting the 'seasonal perched Quaternary aquifer'.

Refer to Section 8 of **Appendix 7**.

No aquifer was identified in the Quaternary and Tertiary age sediments (layer 1) in any drilling phase. The Stage 1 drilling program included the installation of wells in all domains identified at that stage in the basement aquifer (layer 3 and 4). The number and extent of domains was subsequently modified as the results were obtained.

192. WATER

Justification sought for modelling assumptions and further explanation of the implications of the model for the environment:

- ***The permeability of Layer 4 has not been defined by field investigations; it is an assumed value. It appears to be a product of the lack of deep drilling. It is noted that the outputs from the model indicate that Layer 4 is sensitive to changes in permeability and storability (standard groundwater hydraulic parameters).***

Refer to Section 10.4 of **Appendix 7**. The stage 4 investigation (deep drilling [layer 4]) included the installation of 3 wells into layer 4 and their test pumping. This led to revisions to the model with the outcomes as documented in **Appendix 7**. Sensitivity to changes in K were a major driver for undertaking the stage 4 investigations to gain greater confidence in the groundwater model.

- ***The calibration of the model is questionable as it appears to rely on five bores only; two in the Coastal Granite and three in the pit area. The model has embraced a zone of potentially fractured granites to the north and east of the proposed mine in a zone that appears to have an enhanced permeability.***

Refer to Section 14.2 for sensitivity analysis to S_s and Section 14.3 for model calibration in **Appendix 7**. Also refer to **Response_189. Water**.

- ***A number of hypothetical cut-off wells have been modelled as intercepting groundwater flows that appear to exploit this zone of higher permeability. These cutoff wells are oriented north north-east of the proposed pit area to intercept 150L/s (essentially the mine processing water use requirement). Their role appears to be to intercept any potentially contaminated underground water migrating beyond the mining lease.***

The purpose of the cut offs wells is to separate the unaffected groundwater from the water in the open pit. Therefore the cut-off wells intercept water flowing toward the open pit. The purpose of the cutoff wells is not to prevent water flowing toward Gulf St Vincent.

Cut of well field scenario is a contingency option as there is no surplus, refer to ***Response_70. Water.***

- ***Theoretically, under the modelling scenario adopted, all underground water leaving the mine site through this zone can be intercepted except in the final two years of mine operation, wherein there is an 11% excess volume. Accordingly, in the final two years of operations, there is a threat of contaminated underground waters leaving the site that has not been addressed.***

The purpose of the cut offs wells is to separate the unaffected groundwater from the water in the open pit. Therefore the cut-off wells intercept water flowing toward the open pit. The purpose of the cutoff wells is not to prevent water flowing toward Gulf St Vincent.

Refer to ***Response_7. Closure.*** The 11 % excess volume is no longer relevant (refer to ***Response_70. Water.***). The stage 4 investigations indicate that cutoff wells will not be required.

193. **WATER**

Explanation sought regarding post-closure outcomes: the dewatering cone of drawdown does not fully recover to pre-mining groundwater levels. Essentially, the pit (lake) becomes a permanent groundwater sink. Whilst this may, in the short to medium term, assist in restricting off-site migration of any contaminated underground water, there is nonetheless a stated effect for 550 years (the duration of the post-mining model). Whether this impacts on the 'seasonal perched Quaternary aquifer' or any other perched groundwater system remains unknown. If any connections exist, this would have implications for any stock bores in the zone of influence.

There is no perched seasonal aquifer (layer 1). Refer to Section 14.8 *Long term pit water level recovery modelling* in ***Appendix 7.***

Section 15.3 of ***Appendix 7,*** describes revisions to the long term pit water level recovery model due to the information obtained from the stage 4 drilling and testing program. In it, it is stated that the model was run for an increased time period, namely 465,000 days (approx. 1274 years) with the level of water in the pit rising to -38.5 m AHD after approximately 250,000 days (~680 years). As no seasonal or perched aquifers (layer 1) have been encountered, effects to them will be nil.

194. **WATER**

Comments sought on the following suggested groundwater reporting limitations, whilst technically sound, the reporting of the test pumping and groundwater modelling is lacking appropriate context. It neither transparently explains the assumptions of the hydrogeological conceptualisation nor does it discuss results in fracturing sympathetic with the regional geological faulting. No discussion of this is offered. The water quality in the ore body versus the granite GW systems may be different. If so, a discussion is required as to how the disposal of the dewatered water and interaction between these different quality waters would be managed.

Refer to Section 14.7 *Injection modelling* in **Appendix 7**.

It is anticipated that **Appendix 7** provides sufficient context and discussion with regard to these points. The stage 4 groundwater investigation indicates that the disposal of dewatered water will not be required.

195. **WATER**

The reporting results in an apparent disconnect between the high yields intercepted during mineral RC drilling and dedicated water well drilling. This may be because fractures are essentially vertical and therefore wells drilled at the vertical may fail to intercept the more permeable fracture zones (as opposed to mineral holes drilled at angles that may intercept a number of sets of the fracture by their orientation). This leads to some confusion in the conceptualisation of the hydrogeology in that testing is indicating relatively impermeable conditions whilst the mineral drilling suggests that the geological zones can be highly permeability. Further clarification is sought.

Refer to Section 8.3 Stage 3 in **Appendix 7**. Section 8.3 states 'It was concluded that the anecdotal records of significant intersections of groundwater during RC drilling reflect the apparent spectacular surge of water from these holes when compressed air was added to the holes after rod connections rather than the presence of a high yielding and highly transmissive aquifer'.

196. **WATER**

Issues specific to the Mining Plus DFS Report, dated 9 May 2013: The well completion summary Table 1 and Figure 1 appear to be a subset of the complete program of wells drilled. No clear reason is given for not including all wells. The drilling and test-pumping program is aligned to the pit rock mass, hanging wall and footwall zones only. Reasons are not given for the omission of other geological zones. Discussion the results of the test pumping program is perfunctory. The DFS report states that all wells with airlift yield more than 1L/s were tested, but in the prefeasibility report there were more wells stated that fit this definition. If results were selectively reported, a reason for this is not given.

A total of 41 groundwater investigation wells were installed in four separate stages. The first 22 wells were installed in all hydrogeological zones (domains) in stage 1 from 4 January 2012 to 7 March 2012, stage 2 included the installation of 5 wells in April 2012, whilst stage 3 included the drilling of 11 holes (10 of which were completed as investigation wells) in the period 26 September 2012 to 26 October 2012. An additional 3 wells were completed in stage 4 in the period 11 May to 18 June 2013. Well construction permits were obtained for all wells and drilling was carried out by licensed water well drillers, using blade/air and down hole hammer/air methods.

Refer to Section 8 in **Appendix 7** for information on all of the wells drilled in the four stages.

DMITREs additional question to Rex:

Rex to clarify why hydraulic zones 4 and 5 (Figure 159 of Appendix 7) have been assigned different K values. Pumping test results report T values at similar ranges, yet K for zone 5 has been modelled higher.

Test pumping indicates that transmissivity in layer 3 increases from the north eastern margin of the pit to the coast.

The zonation from the pit to the coast in this direction as used in the model was intended to provide a gradation between the low transmissivity pit area and the significantly more transmissive north eastern granite area. Aldam Geoscience selected a T value for zone 4 to be between that of zone 3 and the value used for zone 5 to provide such a gradation.

GLOSSARY

ACARP	Australian Coal Association Research Program
AHD	Australian Height Datum
ANC	Acid neutralisation capacity
ANCOLD	Australian National Committee On Large Dams
ANZECC	Australian and New Zealand Environment and Conservation Council
ARD	acid rock drainage
ARI	average recurrence interval
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
AS	Australian standards
ASLP	Australian Standard Leaching Procedure
ASX	Australian Securities Exchange
CCG	community consultation group
Cl	Chloride
DA	Development Application
DAC	Development Assessment Commission
DEM	Dust Extinction Moisture
DEWNR	Department for Environment, Water and Natural Resources
DMITRE	Department of Manufacturing, Innovation, Trade, Resources and Energy
DPC	Department of the Premier and Cabinet
DPTI	Department of Planning, Transport and Infrastructure
DSCP	Decant, Storage and Collection Pond
EPA	Environmental Protection Authority
EPBC	Environment Protection and Biodiversity Conservation
EPP	Environmental Protection Policy
FIFO	Fly-In Fly-Out
FOS	Factor of Safety
GCE	Ground Control Engineering
GHB	General Head Boundary
GHG	Green House Gas
IWL	Integrated Waste Landform
IWMS	integrated waste management system
JSA	Job Safety Analysis
LOM	Life of Mine
MB	mass balance
MIBC	Methyl Isobutyl Carbinol
ML/d	Megalitres/day
MLP	Mining Lease Proposal and Management Plan
MPA	maximum potential acidity

MT	Mine Technics
Mtpa	Million tonnes per annum
NAAQS	National Ambient Air Quality Standards
NAF	non-acid forming
NAG	Net acid generation
NAPP	net acid production potential
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NEPM	National Environment Protection Measure
NOTAM	Notice to Airmen
NPI	National Pollutant Inventory
NVMP	Native Vegetation Management Plan
NVMU	Native Vegetation Management Unit
ODX	Olympic Dam Expansion
PAF	potentially acid forming
PAX	Potassium Amyl Xanthate
PEL	Pacific Environmental Limited
PEPR	Program for Environmental Protection and Rehabilitation
PFS	Pre-Feasibility Study
PIRSA	Primary Industries and Regions SA
PPE	Personal Protection Equipment
ppm	parts per million
PPSC	Pine Point Structural Corridor
Rex	Rex Minerals Ltd
RMP	Radiation Management Plan
RSF	rock storage facility (also known as a 'Waste Rock Dump')
SCP	section characteristic parameter
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SO ₄ _S	sulphate-sulphur
SO ₄ _S	sulphate sulphur
SOP	Standard Operating Procedure
t/h	tonnes/hour
TDS	total dissolved solids
Tot_S	total sulphur content
TSF	tailings storage facility
U	Uranium
WRD	waste rock dump (also known as a 'rock storage facility')
µg/m ³	micrograms per cubic metre