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26 May 2020

Responses to EPA comments on Haerses Road Quarry Mod 3 Air Quality

ERM prepared an Air Quality Impact Assessment to support a Modification Report (prepared by Umwelt (Australia) Pty Ltd) for an application by Dixon Sand Pty Ltd to modify DA 165-7-2005 for Haerses Road Quarry (Modification 3). The public exhibition of the Modification Report concluded on Wednesday 26 February 2020. The NSW Environment Protection Authority (EPA) lodged a submission (dated 25 February 2020) requesting clarification and recommending further information be provided in relation to the AQIA prior to determination. ERM responded to those submissions from the EPA in March 2020.

The EPA have now requested further information regarding the updated emissions inventory, including:

- 1. Presentation of updated emissions inventories and discussion on any other assumptions that have been updated or made.
- 2. Revision of proposed emission reductions to reflect the anticipated timeframe in which bunds are retained.



1. Presentation of updated emissions inventories

Table 1 presents the high-level comparison that was shown in ERM's March response document. EPA have asked for more information including the detail for each activity, and this is presented in Table 2. We have also included screenshots of the spreadsheet information (see Appendix A), similar to that provided in the original Air Quality Assessment.

Please note that emissions from some haulage activities have increased due to calculations being for maximum truck movements, while others have decreased due to the sealing of roads. No other assumptions were changed.

Table 1 - Total emissions comparison to original EIS

Production scenario	TSP (kg/y)	PM ₁₀ (kg/y)	PM _{2.5} (kg/y)
Original 2019 assessment emissions Annual average production Unsealed roads to processing area	60,252	18,265	6,783
Re-calculated emissions Maximum daily production Sealed roads to processing area	50,593	15,433	6,744

Table 2 - Comparison for each activity for TSP, PM₁₀ and PM_{2.5} to original EIS

Activity		al EIS inver verage pro PM ₁₀ (kg/y)		Update inventory (maximum daily production) TSP PM ₁₀ PM _{2.5} (kg/y) (kg/y) (kg/y)				
Tertiary Sand Extraction Area - Approved	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \							
Dozer stripping topsoil - approved Stage 5	233	57	24	233	57	24		
Excavator loading tertiary sand to trucks for transfer to Processing Area (from Approved Stage 5)	19	9	1	19	9	1		
Hauling from Approved Stage 5 to Processing Area (unsealed - extraction to sealed road)	1,663	449	45	2,395	647	65		
Hauling from Approved Stage 5 to Processing Area (sealed to processing area)	382	73	18	550	105	26		
Hauling of Approved Stage 5 to and in Processing Area (sealed)	1,774	479	48	268	51	12		
Tertiary Sand Extraction Area - Proposed								
Dozer stripping topsoil - Proposed	233	57	24	233	57	24		
Excavator loading tertiary sand to trucks for transfer to Processing Area (from proposed extension)	19	9	1	19	9	1		
Hauling from proposed to Processing Area (unsealed - extraction to sealed road)	1,663	449	45	2,395	647	65		
Hauling from proposed to Processing Area (sealed to processing area)	382	73	18	550	105	26		
Hauling of proposed to and in Processing Area (sealed)	1,774	479	48	268	51	12		
Friable Sand Extraction Area								
Dozer stripping topsoil/ripping friable sandstone (from Cell 5A & 5B)	4,137	974	434	4,137	974	434		
Excavator loading friable sand to trucks for transfer to Processing Area (from Cell 5A & 5B)	71	33	5	71	33	5		
Hauling from Cell 5A & 5B to Processing Area (unsealed)	8,110	2,189	219	11,678	3,153	315		



	Original EIS inventory Update inventory (annual average production) (maximum daily production)										
Activity	(annual a TSP	verage pro PM ₁₀	duction) PM _{2.5}	(maximum daily production) TSP PM ₁₀ PM _{2.5}							
Activity	(kg/y)	(kg/y)	(kg/y)	(kg/y)	(kg/y)	PM _{2.5} (kg/y)					
VENM/ENM placement in Friable area			<u> </u>	(3.7/	<u> </u>	(3.37					
Hauling VENM/ENM on-site from entrance to friable extraction area (Cells 4A & 4B) (sealed)	1,090	209	51	1,596	306	74					
Hauling of VENM/ENM to placement area (sealed)	5,069	1,368	137	766	147	36					
Unloading VENM/ENM to cell	55	26	4	55	26	4					
Dozer spreading/compacting VENM/ENM	3,036	732	319	3,036	732	319					
Processing Area											
Friable Sand processing											
Unloading friable sand to stockpile at Processing Area	71	33	5	71	33	5					
Loading friable sand from stockpile at Processing Area	71	33	5	71	33	5					
Unloading friable sand to Dry Processing at Processing Area	71	33	5	71	33	5					
Crushing friable sand (uncontrolled) at Processing area	6,240	2,400	2,400	6,240	2,400	2,400					
Transfer friable sand (Crusher to Screen) [conveyor transfer point]	35	17	3	35	17	3					
Screen friable sand (uncontrolled)	4,000	1,376	1,376	4,000	1,376	1,376					
Transfer friable processed at plant to product stockpile	35	17	3	35	17	3					
Tertiary Sand processing											
Unloading tertiary sand to stockpile at Processing Area	39	18	3	47	22	3					
Loading tertiary sand from stockpile at Processing Area	39	18	3	47	22	3					
Unloading tertiary sand to Dry Processing at Processing Area	39	18	3	47	22	3					
Screen tertiary sand (uncontrolled)	2,188	753	753	2,669	918	918					
Transfer (Screen to Wet Processing) [conveyor transfer point]	19	9	1	24	11	2					
Wet Processing (no expected emissions)	0	0	0	0	0	0					
Transfer tertiary processed at plant to product stockpile	19	9	1	24	11	2					
Product Sand											
Loading sand from Product Stockpile to haul trucks	65	31	5	70	33	5					
Hauling out of Site (sealed)	10,036	2,709	271	1,130	217	52					
Hauling out of Site (sealed)	2,159	414	100	2,327	447	108					
Wind Erosion											
WE - Extraction Area (Tertiary - Stage 5)	708	354	53	708	354	53					
WE - Extraction Area (Tertiary - proposed)	205	102	15	205	102	15					
WE - Extraction Area (Tertiary - Stage 5 part rehabilitated)	1,395	698	105	1,395	698	105					
WE - Extraction Area (Friable - 5A & 5B)	942	471	71	942	471	71					
WE - Extraction Area (Friable - 4A & 4B plus VENM/ENM)	1,061	531	80	1,061	531	80					
WE - Extraction Area (Friable - 3A & 3B partly rehabilitated)	677	338	51	677	338	51					
WE - Processing Area including Stockpile	431	215	32	431	215	32					
Total	60,252	18,265	6,783	50,593	15,433	6,744					



Revision of emission reductions to reflect bund removal 2.

The EPA have asked the proponent to consider what the estimated increase in emissions might be if the controls that were applied to the wind erosion activities due to bunding, were removed from the calculations. Table 3 presents this comparison and associated increase calculated, for those wind erosion sources where a 55% reduction was applied in the modelling. As shown, there is a small increase in these values, when compared to the updated (March 2020) inventory. This small increase to the emissions inventory is not sufficient to suggest there would be any changes to the outcomes of the assessment. Furthermore, when the inventory with the bund controls removed is compared to the original inventory, on which the predictions of the AQIA are based, there is a reduction in TSP and PM₁₀ emissions and the increase in PM_{2.5} emissions is reduced to only 1.6%.

Table 3 – Comparison for wind erosion without controls applied for bunds

	Update in	ventory (Mar	Bund controls removed					
Activity	TSP (kg/y)	PM ₁₀ (kg/y)	PM _{2.5} (kg/y)	TSP (kg/y)	PM₁₀ (kg/y)	PM _{2.5} (kg/y)		
Total from all non-wind erosion activities (as per Table 2)	45,175	12,723	6,337	45,175	12,723	6,337		
Wind Erosion								
WE - Extraction Area (Tertiary - Stage 5)	708	354	53	1,573	786	118		
WE - Extraction Area (Tertiary - proposed)	205	102	15	455	227	34		
WE - Extraction Area (Tertiary - Stage 5 part rehabilitated)	1,395	698	105	1,395	698	105		
WE - Extraction Area (Friable - 5A & 5B)	942	471	71	2,094	1,047	157		
WE - Extraction Area (Friable - 4A & 4B plus VENM/ENM)	1,061	531	80	1,061	531	80		
WE - Extraction Area (Friable - 3A & 3B partly rehabilitated)	677	338	51	677	338	51		
WE - Processing Area including Stockpile	431	215	32	431	215	32		
Total	50,593	15,433	6,744	52,860	16,566	6,914		
Percentage change	-	-	-	+4.5%	+7.3%	+2.5%		

We trust this provides sufficient clarification and additional information to address the comments and recommendations made by the EPA.

Yours sincerely

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Appendix A – Detailed emissions inventories

TSP Emissions Inventory



ACTIVITY	TSP	Intensity Units	Emission factor Units	Variable 1	Units	Variable 2 Units	Variable 3 Units	Variable 3 U	nits Variable 4	Units	Control Units	Assumed control
erliary Sand Extraction Area - Approved	(kg/y)											
Dozer stripping topsoil - approved Stage 5	233	25 h/y	9.3 kg/h	13 silt co	ntent in %	4.0 moisture content (%)						
excavator loading tertiary sand to trucks for transfer to Processing Area (from Approved Stage		87,500 t/y			age of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
Hauling from Approved Stage 5 to Processing Area (unsealed - extraction to sealed road)		126.000 t/v		40 t/log		52.8 Vehicle mean mass (t)	0.9 km/return trip	3.38 kg	/VKT 64% si	It content	75 % control	Level 2 watering
Hauling from Approved Stage 5 to Processing Area (sealed to processing area)		126,000 t/y	0.004 kg/t	40 t/log		52.8 Vehicle mean mass (t)	1.968 km/return trip	0.09 kg		n2 silt loadina	0 % control	LOTO I MOTORING
Hauling of Approved Stage 5 to and in Processing Area (sealed)		126,000 t/y	0.002 kg/t	40 t/log		52.8 Vehicle mean mass (t)	0.96 km/return trip	0.09 kg		n2 silt loading	0 % control	
erilary Sand Extraction Area - Proposed	200	120,000 177	0.002 kg/1	40 1/100	,	32.0 Vehicle medifficas (1)	0.70 kingicioin inp	0.07 kg	VKI 0.4 g/II	12 311 loading	0 /0 COIIIIO	
Ozer stripping topsoil - Proposed	233	25 h/y	9.3 kg/h	13 silt co	ntent in %	4.0 moisture content (%)						
cavator loading tertiary sand to trucks for transfer to Processing Area (from proposed		87,500 t/y	0.00022 kg/t		age of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
lauling from proposed to Processing Area (unsealed - extraction to sealed road)		126.000 t/v	0.0022 kg/f	40 t/log		52.8 Vehicle mean mass (t)	0.9 km/return trip	3.38 kg	io ZP A A TAVA	it content	75 % control	Level 2 waterina
lauling from proposed to Processing Area (sealed to processing area)		126,000 t/y		40 t/log		52.8 Vehicle mean mass (1)	1.968 km/return trip	0.09 kg		n2 silt loading	0 % control	LOVG 2 Warding
auling of proposed to and in Processing Area (sealed)		126,000 t/y		40 t/log		52.8 Vehicle mean mass (1)	0.96 km/return trip	0.07 kg		n2 silt loading	0 % control	
iable Sand Extraction Area	200	120,000 179	0.002 kg/1	40 1/100	,	32.0 Vehicle medimioss (1)	0.70 kili/lelullilip	0.07 kg	VKI 0.4 9/II	12 SIII loudilily	U/s COIIIIO	
ozer stripping topsoil/ripping friable sandstone (from Cell 5A & 5B)	4.137	570 h/y	7.3 kg/h	12 cilt co	ntent in %	4.5 moisture content (%)						
covator loading friable sand to trucks for transfer to Processing Area (from Cell 5A & 5B)		320,000 t/y	0.00022 kg/t		age of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
auling from Cell 5A & 5B to Processing Area (unsealed)		460,800 t/y	0.00022 kg/l	40 t/log		52.8 Vehicle mean mass (t)	1.2 km/return trip	3.38 kg	N/VT	It content	75 % control	
BNM/ENM placement in Friable area	11,0/8	400,000 1/9	0.101 kg/1	40 1/100		32.0 Vehicle mean mass (1)	1.2 km/return mp	3.36 Kg	0.4 % SI	ii conienii	73 % CONTROL	
auling VENM/ENM on-site from entrance to friable extraction area (Cells 4A & 4B) (sealed)	1 50/	360,000 t/y	0.004 kg/t	40 t/log		52.8 Vehicle mean mass (t)	2.0 km/return trip	0.09 kg	N/VT 0.4 a/a	n2 silt loading	0 % control	
				40 1/100 40 1/10a		52.8 Vehicle mean mass (t)					0 % control	
puling of VENM/ENM to placement area (sealed)		360,000 t/y	0.002 kg/t				1.0 km/return trip	0.09 kg	VKI 0.4 g/m	n2 silt loading	U % CONITO	
loading VENM/ENM to cell		250,000 t/y			age of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
ozer spreading/compacting VENM/ENM	3,036	380 h/y	8.0 kg/h	13 SIIT CO	ntent in %	4.5 moisture content (%)						
ocessing Area												
able Sand processing												
aloading friable sand to stockpile at Processing Area		320,000 t/y			ige of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
ading friable sand from stockpile at Processing Area		320,000 t/y			ige of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
nloading friable sand to Dry Processing at Processing Area		320,000 t/y	0.00022 kg/t	0.58 aven	ige of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
rushing friable sand (uncontrolled) at Processing area		320,000 t/y										
ansfer friable sand (Crusher to Screen) [conveyor transfer point]		320,000 t/y	0.00022 kg/t	0.58 aver	age of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)					50 % control	Application of water at transfers - boom tip water sprays
reen friable sand (uncontrolled)		320,000 t/y										
ansfer friable processed at plant to product stockpile	35	320,000 t/y	0.00022 kg/t	0.58 aver	age of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)					50 % control	Application of water at transfers - boom tip water sprays
erliary Sand processing												
nloading tertiary sand to stockpile at Processing Area		213,500 t/y			ige of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
ading tertiary sand from stockpile at Processing Area	47	213,500 t/y	0.00022 kg/t	0.58 aver	age of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
aloading tertiary sand to Dry Processing at Processing Area		213,500 t/y		0.58 aver	ige of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						
reen tertiary sand (uncontrolled)	2,669	213,500 t/y	0.0125 kg/t									
ansfer (Screen to Wet Processing) [conveyor transfer point]	24	213,500 t/y	0.0002 kg/t	0.6 aver	ge of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)					50 % control	Application of water at transfers - boom tip water sprays
et Processing (no expected emissions)	-											
ansfer tertiary processed at plant to product stockpile	24	213,500 t/y	0.00022 kg/t	0.58 aver	ge of (wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)					50 % control	Application of water at transfers - boom tip water sprays
roduct Sand												
oading sand from Product Stockpile to haul trucks	70	533,500 t/y	0.000 kg/t	0.58 aver	ige of (wind speed/2.2)^1.3 in m/s	6.5 moisture content (%)						
auling out of Site (sealed)		533,500 t/y	0.002 kg/t	40 t/loa		52.84 Vehicle mean mass (t)	1 km/return trip	0.09 kg	/VKT 0.4 g/m	n2 silt loading	0 % control	
auling out of Site (sealed)	2,327	533,500 t/y	0.004 kg/t	40 t/loa	i	52.84 Vehicle mean mass (t)	2 km/return trip	0.09 kg	/VKT 0.4 a/m	n2 silt loading	0 % control	
ind Erosion												
E - Extraction Area (Tertiary - Stage 5)	708	3.7 ha	850 kg/ha/s	/							77.5 % control	
E - Extraction Area (Tertiary - proposed)	205		850 kg/ha/y								77.5 % control	50% control from watering plus 55% control from fencing, bunding or shelterbelt:
/E - Extraction Area (Tertiary - Stage 5 part rehabilitated)	1.395		850 kg/ha/									vegetative cover
/E - Extraction Area (Friable - 5A & 5B)	942		850 kg/ha/									50% control from watering plus 55% control from fencing, bunding or shelterbelt
E - Extraction Area (Friable - 4A & 4B plus VENM/ENM)	1.061		850 kg/ha/									vegetative cover
E - Extraction Area (Friable - 3A & 3B partly rehabilitated)	677		850 kg/ha/									vegetative cover
VE - Processing Area including Stockpile	431		850 kg/ha/s									Chemical wetting agent

PM₁₀ Emissions Inventory



ACTIVITY	PM10 (kg/y)	Intensity U	nits Emission factor Units	Variable 1	Units	Variable 2 Units	Variable :	3 Units	Variable 3 Units (haulina)	Variable 4	Units	Control Units	Assumed control
Terliary Sand Extraction Area - Approved	(-3/1/								(
Dozer stripping topsoil - approved Stage 5	57	25 h/	y 2.3 kg/h	13 silt content i	n %	4.0 moisture content (%)							
Excavator loading tertiary sand to trucks for transfer to Processing Area (from Approved Stage	9	87,500 1/	/ 0.00010 kg/t	0.58 average of	wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)							
Hauling from Approved Stage 5 to Processing Area (unsealed - extraction to sealed road)	647	126,000 †/	v 0.021 kg/t	40 t/load		52.8 Vehicle mean mass (t) 0.	.9 km/retum trip	0.91 kg/VK	T 6.4	% silt content	75 % contro	Level 2 watering
Hauling from Approved Stage 5 to Processing Area (sealed to processing area)	105			40 t/load		52.8 Vehicle mean mass		8 km/retum trip			a/m2 silt loadina		
Hauling of Approved Stage 5 to and in Processing Area (sealed)	51			40 t/load		52.8 Vehicle mean mass		6 km/retum trip			g/m2 silt loading		
Terligry Sand Extraction Area - Proposed	01	120,000 17	0.000 kg/1	10 171000		02.0 10110011001111033	1, 0.7	o kingrorom mp	0.02 (18)	. 0.1	grinzaniodding	o jo comic	"
Dozer stripping topsoil - Proposed	57	25 h/	y 2.3 kg/h	13 silt content i	n %	4.0 moisture content (%)		1					
Excavator loading tertiary sand to trucks for transfer to Processing Area (from proposed	9				wind speed/2.2\^1.3 in m/s								
Hauling from proposed to Processing Area (unsealed - extraction to sealed road)	647			40 t/load	mile speces, E.E., T.O II THYS	52.8 Vehicle mean mass		9 km/retum trip	0.91 kg/VK	T 6.4	% silt content	75 % contro	Level 2 waterina
Hauling from proposed to Processing Area (sealed to processing area)	105	126,000 1/		40 t/load		52.8 Vehicle mean mass		8 km/retum trip			g/m2 silt loading		
Hauling of proposed to and in Processing Area (sealed)	51			40 t/load		52.8 Vehicle mean mass		6 km/retum trip			g/m2 silt loading		
Friable Sand Extraction Area	JI	120,000 17	0.000 kg/1	40 1710000		32.0 Vehicle medimidss	1) 0.7	o kinineroiii inp	0.02 kg/vk	0.4	g/11/2 siii loudiilig	U // COIIIIC	//
Dozer stripping topsoil/ripping friable sandstone (from Cell 5A & 5B)	974	570 h/	y 1.7 kg/h	12 silt content i	. or	4.5 moisture content (%)		_					
Excavator loading friable sand to trucks for transfer to Processing Area (from Cell 5A & 5B)	33				wind speed/2.2)^1.3 in m/s								
	3,153			0.58 average of 40 t/load	wina speea/z.zj/1.3 in m/s	52.8 Vehicle mean mass		.2 km/retum trip	0.91 kg/VK	7 (4	% silt content	75 % contro	4
Hauling from Cell 5A & 5B to Processing Area (unsealed)	3,133	460,800 †/	y 0.027 kg/t	40 1/100d		52.8 venicie mean mass	1) 1.	.z kittyrerum tnp	U.91 kg/VK	1 6.4	% Sill Content	/5 % CONTro	л
VENM/ENM placement in Friable area	001	0.40.000 1.4	0.001	40 1.0		50.014.11.1		0 1 1	0.001 0.00	- 0.1	/ 0 31 L F	0 77 1	
Hauling VENM/ENM on-site from entrance to friable extraction area (Cells 4A & 4B) (sealed)	306			40 t/load		52.8 Vehicle mean mass (.0 km/retum trip			g/m2 silt loading		
Hauling of VENM/ENM to placement area (sealed)	147			40 t/load		52.8 Vehicle mean mass (.0 km/retum trip	0.02 kg/VK	1 0.4	g/m2 silt loading	0 % contro	OI
Unloading VENM/ENM to cell	26				wind speed/2.2)^1.3 in m/s								
Dozer spreading/compacting VENM/ENM	732	380 h/	y 1.9 kg/h	13 silt content i	1 %	4.5 moisture content (%)							
Processing Area													
Friable Sand processing	1												
Unloading friable sand to stockpile at Processing Area		320,000 †/			wind speed/2.2)^1.3 in m/s								
Loading friable sand from stockpile at Processing Area	33	320,000 t/	y 0.00010 kg/t		wind speed/2.2)^1.3 in m/s								
Unloading friable sand to Dry Processing at Processing Area	33	320,000 t/	y 0.00010 kg/t	0.58 average of	wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)							
Crushing friable sand (uncontrolled) at Processing area	2,400	320,000 t/	y 0.0075 kg/t										
Transfer friable sand (Crusher to Screen) [conveyor transfer point]	17	320,000 t/	y 0.00010 kg/t	0.58 average of	wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						50 % contro	Application of water at transfers - boom tip water sprays
Screen friable sand (uncontrolled)	1,376	320,000 †/	v 0.0043 kg/t										
Transfer friable processed at plant to product stockpile	17	320.000 †/	v 0.00010 kg/t	0.58 average of	wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						50 % contro	Application of water at transfers - boom tip water sprays
Terliary Sand processing						1							
Unloading tertiary sand to stockpile at Processing Area	22	213.500 †/	v 0.00010 kg/t	0.58 gyerage of	wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)							
Loading tertiary sand from stockpile at Processing Area	22				wind speed/2.2)^1.3 in m/s								
Unloading tertiary sand to Dry Processing at Processing Area	22				wind speed/2.21^1.3 in m/s								
Screen tertiary sand (uncontrolled)	918			0.00 a rorago or	mila spoody E.E.	ile medicio comoni (x)							
Transfer (Screen to Wet Processing) [conveyor transfer point]	11			0.6 average of	wind speed/2.2)^1.3 in m/s	4.5 moisture content (%)						50 % contro	Application of water at transfers - boom tip water sprays
Wet Processing (no expected emissions)		210,000 17	0.0001 kg/1	0.0 avelage of	**************************************	4.5 Inobidic content (/b)						30 /0 COIIIIC	Application of water at marisies about hip water sprays
Transfer tertiary processed at plant to product stockpile		213.500 †/	v 0.00010 kg/t	0.50 autorago of	wind speed/2.2\^1.3 in m/s	4.5 moisture content (%)						EO @ contro	Application of water at transfers - boom tip water sprays
Product Sand	- 11	213,300 17	0.00010 kg/1	0.30 uvelage of	willia speed/2.2/11.5 ii 111/3	4.5 Inostore content (/s)						JU /6 CUITIC	in population of water at mansiers - booth tip water sprays
Loading sand from Product Stockpile to haul trucks	33	533,500 t/	v 0.000 kg/t	0.59 gyaraga of	wind speed/2.2)^1.3 in m/s	6.5 moisture content (%)							
Lodaing sana from Product Stockpile to hauf tracks Haufing out of Site (sealed)	217			0.58 average of 40 t/load	wiila speed/2.2j^1.3 iff ff/s	52.84 Vehicle mean mass i		1 km/retum trip	0.02 kg/VK	T 0.4	g/m2 silt loading	0 % contro	d l
Hauling out of Site (sealed)	447	533,500 t/		40 1/load 40 1/load		52.84 Vehicle mean mass		2 km/return trip			g/m2 siit loading a/m2 silt loadina		
	44/	333,300 T/	v.uui kg/f	40 17/00dd		32.84 venicie mean mass	1) 2	z kityrerum trip	U.UZ KG/VK	0.4	g/11/2 sill loading	U % CONTro	Л
Wind Erosion													
WE - Extraction Area (Tertiary - Stage 5)	354	3.7 ho										77.5 % confro	of 50% control from watering plus 55% control from fencing, bunding or shelterbelts
WE - Extraction Area (Tertiary - proposed)	102	1.1 ho											
WE - Extraction Area (Tertiary - Stage 5 part rehabilitated)	698	5.5 ho											l vegetative cover
WE - Extraction Area (Friable - 5A & 5B)	471	4.9 ho											ol 50% control from watering plus 55% control from fencing, bunding or shelterbelts
WE - Extraction Area (Friable - 4A & 4B plus VENM/ENM)	531	4.2 ho											l vegetative cover
WE - Extraction Area (Friable - 3A & 3B partly rehabilitated)	338	2.7 ho											l vegetative cover
WE - Processing Area including Stockpile	215	3.4 ho	a 425 kg/ha	'y								85 % contro	Chemical wetting agent
TOTAL PM10 EMISSIONS	15,433												

Sydney, NSW, 2000

PM_{2.5} Emissions Inventory



ACTIVITY	PM2.5 (kg/y)	Intensi	ty Units	Emission factor Units	Variable 1	Units	Variable 2	nits	Variable 3 Units	Variable 3 (haulina)	Units	Variable 4	Units	Control Ur	nits Assumed control
Terliary Sand Extraction Area - Approved	(Ng/Y)									(Hadiling)					
Dozer stripping topsoil - approved Stage 5	24		25 h/y	1.0 kg/h	13 silt content	in %	4.0 moisture c	ontent (%)							
Excavator loading tertiary sand to trucks for transfer to Processing Area (from Approved Stage	1		00 t/y	0.00002 kg/t	0.58 average of	(wind speed/2.2)^1.3 in m/s	4.5 moisture c	ontent (%)							
Hauling from Approved Stage 5 to Processing Area (unsealed - extraction to sealed road)	65	126,0		0.002 kg/t	40 t/load		52.8 Vehicle m		0.9 km/retum tri	0.0	kg/VKT	6.4	% silt content	75 % co	ontrol Level 2 waterina
Hauling from Approved Stage 5 to Processing Area (sealed to processing area)	26		00 t/y	0.0002 kg/t	40 t/load		52.8 Vehicle m	ean mass (t)			kg/VKT	0.4	g/m2 silt loading	0 % cc	ontrol
Hauling of Approved Stage 5 to and in Processing Area (sealed)	12		00 t/y	0.000 kg/t	40 t/load		52.8 Vehicle m				kg/VKT		g/m2 silt loading	0 % cc	
Terliary Sand Extraction Area - Proposed		,								, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	1.0	***	5,		
Dozer stripping topsoil - Proposed	24		25 h/y	1.0 kg/h	13 silt content	in %	4.0 moisture c	ontent (%)							
Excavator loading tertiary sand to trucks for transfer to Processing Area (from proposed	1		00 t/y	0.00002 kg/t		(wind speed/2.2)^1.3 in m/s									
Hauling from proposed to Processing Area (unsealed - extraction to sealed road)	65		00 t/v	0.002 kg/t	40 t/load	(52.8 Vehicle m		0.9 km/return tri	n 0.0	kg/VKT	6.4	% silt content	75 % cc	ontrol Level 2 watering
Hauling from proposed to Processing Area (sealed to processing area)	26		00 t/y	0.000 kg/t	40 t/load		52.8 Vehicle m				kg/VKT		g/m2 silt loading	0 % cc	
Hauling of proposed to and in Processing Area (sealed)		126,0		0.000 kg/t	40 t/load		52.8 Vehicle m				kg/VKT		g/m2 silt loading	0 % cc	
Friable Sand Extraction Area	12	120,0	00 1177	0.000 kgri	10 17/000		02.0 1 01800 119	Jan 111033 (1)	0.70	p 0.00	ing/ rici	0.1	girriz siir loodii ig	0,000	7.1101
Dozer stripping topsoil/ripping friable sandstone (from Cell 5A & 5B)	434	5	70 h/y	0.8 kg/h	12 silt content	in %	4.5 moisture c	ontent (%)							
Excavator loading friable sand to trucks for transfer to Processing Area (from Cell 5A & 5B)	5		00 t/y	0.00002 kg/t		(wind speed/2.2)^1.3 in m/s									
Haufing from Cell 5A & 5B to Processing Area (unsealed)		460,8		0.0002 kg/t	40 t/load	[3p0000/2.2j-1.0 IIIII/3	52.8 Vehicle m		1.2 km/retum tri	n 00	kg/VKT	6.4	% silt content	75 % cc	ontrol
VENM/ENM placement in Friable area	013	400,0	00 117	0.000 Kg/1	4017/000		32.0 + GIACIE III	JG. 7111G33 [1]	1.Z KITQTGTUITTII	0.0	ng/ TRI	0.4	o siii Cornicin	75/800	,
Haufing VENM/ENM on-site from entrance to friable extraction area (Cells 4A & 4B) (sealed)	7.4	360,00	n t/v	0.0002 kg/t	40 t/load		52.8 Vehicle m	an mass (t)	2.0 km/return tri	n 000	kg/VKT	0.4	g/m2 silt loading	0 % cc	ontrol
Haufing of VENM/ENM to placement area (sealed)		360,00		0.0002 kg/t	40 t/load		52.8 Vehicle m				kg/VKT		g/m2 silt loading		
Unloading VENM/ENM to cell		250,00		0.00002 kg/t		(wind speed/2.2)^1.3 in m/s			1.0 KIIVICIOIII III	p 0.00	kg/ vki	0.4	g/112 siii loudii ig	0 /6 CC	JIIIO STATE OF THE
Dozer spreading/compacting VENM/ENM	319		80 h/y	0.00002 kg/l	13 silt content		4.5 moisture c								
Processing Area	317	3	00 II/y	0.6 kg/II	13 SIII COMENI	II /6	4.5 [11061016 C	onieni (%)							
Friable Sand processing Unloading friable sand to stockpile at Processing Area	-	320,0	00 14.	0.00002 kg/t	0.50	(wind speed/2.2)^1.3 in m/s	4.5 moisture c			_					
		320,0		0.00002 kg/t		(wind speed/2.2)^1.3 in m/s									
Loading friable sand from stockpile at Processing Area						(wind speed/2.2)^1.3 in m/s									
Unloading friable sand to Dry Processing at Processing Area		320,0		0.00002 kg/t	0.38 average of	(wind speed/2.2)^1.3 in m/s	4.5 Mosture C	onteni (%)							
Crushing friable sand (uncontrolled) at Processing area	2,400		00 t/y 00 t/v	0.0075 kg/t	0.50		45 11	1 1 (00)						50.00	
Transfer friable sand (Crusher to Screen) [conveyor transfer point]				0.00002 kg/t	U.58 average of	(wind speed/2.2)^1.3 in m/s	4.5 moisture c	ontent (%)						50 % CC	ontrol Application of water at transfers - boom tip water sprays
Screen friable sand (uncontrolled)	1,376		00 t/y	0.0043 kg/t	0.50		45 11	1 1 (00)						50.00	
Transfer friable processed at plant to product stockpile	3	320,0	00 f/y	0.00002 kg/t	U.58 average of	(wind speed/2.2)^1.3 in m/s	4.5 moisture c	ontent (%)						50 % CC	ontrol Application of water at transfers - boom tip water sprays
Terliary Sand processing										_					
Unloading tertiary sand to stockpile at Processing Area		213,5		0.00002 kg/t		(wind speed/2.2)^1.3 in m/s									
Loading tertiary sand from stockpile at Processing Area		213,5		0.00002 kg/t		(wind speed/2.2)^1.3 in m/s									
Unloading tertiary sand to Dry Processing at Processing Area		213,5		0.00002 kg/t	0.58 average of	(wind speed/2.2)^1.3 in m/s	4.5 moisture c	ontent (%)							
Screen tertiary sand (uncontrolled)		213,5		0.0043 kg/t											
Transfer (Screen to Wet Processing) [conveyor transfer point]	2	213,5	00 t/y	0.00002 kg/t	0.6 average of	(wind speed/2.2)^1.3 in m/s	4.5 moisture c	ontent (%)						50 % cc	ontrol Application of water at transfers - boom tip water sprays
Wet Processing (<u>no expected emissions</u>)	-														
Transfer tertiary processed at plant to product stockpile	2	213,5	00 t/y	0.00002 kg/t	0.58 average of	(wind speed/2.2)^1.3 in m/s	4.5 moisture c	ontent (%)						50 % co	ontrol Application of water at transfers - boom tip water sprays
Product Sand															
Loading sand from Product Stockpile to haul trucks		533,5		0.00001 kg/t		(wind speed/2.2)^1.3 in m/s									
Hauling out of Site (sealed)		533,5		0.000 kg/t	40 t/load		52.84 Vehicle m				kg/VKT		g/m2 silt loading	0 % cc	
Hauling out of Site (sealed)	108	533,5	00 t/y	0.0002 kg/t	40 t/load		52.84 Vehicle m	ean mass (t)	2 km/retum tri	p 0.00	kg/VKT	0.4	g/m2 silt loading	0 % cc	ontrol
Wind Erosion															
WE - Extraction Area (Tertiary - Stage 5)	53		3.7 ha	64 kg/ha/y										77.5 % co	control 50% control from watering plus 55% control from fencing, bunding or shelterbelts
WE - Extraction Area (Tertiary - proposed)	15		1.1 ha	64 kg/ha/y										77.0 70 00	A III O
WE - Extraction Area (Tertiary - Stage 5 part rehabilitated)	105		5.5 ha	64 kg/ha/y											ontrol vegetative cover
WE - Extraction Area (Friable - 5A & 5B)	71		4.9 ha	64 kg/ha/y											ontrol 50% control from watering plus 55% control from fencing, bunding or shelterbelts
WE - Extraction Area (Friable - 4A & 4B plus VENM/ENM)	80		4.2 ha	64 kg/ha/y											ontrol vegetative cover
WE - Extraction Area (Friable - 3A & 3B partly rehabilitated)	51		2.7 ha	64 kg/ha/y											ontrol vegetative cover
WE - Processing Area including Stockpile	32		3.4 ha	64 kg/ha/y										85 % cc	ontrol Chemical wetting agent
TOTAL PM2.5 EMISSIONS	6,744														