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CRESCENT HEAD ILMENITE STOCKPILE REHABILITATION

For Greencoast Environmental Rehabilitation

*Assessment of
likely air quality
impacts*

Air Quality Assessment - Crescent Head Ilmenite Stockpile Rehabilitation

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1. Introduction

Greencoast Environmental Rehabilitation (GER) is seeking approval under section 11A of the NSW Mining Act Mining Act 1992 to remove an existing low-grade ilmenite stockpile/ dump located within GER’s Exploration License 8085.

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The stockpile is located at the site of a former mineral separation plant or 'dry mill', located approximately one kilometre south of the township of Crescent Head, New South Wales, on the eastern side of Point Plomer Road, on Lot 2281 Deposited Plan 1153793.

Green coast Environmental Rehabilitation (GER) has engaged the services of Bravo Resource Solutions (BRS) to undertake an assessment of likely air quality impacts.

As part of the planning approval process, the proposed activity has been the subject of a Secretary's Environmental Assessment Requirements (SEARs) report (EAR Number 1180).

The NSW EPA advised GER on the 13 November 2017 that the proposed activity is would not be classified as 'land-based extractive activity' under the Protection of the Environment Operations Act 1997 (POPEO Act).

In accordance with the Protection of the Environment Operations (Clean Air) Regulations 2002, the activity can be regarded as being a Group C activity, under Division 3, Standards for non-scheduled premises.

The following guidelines have been used in completing this assessment:

- Approved method of Sampling and Analysis of Air Pollutants in NSW (EPA);
- Approved-methods-for-modelling-and-assessment-of-air-pollutants-in-NSW (EPA);
- National Pollutant - Inventory emission estimation technique for mining (Version 3.1, January 2012); and
- National Pollutant -Emission Estimation Technique Manual for Mineral Sands Mining and Processing (Version 1.0).

2. Site Plan

The low-grade ilmenite stockpile/dump is located approximately 1km south of Crescent Head, New South Wales. The stockpile bounded to the West by Point Plomer Rad and to the North, South and East by dense eucalyptus forest.

It's nearest sensitive receptor is a private residence located approximately 200m south east of the stockpile (Figure 1). The general topography is that of flat coastal plain.

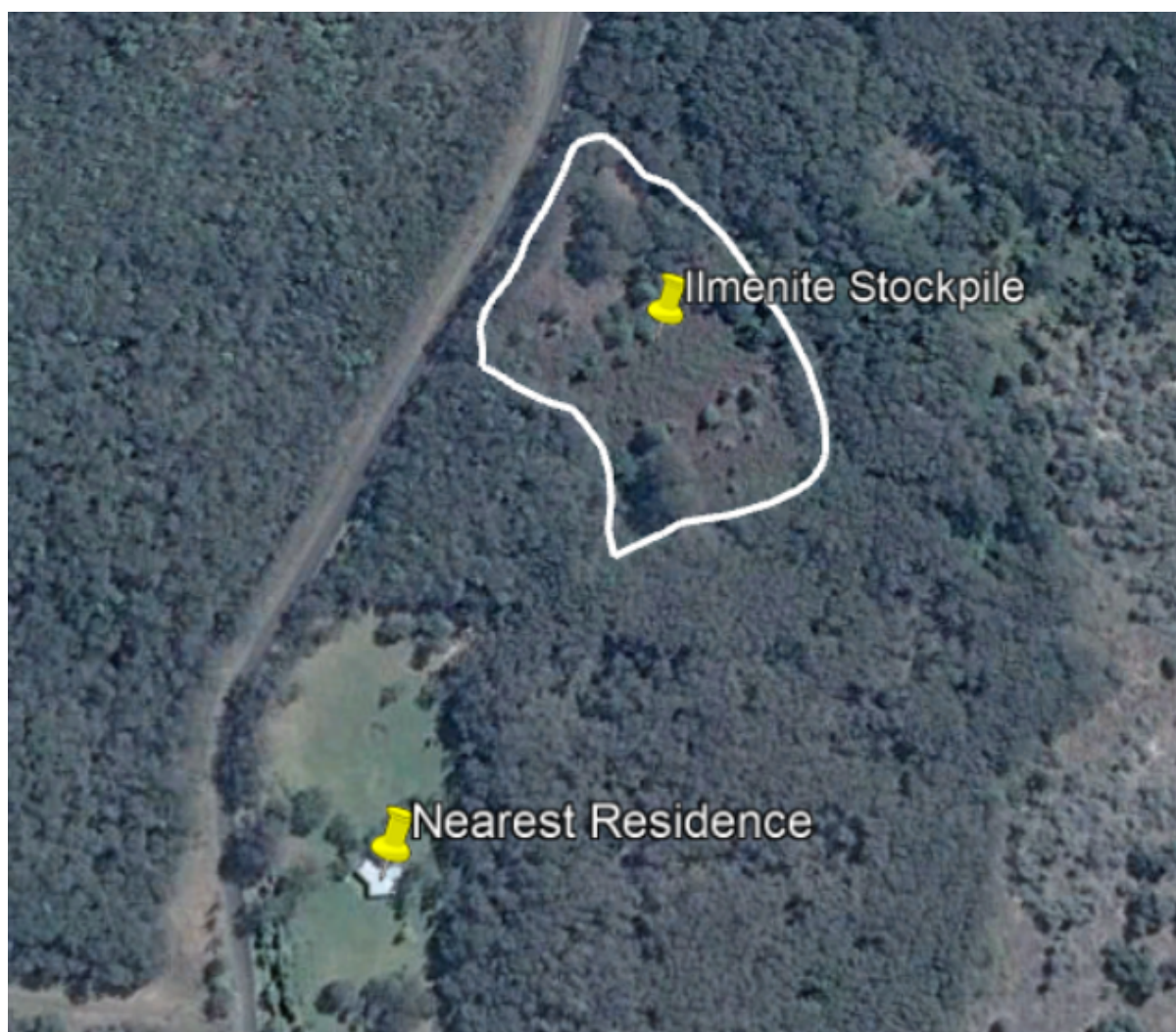


Figure 1. Location map of the stockpile and nearest residence.

3. Description of the activities carried out on the site

The stockpile is located on the site of a former mineral separation plant or 'dry mill'. The stockpile consists of low grade ilmenite sand and was most likely deposited as "Process middlings" during the processing of mineral sands. The stockpile has a bulk density of 2.3 g/m³, and whilst mostly free draining, has an approximate moisture content of between 2-4%. It's noted that the relatively high bulk density and the presences of moisture both limit the potential dust generation of the stockpiled material.

The proposed activity is a truck loading operation using either a front-end loader or small backhoe excavator to recover material from a stockpile 5-6m above natural ground level.

Activity on site is planned to occur within daylight hours only. No permanent infrastructure will be required onsite. The stockpile's recovery will commence at the Northern end of the stockpile and progress in a Southerly direction.

The removal of the approximately 47,500 cubic metre low grade ilmenite stockpile is expected to take approximately 100 working days and occur over a period of 6 months.

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4. Regulatory Setting

A Secretary's Environmental Assessment Requirements (SEARs) has been completed for the proposed activity. The activity has been designated local development under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The NSW Department of Environment and Protection Authority (EPA) provided input into the SEARs. The EPA advised that under the Protection of the Environment Operations Act 1997, no licence will be required to be issued by the EPA, in respect of the proposal (Figure 2.).

Extractive activity

Land-based activity which involves the extraction, processing or storage of more than 30,000 tonnes (T) per year of extractive materials would require an Environment Protection Licence (EPL). It is understood from the PEA that the ilmenite to be removed is material from previous sand mining activities.

On this basis, the ilmenite has previously been extracted, and the '*conventional load and haul techniques*' that comprise the proposed activity, do not fit within the meaning of 'extraction' for the purposes of 'land-based extractive activity'. It is also noted that the definition of extractive materials in schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act) excludes substances that are minerals within the meaning of the *Mining Act 1992*.

Based on this information the EPA has formed the view that the proposed activity would not be classified as 'land-based extractive activity' as defined in the POEO Act and no licence will be required to be issued by the EPA, in respect to the proposal.

Figure 2. Extract of advice received by GER from NSW Environmental Protection Authority, 13 November 2017.

The NSW EPA advised GER on the 13 November 2017 that the proposed activity is would not be classified as 'land-based extractive activity' under the Protection of the Environment Operations Act 1997 (POPEO Act).

The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (Approved Methods), lists the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in the NSW. It is referred to in Part 5: Air Impurities Emitted from Activities and Plant in the Protection of the Environment Operations (Clean Air) Regulation 2010 (the Regulation). GER has an obligation to ensure compliance with the requirements specified in this Regulation.

In the absence of a requirement for an EPA licence, in accordance with the NSW Protection of the Environment Operations (Clean Air) Regulations 2010, the activity can be regarded as being an activity, under Division 3, Standards for non-scheduled premises.

As the proposed activity is a subject of a development application made after 1 September 2005, it is classified as a Group C activity (Figure 3).

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Division 3 Standards for non-scheduled premises

<p>43 Grouping of activities and plant</p> <p>(1) Subject to subclause (2), an activity carried out, or plant operated, on non-scheduled premises:</p> <p>(a) belongs to Group A if:</p> <p>(i) it commenced to be carried on, or to operate, before 1 August 1997, or</p> <p>(ii) it commenced to be carried on, or to operate, on or after 1 August 1997 as a result of development consent granted pursuant to a development application made before 1 August 1997, or</p> <p>(b) belongs to Group B if it commenced to be carried on, or to operate, on or after 1 August 1997 as a result of development consent granted pursuant to a development application made on or after 1 August 1997 and before 1 September 2005, or</p> <p>(c) belongs to Group C if it commenced to be carried on, or to operate, on or after 1 September 2005 as a result of development consent granted pursuant to a development application made on or after 1 September 2005.</p> <p>(2) If, in relation to plant operated in the Greater Metropolitan Area, an emission unit in Group A or B is replaced, the replacement emission unit is taken to belong to Group C.</p> <p>44 Prescribed standards of concentration for air impurities</p> <p>For the purposes of section 128 (1) of the Act, the prescribed standards of concentration for the emission of air impurities in relation to any activity carried on, or plant operated, at non-scheduled premises are as set out in Schedule 6.</p>

Figure 3. Extract from the NSW Protection of the Environment Operations (Clean Air) Regulations 2002.

5. Prescribed standards of concentration for air impurities

Section 44 of the NSW Protection of the Environment Operations (Clean Air) Regulations 2002 detail prescribed stand of concentration for air impurities beyond which the NSW Protection of the Environment Operations Act imposes financial penalties.

These standards are set out in Schedule 6 of the NSW Protection of the Environment Operations (Clean Air) Regulations 2002 (Figure 3).

Schedule 6 Standards of concentration for non-scheduled premises			
Air impurity	Activity or plant	Group	Concentration
Solid particles	Any activity or plant (except as listed below)	Group A	400 mg/m ³
		Group B	250 mg/m ³
		Group C	100 mg/m ³
Smoke	Any activity or plant in which, or in connection with which, solid fuel is burnt	Group A	Ringelmann 2 or 40% opacity
		Group B or C	Ringelmann 1 or 20% opacity
	Any activity or plant in connection with which liquid or gaseous fuel is burnt	Group A, B or C	Ringelmann 1 or 20% opacity
	Any activity or plant in connection with which solid fuel is burnt	Group A, in relation to marine vessels or premises, in approved circumstances	Ringelmann 3 or 60% opacity
		Group A, in relation to marine vessels or premises, in other circumstances	Ringelmann 2 or 40% opacity
		Group B or C, in relation to marine vessels or premises, in approved circumstances	Ringelmann 3 or 60% opacity, or
		Group B or C, in relation to marine vessels or premises, in other circumstances	Ringelmann 1 or 20% opacity
	Any activity or plant in connection with which liquid or gaseous fuel is burnt	Group A, B or C in relation to marine vessels or premises, in approved circumstances	Ringelmann 3 or 60% opacity
		Group A, B or C, in relation to marine vessels or premises, in other circumstances	Ringelmann 1 or 20% opacity

Figure 4. Schedule 6, NSW Protection of the Environment Operations (Clean Air) Regulations 2002.

Schedule 6 of the NSW Protection of the Environment Operations (Clean Air) Regulations 2002 designates solid particle emission concentrations of no greater than 100mg/m³ for any Group C activity or plant.

6. Emissions inventory

The potential emission associated with the activity is dust generation during the loading of the ilmenite onto semi -trailer trucks.

The National Pollutant -Emission Estimation Technique Manual for Mineral Sands Mining and Processing (Version 1.0) references the National Pollutant - Inventory emission estimation technique for mining (Version 3.1, January 2012) to model dust emissions.

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Under the National Pollutant - Inventory emission estimation technique for mining (Version 3.1, January 2012), the proposed activity is modelled in accordance with the non-coal “Excavators/shovels/front-end loaders (on overburden) dust emission model”.

The “Excavators/shovels/front-end loaders (on overburden) dust emission model” recommends the use of default values derived from the National Energy Research, Development and Demonstration Council (NERDDC, 1988) and State Pollution Control Commission of NSW (SPCC, 1983).

Default values: The NERDDC (NERDDC, 1988) work provides an estimate of TSP emissions from truck loading operations of 0.025 kg/t.

GER has provided a particle size distribution of the stockpile (Appendix). The particle distribution of the stockpile indicates that less than 6.1% of the stockpile is sized below 106 Micron.

A very small percentage of ultra-fine particles would be expected as the stockpile contains already processed material (Ultra fine particles tend to remain suspended during wet separation techniques and would have most likely reported to the tails stream of any processing plant).

This indicates that significantly the less than 6.1% of the total particle size is will be in the PM10 Range.

Assuming 6.1% of the stockpile is in the PM10 Range, the recommended PM10 emissions factor is:

$$0.025 \times 0.061 = 0.0015 \text{ kg/t.}$$
$$0.0015 \text{ kg/t} \times 1000 = 1.5252 \text{ mg/t}$$

Using a bulk density of 2.31 g/cm³ this equates to a PM10 emission of 3.53 mg/m³.

7. Metrological data

As the predicted air emission is well below the activity limit detailed metrological and dispersion modelling was not undertaken.

However, a preliminary examination noted that following:

- The site is well shield by dense surround trees providing a windbreak and giving it a high roughness factor (Wind Resistance).
- Based upon Bureau of Meteorology (BOM) data for Port Macquarie prominent (9am) wind direction in all seasons is from the South West (Away from the noise receptor House 1) and the (3pm) afternoon/evening wind direction is from the North East (Towards the receptor House 1).

Considering the project will operate in daylight hours only, the metrological conditions would appear to reduce the air emissions as measured at the nearest residence for the majority of daylight hours.

8. Background air quality

As the predicted air emission is well below the activity limit, background air quality levels were not tested.

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It is noted that the location is coastal and adjacent (Approximately 400m) to an exposed beach. It's likely that in cases of extreme Eastly winds (For example those associated with offshore tropical lows) both the proposed activity area and the nearest receptor experience periods of higher background air particulate levels.

9. Dispersion modelling

The predicted air emission PM10 is 3.53 mg/m³, well below the activity limit of 100 mg/m³.

As the predicted air emission is well below the activity limit, background air quality levels no detailed dispersion modelling was completed.

The proposed activity will not impact air quality and no specific mitigation methods are recommended.

10. Performance monitoring

A suitable air emission level was determined as per NSW Protection of the Environment Operations (Clean Air) Regulations 2002. This condition appears to be easily met. As a result, a formal air emission or dust management plan is not required.

However, it is strongly recommended that GER include in its Project Execution Plan a commitment to minimising air emission during the proposed activity. In particular:

- A requirement to ensure trucks leaving the activity area are clean of any ilmenite spillage.
- Any air emission or dust complaints be formally recorded and investigated.
- Any dust monitoring conducted (as a result of a complaint or other), be completed as per NSW Protection of the Environment Operations (Clean Air) Regulations 2002.

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11. Appendix – Stockpile Particle Size Distribution Curve

SAMPLE SIZE ANALYSIS

DATE	28/05/2014	GRADE:	ILMENITE
SAMPLE	67838		

ASTME MESH	SIEVE MICRON	WEIGHT RETAINED	% WEIGHT RETAINED	CUM. % RETAINED	WEIGHT PASSING
30	600	0.0	0.0	0.0	100.0
35	500	0.0	0.0	0.0	100.0
40	425	0.2	0.3	0.3	99.7
45	355	0.8	0.9	1.1	98.9
50	300	1.0	1.2	2.3	97.7
60	250	1.5	1.7	4.0	96.0
70	212	3.3	3.8	7.8	92.2
80	180	5.0	5.7	13.6	86.4
100	150	21.0	24.0	37.5	62.5
120	125	28.1	32.1	69.6	30.4
140	106	21.2	24.2	93.9	6.1
Pan	Pan	5.4	6.1	100.0	0.0
Total:		87.6			

D60 % = 148
D10 % = 109

Effective Size = 109
Uniformity Coefficient = 1.36

