Raeburn Quarry

Development Proposal and Environmental Management Plan

APPENDIX I

Vipac Noise Report

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STORNAWAY RELBIA QUARRY – DP&EMP NOISE ASSESSMENT

Stornaway operate a quarry at Western Junction near the Launceston Airport, processing nominally 56,000 m^3 per annum of basalt. The quarry is currently in the process of submitting a DP&EMP for an expansion to 210,000 m^3 per annum, and as part of that process is required to submit a noise assessment of the quarry operations. This letter presents that noise assessment which looks at the continuous emissions from the site, the blast noise and vibration emissions being covered elsewhere.

1.0 SITE DESCRIPTION

The quarry is located in the Tamar Valley approximately 4 km from the residential outskirts of Launceston. The quarry is situated on a small hilltop and is surrounded by open farmland. To the east the land falls off relatively steeply to The Joseph Chromy vineyard and Relbia Road, while to the west and south it remains relatively flat. One and a half kilometres to the south is the BIS quarry, with the Launceston domestic airport a further half kilometre south again. Six residential dwellings are located within 11/2 kilometres of the quarry, the nearest being the Mount Oriel homestead 250m north of the quarry, with the remainder 1 to 1.5 km from the quarry and on the east or western sides of the quarry.

The existing quarry comprises a pit that is roughly 10m deep, the screening / crushing plant being centrally in the pit, with the ore currently being extracted on the northern western face.

A dozer presently exposes the ore for extraction and removal by loaders with no drilling or blasting occurring, although this will commence to extract ore below the 170m level after completing a successful test blast. The ore is passed through a mobile cone crusher and screening plant, with the final product stored in stockpiles for transport off site. The existing plant is shown in Figure 1. Product is transported west off the site to Hobart Road.

Figure 1: Existing Quarry Operations – Looking NW

The noise sources from the quarry are then the crushing plant, the excavator / loader, and the haul trucks. To support the quarry development to 210,000 m^3 pa, additional equipment to that presently used will be installed, most significantly increased crushing capacity. All equipment will remain mobile based. A list of the current and future equipment to be used is given in Table 1.

Item	Make / Model	Quantity	
		Present	Stage 3
Crusher, Cone	Terex Cougar, TC 1235C	1	2
Crusher, Jaw		-	1
Sizing Screens	Finlay 393, Fintec 542	2	4
Dozer	Cat D6	1	1
Loaders	Daewoo, Doosan 400's	3	3
Excavator	20 tonne	-	1

Table 1: Equipment List

Additional to the quarry, a cement batching plant is to be installed. The plant will be located in the pit near the current site shed and so will be well shielded from the Mt Oriel Homestead. The plant will comprise a silo, material stockpiles, a conveying system, and a batching plant.

As per the quarry code of practice, the operating hours are 0700 to 1900 hrs Monday to Friday, 0800 to 1600 hrs Saturday, and no operation Sundays or public holidays.

2.0 SITE DEVELOPMENT

The quarry is to be developed in stages as listed below and summarised in Figure 3 to Figure 5:

1 Establish a floor level for the existing quarry perimeter at 175m. No blasting / drilling.
Via drilling and Blasting, drop the floor to 150m
Duration approximately 15 years

2 Extend the 170m bench south
Drop the floor level to 160m and Extend it south to daylight
Drop floor to 150m level
Duration approximately 20 years

3 Extend benches successively to the SW
Finally push 150m floor south to daylight
Duration approximately 30 - 40 years

During all works the overburden is removed to the side of the pit and used as a bund of approximately 2m height.

The quarry equipment is mobile and the crushing will be performed at the location most suitable at the particular time of the development.

The cement batching plant will be installed concurrently with the development of stage 1 of the quarry expansion.

3.0 SITE NOISE EMISSIONS

To determine the quarry noise emissions during its future expansion the acoustic modelling software SoundPlan has been used. Initially the sound power levels for the site equipment are determined, in this case by measurement of the existing equipment. An acoustic model of the quarry and its surrounding area is then built in SoundPlan based on topographical data, the determined sound power levels, and the relevant locations or sources and receivers. Running the model based on the Concawe algorithms then produces the expected noise levels, presented as a noise contour map of the area.

To assess the quarry noise emissions they are then compared against the relevant criteria and the existing ambient noise levels.

3.1 EXISTING AMBIENT SOUND LEVELS

Ambient noise levels in the surrounding community have been measured on the 16th October 2008 and the 23rd and 25th March 2009. The measurement locations are shown in Figure 6, and the results summarised in Table 2 and by the following comments:

- The crushing equipment was located in the positions shown in the photo of Figure 1.
- On the eastern side of the quarry the land falls away sharply, and so the topography has a strong shielding effect on noise levels. As such the quarry, between the quarry and Relbia Road, was only just audible via what was perceived as the loaders and their reverse beacons. Birds, farm activities, and traffic on Relbia road made up the main of the ambient noise levels here.
- At the Mt Oriel Homestead directly north of the quarry, the quarry is only just audible due to the strong screening afforded by the "hill" between it and the homestead. The noises heard are mainly the loader engine with the crusher and screens only occasionally barely audible.
- With the quarry off, the main noises at Mt Oriel were distant traffic from the A1 highway and Old Hobart Road, the occasional plane movement associated with the airport (both commercial and training flights), and bird or cricket noises.
- At Tara Cottage the quarry was inaudible and the noise levels dominated by traffic on the A1 highway and Old Hobart Road. The occasional plane movement associated with the airport (both commercial and training flights), was clearly audible.

LOCATION	SOUND PRESSURE LEVEL, **dBA**			COMMENTS
	L10	L90	Leq	
6	40	34	38	Quarry off, birds, planes
6	41	37	39	Quarry On, just audible
8	45	34	41	Birds primarily, Quarry just
3	47	41	45	Highway Traffic dominant
9	44	35	41	Birds primarily, Quarry just

Table 2: Daytime Noise Levels

3.2 QUARRY SOUND POWER LEVELS

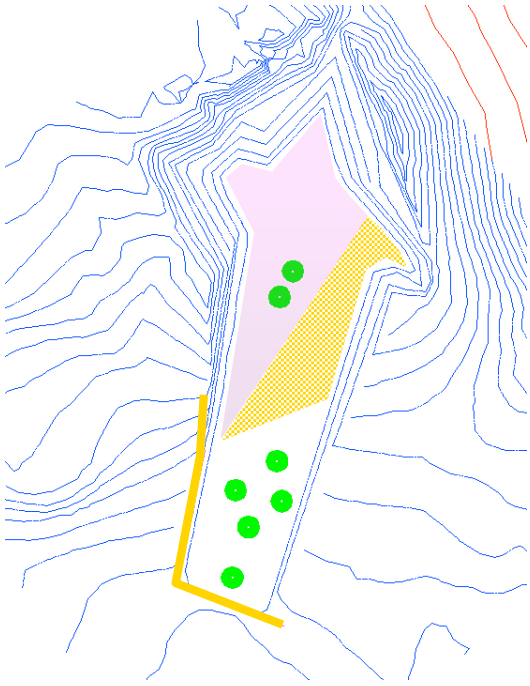
Measurements were made on site on 16th October 2008 with all equipment operating in normal format. Based on sound pressure level measurements made around each source the equipment sound power levels are as listed in Table 3. For the jaw crusher system, the data is taken from site measurements at a Tasmanian quarry using a mobile crushing facility. The cement batching plant data is similarly based on measurements made at a similar sized facility in Tasmania.

	Sound Power Levels, dBA
Loader	113
Dozer	110
Screen	113
Excavator	110
Jaw + Cone Crushers + Screen	119
Cone Crusher + Screen	115
Cement Plant	109

Table 3: Quarry Sound Power Levels

3.3 Predicted Community Sound Levels

For the existing quarry operations where the quarry equipment is located close in to the quarry faces at the 170m level, the quarry has been measured to be barely audible at locations 6 and 9 and inaudible at 3. As stage 1 develops via a lowered pit floor the noise levels at the receivers will decrease due to increased screening by the quarry faces. Stage 2 pushes the pit south a little but still maintains significant pit faces and so similarly maintains the good acoustic screening. When stage 3 develops the pit pushes SW and starts to daylight. With equipment in this SW area the community noise levels will now be at their highest. For the Mount Oriel homestead (location 6), the equipment is now furthest from the relevant pit face and so the screening is at its minimum (countered to some extent by the increased source / receiver distance). For location 4 in particular the equipment is now at its closest and the screening non existent and it is therefore this location that will be critical. As such it is Stage 3 that has been modelled in detail in this assessment.



The adjacent Figure shows the input data for the acoustic model, the green points indicating noise sources. The group at the SW extent of the 150m level comprise the 2 loaders, the dozer, a cone crusher, and two screens. The two sources further back in the quarry are the jaw crusher system and the final loader.

The jaw crusher system is the loudest noise source on site and its location therefore important in terms of community noise levels. In order that the natural topography provides some screening of this system from the residences around the quarry, the system needs to be located within the pink shaded area shown in the adjacent Figure. A location for the jaw crusher system has then been chosen within this defined area, based on minimising the screening afforded to the west of the quarry. It is then a worst case location for the jaw crusher within the defined area.

The acoustic model was run using the ConCawe algorithms for the case of a light wind blowing from source to receiver. This represents the worst case quarry noise levels that will be experienced by the residents. The results of the prediction are shown in the noise contour map of Figure 7, and by the overall levels of Table 4. The results show:

- Quarry noise is highest to the south west. The quarry benches and natural topography provide significant screening in the remaining directions.

- The highest residential noise level is 51 dBA at location 4.
- As Figure 2 shows, the noise is not tonal and so no adjustments need to be applied.
- For neutral weather conditions (no wind), noise levels are typically 5 dB lower.
- The loaders, screens and dozer at the SW end of the pit are the main sources for receivers 1 to 3, while for the remainder of the receivers the crushers (cone and jaw), are the dominant sources.
- With the cement plant down in the pit it is well screened from all observers so has minimal impact on community noise levels.
- Should a bund be added along the western edge of the pit (brown line in Figure above), it would afford an increased degree of screening of the crusher and hence the allowable crusher area could extend further south (brown area).

	Sound Pressure Level, dBA	
	Predicted	Criteria
1	43	55
2	40	55
3 Tara House	40	55
4 Raeburn House	51	55
5	26	49
6 Mt Oriel Homestead	46	49
7	25	49

Table 4: Predicted Quarry Sound Levels – Worst Case, Stage 3

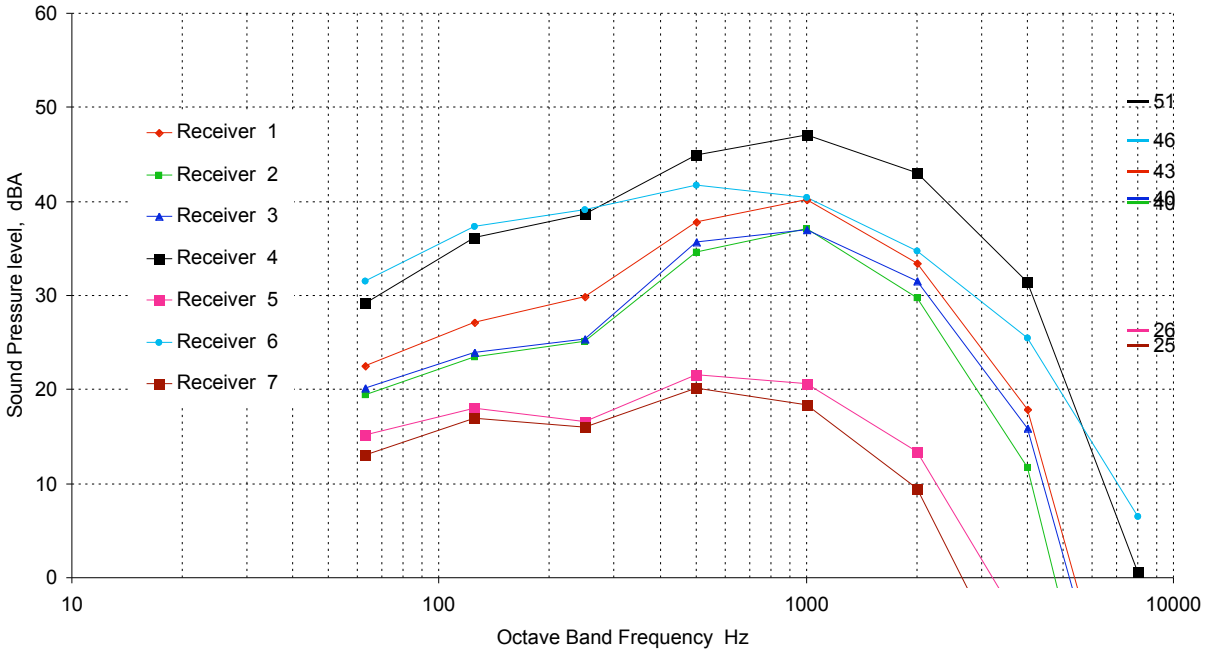


Figure 2: Predicted Quarry Sound Spectra at Various Receiver Locations

4.0 NOISE ASSESSMENT

The quarry noise will be at its highest when Stage 3 of the quarry is being developed. The assessment then focuses on this stage of the quarry life.

The predicted quarry noise is highest at locations 4 and 6 where it is predicted to be 51 and 46 dBA respectively when down wind of the source and 46 and 42 dBA when there is no wind. With a background noise of around 40 dBA the quarry will then be clearly audible at these locations when downwind of it, and just audible when there is no wind.

To determine if this audible quarry noise is acceptable, the information of Table 5 is used. In the Table only the Quarry Code of Practice gives an actual not to exceed level, the remaining sources being guidelines. Criteria of 55 dBA for locations 1 to 4, and 49 dBA for all other locations are chosen from the table based on:

- Primarily the Quarry Code of Practice.
- At location 4, 59 dBA is well above what would be considered a desirable planning limit (50 dBA).

			Noise Level, dBA		
			Location		
	Reference	Criterion	4	6	5
1	Quarry Code Practice	Noise Limit, Leq + 10	59	49	51
2	DEPHA, 2006	Moderate annoyance outside	50	50	50
3	DTAE, 2003	Typical Planning Limit	50	50	50
4		Minimum limit	35	35	35
	NSW Ind. Noise Policy	Intrusive L90 + 5dB			
5		L90 from AS1055 R1 / R3	55	45	45
6		L90 from measurements	48	39	40

Table 5: References for Various Noise Criteria

The reason for the higher criteria at locations 1 to 4 is the higher background noise there due to traffic on the A1 highway, Old Hobart Road, and Evandale Road. As you move further from these roads the background drops and so the criteria also drops.

The determined criteria are included in Table 4 and comparing the predicted worst case noise against the criteria shows ***the quarry development as a whole will achieve acceptable noise emissions***.

Should you have any queries, please do not hesitate to call this office directly.
Yours faithfully

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Bill Butler
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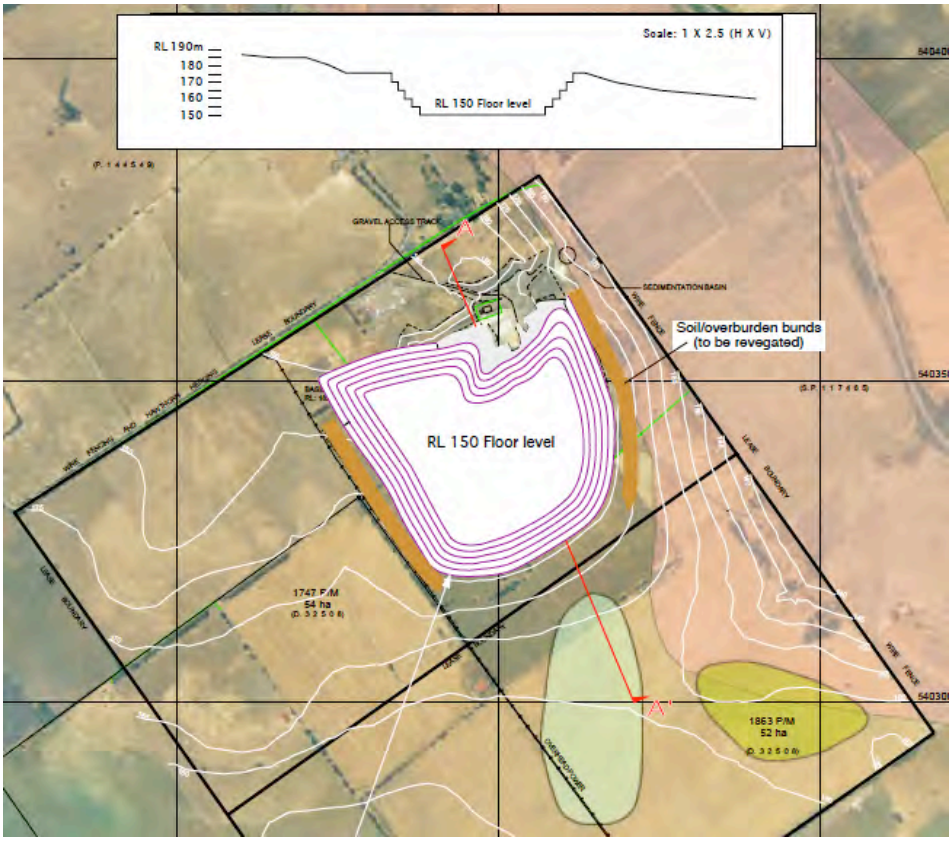

Figure 3: Completion of Stage 1

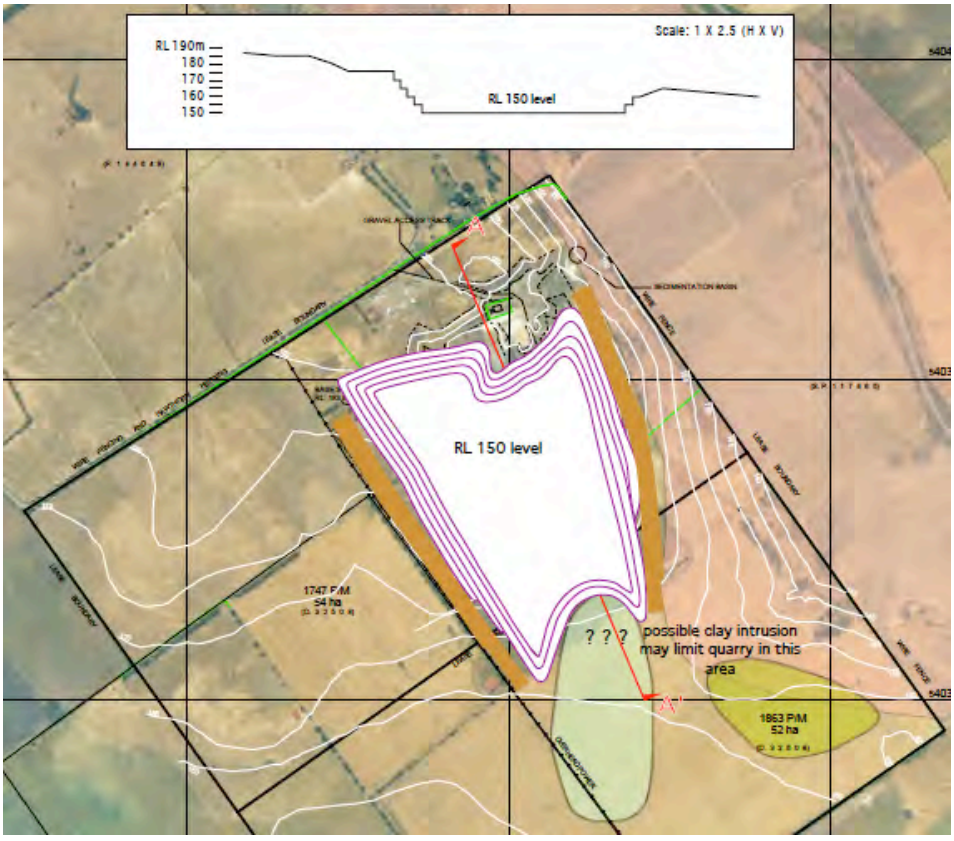

Figure 4: Completion of Stage 2

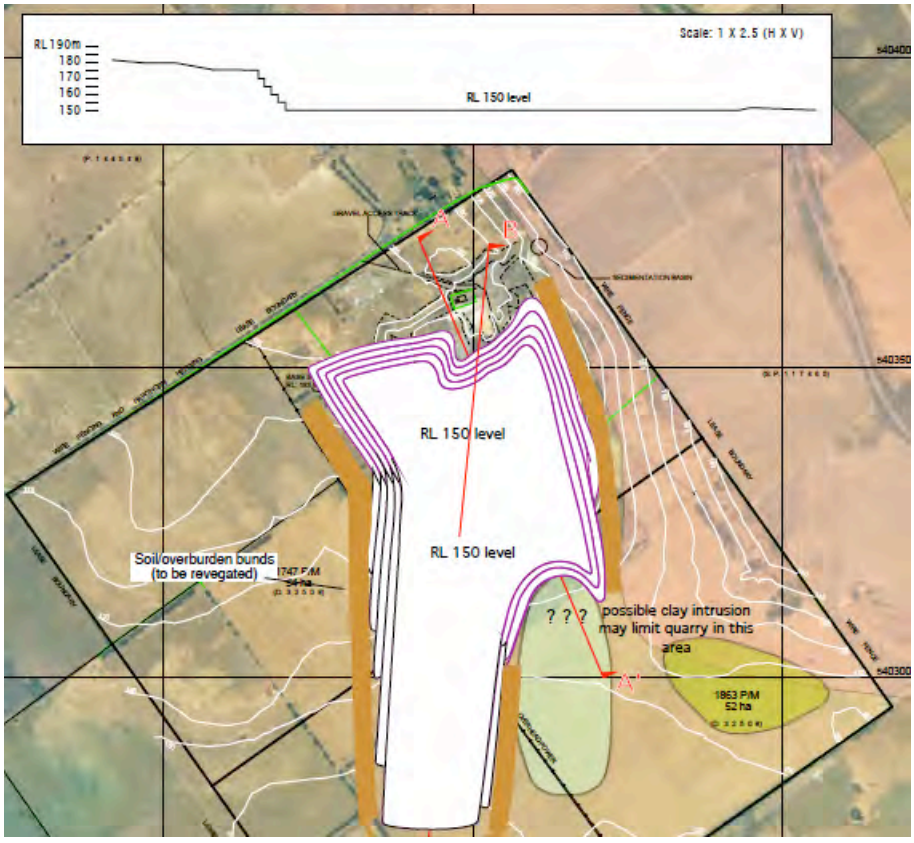

Figure 5: Completion of Stage 3

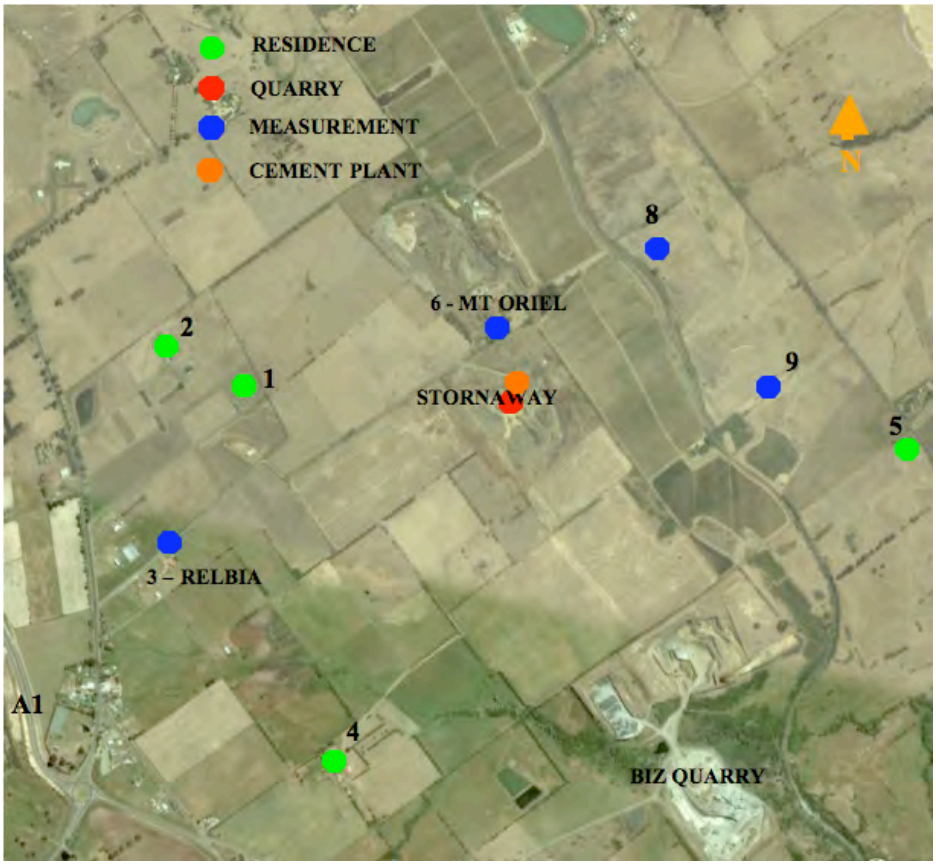

Figure 6: Stornaway Quarry and Surrounds

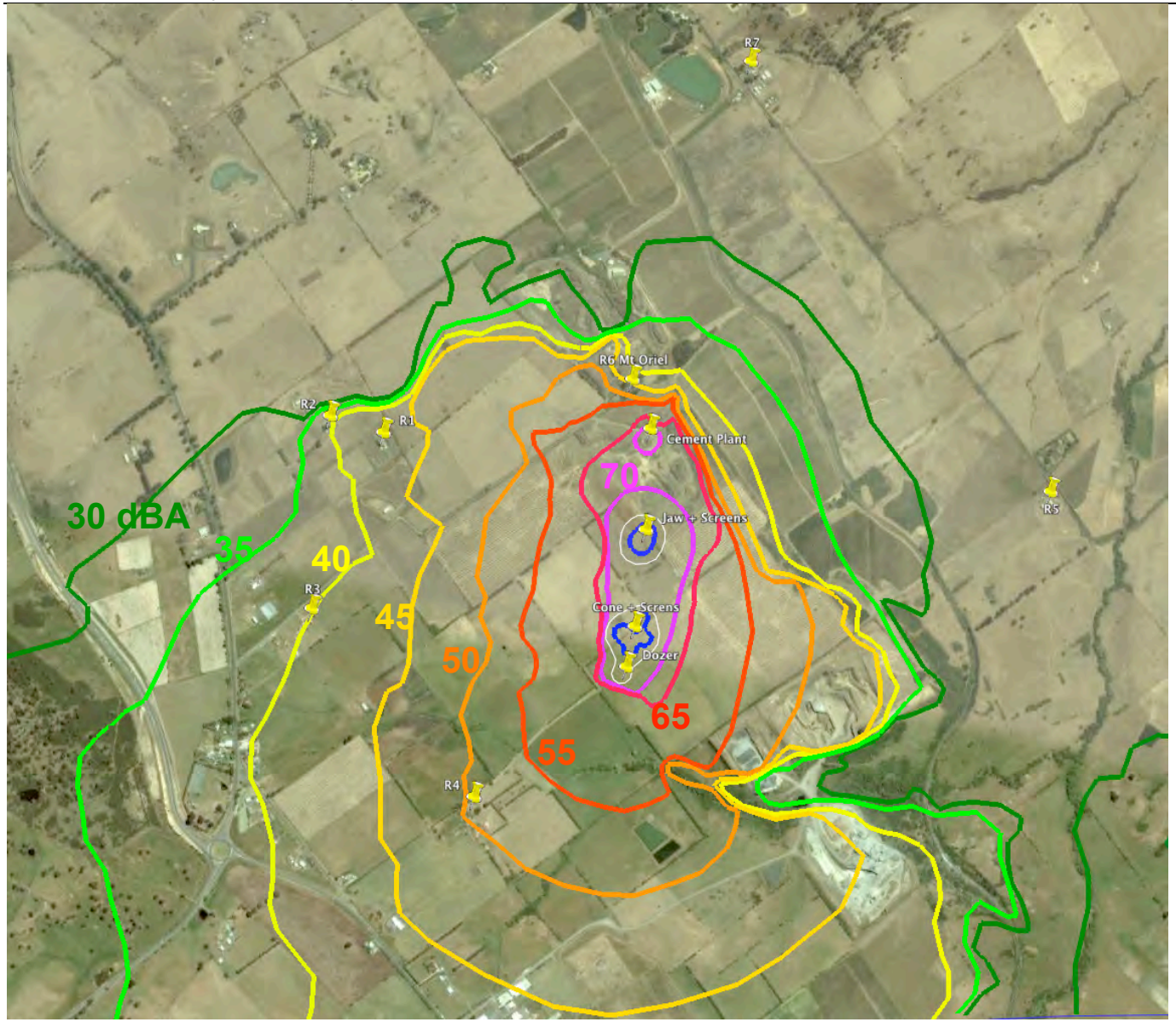

Figure 7: Stage 3 Noise Emissions