AshtonCoal

Appendix 4

Noise and Vibration Impact Assessment

South East Open Cut Project

&

Modification to the

Existing ACP Consent

Project No: 07373

Noise and Vibration Impact Assessment
Ashton South East Open Cut Project
Camberwell, NSW

Prepared for:

Wells Environmental Services
PO Box 205
East Maitland NSW 2323

Author:

……………………………………………
Neil Pennington
B.Sc., B. Math.(Hons), MAAS, MASA
Principal / Director

Review:

……………………………………………
Ross Hodge
B.Sc.(Hons)
Principal / Director

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EXECUTIVE SUMMARY

A Noise and Vibration Impact Assessment (NVIA) has been prepared for the proposed Ashton South East Open Cut (SEOC) project near Camberwell, NSW.

The assessment is based on or refers to the following Standards, policies, guidelines and documents:

- DECC *NSW Industrial Noise Policy* (2000).
- ANZECC *Technical basis for guidelines to minimise annoyance due to blast overpressure and ground vibration* (2000).
- Australian Rail Track Corporation (ARTC) Environmental pollution license EPL 3142.
- AS 2187.2-1993 *"Explosives – Storage, Transport and Use. Part 2: Use of Explosives"*

A brief summary of essential data, results and recommendations arising from this assessment is presented below.

Ambient Noise Levels

Ambient background and traffic noise, and noise from mines other than Ashton, are summarised in **Table S1**. This information provided the basis for establishing project-specific noise criteria for the SEOC.

TABLE S1
Summary of noise levels used for setting noise criteria for the SEOC.

<table>
<tr><th colspan="2" rowspan="2">Location</th><th colspan="3">L_{Aeq}, period</th><th colspan="3">L_{A90}, period (RBL)</th></tr>
<tr><th>Day</th><th>Eve.</th><th>Night</th><th>Day</th><th>Eve.</th><th>Night</th></tr>
<tr><td rowspan="2">Camberwell (north)[1]</td><td>Traffic</td><td>41</td><td>37</td><td>38</td><td rowspan="2">38</td><td rowspan="2">38</td><td rowspan="2">36</td></tr>
<tr><td>Other mines</td><td>31</td><td>31</td><td>32</td></tr>
<tr><td rowspan="2">Camberwell (south) [2]</td><td>Traffic</td><td>44</td><td>44</td><td>39</td><td rowspan="2">40</td><td rowspan="2">39</td><td rowspan="2">36</td></tr>
<tr><td>Other mines</td><td>34</td><td>34</td><td>33</td></tr>
<tr><td rowspan="2">R83 – Hall</td><td>Traffic</td><td>55</td><td>44</td><td>44</td><td rowspan="2">40</td><td rowspan="2">39</td><td rowspan="2">36</td></tr>
<tr><td>Other mines</td><td>34</td><td>34</td><td>33</td></tr>
<tr><td rowspan="2">R111 – Richards</td><td>Traffic</td><td>N/A</td><td>N/A</td><td>N/A</td><td rowspan="2">38</td><td rowspan="2">38</td><td rowspan="2">36</td></tr>
<tr><td>Other mines</td><td>34</td><td>34</td><td>33</td></tr>
<tr><td rowspan="2">R114 – Richards</td><td>Traffic</td><td>52</td><td>49</td><td>46</td><td rowspan="2">38</td><td rowspan="2">38</td><td rowspan="2">36</td></tr>
<tr><td>Other mines</td><td>34</td><td>34</td><td>33</td></tr>
<tr><td rowspan="2">R120 – Ernst</td><td>Traffic</td><td>48</td><td>46</td><td>42</td><td rowspan="2">41</td><td rowspan="2">43</td><td rowspan="2">39</td></tr>
<tr><td>Other mines</td><td>34</td><td>34</td><td>33</td></tr>
<tr><td rowspan="2">South of SEOC</td><td>Traffic</td><td>N/A</td><td>N/A</td><td>N/A</td><td rowspan="2">32</td><td rowspan="2">32</td><td rowspan="2">32</td></tr>
<tr><td>Other mines</td><td>37</td><td>37</td><td>37</td></tr>
</table>

[1] Receivers generally shielded from the New England Highway by topography.
[2] Receivers exposed to noise from the New England Highway.

Operational Noise Criteria

Criteria for noise emissions from the SEOC, including noise from continued operation of the surface facilities, are summarised in **Table S2**. The "intrusiveness" criteria seek to limit short term (15-minute) noise emissions from the SEOC, whereas the "amenity" criteria limit the noise contribution from the SEOC to the overall industrial noise levels in the area.

	Intrusiveness criteria dB(A),$L_{eq(15minute)}$			Amenity criteria dB(A),$L_{eq(period)}$		
Receiver	Day	Evening	Night	Day	Evening	Night
R35 De Jong	43	43	41	50	45	40
R117 McInerney	43	43	41	50	45	40
R34 Olofsson	43	43	41	50	45	40
R23 Lopes	43	43	41	50	45	40
R24 Clarke	43	43	41	50	45	40
R52 Foord	43	43	41	50	45	40
R30 Bennett	43	43	41	50	45	40
R32 Stapleton	45	44	41	50	45	40
R26 Schubert	43	43	41	50	45	40
R151 Church*	N/A	N/A	N/A	50 (external) when in use		
R18 Turner	45	44	41	50	45	40
R11 Richards	45	44	41	50	45	40
R8 Chisholm	45	44	41	50	45	40
R2 Ninness	45	44	41	50	45	40
R50 Standing	45	44	41	50	45	40
R51 Bailey	45	44	41	50	45	40
R119 Beasley	46	48	44	50	45	40
R120 Ernst	46	48	44	50	45	40
R121 Burgess	46	48	44	50	45	40
R83 Hall	45	44	41	50	45	40
R84 Tisdell	45	44	41	50	45	40
R114 Richards	43	43	41	50	45	40
R111 Richards	43	43	41	55	50	37
R129 Bowman	37	37	37	50	45	37
R130A Bowman	37	37	37	50	45	37
R130B Bowman	37	37	37	50	45	37
R184A Moxey	37	37	37	50	45	37

* St. Clement's Anglican Church

TABLE S2
Summary of operational noise criteria for the SEOC.

Summary of affected receivers

Predicted noise criterion exceedances are summarised in **Table S3** which also includes operational years in which each receiver is predicted to fall within the relevant noise zone(s).

Receiver	Management zone		Acquisition zone
	1 or 2dB (minor)	3 or 4dB (moderate)	5 dB or more (major)
R35 De Jong			Years 1, 3, 5 and 7
R117 McInerney		Year 3	Years 1, 5 and 7
R34 Olofsson			Years 1, 3, 5 and 7
R23 Lopes			Years 1, 3, 5 and 7
R24 Clarke			Years 1, 3, 5 and 7
R52 Foord			Years 1, 3, 5 and 7
R30 Bennett			Years 1, 3, 5 and 7
R32 Stapleton			Years 1, 3, 5 and 7
R26 Schubert			Years 1, 3, 5 and 7
R18 Turner			Years 1, 3, 5 and 7
R11 Richards			Years 1, 3, 5 and 7
R8 Chisholm			Years 1, 3, 5 and 7
R2 Ninness		Year 3	Years 1 and 5
R50 Standing			Years 1, 3, 5 and 7

TABLE S3
Summary of operation noise criterion exceedances.

Receiver	Management zone		Acquisition zone
	1 or 2dB (minor)	3 or 4dB (moderate)	5 dB or more (major)
R51 Bailey			Years 1, 3, 5 and 7
R119 Beasley			Year 1
R120 Ernst			Year 1
R121 Burgess	Years 3 and 5		Year 1
R83 Hall			Year 1
R84 Tisdell		Year 1	
R114 Richards	Year 3	Year 5	Year 1
R111 Richards	Year 1		
R129 Bowman			Years 1, 3, 5 and 7
R130A Bowman			Years 1, 3, 5 and 7
R130B Bowman			Years 1, 3, 5 and 7
R184A Moxey	Years 3 and 5		

The results in Table S3 show that all receivers except R84 (Tisdell), R111 (Richards) and R184A (Moxey) fall within the SEOC noise acquisition zone. These three receivers are in a noise management zone and should be included as noise monitoring locations, along with any locations that may be nominated by the Department of Environment and Climate Change or the Department of Planning. A Noise Management Plan (NMP) and noise monitoring program will be drafted to address these receivers specifically. It is recommended that ground clearing activities not be conducted under inversion conditions beyond approximately Year 4 of the SEOC as a management measure to reduce noise levels to below the operational noise criterion at R184A (Moxey).

Off-site road and rail noise impacts

A maximum of two additional trains generated by the SEOC project per day would not increase existing train noise levels by a measurable quantity at any receiver; therefore, no adverse train noise impacts are likely.

The proposal would generate no additional traffic on the New England Highway, and would reduce the number of employee vehicles using the existing site entrance on Glennies Creek Road, therefore no adverse traffic noise impacts would occur.

Sleep Disturbance

No sleep disturbance impacts have been predicted at any receiver outside the noise acquisition zone.

Blasting

Excessive blast overpressure and vibration levels will be experienced at Camberwell village residences in the SEOC noise acquisition zone within approximately 350m of blasting. Vibration levels likely to cause cosmetic damage have also been predicted at the disused Community Hall.

Vibration levels from the average MIC 503kg blasts at the two A. Bowman properties (R130A and R130B) are predicted to be well below the building damage criteria, and below the more stringent personal comfort criteria. Increasing the blast MIC to 850kg would still result in compliance with the personal comfort (vibration) criterion at these locations.

Blasting with 503kg MIC should not occur within 100m of the AAPT optic fibre, or the MIC should be reduced to 450 kg based on an 88m separation, in order for the 100mm/s vibration criteria to be achieved. Larger blasts with 850kg MIC should be set back at least 150m from the optic fibre and 875m from St Clement's Church to achieve the relevant criteria.

No exceedances of the overpressure or ground vibration criteria are predicted at residential receivers outside the SEOC noise acquisition zone for 503 kg MIC blasts. Calculated maximum blast MIC to achieve the overpressure and vibration criteria are 1100kg (R84), 2500kg (R111) and 4500kg (R184). It is understood that typical blasts would be smaller than these limiting values.

Blast monitoring at the above locations should be conducted to determine appropriate blast design to achieve the criteria as the mine progresses.

1.0 INTRODUCTION

1.1 The Proposal

Ashton Coal Operation Limited (ACOL) seeks project approval under Part 3A of the Environmental Protection and Assessment (EP&A) Act for the South East Open Cut (SEOC) Project. Accordingly, a noise and vibration impact assessment (NVIA) is required for inclusion with an Environmental Assessment (EA) for the proposal. This NVIA has been conducted in accordance with relevant NSW DECC policies and guidelines.

The SEOC and associated facilities are to be located approximately 2.5 km southeast of the existing Ashton Coal Project (ACP) processing plant, and immediately south of Camberwell village. The project will comprise:

- One open cut pit, the SEOC producing up to 3.6Mtpa of ROM coal;
- An environmental bund constructed along the portion of the pit adjacent to the New England Highway;
- ROM coal facilities to provide initial coal processing prior to being conveyed to the existing ACP processing plant;
- Conveyors to transport the ROM coal to the existing ACP processing plant over Glennies Creek and the New England Highway; and
- Various water diversion/storage devices, road closures and site facilities.

1.2 Study Area

The ACP is located 14 km northwest of Singleton in then Hunter Valley of NSW within the Hunter coalfields of the Sydney Basin. The SEOC project is located approximately 400m south of the village of Camberwell, on the southern side of the New England Highway. The locations of the ACP and the SEOC are illustrated in **Figure 1** (at the end of this report).

1.3 Proposed Operations

The SEOC will be operated as part of the ACP and utilise the coal handling, preparation and loading facilities approved under the Ashton Development Consent (DA) 309-11-2001-i. In order to allow the integration and combined operation of the SEOC with the existing ACP an application to modify the existing ACP development consent under Part 75W of the EP&A Act in the following manner will also be lodged:

- Increase the throughput of the CHPP and rail loading facilities to cater for approximately 8.6Mtpa of ROM coal;
- Modification of the existing CHPP to allow the receipt of coal from the SEOC;

- Disposal of coal tailings from the existing underground coal mine in the SEOC final void; and
- Increased coal extraction rate to 5.0Mtpa ROM coal in the existing underground coal mine.

The mining method utilised for the SEOC would be primarily truck and excavator. Mining will commence in the north and progress to the south. Initial overburden displaced will be used to construct the environmental bund and out of pit emplacement at the northern end of the pit. Overburden will then be back-filled into the SEOC.

At planned extraction rates the SEOC will run for approximately seven years. The mine will commence prior to the completion of the Barrett pit within the North East Open Cut (NEOC) to ensure continuity of employment for mine workers and coal production. The open cut will operate 24 hours per day, seven days per week.

1.4 Surrounding Land Uses and Receivers

The village of Camberwell lies to the north of the SEOC with scattered rural properties surrounding the site. Non-mine related receivers (and noise monitoring locations) considered in this assessment are listed in **Table 1** below and illustrated in **Figure 2**.

TABLE 1
Non-mine related receivers considered in this assessment.

Receiver	Owner / Description
35	De Jong, Meindert & Thelma Eileen
117	McInerney, John Charles & Judith
34	Olofsson, Torbjorn Anders & Diedre Ella
23	Lopes, Valda Kim
24	Clarke, Tracey Lee & Vollebreght, John Leonardus
52	Foord, Leslie Alan & Susan Dorothy
30	Bennett, Alan John
32	Stapleton, Colin Leslie
26	Schubert, Corey Ian and Rosemary Anne
151	Trustees of Church Property, Diocese of Newcastle
18	Turner, Sandra Phyllis
11	Richards, Bruce Howard & Rosalie Ellen
8	Chisholm, Michael James
2	Ninness, Ronald Wayne
50	Standing, Clinton
51	Bailey, Robert John and Cindy Narelle
119	Beasley, Mark Andrew & Michele Kathleen
120	Ernst, Stephen Francis & Carol Dawn
121	Burgess, Trevor Geoffrey
83	Hall, Gregory James
84	Tisdell, Isobel Mary
114	Richards, Bruce Howard & Rosalie Ellen
111	Richards, Bruce Howard & Rosalie Ellen
129	Bowman, W.H., M. H., and W.G. & Elder, G. R.
130A	Bowman, Alistair Stuart
130B	Bowman, Alistair Stuart
184A	Moxey, Bruce Eric & Thea Anne

2.0 THE EXISTING ENVIRONMENT

The existing meteorological and acoustic environments have been studied as part of this EA. Meteorological data from existing ACP weather monitoring stations were analysed by PEAHolmes and seasonal wind roses provided for this NVIA.

2.1 Meteorology

2.1.1 Wind Speed and Direction

Winds are an assessable feature of an area if the sum of wind vector components up to 3 m/s from a given direction occurs for more than 30% of the time during the day, evening or night periods in any given season. Analysis of winds for the SEOC noise assessment did not separate the day, evening and night periods so any assessable wind is assumed to occur at all times of the day during the relevant season(s), as a worst case.

Wind roses produced by PAEHolmes and details of the analysis of wind vector components are presented in **Appendix B**. Results of the analysis are summarised in **Table 2** with assessable winds (>30% occurrence of vector components 0.5-3 m/s) indicated in bold type. Wind directions selected for noise modelling are shaded grey. As detailed in Appendix B, winds from each of the 16 compass directions in Table 2 receive vector contributions from six 'side-band' directions so the percentages for each season (summed over all wind directions) greatly exceed 100%.

TABLE 2
Summary of wind vector components from 0.5 m/s to 3 m/s.

Direction	SEASON			
	Summer	Autumn	Winter	Spring
N	5.91%	20.30%	**30.10%**	17.20%
NNE	17.31%	22.70%	10.60%	18.00%
NE	**44.77%**	**31.30%**	12.10%	**33.50%**
ENE	**53.65%**	**43.40%**	21.10%	**41.40%**
E	**41.86%**	**43.00%**	21.20%	**38.00%**
ESE	**43.87%**	**43.30%**	21.70%	**38.30%**
SE	**47.85%**	**44.30%**	23.60%	**40.40%**
SSE	**57.30%**	**47.00%**	26.80%	**45.50%**
S	**48.55%**	**38.90%**	28.70%	**42.00%**
SSW	19.00%	27.40%	23.40%	25.30%
SW	7.40%	24.70%	**34.90%**	21.60%
WSW	8.00%	26.80%	**38.40%**	24.10%
W	6.97%	20.70%	**31.20%**	21.00%
WNW	6.06%	21.90%	25.10%	18.70%
NW	5.65%	21.80%	24.90%	18.40%
NNW	5.67%	24.00%	29.30%	19.00%
Calms	8.50%	14.50%	7.80%	6.90%

Winds from the N, NE, S and WSW are worst case with respect to receivers surrounding the SEOC.

2.1.2 Temperature Inversions

A temperature inversion study was conducted by Spectrum Acoustics on the ACP site during August/September 2006, with five Gemini data loggers placed at various locations on the site and in Camberwell village to cover a total altitude separation of 79m.

The tenth percentile inversion strength recorded in the sound propagation path between mining activities and Camberwell village was 4.7^{0}C/100m. This inversion strength was adopted in noise modelling for the SEOC.

Typical calm daytime conditions of no wind, 70% RH and -1^{o}C/100m vertical temperature gradient (ie, dry adiabatic lapse rate, DALR) was also modelled to represent daytime noise levels under calm conditions.

2.2 Ambient Noise Levels

Ambient noise monitoring was conducted at four receivers close to the project site during the period 12 to 18 August 2008 (refer to Figure 1 for noise monitoring locations). Existing L_{Aeq} and L_{A90} (Rating Background levels, RBL) levels are summarised in **Table 3**. Noise data charts are shown in **Appendix C**.

TABLE 3
Measured ambient noise levels (August 2008).

Location	L_{Aeq}, period			L_{A90}, period (RBL)		
	Day	Evening	Night	Day	Evening	Night
R35 – De Jong	51	44	48	40	40	37
R120 – Ernst	48	46	42	41	43	39
R83 – Hall	55	44	44	40	39	36
R114 – Richards	52	49	46	38	38	36

2.2.1 Background (RBL) levels excluding ACP

Attended noise monitoring conducted for ACP by Spectrum Acoustics during August 2008 confirmed that the major contributing noise source at R120, R83 and R114 was the New England Highway. Noise from ACP was evident in Camberwell village at R24 (Clarke), suggesting that the RBL's in Table 2 for R35 may be influenced by ACP noise and, in accordance with the INP, cannot be used as the basis for setting noise criteria in the northern part of the village.

The original 2001 noise monitoring for the ACP EIS, conducted by Spectrum Acoustics' directors Neil Pennington and Ross Hodge (then employed by HLA-Envirosciences), determined RBL's of 33 dB(A),L_{90} (day), 35 dB(A),L_{90} (evening) and 32 dB(A),L90 (night) at R24. These data were obtained prior to commencement of ACP and are therefore appropriate for setting intrusive noise criteria in the northern part of the village.

2.2.2 Estimating Industrial (L_{Aeq}) noise levels

The night time L_{Aeq} level of 48 dB(A) at R35 was strongly influenced by elevated noise levels between 4 am and 7 am (see charts in Appendix C). As these times are outside ACP mining hours, and the daily elevated periods are not evident at the other monitoring locations, it is clear that an environmental noise source near R35 has affected the data during these night time (albeit, early morning) hours.

For this reason, the evening L_{Aeq} level of 44 dB(A),L_{eq} at R35 will be adopted as the night time L_{Aeq} level in the northern section of Camberwell village.

While it has been established that L_{Aeq} levels at R120, R83 and R114 are dominated by traffic on the New England Highway, the relative contributions of mining (dominated by ACP) and traffic noise at R35, and within Camberwell village generally, remains to be established.

Quarterly attended noise monitoring results from November 2007 to May 2009, conducted by Spectrum Acoustics at two locations in Camberwell village, are summarised in **Table 4**. Receiver R32 (Stapleton) is in a position which is exposed to the New England Highway, whereas receiver R24 (Clark) is further from the highway and is shielded from it by topography.

The blue shaded cells in Table 4 indicate times when the wind speed was in the range 3-5 m/s. Grey shaded cells indicate times when the inversion strength was greater than 90th percentile value of 4.7^{0}C/100m used in this assessment.

In the following assessment of existing industrial noise levels, the times of excessive inversion strength will be excluded, but the periods when the wind was in the range 3-5 m/s will be included, for conservatism.

Where ACP is listed as “inaudible” a value equal to the higher of (a) the total L_{Aeq} level minus 12dB or (b) the lowest identified noise source minus 6dB or (c) the estimated value (if given) in column 9 of Table 4 will be assigned. Similarly, where ACP is listed as “faintly inaudible” a value equal to the higher of (a) the total L_{Aeq} level minus 9dB or (b) the lowest identified noise source minus 2dB or (c) the estimated value (if given) in column 9 of Table 4 will be assigned. These assigned values are likely to be higher than the actual levels at the time, but will be adopted for conservatism.

Summaries of existing ACP noise levels for R32 and R34, based on the above assumptions, are summarised in **Table 5**. Periods when noise is identified as "traffic" or "other mines" are also included in Table 5.

Date	Time	Period	Location	Total dB(A) Leq	ACP Contribution dB(A) Leq	Wind	Inversion	Detailed Noise levels Recorded	Comments
19-Nov-07	3.18 pm	Day	Stapleton	46	40	1.5 ENE	n/a	Traffic (42), ACP (40)	
19-Nov-07	3.01 pm	Day	Clark	41	40	1.7 ENE	n/a	ACP (40), traffic (32)	
19-Nov-07	8.17 pm	Evening	Stapleton	45	35	2.8 ESE	n/a	Traffic (45), ACP (35), insects (34)	Mine hum
19-Nov-07	8.00 pm	Evening	Clark	44	30	2.8 ESE	n/a	Birds (44), ACP (30), traffic (27),	Mine hum
19-Nov-07	12.42 am	Night	Stapleton	42	inaudible	1.5 SSE	3.75	Traffic (40), insects (37), other mines (32), ACP inaudible	
19-Nov-07	12.25 am	Night	Clark	39	inaudible	2.2 SSE	0	Traffic (37), other mines (33), insects (26), ACP inaudible	
18-Feb-08	4.25 pm	Day	Stapleton	43	inaudible	4.4 ESE	n/a	Traffic (42), birds (36), ACP inaudible	n/a
18-Feb-08	4.07 pm	Day	Clark	43	40	3.6 ESE	n/a	ACP (40) traffic (38), wind (37), insects (30)	Dozer
18-Feb-08	8.20 pm	Evening	Stapleton	44	inaudible	3.4 ESE	n/a	Birds & insects (42), traffic (41), other mines (32), ACP inaudible	Mine hum
18-Feb-08	8.02 pm	Evening	Clark	41	inaudible	3.0 ESE	n/a	Traffic (38), birds & insects (37), other mines (32), ACP inaudible	
18-Feb-08	10.47 pm	Night	Stapleton	42	inaudible	2.1 ENE	n/a	Traffic (39), insects (36), other mines (31), ACP inaudible	
18-Feb-08	10.30 pm	Night	Clark	42	inaudible	2.4 ENE	n/a	Traffic (40), insects (35), other mines (31), ACP inaudible	
26-May-08	4.18 pm	Day	Stapleton	50	36	4.8 WNW	n/a	Traffic (50), birds (37), ACP (36)	Mine hum, conveyor ?
26-May-08	4.01 pm	Day	Clark	46	33	4.4 WNW	n/a	Traffic (45), birds(34) ACP (33)	Mine hum, conveyor ?
26-May-08	8.13 pm	Evening	Stapleton	46	42	1.9 WNW	10	Traffic (44), ACP (42)	Mine hum, trucks, conveyor?
26-May-08	7.57 pm	Evening	Clark	47	42	1.7 WNW	8.2	Traffic (45), ACP (42), dog (30)	Mine hum, trucks
26-May-08	11.00 pm	Night	Stapleton	47	43	2.3 WNW	8.6	Traffic (44), ACP (43)	CHPP, dozer?, engine revs
26-May-08	10.43 pm	Night	Clark	47	44	1.9 WNW	7.9	ACP (44), traffic (43)	CHPP, dozer?, engine revs
25-Aug-08	4.46 pm	Day	Stapleton	40	35	1.2 ENE	n/a	Traffic (39), ACP (35), birds (28)	Dozer
25-Aug-08	4.02 pm	Day	Clark	41	40	0.8 ENE	n/a	ACP (40), birds (33), dog (30)	Dozer
25-Aug-08	9.17 pm	Evening	Stapleton	48	32	0.9 SSE	4.65	Traffic (48), other mines (36), ACP est. (32)	Haul trucks, mine hum
25-Aug-08	8.02 pm	Evening	Clark	44	34	2.2 SSE	5.55	Traffic (41), other mines (38), ACP est. (34), train (33)	Haul trucks, mine hum
25-Aug-08	10.46 pm	Night	Stapleton	42	faintly audible	0.3 SSE	7.16	Other mines (39), traffic (38), trains (32) ACP faintly audible	Mine hum
25-Aug-08	10.28 pm	Night	Clark	41	faintly audible	0.7 SSE	7.16	Other mines (37), traffic (36), trains (36) ACP faintly audible	Mine hum
11-Nov-08	4.35 pm	Day	Stapleton	40	inaudible	3.6 ESE	<+3	Wind (38), traffic (37), ACP inaudible	n/a
11-Nov-08	4.15 pm	Day	Clark	41	27	4.7 ESE	<+3	Wind (39), birds (37), ACP (27)	Haul trucks
11-Nov-08	8.35 pm	Evening	Stapleton	39	30	2.2 ESE	<+3	Other mines (34), insects (31), traffic (30) ACP (30)	Haul trucks
11-Nov-08	8.18 pm	Evening	Clark	49	<30	2.6 ESE	<+3	Insects (49), other mines (30), traffic (30), ACP (<30)	Haul trucks, dozer tracks
11-Nov-08	10.41 pm	Night	Stapleton	36	inaudible	1.7 E	<+3	Other mines (33), traffic (30), insects (30), ACP inaudible	
11-Nov-08	10.23 pm	Night	Clark	49	inaudible	1.8 ESE	<+3	Insects (49), other mines (30), ACP inaudible	
28-Feb-09	4.42 pm	Day	Stapleton	43	barely audible	1.8 WNW	n/a	Traffic (43), wind (33), ACP barely audible (est. <30)	
28-Feb-09	4.25 pm	Day	Clark	44	barely audible	2.0 WNW	n/a	Traffic (42), wind (35), birds (35) ACP barely audible (est. <30)	
28-Feb-09	8.37 pm	Evening	Stapleton	46	42	3.2 NNW	n/a	ACP (42), frogs & insects (40), traffic (40)	Truck revs and retards, dozer
28-Feb-09	8.21 pm	Evening	Clark	43	38	3.0 NNW	n/a	Traffic (39), ACP (38)*, insects (37)	Truck revs and retards, dozer
28-Feb-09	10.43 pm	Night	Stapleton	42	inaudible	2.2 NNW	n/a	Traffic (39), frogs & insects (38), mine noise (36), ACP inaudible	
28-Feb-09	10.26 pm	Night	Clark	40	inaudible	2.6 NNW	n/a	Mine noise (34), traffic (33), train (33), ACP inaudible	
11-May-09	4.47 pm	Day	Stapleton	44	inaudible	2.2 E	n/a	Traffic (43), birds & insects (38), ACP inaudible	
11-May-09	4.30 pm	Day	Clark	35	inaudible	2.5 E	n/a	Traffic (34), birds & insects (28), ACP inaudible	
11-May-09	8.40 pm	Evening	Stapleton	45	inaudible	1.3 ESE	n/a	Traffic (45), ACP inaudible	
11-May-09	8.23 pm	Evening	Clark	39	inaudible	1.3 ESE	n/a	Traffic (39), birds & insects (30), ACP inaudible	
11-May-09	10.40 pm	Night	Stapleton	42	faintly audible	1.4 SSE	n/a	Traffic (42), ACP barely audible	Revs, dozer tracks
11-May-09	10.23 pm	Night	Clark	40	faintly audible	1.1 S	n/a	Traffic (40), train (30), ACP barely audible	Revs, dozer tracks

Table 4. Attended noise monitoring results in Camberwell village.

TABLE 5
Summary of attended noise monitoring results in Camberwell.

Location	Period	Total dB(A),Leq	ACP dB(A),Leq	Other mines dB(A),Leq	Traffic dB(A),Leq
R32 Stapleton	Day	46	40	--	42
	Day	43	30	--	42
	Day	50	36	--	50
	Day	40	35	--	39
	Day	40	31	--	37
	Day	43	30	--	43
	Day	44	32	--	43
	LAeq	45	35	--	44
	Evening	45	35	--	45
	Evening	44	32	32	41
	Evening	48	32	36	48
	Evening	39	30	34	30
	Evening	46	42	--	40
	Evening	45	33	--	45
	LAeq	45	36	34	44
	Night	42	26	32	40
	Night	42	30	31	39
	Night	36	24	33	30
	Night	42	30	36	39
	Night	42	32	--	42
	LAeq	41	29	33	39
R24 Clark	Day	41	40	--	32
	Day	43	40	--	38
	Day	46	33	--	45
	Day	41	40	--	
	Day	41	27	--	
	Day	44	30	--	42
	Day	35	23	--	34
	LAeq	43	37	--	41
	Evening	44	30	--	27
	Evening	41	29	32	38
	Evening	49	30	30	30
	Evening	43	38	--	39
	Evening	39	27	--	39
	LAeq	45	33	31	37
	Night	39	27	33	37
	Night	42	30	31	40
	Night	49	30	30	33
	Night	40	28	34	33
	Night	40	28	--	40
	LAeq	44	29	32	38

While the above analysis establishes existing noise levels within Camberwell village, much of the existing ACP mining noise will be 'replaced' in future by noise from the SEOC (although noise from the processing area will remain).

A review of unattended noise logging at R184A (Moxey) in Maison Dieu, presented in the Hunter Valley Operations 2007 AEMR, reveals a night time background level of 32 dB(A),L_{90}. This value will also be adopted for the day and evening periods and used to establish intrusive noise criteria at receivers south of the SEOC. Traffic and existing/predicted mining (non-ACP) L_{Aeq} noise levels and RBL's for the various receivers are summarised in **Table 6**. Residences in Camberwell (north) are R35, R117, R34, R22, R23, R24 and R52. Camberwell (south) residences are R32, R18, R11, R12, R8, R2 and R50.

Mining noise levels of 34 dB(A),L_{eq} (day), 34 dB(A),L_{eq} (evening) and 33 dB(A),Leq (night) from Table 5 have been adopted at receivers R83, R111, R114 and R120 to estimate existing noise emissions from other mines near Camberwell village. Mining noise levels for receivers south of the SEOC have been sourced from typical predicted levels in the HVO South Coal Project EA (noise assessment by ERM, 2009).

TABLE 6
Summary of noise levels used for setting noise criteria for the SEOC.

Location		L_{Aeq}, period			L_{A90}, period (RBL)		
		Day	Eve.	Night	Day	Eve.	Night
Camberwell (north)	Traffic	41	37	38	38	38	36
	Other mines	31	31	32			
Camberwell (south) [1]	Traffic	44	44	39	40	39	36
	Other mines	34	34	33			
R83 – Hall	Traffic	55	44	44	40	39	36
	Other mines	34	34	33			
R111 – Richards	Traffic	N/A	N/A	N/A	38	38	36
	Other mines	34	34	33			
R114 – Richards	Traffic	52	49	46	38	38	36
	Other mines	34	34	33			
R120 – Ernst	Traffic	48	46	42	41	43	39
	Other mines	34	34	33			
South of SEOC	Traffic	N/A	N/A	N/A	32	32	32
	Other mines	37	37	37			

[1] Acoustically similar to R83 in terms of RBL and traffic L_{Aeq}.

3.0 NOISE CRITERIA AND PREDICTED IMPACTS

Criteria for noise and vibration impacts from the Proposal are presented in the following sections.

3.1 Operational Noise Criteria

The INP specifies two noise criteria: an *intrusiveness criterion* which limits Leq noise levels from the industrial source to a value of 'background plus 5dB' and an *amenity criterion* which aims to protect against excessive noise levels where an area is becoming increasingly developed. DECC recommended industrial noise levels (ANL's and maxima, as presented in Table 2.1 of the INP) are summarised in **Table 7** below. These values, and the measured existing traffic and industrial noise levels, are used to establish the amenity criteria by applying corrections to the recommended levels. The correction factors are shown in **Table 8** (reproduced from Table 2.2 of the INP).

TABLE 7
DECC recommended L_{Aeq} noise levels from industrial sources (INP, Table 2.1).

Type of Receiver	Indicative Noise Amenity Area	Time of Day	Recommended Leq Noise Level, dB(A)	
			Acceptable (ANL)	Recommended Maximum
Residence	Rural	Day	50	55
		Evening	45	50
		Night	40	45
Residence	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
Residence	Urban	Day	60	65
		Evening	50	55
		Night	45	50
Church	All – when in use (internal)		40	45

Section 2.2.1 of the INP contains guidelines for the selection of noise amenity categories for various land use zones. The noise amenity category is generally independent of the formal land zoning. Due to the proximity of mines and the New England Highway, it would be reasonable to categorise many receivers in Camberwell village as "suburban".

To remove any uncertainty over receiver types, all residential receivers will be assumed to be in a "Rural" noise amenity area for the purpose of setting amenity criteria. Although there is a high degree of mining development in the area and the recommended maximum values in Table 7 may be applicable, amenity criteria for residences generally north of the SEOC will be based on the acceptable levels in Table 7 for conservatism.

TABLE 8
Modification factors to account for industrial sources (INP, Table 2.2).

Total existing Leq noise level from industrial sources, dB(A)	Maximum Leq noise level for noise from new sources alone, dB(A)
≥ ANL +2	If existing noise level is *likely to decrease* in the future: ANL – 10 If existing noise level is un*likely to decrease* in the future: Existing level – 10
ANL + 1	ANL - 8
ANL	ANL - 8
ANL - 1	ANL - 6
ANL - 2	ANL - 4
ANL - 3	ANL - 3
ANL - 4	ANL - 2
ANL - 5	ANL - 2
ANL - 6	ANL - 1
< ANL - 6	ANL

For a high traffic noise area where the existing traffic noise level (L_{Aeq}) is 10dB or more above the recommended levels shown in Table 7 and a future decrease in traffic noise is not expected, the amenity criterion is equal to the existing traffic noise level minus 10dB. Intrusiveness and amenity criteria for all assessed receivers are summarised in **Table 9**.

TABLE 9
Intrusiveness and amenity noise criteria for the SEOC.

	Intrusiveness criteria dB(A),$L_{eq(15minute)}$			Amenity criteria dB(A),$L_{eq(period)}$		
Receiver	Day	Evening	Night	Day	Evening	Night
R35 De Jong	43	43	41	50	45	40
R117 McInerney	43	43	41	50	45	40
R34 Olofsson	43	43	41	50	45	40
R23 Lopes	43	43	41	50	45	40
R24 Clarke	43	43	41	50	45	40
R52 Foord	43	43	41	50	45	40
R30 Bennett	43	43	41	50	45	40
R32 Stapleton	45	44	41	50	45	40
R26 Schubert	43	43	41	50	45	40
R151 'Church'	N/A	N/A	N/A	50 (external) when in use		
R18 Turner	45	44	41	50	45	40
R11 Richards	45	44	41	50	45	40
R8 Chisholm	45	44	41	50	45	40
R2 Ninness	45	44	41	50	45	40
R50 Standing	45	44	41	50	45	40
R51 Bailey	45	44	41	50	45	40
R119 Beasley	46	48	44	50	45	40
R120 Ernst	46	48	44	50	45	40
R121 Burgess	46	48	44	50	45	40
R83 Hall	45	44	41	50	45	40
R84 Tisdell	45	44	41	50	45	40
R114 Richards	43	43	41	50	45	40
R111 Richards	43	43	41	55	50	37
R129 Bowman	37	37	37	50	45	37
R130A Bowman	37	37	37	50	45	37
R130B Bowman	37	37	37	50	45	37
R184A Moxey	37	37	37	50	45	37

3.2 Noise Impact Assessment Procedure

The assessment of operational noise was conducted using RTA Technology's Environmental Noise Model (ENM) v3.06. All major noise producing items were modelled at their known (for stationary sources such as the rail load-out and surface facilities) or most exposed (for mobile sources such as dump trucks) positions and noise contours and point calculations were generated for the surrounding area and receivers.

3.2.1 Noise Sources

Noise data for significant sources associated with the ACP have been measured on site by Spectrum Acoustics. Sound power levels of operational noise sources used in the modelling are shown below in **Table 10**. All values for time-varying sources (particularly haul trucks and dozers) have been calculated as $L_{Aeq(15minute)}$ levels and are approximately 5-7 dB below the maximum pass-by levels recorded during site measurements.

TABLE 10
Operational noise source sound power levels. These are calculated 15-minute L_{Aeq} levels as used in the noise model and measured maximum levels.

Operational noise source	Sound power level, dB(A)		Source Height, m
	$L_{eq(15\ min)}$	L_{max}	
Loading empty coal wagons	101	116	3
3 x loco's idling on loop	105	111	3
Loader ROM hopper	114	120	3
Rotary breaker (enclosed)	108	112	5
Tracked dozer (fwd/reverse cycle)	115	128	2
Overburden drill	114	116	1
O/B excavator	117	125	5
Coal excavator	116	122	5
Overburden dump (full cycle)	115	121	3
Overburden haul (on slope, per 350m)	115	123	3
Overburden haul (on flat, per 350m)	113	118	3
Coal haul (per 350m)	111	120	3
Transfer station	112	116	15
Coal washery	112	116	15
Conveyors (per 100m)	96	N/A	2-10
Stacker/reclaimers (each)	105	N/A	10

3.2.2 Modelled Scenarios

Noise modelling was conducted for the following atmospheric conditions:

- *Daytime calm* – Air temperature 20^{0}C, 70% relative humidity (RH), no wind, -1^{o}C/100m vertical temperature gradient (dry adiabatic lapse rate);
- *Inversion* – Air temperature 5^{0}C, 85% RH, +4.7^{o}C/100m vertical temperature gradient;
- *Prevailing winds (summer/autumn/spring)* – Air temperature 20^{0}C, 70% RH, 3m/s wind from NE, ESE and S; and
- *Prevailing wind (winter)* – Air temperature 10^{0}C, 70% RH, 3m/s wind from N and WSW.

Noise models were generated for Years 1, 3, 5 and 7 for each of the seven atmospheric conditions discussed above. Noise source locations for the four operational years were provided by the Proponent and are shown in **Figures 3-6**.

Operational noise level predictions in this report apply to times of day as summarised in **Table 11**. As all operations will be 24-hour, the predicted levels are compared with night time criteria to present a worst case.

TABLE 11
Applicable times for predicted noise levels.

Met Condition	Applicable time(s) for predicted noise levels
Lapse	Day, evening and night during calm conditions
NE, ESE and S winds	Day, evening and night during summer/autumn/spring
N and WSW winds	Day, evening and night during winter
Inversion	Night, winter only (per INP)

3.3 Predicted Operational Noise Levels

Predicted operational (intrusive) noise levels using the ENM point calculation mode are presented below for the modelled operational and meteorological scenarios.

3.3.1 Year 1 Operational Noise

Predicted noise levels for the Year 1 scenarios are summarised in **Table 12**. Exceedances of the most stringent (night time) criteria in Table 12 are shown in bold type. Major (5 dB or more) exceedances are also shaded grey. Noise contours for this scenario are shown in **Figures C1 to C7** in **Appendix C**.

TABLE 12
Predicted Year 1 intrusive noise levels.

	Predicted intrusive noise level dB(A),$L_{eq(15min)}$							
			Winds					
Receiver	Neut	Inv	N	NE	ESE	S	WSW	Criteria
35	37	47	37	35	40	46	48	41
117	38	47	37	35	40	45	48	41
34	38	48	38	35	40	46	49	41
23	39	49	40	36	42	47	50	41
24	40	50	40	36	42	49	50	41
52	41	50	41	38	44	50	51	41
30	45	52	45	41	47	52	52	41
32	45	52	45	41	47	52	52	41
26	41	50	42	39	47	49	51	41
151	49	53	50	46	51	54	54	50
18	45	52	48	44	48	52	50	41
11	45	52	47	44	48	50	50	41
8	45	52	47	44	48	50	50	41
2	45	52	46	44	48	50	50	41
50	51	53	51	51	51	53	52	41
51	51	53	51	51	51	53	52	41
119	45	51	45	44	50	51	50	44
120	48	52	47	45	50	52	53	44
121	50	51	50	45	50	50	53	44

Receiver	Predicted intrusive noise level dB(A),$L_{eq(15min)}$							Criteria
	Neut	Inv	Winds					
			N	NE	ESE	S	WSW	
83	39	45	40	35	35	40	50	41
84	34	40	35	29	29	35	45	41
114	43	50	41	39	45	50	49	41
111	30	42	29	25	30	40	43	41
129	45	51	52	52	46	42	44	37
130A	40	50	50	50	45	40	40	37
130B	33	44	45	43	35	30	31	37
184A	24	36	36	33	28	20	23	37

3.3.2 Discussion of Year 1 Results

Major (5dB or more) exceedances of the noise criteria have been predicted at all receivers shaded grey in Table 12, placing these receivers in a noise acquisition zone. Given the magnitude of exceedances (generally 10dB or more), options for effective noise control of mobile plant are not achievable with current best practice technology, no measures can be recommended.

Predicted exceedances from 1dB to 4dB at R84 (Tisdell) and R111 (Richards) place these receivers in a noise management zone. No exceedances are predicted at R184A (Moxey). Approval of the project may carry a requirement to develop a Noise Management Plan for these receivers, incorporating a noise monitoring program.

Predicted 1-4 dB exceedances at St Clement's Church may require noise monitoring to be conducted during a church service and, if necessary, a noise management strategy to be agreed with the Church Trustees and implemented.

3.3.3 Year 3 Operational Noise

Predicted noise levels for the Year 3 scenario are summarised in **Table 13**. Exceedances of the most stringent (night time) criteria in Table 13 are shown in bold type. Major (5 dB or more) exceedances are also shaded grey. Noise contours for this scenario are shown in **Figures C8 to C14** in **Appendix C**.

TABLE 13
Predicted Year 3 intrusive noise levels.

Receiver	Predicted intrusive noise level dB(A),$L_{eq(15min)}$							Criteria
	Neut	Inv	Winds					
			N	NE	ESE	S	WSW	
35	35	45	35	30	32	40	47	41
117	30	43	35	28	28	35	45	41
34	35	45	36	31	31	40	46	41
23	35	45	39	31	31	40	46	41
24	37	47	39	33	34	43	48	41
52	39	47	40	35	36	45	49	41
30	42	49	43	39	40	47	51	41
32	42	49	43	39	40	47	51	41

Receiver	Predicted intrusive noise level dB(A),$L_{eq(15min)}$							Criteria
			Winds					
	Neut	Inv	N	NE	ESE	S	WSW	
26	35	45	40	32	32	40	47	41
151	45	52	48	46	47	49	53	50
18	40	50	46	39	39	45	51	41
11	40	48	46	40	37	42	50	41
8	40	47	45	40	36	41	49	41
2	38	46	45	38	35	40	45	41
50	47	52	50	45	47	47	52	41
51	47	52	50	45	47	47	52	41
119	31	44	40	30	29	34	41	44
120	32	43	40	30	29	34	42	44
121	33	42	38	32	30	35	45	44
83	28	39	35	27	25	30	41	41
84	27	37	35	25	24	29	39	41
114	28	42	38	28	28	33	43	41
111	25	37	27	22	23	33	40	41
129	55	56	56	57	55	54	53	37
130A	45	53	51	50	50	40	44	37
130B	36	45	47	45	37	33	38	37
184A	24	37	38	35	27	20	23	37

3.3.4 Discussion of Year 3 Results

Major (5dB or more) exceedances of the noise criteria have been predicted at all receivers within Camberwell village and at R129 (Bowman), R130A (Bowman) and R130B (Bowman). Predicted exceedances from 1dB to 4dB at R117 (McInerney), R114 (Richards), and R121 (Burgess) place these receivers in a management zone for Year 3, although these three receivers are included within the Year 1 acquisition zone. A minor 1dB exceedance has been predicted at R184A (Moxey). Predicted noise levels at R184A are discussed further in Section 3.5.3.

3.3.5 Year 5 Operational Noise

Predicted noise levels for the Year 5 scenario are summarised in **Table 14**. Exceedances of the most stringent (night time) criteria in Table 14 are shown in bold type. Major (5 dB or more) exceedances are also shaded grey. Noise contours for this scenario are shown in **Figures C15 to C21** in **Appendix C**.

TABLE 14
Predicted Year 5 intrusive noise levels.

Receiver	Predicted intrusive noise level dB(A),$L_{eq(15min)}$							Criteria
			Winds					
	Neut	Inv	N	NE	ESE	S	WSW	
35	35	45	35	30	32	41	47	41
117	30	43	34	28	28	37	46	41
34	35	45	35	31	31	40	47	41
23	35	45	36	31	31	40	46	41
24	37	46	38	34	34	43	48	41
52	39	47	40	35	35	45	49	41

Receiver	Predicted intrusive noise level dB(A),$L_{eq(15min)}$							Criteria
			Winds					
	Neut	Inv	N	NE	ESE	S	WSW	
30	42	49	42	39	40	47	51	41
32	42	49	42	39	40	47	51	41
26	35	45	40	32	32	40	47	41
151	45	52	46	42	43	50	53	50
18	40	50	45	40	39	45	51	41
11	40	47	45	40	37	42	50	41
8	40	46	45	40	36	41	49	41
2	36	45	42	36	35	40	46	41
50	47	52	49	45	44	48	52	41
51	47	52	49	45	44	48	52	41
119	30	43	40	30	29	33	41	44
120	30	43	39	30	29	33	40	44
121	33	41	35	31	30	36	45	44
83	28	40	35	27	25	32	41	41
84	27	38	34	25	24	29	40	41
114	29	42	36	28	27	34	45	41
111	25	38	25	24	24	33	40	41
129	54	>55	55	>55	>55	>55	55	37
130A	46	55	50	55	55	46	45	37
130B	37	48	47	49	41	35	41	37
184A	25	38	36	37	30	23	24	37

3.3.6 Discussion of Year 5 Results

Major (5dB or more) exceedances of the noise criteria have been predicted at all residential receivers within Camberwell village and at R129 (Bowman), R130A (Bowman) and R130B (Bowman). Predicted exceedances from 1dB to 4dB at R114 (Richards), and R121 (Burgess) place these receivers in a management zone for Year 5, although both receivers are in the acquisition zone for previous years. A minor 1dB exceedance has been predicted at R184A (Moxey).

3.3.7 Year 7 Operational Noise

Predicted noise levels for the Year 7 scenario are summarised in **Table 15**. Exceedances of the most stringent (night time) criteria in Table 15 are shown in bold type. Major (5 dB or more) exceedances are also shaded grey. Noise contours for this scenario are shown in **Figures C22 to C28** in **Appendix C**.

TABLE 15
Predicted Year 7 intrusive noise levels.

Receiver	Predicted intrusive noise level dB(A),$L_{eq(15min)}$							Criteria
			Winds					
	Neut	Inv	N	NE	ESE	S	WSW	
35	35	45	35	30	32	40	47	41
117	30	42	34	29	28	36	46	41
34	35	45	36	31	31	40	47	41
23	35	45	37	31	31	40	47	41
24	37	47	39	34	34	43	48	41
52	39	48	40	35	36	45	50	41

Receiver	Predicted intrusive noise level dB(A),$L_{eq(15min)}$							Criteria
	Neut	Inv	Winds					
			N	NE	ESE	S	WSW	
30	42	49	43	39	40	47	51	41
32	42	49	43	39	40	47	51	41
22	35	45	40	32	31	40	47	41
18	40	50	46	40	39	45	51	41
11	40	48	46	40	37	42	50	41
8	40	47	46	39	36	41	48	41
2	36	45	45	36	34	39	46	41
50	46	52	50	45	43	48	52	41
119	30	43	40	30	29	34	41	44
120	30	40	40	30	29	33	39	44
121	32	40	37	30	29	35	40	44
83	29	38	35	26	25	30	40	41
84	27	36	34	25	24	28	38	41
114	29	42	38	28	27	34	44	41
111	25	37	32	23	23	33	39	41
129	>55	>55	>55	>55	>55	>55	55	37
130A	46	55	50	55	55	47	45	37
130B	36	45	47	45	38	32	35	37
184A	23	35	37	34	25	<20	22	37

3.3.8 Discussion of Year 7 Results

Major (5dB or more) exceedances of the noise criteria have been predicted at all receivers within Camberwell village and at R129 (Bowman), R130A (Bowman) and R130B (Bowman). A predicted exceedances of 3dB at R114 (Richards) places this receiver in a management zone, although this receiver is included in the acquisition zone for previous years. No exceedances have been predicted at R184A (Moxey).

3.4 Summary of Predicted Exceedances

Noise criterion exceedances predicted in Tables 12-15 are summarised in **Table 16** which also includes operational years in which each receivers is predicted to fall within the relevant noise zone(s).

TABLE 16
Summary of operation noise criterion exceedances.

Receiver	Management zone		Acquisition zone 5 dB or more (major)
	1 or 2dB (minor)	3 or 4dB (moderate)	
R35 De Jong			Years 1, 3, 5 and 7
R117 McInerney		Year 3	Years 1, 5 and 7
R34 Olofsson			Years 1, 3, 5 and 7
R23 Lopes			Years 1, 3, 5 and 7
R24 Clarke			Years 1, 3, 5 and 7
R52 Foord			Years 1, 3, 5 and 7
R30 Bennett			Years 1, 3, 5 and 7
R32 Stapleton			Years 1, 3, 5 and 7
R26 Schubert			Years 1, 3, 5 and 7
R18 Turner			Years 1, 3, 5 and 7
R11 Richards			Years 1, 3, 5 and 7

Receiver	Management zone 1 or 2dB (minor)	Management zone 3 or 4dB (moderate)	Acquisition zone 5 dB or more (major)
R8 Chisholm			Years 1, 3, 5 and 7
R2 Ninness			Years 1, 3, 5 and 7
R50 Standing			Years 1, 3, 5 and 7
R51 Bailey			Years 1, 3, 5 and 7
R119 Beasley			Year 1
R120 Ernst			Year 1
R121 Burgess	Years 3 and 5		Year 1
R83 Hall			Year 1
R84 Tisdell		Year 1	
R114 Richards	Year 3	Year 5	Year 1
R111 Richards	Year 1		
R129 Bowman			Years 1, 3, 5 and 7
R130A Bowman			Years 1, 3, 5 and 7
R130B Bowman			Years 1, 3, 5 and 7
R184A Moxey	Years 3 and 5		

3.5 Sleep Disturbance

Assessment of potential sleep disturbance during night time hours usually begins by considering the DECC recommendation that further assessment is required if maximum noise levels[1] (L_{Amax}) exceed the background level (L_{A90}) by more than 15 dB at a bedroom window. If this level is exceeded then further consideration of potential disturbance to sleep includes the nature and level of ambient noise in the area, with some guidance also offered in Appendix B of the DECC *Environmental Criteria for Road Traffic Noise* (ECRTN, 1999).

The DECC website contains an INP Application Note relating to sleep disturbance which admits to a general lack of knowledge about sleep disturbance and that the “background + 15 dB” criterion is *“not ideal”*. The application note directs readers to a research review presented in the appendices to the ECRTN. This additional information will be consulted if the “background + 15 dB” criterion is exceeded.

3.5.1 Sleep Disturbance Criteria

Potential for sleep disturbance will be considered at receivers not included in the operational noise acquisition zone. Sleep disturbance criteria for these receivers are:

Receiver	Criterion dB(A),Lmax
R111 (Richards)	51
R84 (Tisdell)	51
R184 (Moxey)	47

[1] The sleep disturbance criterion is technically the $L_{A1(1minute)}$ level. As this is the loudest 0.6s during a 15-minute period, the L_{Amax} level is usually adopted.

3.5.2 Sleep Disturbance Assessment Methodology

An assessment of L_{max} levels has been conducted as follows:

- Determine the worst case noise impacts at the three receivers for Year 1 (worst case at R84 and R111) and Year 5 (worst case at R184);
- Review the source ranking files and note down the five largest individual L_{Aeq} contributions; and
- Add the difference between L_{Aeq} and L_{Amax} sound power level (L_w) from Table 10 to each of the ranked L_{Aeq} levels at the receivers.

3.5.3 Predicted Maximum Noise Levels

Estimated L_{Amax} noise impacts are summarised in **Table 17**.

TABLE 17

Estimated L_{max} noise levels for assessment of potential sleep disturbance impacts.

Receiver	Top 5 sources (dB(A),L_{eq})	Source L_w (L_{max} - L_{Aeq})	Est. L_{max} at receiver	L_{max} Criterion
R111 Richards Year 1 WSW wind	Dozer on dump (36.8)	13	50	51
	Dump on bund (36.7)	6	43	
	O/B Truck 1 (36.5)	5	42	
	O/B Truck 2 (35.9)	5	41	
	Conveyor (33.4)	N/A	33	
Received L_{Aeq}	43			
R84 Tisdell Year 1 WSW wind	O/B Truck 1 (38.4)	5	43	51
	Dump on bund (38.0)	6	44	
	Dozer on dump (37.8)	13	51	
	O/B Truck 2 (35.9)	5	41	
	Conveyor (34.5)	N/A	35	
Received L_{Aeq}	45			
R184A Moxey Year 5 Inversion	Dozer clearing (30.8)	3	34	47
	Loader clearing (30.7)	3	34	
	O/B Dump 1 (27.6)	6	34	
	Dozer on dump 1 (27.2)	13	40	
	Dozer on dump 1 (26.6)	13	40	
Received L_{Aeq}	38			

Results in Table 17 suggest that maximum noise levels from dozers operating at high level on overburden dumping areas may approach or equal the sleep disturbance criterion at R84 and R111. Since the sleep disturbance criteria are recommended by DECC as the first step in assessing potential sleep disturbance and, as they are not exceeded, no further assessment is required.

Table 17 also highlights another important result for R184A. The predicted worst case noise level of 38 dB(A),$L_{eq(15minute)}$ under inversion conditions is 1 dB above the criterion at this location, and 34 dB(A) is attributable to a dozer and loader clearing the land ahead of the active pit. This leaves a 36 dB(A) contribution from all other sources associated with the SEOC. Both DECC and DoP prefer noise levels not to exceed the INP noise criteria. That is, a 'noise management zone' is usually defined at receivers where all reasonable and feasible noise mitigation options have been applied and predicted levels remain 1-4 dB above the criteria.

It is recommended that land clearing activities, which typically operate on a campaign basis and during the daytime only, are not conducted under inversion conditions beyond approximately Year 4 (when mining will have advanced to the south towards R184A) so that the predicted noise impact at R184A is below the intrusiveness criterion of 37 dB(A). The effectiveness of this strategy would be tested by including this receiver as a noise compliance monitoring location.

3.6 Cumulative Mining Noise Levels

As with the assessment of potential sleep disturbance in Section 3.5 above, cumulative mining noise impacts will only be considered at receivers R84, R111 and R184A. All other receivers have predicted noise levels from the SEOC of 10 dB or more above the intrusive noise criteria and additional noise from existing approved mining operations is unlikely to raise these levels significantly. This is confirmed by predicted SEOC noise levels in the order of 46-52 dB(A) in Camberwell village (Tables 12-15) and existing non-ACP mining noise levels of 31-34 dB(A) (Table 6).

3.6.1 Receivers north of the SEOC

Receivers R84 and R111 are generally northeast of the SEOC, southwest of the Integra mine and southeast of the Glendell mine. These receivers would therefore receive maximum noise levels from each mine under different wind conditions. The worst case noise impact would be experienced under temperature inversion conditions, which are omni-directional. It is also relevant to the assessment of 'worst-case' impacts that temperature inversions generally occur on calm evenings / nights / mornings when noise-sensitivity might be greatest.

The assessment of cumulative noise impacts at R84 and R111 will consider available predicted levels for approved operations at the Glendell and Integra mines. The Glendell mine will commence significantly north of the assessed receivers and progress in a southerly direction towards the receivers. Conversely, the SEOC would commence near the receivers and progress away from them in a southerly direction. The Glendell Year 1.5 scenario[2] will be assumed to coincide with the SEOC Year 1 (namely, 2010).

The noise criterion for Integra (Camberwell Open Cut) is 39 dB(A),$L_{eq(15minute)}$ at R111 and this level will be adopted as the worst case for all operational years at this receiver. R84 is within the Camberwell Open Cut Zone of Affectation, which is defined in the Camberwell

[2] Noise Impact Assessment by Umwelt, July 2007.

consent as 44 dB(A) at receiver R83. Since R83 and R84 are close together and in acoustically similar environments, a level of 44 dB(A) will be adopted for R84 in order to assess worst case cumulative noise impacts.

An analysis based on the above assumptions is summarised in **Table 18**. The results represent approved or predicted $L_{Aeq(15minute)}$ (ie, intrusive) noise levels, whereas cumulative noise is assessable against amenity criteria which apply over the full assessment period. In the worst case assessment, this is the 9-hour night time period from 10pm – 7am. Assuming that operational and meteorological conditions remain constant (and worst case) for the entire night period, values in Table 18 will be adopted as amenity noise levels.

TABLE 18
Estimated cumulative mining noise levels at receivers north of the SEOC.

Receiver	Mine	Year of operation (approximate)			
		2010	2012	2014	2016
R111 Richards	SEOC	42	37	38	37
	Glendell	34	29	36	39
	Integra	39	39	39	39
	TOTAL	44	41	43	43
R84 Tisdell	SEOC	40	37	38	36
	Glendell	33	26	31	33
	Subtotal	41	37	39	38
	Integra	44	44	44	44
	TOTAL	46	45	45	45

The recommended acceptable and maximum amenity (ie, cumulative) mining noise level at the rural receivers in Table 18 are 40 dB(A) and 45 dB(A), respectively. Given the high level of mining development in the area, a level in the range 40-45 dB(A) may be considered a reasonable limit on cumulative mining noise. Existing and approved levels, when combined with predicted levels from the SEOC, lie within this range at R111.

Receiver R84 is within the Camberwell Zone of Affectation and additional noise from Glendell mine and the SEOC is predicted to further increase noise levels at this receiver by 1-2 dB. Since 2 dB is widely accepted as the minimum noise level increase perceptible by the human ear, the additional noise from Glendell and the SEOC does not constitute a significant increase over existing levels at R84.

3.6.2 Receivers south of the SEOC

Receiver R184A is the northern-most residence in Maison Dieu and would receive noise from the SEOC and/or Hunter Valley Operations (HVO) under various meteorological conditions.

The HVO South Coal Project approval (24th March 2009) contains a noise criterion of 41 dB(A),$L_{eq(15minute)}$ for the day, evening and night periods at R184A (referred to as R47 in the HVO assessment). This value was based on worst case modelled results for all potential operational scenarios under winds from the west and/or inversion conditions.

It is acknowledged in both the HVO South Coal Project EA and the DoP Assessment Report (February 2009) that the scenario resulting in the predicted level of 41 dB(A) at R184A was absolute worst case and that lower noise levels are likely to be the norm. A typical scenario considered in the DoP Assessment Report shows a worst case (in terms of meteorological conditions) noise level of 37 dB(A) at R184A.

The worst case predicted level of 36 dB(A) from the SEOC (with land clearing not occurring under inversion conditions as discussed in Section 3.5.3 above) when combined with the typical worst case level of 37 dB(A) from HVO gives a cumulative worst case level of 40 dB(A). This is equal to the acceptable night time amenity level for rural receivers.

4.0 OFF-SITE RAIL TRAFFIC

4.1 Train Noise and Vibration Criteria

4.1.1 Train Noise Criteria – ACP

Chapter 163 of the DECC *Environmental Noise Control Manual* (ENCM) specifies limits on train noise levels as follows:

Descriptor	Planning Levels	Maximum Levels
Leq, 24 hour	55dB(A)	60dB(A)
Lmax	80dB(A)	85dB(A)

4.1.2 Train Noise Criteria – Cumulative

The Australian Rail Track Corporation (ARTC) operates the Gulgong-Sandy Hollow and Main Northern railways. ARTC's EPL 3142 does not contain environmental noise limits but states the objective of progressive reduction of noise levels from rail lines through Pollution Reduction Programs (PRPs).

While the Main Northern railway line is not currently subject to a PRP, Section U1.1 of EPL 3142 provides the following goals to work towards in developing a PRP:

Descriptor	Design Goal
Leq, (15 hour), day	65dB(A)
Leq, (9 hour), night	60dB(A)
Lmax (24 hour)	85dB(A)

4.2 Train Noise Impact Assessment

The SEOC Project and proposed increase to underground production seeks to increase the total product coal output of the ACP by approximately 2.3Mtpa. This equates to approximately 1.2 additional trains per day, or a maximum of 2 trains per day, from ACP.

A review of the ARTC's *"Standard working Timetable – freight and Country Passenger Services from 5th August 2007 – Book 5 North and North West",* effective 8 January 2008, suggests that there are over 160 timetabled coal train slots (100+ during the day and 60+ during the night) on the Main Northern Line. This capacity is not filled by the current coal train numbers. Data presented by GHD in the Minimbah Third Track EA (July 2008) suggest an actual maximum volume of 63 coal trains during the day and 35 coal trains at night.

The addition of a maximum of two additional trains per 24-hour period from the SEOC will not increase existing noise levels by a measurable or audible amount, nor would any current train noise set-back distances be affected, and further assessment of train noise impacts from the proposal is not required.

5.0 OFF-SITE ROAD TRAFFIC

The proposal would not increase the number of employee vehicles on Glennies Creek Road, associated with the current surface facilities and underground mine access. Rather, employee traffic on this road would decrease considerably when the open cut activities relocate to the SEOC.

Employees previously working at the NEOC would transfer to the SEOC and no additional traffic would be generated by the Proposal. Employee traffic was found in the 2001 EIS to satisfy the (still applicable) DECC traffic noise criteria, so no further assessment of off-side road traffic noise is required.

6.0 BLAST OVERPRESSURE AND VIBRATION

6.1 Blasting Criteria

6.1.1 Annoyance criteria

Noise and vibration levels from blasting are assessable against criteria proposed by the Australian and New Zealand Environment and Conservation Council (ANZECC) in their publication *"Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and*

Ground Vibration – September 1990". These criteria are summarised as follows.

- The recommended maximum overpressure level for blasting is 115dB.
- The level of 115dB may be exceeded for up to 5% of the total number of blasts over a 12-month period, but should not exceed 120dB at any time.
- The recommended maximum vibration velocity for blasting is 5mm/s Peak Vector Sum (PVS).
- The PVS level of 5mm/s may be exceeded for up to 5% of the total number of blasts over a 12-month period, but should not exceed 10mm/s at any time.
- Blasting should generally only be permitted during the hours of 9am to 5pm Monday to Saturday, and should not take place on Sundays and Public Holidays.
- Blasting should generally take place no more than once per day.

6.1.2 Building damage criteria

Building damage assessment criteria are nominated in AS 2187.2-1993 *"Explosives – Storage, Transport and Use Part 2: Use of Explosives"* and summarised in **Table 19.**

TABLE 19
Blasting Criteria to Limit Damage to Buildings (AS 2187).

Building Type	Vibration Level (mm/s)	Airblast Level (dB re 20 µPa)
Sensitive (and Heritage)	5	133
Residential	10	133
Commercial/Industrial	25	133

The annoyance (ANZECC) criteria are more stringent than the building damage criteria (Table 19) and will be taken as the governing criteria for residential receivers outside the noise acquisition zone and St Clements Church. The building damage criteria will be adopted for other structures within the acquisition zone.

A 100mm/s vibration criterion is applicable to the AAPT fibre optic cable that runs along the southern side of the New England Highway.

6.2 Blast Impact Assessment Procedure

The following sections provide standard equations for predicting blast overpressure and ground vibration levels, sourced from the United States Bureau of Mines.

6.2.1 Blast Overpressure

Unweighted airblast overpressure levels (OP) are predicted from **Equation 1** below.

$$OP = 165 - 24(\log_{10}(D) - 0.3\log_{10}(Q)), \quad \text{dB} \qquad (1)$$

where *D* is distance from the blast to the assessment point (m) and
Q is the weight of explosive per delay (kg).

Analysis of 12 months blast data for a coal mine in the Hunter Valley has shown Equation 1 to underestimate overpressure levels by up to 3 dB for small blasts (MIC 100-400kg) and overestimate by 1 dB for larger blasts (MIC > 400kg). These correction factors will be applied to Equation 1 as appropriate.

6.2.2 Blast Vibration

The basic equations for calculation of peak particle vibration (PPV) levels from blasting are as follows:

$$\mathrm{PPV} = 1140\left(\frac{D}{Q^{0.5}}\right)^{-1.6}$$, mm/s (for average ground type) (2)

$$\mathrm{PPV} = 500\left(\frac{D}{Q^{0.5}}\right)^{-1.6}$$, mm/s (for hard rock) (3)

where *D* and *Q* are defined as in Equation 1. The ground in the area is generally sandstone and conglomerate (hard materials), indicating that Equation 3 may be appropriate for blast vibration impacts. The difference between Equations 2 and 3 is the value of the coefficient 1140 or 500 and, for conservatism, a coefficient of 1000 will be adopted.

6.3 Blast Impact Predictions

Table 20 shows the distances to each assessment point, the predicted overpressure (OP) and peak ground vibration (PPV) levels, and applicable criteria for a MIC of 503 kg (as advised by the proponent).

TABLE 20
Summary of blast impact predictions.

Receiver	Distance (m)	OP (dB) Predicted	OP Criterion	PPV (mm/s) Predicted	PPV Criterion
Optic fibre	88	140	-	108	100
R46[1]	185	132	133	33	10
R51[2]	185	132	133	33	10
R50[2]	220	130	133	26	10
R8[2]	345	125	133	12	10
R130A	800	117	133	3.3	10
R130B	1100	113	133	1.7	10
R151[3]	794	117	133	3.3	5
R84[4]	1250	112	115	1.6	5
R111[4]	2000	107	115	0.8	5
R184A[4]	2950	103	115	0.4	5

[1] Disused Community Hall.
[2] Residences within SEOC noise acquisition zone.
[3] St Clement's Church.
[4] Residences outside SEOC noise acquisition zone.

The results in Table 20 suggest that residences in the SEOC noise acquisition zone, within approximately 350m of blasting, will receive sufficiently high vibration levels to cause cosmetic cracking in the dwellings. Vibration levels well in excess of personal comfort criteria will occur at these residences, as well as unacceptably high overpressure levels.

Vibration levels at the two A. Bowman properties (R130A and R130B) are predicted to be well below the building damage criteria, and below the more stringent personal comfort criteria. Increasing the blast MIC to 850kg would still result in compliance with the personal comfort (vibration) criterion at these locations.

Blasting with 503kg MIC should not occur within 100m of the AAPT optic fibre, or the MIC should be reduced to 450 kg based on an 88m separation, in order for the 100mm/s vibration criteria to be achieved. Larger blasts with 850kg MIC should be set back at least 150m from the optic fibre and 875m from St Clement's Church to achieve the relevant criteria.

No exceedances of the overpressure or ground vibration criteria are predicted at residential receivers outside the SEOC noise acquisition zone for 503 kg MIC blasts. Calculated maximum blast MIC to achieve the overpressure and vibration criteria are 1100kg (R84), 2500kg (R111) and 4500kg (R184). It is understood that typical blasts would be smaller than these limiting values.

Blast monitoring at the above locations should be conducted to determine appropriate blast design to achieve the criteria as the mine progresses.

7.0 SUMMARY OF IMPACTS AND RECOMMENDATIONS

7.1 Impacted Receivers

Receivers predicted to be impacted by noise from the SEOC are summarised in **Table 21**.

TABLE 21
Summary of noise impacted receivers.

Receiver	Management zone		Acquisition zone
	1 or 2dB (minor)	3 or 4dB (moderate)	5 dB or more (major)
R35 De Jong			Years 1, 3, 5 and 7
R117 McInerney		Year 3	Years 1, 5 and 7
R34 Olofsson			Years 1, 3, 5 and 7
R23 Lopes			Years 1, 3, 5 and 7
R24 Clarke			Years 1, 3, 5 and 7
R52 Foord			Years 1, 3, 5 and 7
R30 Bennett			Years 1, 3, 5 and 7
R32 Stapleton			Years 1, 3, 5 and 7

Receiver	Management zone		Acquisition zone 5 dB or more (major)
	1 or 2dB (minor)	3 or 4dB (moderate)	
R26 Schubert			Years 1, 3, 5 and 7
R18 Turner			Years 1, 3, 5 and 7
R11 Richards			Years 1, 3, 5 and 7
R8 Chisholm			Years 1, 3, 5 and 7
R2 Ninness		Year 3	Years 1 and 5
R50 Standing			Years 1, 3, 5 and 7
R51 Bailey			Years 1, 3, 5 and 7
R119 Beasley			Year 1
R120 Ernst			Year 1
R121 Burgess	Years 3 and 5		Year 1
R83 Hall			Year 1
R84 Tisdell		Year 1	
R114 Richards	Year 3	Year 5	Year 1
R111 Richards	Year 1		
R129 Bowman			Years 1, 3, 5 and 7
R130A Bowman			Years 1, 3, 5 and 7
R130B Bowman			Years 1, 3, 5 and 7
R184A Moxey	Years 3 and 5		

All receivers except R84 (Tisdell), R111 (Richards) and R184A (Moxey) are within the acquisition zone. Due to the high level of predicted noise impacts (10dB or more in most cases) recommendations to reduce levels to within the noise criteria at receivers in the acquisition zone have not been made.

It is recommended that land clearing activities not occur under inversion conditions as a management measure to achieve compliance with the noise criterion at 184A (Moxey).

Additional trains generated by the SEOC project would not increase existing train noise levels by a measurable quantity at any receiver; therefore, no adverse train noise impacts are likely.

The proposal would generate no additional traffic on the New England Highway, and would reduce the number of employee vehicles using the existing site entrance on Glennies Creek Road. No sleep disturbance impacts have been predicted at any receiver outside the noise acquisition zone.

Excessive blast overpressure and vibration levels will be experienced at Camberwell village residences in the SEOC noise acquisition zone within approximately 350m of blasting. Vibration levels likely to cause cosmetic damage have also been predicted at the disused Community Hall.

Vibration levels from the average MIC 503kg blasts at the two A. Bowman properties (R130A and R130B) are predicted to be well below the building damage criteria, and below the more stringent personal comfort criteria. Increasing the blast MIC to 850kg would still result in compliance with the personal comfort (vibration) criterion at these locations.

Blasting with 503kg MIC should not occur within 100m of the AAPT optic fibre, or the MIC should be reduced to 450 kg based on an 88m separation, in order for the 100mm/s vibration criteria to be achieved. Larger blasts with 850kg MIC should be set back at least 150m from the optic fibre and 875m from St Clement's Church to achieve the relevant criteria.

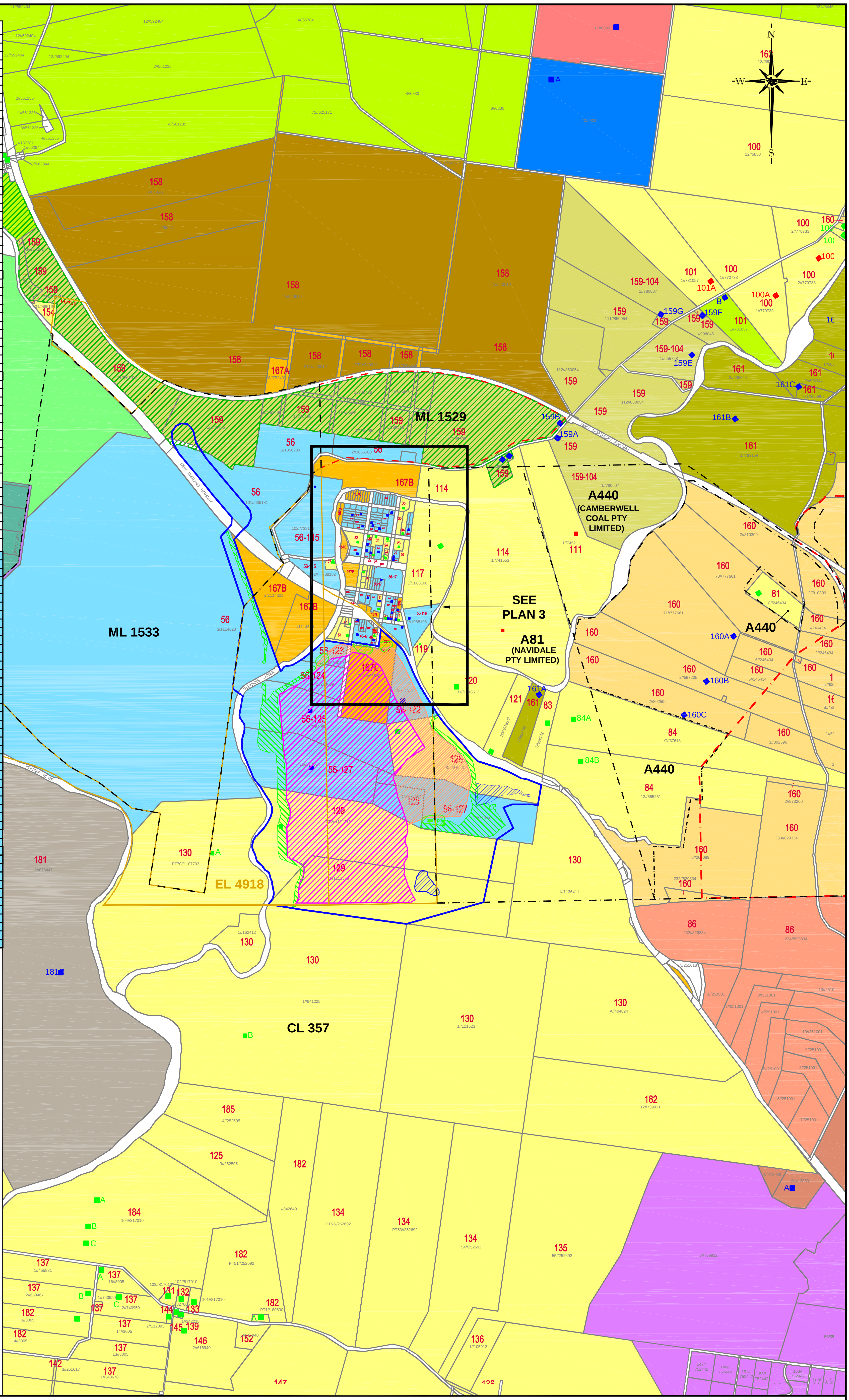
No exceedances of the overpressure or ground vibration criteria are predicted at residential receivers outside the SEOC noise acquisition zone for 503 kg MIC blasts. Calculated maximum blast MIC to achieve the overpressure and vibration criteria are 1100kg (R84), 2500kg (R111) and 4500kg (R184). It is understood that typical blasts would be smaller than these limiting values.

Blast monitoring at the above locations should be conducted to determine appropriate blast design to achieve the criteria as the mine progresses.

FIGURES

Ref.	Land Owner
2	Ronald Wayne Ninness
8	Michael James Chisholm & Jo-Anne Tracey Chisholm
11	Bruce Howard Richards & Rosalie Ellen Richards
18	Sandra Phyllis Turner
20	Torbjorn Anders Olofsson & Diedre Ella Olofsson
23	Valda Kim Lopes
24	John Leonardus Vollebreght & Tracey Lee Clarke
26	Corey Ian Schubert & Rosemary Anne Schubert
30	Alan John Bennett
32	Colin Leslie Stapleton
34	Torbjorn Anders Olofsson & Diedre Ella Olofsson
35	Meindert De Jong & Thelma Eileen De Jong
46	Alfred Nowland, Edgar Moore, John Thomas Dunn
50	Clinton Standing
51	Robert John Bailey & Cindy Narelle Bailey
52	Leslie Alan Foord & Susan Dorothy Foord
56	Ashton Coal Mines Limited
81	Rodney George Hall & Doreen Ann Hall
83	Gregory James Hall
84	Isobel Mary Tisdell
86	Four Mile PTY Limited
100	Alan Charles Noble
101	Gregory James Donnellan
111	Bruce Howard Richards & Rosalie Ellen Richards
114	Bruce Howard Richards & Rosalie Ellen Richards
117	John Charles McInerney & Judith McInerney
119	Mark Andrew Beasley & Michele Kathleen Beasley
120	Stephen Francis Ernst & Carol Dawn Ernst
121	Trevor Geoffrey Burgess
126	Neville Gordon Smiles & Margaret Fay Smiles
129	W.H. Bowman, M. H. Bowman, W.G. Bowman & G. R. Elder
130	Alistair Stuart Bowman
131	Malcolm James Ryan & Elaine Tze Mei Ryan
132	Paul Raymond Burley & Catherine Maree Burley
133	Tony Zanardi & Sandra Maree Zanardi
134	WG Bowman, GR Elder & AS Bowman
135	Canravo PTY Limited
136	Keith Heuston PTY Limited
137	Wyoming Holsteins PTY Limited
139	Robert John Algie
142	Tansil PTY Limited
144	Chriss Inav Maskey
145	HJ Kauter, WH Bowman & H Wright
146	Todd Anthony Mills & Sharon Ann Mills
147	SD Edwards, T-A Howard & JV Clifton
151	Trustees of Church Property-Diocese of Newcastle
152	Energy Australia
154	WG Bowman, GR Elder & IH Bowman
158	Savage Minerals Limited & Enex Foydell Limited
159	Glendell Tenements PTY Limited
160	RHA Pastoral Company PTY Limited
167	Crown Land
161	Vale Australia (GC), Maitland Main Collieries P/L, NS Glennies Creek P/L, POS-GC P/L, JS Glennies Creek P/L & JFE Steel Aus. P/L
162	William Edwin Gardner & Anne Mary Gardner
181	Coal & Allied Operations PTY Limited
182	Elizabeth Stuart Bowman
184	Bruce Eric Moxey & Thea Anne Moxey
185	Anthony James Taggart & Anette Maree McLeod
188	Wanaruah Local Aboriginal Land Council

	Owner (Original Owner)
56-1	Ashton (G. & F. WOOD)
56-3	Ashton (T. CASLICK)
56-4	Ashton (K & M. GALE)
56-5	Ashton (DENNIS RICHARD YATES)
56-6	Ashton (KEITH JOHN MILLER & DIANNE MARION MILLER)
56-7	Ashton (M. PUGH)
56-9	Ashton (ESTATE LATE J. TULLOCH)
56-10	Ashton (R & K. HILL)
56-12	Ashton (MICHELE THERESE PEACHEY)
56-13	Ashton (R & H. MELL)
56-14	Ashton (J. SPITERI)
56-15	Ashton (H. STEPHENSON)
56-16	Ashton (MIRACLEREACH PTY LTD)
56-17	Ashton (JOHN DEAKIN HANCOCK)
56-19	Ashton (MONTGOMERY)
56-21	Ashton (P. HOLZ & C. BALL)
56-22	Ashton (STEVEN JOHN ROBERTSON)
56-25	Ashton (L. MERCHANT)
56-27	Ashton (F. McALARY)
56-28	Ashton (D & S. ORCHARD)
56-29	Ashton (A. FARUGGIA)
56-31	Ashton (C. GREEN)
56-33	Ashton (J. COYLE)
56-36	Ashton (T & L. BYRNES)
56-37	Ashton (T & G. HASSETT)
56-38	Ashton (K & P. PATTERSON)
56-39	Ashton (W. F. JAMES)
56-40	Ashton (P. CLARKE)
56-41	Ashton (T. McKEAN & B. TAYLOR)
56-42	Ashton (C. BRODIE)
56-43	Ashton (D. SCHOLZ)
56-44	Ashton (G. ANDREWS)
56-45	Ashton (ROSLYN MARY LETHBRIDGE)
56-47	Ashton (PAUL ASHFORD & VIRGINIA ARNEJO ASHFORD)
56-48	Ashton (M. WALSH)
56-49	Ashton (L. STEVENS)
56-115	Ashton (P. & D. RICHARDS)
56-118	Ashton (R. & L. WOODS)
56-122	Ashton (K. & Y. MOSS)
56-123	Ashton (STAFFORD & STAFFORD-SMITH)
56-124	Ashton (A. & L. HORADAM)
56-125	Ashton (C. & M. LANE)
56-127	Ashton (P. MOORE)
56-128	Ashton (I. & J. POULTON)
	Ashton (SINCLAIR)
	Ashton (CNA-Ashton)
56-150	Ashton



0 100 200 300 400 500

All distances are in metres

LEGEND

- Dwelling (Ashton Owned)
- Dwelling (Privately Owned with existing aquisition rights)
- Dwelling (Privately Owned)
- Community Infrastructure
- Ashton Mining Leases
- Other Mining Leases
- EL Boundaries
- Glendell Land Leased to ACML
- SEOC Project Boundary
- Proposed South East Open Cut
- Environmental Bund
- Proposed Infrastructure Area
- Ashton Coal Mines Limited
- AMCI P/L, Maitland Main Collieries P/L, NS Glennies Creek P/L, POS-GC P/L, JS Glennies Creek P/L & JFE Steel Aus. P/L
- Coal & Allied Operations Pty Limited
- Crown Land
- Four Mile PTY Limited
- Freehold Land
- Glendell Tenements Pty Limited
- RHA Pastoral Company Pty Limited
- Savage Mineral Limited & Enex Foydell Limited
- Wanaruah Local Aboriginal Land Council
- Clean Water Dam
- Sediment Dam

AshtonCoal

South East Open Cut Project

Land Ownership of the South East Open Cut area

Figure 1

Prepared by Pegasus Technical

CAD FILE: 05007D.dwg

Ref.	Land Owner
2	Ronald Wayne Ninness
8	Michael James Chisholm & Jo-Anne Tracey Chisholm
11	Bruce Howard Richards & Rosalie Ellen Richards
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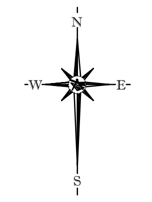
114	Bruce Howard Richards & Rosalie Ellen Richards
117	John Charles McInerney & Judith McInerney
119	Mark Andrew Beasley & Michele Kathleen Beasley
120	Stephen Francis Ernst & Carol Dawn Ernst
121	Trevor Geoffrey Burgess
126	Neville Gordon Smiles & Margaret Fay Smiles
129	W.H. Bowman, M. H. Bowman, W.G. Bowman & G. R. Elder
130	Alistair Stuart Bowman
131	Malcolm James Ryan & Elaine Tze Mei Ryan
132	Paul Raymond Burley & Catherine Maree Burley
133	Tony Zanardi & Sandra Maree Zanardi
134	WG Bowman, GR Elder & AS Bowman
135	Canravo PTY Limited
136	Keith Heuston PTY Limited
137	Wyoming Holsteins PTY Limited
139	Robert John Algie
142	Tansil PTY Limited
144	Chriss Inav Maskey
145	HJ Kauter, WH Bowman & H Wright
146	Todd Anthony Mills & Sharon Ann Mills
147	SD Edwards, T-A Howard & JV Clifton
151	Trustees of Church Property-Diocese of Newcastle
152	Energy Australia
154	WG Bowman, GR Elder & IH Bowman
158	Savage Minerals Limited & Enex Foydell Limited
159	Glendell Tenements PTY Limited
160	RHA Pastoral Company PTY Limited
167	Crown Land
161	Vale Australia (GC), Maitland Main Collieries P/L, NS Glennies Creek P/L, POS-GC P/L, JS Glennies Creek P/L & JFE Steel Aus. P/L
162	William Edwin Gardner & Anne Mary Gardner
181	Coal & Allied Operations PTY Limited
182	Elizabeth Stuart Bowman
184	Bruce Eric Moxey & Thea Anne Moxey
185	Anthony James Taggart & Anette Maree McLeod
188	Wanaruah Local Aboriginal Land Council

	Owner (Original Owner)
56-1	Ashton (G. & F. WOOD)
56-3	Ashton (T. CASLICK)
56-4	Ashton (K & M. GALE)
56-5	Ashton (DENNIS RICHARD YATES)
56-6	Ashton (KEITH JOHN MILLER & DIANNE MARION MILLER)
56-7	Ashton (M. PUGH)
56-9	Ashton (ESTATE LATE J. TULLOCH)
56-10	Ashton (R & K. HILL)
56-12	Ashton (MICHELE THERESE PEACHEY)
56-13	Ashton (R & H. MELL)
56-14	Ashton (J. SPITERI)
56-15	Ashton (H. STEPHENSON)
56-16	Ashton (MIRACLEREACH PTY LTD)
56-17	Ashton (JOHN DEAKIN HANCOCK)
56-19	Ashton (MONTGOMERY)
56-21	Ashton (P. HOLZ & C. BALL)
56-22	Ashton (STEVEN JOHN ROBERTSON)
56-25	Ashton (L. MERCHANT)
56-27	Ashton (F. McALARY)
56-28	Ashton (D & S. ORCHARD)
56-29	Ashton (A. FARUGGIA)
56-31	Ashton (C. GREEN)
56-33	Ashton (J. COYLE)
56-36	Ashton (T & L. BYRNES)
56-37	Ashton (T & G. HASSETT)
56-38	Ashton (K & P. PATTERSON)
56-39	Ashton (W. F. JAMES)
56-40	Ashton (P. CLARKE)
56-41	Ashton (T. McKEAN & B. TAYLOR)
56-42	Ashton (C. BRODIE)
56-43	Ashton (D. SCHOLZ)
56-44	Ashton (G. ANDREWS)
56-45	Ashton (ROSLYN MARY LETHBRIDGE)
56-47	Ashton (PAUL ASHFORD & VIRGINIA ARNEJO ASHFORD)
56-48	Ashton (M. WALSH)
56-49	Ashton (L. STEVENS)
56-115	Ashton (P. & D. RICHARDS)
56-118	Ashton (R. & L. WOODS)
56-122	Ashton (K. & Y. MOSS)
56-123	Ashton (STAFFORD & STAFFORD-SMITH)
56-124	Ashton (A. & L. HORADAM)
56-125	Ashton (C. & M. LANE)
56-127	Ashton (P. MOORE)
56-128	Ashton (I. & J. POULTON)
	Ashton (SINCLAIR)
	Ashton (CNA-Ashton)
56-150	Ashton

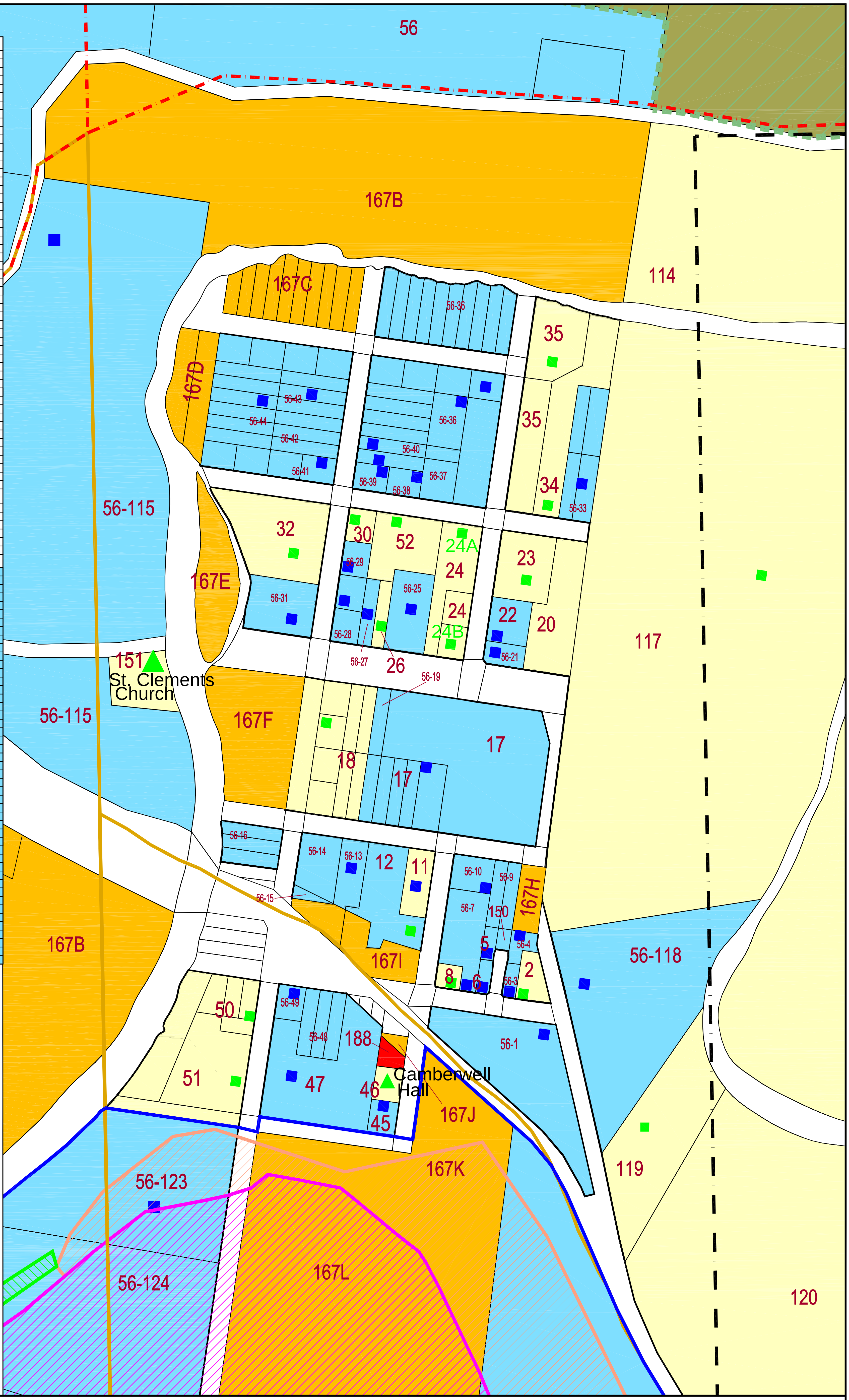


0 50 100 150 200

All distances are in metres

LEGEND

- 56-115 Ashton Property Reference Number
- 124 Land Owners Reference Number
- Dwelling (Ashton Owned)
- Dwelling (Privately Owned)
- Community Infrastructure
- Ashton Mining Leases
- Other Mining Leases
- EL Boundaries
- Land Holding Boundary
- SEOC Project Boundary
- Proposed South East Open Cut
- Environmental Bund
- Proposed Infrastructure Area
- Ashton Coal Mines Limited
- Coal & Allied Operations Pty Limited
- Crown Land
- Freehold Land
- Wanaruah Local Aboriginal Land Council



AshtonCoal

South East Open Cut Project

Land Ownership of the Camberwell Villiage

Figure 2

Prepared by Pegasus Technical

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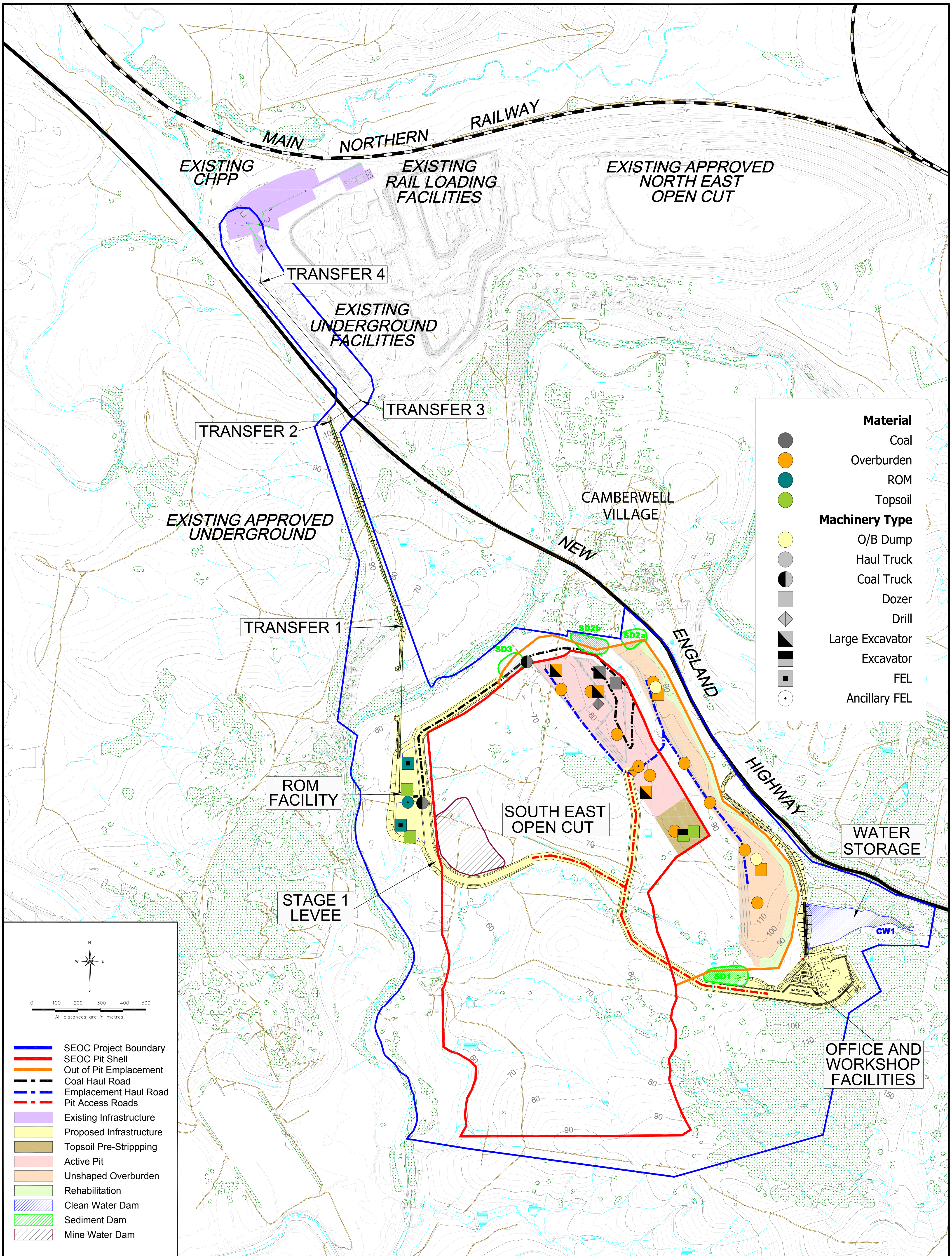


AshtonCoal

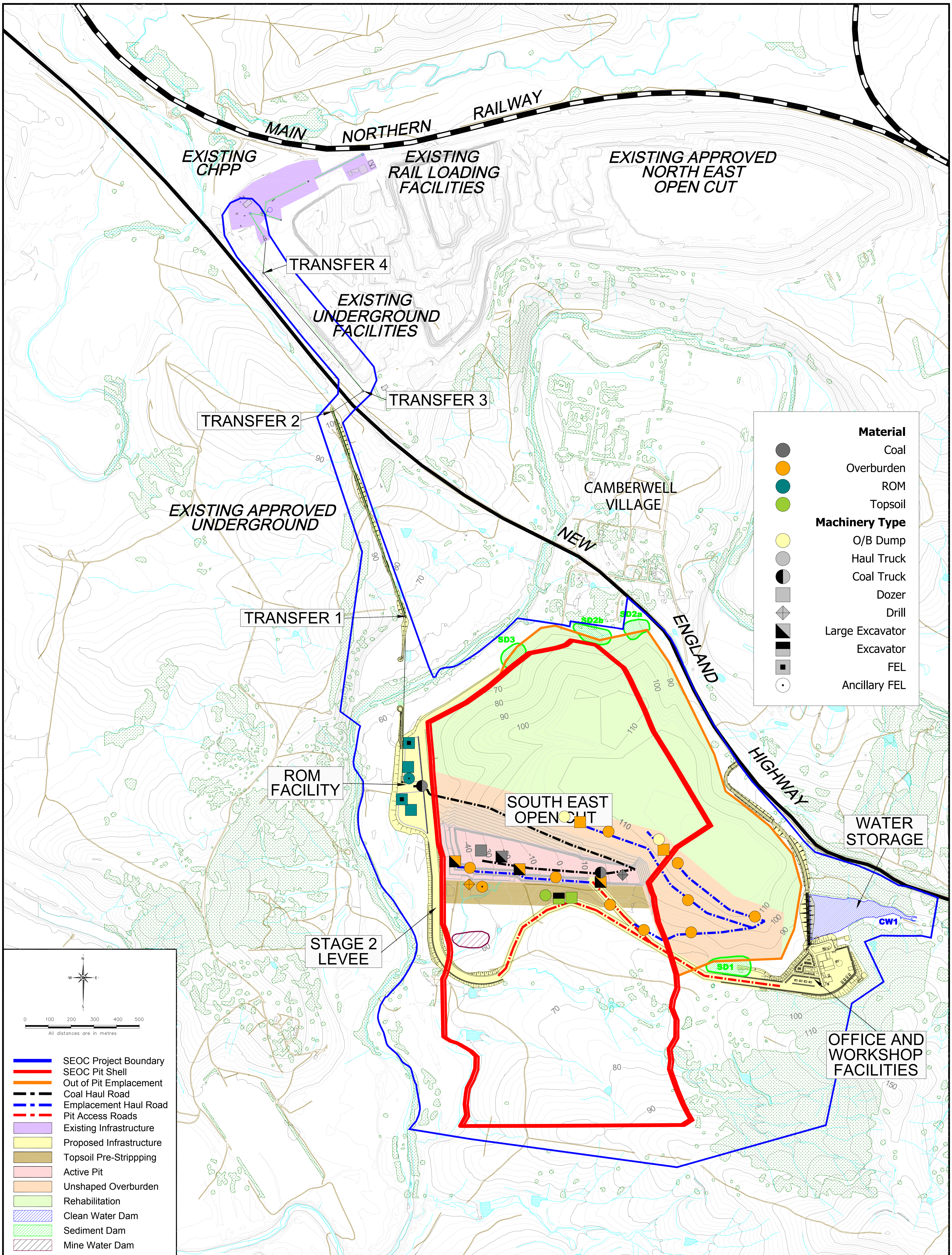
South East Open Cut Project

Proposed mining progression plan for Year 1

Figure 3

Prepared by Pegasus Technical

CAD FILE: 05012B.dwg



AshtonCoal

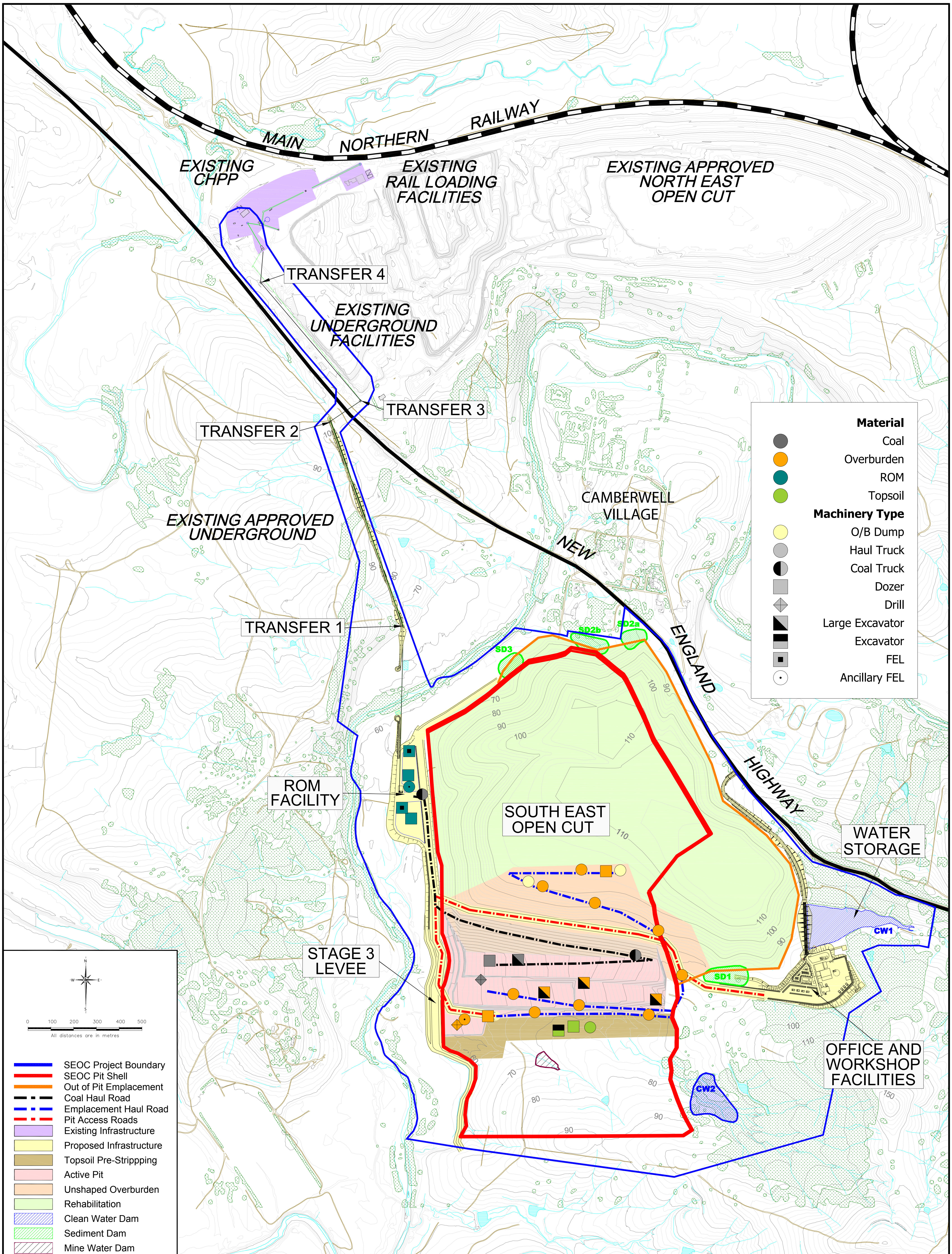
South East Open Cut Project

Proposed mining progression plan for Year 3

Figure 4

Prepared by Pegasus Technical

CAD File: 05013B.dwg



AshtonCoal

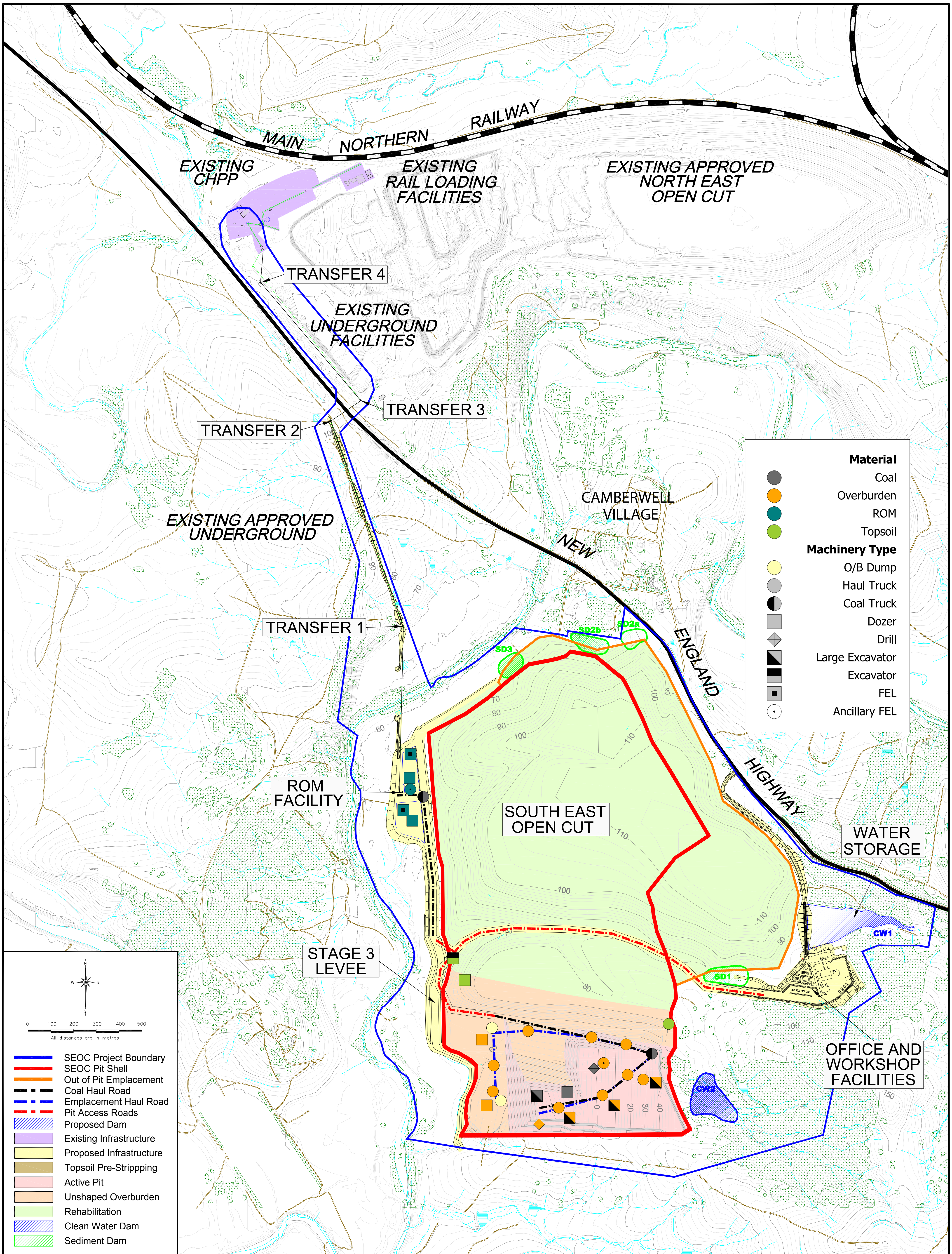
South East Open Cut Project

Proposed mining progression plan for Year 5

Figure 5

Prepared by Pegasus Technical

CAD FILE: 05014B.dwg



AshtonCoal

South East Open Cut Project

Proposed mining progression plan for Year 7

Figure 6

Prepared by Pegasus Technical

CAD FILE: 05015B.dwg

APPENDIX A

DESCRIPTION OF ACOUSTICAL TERMS

This section of the report aims to convey an understanding of several commonly used acoustical terms. Various terms are explained in plain language and the effects of certain atmospheric conditions on noise propagation are discussed. Noise level percentiles are explained with the aid of a diagram of a hypothetical noise signal.

The descriptions in this section are not formal definitions of the terms. Formal definitions may be found in AS1633-1985 “Acoustics – Glossary of terms and related symbols”.

General Terms

Sound Power Level

The amount of acoustic energy (per second) emitted by a noise source. Usually written as “L_w” or “SWL”, the Sound Power Level is expressed in decibels (dB) and cannot be directly measured. L_w is usually calculated from a measured sound pressure level.

Sound Pressure Level

The “noise level”, in decibels (dB), heard by our ears and/or measured with a sound level meter. Written as “SPL”, the sound pressure level generally decreases with increasing distance from a source. Noise levels are often written as dB(A) rather than dB. The “A-weighting” is a correction applied to the measured noise signal to account for the ear’s ability to hear sound differently at different frequencies. The A-weighted sound pressure level therefore represents the measured (or predicted) noise level as it would be heard by the typical human ear.

Temperature Inversion

An atmospheric state in which the air temperature increases with altitude. Sound travels faster in warmer air than in cold air, so that during an inversion the top of a “sound wave” will move faster than the bottom. This bends (refracts) sound back towards the ground. The result is a “trapping” of sound energy near the ground and an increase in noise levels. Similarly, daytime air temperatures typically reduce with altitude (approximately 1-2 ^{0}C/100m called the adiabatic lapse rate) and sound refracts upward slightly. The result is slightly reduced noise levels compared with a uniform or ‘neutral’ atmosphere.

Wind Shear

A moving air mass will experience a “friction drag” at the ground in much the same way as a lava flow will flow quickly on top and “roll over” the lava beneath which must drag along the ground. This increasing wind speed with altitude is called “wind shear”.

For a sound wave travelling down wind, the top of the wave moves faster than the bottom and the wave bends towards the ground. However, for a wave travelling into the wind the top of the wave is slowed down more than the bottom is and the wave bends upwards. **Figure A1** shows several examples of how atmospheric effects can bend sound waves.

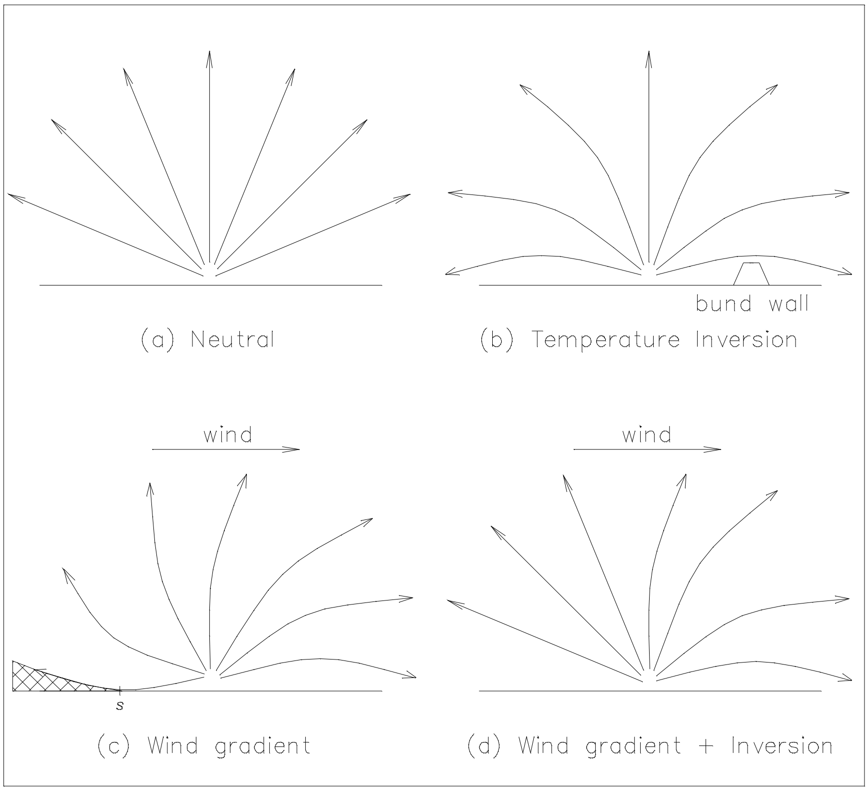


FIGURE A1
Sound refraction under temperature inversions and wind gradients.

Figure A1 shows that sound rays can be refracted over a barrier (usually a bund wall or small hill) during a temperature inversion, increasing noise levels in the 'shadow zone'.

Neutral Atmospheric Conditions

An atmosphere that is at a temperature of approximately 23^{0}C from ground level to an altitude of 200m or more. There are no fluctuations in density or humidity and no wind. Such conditions rarely occur, as temperature will usually vary with altitude and there is always movement in various directions in different layers of the atmosphere.

Prevailing Atmospheric Conditions

Atmospheric conditions (with regards to potential effects on noise propagation) which are characteristic of the study area. These will typically include seasonal wind directions and velocities. Temperature inversions will be included as prevailing if they occur, on average, for more than 2 nights per week in winter.

Adverse Atmospheric Conditions

Adverse conditions will include simultaneous winds and temperature inversions, even if the inversions occur for less than 2 nights per week in winter. This represents the worst case scenario for potential noise enhancement due to atmospheric effects.

Noise Level Percentiles

A noise level percentile (L_n) is the noise level (SPL) in decibels which is exceeded for "n" % of a given monitoring period. Several important L_n percentiles will be explained by considering the hypothetical time signal in **Figure A2**.

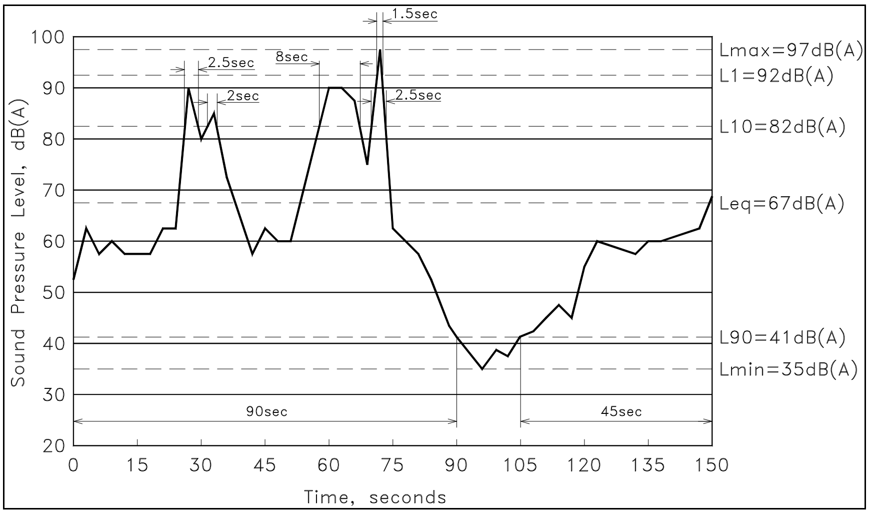


FIGURE A2

Hypothetical time signal to illustrate noise level percentiles.

The signal in Figure A2 has a duration of 2.5 minutes (ie 150 seconds) with noises occurring as follows:

- The instrument is located beside a road and records crickets in nearby grass at a level of around 60 dB (A);
- At about the 30 second mark a motorcycle passes on the road, followed by a car;
- At 60 seconds a truck passes;
- After the truck passes it sounds its air horn at the 73 second mark;
- The crickets are startled into silence as the truck fades into the distance;
- All is quiet until 105 seconds when the crickets slowly start to make noise, reaching full pitch by 120 seconds;
- The measurement stops at 150 seconds, just when an approaching car starts to become audible.

L_{A1} Noise Level

Near the top of Figure A2, there is a dashed line at 92 dB(A). A small spike of 1.5 sec duration extends above this line at around 73 seconds. Since 1.5 sec is 1% of the signal duration (150 seconds), the L_1 (or L_{A1} to signify A-weighting) noise level of this sample is 92 dB(A) and is from the truck's air horn. The L_1 percentile is often called the *average peak noise level* and is used by the NSW Department of Environment and Climate Change (DECC) as a measure of potential disturbance to sleep.

L_{A10} Noise Level

The dashed line at 82 dB(A) is exceeded for four periods of duration 2.5 sec, 2 sec, 8 sec and 2.5 sec, respectively. The total of these is 15 sec, which is 10% of the total sample period. Therefore, the L_{A10} noise level of this sample is 82 dB(A). The L_{A10} percentile is called the *average maximum noise level* and has been widely used as an indicator of annoyance caused by noise.

L_{A90} Noise Level

In similar fashion to L_{A1} and L_{A10}, Figure A2 shows that the noise level of 41 dB(A) is exceeded for 135 seconds (90 + 45 =135). As this is 90% of the total sample period, the L_{A90} noise level of this sample is 41 dB(A). The L_{A90} percentile is called the *background noise level*.

L_{Aeq} Noise Level

Equivalent continuous noise level. As the name suggests, the L_{Aeq} of a fluctuating signal is the continuous noise level which, if occurring for the duration of the signal, would deliver equivalent acoustic energy to the actual signal. L_{Aeq} can be thought of as a kind of 'average' noise level. Recent research suggests that L_{Aeq} is the best indicator of annoyance caused by industrial noise and the DEC *NSW Industrial Noise Policy* (INP) takes this into consideration.

L_{Amax} and L_{Amin} Noise Levels

These are the maximum and minimum SPL values occurring during the sample. Reference to Figure A2 shows these values to be 97 dB(A) and 35 dB(A), respectively.

APPENDIX B

WIND ROSE ANALYSIS METHODOLOGY

ANALYSIS OF WIND DIRECTIONS FOR NOISE ASSESSMENT PURPOSES FROM 16-POINT WIND ROSES (MANUAL ESTIMATION METHOD)

Each seasonal wind rose is manually examined as detailed below to determine the percentage occurrence of winds (speeds <0.5 m/s are excluded as calms) from each of the 16 compass directions (N, NNE, NE, …, WNW, NW, NNW) in the wind speed ranges 0.5-3 m/s, 0.5-3.25 m/s, 0.5-4.24 m/s and 0.5-5 m/s (see discussion below). Because the wind data are not separated for the day, evening and night periods, any wind found by this method to be a feature of the area for noise assessment purposes is considered applicable for all time periods.

The analysis of source-receiver wind speeds is explained with the aid of **Figure B1** below. For each data set, each of the 16 compass directions was considered in turn as the primary (***P***) source-receiver direction. The percentage occurrence of winds from this direction >0.5 m/s and up to 3m/s commences a summation of total source-receiver wind vector components parallel to this direction. The two neighbouring compass directions at +22.5^0 and -22.5^0 were then considered. (As an example, if the current primary direction ***P*** is NE, then ***P***+22.5^0 is ENE and ***P***-22.5^0 is NNE).

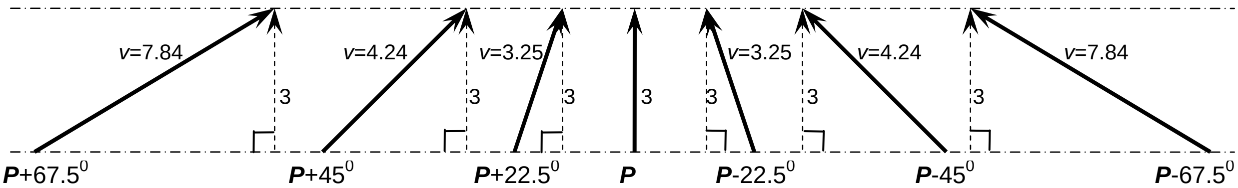


Figure B1. Source to receiver vector components (dotted) of all wind directions within *P*±**67.5^0**.

Figure B1 shows that winds from ***P***±22.5^0 with a vector component of 3 m/s parallel to ***P*** have a velocity (*v*) of 3.25 m/s (since *v* = 3cos(22.5) = 3.25). The percentage occurrences of winds >0.5 m/s and up to 3.25 m/s from ***P***±22.5^0 are added to the summation for primary direction ***P***. Similarly, the percentage occurrences of winds up to 4.24 m/s from ***P***±45^0 are added to the summation. (In the above example, ***P***+45^0 would be east and ***P***-45^0 would be north).

Finally, Figure B1 shows that at ***P***±67.5^0 winds up to 7.84 m/s have components up to 3 m/s parallel to ***P***. Total wind speeds above 5 m/s are not considered in noise assessments, as this is the limit of noise measurement validity in AS 1055, so the percentage occurrences of winds up to 5 m/s from ***P***±67.5^0 are added to the summation. (In the above example, ***P***+67.5^0 would be ESE and ***P***-67.5^0 would be NNW).

This process is repeated for each of the 16 primary wind directions and each seasonal wind rose. Because the assessment of wind vector components from each primary direction includes information from six ‘side-band’ directions, the results may bare little resemblance to wind roses for the same data set. As an example, winds could be strongly confined to, say, the ENE and WNW directions at relatively high velocity. These directions themselves may not exceed the 30% assessability level, but the combined influence on their mid-point could make winds from the north assessable under the above analysis, even if winds from the north occur 0% of the time.

A worked example of the above procedure is presented below. Figure B2 shows a wind rose for evenings in spring. In typical Hunter Valley fashion, the winds are aligned along an ESE/WNW axis with the north-westerlys stronger than the south-easterlys. The dominant ESE segment is shown expanded in Figure B3. Wind roses are not generally presented with the 3.25 m/s and 4.24 m/s cut-offs evident, but these can be estimated by interpolation between the typical 3 m/s, 4.5 m/s and 6 m/s end points of successive wind speed categories. Wind roses, which are usually generated by air quality consultants for use by acoustic consultants, can easily be modified to present the required wind speed categories.

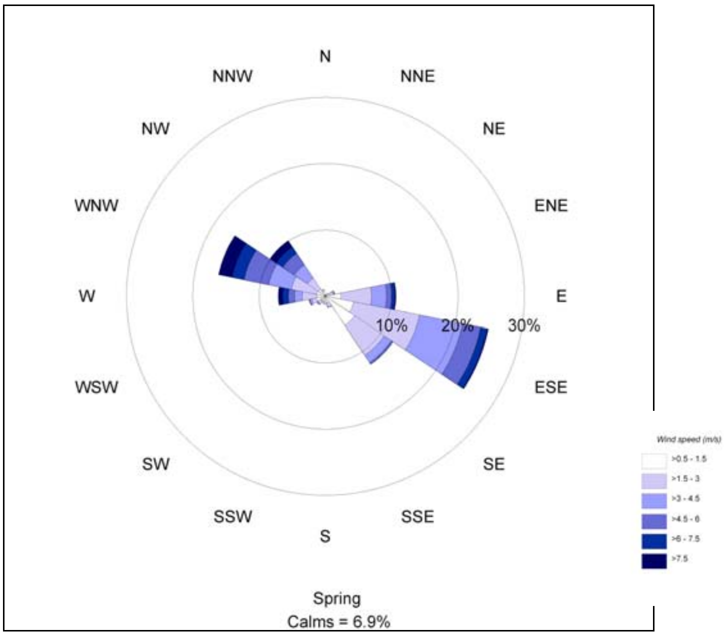


Figure B2. Sample wind rose for evenings in spring.

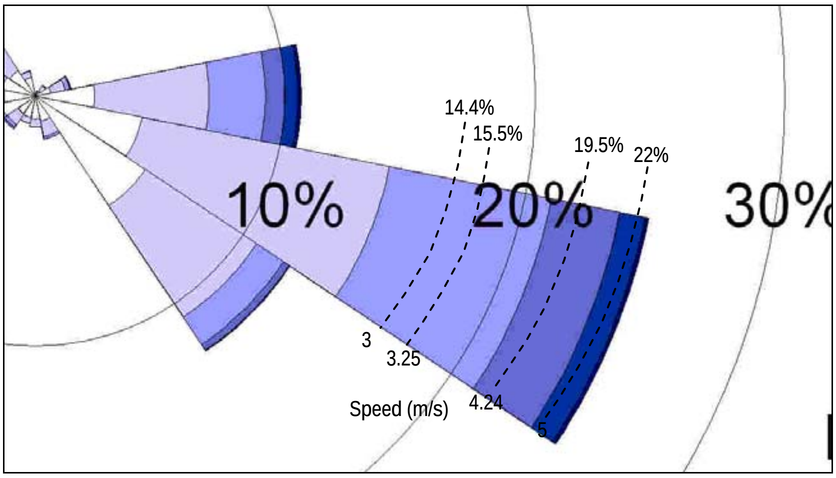


Figure B3. Detail of the ESE wind direction.

It can be seen in Figure B3 that the various wind speeds correlate with percentage occurrences as follows:

Wind speed (up to)		Occurrence
3 m/s	--	14.5%
3.25 m/s	--	15.5%
4.24 m/s	--	19.5%
5 m/s	--	22%

A completed analysis for all 16 wind directions in Figure B2 is shown in Table B1, with the summations for the ESE, NE and S wind directions highlighted.

TABLE B1 Wind analysis – spring, evening						
Angle from ***P***	0	+/- 22.5	+/- 45	+/- 67.5		Percent
Speed (m/s)[1]	3	3.25	4.24	5		
N	0.10%	0.20%	0.30%	0.50%		17.20%
NNE	0.10%	0.20%	0.30%	0.50%		18.00%
NE	0.10%	0.20%	0.30%	0.50%		**33.50%**
ENE	1.20%	1.30%	1.40%	1.50%		**41.40%**
E	7.00%	7.70%	8.50%	9.00%		**38.00%**
ESE	14.50%	15.50%	19.50%	22.00%		**38.30%**
SE	10.50%	11.00%	11.50%	12.00%		**40.40%**
SSE	1.80%	1.90%	1.90%	1.90%		**45.50%**
S	1.20%	1.30%	1.30%	1.30%		**42.00%**
SSW	1.10%	1.20%	1.20%	1.20%		25.30%
SW	1.50%	1.60%	1.70%	1.70%		21.60%
WSW	2.00%	2.20%	2.40%	2.50%		24.10%
W	3.80%	4.00%	4.50%	5.00%		21.00%
WNW	5.00%	6.00%	8.00%	9.00%		18.70%
NW	3.50%	4.00%	5.00%	6.00%		18.40%
NNW	1.00%	1.10%	1.10%	1.10%		19.00%
CALM						6.90%
[1] Wind speed categories indicate winds >0.5 m/s and up to the respective maximum values.						

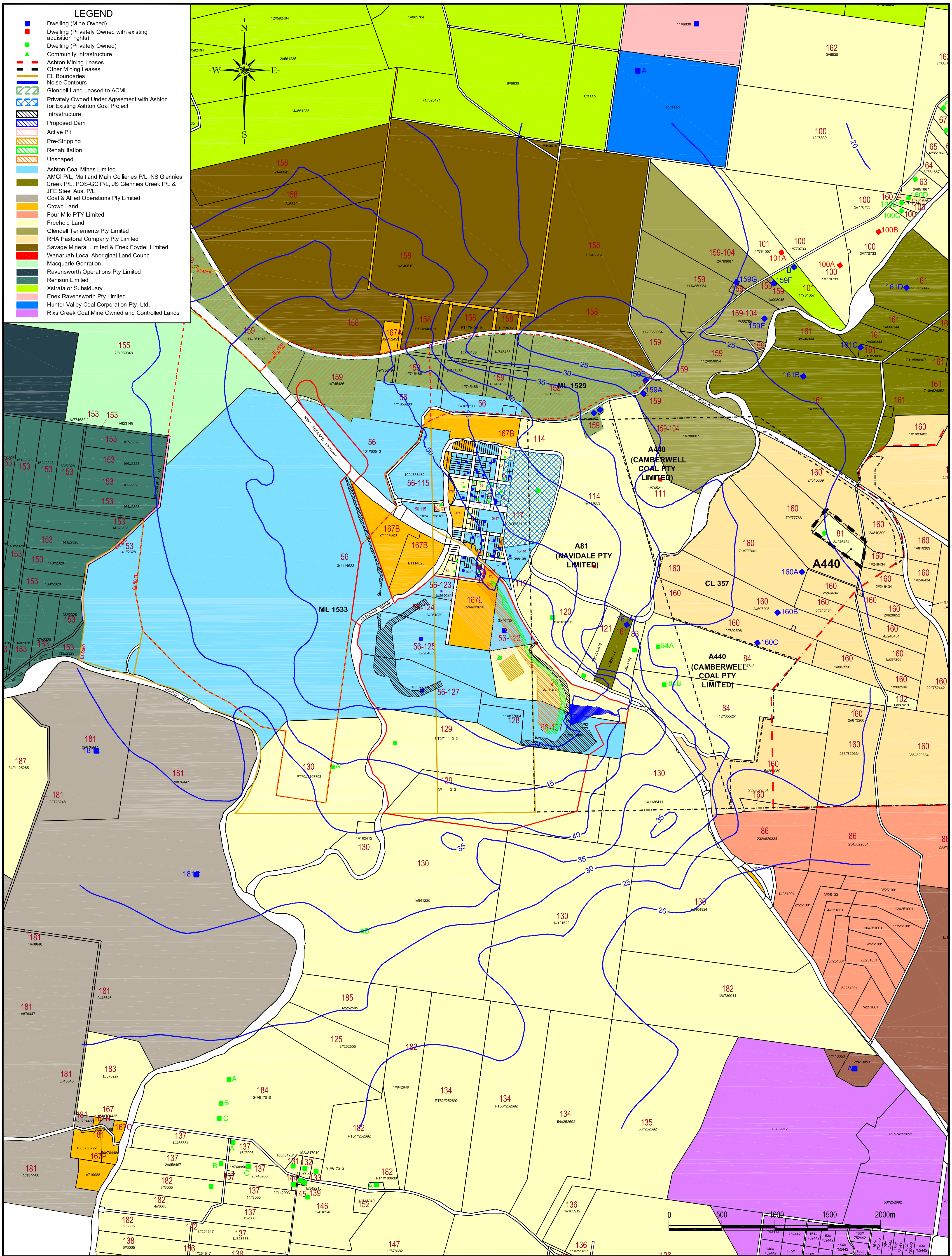
Grey shaded cells are included in the summation for ESE winds.
Cells included in the summation for NE and S winds are also highlighted.

Table B1 shows that the dominant ESE wind is an assessable wind direction predominantly due to its intrinsic direction and the two adjacent ‘side-bands’. There is virtually no wind from the NE and S directions, however, yet it is the higher wind speeds from the ESE and adjacent bands that make the NE and S winds assessable.

If wind roses were generated with values 3, 3.25, 4.24 and 5 m/s as the upper limits on wind speed categories then production of a table such as Table B1 would be straightforward and the method would exact, rather than an approximation.

APPENDIX C

NOISE CONTOUR DIAGRAMS



South East Open Cut Project

Year 1 Noise Contours (ACP and SEOC Only) East-south-east wind

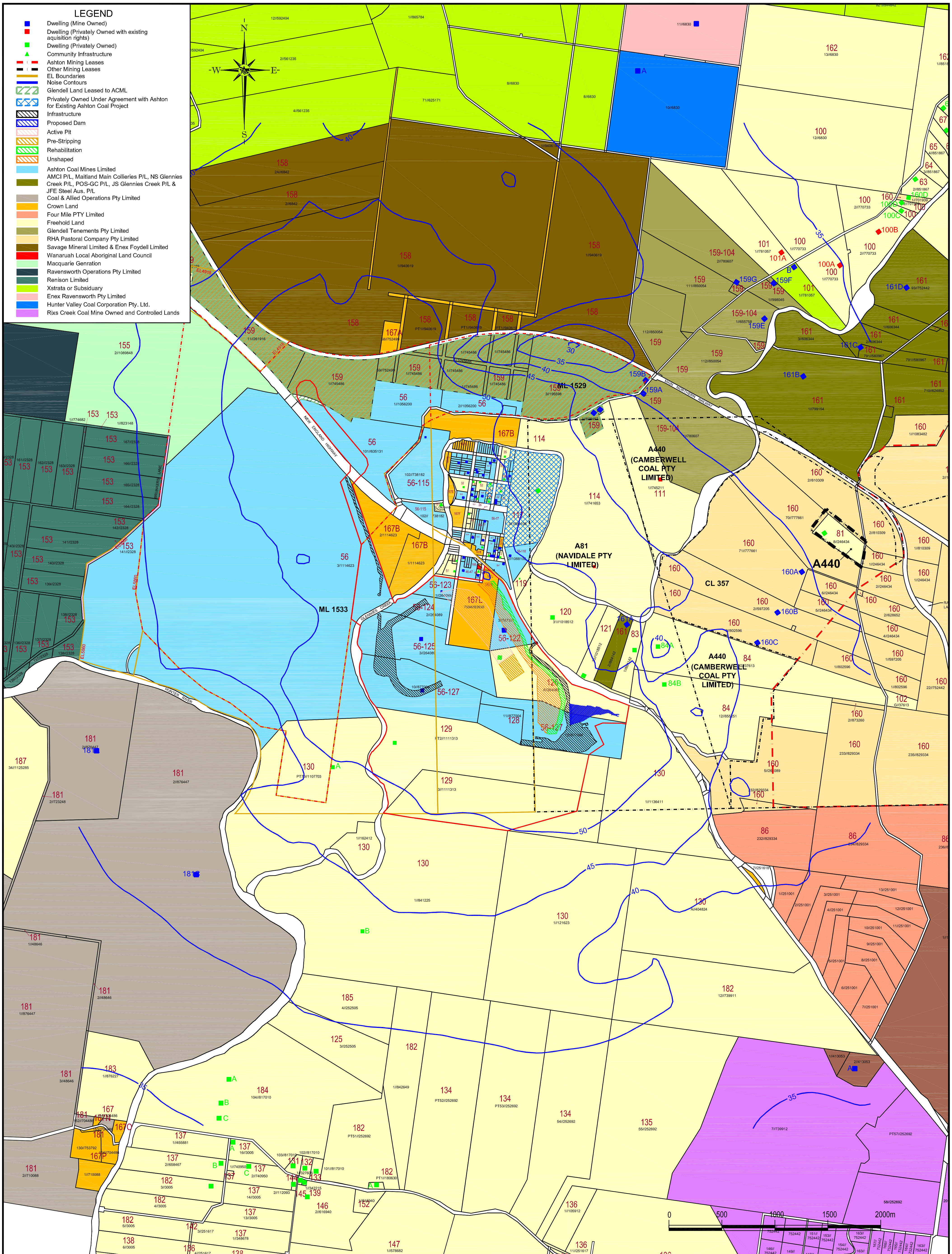
Spectrum Acoustics

AshtonCoal

Plan C1

Prepared by Pegasus Technical

CAD FILE: 03924B.dwg



AshtonCoal

South East Open Cut Project

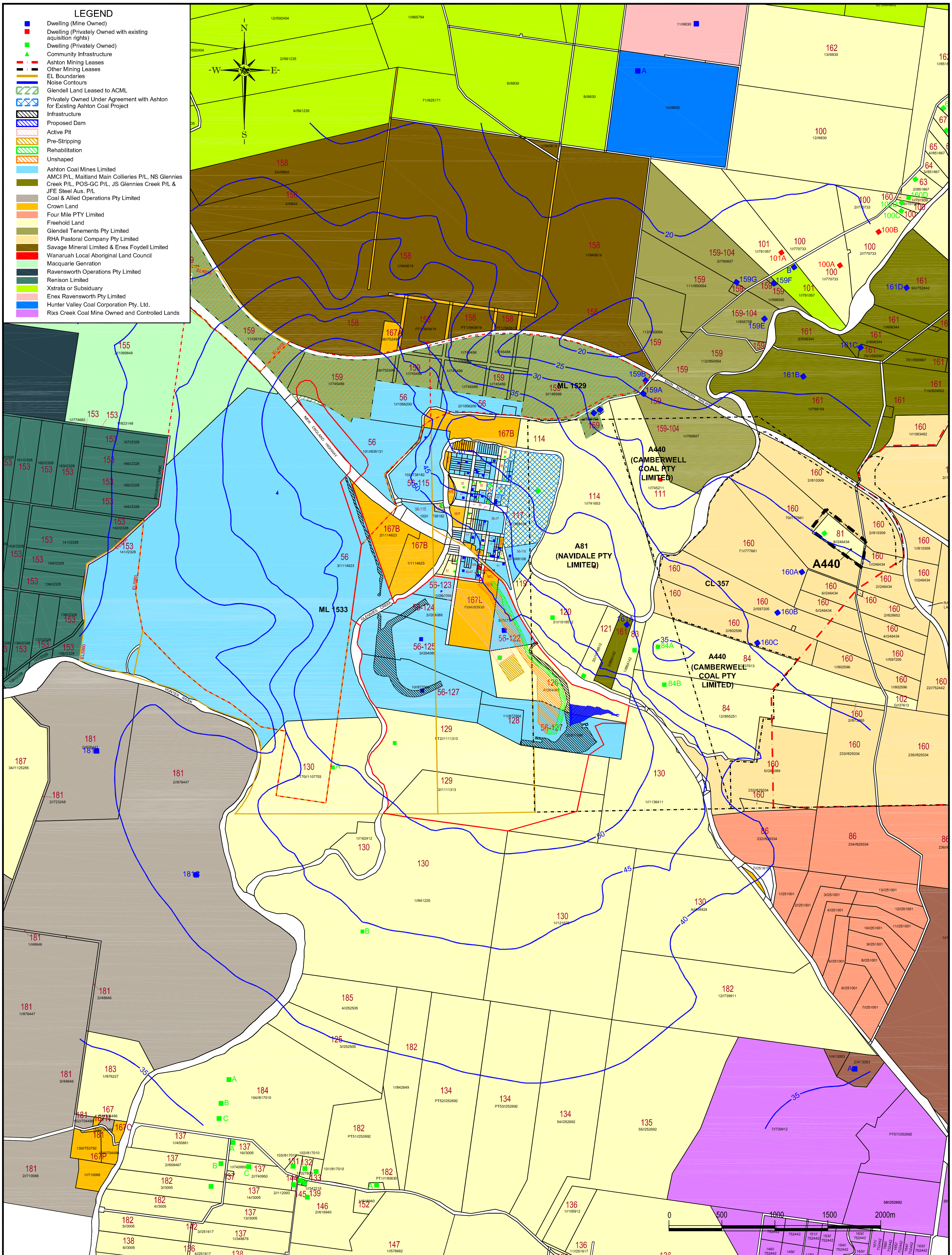
Year 1 Noise Contours (ACP and SEOC Only) Inversion conditions

Spectrum Acoustics

Plan C2

Prepared by Pegasus Technical

CAD FILE: 03925B.dwg



AshtonCoal

South East Open Cut Project

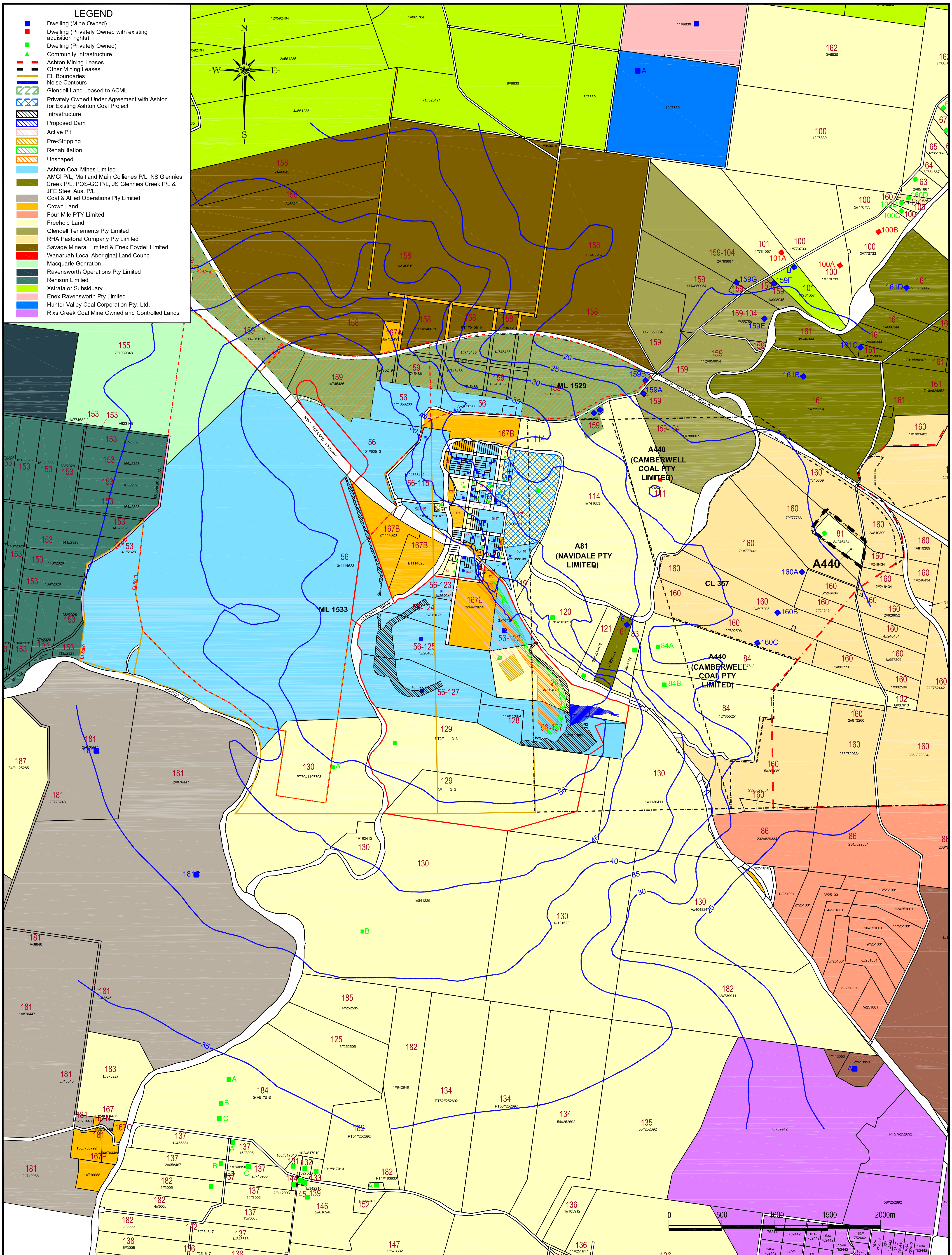
Year 1 Noise Contours (ACP and SEOC Only) North wind

Spectrum Acoustics

Plan C3

Prepared by Pegasus Technical

CAD FILE: 03926B.dwg



South East Open Cut Project

Year 1 Noise Contours (ACP and SEOC Only) North-east wind

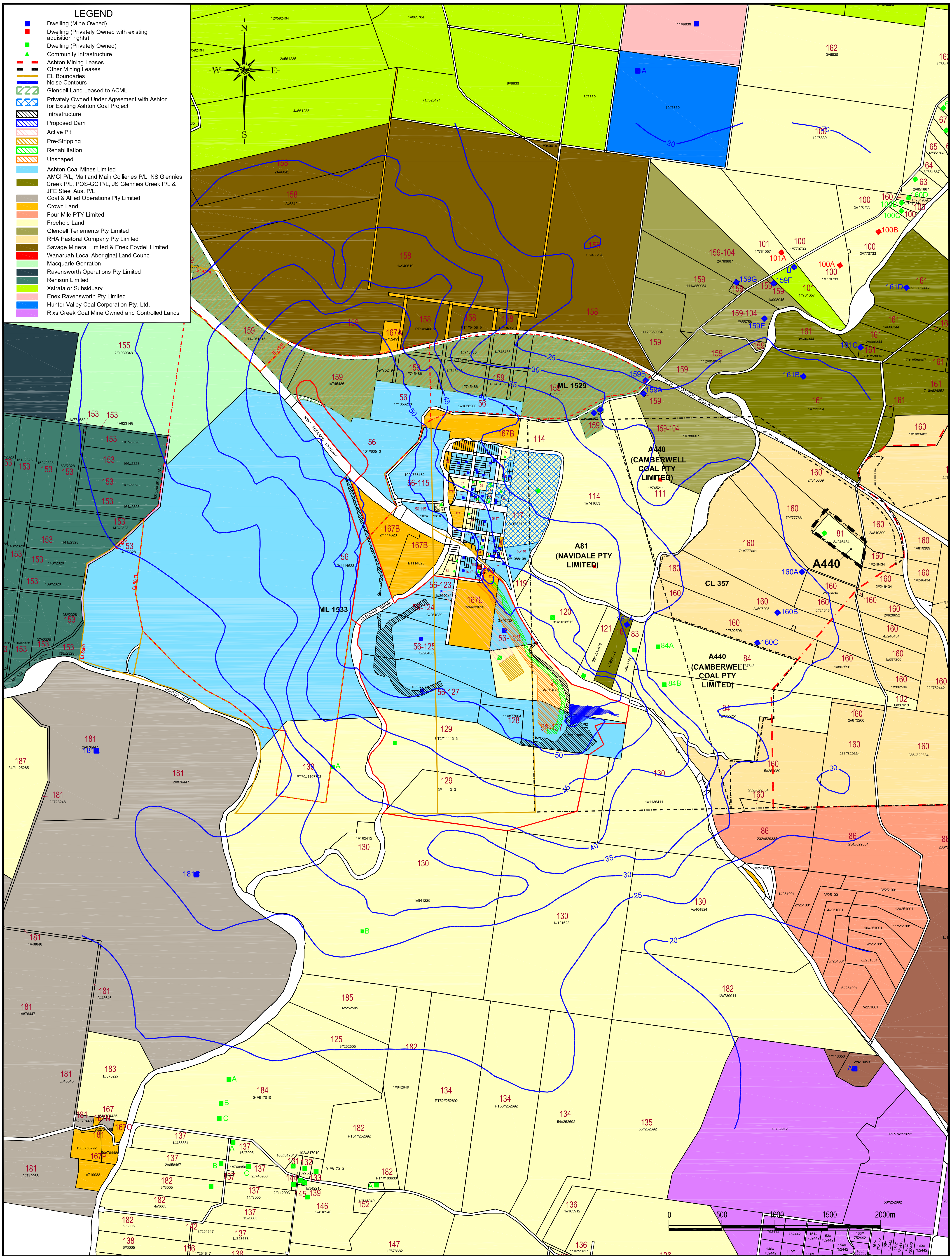
Spectrum Acoustics

AshtonCoal

Plan C4

Prepared by Pegasus Technical

CAD FILE: 03927B.dwg



AshtonCoal

South East Open Cut Project

Year 1 Noise Contours (ACP and SEOC Only) Neutral Conditions

Spectrum Acoustics

Plan C5

Prepared by Pegasus Technical

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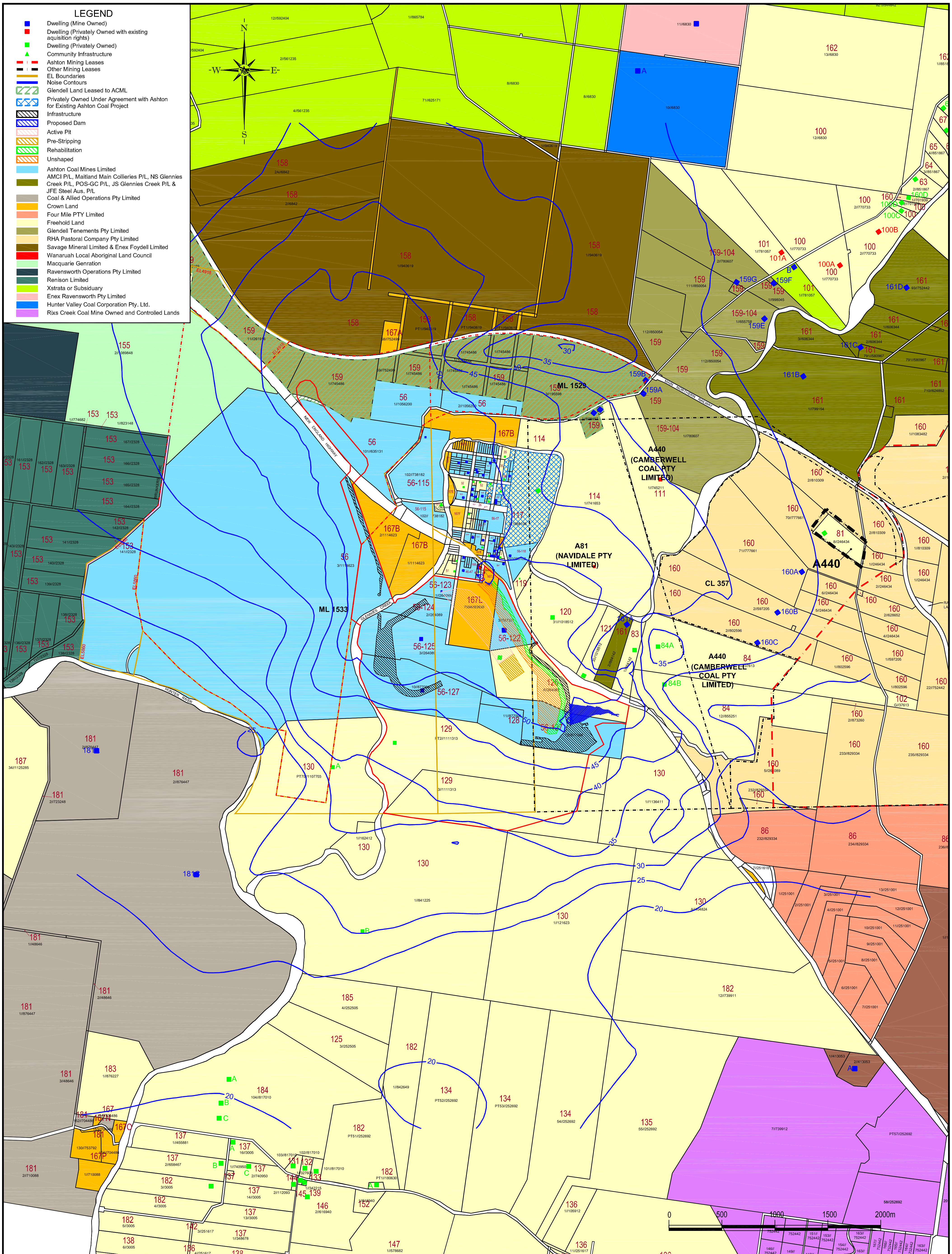

South East Open Cut Project

Year 1 Noise Contours (ACP and SEOC Only) South wind

Spectrum Acoustics

AshtonCoal

Plan C6

Prepared by Pegasus Technical

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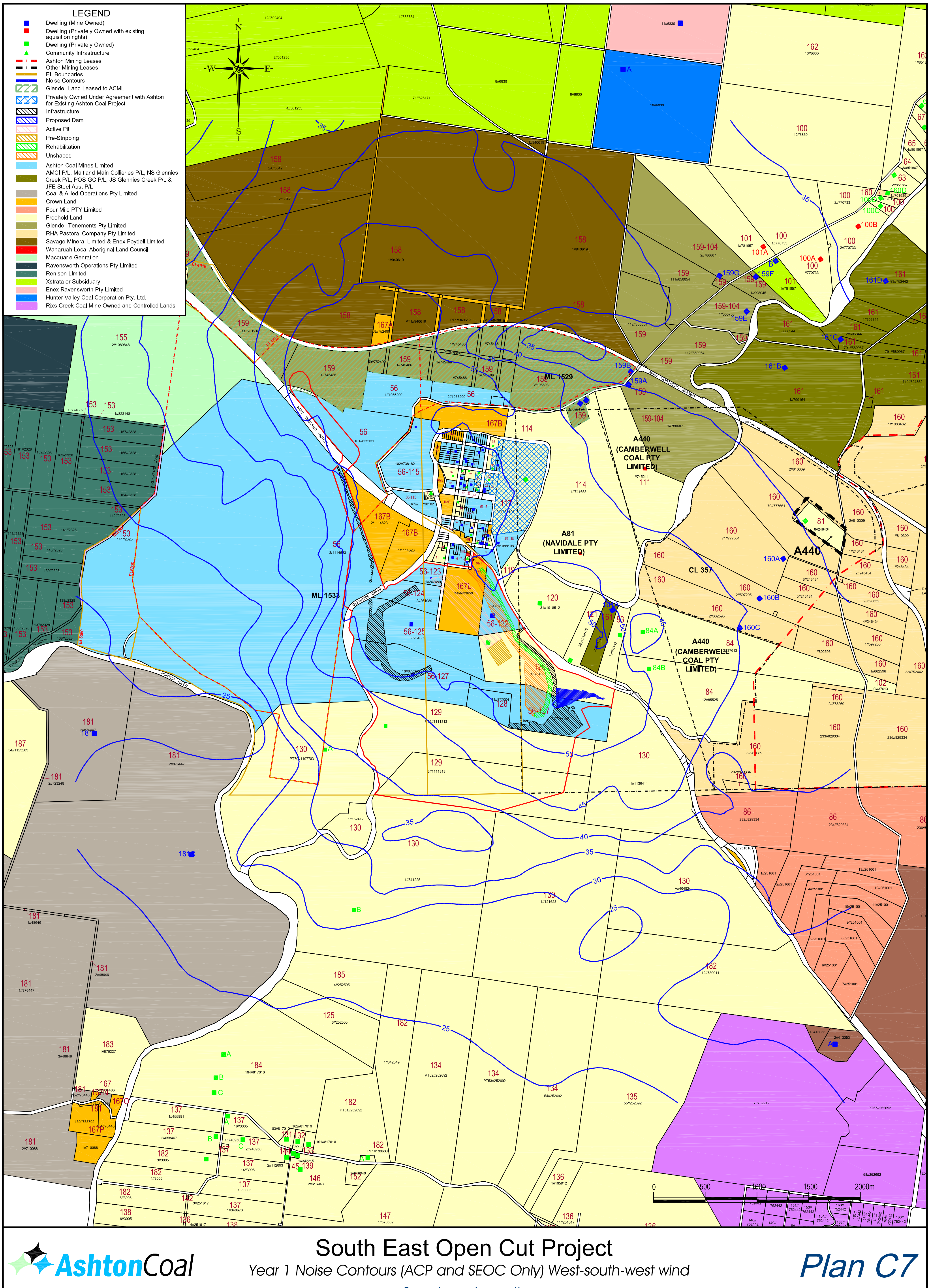

South East Open Cut Project

Year 1 Noise Contours (ACP and SEOC Only) West-south-west wind

Spectrum Acoustics

AshtonCoal

Plan C7

Prepared by Pegasus Technical

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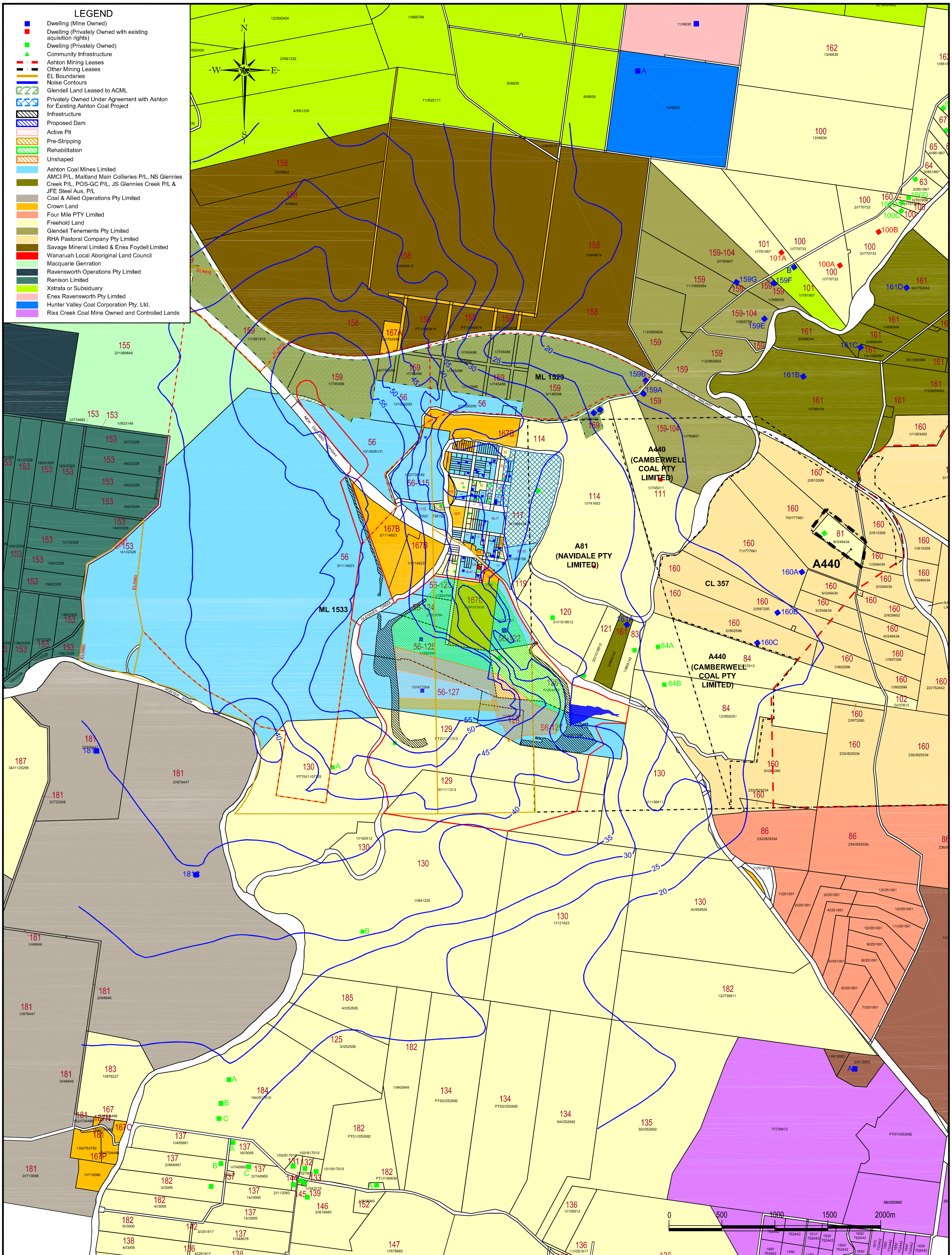


South East Open Cut Project

Year 3 Noise Contours (ACP and SEOC Only) East-south-east wind

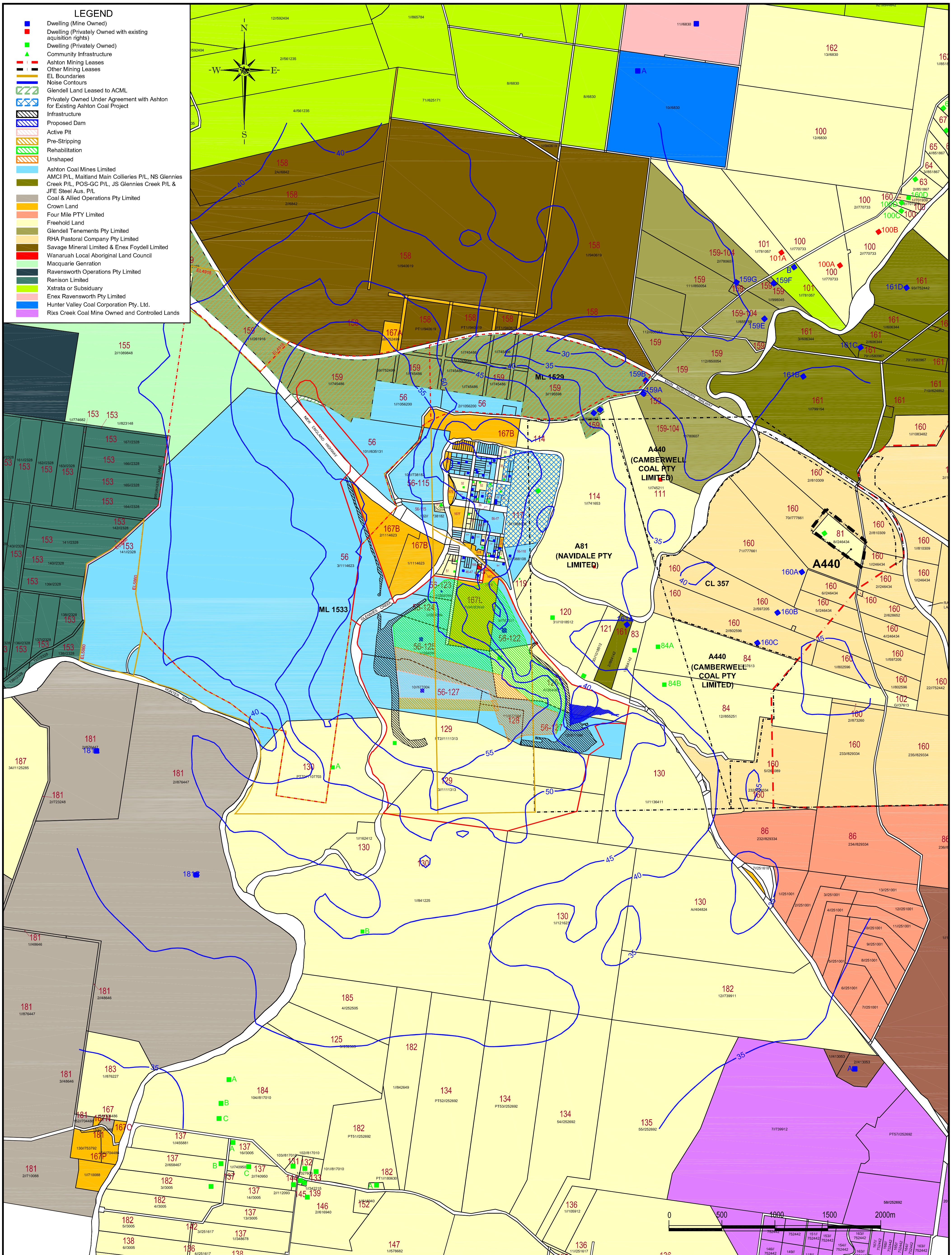
Spectrum Acoustics

Plan C8

AshtonCoal

Prepared by Pegasus Technical

CAD FILE: 03931B.dwg



South East Open Cut Project

Year 3 Noise Contours (ACP and SEOC Only) Inversion conditions

Spectrum Acoustics

Plan C9

Prepared by Pegasus Technical

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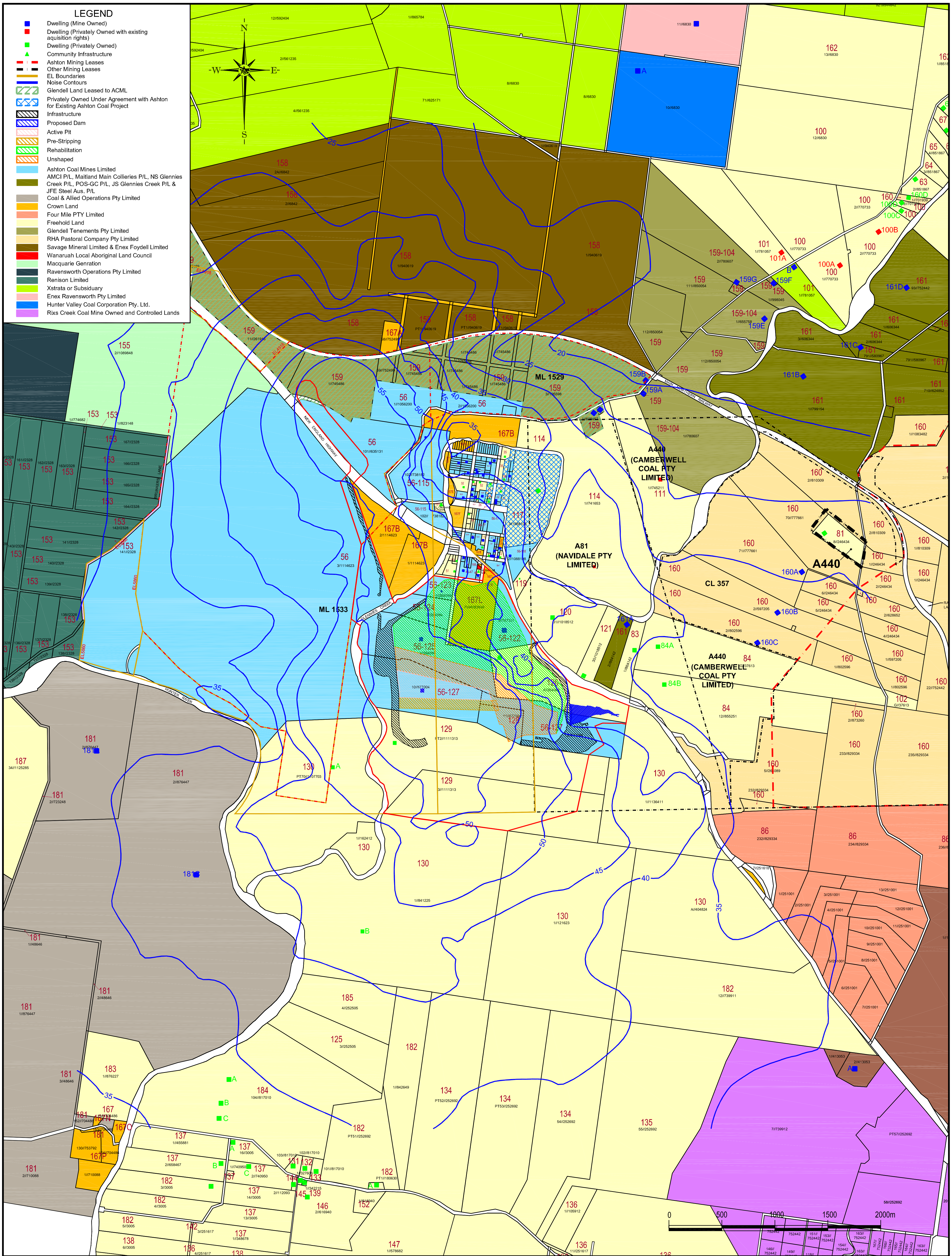


AshtonCoal

South East Open Cut Project

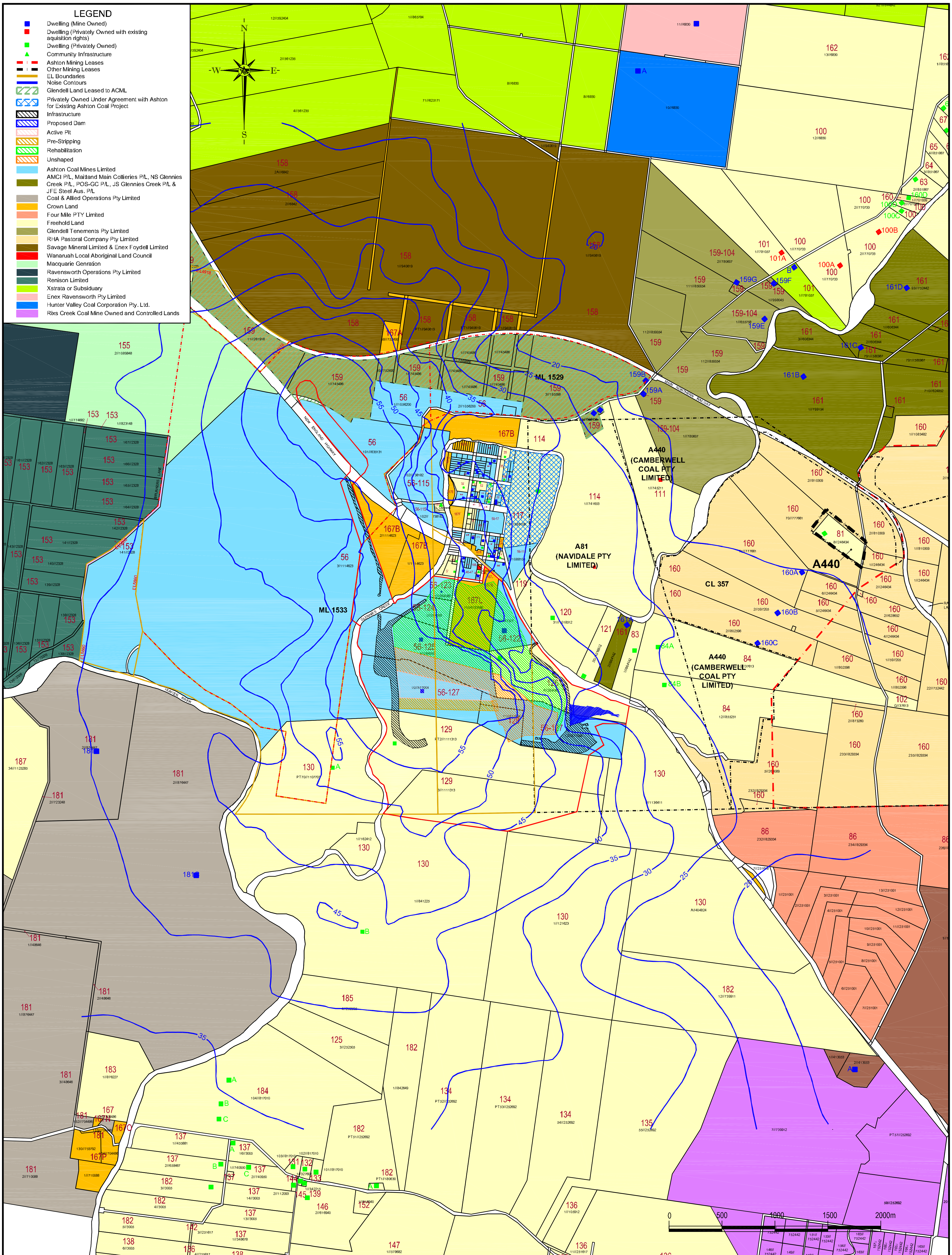
Year 3 Noise Contours (ACP and SEOC Only) North wind

Spectrum Acoustics

Plan C10

Prepared by Pegasus Technical

CAD FILE: 03933B.dwg



South East Open Cut Project

Year 3 Noise Contours (ACP and SEOC Only) North-east wind

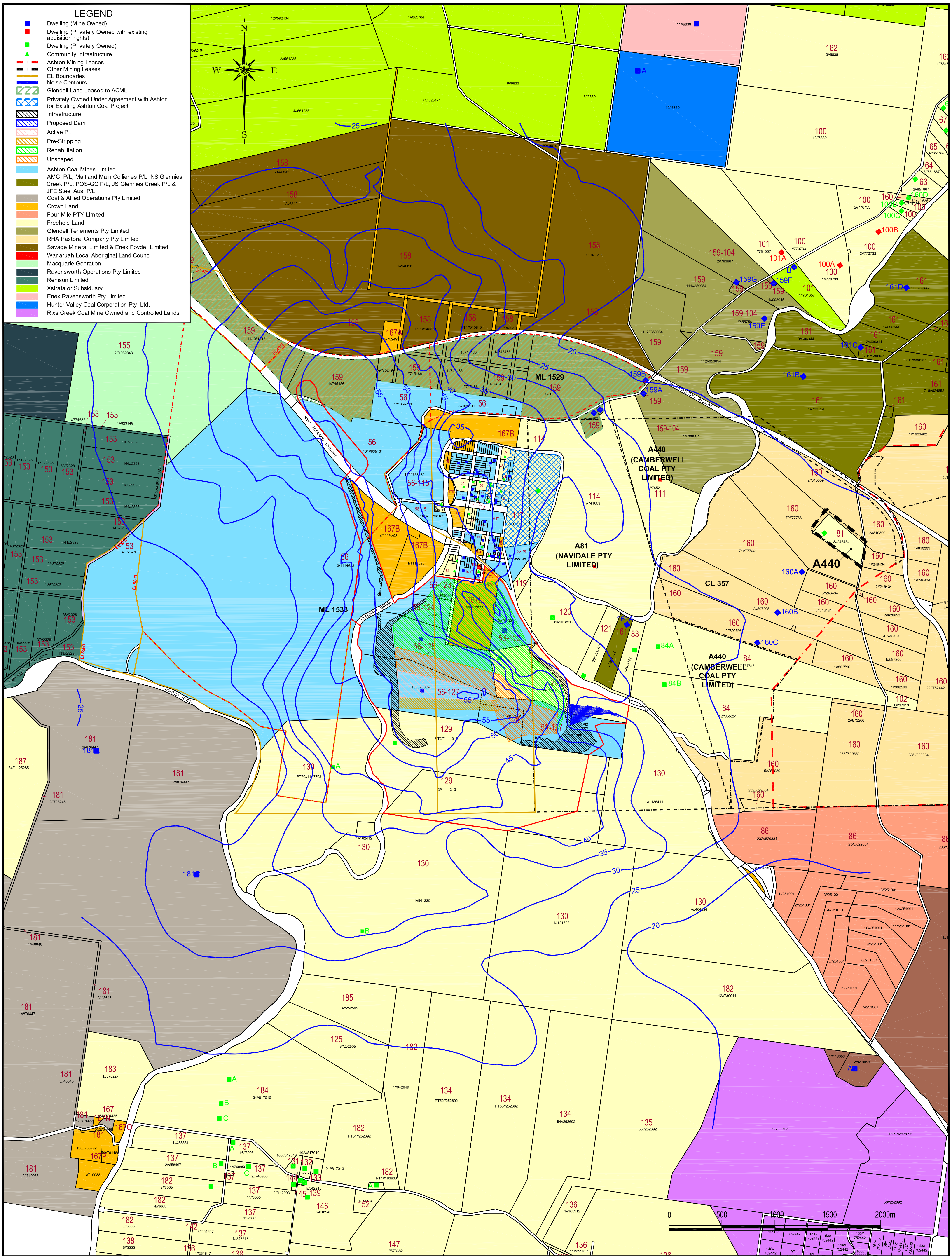
Spectrum Acoustics

Plan C11

AshtonCoal

Prepared by Pegasus Technical

CAD FILE: 03934B.dwg



AshtonCoal

South East Open Cut Project

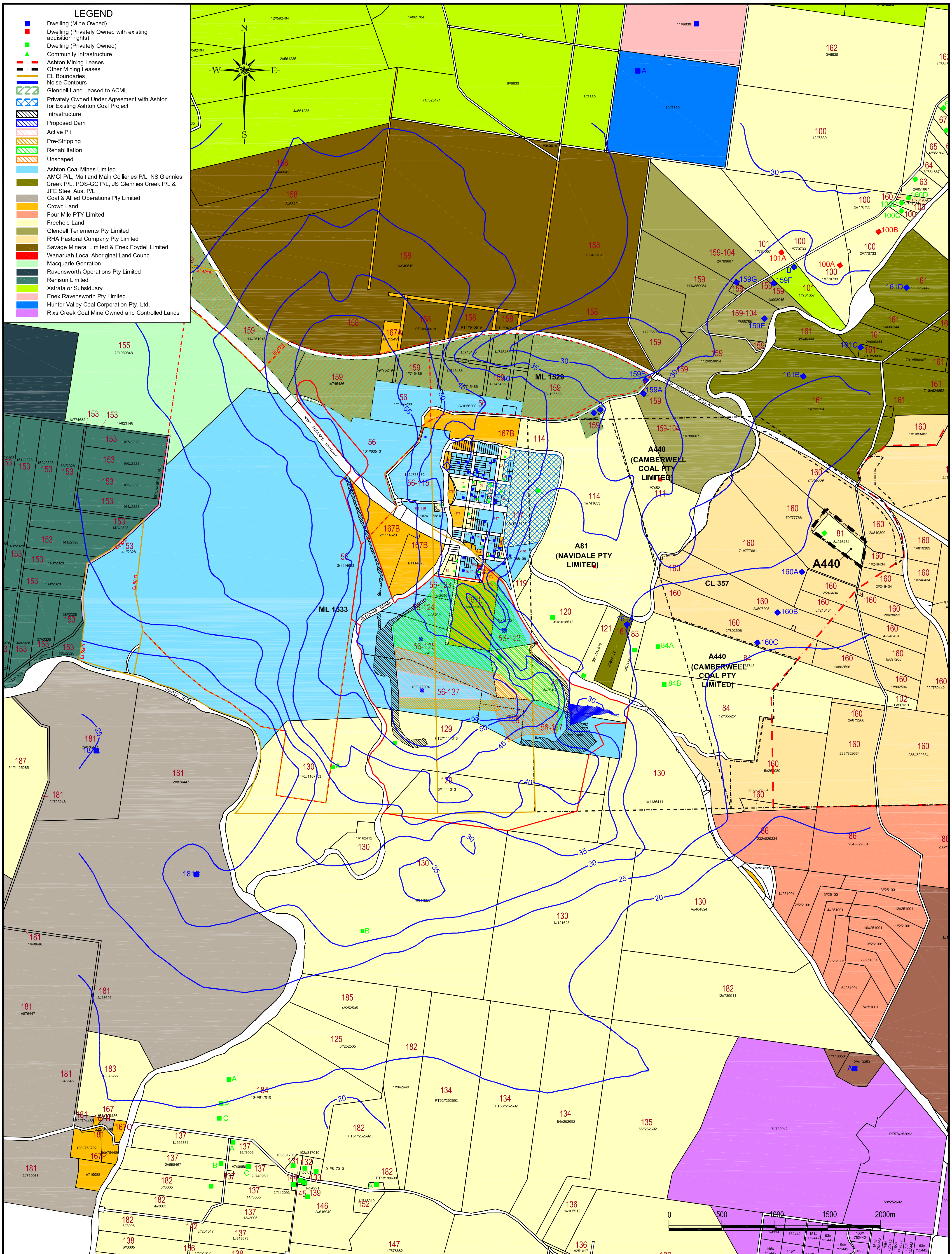
Year 3 Noise Contours (ACP and SEOC Only) Neutral conditions

Spectrum Acoustics

Plan C12

Prepared by Pegasus Technical

CAD FILE: 03935B.dwg



South East Open Cut Project

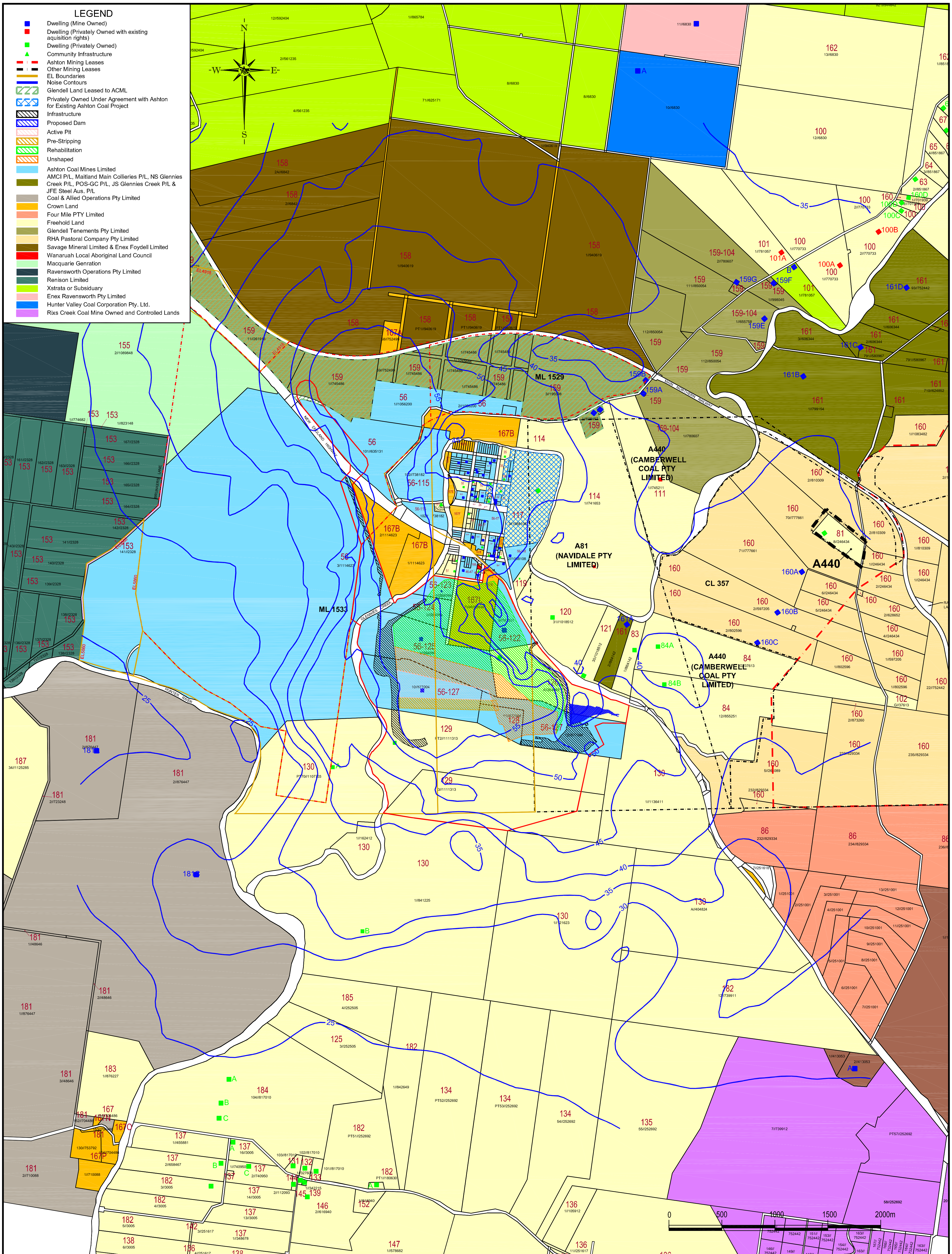
Year 3 Noise Contours (ACP and SEOC Only) South wind

Spectrum Acoustics

Plan C13

Prepared by Pegasus Technical

CAD FILE: 03936B.dwg



AshtonCoal

South East Open Cut Project

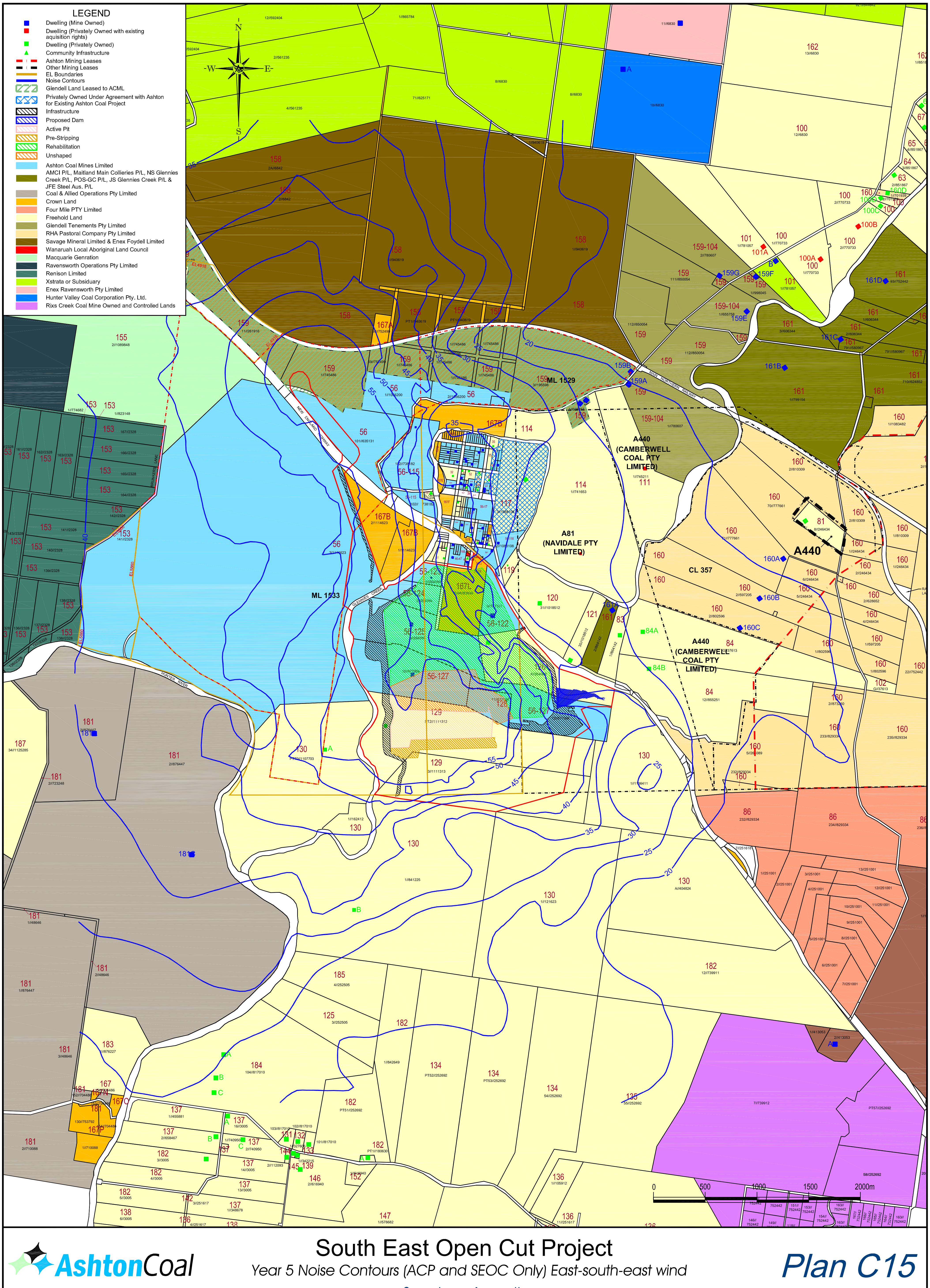
Year 3 Noise Contours (ACP and SEOC Only) West-south-west wind

Spectrum Acoustics

Plan C14

Prepared by Pegasus Technical

CAD FILE: 03937B.dwg



South East Open Cut Project

Year 5 Noise Contours (ACP and SEOC Only) East-south-east wind

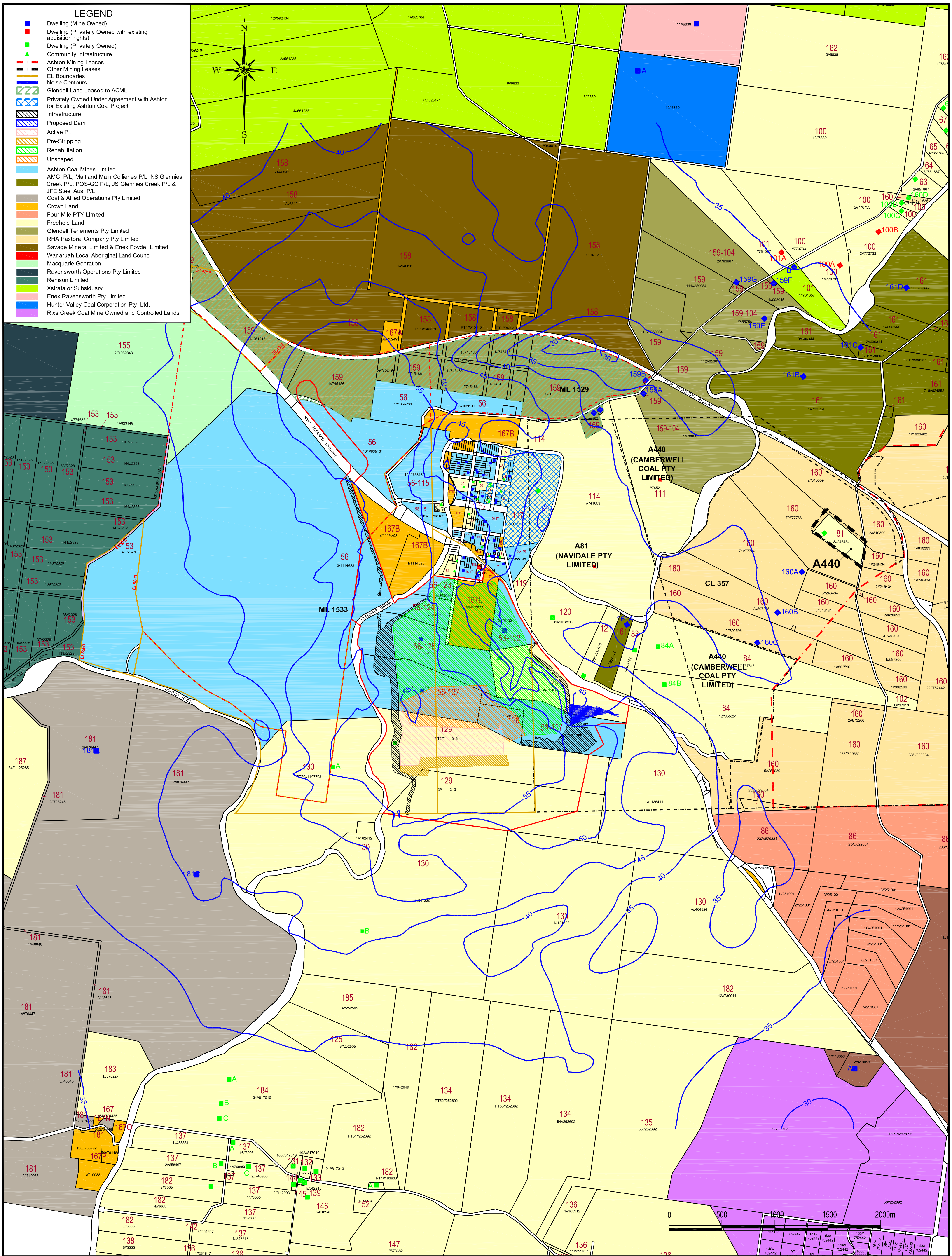
Spectrum Acoustics

AshtonCoal

Plan C15

Prepared by Pegasus Technical

CAD FILE: 03938B.dwg



South East Open Cut Project

Year 5 Noise Contours (ACP and SEOC Only) Inversion conditions

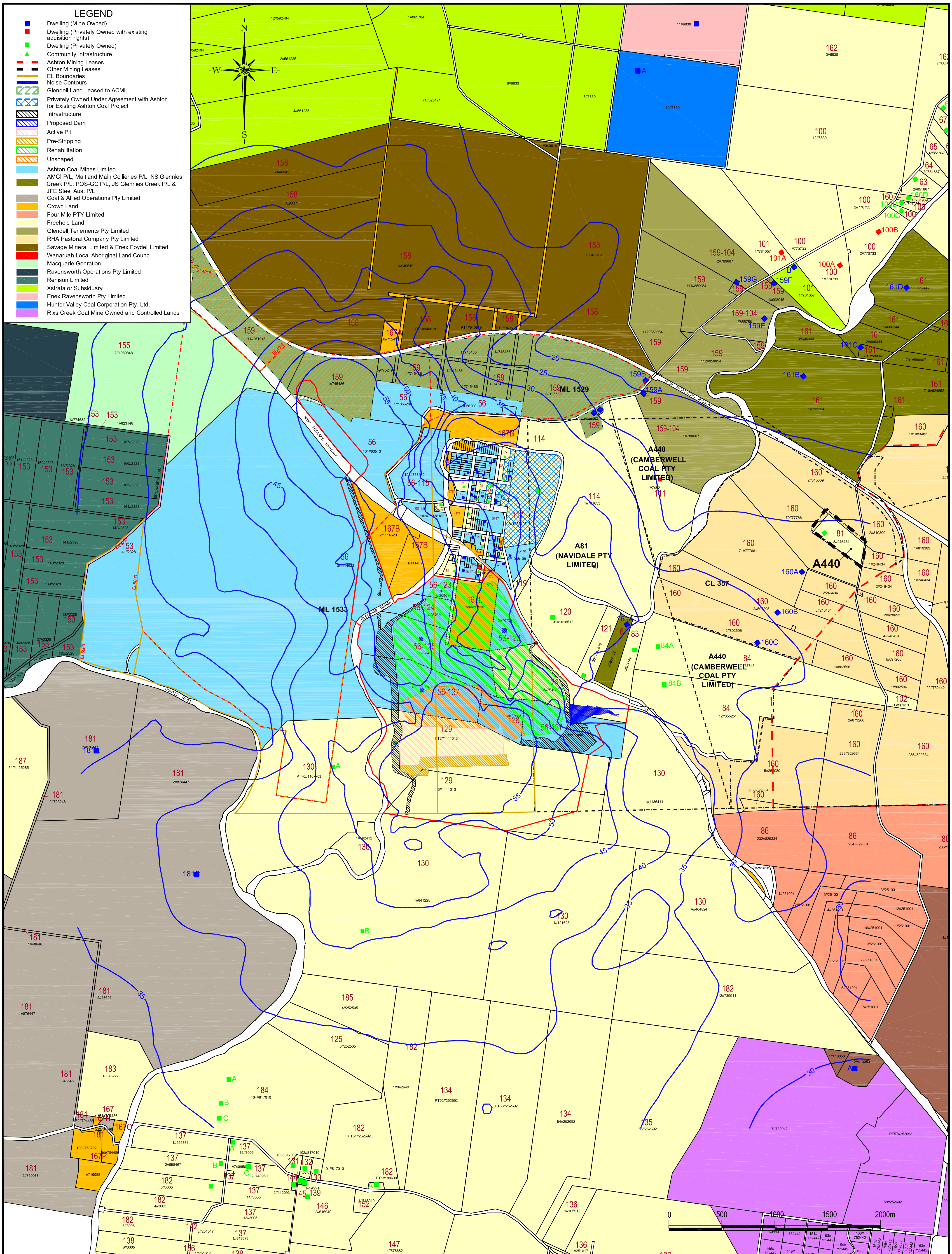
Spectrum Acoustics

AshtonCoal

Plan C16

Prepared by Pegasus Technical

CAD FILE: 03939B.dwg



AshtonCoal

South East Open Cut Project

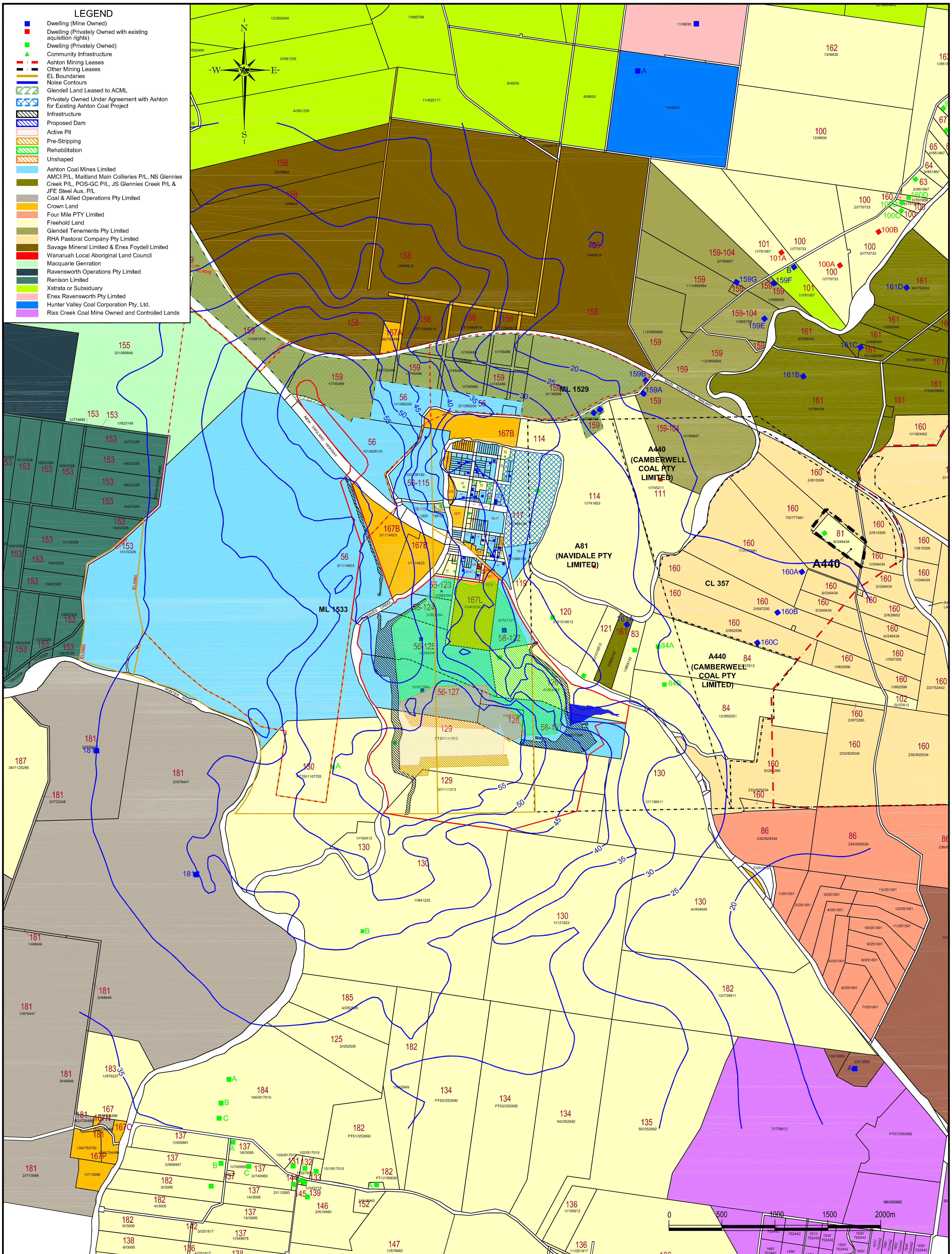
Year 5 Noise Contours (ACP and SEOC Only) North wind

Spectrum Acoustics

Plan C17

Prepared by Pegasus Technical

CAD FILE: 03940B.dwg



AshtonCoal

South East Open Cut Project

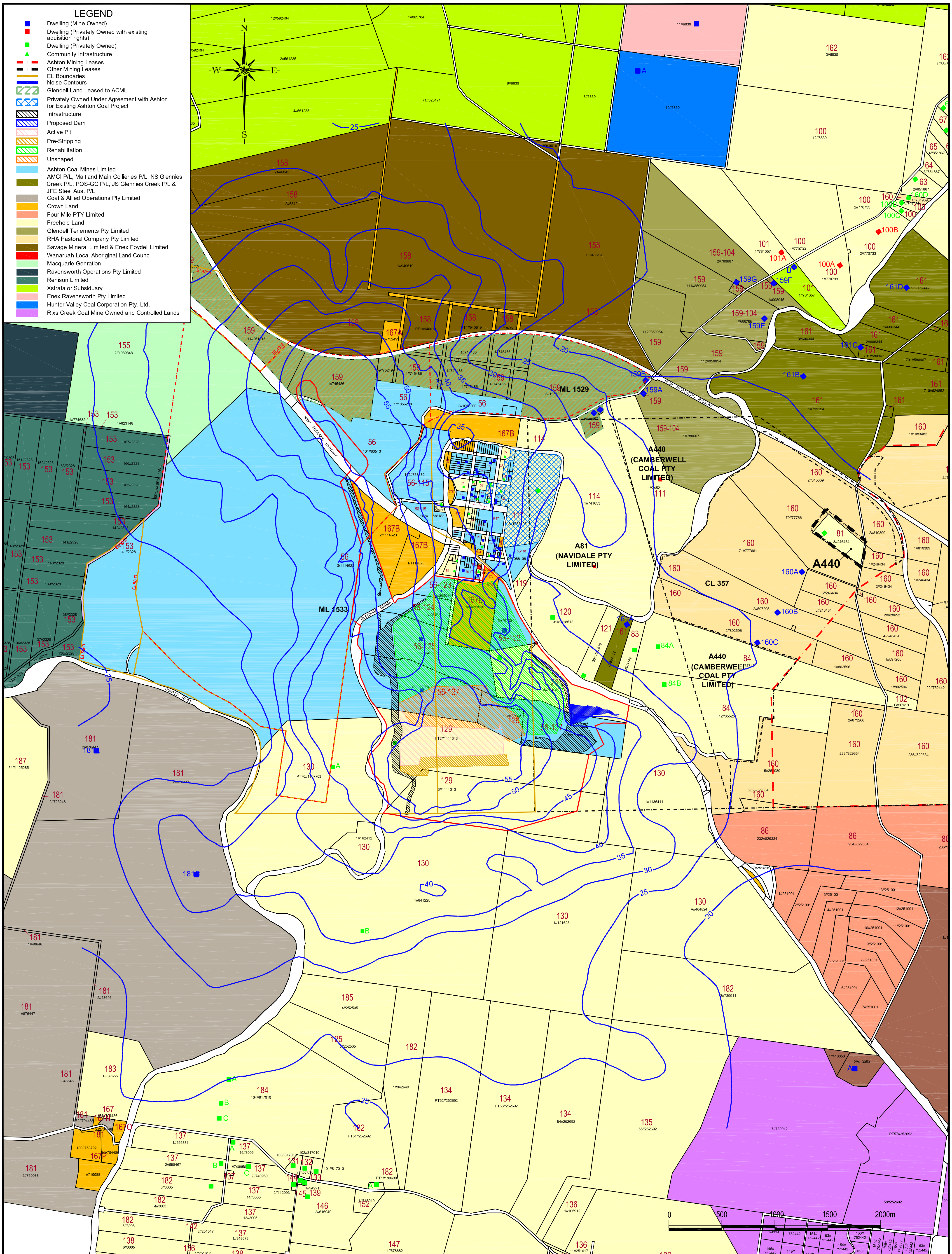
Year 5 Noise Contours (ACP and SEOC Only) North-east wind

Spectrum Acoustics

Plan C18

Prepared by Pegasus Technical

CAD FILE: 03941B.dwg



AshtonCoal

South East Open Cut Project

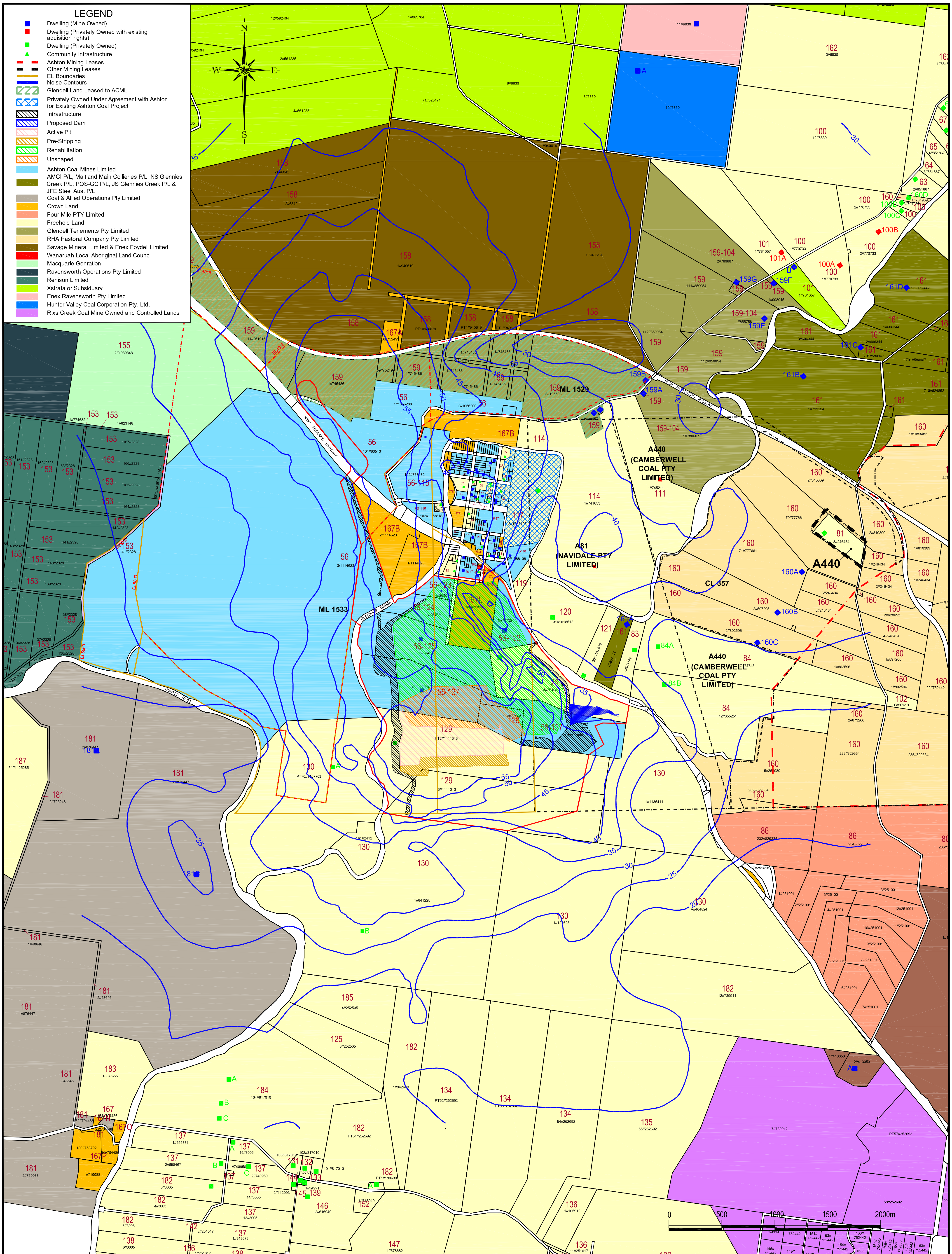
Year 5 Noise Contours (ACP and SEOC Only) Neutral conditions

Spectrum Acoustics

Plan C19

Prepared by Pegasus Technical

CAD FILE: 03942B.dwg



AshtonCoal

South East Open Cut Project

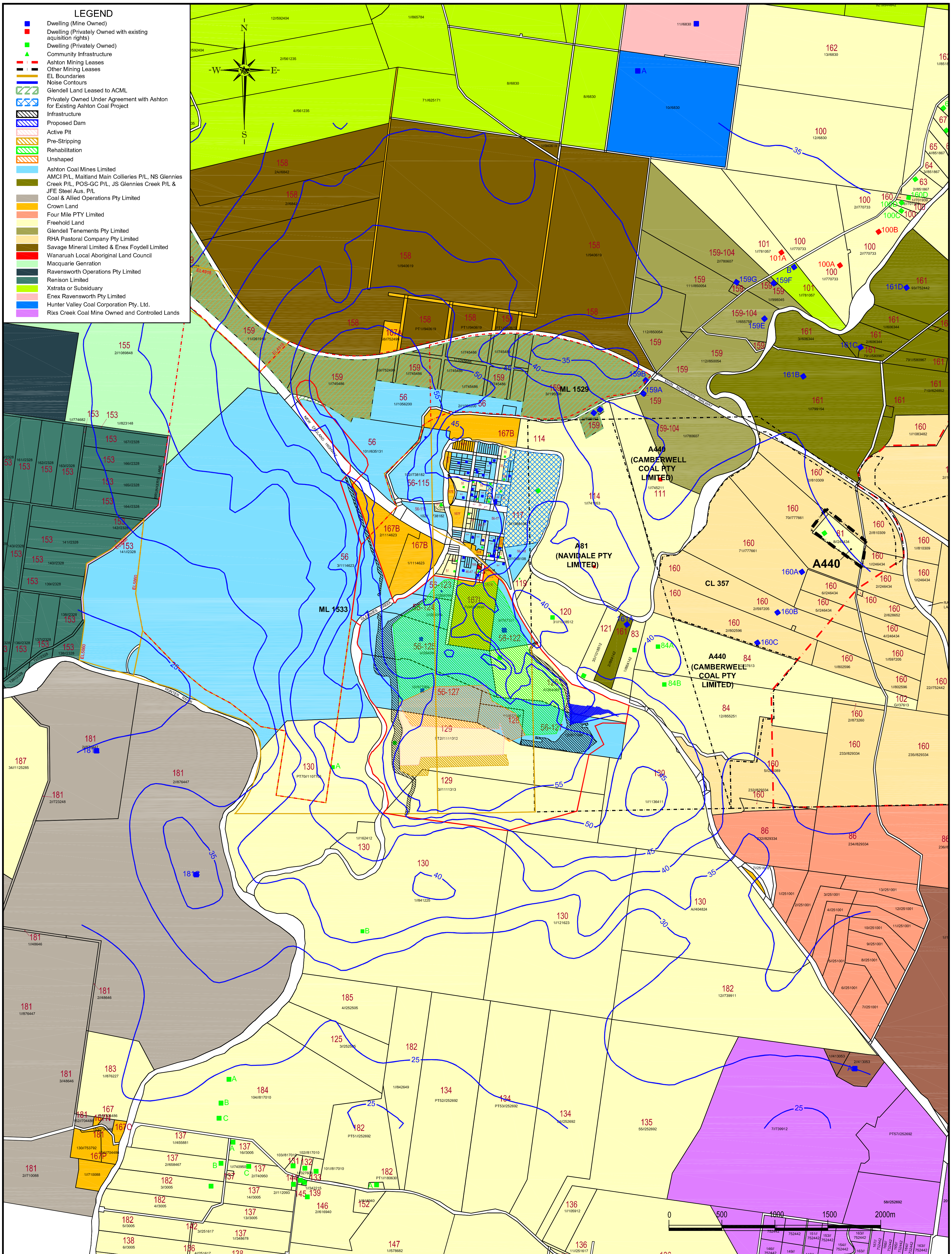
Year 5 Noise Contours (ACP and SEOC Only) South wind

Spectrum Acoustics

Plan C20

Prepared by Pegasus Technical

CAD FILE: 03943B.dwg



South East Open Cut Project

Year 5 Noise Contours (ACP and SEOC Only) West-south-west wind

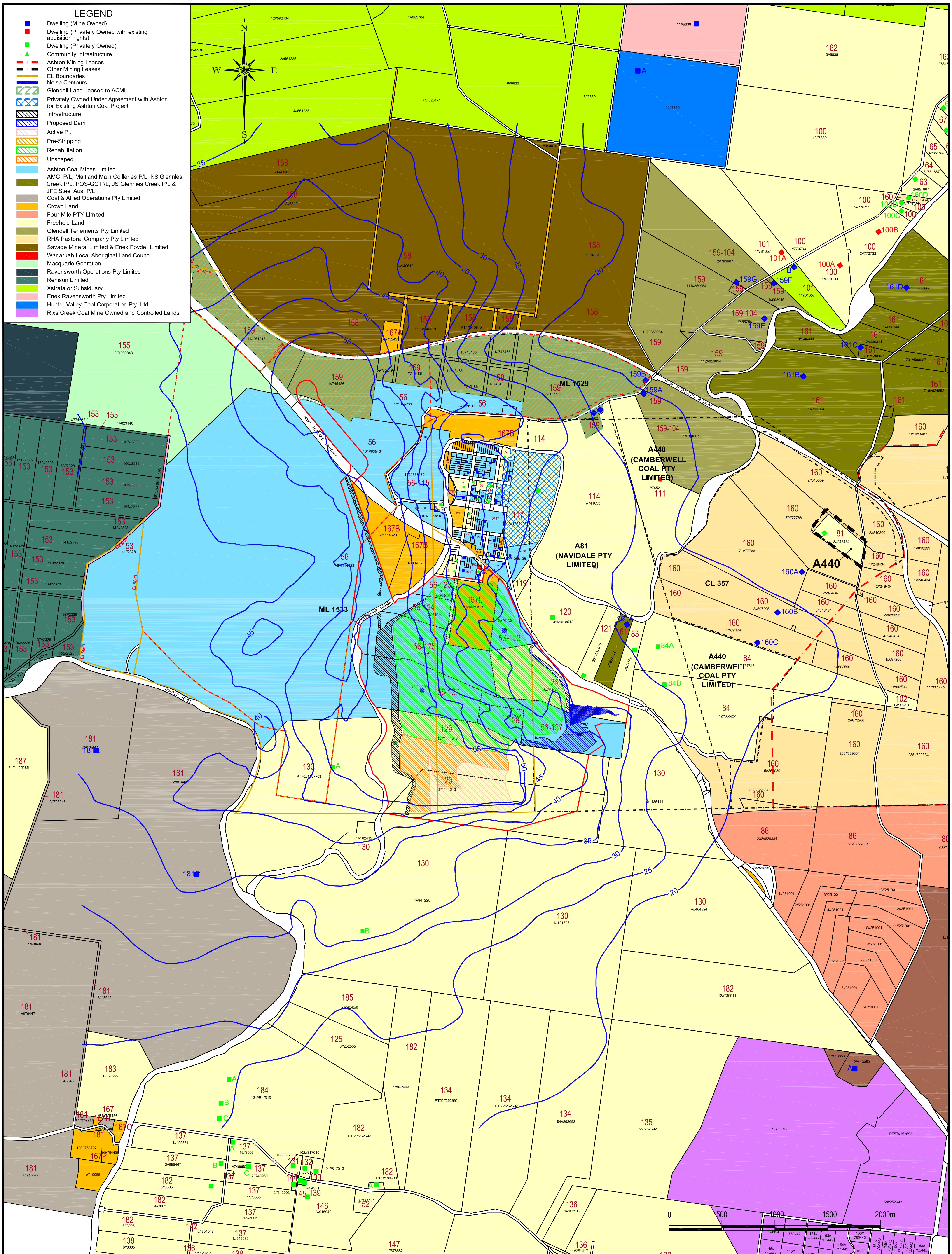
Spectrum Acoustics

Plan C21

AshtonCoal

Prepared by Pegasus Technical

CAD FILE: 03944B.dwg



South East Open Cut Project

Year 7 Noise Contours (ACP and SEOC Only) East-south-east wind

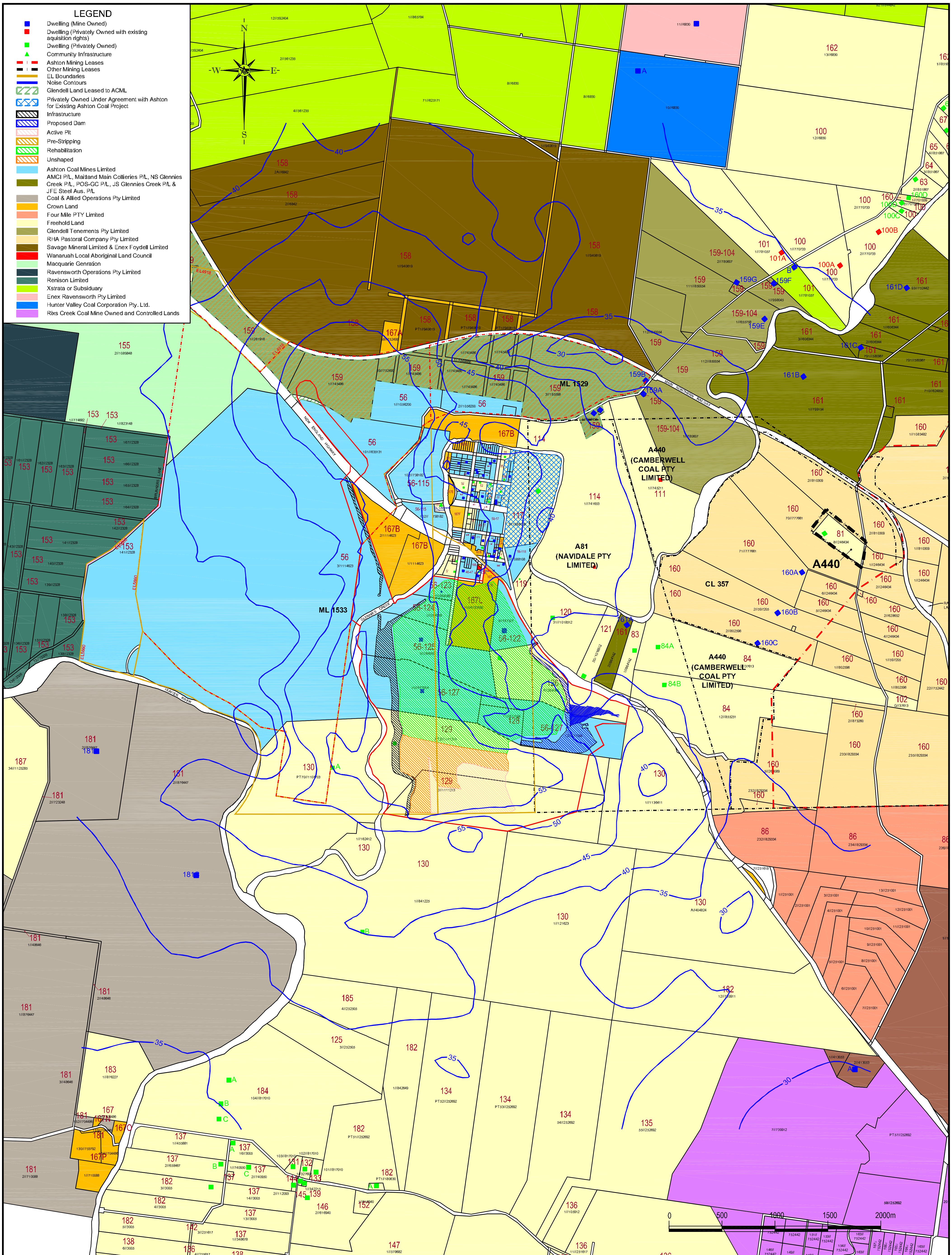
Spectrum Acoustics

AshtonCoal

Plan C22

Prepared by Pegasus Technical

CAD FILE: 03945B.dwg



South East Open Cut Project

Year 7 Noise Contours (ACP and SEOC Only) Inversion conditions

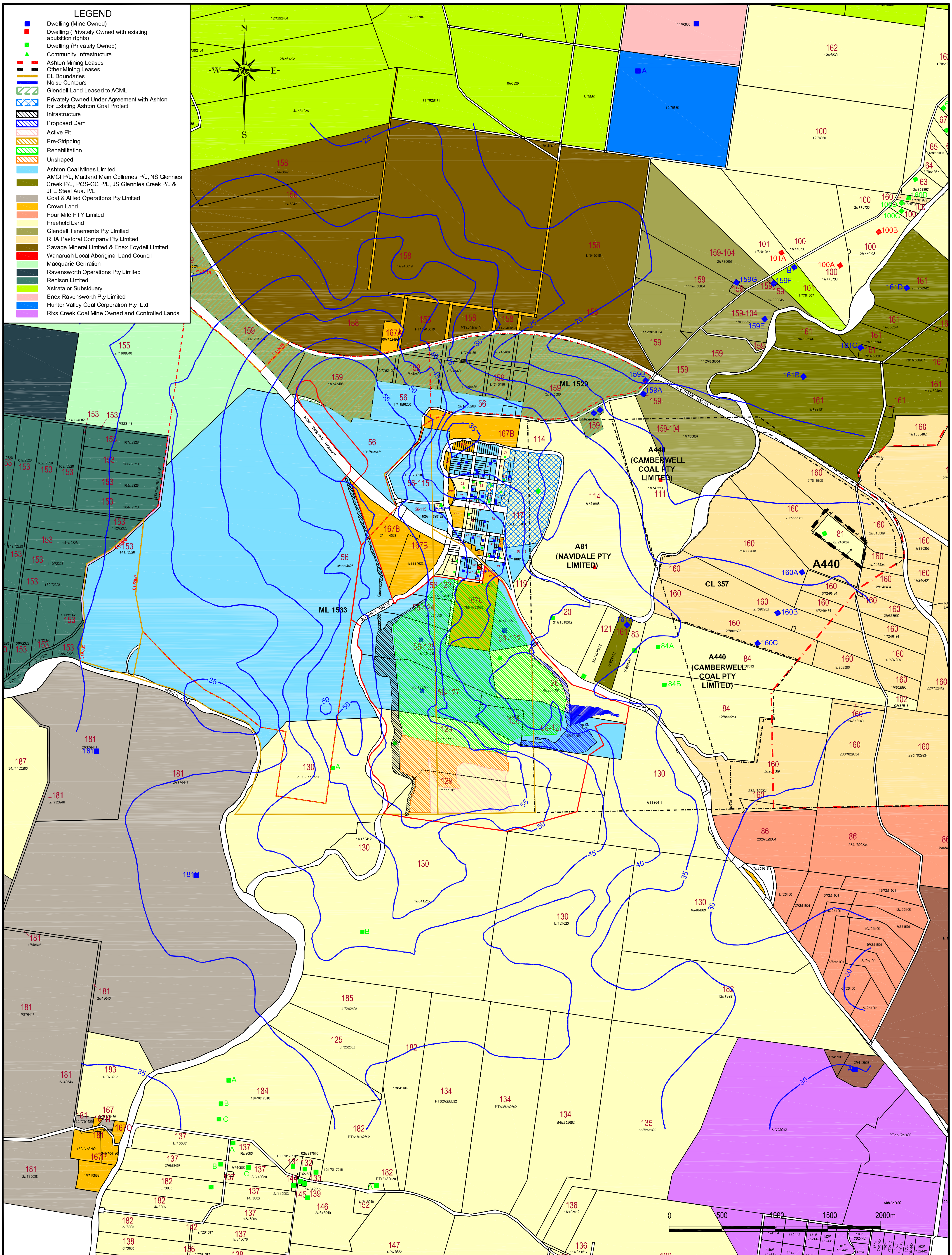
Spectrum Acoustics

AshtonCoal

Plan C23

Prepared by Pegasus Technical

CAD FILE: 03946B.dwg



AshtonCoal

South East Open Cut Project

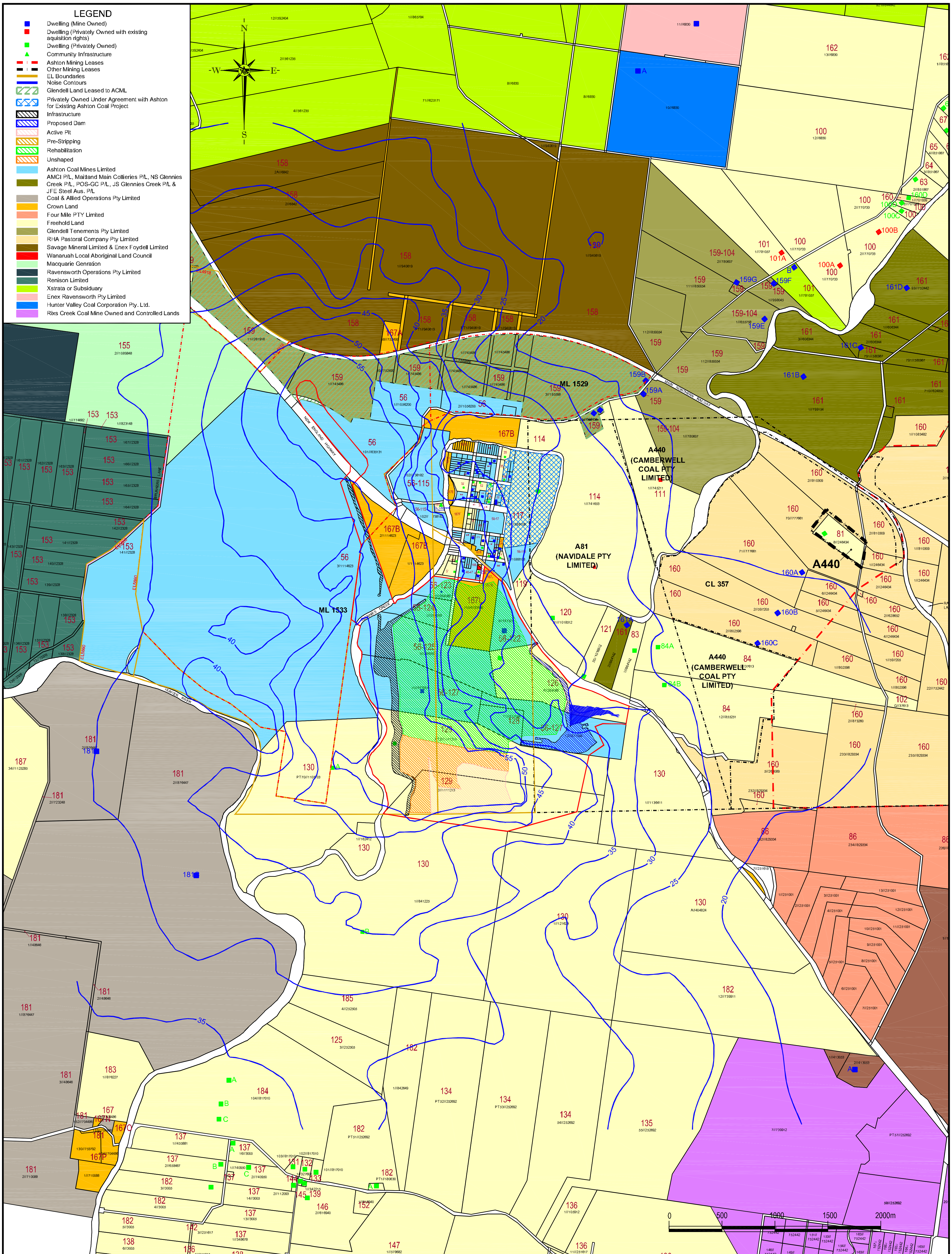
Year 7 Noise Contours (ACP and SEOC Only) North wind

Spectrum Acoustics

Plan C24

Prepared by Pegasus Technical

CAD FILE: 03947B.dwg



AshtonCoal

South East Open Cut Project

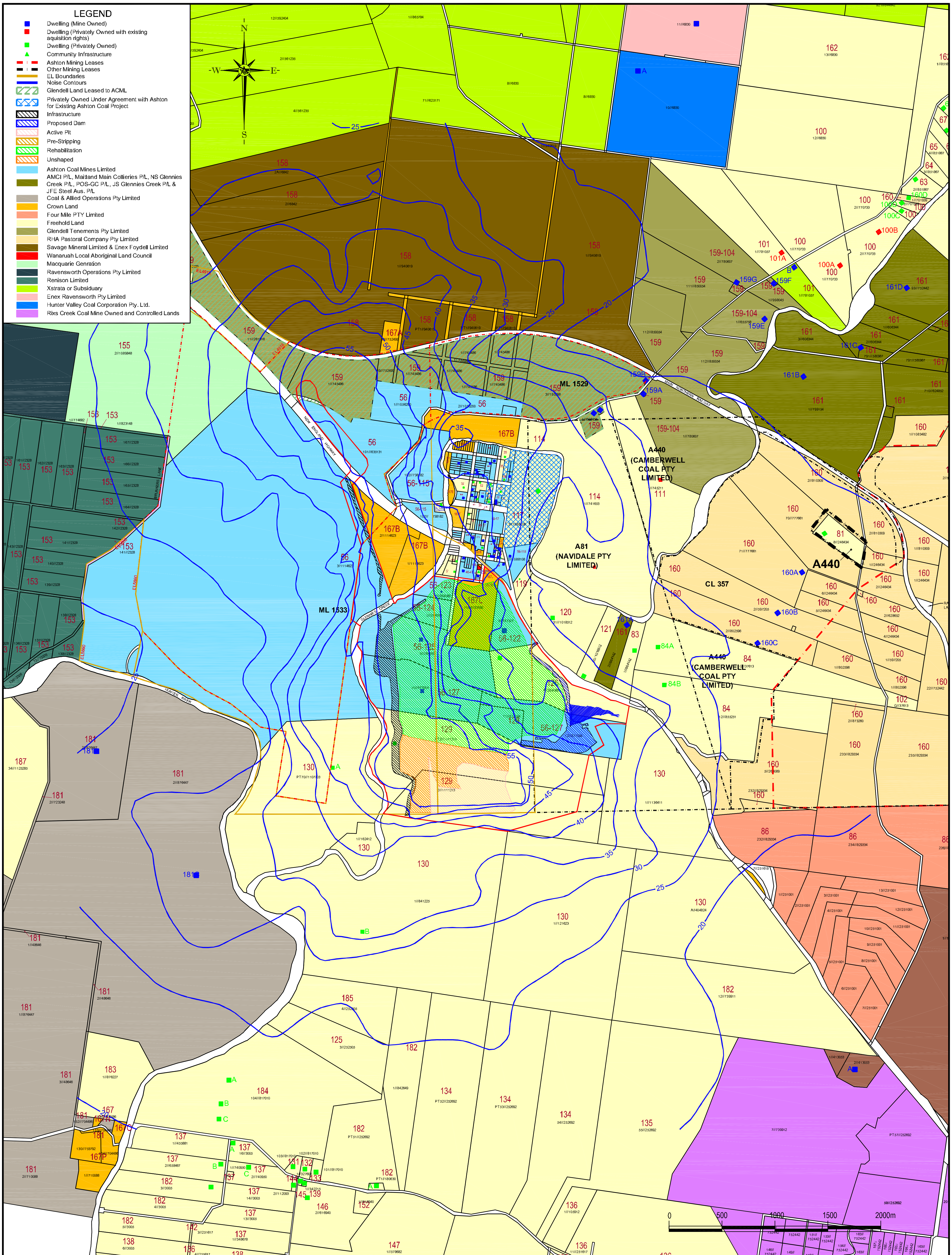
Year 7 Noise Contours (ACP and SEOC Only) North-east wind

Spectrum Acoustics

Plan C25

Prepared by Pegasus Technical

CAD FILE: 03948B.dwg



South East Open Cut Project

Year 7 Noise Contours (ACP and SEOC Only) Neutral conditions

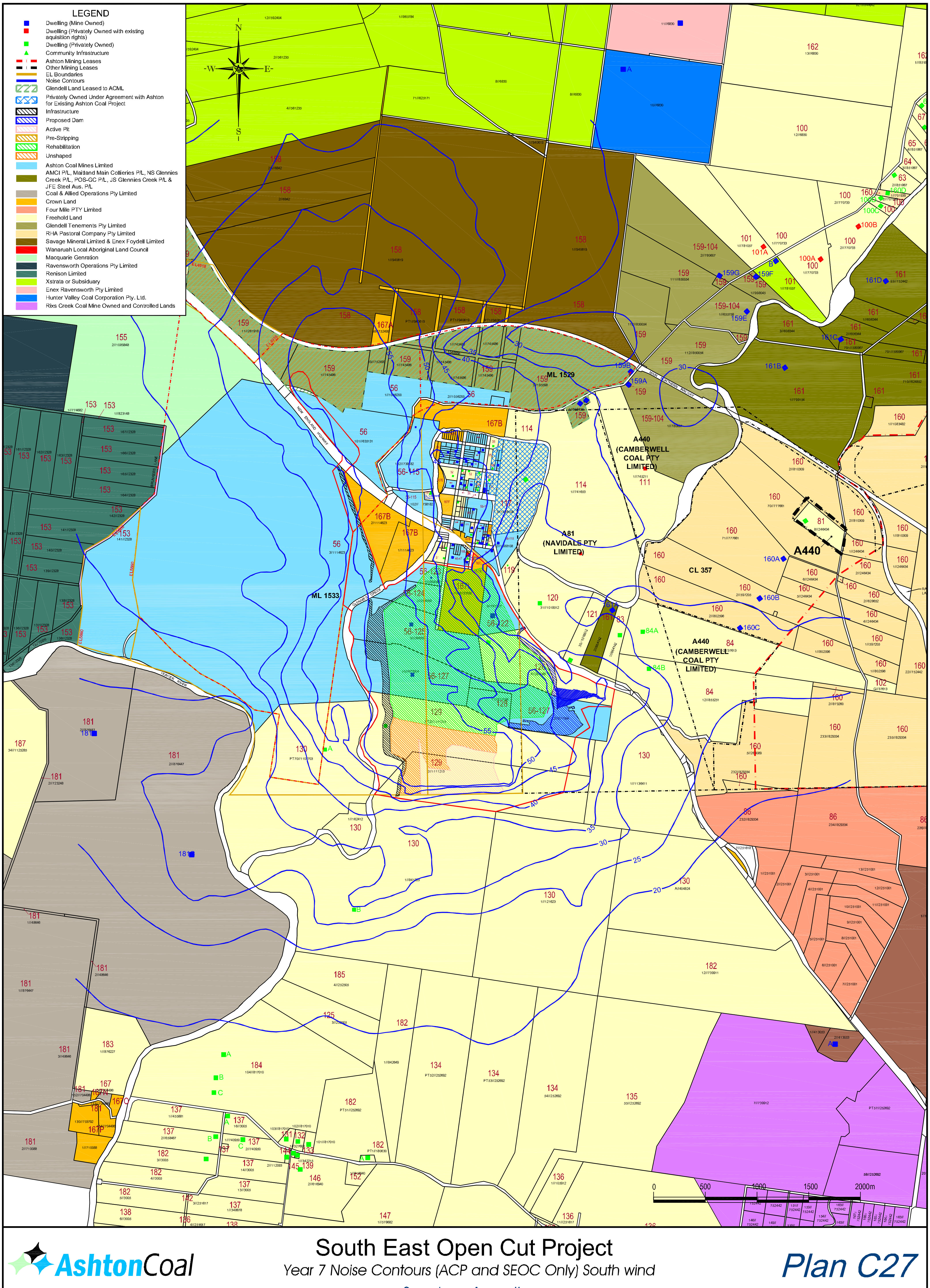
Spectrum Acoustics

AshtonCoal

Plan C26

Prepared by Pegasus Technical

CAD FILE: 03949B.dwg



AshtonCoal

South East Open Cut Project

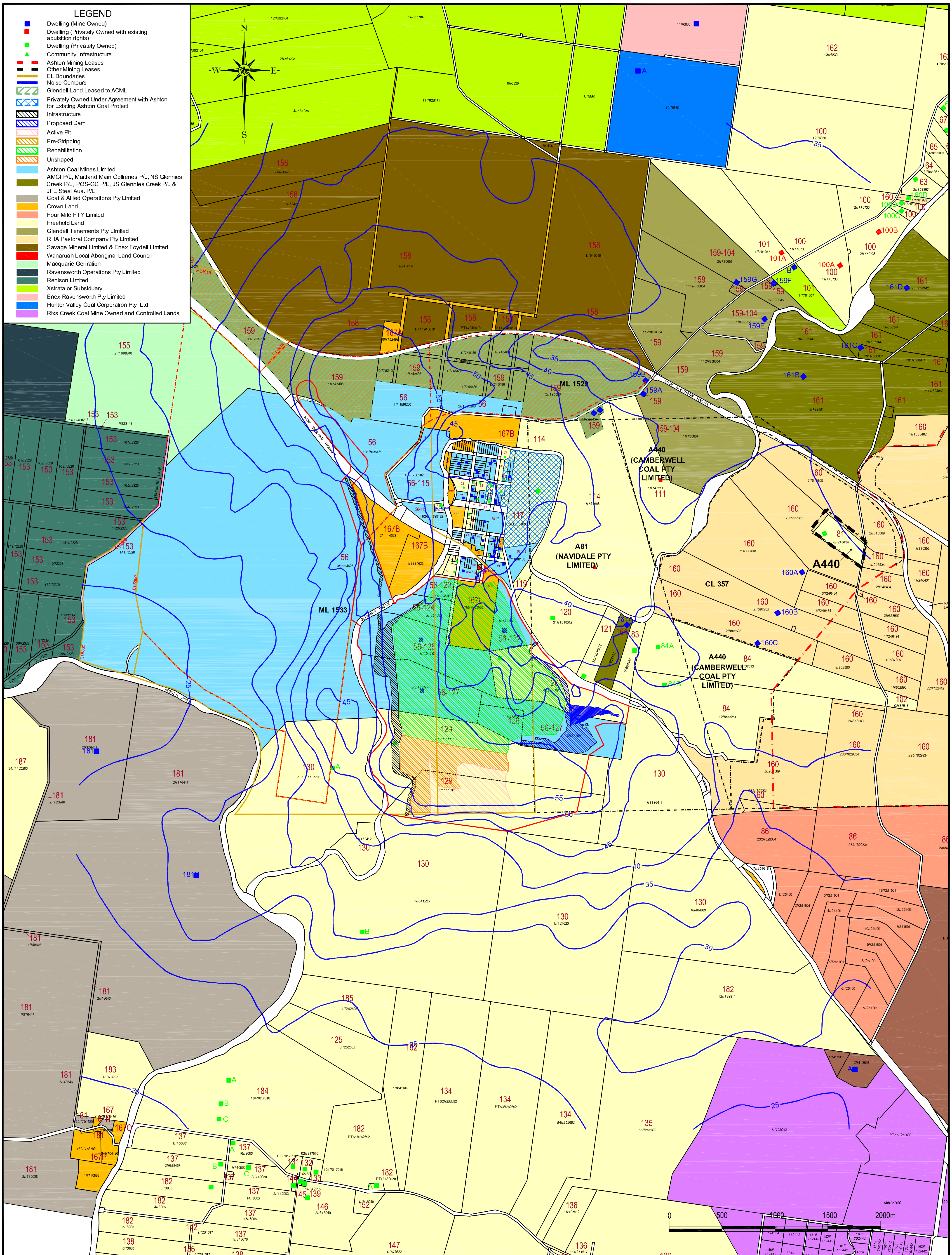
Year 7 Noise Contours (ACP and SEOC Only) South wind

Spectrum Acoustics

Plan C27

Prepared by Pegasus Technical

CAD FILE: 03950B.dwg



South East Open Cut Project

Year 7 Noise Contours (ACP and SEOC Only) West-south-west wind

Spectrum Acoustics

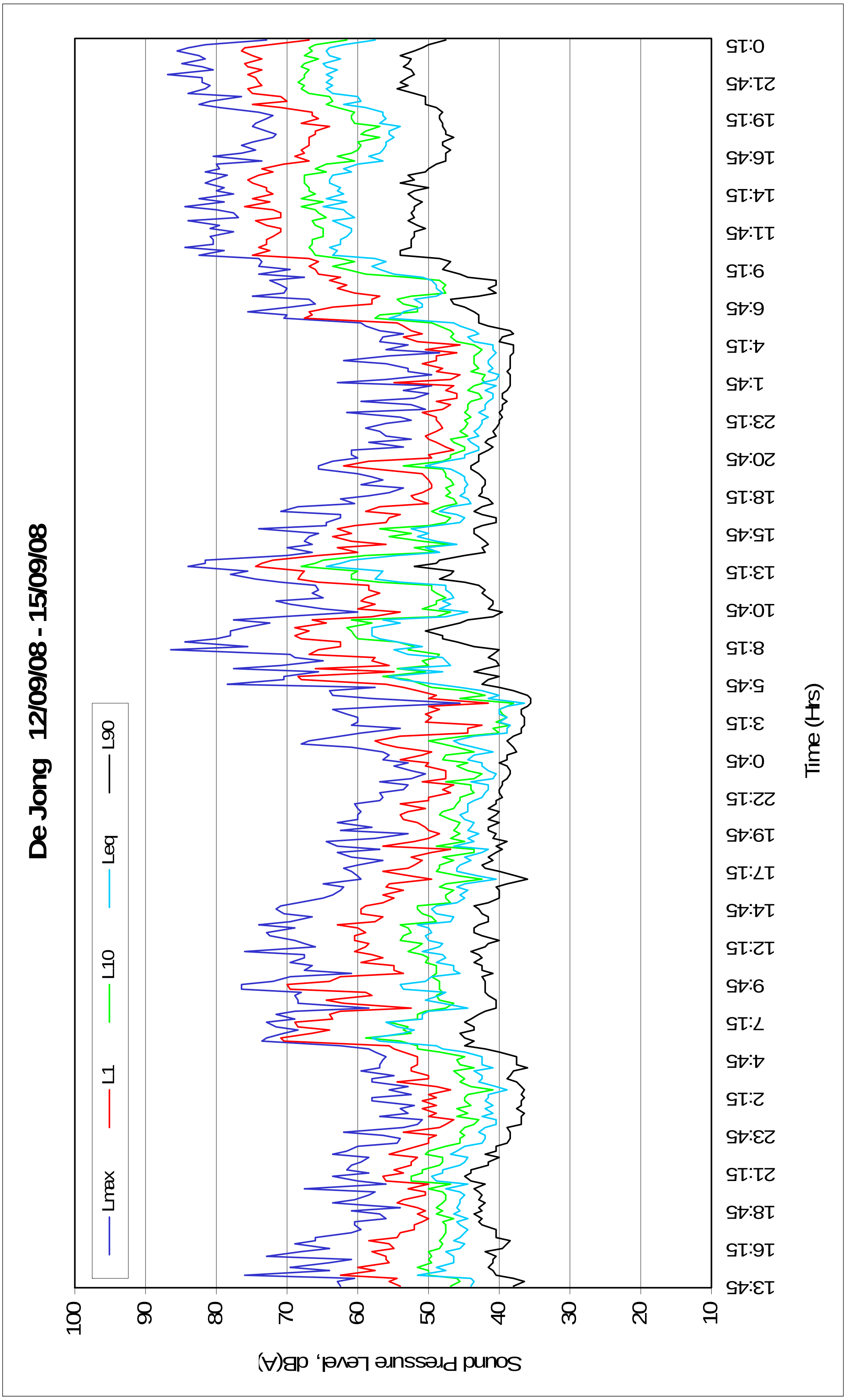
Plan C28

Prepared by Pegasus Technical

CAD FILE: 03951B.dwg

APPENDIX D

MEASURED AMBIENT NOISE DATA CHARTS


De Jong 12/09/08 - 15/09/08
Lmax
L1
L10
Leq
L90
100
90
80
70
60
50
40
30
20
10
Sound Pressure Level, dB(A)
13:45
16:15
18:45
21:15
23:45
2:15
4:45
7:15
9:45
12:15
14:45
17:15
19:45
22:15
0:45
3:15
5:45
8:15
10:45
13:15
15:45
18:15
20:45
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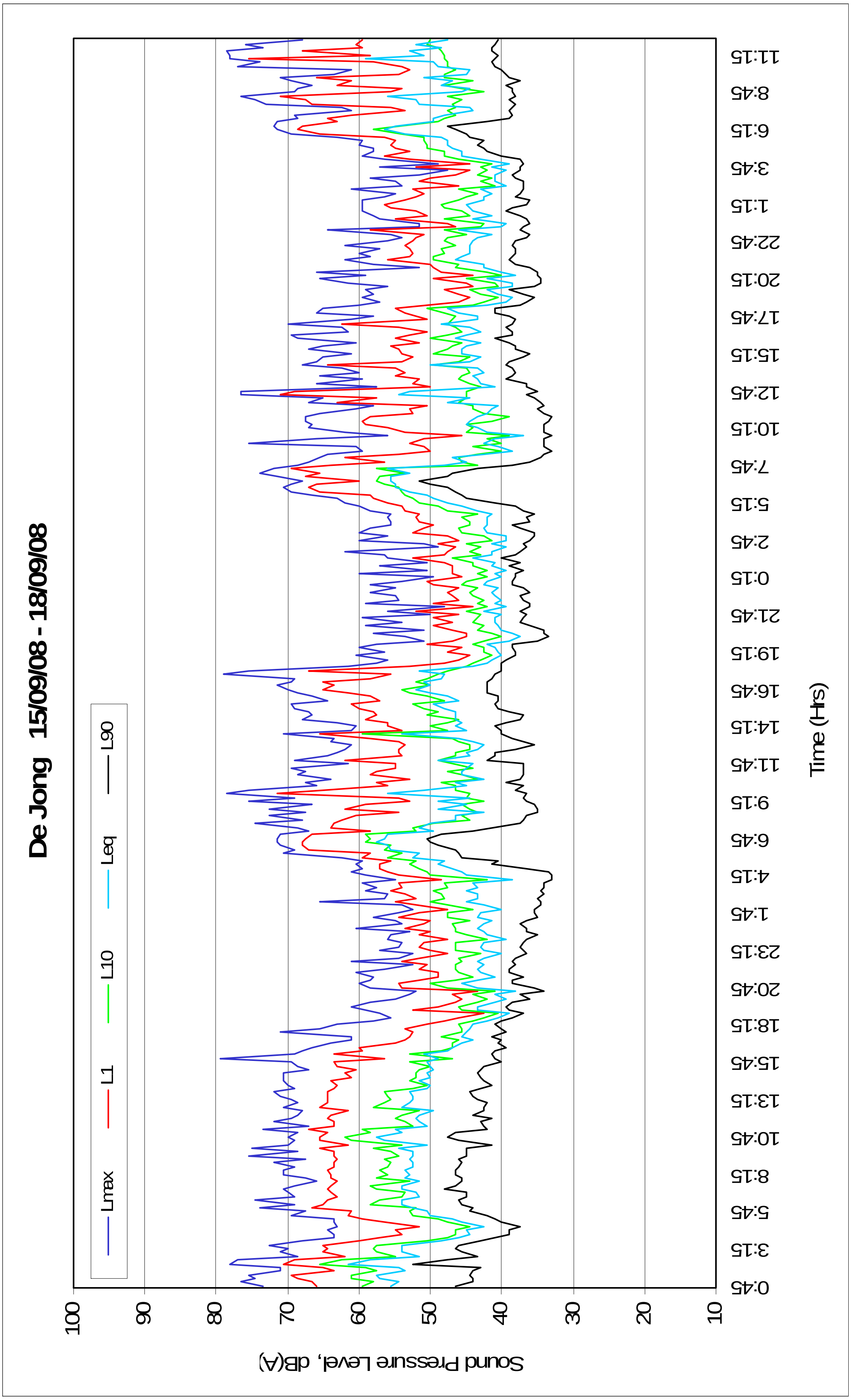
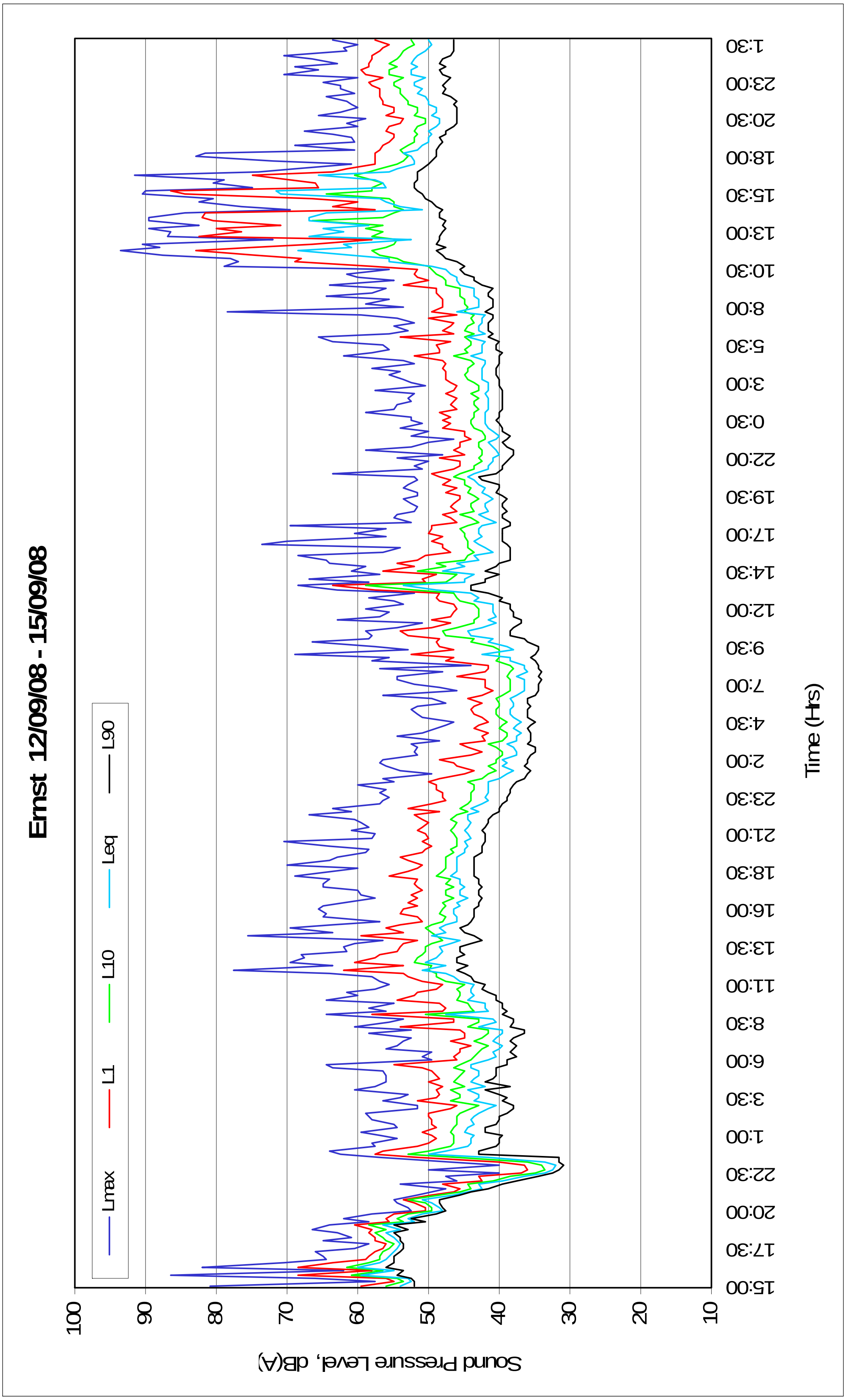
19:15
21:45
0:15
Time (Hrs)


De Jong 15/09/08 - 18/09/08
Lmax
L1
L10
Leq
L90
Sound Pressure Level, dB(A)
100
90
80
70
60
50
40
30
20
10
Time (Hrs)
0:45
3:15
5:45
8:15
10:45
13:15
15:45
18:15
20:45
23:15
1:45
4:15
6:45
9:15
11:45
14:15
16:45
19:15
21:45
0:15
2:45
5:15
7:45
10:15
12:45
15:15
17:45
20:15
22:45
1:15
3:45
6:15
8:45
11:15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L1
L10
Leq
L90
Sound Pressure Level, dB(A)
Time (Hrs)
100
90
80
70
60
50
40
30
20
10
15:00
17:30
20:00
22:30
1:00
3:30
6:00
8:30
11:00
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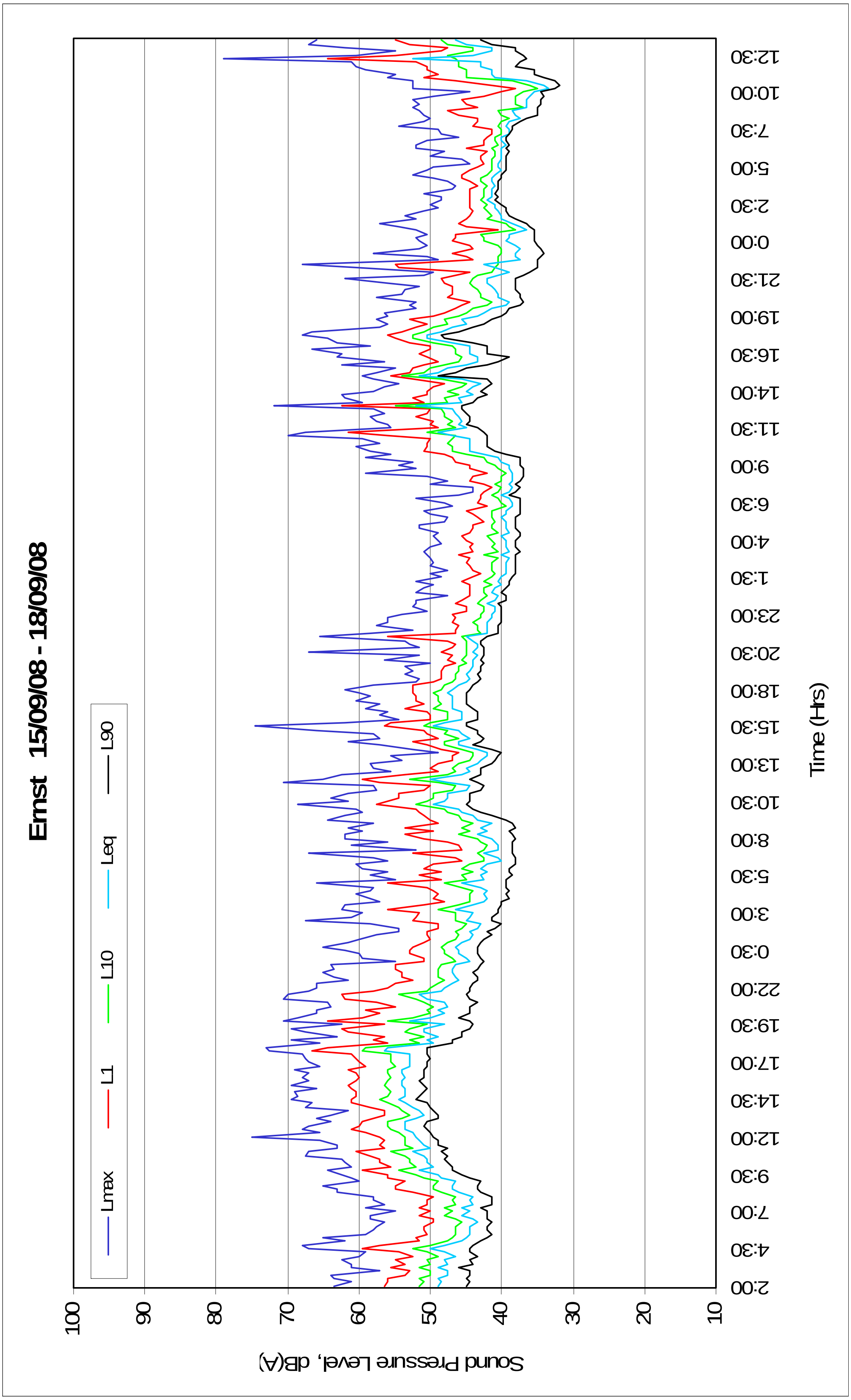
20:30
23:00
1:30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L10
Leq
L90
Sound Pressure Level, dB(A)
100
90
80
70
60
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40
30
20
10
Time (Hrs)
2:00
4:30
7:00
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12:00
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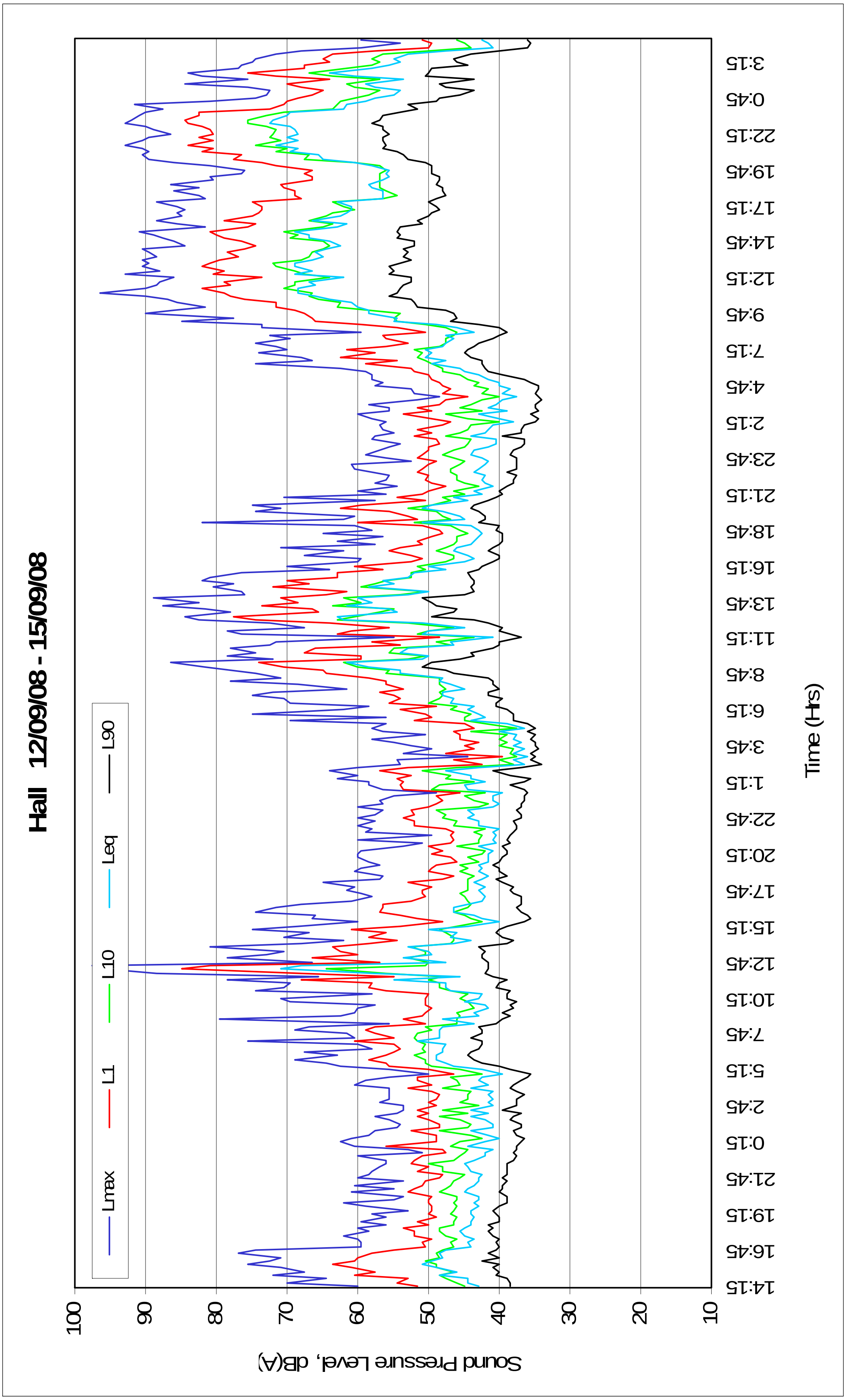
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Leq
L90
Sound Pressure Level, dB(A)
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80
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60
50
40
30
20
10
Time (Hrs)
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16:45
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2:45
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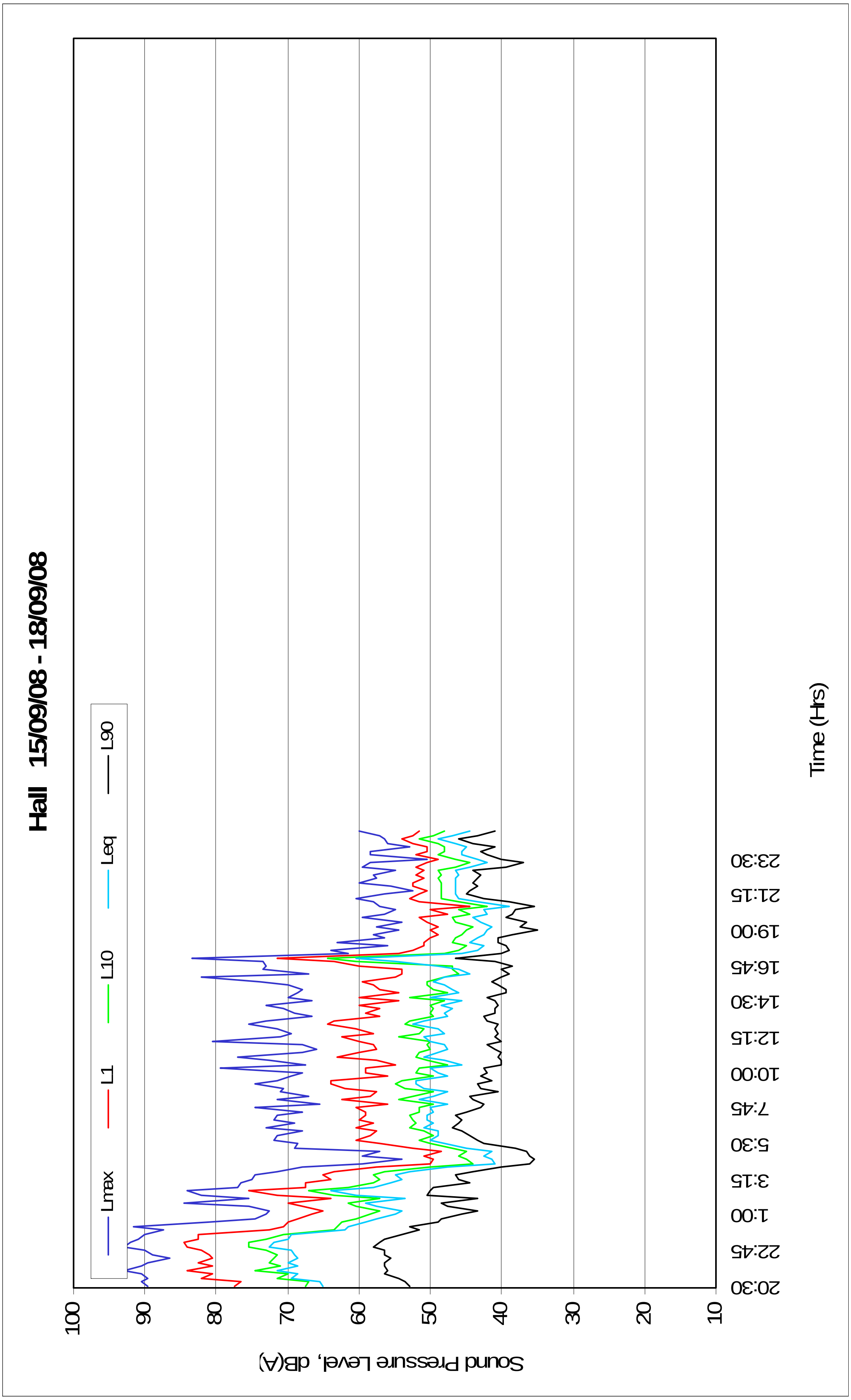
0:45
3:15


Hall 15/09/08 - 18/09/08
Lmax
L1
L10
Leq
L90
Sound Pressure Level, dB(A)
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80
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20:30
22:45
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3:15
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10:00
12:15
14:30
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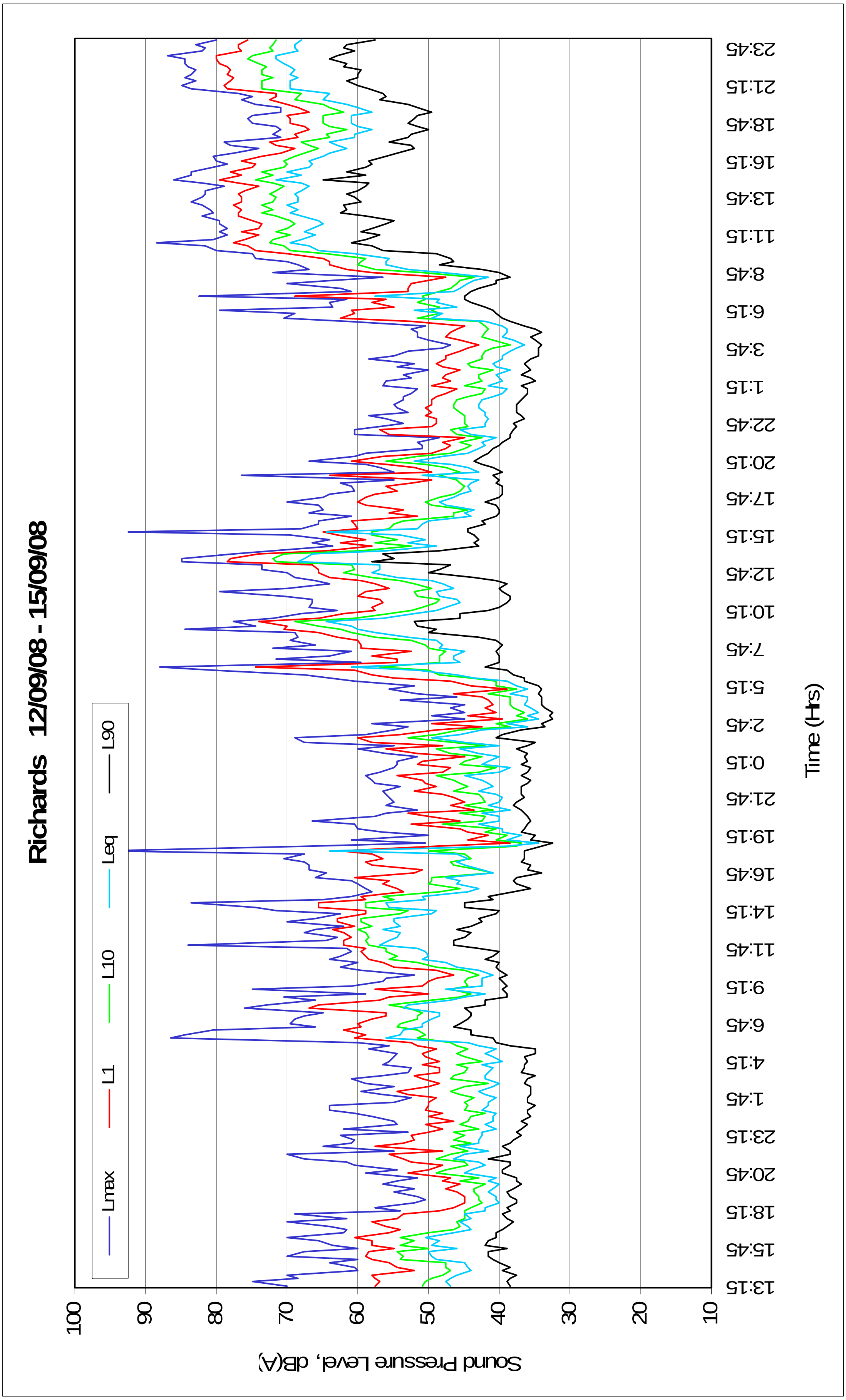
19:00
21:15
23:30
Time (Hrs)



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Leq
L90
Sound Pressure Level, dB(A)
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20
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Time (Hrs)
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15:45
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23:15
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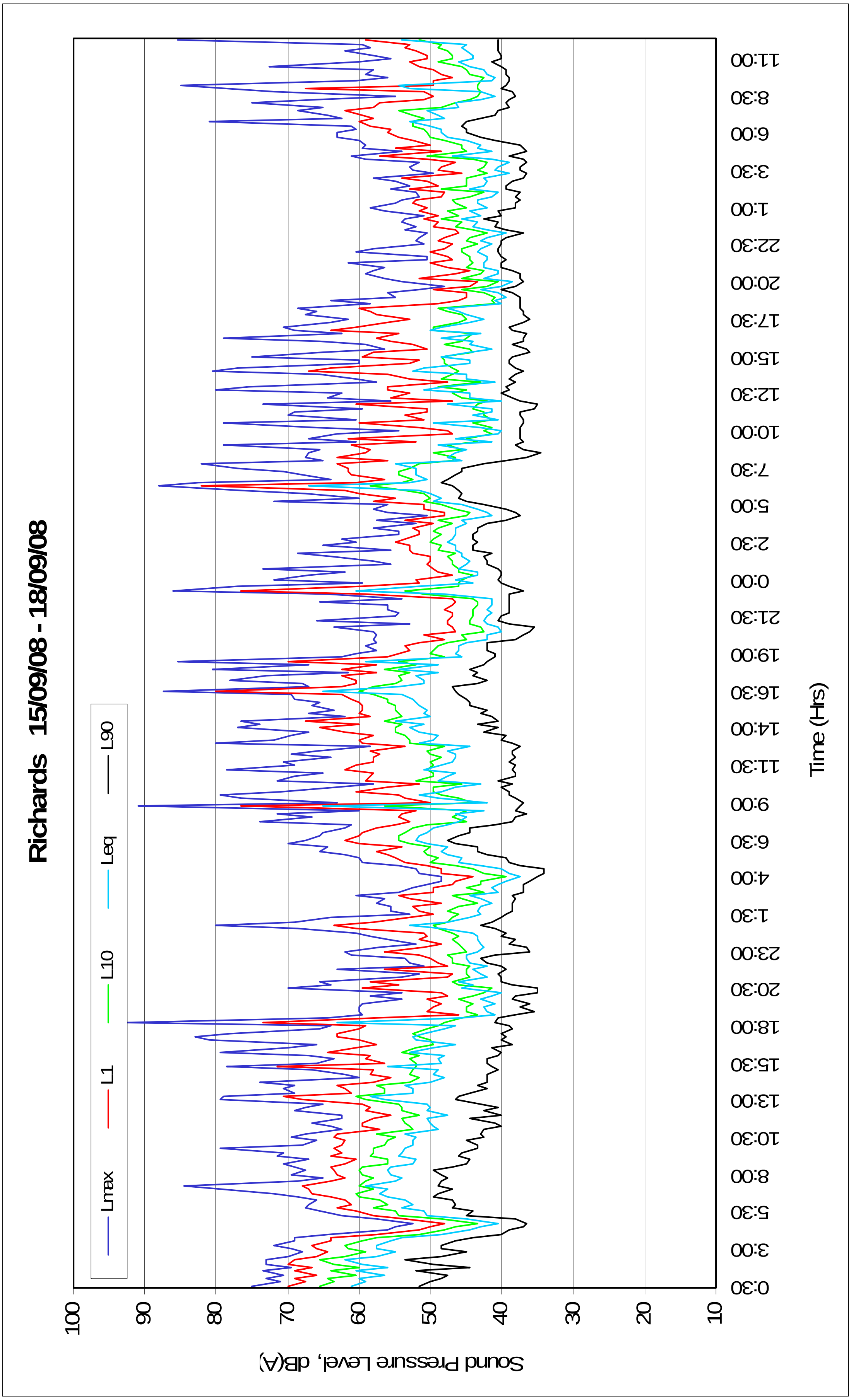
Richards 15/09/08 - 18/09/08
Lmax
L1
L10
Leq
L90
Sound Pressure Level, dB(A)
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Time (Hrs)
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