APPENDIX 4 :

SOIL SURVEY REPORTS

SOIL SURVEY DATA

extracted from

BELLBIRD SOUTH COAL PROJECT

ENVIRONMENTAL IMPACT STATEMENT

EPPS AND ASSOCIATES PTY LIMITED

NOVEMBER 1988

APPENDIX 2

Soil Profile Descriptions

2A.1 Duplex Soils

Coarse Duplex Soils Dy 3.22

Distribution

This soil is the most common within the study area. It occupies approximately 34.7ha of land with a widespread distribution.

Morphology

The A1 horizon ranges in depth to 170mm with a loamy sand or clayey sand texture. It is weakly structured with an earthy fabric and is reddish brown in colour. This horizon is hardsetting when dry.

The A2 horizon consists of a yellowish-red loamy sand. It has 6mm to 20mm sized conglomeratic material dispersed throughout. The A3 horizon below it also contains conglomerate. The A3 horizon is sometimes absent. These layers are found to depths of 350mm and are weakly structured with polyhedral peds.

The B horizon is a yellowish-red, sandy clay of moderate structure. Less than 2% conglomeratic material is dispersed throughout the horizon. It is moderately structured.

Erodibility

The coarse sandy nature of the A horizons and the texture contrast between the A and B horizons, together with the low permeability of the B horizon, means that this soil is highly susceptible to sheet and gully erosion when cleared.

Fine Duplex Soils Dr 3.42

Distribution

This soil type occupies 3.8ha of land and is found near to drainage lines.

Morphology

The A1 horizon is 140mm deep and has a loamy sand texture. It is weakly structured, has an earthy fabric and is hardsetting upon drying. It has a reddish-brown colour.

A sharp boundary divides the A1 from the bleached A2 horizon. The A2 horizon is a 60mm thick layer with a clayey, sand texture and has dispersed conglomeratic material throughout.

The B1 horizon is a reddish-brown, sandy clay with rough-faced peds and moderate structure. A sharp boundary separates the B1 and B2 horizons. The B2 is a yellowish-red, heavy clay. It has rough-faced peds and strong structure with conglomerate dispersed throughout. Permeability of this layer is low, occasionally causing mottling.

Erodibility

The coarse sandy nature of the upper horizons results in accelerated erosion. The texture contrast between the A and B horizons and the low permeability of the B horizon clay, mean that the soil is highly susceptible to sheet and gully erosion.

2A.2 Uniform Soils

Uniform shallow soils Uc 4.13

Distribution

This soil type occupies a 4.6ha strip of land aligned in a north-west south-east direction in the southern part of the proposed Rail Loop Site.

Morphology

The A1 horizon consists of a yellowish-red or reddish-grey, loamy sand. It is similar to the other A horizons in the area as it is weakly structured and has an earthy fabric. It varies from the others due to the presence of dispersed conglomeratic material.

Gravel is often found at the surface and the surface is hard-setting.

The A2 horizon is similar to the A1 horizon but has a bleached appearance and contains more conglomerate of larger average size. The A2 horizon occurs to depths of 200mm where a sharp boundary to the C horizon is located. This horizon consists of weakly weathered conglomerate.

Erodibility

This coarse textured soil is highly susceptible to sheet and gully erosion especially on slopes. When undisturbed it is stable, which is also true for other soils in the area.

Medium Depth Uniform Soils Uc 4.24

Distribution

This soil type occurs near drainage lines over an area of 4.1ha.

Morphology

The A horizon consists of a reddish brown, clayey sand to 270mm in depth. It has weak pedality, an earthy fabric and has a low consistence. The surface is loose.

The boundary between the A1 and A2 horizons is diffuse. The A2 horizon is a yellowish-red, clayey sand with weak pedality and a sandy fabric. It consists of sub-angular blocky peds 8mm in diameter. The A2 horizon occurs to 650mm depth.

The B horizon consists of a pale yellow, loamy sand with weak pedality. It has less than 2% dispersed conglomerate and comprises 10mm prismatic peds.

Erodibility

This soil type is highly susceptible to sheet and gully erosion. Its location near watercourses increases its susceptibility to erosion when disturbed.

Deep Uniform Soils Uc 4.21

Distribution

This soil type occupies 26.8ha of land adjacent to intermittent watercourses which flow in a northerly direction.

Morphology

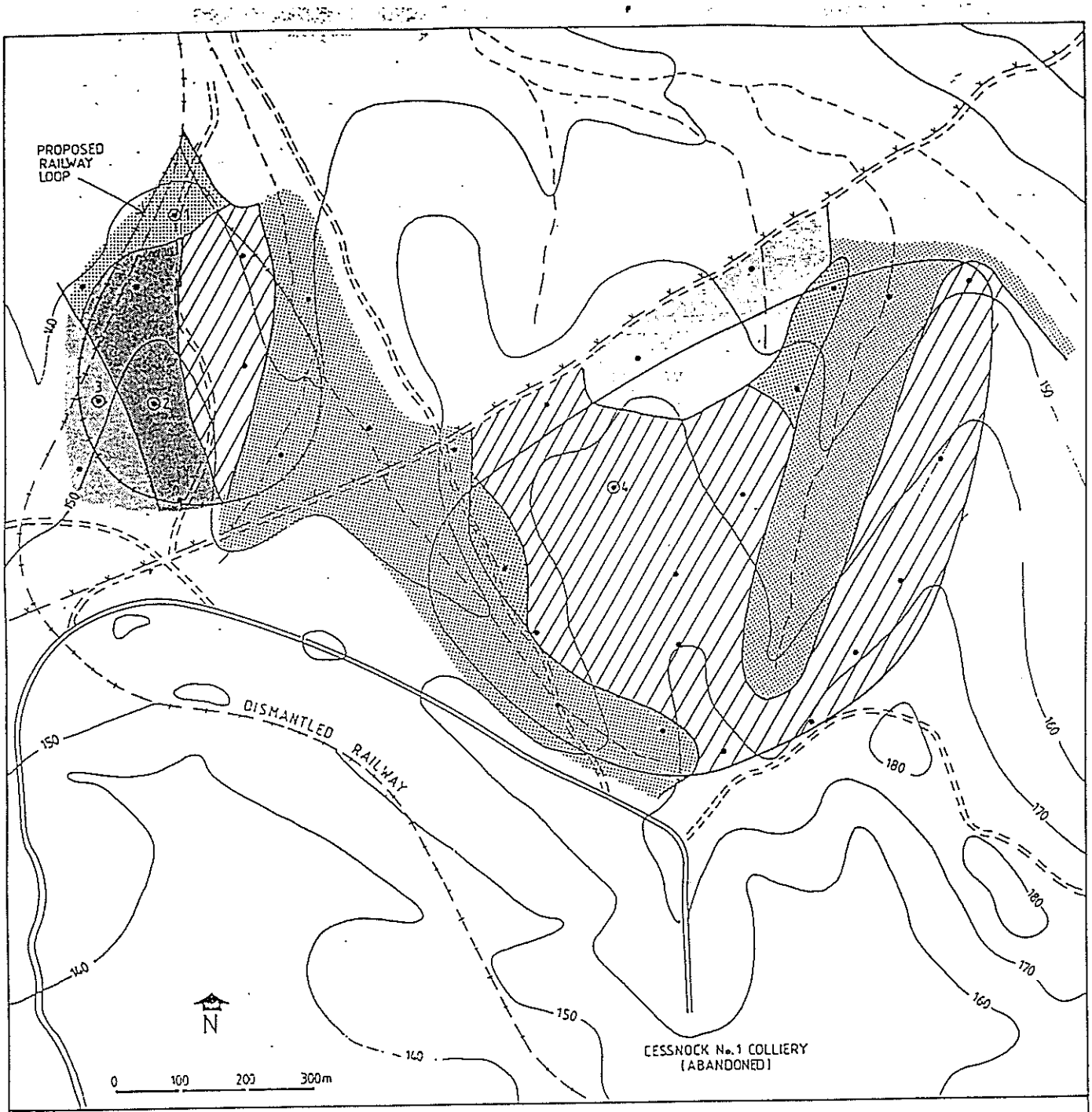
The A1 horizon is a dark, reddish-grey, loamy sand with weak structure and an earthy fabric. It occurs to a depth of 170mm.

The A2 horizon is a yellowish-red, loamy sand with similar characteristics to the A1 horizon.

It occurs to 900mm depth. A sharp boundary separates it from the B horizon which is a structureless yellow sand.

Erodibility

Similar to other soils in the area, the coarse nature of this soil results in a high susceptibility to sheet and gully erosion. Located adjacent to intermittent watercourses, it is likely to erode if disturbed.



LEGEND

- Coarse duplex soils Dy 3.22
- Fine duplex soils Dr 3.42
- Shallow uniform soils Uc 4.13
- Medium depth uniform soils Uc 4.24
- Deep uniform soils Uc 4.21
- • Survey site
- ⊙3 Soil sampling site
- —— Existing contours
- —·— Intermittent watercourses

SOUTHLAND COAL PTY LIMITED

BELLBIRD SOUTH PROJECT

SOIL DISTRIBUTION

FIGURE 1

APPENDIX 5 :

ENVIRONMENTAL IMPACT

EXISTING MINING OPERATIONS

HLA-Envirosciences Pty Limited
ACN 060 204 702
A subsidiary of Harding Lawson Australia Pty Limited
ACN 063 854 606

Prepared for:
THE NEWCASTLE WALLSEND COAL COMPANY

ENVIRONMENTAL IMPACT

EXISTING MINING OPERATIONS

ELLALONG COLLIERY

Prepared by:

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(Other offices in Sydney, Tamworth, Melbourne, Brisbane, Gladstone and Mackay)

6 MAY 1995

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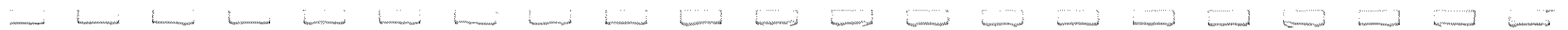


1.0 AIR QUALITY

Air quality is a major issue when assessing the environmental effects of developments. Air monitoring programmes are implemented to identify existing air quality in accordance with EPA recommended criteria. Such programmes indicate when dust suppression measures are required to assure that dust fallout does not reach a nuisance level.

To monitor atmospheric dust a system of dust deposition gauges and a high volume air sampler are located within and adjacent to the mine lease area. The current air monitoring programme was instigated in July 1991, when two dust deposition gauges were installed with a third dust deposition gauge being installed in May 1992. The high volume air sampler has been operational since October 1993. (Refer to **Figures 4.8** and **4.9** in **Volume 3** - monitoring locations).

Annual average dust deposition levels recorded during the period 1991-1994 are given in **Table A5.1**. **Table A5.2** shows the total suspended particulate results for the period October 1993 to September 1994.

A feature of underground mining to the relatively low dust emission rate compared with open cut mining operations. However, to ensure compliance with EPA atmospheric dust fallout criteria, it is necessary to implement an air monitoring programme. Dust deposition results indicate that the Pelton/Ellalong mining operation has had no affect on ambient air quality and has at no time been recorded to have exceeded the nominal EPA recommended guidelines of 4 g/m^2/month, as an annual average.

TABLE A5.1
DUST DEPOSITION RATES INSOLUBLE SOLIDS
(g/m^2/month)

Gauge No.	1991	1992	1993	1994
P1	1.0	0.9	0.61	0.5
P2	1.4	1.4	0.78	0.4
P3	-	0.9	0.78	0.5

Source: Pelton/Ellalong Colliery

The high volume air sampler is located at the perimeter of the mine site and records total suspended particulates over a 24 hour period on a six day cycle.

Two limits are established for total suspended particulates. The USEPA 24 hour maximum TSP level of (260 $\mu g/m^3$) and the nominal annual average of 90 $\mu g/m^3$. **Table A5.2** outlines the results for total suspended particulates, that have been recorded at the monitoring location.

TABLE A5.2
TOTAL SUSPENDED PARTICULATES ($\mu g/m^3$), PELTON/ELLALONG COLLIERY
OCTOBER 1993 to SEPTEMBER 1994

Month/Year	Total Suspended Particulates $\mu g/m^3$
October 1993	6
November 1993	26
December 1993	#
January 1994	#
February 1994	10
March 1994	13
April 1994	14
May 1994	23
June 1994	15
July 1994	19
August 1994	27
September 1994	31

Sample contaminated
Source: Pelton/Ellalong Colliery

The recorded levels are all well below the nominal annual average set by the EPA and no individual 24 hour recording has exceeded the USEPA limit of 260 $\mu g/m^3$. No result has exceeded the annual average standard of 90 $\mu g/m^3$.

2.0 SURFACE WATER QUALITY

2.1 HISTORICAL DATA

Historical water quality data, available from various sources, indicates that the Congewai Creek system generally contains water of good quality, with the water in the Black Creek system being more saline.

Water monitoring data, described below, are consistent with these historical observations.

2.2 1987, EPPS AND ASSOCIATES

In 1987, a water monitoring programme was set up to sample water at seven locations as shown in **Figure 4.7, Volume 3**. Of these locations, one (Site 7) is within the proposed Bellbird South mining area and three (Sites 1, 4 and 5) are within the Congewai Creek Catchment, as are two of the proposed washery reject emplacement areas.

Sampling was conducted at weekly intervals for six weeks, and thereafter on a monthly basis. The results of sampling for the first 12 months are reproduced in **Attachment 1** to this appendix. All samples were laboratory tested for pH, conductivity, total filterable residue and non-filterable residue. In the field, an estimate of water flow at each station was made, where applicable. Samples were also tested for a range of common ions (potassium, sodium, calcium, magnesium, chloride, sulphate and bicarbonate).

Results obtained indicated that all watercourses had very good quality water. Electrical conductivity and total dissolved solids were low. Congewai Creek had marginally better quality water than Quorrobolong Creek. Sodium and chlorine were the dominant ions and pH was slightly acidic (5.5 to 6.5). The unnamed tributary on which stations 4 and 5 were located contained water in which dissolved solids were lower and turbidity was higher. Station 5 was also slightly more acidic. There was no difference between the disused mine water dam at Cessnock No. 1 Colliery and the downstream watercourses.

2.3 CURRENT MONITORING PROGRAMME, PELTON/ELLALONG COLLIERY

Twenty four surface water monitoring sites are located within and adjacent to the mine lease area. A single licensed discharge point, No. 001, is located in Bellbird Creek downstream of the railway culvert at the gauging station. Discharge of mine water is limited to 2 ML/d. A Water Management Plan was completed in September 1994, and is described in **Section 5.2.8**. **Figures 4.8 and 4.9** (refer **Volume 3**) show the location of water monitoring stations.

Figure 1 in this appendix shows the location of water samples taken between June and November 1994.

Tables A5.3, A5.4 and A5.5 below show the surface water quality data at various locations as recorded in 1994.

Table A5.3 contains data from water sampling points within the Pelton/Ellalong Colliery surface infrastructure sites.

Table A5.4 provides results from samples taken during an exploration programme and from creeks in the Kalingo area.

Table A5.5 relates to water samples taken from a site in Bellbird township (W21) and sites downstream of Pelton Colliery, in the Cessnock area.

TABLE A5.3
WATER MONITORING STATIONS 1 TO 10,
1 JANUARY 1994 TO 31 DECEMBER 1994

Station No.	pH			Conductivity µS/cm			NFR mg/L			Filtrable Iron mg/L			TDS mg/L			Comments
	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	Max	Min	Av	
W1	8.7	7.4	8.2	12600	8200	10903	4	18	8	0.7	<0.1	n/a	11719	9000	9711	
W4	7.9	6.2	7.4	12400	7600	10683	130	3	39	40.0	<0.1	n/a	9024	11926	10091	
W5 (Pelton Main Dam)	8.5	7.7	8.1	10900	6800	9092	20	4	8.2	3.5	<0.1	n/a	9618	5146	8071	
W6			7.8			100			468			23.0			296	One reading only taken due to nil flow at other times
W7	No flow during reporting period															
W8	No flow during reporting period															
W9	7.9	7.3	7.7				31	4	11.5	12	0.3	2.3	9057	6423	7675	Six readings only take due to nil flow at other times
W10	No flow during reporting period															

Source : Pelton Colliery Annual Environmental Report, 1994
n/a = not applicable

TABLE A5.4
ADDITIONAL SURFACE WATER MONITORING RESULTS
JUNE - NOVEMBER 1994

Site Number	EC μs/cm	pH	TDS mg/L
Greenmount Lagoon (western side)	560	7.2	275
Kalingo Dam (East end of dam wall)	120	7.2	110
Quorrobolong creek (At Sandy Creek Road Bridge)	1480	6.6	745
DDH27 sump (some oil contaminants drill cuttings and additives)	1960	11.1	1140
Creek near DDH27	10500	8.1	6900
Kalingo Dam #	152	6.9	150

Source: Pelton/Ellalong Colliery

taken by HLA-Envirosciences November 1994

TABLE A5.5
ELECTRICAL CONDUCTIVITY - SURFACE WATER MONITORING SITES, 1994

Month	Average Monthly Conductivity μS/cm				
	W9	W21	W23	W24	W27
	Bellbird Creek			Black Creek	
July	No flow	6450	980	1846	940
August	No flow	4709	915	1552	879
September	No flow	3325	758	1780	940
October	No flow	6233	641	1555	977
November	No flow	665*	1241	1336**	823
December	No flow	486	1169	1520**	817

* flow on 2 days only
** flow on 4 days only

Source : Pelton/Ellalong Colliery

Table A5.3 indicates that pH levels at water monitoring stations W1, W4, W5, W6, W7, W8 and W9 are alkaline but generally at acceptable levels under the Clean Waters Act 1970. **Table A5.4** indicates similar results for a selection of other sites in or near the Pelton/Ellalong Colliery.

At one sample site, DDH27 sump, the water sampled was highly alkaline, probably due to the

presence of contaminants related to drilling operations.

Electrical conductivity at all monitoring stations where results were obtained, apart from site W6, was high, indicating high salinity. At the additional surface monitoring sites, in **Table A5.4** high electrical conductivities were also recorded except for samples taken from Greenmount Lagoon and Kalingo Dam. Average monthly figures for monitoring sites W21, W23, W24 and W27 (**Table A5.5**), all showed high electrical conductivities indicating that these waters are highly saline. These high salinities are reflected in the corresponding high Total Dissolved Solids figures.

Non-filterable residue figures presented in **Table A5.3** are low, except for water from site W4, where water flows onto the site from Wollombi Road.

3.0 GROUNDWATER QUALITY

Cessnock No. 1 Colliery was closed in 1961 and water allowed to accumulate in old workings. Prior to closure, water was continuously pumped from underground workings to the surface for disposal. The depth of the Cessnock No. 1 Shafts is 374 m. The current standing water level is 252 m below the ground surface, giving a depth of water in the shaft of 122 m.

In November 1994, samples of water were taken at various depths in the flooded shafts at Cessnock No. 1 Colliery. The analysis results are presented below in **Table A5.6**. These results indicate high salinity, due to high figures for electrical conductivity and total dissolved solids. The shaft water is alkaline but within or very close to acceptable limits.

TABLE A5.6
KALINGO SHAFT WATER SAMPLING DATA

Characteristic	Kalingo Upcast Shaft Surface	Kalingo Downcast Shaft Surface	Kalingo Downcast Shaft 270 m	Kalingo Downcast Shaft 290 m	Kalingo Downcast Shaft 310 m
Acidity pH 3.7	Nil	Nil	NA	NA	NA
Acidity pH 8.3	Nil	Nil	NA	NA	NA
Alkalinity $CaCO_3$	68	194	NA	NA	NA
Alkalinity HCO_3	642	770	NA	NA	NA
Alkalinity OH	Nil	Nil	NA	NA	NA
Ammonia - N	0.16	0.05	NA	NA	NA
Arsenic	0.007	0.005	NA	NA	NA
Calcium as $CaCO_3$	26.5	20.2	NA	NA	NA
Chlorides	455	850	NA	NA	NA
Conductivity μS/cm	3,350	4,820	4,800	4,770	4,790
Copper	0.03	0.01	NA	NA	NA
Fluorides	0.62	0.72	NA	NA	NA
Iron - Total	0.35	0.98	NA	NA	NA
Iron - Filtered	0.35	0.88	NA	NA	NA
Langelier Index	NA	NA	NA	NA	NA
Lead	0.08	0.04	NA	NA	NA
Magnesium as $CaCO_3$	33.0	27.1	NA	NA	NA
Manganese	0.03	<0.01	NA	NA	NA
Mercury	0.001	<0.001	NA	NA	NA
Nitrate - N	0.51	0.22	NA	NA	NA
Nitrite - N	<0.01	<0.01	NA	NA	NA
Oil and Grease	3	2	NA	NA	NA
Organic Nitrogen	Nil	0.29	NA	NA	NA
PCB	ND	ND	NA	NA	NA
Phenols	<0.001	<0.001	NA	NA	NA
Potassium	7.96	11.0	NA	NA	NA
Sodium	775	1,100	NA	NA	NA
Sulphates	416	NA	NA	NA	NA
Sulphides	0.1	<0.1	NA	NA	NA
Total Dissolved Solids	2,120	2,830	NA	NA	NA
Total Hardness	59.5	47.3	NA	NA	NA
Total Phosphorus	0.06	0.05	NA	NA	NA
Total Suspended Solids	1	2	NA	NA	NA
Zinc	0.07	0.10	NA	NA	NA
pH	8.5	8.6	NA	NA	NA

NA = Not Applicable ND = Not Detected All analyses in mg/L unless noted. pH unitless

A5.9

Samples taken from four underground sites in June-July 1994 are reported in **Table 5.7**. High electrical conductivity and high total dissolved solids indicate high salinity. pH is slightly to highly acidic. Note that sampling took place on a single monitoring run, hence results of these samples should not be taken as representative samples of inflows.

Figure 2 indicates the locations of additional underground monitoring sites. **Table 5.8** presents the analysis of samples taken from these locations in May 1995.

For underground water sampled, pH is acidic to highly acidic. Electrical conductivity , total dissolved solids and sulfate are high.

TABLE A5.7
WATER MONITORING RESULTS
JUNE - JULY 1994

Site Number	EC μs/cm	pH	TDS mg/L
LWI2 Development Heading	13400	6.9	9700
1 East	12800	6.7	11050
16 Cut through	11500	4.7	10300
Pelton Rib	9600	6.2	No Result

TABLE A5.8
ELLALONG WATER QUALITY MONITORING, MAY 1995

Sample	1	2	3	4	5	6	7	8	9
pH	5.1	5.9	6.4	7.1	6.4	6.9	7.6	7.4	2.7
Acidity to pH 3.7									730
Acidity to pH 8.3	350	460	250	◆	◆	90	130	140	2,650
Alkalinity due to CO_3									
Alkalinity due to HCO_3	60	80	140	640	200	540	4,050	1,800	
Alkalinity due to OH									
Chloride	1,530	940	975	815	850	880	1,170	1,150	960
Sulphate	3,380	5,600	5,230	3,980	6,770	7,360	2,520	3,920	9,910
Sodium	1,880	2,020	2,220	2,260	2,780	3,600	3,340	2,800	2,520
Potassium	60	68	58	40	31	33	86	80	42
Iron (total)	130	205	160	◆	◆	35	1.4	49	1,640
Calcium (as Ca)	180	345	305	60	135	175	52	130	410
Magnesium (as Mg)	155	300	245	37	100	145	37	105	205
Total Hardness (Ca,Mg)	1,080	2,100	1,760	300	750	1,040	280	760	1,860
Total Dissolved Solids	7,550	9,750	9,500	8,600	10,900	12,800	9,800	9,500	17,750
Conductivity (μS/cm)	9,900	11,100	11,200	10,500	13,300	15,000	13,100	12,300	15,500

◆ - Denotes insufficient sample for analysis

All analysis in mg/L unless noted. pH unitless

ATTACHMENT 1

MONITORING RESULTS, EPPS AND ASSOCIATES, 1988

Water Quality Monitoring Results

TABLE 3A1

pH

Sample Location	No of Samples	Median	50% Range	Total Range
1	17	6.3	6.1 – 6.7	5.8 – 7.1
2	9	6.1	–	5.7 – 6.6
3	9	6.7	–	6.1 – 7.4
4	13	6.1	5.5 – 6.8	5.1 – 7.1
5	7	5.8	–	5.5 – 6.6
6	9	6.0	–	5.4 – 7.4
7	17	5.9	5.7 – 6.3	5.5 – 7.0

TABLE 3A2

CONDUCTIVITY (µmhos/cm)

Sample Location	No of Samples	Median	50% Range	Total Range
1	17	370	330 – 480	145 – 610
2	9	520	–	145 – 950
3	9	1000	–	240 – 1700
4	13	200	125 – 910	104 – 2900
5	7	165	–	98 – 185
6	9	410	–	200 – 710
7	17	140	120 – 145	71 – 160

TABLE 3A3

TOTAL FILTERABLE RESIDUE (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	17	230	200 – 270	170 – 350
2	9	280	–	116 – 550
3	9	575	–	215 – 1065
4	13	190	115 – 600	90 – 1570
5	7	160	–	130 – 295
6	9	290	–	145 – 450
7	17	100	90 – 120	70 – 140

TABLE 3A4

NON-FILTERABLE RESIDUE (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	17	2	1 – 9	1 – 300
2	9	12	–	5 – 35
3	9	15	–	3 – 3110
4	13	50	20 – 110	5 – 205
5	7	17	–	13 – 30
6	7	30	–	7 – 40
7	17	6	4 – 28	2 – 475

TABLE 3A5

TURBIDITY (NTU)

Sample Location	No of Samples	Median	50% Range	Total Range
1	11	5	5 – 5	1 – 13
2	5	13	–	3 – 33
3	4	8.5	–	2 – 34
4	8	150	–	3 – 350
5	3	35	–	1 – 62
6	4	13	–	1 – 45
7	11	10	5 – 20	3 – 45

Note: Lowest detectable Range varies up to June 1987. 5 was reported as the lowest detectable limit.

TABLE 3A6

SODIUM (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	11	48	43 – 58	17 – 61
2	5	61	–	17 – 70
3	4	170	–	25 – 204
4	8	17	–	10 – 102
5	3	14	–	10 – 21
6	4	32.5	–	23 – 93
7	11	14	12 – 16	11 – 22

TABLE 3A7

POTASSIUM (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	11	2.7	2.5 – 3.1	2.3 – 4.5
2	5	4.5	–	2.3 – 7.2
3	4	5.5	–	3.1 – 6.4
4	8	4.3	–	3.3 – 9.0
5	3	5.3	–	1.6 – 6.1
6	4	5.4	–	5.0 – 6.4
7	11	4.0	3.3 – 4.5	2.2 – 4.6

TABLE 3A8

CALCIUM (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	11	9.2	8.2 – 11.0	4.5 – 13.0
2	5	9.6	–	4.5 – 14.0
3	4	29	–	16 – 41
4	8	3.5	–	2.2 – 10
5	3	4.2	–	4.0 – 6.3
6	4	8.4	–	4.5 – 17.0
7	11	4.6	3.7 – 5.6	2.8 – 6.8

TABLE 3A9

MAGNESIUM (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	11	9.4	7.8 – 12.0	2.9 – 14.0
2	5	8.4	–	2.9 – 13.0
3	4	24	–	4.9 – 39
4	8	2.7	–	2.0 – 7.0
5	3	5.0	–	2.5 – 5.2
6	4	6.1	–	5.0 – 12.0
7	11	3.1	2.7 – 3.3	2.0 – 4.6

TABLE 3A10

CHLORIDE (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	11	82	78 – 90	45 – 110
2	5	95	–	20 – 115
3	4	290	–	50 – 370
4	8	14.5	–	3.5 – 65
5	3	20	–	20 – 30
6	4	55	–	35 – 160
7	11	20	14 – 21	7 – 30

TABLE 3A11

BICARBONATE (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	11	39	24 – 55	18 – 61
2	5	31	–	18 – 61
3	4	104	–	49 – 128
4	8	25	–	17 – 225
5	3	25	–	20 – 43
6	4	49	–	18 – 73
7	11	37	31 – 43	18 – 45

TABLE 3A12

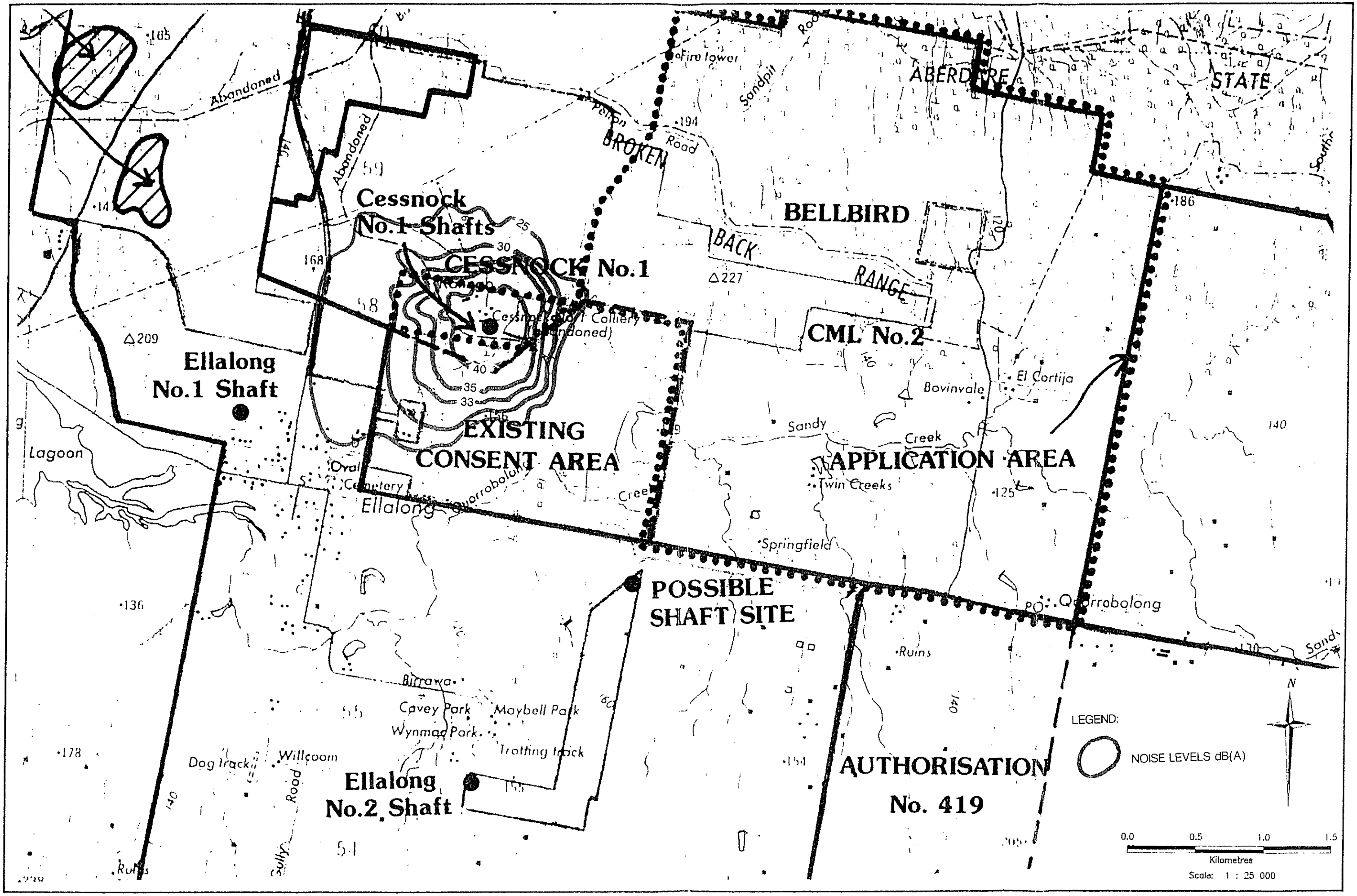
SULPHATE (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	11	20	17 – 25	15 – 27
2	5	20	–	10 – 73
3	4	82	–	25 – 85
4	8	20	–	9 – 70
5	3	20	–	10 – 25
6	4	23	–	12 – 35
7	11	10	7 – 11	2 – 25

TABLE 3A13

TOTAL ALKALINITY (mg/l)

Sample Location	No of Samples	Median	50% Range	Total Range
1	11	32	20 – 45	15 – 50
2	5	25	–	15 – 50
3	4	85	–	40 – 105
4	8	20	–	14 – 185
5	3	20	–	16 – 35
6	4	40	–	15 – 60
7	11	30	25 – 35	15 – 37

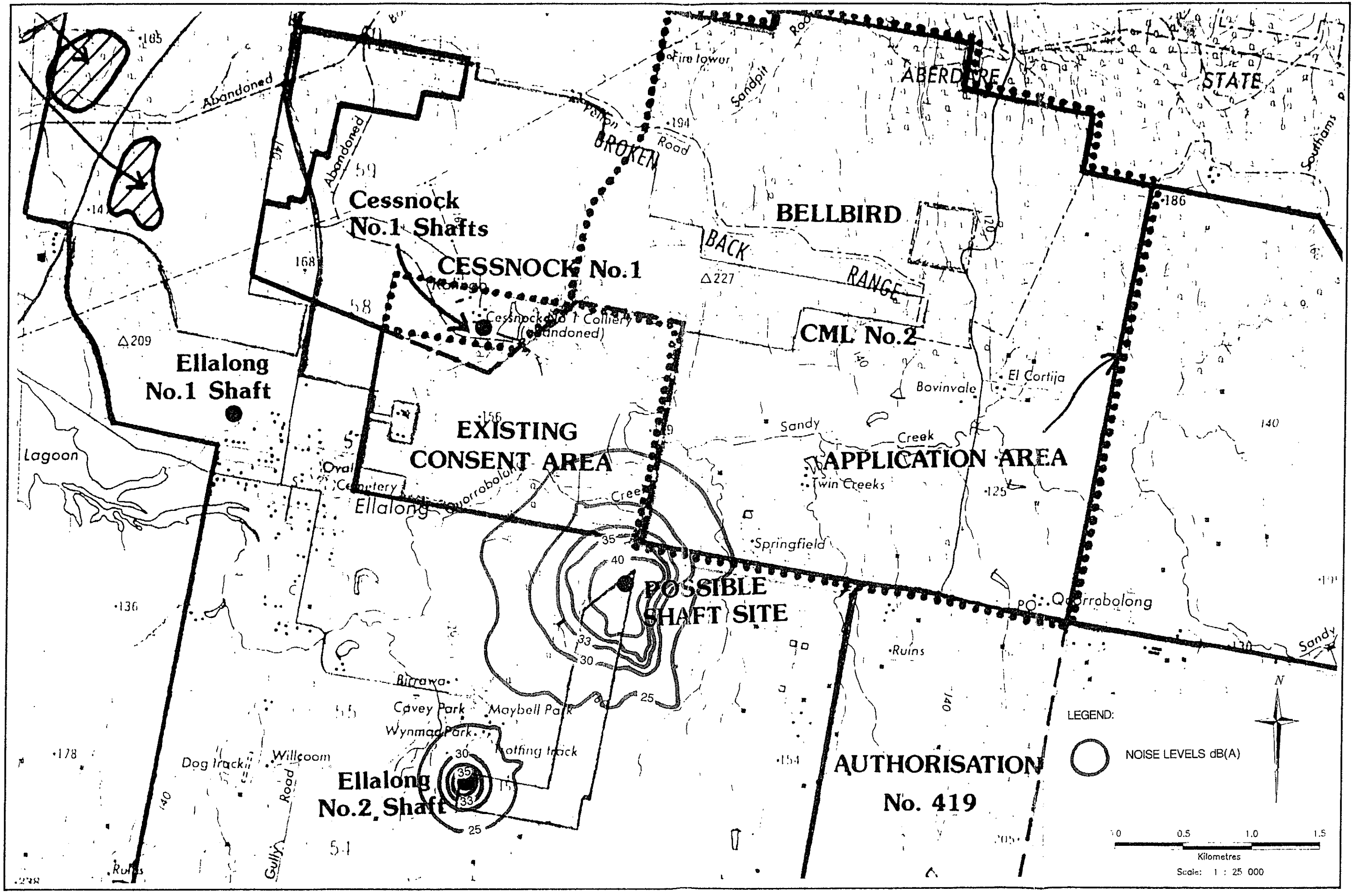


HLA-ENVIROSCIENCES PTY LIMITED

PROJECT No.: F1310

PREDICTED FAN NOISE CONTOURS
CESSNOCK No. 1

FIG. 2



HLA-ENVIROSCIENCES PTY LIMITED

PROJECT No.: F1210

PREDICTED FAN NOISE CONTOURS
SANDY CREEK ROAD

FIG. 3

Construction at the Sandy Creek road site would be similar to that described for Cessnock No. 1.

Coal production levels will not change as a result of the proposed extension. Therefore washery operation and rail traffic movements are unaffected by the proposal, for this reason these noise sources are not specifically addressed in this assessment. All noise level calculations include allowance for the cumulative effect of existing and proposed mining activities.

No change in workforce number is anticipated as a result of the proposed extension. Therefore no change will occur in vehicular movements associated with each shift change.

The traffic route for these vehicular movements will change if manriding moves from the No. 2 shaft to a Cessnock No. 1 shaft. Traffic from Cessnock and Pelton would not need to pass through Ellalong. Traffic from Paxton and Ellalong would exit Ellalong via Rugby Street rather than Sandy Creek Street. Traffic from Sandy Creek Road would continue on through Ellalong to Cessnock No. 1. Additionally, any traffic movement from Pelton Washery to the manriding shaft will not need to pass through Ellalong as is the present situation.

The noise sources / activities that are considered in this assessment are:

- A ventilation shaft fan proposed for location at the Cessnock No. 1 site.
- A man riding shaft, also proposed for the Cessnock No. 1 site.
- A ventilation shaft fan proposed for location near Sandy Creek road.
- Washery reject emplacement at three proposed emplacement sites.
- Construction activity and mine dewatering at the proposed Cessnock No. 1 site.
- Construction activity at the proposed Sandy Creek Road site.

3.0 CRITERIA

Cessnock City Council and the Environment Protection Authority (EPA) both have responsibility for approval and control of noise from industrial or mining activities in the Pelton / Ellalong area.

Development approval for a proposed activity is ultimately the responsibility of Cessnock City Council, however, council usually adopt any EPA requirements. These requirements are contained in the EPA's "Environmental Noise Control Manual" (ENCM).

Both Council and the EPA aim to preserve existing background levels at noise sensitive receptors. In certain circumstances the EPA will allow noise emission from a new development to exceed the existing background by 5 dB(A). This exceedence is allowable (where applicable) if the noise is not tonal or impulsive.

Different aspects of the proposal are governed by different criteria. The majority of operations relate to planning levels based on existing background levels. However, it is considered that intermittent truck movements should be related to the EPA's intermittent or low traffic flow criteria. The EPA also have criteria limits that relate specifically to short-term construction activities.

NWCC has a current EPA licence (No. 000416) stating noise emission limits of L_{AMAX} 57 dB(A) daytime and 47 dB(A) night-time at any residence in the vicinity of the Wollombi Road open cut coal mine. This licence does not appear to specify any noise level limits for operation of the Pelton washery and associated equipment.

Previous recent issues of this Licence contained a noise level limit of 40 dB(A) L_{10} at any residence in the vicinity of the premises. In these licences the premises referred to (apparently) the Pelton washery and associated equipment as well as the No. 1 shaft ventilation fan near Hunter Street.

All recent issues of the licence specifically referred to the O'Hearn residence, the Pyne residence and Pelton Village as residences in the vicinity of the premises. The current licence also specifically refers to these residences.

3.1 OPERATING NOISE CRITERIA

A planning level for noise sensitive receptors is determined by the relationship between existing background noise levels and the recommended acceptable or extreme levels. The planning level is to either prevent the acceptable or extreme limit being exceeded, or to limit the increase in noise level to 5 dB(A) above background.

The procedure for planning level determination is described in chapters 20 and 21 of the ENCM. Tables 20-1 and 21-1 of these chapters are reproduced below.

TABLE 20-1
RECOMMENDED PLANNING LEVELS

Existing background noise level at the most sensitive point in an affected residential area	Recommended maximum noise level, for planning approval purposes, at that point as a result of a proposed new noise source
A. Background is above relevant acceptable level (from Chapter 21)	• preferably, set maximum planning level 10 dB(A) or more below acceptable level • at least, set maximum planning level 10 dB(A) below existing background level
B. Background is at acceptable level	• set maximum planning level 10 dB(A) below acceptable level
C. Background is below acceptable level by - 1 dB(A) 2 dB(A) 3 dB(A) 4 dB(A) 5 dB(A) 6 dB(A) or more	• set maximum planning level 9 dB(A) below acceptable level 5 dB(A) below acceptable level 3 dB(A) below acceptable level 2 dB(A) below acceptable level 2 dB(A) below acceptable level 5 dB(A) above acceptable level

TABLE 21-1
RECOMMENDED OUTDOOR BACKGROUND NOISE LEVELS

ROW	Zoning of noise receiver area	Predominant land-use of receiver area	Time period	L_{90} background noise level dB(A)	
				Acceptable Limit	Extreme Limit
(a)	Rural (approx R1 AS1055)	Residential, church, hospital	Day Night	45 35	50 40
(b)	Residential area (approx R1-R2 AS1055)	Residential, church, hospital, school	Day Night	45 35	50 40
(c)		Shop or commercial office	Day Night	50 40	55 45
(d)		Light industry	Day Night	55 45	60 50
(e)	Residential area on a busy road or near an industrial area or commercial area (approx R2-R3 AS1055)	Residential, church, hospital, school	Day Night	50 40	55 45
(f)		Shop or commercial office	Day Night	55 45	60 50
(g)		Light industry	Day Night	60 50	65 55
(h)	Industrial area (approx R4-R6 AS1055)	Residential, church, hospital, school	Day Night	55 45	60 50
(i)		Shop or commercial office	Day Night	60 50	65 55
(j)		Factory office of factory	Day Night	65 65	70 70
(k)	Passive recreation area	Picnic grounds, public beaches, bush walks, public gardens, etc	Day Night	40 40	50 50

NOTE: From Monday to Saturday, daytime is defined as 7.00 am to 10.00 pm and night time is 10.00 pm to 7.00 am. On Sundays and Public Holidays daytime is 8.00 am to 10.00 pm and night time is 10.00 pm to 8.00 am.

Planning levels derived as per EPA procedure are provided in **Table 1.**

TABLE 1
RECOMMENDED PLANNING LEVELS

Area	Background Level		Planning Level	
	Day	Night	Day	Night
Ellalong	30	30	35	33
Bimbadeen Road	31	33	36	30
Bellbird	35	31	40	33
Sandy Creek Road	30	30	35	33
Paxton*	30	30	35	33

*Assumed Levels

Background levels presented in **Table 1** have been sourced by data logger monitoring. The methodology and further details about this monitoring are in subsequent sections of this report.

3.2 INTERMITTENT TRAFFIC NOISE CRITERIA

EPA criteria limits for intermittent traffic flow noise levels are specified in chapter 157 of the ENCM. For a new development the criterion limit is an L_{AeqT} of 55 dB(A).

3.3 CONSTRUCTION NOISE CRITERIA

Construction noise limits are set as an allowable accedence above background noise level. The allowable accedence is related to the construction activity duration.

Chapter 171 of the ENCM also specifies time restriction for construction activity which are:

- Monday to Friday, 7.00 a.m. to 6.00 p.m.
- Saturday, 7.00 a.m. to 1.00 p.m. if inaudible on residential premises, otherwise: 8.00 a.m. to 1.00 p.m.
- No construction work to take place on Sundays or Public Holidays.

The level restrictions are:

- Construction period of four weeks and under, construction noise (L_{10}) must not exceed the background level by more than 20 dB(A).
- Construction period greater than four weeks and not exceeding 26 weeks, construction noise (L_{10}) must not exceed the background level by more than 10 dB(A).

4.0 METHODOLOGY

4.1 BACKGROUND NOISE LEVEL SURVEYS

The ambient noise level was determined for areas surrounding the proposal ventilation shaft fans and reject emplacement sites. A summary is provided in **Section 3.0** of this report. The monitoring locations are shown on **Figure 1**.

Survey procedures were as per the latest EPA requirements and according to the guidelines of AS1055 "Acoustics - Description and measurement of environmental noise".

The instruments used for this monitoring were sound logging meters with calibration checked using a Bruel Kjaer Model 4230 Calibrator. Data taken for each sampling period consist of (amongst others) L_{90} and L_{10} levels. The L_n designation refers to that level in dB(A) which is exceeded for n percentage of the sampling period. The "background" noise level is taken to be the L_{90} level. The L_{10} level is considered to represent the "average maximum" noise level.

Noise data was then statistically summarised in accordance with the EPA's interim policy on background noise measurement. A copy of the policy is not specific in defining the "Assigned background noise level" except to say the background noise level is "the lowest repeatable 90th percentile noise level..." The EPA have verbally advised the "lowest repeatable" level to be the 90th percentile value of the 90th percentile noise levels.

Background data collected over period of years at the O'Hearn residence was made available by NWCC. This data was collected as part of NWCC's monitoring programme and represents the acoustic climate of the Bimbadeen Road area.

4.2 ACOUSTIC POWER LEVELS OF NOISE SOURCES

To calculate received noise levels at the nearest noise sensitive receptors, the acoustic power level (L_w) of noise emitting from the plant proposed for the development must be known.

Plant currently operated by NWCC (or similar) will be used for the proposed mine extension. Noise level measurements were made and the L_w determined for major noise emitting plant.

Procedures followed to determine the plants L_w were as per AS1217.7 - 1985 "Acoustics - Determination of sound power levels of noise sources. Part 7 - Survey method". The instrument used was a RION NA29E Type 1 Octave Band Analyser. Calibration was checked using a Bruel & Kjaer 4130 Acoustic Calibrator.

The Hunter Street ventilation shaft fan L_w was sourced from a Richard Heggie Associates Pty Ltd report, 823-R1.

Acoustic power levels used in calculations are shown in **Table 2.**

TABLE 2
ACOUSTIC POWER LEVELS

Source	L_w dB(A)	Linear Octave Band Spectra							
		63	125	250	500	1k	2k	4k	8k
A	102	120	114	104	92	91	87	84	74
B	84	89	87	91	79	72	62	50	39
C	109	95	99	104	107	104	103	98	91
D	106	106	110	109	103	101	95	90	83
E	103	107	101	97	100	99	96	89	83

Key to Sources:
A. Ventilation shaft fans.
B. Shaft winder.
C. Vibrating roller (Multipac).
D. Dozer (Fiat Allis 14B).
E. 25 tonne highway truck.

4.3 CALCULATION OF RECEIVED NOISE LEVELS

Calculation of received noise levels from the reject emplacement areas and ventilation shaft fans has been conducted using the EPA approved RTA-ENM noise model. This software calculates attenuation due to directivity, distance, barrier, air absorption, meteorological and ground effects. For the purpose of this assessment, neutral atmospheric conditions have been assumed. As a conservative measure, meteorological conditions most conducive to noise propagation have been modelled i.e. 10°C temperature and 90% relative humidity.

Modelling of ventilation shaft fan noise during temperature inversions and down wind conditions has also been done to provide an indication of maximum possible noise levels. These results should be considered as indicative only. They represent possible short term impacts. These results are provided as information but are generally not used for comparison with planning levels to determine a development's compliance with planning level limits.

Results have been provided in the form of a received sound pressure level (SPL) and spectrum for each source as well as a combined total. The combined total SPL received at the nearest residence can be compared to the planning level to determine if any impact occurs. Also provided as **Figures 2** and **3** are noise contour maps for operation of ventilation shaft fans at the Cessnock No. 1 and Sandy Creek Road sites.

The received noise levels calculated for highway trucks provides the L_{max} value for the intermittent traffic noise calculation (see **Section 4.4** of this report).

Table 3 provides a list of receptors considered in this assessment. The table also identifies the relevant mining operation nearest to each receptor.

TABLE 3
NEAREST NOISE SENSITIVE RECEPTORS

Proposed Noise Generating Activity / Operation	Nearest Receptor or Area
Cessnock No. 1 ventilation shaft fans and shaft winder.	Glennie Street, Ellalong. (A)
Sandy Creek Road ventilation shaft fans.	Lot 5 Sandy Creek Road, Ellalong. (B)
Reject emplacement area 1, eastern most activity.	Kendall (C) and Doyle (D) Street, Bellbird.
Reject emplacement area 1, northern most activity.	Bimbadeen Road, Hamilton residence. (E)
Reject emplacement area 1, western most activity.	Bimbadeen Road, O'Hearn residence. (F)
Reject emplacement area 3.	Paxton Road, Paxton. (G)
Reject emplacement area 4.	Wollombi Road, Paxton (H)

4.4 CALCULATION OF INTERMITTENT TRUCK NOISE LEVELS

Intermittent traffic/truck noise levels are calculation according to the following formula.

$$L_{eq}, T = 10 \log \frac{1}{T} (ND \times 10^{\wedge}(L_{max}/10) + (T - ND) \times 10^{\wedge}(L_b/10))$$

where:

L_{max}	=	maximum received truck noise.
L_b	=	background noise level.
T	=	time period duration in minutes.
D	=	duration of truck noise in minutes.
N	=	number of truck measurements in time period.

L_{max} has been calculated for each receptor using the ENM noise model, background noise level (L_b) are as per those shown in **Table 1** of this report.

The L_{eq}, T has been calculated for a 60 minute period as washery operations are continuous and therefore each hours operations will be the same on average. From information supplied by NWCC the number of trucks per hour (N) has been calculated as two. A conservative 5 minutes (D) has been used in calculation as the time each truck generates L_{max} noise levels when unloading reject material.

4.5 DETERMINATION OF CONSTRUCTION L_w LIMITS

Modelling of ventilation shaft fan noise levels at the nearest receptors provides a total acoustic loss between source and receptor. This loss will be that applicable when construction occurs on the same site.

Consequently it is possible to simply add this loss to the allowable received construction noise level (based on existing background and construction period duration) to arrive at a maximum acoustic power level limit.

5.0 RESULTS

5.1 BACKGROUND NOISE LEVEL SURVEY RESULTS

Tables 4 and **5** provide a summary of monitoring results.

TABLE 4
BACKGROUND NOISE LEVEL SURVEY, DAYTIME RESULTS

Location	L_n percentile	Average dB(A)	Maximum dB(A)	Minimum dB(A)	Lowest repeated dB(A)
1	L_{10} L_{90}	44 35	72 54	31 27	38 29*
2	L_{10} L_{90}	46 32	56 48	33 27	40 28*
3	L_{10} L_{90}	46 39	63 60	38 32	42 35

*Below 30 dB(A), therefore the background noise level for this location can be considered as 30 dB(A) in accordance with page 20-2 of the ENCM.

The monitoring locations listed in **Tables 4** and **5** are as follows:
1. 5 Glennie Street, Ellalong.
2. Lot 3 Sandy Creek Road, Ellalong.
3. 79 Kendall Street, Bellbird.

TABLE 5
BACKGROUND NOISE LEVEL SURVEY NIGHT-TIME RESULTS

Location	L_n percentile	Average dB(A)	Maximum dB(A)	Minimum dB(A)	Lowest repeated dB(A)
1	L_{10} L_{90}	38 30	71 46	26 25	29 26*
2	L_{10} L_{90}	37 28	57 35	28 26	30 27*
3	L_{10} L_{90}	42 36	58 46	32 29	36 31

*Below 30 dB(A), therefore the background noise level for this location can be considered as 30 dB(A) in accordance with page 20-2 of the ENCM.

The monitoring locations listed in **Tables 4** and **5** are as follows:
1. 5 Glennie Street, Ellalong.
2. Lot 3 Sandy Creek Road, Ellalong.
3. 79 Kendall Street, Bellbird.

5.2 RECEIVED NOISE LEVELS FROM REJECT EMPLACEMENT AREAS AND VENTILATION SHAFT FANS

A sound pressure level (SPL) in dB(A) has been calculated (neutral atmospheric conditions) for each receptor as listed in **Table 3**. Results obtained are shown in **Table 6**.

TABLE 6
RECEIVED NOISE LEVELS

Receptor	SPL dB(A)	Linear Octave Band Spectra							
		63	125	250	500	1k	2k	4k	8k
A	29.5	49	37	33	25	21	14	1	0
B	35.1	57	46	36	27	24	19	11	0
C	30.8	28	26	25	32	24	19	5	0
D	42.4	27	27	29	41	39	34	22	0
E	35.0	27	27	36	34	30	25	10	0
F	40.1	30	29	32	41	34	32	20	0
G	22.9	22	19	15	23	20	9	0	0
H	35.3	24	23	17	27	32	31	11	0

The results presented in **Table 6** for receptors C through to H are the SPL's received from operation of the vibrating roller only. Operation of the dozer results in lower SPLs. A combined SPL is not provided as the plant items operate on separate days.

Tables 7 and **8** provide indicative results for fan noise receptors located downwind (3 m/sec) or during inversion conditions (3^{o}C/100 m).

TABLE 7 DOWNWIND NOISE LEVELS									
Receptor	SPL dB(A)	Linear Octave Band Spectra							
		63	125	250	500	1k	2k	4k	8k
A	37.8	59	43	35	35	31	21	9	0
B	38.6	61	47	34	33	32	23	16	0

TABLE 8 INVERSION NOISE LEVELS									
Receptor	SPL dB(A)	Linear Octave Band Spectra							
		63	125	250	500	1k	2k	4k	8k
A	33.0	55	41	35	27	23	16	3	0
B	35.7	58	46	36	28	26	20	12	0

5.3 INTERMITTENT TRUCK NOISE LEVELS

Using the formula described in **Section 4.4** of this report, intermittent truck noise levels were calculated. Results are shown in **Table 9.**

TABLE 9 INTERMITTENT TRUCK NOISE LEVELS		
Receptor	L_{AMAX}	L_{AEQ}
C	25	31.2
D	36.5	31.5
E	29	31
F	36	31.3
G	17.8	30.5
H	29.5	30

5.4 CONSTRUCTION NOISE LEVEL LIMITS

Following the procedures specified in **Section 4.5** of this report, construction noise L_w limits have been determined. Results are shown in **Table 10.**

TABLE 10
CONSTRUCTION L_w LIMITS

Site	dB(A) L_w Limit For Construction Period In Weeks	
	0 To 4	4 To 26
1	122	112
2	117	107

Key To Sites:
1. Cessnock No. 1
2. Sandy Creek Road

6.0 DISCUSSION

6.1 VENTILATION SHAFT FAN WITH SHAFT WINDER OPERATING AND CONSTRUCTION NOISE LEVEL IMPACT

Results presented in **Section 5.2** of this report show the proposed ventilation shaft fans and shaft winder for the Cessnock No. 1 site do not generate noise levels in excess of planning limits.

The ventilation shaft fans proposed for the Sandy Creek Road site result in a 2.1 dB(A) exceedence at the nearest residence during neutral atmospheric conditions, and up to 5.6 dB(A) exceedence during adverse meteorological conditions.

Calculation of these results was based on the noise emission levels from the existing Hunter Street fans. For a new installation at the Sandy Creek Road site, scope exists for silencing the fans.

It is recommended that the fan arrangement chosen for the Sandy Creek Road site should have a maximum possible L_w of 100 dB(A). Maximum possible is stated as noise emissions from fans can change dependent on fan loadings.

The shaft winder acoustic power level is 16 dB(A) less than the ventilation shaft fan L_w and did not contribute to the received total at Glennie Street, Ellalong (Receptor A).

No impacts are predicted for construction noise at the Cessnock No. 1 and Sandy Creek Road sites provided the L_w limits specified in **Section 5.4** of this report are adhered to.

6.2 EMPLACEMENT AREA NOISE LEVEL IMPACTS

A comparison of **Section 5.2** results and the planning levels described in **Section 3.1** is provided in **Table 11**.

TABLE 11
PREDICTED NOISE LEVEL EXCEEDENCES

Receptor	Received SPL dB(A)	Planning Level dB(A)	Accedence dB(A)
C	30.8	40	NIL
D	42.4	40	2.4
E	35.0	36	NIL
F	40.1	36	4.1
G	22.9	35	NIL
H	35.3	35	0.3

No impacts are predicted for the spreading and compaction of reject material except for Wollombi Road, Bellbird and Bimbadeen Road (O'Hearn residence). The impacts predicted for those receptors are 2.4 dB(A) and 4.1 dB(A) respectively. It should be noted that the exceedences cannot occur concurrently. These receptors are 1,680 m apart at

opposite ends of proposed emplacement Area 1. Worst case noise modelling considered spreading and compacting occurring at the nearest point of the emplacement area (itself 960 m long). Therefore when operations are in proximity to one receptor they are well removed from others. Additionally, an alternative criteria limit may be applicable to these operations as they only occur for 2 days every week.

The EPA have advised an alternative planning level may apply for these receptors based on the short duration per week of these noise levels. A decision on an alternative planning level will not be made until the EPA have assessed the proposal on a holistic basis.

6.3 INTERMITTENT TRUCK NOISE

The planning level of 55 dB(A) L_{eq}, T described in **Section 3.2** of this report is not exceeded by any result presented in **Section 5.3** of this report. Therefore, no impacts are predicted for emplacement of reject material by highway trucks.

7.0 CONCLUSION

No acoustic impacts are predicted for Ellalong residents for any aspect of the proposed mine extension.

The proposed possible ventilation fan installation at Sandy Creek Road would result in a 2.4 dB(A) impact based on noise emissions from the existing NWCC ventilation shaft fan. It is suggested that any fan chosen for installation at this site should be designed to meet noise planning levels as described in this report.

Some minor planning level exceedences have been calculated for some receptors in proximity to the proposed reject emplacement areas. However, an alternative planning level may apply as received noise levels are well below EPA acceptable limits.

No acoustic impacts will result from the intermittent movements of highway trucks to the emplacement areas.

Dependent on the EPA's view of reject emplacement compaction and spreading, and provided a ventilation shaft fan is specifically designed for the Sandy Creek Road site, little or no acoustic impact is expected for the proposed mine extension.

8.0 REFERENCE

RICHARD HEGGIE ASSOCIATES PTY LTD. Report 823-R1. Noise Impact Statement, Bellbird South Coal Project via Cessnock. Southland Coal Pty Limited.

Michael Simes -
As a final protection, under the Mining Act, should you suffer damages you are able to take action to recover those losses.

Q2. *Stephen Smaller -*
Wanted to reinforce Mr Jones' comments on soot coming from the exhaust fan.

Would there be an improvement in noise from the fans if they were moved to the Cessnock No 1 site and to whose benefit - a majority of Ellalong?

Answer: *Michael Simes -*
A study was done by people from Envirosciences who made their predictions. This study was done on the existing fans in the new location.

The predictions that have been made for the new fans were based on a worst case scenario, where the modelling was based on the same kind of fans in use now and it is anticipated that the new fans will be an improvement on the existing fans. We have modelled on the basis of existing fans, it is unlikely that if they are located at Kalingo, they would be more noisy. The existing levels comply with the EPA levels.

Q3. *John Jones -*
If we know that all these problems that we have with underground mining such as subsidence, etc, why not declare Ellalong as a mine subsidence area?

Answer: *Graham Hanson - MSB -*
We often get asked this question and we need to think back. The reason for a district is to give the Board a measure of control over development of the surface and to make sure that any improvements that are constructed are compatible with planned mining that may take place in the future.

The role is not to let people know what is happening in the future. If there had been a district proclaimed in that area the residents would have suffered inconvenience in that dwellings would need approval by the Board. If we had been asked in the 1960s or 1970s to declare the area a district, guidelines would have been for a two storey, brick veneer dwellings. So really there is no advantage in having a district in an area like Ellalong. There has been no changes.

Q4. *Mr M Dunipace -*
Stated the MSB has no criteria for a new home in the Ellalong area!
Advised that the Board should come out with something to give a person a fair go on what they can build. Mr Dunipace advised that when he was building his home no-one from either the MSB or local council helped in how he should construct the footings on his home.

Graham Hanson -
A normal two storey dwelling building to Council requirements would be more than adequate for the subsidence and strains which we have talked about tonight.

Q5. *Judy Gordon -*
What about the people who have built full brick homes?

Answer: *Graham Hanson -*
There a very few full brick homes. I would have expected that firstly no matter if there is a district declared, anything that pre-exists is covered so the existence of a district does not affect ability to obtain compensation. If a district is declared then future development has the disadvantage of approvals and some requirements.

Q6. *Stephen Smaller -*
We would have chosen not to buy in the area if we knew it was in a mine subsidence area!

Graham Hanson -
There is no legislation to create districts.

Q7. *Sue Woods (?)*
Why is it necessary to reopen Kalingo shaft?

Answer: *Sean Egan -*
When we planned to mine in the new area there is a requirement to supply air to that new area. Whether it is the Kalingo shafts or another new shaft we do believe that a shaft is required.

Q8. *Peter Smythe*
Inquired about the number of coal trucks on Wollombi Road. Does the company use road transport as opposed to rail?

Answer: *Sean Egan -*
With the proposal there is no planned increase in road transport. Extra tonnes would be by rail.

We do presently truck some coal which is about 40,000 t/year.

Norm Gow -

The company has only one contract to haul coal. It is hauled by road to protect the product. We have worked closely with Cessnock Council to reduce the number of trucks. Some of the trucks travelling along Wollombi Road are in fact not coal trucks.

Q9. *Stephen Smaller -*
Because the new area that you are planning to mine is close to Glennie Street, I asked Michael Simes before if any of the roads would be used as access into that area at any time?

Michael Simes -
We have no plans to use those roads to access the new area should the Kalingo shafts not eventuate. Should a new shaft be sunk to the north east of Kalingo we would extend the road past Kalingo shafts.

Only possible need to access that area would be for exploration work.

Q10. *Jim Muxlow -*
With our property set up we have got a family company. If I provide improvements they are not recognised as the company's improvements. Therefore any problems that come before us come to us as individuals, not as a company. Will the company's directors be prepared to stand up instead of the company? If the company is so sure there is going to be no problems put the Directors up!

Jim Muxlow also expressed his opinion that he felt it was an insult that none of the company's directors were in attendance.

Mr Muxlow also expressed his worries with his turkeys not feeding when subject to vibration.

Sean Egan -
Legal advice would need to be sought in regard to directors of the company standing up for compensation instead of the company.

As far as subsidence goes, there is a Mine Subsidence Act which is there to support individuals like yourself.

Michael Simes -
Past experience has been that we had significant vibration events about 3-4 times per year.

Renzo Tonin -
Vibrations are very short. They would last about .25 sec. I have done a lot of work in the effects of blasting noise on chickens and the like, as well as survey on noise effects on animals. All literature is contrary to your experience in that there is very little effect to wildlife when exposed to noise. Research shows turkeys will stop feeding for a short while and then resume feeding.

Q11. *John Jones -*
What happens to the old workings?

Answer: *Sean Egan -*
These are generally sealed off - gas and water stays in the workings but generally we pump the water out for working areas and use the water within the washing plant.

Q12. *Robert (?)*
Surveys from the mine indicate that they mine about 500m from my house, even the roof moves. We have requested things from the mine, ie maps to show us where they are mining. The vibration is very bad. I live at Ellalong on Dry Creek Road.

Answer: Greg Hanson from the MSB advised he would speak to Mr (?) after the meeting.

Q13. *Man with beard - (Pelton Village)*
I have noticed various items in my house moving on account of vibration.

Answer: *Renzo Tonin -*
That sort of vibration would not be a stress fracture. It is common that a person can not tell between a vibration and low frequency air drawn vibration. This could be from operations at the washery.

Kevin Gilbert stated his views on the socio-economic aspects of the new proposal. He stated that the future of the mine depends on mining in the new area and the community needs to support this move. He advised that importantly he sees the community's comments but also sees his future with the mine. He asked for the community's support and advised that he takes on board their comments.

MEETING CLOSED at 9.15pm

APPENDIX 6 :

ARCHAEOLOGICAL REPORT

HLA-Envirosciences Pty Limited
ACN 060 204 702
A subsidiary of Harding Lawson Australia Pty Limited
ACN 063 854 606

Prepared for:
NEWCASTLE WALLSEND COAL COMPANY

AN ARCHAEOLOGICAL SURVEY

OF THE PROPOSED

ELLALONG COLLIERY EXTENSION

NEAR CESSNOCK NSW

Prepared by:

.....
IAIN STUART BA(Hons), MEnvSci

Checked by:

.....
DENNIS REGAN BE(Chem), PhD

HLA·ENVIROSCIENCES PTY LIMITED
(A Subsidiary of Harding Lawson and Associates)
55-65 Grandview Street, Pymble, NSW 2073
Phone: (02) 988 4422 - Fax: (02) 988 4441

(Other offices at Newcastle, Melbourne, Brisbane, Gladstone & Mackay)

January 1994

TABLE OF CONTENTS

1.0 INTRODUCTION

The Newcastle Wallsend Coal Company is submitting a development application to the Cessnock City Council for a proposal to extend underground longwall mining from the current workings in Ellalong Colliery to the north and north-east into the Bellbird South Colliery Holding (under Consolidated Mining Lease No. 2). Accordingly an Environmental Impact Statement (E1S) is being prepared (by HLA-Envirosciences) to accompany the development application (see **Figure 1**).

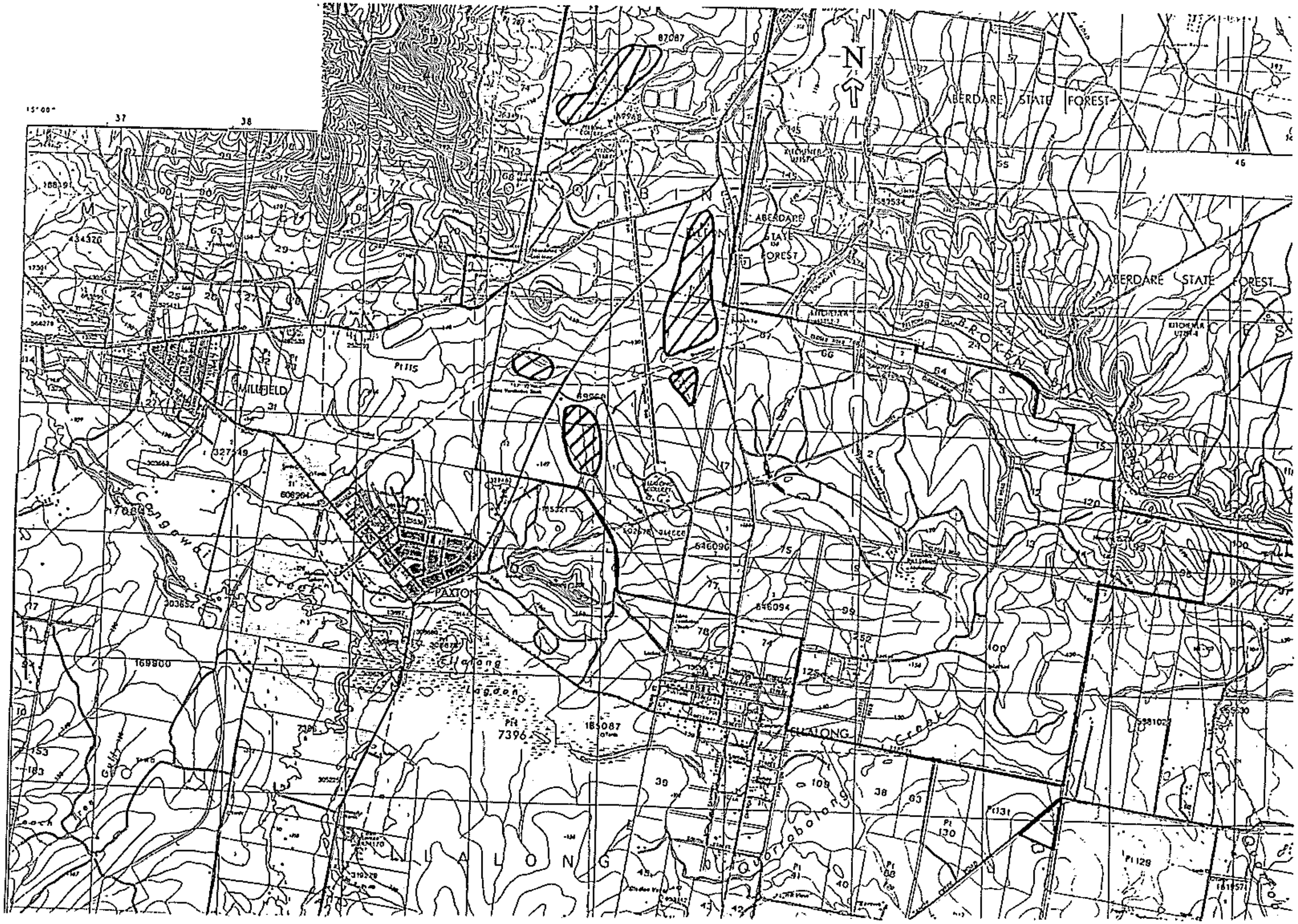
As part of the Director's requirements for items to be considered in the EIS an assessment of the sites of Aboriginal archaeological or European heritage value, is required.

This report discusses the impact of the proposed development on the archaeology and heritage items within the study area. It is based on the archaeological survey described below, and previous research undertaken as part of an earlier EIS prepared in 1988 by Epps and Associates for Southland Pty Ltd. In addition Mr Peter Fenwick, Industrial Archaeologist has generously made available his work on the former Cessnock No. 1 Colliery undertaken on a voluntary basis for the National Trust of Australia (NSW Branch).

The study area encompasses the area in **Figure 1** but does not include the townships of Ellalong or Pelton.

2.0 ENVIRONMENTAL BACKGROUND

The study area is located in the Broken Back Range about 8 km south of Cessnock. The topography of the study area comprises three main morphological units:



ENVIROSCIENCES PTY LIMITED	
Study area	Figure 1
DATE: May 1995	PROJECT No.: F1210

i) The Broken Back Range: this is characterised by steeply sloping land traversing the northern part of the study area running from west to east;

ii) Alluvial flats: alluvial flats are located adjacent to the major creek draining the study area, notably along Quorrobolong Creek which runs through the southern portion of the study area;

iii) Undulating land: between the alluvial flats and the Broken Back Range lies an area of undulating land with less pronounced slopes than in the Broken Back Range.

The study area is heavily vegetated except for the farm land around Quorrobolong Creek. There is evidence of previous land clearing as a dead tree was located with ring-bark marks on its trunk indicating phases of clearing and then regrowth. This is not surprising considering the history of settlement in the area.

3.0 ARCHAEOLOGICAL BACKGROUND

This section reviews background information on the archaeology and history of the study area and outlines expectations for the sites of archaeological and heritage value. For convenience this discussion has been divided into Aboriginal and Post-Contact heritage.

3.1 ABORIGINAL HERITAGE

Despite a number of archaeological surveys in the Hunter Valley the archaeology of the study area is poorly known. The southern half of the study area has been surveyed by Brayshaw (1987) as part of the EIS for Southland Colliery. Brayshaw located two archaeological sites; a small open site Quorrobolong 1 and an isolated artefact IF-1 (see **Figure 2**). Since then only one further survey has occurred in the study area. This was a survey of a proposed cable route

between Paxton and Bellbird via Ellalong undertaken in 1993 by J Appleton. Appleton located an isolated artefact on the edge of Paxton (see **Figure 2**).

3.2 PREDICTED NATURE OF THE ABORIGINAL ARCHAEOLOGICAL RESOURCE

In reviewing the literature only two types of archaeological sites have been located in the general area - open sites and isolated finds. Open sites are defined as the remains of camp sites where the archaeological material consists mainly of stone artefacts, charcoal and food debris. Isolated finds are single occurrences of archaeological artefacts, usually stone artefacts. It was considered possible that scarred trees - trees from which the bark has been removed for use as an artefact - could occur in the study area provided that past contact vegetation clearing was not too intensive. Rock shelters, some with art, have been reported from the wider area however no suitable outcrops occur in the study area.

The ability to predict the location and nature of Aboriginal archaeological sites within the study area is limited by the lack of well documented archaeological sites from the region. Without a regional pattern of sites it is difficult to make any but the mot general statements about the likely occurrence of archaeological sites within the study area.

A general model would be based on the observation made of Hunter Valley archaeology that site density and complexity increases close to water and wetlands. This is probably due to increased biodiversity creating a greater variety of food resources which would sustain a greater level of Aboriginal settlement. Thus at a general level more complex sites will be located close (say 100 m) to major watercourses and wetlands. Conversely site density and complexity would decrease away from these areas.

For the study area it should be noted that the major wetland complex is to the south along Ellalong Lagoon and Quorrobolong Creek. To the north the land rises to reach the main ridge of the Broken Back Range. A lower ridge runs between Pelton and Cessnock No. 1 Colliery.

ENVIROSCIENCES PTY LIMITED

Location of sites within study area	Figure 2
DATE: May 1995	PROJECT No.: F1210

The areas which are further away from the wetlands are around Ellalong Colliery and around Pelton. The most substantial site Quorrobolong 1 is located adjacent to the Quorrobolong Creek. The above model would suggest that further sites would be located in this area and that they would contain artefacts indicating that a complex range of functions occurring on the site.

Away from the major streams and wetlands, sites would become less dense and more specialised such as small stone scatters and isolated finds.

It should be noted that this model is extremely general and (like any model) requires considerable more research to expand and test it. The model's main purpose in this study is as a first attempt to predict where archaeological sites might occur in the study area.

3.3 POST CONTACT HERITAGE

Until the development of the South Maitland Coalfields (in the late 1880s) the Cessnock area was a farming area on the margins of the Hunter Valley. The main focus of settlement in the Hunter was along the Hunter River from Newcastle to Singleton. The river provided land and a transport route to the sea (King and Wodmington 1960). Even though the river's use for transport declined the relatively flat terrain along the river made it a useful transport route for road and rail transport.

The availability of efficient transport to Newcastle and on to Sydney allowed the development of small farms selling produce such as vegetable and dairy products to the urban area of Newcastle (Burley 1962:225-226).

The Cessnock region was not favoured by these advantages. The small settlers who occupied the area from the 1820s were involved in grazing sheep and cattle, growing wheat and maize and timber getting. Vineyards developed after the 1840s and formed an important part of the

farming economy. The farms produced items such as wool and grain that were in the short term at least non-perishable and thus could survive a longer trip to market.

With the development of mines at East Greta in 1891 exploitation of the South Maitland Coalfields began and mines began to open as the Greta coal measures were followed south. Mines were established in the Cessnock area by 1906 and were linked to what later became the South Maitland Railway. Collieries to the south west of Cessnock (within and adjacent to the study area) were established in the 1920s (Eardly 1969).

The effect of coal mining was to increase the regional population and improve the transport links to Maitland and Newcastle. Maze notes two opposing effects of coal mining on the agriculture of the area (1933). Firstly, people gave up farming and became miners. Secondly the growing demand for fresh food increased the production of vegetable, fruit and dairy products. Maze paints a picture of changing land use patterns from small farms growing grain or grazing sheep and cattle to a mining landscape with the mines themselves, transport networks to take the coal out to Newcastle and a network of residential towns (such as Ellalong and Paxton) for miners. The agricultural landscape changed to dairying and vegetable production on the richer soils with the marginal farms being abandoned (Maze 1933:37-38).

Within the study area it was expected that two types of post-contact sites would be located, those relating to agriculture and mining related sites. Agricultural sites are likely to be small farms and could possibly contain evidence of change in land-use. Evidence of abandoned farmland might be expected as well. Agricultural sites have the potential to date from the 1820s.

Mining sites are likely to be the mines themselves consisting of head frames, winding gear, coal screens, changing rooms and rail connections. Associated sites are the railways and the dormitory townships.

4.0 ARCHAEOLOGICAL SURVEY

A search of the Aboriginal Sites Register of the National Parks and Wildlife Service (NPWS) identified only the two sites recorded by Brayshaw (1987) as being in the study area.

A request to the Heritage Council of NSW to establish whether there were any sites with conservation instruments on them within the study revealed that only the former South Maitland Railway which has a Section 130 Order on it occurs within the study area. However there was some difficulty in ascertaining the extent of coverage of this order but after some correspondence (see **Attachment 2**). It is apparent that the Section 130 order does not cover the study area.

The former Cessnock No.1 Colliery is listed under Schedule 4 "Items Requiring further Investigation" to the Hunter Regional Environment Plan. This schedule is currently being re-evaluated so that the status of this item may change.

4.1 METHODOLOGY

As part of the study area had previously been surveyed it was decided to concentrate on areas where the surface impact is likely to occur these were the four sites proposed for washery reject emplacement and the Cessnock No. 1 colliery site which is proposed for re-use.

The survey was undertaken on the 8th December with the author, Claire Everett (who generously volunteered her services) and Ricki-Jo Griffiths representing the Mindaribba Local Aboriginal Lands Council (see **Attachment 1**). On 31 March 1995 an additional survey of 6.72ha of land was undertaken as the proponents were considering this land for use as shaft and fan house. This was surveyed by Iain Stuart and Claire Everett from HLA-Envirosciences and Steve Talbot and Todd Maley from the Mindaribba Local Aboriginal Lands Council.

4.2 COVERAGE ANALYSIS

The effectiveness of an archaeological survey is constrained by the nature of the ground surface visibility, for example dense vegetation and recent deposits of fill can cover less obtrusive sites such as open artefact scatters. Coverage analysis is an attempt to estimate how much of the area has been surveyed effectively (taking into account the effects of visibility). The areas surveyed were the four sites of coarse washery reject emplacement areas and the proposed fan house area (**see Figure 2**).

The methods outlined in Witter (1980) were used to estimate the effective coverage. **Table 1** indicates the effective coverage for each emplacement area.

TABLE 1
EFFECTIVE COVERAGE, EMPLACEMENT AREAS

Location	Area (ha)	Visibility	Area Surveyed	Effective Coverage %
Area 1	32.9	10-20%	0.75	0.6%
Area 2a+b+c	29.9	10-20%	0.8	0.8%
Area 3	13.9	10-20%	1.32	3%
Area 4	12.1	10-20%	0.78	1.6%
Fan Area	6.7	10-20%	1.08	3.7%

The majority of the areas surveyed had been burned in bushfires during October 1994 and therefore the ground surface visibility was generally good. Despite this it is clear that the survey was limited by the low level of effective visibility to a small part of the areas concerned. Therefore the low level of effective visibility throughout the study area is a constraint on the results of this study.

4.3 RESULTS

4.3.1 Aboriginal Sites

Only one Aboriginal site was located.

EL-1 An isolated find consisting of a stone artefact.

This result is typical of other surveys in the area reflecting a combination of low effective coverage and an Aboriginal settlement pattern that may have produced a small number of low-density sites away from major streams and wetland area.

4.3.2 Post-Contact Sites

Sites Relating to Agricultural Land Use

There was little evidence of agricultural sites in the areas surveyed. In Area 4 it was apparent from the vegetation that the area had been cleared and was now revegetating. A large ring-barked tree was located and recorded as EL-2.

EL-2 A tree has been killed by ring-barking.

Sites Relating to Coal Mining

The majority of the post-contact sites were those relating to coal mining. The Kalingo Junction to Millfield and Paxton branch line bisects Area 2 and forms the southern boundary of Area 4. As well the Kalingo Junction to Cessnock No. 1 Colliery line runs through the broader area of the study area. The track formations and remains of railway infastructure was identified as a single site running through the study area.

The Cessnock No. 1 Colliery, which has been recorded by Peter Fenwick, was inspected as part of the survey to assess possible damage to the site due to recent bushfires. This identified that only the former administration block had suffered damage it having been burned out but appears to still be structurally sound.

4.4 CULTURAL SIGNIFICANCE

The basis for assessing the cultural significance of archaeological sites is the ICOMOS "Charter for the Conservation of Places of Cultural Significance" (the Burra Charter). However, the emphasis in significance assessment varies between Aboriginal and Post-contact sites. For Aboriginal sites the following aspects of cultural significance are emphasised: archaeological; Aboriginal and educational significance.

Archaeological (or scientific) significance is the ability of an archaeological site to answer relevant questions and the past. This is dependant on the intactness and integrity (degree of preservation) of the site and its representativeness.

Aboriginal significance is the significance of the site to Aboriginal people both in the past and in the present.

Educational significance is the ability of an archaeological site to demonstrate or explain the past or contemporary use of the site by Aboriginal people.

For Post-contact sites seven significance criteria have been identified and sites are assessed using these (see Department of Planning 1994).

The criteria are divided into two categories:

- **nature** of significance; and

- **comparative** significance.

There are five criteria in the first category and two in the second.

Nature of Significance Criteria - Type

Criterion 1: Evolution and Association (Historic)

An item which meets this criterion is significant because of the importance of its association with the history of New South Wales.

Criterion 2: Creative and Technical Accomplishment (Aesthetic)

An item meeting this criterion is significant because it demonstrates creative or technical excellence, innovation or achievement in New South Wales.

Criterion 3: Community Esteem (Social)

Items meeting this criterion are significant through their social, spiritual or cultural association with a community in New South Wales.

Criterion 4: Research Potential (Scientific)

Items meeting this criterion are significant because of their potential to contribute to an understanding of the history or historic environment of New South Wales.

Criterion 5: Other

Significant for some other value to past, present or future generations in New South Wales. This criterion can only be used if it can be successfully argued that a previously unidentified criterion exists outside those already specified.

Comparative Significance Criteria

Criterion 6: Rarity

An item meeting this criterion is significant because it represents a rare, endangered or unusual aspect of the history or historic environment of New South Wales.

Criterion 7: Representatives

Items meeting this criterion are significant because they represent an important class of historic items or environments in New South Wales.

To be assessed as significant an item must:

- qualify under one of the five nature criteria; and
- qualify under one of the two degree criteria; and
- it must also retain the integrity of its key attributes of significance.

4.4.1 Aboriginal Sites

EL-1 Isolated find.

Archaeological significance: the ability of this site to answer questions about the past is minimal.

Aboriginal significance: from the comments of the Midaribba Local Aboriginal Lands Council it seems this site is important but not of major significance to the Aboriginal Community.

Educational significance: the ability of this site to demonstrate or explain some aspect of the past is minimal.

Given the above it can be seen that the significance of site EL-1 is low.

4.4.2 Post-Contact Sites

EL-2 Ring-barked tree.

This site can be seen as significant for its association with the history of the Cessnock area representing a pattern of land clearance and settlement and then abandonment of some agricultural land. The site meets only one of the significance criteria (Criterion 1). Accordingly under the methodology the site is not significant or of low significance.

The railway line formations

These sites are seen as being significant for their association with the mining industry and as part of the well known South Maitland Railway System. The construction of the lines however was not a major technological feat nor was there anything particularly unique about the technology used or method of working. However, the South Maitland Railway as a whole was one of the largest private railways in Australia as well as playing a significant role in the development of the South Maitland Coal fields and the towns of Cessnock and Kurri Kurri by providing transport facilities.

The South Maitland railway had also considerable community esteem as one of the last steam railways in Australia.

The two railway line formations as part of the South Maitland system share in this overall significance. However the integrity of these sites must be seen as compromised by the removal of all track signalling and other railway facilities from the lines leaving only the track formation.

In the case of the Kalingo Junction to Millfield and Paxton line the integrity is even more compromised by the formation being cut by the Ellalong to Pelton coal conveyor.

While the two railway formations would qualify as being a significant heritage item that significance is diminished by their low integrity. The railway formations are representative in nature.

Cessnock No.1 Colliery

The Cessnock No.1 mine has important historical associations with the development of the Cessnock coal fields being one of a number of colleries opening in the southern end of the field. However, the long development period and high operating costs resulted in the delayed opening in 1938 and early closing in 1959. The site has important historical associations with the Sumner family.

The existing fabric on the surface demonstrates the process of site development and utilisation. The integrity of site is good. The site is rare, despite the large number of mines in the South Maitland, East Greta area, few retained any surviving fabric once production stopped.

5.0 MANAGEMENT

LEGISLATIVE PROTECTION

Aboriginal sites are protected by the *National Parks and Wildlife Act* 1974. Under Section 86 it is an offence to disturb or excavate any land for the purpose of discovering a relic except in accordance with a permit issued under Section 87 of the Act.

Post-contact sites are protected under the *Heritage Act* 1977 (as amended). Protection is afforded through the imposition of Permanent and Interim Conservation Orders or for relics not covered by conservation orders, through Section 139 where it is prohibited for a person to disturb or excavate any land for the purpose of discovering, exposing or moving a relic.

A relic in this case is any deposit, object or material evidence that relates to the settlement of New South Wales (excluding Aboriginal settlement) and is more that 50 years old.

5.1 IMPACT OF THE PROPOSAL

The proposal will impact on the archaeology and cultural heritage of the area in three main areas:

i. the emplacement of washery reject material in four areas within the study area;
ii. the re-utilisation of Cessnock No. 1 Colliery; and
iii. potential damage to sites due to long term subsidence following mining.

5.1.1 Washery Reject Emplacement

It is planned that coarse washery reject material will be deposited in four areas. This will only affect one known site EL-1 which is of low significance. However, it is likely that more sites may be located in the area due to changes in ground surface visibility. It is recommended that as each area is scheduled for utilisation the area be resurveyed by an archaeologist with a representative of the Mindaribba Local Aboriginal Lands Council six month prior to utilisation to check that no archaeological sites will be effected.

If the Washery Reject Emplacement areas are relocated to the south near Ellalong Lagoon or Quorrobolong Creek (which has not been suggested) then consideration should be given to a sub-surface testing program to attempt to locate archaeological sites in these areas.

If site EL-1 is still to be effected by the washery reject material deposit then a "consent to destroy "under Section 87 of the *National Parks and Wildlife Act* 1974 will be required. The concurrence of the Mindaribba Local Aboriginal Lands Council will be required for this application to proceed.

5.1.2 Cessnock No. 1 Colliery Site

It is proposed that the Cessnock No. 1 site be reused to obtain access to the workings. This has the potential to affect the heritage items on the site and accordingly it is recommended that a Conservation Management Plan is prepared for the site.

A Conservation Management Plan is a document which details why a heritage item is considered to be of significance and develops policies for retaining its significance while allowing for economic reuse, possible future development and ongoing maintenance.

The conservation management plan will set out policies for ongoing management of the site. Once a decision is made concerning the reopening of the Cessnock No.1 site is finalised then it is recommended that a Heritage Impace Statement is prepared.

A Heritage Impact Statement accompanies a proposal to alter a heritage item such as the Cessnock No.1 Colliery. It analyses the proposed work in terms of previously established conservation policy or a statement of cultural significance (as outlined in the conservation mangement plan). A Heritage Impact Statement should accompany any application to alter a heritage item of regional or state significance.

5.1.3 Subsidence

The question of the impact of subsidence an archaeological sites has been discussed in the report by G. E. Holt and Associates Pty Ltd (see **EIS Volume 2, Appendix 10**). While their discussion is useful it does overlook the question of potential increases in erosion and their effect on archaeological sites. Holt and Associates note the possibility of increased erosion on the banks of creeks. Such erosion has the potential to affect archaeological sites, especially as it is predicted that a greater density of sites is likely to occur associated with major streams and wetlands. It is recommended that the area be monitored by an archaeologist in

consultation with the Mindaribba Local Aboriginal Lands Council to observe changes in erosion patterns in the area and to assist in stabilisation work. Stabilisation work will need to be discussed with the Hunter Regional Archaeologist, National Parks and Wildlife Service.

5.1.4 Archaeological Sites

As all archaeological sites are protected by legislation against damage, disturbance or excavation without the appropriate permit any work that is likely to affect the sites identified in this report (or any other archaeological sites) will require an appropriate permit. The application for such permits (discussed under 5.0) will take time to process and at least three months lead time should be allowed.

5.1.5 Overall Heritage Strategy

The most appropriate way for the above issues to be dealt with would be for an overall heritage strategy to be drawn up. This would detail work required, permission required and time frames and be updated as the reproject develops. It is recommended that such a strategy be prepared and an archaeological consultant be retained to implement the strategy.

6.0 SUMMARY OF RECOMMENDATIONS

6.1 That the areas of the deposition of coarse washery reject material be resurveyed six months prior to utilisation to verify that no archaeological sites will be affected.

6.2 That a Conservation Management Plan be prepared for Cessnock No. 1 Colliery Site.

6.3 That a programme of systematic monitoring of the study are to be undertaken to check that any increased erosion does not effect or expose archaeological sites.

6.4 That as archaeological consultant be retained to formulate and impact the above recommendations as a Heritage Strategy.

6.5 That on all matters affecting Aboriginal Archaeological sites the Mindaribba Local Aboriginal Lands Council be consulted with.

7.0 REFERENCES

Burley, T. M. 1962 The evolution of the agricultural pattern in the Hunter Valley, New South Wales. *Australian Geographer* 8(5):221-231.

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King, H. W. H and Wodmington E. R. 1960 The Role of the River in the development of settlement in the Lower Hunter Valley. *Australian Geographer* 8(3):3-16.

Maze, W. H. 1933 Land Utilisation in the Lower Hunter Valley, New South Wales, Australia. *Australian Geographer* 2(2):39-51.

Witter, D. C. 1980 An Archaeological Pipeline Survey between Wagga Wagga and Young Report to NPWS.

ATTACHMENT 1

MINDARIBBA LOCAL ABORIGINAL LAND COUNCIL

SUITE 12, 420 HIGH STREET, MAITLAND. 2320
P.O. BOX 453 MAITLAND
Phone: (049) 34 3390 Fax: (049) 34 3393

Jane Goulstone
N.P.W.S. Environment

Re: Allalong Colliery Extension.

Further to our discussions regarding the above project.

The main concerns of Mindaribba L.A.L.C. are:

* There has been very little work carried out in the area.
* Scarred Trees in the proposed area
* The impact of effect erosion will have on sites along creek bed.
* Because there has been [redacted] many years surveys conducted in the area. Obvious reason N.P.W.S. don't have any information regarding the area.
* What type of plan will be put into place when work starts in terms of Survey dates.
* Will they cover areas that haven't been excavated or test pits done.

Also on page (12) 5.0 Management
and 5.1.1. Waste Rock Deposition.

Shy contractor each site.

* Also while there is only 1) known site, because of the area it is possible othr sites haven't been located as yet.

- Also you read page 13 5.1.5 last sentence. will alsmarty increase and effect other sites shy suggest it should be monitored. (Recommended.)

* How often will this happen. Then a management control plan, should be established.

* Manitoba LSRC recommend no further work take place without without consultation with and acceptance.

Rob Griffiths
Coordinator
M.L.R.A.L.C.

17. 5. 95.

ATTACHMENT 2

[*Published in Government Gazette No. 126 of 16th September, 1983.*]

HERITAGE ACT, 1977

ORDER UNDER SECTION 130

I, the Minister for Planning and Environment, in pursuance of section 130 of the Heritage Act, 1977, do, by this my order, declare that such buildings and works as are specified in the Schedule hereto shall not be demolished except in accordance with Division 8 of Part VI of the said Act. (H.C. 30798)

ERIC BEDFORD,
Minister for Planning and Environment.

Sydney, 16th September, 1983.

SCHEDULE

The buildings and works associated with the South Maitland private railway system between East Greta Junction and Pelton Colliery. (855)

D. West, Government Printer, New South Wales—1983

New South Wales Government

Department of Urban Affairs and Planning

Governor Macquarie Tower,
1 Farrer Place, Sydney 2000
Box 3927 G.P.O. Sydney 2001
DX 15 Sydney

Telephone :(02) 391 2000 Ext:

Fax No. :(02) 391 2111

Contact :

Our Reference :

Your Reference :

Mr Iain Stuart
Archaeologist
HLA Envirosciences Pty Ltd
PO Box 726
Pymble 2073.

Dear Mr Stuart

South Maitland Railway

In regard to the above site I have enclosed a copy of a map marked by Branch historian Tony Prescott, to show the area covered by the section 130 order.

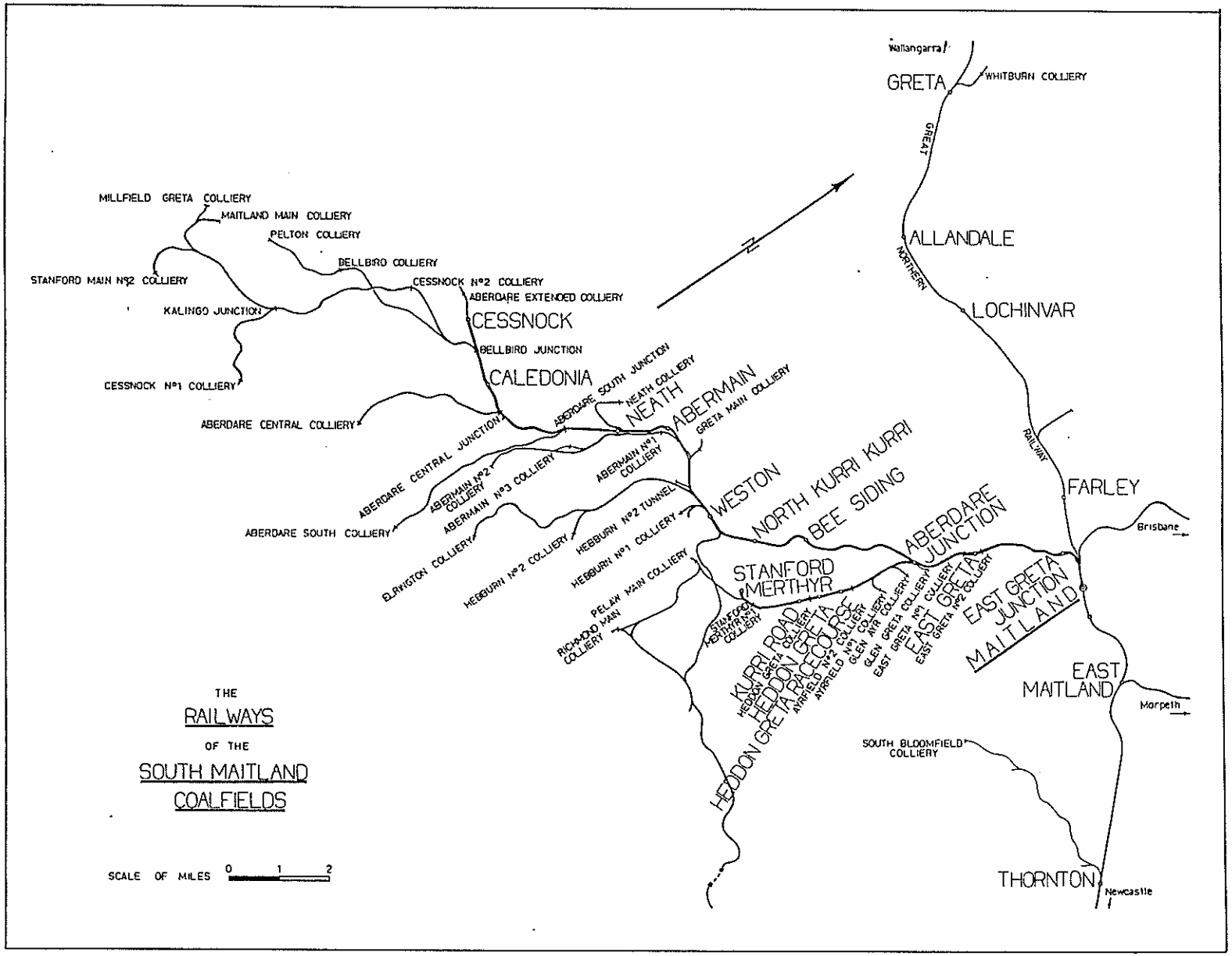
Although the branch line in which you are interested does not fall within the area of the section 130 order, it is nevertheless probably still of some significance. Its significance lies in its association with the South Maitland railway and its association with the Cessnock number 1 colliery. For this reason, efforts should be made to protect the item within the proposed development.

If you have any queries on this matter please do not hesitate to contact Cath Snelgrove on 391 2051.

Yours sincerely

for Rob Power
Manager
Heritage Branch.

6/7/02


THE
RAILWAYS
OF THE
SOUTH MAITLAND
COALFIELDS
SCALE OF MILES 0 1 2
Wallangarra
GRETA
WHITBURN COLLIERY
GREAT
ALLANDALE
NORTHERN
LOCHINVAR
RAILWAY
FARLEY
Brisbane
MILLFIELD GRETA COLLIERY
MAITLAND MAIN COLLIERY
PELTON COLLIERY
BELLBIRD COLLIERY
STANFORD MAIN No2 COLLIERY
CESSNOCK No2 COLLIERY
ABERDARE EXTENDED COLLIERY
KALINGO JUNCTION
CESSNOCK
BELLBIRD JUNCTION
CESSNOCK No1 COLLIERY
CALEDONIA
ABERDARE SOUTH JUNCTION
NEATH COLLIERY
NEATH
ABERMAIN
GRETA MAIN COLLIERY
ABERDARE CENTRAL COLLIERY
ABERDARE CENTRAL JUNCTION
ABERMAIN No2 COLLIERY
ABERMAIN No3 COLLIERY
ABERMAIN No1 COLLIERY
ABERDARE SOUTH COLLIERY
ELRINGTON COLLIERY
HEBBURN No2 TUNNEL
HEBBURN No2 COLLIERY
HEBBURN No1 COLLIERY
WESTON
NORTH KURRI KURRI
BEE SIDING
ABERDARE JUNCTION
PELAW MAIN COLLIERY
RICHMOND MAIN COLLIERY
STANFORD MERTHYR
STANFORD MERTHYR No1 COLLIERY
KURRI ROAD
HEDDON GRETA COLLIERY
HEDDON GRETA RACECOURSE
AIRFIELD No2 COLLIERY
GLEN GRETA No1 COLLIERY
AIR COLLIERY
EAST GRETA COLLIERY
EAST GRETA No1 COLLIERY
EAST GRETA No2 COLLIERY
EAST GRETA JUNCTION
MAITLAND
EAST MAITLAND
Morpeth
SOUTH BLOOMFIELD COLLIERY
HEDDON GRETA
THORNTON
Newcastle

APPENDIX 7 :

ACOUSTIC SURVEY REPORT

HLA-Envirosciences Pty Limited
ACN 060 204 702
A subsidiary of Harding Lawson Australia Pty Limited
ACN 003 854 606

Prepared for:
THE NEWCASTLE WALLSEND COAL COMPANY PTY LIMITED

ACOUSTICAL ASSESSMENT OF PROPOSED EXTENSION OF OPERATIONS OF ELLALONG COLLIERY INTO BELLBIRD SOUTH

Prepared By:

TONY WELBOURNE
Senior Environmental Engineer

Checked By:

ROD MASTERS
Manager, Mining & Rural Environment

HLA-ENVIROSCIENCES PTY LIMITED
122 Parry Street, Newcastle West NSW 2302
Phone (049) 262600, Fax (049) 264532

(Other offices in Sydney, Tamworth, Melbourne, Brisbane, Gladstone and Mackay)

6 MAY 1995

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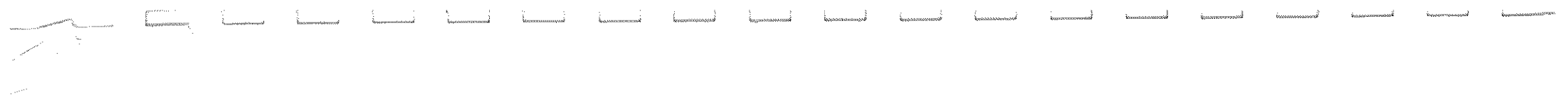

1.0 INTRODUCTION

The Newcastle Wallsend Coal Company Pty Limited (NWCC) currently operates an underground coal mine at Ellalong, NSW. NWCC propose to extend mining operations into part of an adjacent lease area. The proposed extension area is part of the existing Consolidated Mining Lease No. 2 of Bellbird South. For the location of these mining areas see **Figure 1**.

In order to gain approval to extend mining operations, an EIS is being prepared. This acoustic assessment will become part of the EIS, addressing all acoustic issues associated with the proposal.

2.0 PROPOSAL

NWCC currently operate an underground coal mine in the Ellalong area. Existing facilities and activities that generate noise include:

- A shaft with man riding facilities at Dry Creek Road.
- A ventilation fan near Hunter Street, Ellalong.
- A drift at Ellalong Colliery and overland conveyor to Pelton Washery.
- Pelton washery and rail loading facilities.
- Placing of washery rejects at Aberdare Extended.

The proposed mine extension is planned to operate within the constraints of existing infrastructure. Equipment currently in use will mine the proposed extension area. The extension's purpose is to increase the mines operating life by a further 21 years.

As mining progresses into the extension area it may become necessary to provide alternative ventilation for the underground workings. It is proposed by NWCC to either

recommission an old Cessnock No. 1 shaft (one of two, see **Figure 1** for location) and install fans similar to that at Hunter Street, or install fans at a site on Sandy Creek road should the alternative ventilation be required.

Access to the working face from the existing No. 2 shaft may become impractical as mining develops into the extension area. NWCC are considering access via a recommissioned shaft at Cessnock No. 1 (additionally to the proposed ventilation shaft) as a practical alternative.

The Aberdare Extended reject emplacement area is expected to reach maximum capacity (at current production rates) by the year 2002. From this time onwards NWCC intend to place reject material at three proposed additional emplacement areas over 15 years. The location of these emplacement areas is shown on **Figure 1**.

Dewatering of the Cessnock No. 1 mine will be necessary if the shafts are to be recommissioned. This will involve pumping out minewater over a period of approximately five to seven years.

Following dewatering, some construction activity would be necessary prior to recommissioning. This would involve building demolition, fan and manlift installations, possibly office and bathhouse construction and various access road upgrades and possibly minor earthworks.

If dewatering of Cessnock No. 1 mine is not considered a feasible option, NWCC have indicated that sinking a new shaft near the Cessnock No. 1 site may be a viable alternative.

Installation of a ventilation fan at the Sandy Creek road site would also necessitate sinking a new shaft to link with nearby underground headings. The preferred method of shaft construction for both sites is raise boring, however, blasting and removal of material from above may be necessary once site constraints are investigated.

APPENDIX 8 :

GEOHYDROLOGICAL REPORT

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INTERIM REPORT PREPARED ON BEHALF OF INSEARCH LIMITED

ELLALONG COLLIERY EXTENSION - ENVIRONMENTAL IMPACT STATEMENT WATER INFLOW TO ELLALONG MINE CESSNOCK

FOR

THE NEWCASTLE WALLSEND COAL COMPANY PTY LTD

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1) Sources of Information used, but as yet not fully researched

These sources comprise:

* structural geology maps, other maps and other data supplied by NWCC and DMR (NSW);
* Geostock reports on the abandoned Aberdare South mine;
* CSIRO reports on permeability and in-situ stress field analysis;
* Areal water analysis data;
* Information obtained by Larry Cook during discussions with geologists from the DMR (NSW) at the Department's Newcastle office on 28 April 1995.

2) General Working Hypothesis.

The working hypothesis is based on information listed in Section 1 and on observations made during an inspection of the Ellalong mine workings on 20 April, 1995.

The hypothesis is derived from the incomplete analysis of sparse, areally scattered data, and is subject, therefore, to refinement and change. The major components comprise the geology and geohydrology of the minesite. A brief discussion of these components follows.

2.1 Geology

Ellalong mine is located within the southern flank of the Lochinvar Anticline, between the Eglington Fault in the west and inferred southeastern extensions of the southeast-trending Kalingo Fault in the east. The faults which have been mapped within the regional mines generally trend in a northwest-southeast direction and have been in the main classified as normal faults. They swing to become parallel to the north-south trending axis of the southern part of the Lochinvar Anticline as they approach this structure. These faults appear to conform with the expected fault geometry associated with the formation of a fold structure. The regional current tectonics are dominated apparently by a compression vector directed towards the southwest. (This statement is supported by the in-situ, three dimensional stress field measurements carried out by the CSIRO). The major regional, structural element which reflects this complex tectonic regime is the Hunter Thrust, which is located approximately 30 km. north of the minesite.

2.2 Geohydrology

The major faults referred to in Section 2.1 appear to be geohydrological barriers which divide the coalfield between the Pelton and Elrington mines into a series of almost isolated, northwest-southeast trending conduits. Leakage across these faults is minimal, as demonstrated by the differential heads reported previously between Aberdare East, the surrounding mines, Pelton, and the Cessnock No. 1 mine. Further evidence of this is provided by the differences in the standing water levels measured during 1986 and 1987 by Geostock Ltd. The water levels in the shafts were approximately 20 metres in Cessnock No. 1, 4 metres in Aberdare Central and 1 metre in Abermain No. 2, respectively, above the level in Aberdare South.

2.3 Visit to Ellalong Mine

The project team visited Ellalong mine on 20 April 1995, accompanied by Michael Simes of NWCC. The new drift immediately south of the old Pelton workings, the Northern and Eastern Barrier Roadways and the southeastern part of the mine were examined. Samples of groundwater were collected for laboratory analysis. The observations made during the visit also confirm the inferences from the water levels and the hydrogeological interpretations. These observations are described in Sections 2.3.1, 2.3.2 and 2.3.3, below.

2.3.1 The only "wet" coal ribs occurred along the barrier between the old Pelton workings and the Ellalong workings down dip of the horizontal bore which drains the Pelton workings. The pump on this bore is reported to suck air at times.

2.3.2 The Eastern Barrier Roadway was dry and the floor dusty in places.

2.3.3 In general there is no substantial roof leakage nor wetness. Occasional, slow-running or dripping roof springs were noted. These springs are believed to be associated with minor, individual fractures or fracture zones. The main zones of water inflow to the mine appear to be the Pelton-Ellalong barrier and the faults which intersect the roof in this area.

3) The Geohydrological Working Hypothesis.

3.1 The Greta Coal Seam Aquifer

The coalfield between the Eglington and Hebburn-Mulbring fault zones is transected by a series of sub parallel, northwest-southeast trending faults. A geohydrological barrier of low permeability occurs where the throw of the fault results in the total separation of the Greta coal seam, which is the main aquifer. The net result is that the coalfield is divided into a series of discrete, hydraulically disconnected, permeable conduits whose boundaries are the faults.

3.2 Recharge to the Greta Coal Seam Aquifer

The major source of replenishment water into the coal seam appears generally to be the outcrop and the first tier of underground workings. Hydraulic testing of the Greta coal seam at Aberdare South mine yielded values on the order of 300 millidarcies or 3E-6 m/sec. This value is considered to be the upper bound permeability of the coal seam.

3.3 Groundwater Flow in the Greta Coal Seam

Groundwater flow occurs by gravity along the dip of the coal seam to the two, low-pressure sinks, Ellalong mine and Aberdare South-Elrington mines. Leakage can take place between the conduits and between the sub-conduits created by inferred en-echelon faults. It is of interest to note that the major spring at the northeast end of the existing mine occurs where the Barraba Fault was intercepted.

4) Application of the Geohydrological Hypothesis to Water Inflows into Ellalong Mine.

4.1 Sources of Water Inflow to Ellalong Mine

The hypothesis suggests the hydraulic potential (water head) in the Greta Coal Seam within the geohydrological conduit bounded on the west by the Eglinton-Pelton 'A' fault zone and the Kalingo fault zone on the east has been depleted considerably. The only sources of ground water flowing into the mine are the very small roof springs previously noted and the minor quantity of seepage through the coal seam down dip from the barrier between the old Pelton and Ellalong workings. The seepage face along the wall, noted in Section 2.3.1, is evidence of this inflow.

4.2 Effect of New Heading

The construction of the new heading (inbye) will result in only minor changes to the inflow of water into the mine, while this heading remains in its present geohydrological conduit. This is because it is merely replacing the existing northern road east of the heading as an interceptor drain across the main direction of water inflow from Pelton. This effect may be inferred from the observation that the northern roadway is dry immediately east of the junction with the new heading.

5) Work in Progress

Work in progress includes:

* Complete review of previous reports on the geology and geohydrology of the area;
* Rehabilitation of the water level measurement instrumentation at Cessnock No 1 mineshaft;
* Design of an experiment to measure the water balance of the new heading and to estimate seepage into the heading;
* Chemical analysis of groundwater samples collected on 20 April 1995 to check whether there are areal differences in water chemistry which may be related to sources of inflow.

6) Conclusions

6.1 The present Ellalong Mine is contained within a discrete geohydrological conduit bounded by northwest-southeast trending, sub-parallel faults which form the low-permeability walls of the conduits.

6.2 The mine acts as a pressure sink and the hydraulic potential (water head), in the coal seam within the conduit has been largely depleted.

6.3 The main source of water entering the mine is water seeping through the northern roadway rib from the old Pelton workings. Roof springs are a secondary source.

6.4 The northern roadway has acted in the past as a sub-horizontal interceptor drain to the water seeping down dip from the old Pelton workings. It continues to do so at present. Deposits of red iron precipitates (probably ferric oxyhydroxides) occur generally on the northern rib only and a seepage face is clearly visible on this rib.

6.5 The northeast heading into the Bellbird lease will act as an interceptor drain shadowing that section of the northern rib lying to the south of it.

6.6 While the new heading remains within its present geohydrological conduit only minor changes may be expected to the quantity of water inflow and its chemical quality, reflected in the drainage pumped from the mine. There is no direct evidence to suggest that any new geohydrological conduit will be intersected by this Heading.