EIS 285

AA054658

Draft : environmental impact statement : Neubecks Creek open-cut coal mine for Newcom Collieries Pty. Limited

NSW DEPT PRIMARY INDUSTRIES
AA054658

MISCELLANEOUS
-1SEP82
82-3578.
ENCLOSURE

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

NEUBECKS CREEK OPEN-CUT COAL MINE

FOR

NEWCOM COLLIERIES PTY. LIMITED

AUGUST 1982

EIS
285

Prepared by
Longworth & McKenzie Pty. Limited

RNT250/d.39/RG/DJ/me

1st DRAFT
26th August 1982.

EIS 285

43263324

EIS
285

LIST OF CONTENTS

LIST OF CONTENTS (cont.)

LIST OF CONTENTS (cont.)

LIST OF FIGURES

LIST OF TABLES

PAGE NO

1.0 SUMMARY

1.1 Synopsis of Proposal

This environmental impact statement outlines a proposal by Newcom Collieries Pty. Limited, a subsidiary of the Electricity Commission of New South Wales, to extract 1.6 million tonnes of coal by open cut methods from an area known as Neubecks Creek, north-west of Wallerawang, New South Wales. The location of the site is shown in Figure 1. The site forms part of a large expanse of land which is being acquired by the Commission for the Mount Piper Power Station, and a large part of the mining area will be covered by the ash dam which forms a part of this development.

The entire mining operation will be completed in approximately 3 years and during the latter part of this period, construction of the ash dam wall will take place concurrently.

The coal will be hauled to Wallerawang Power Station and used for power generation. It is thus a valuable resource which, if not mined, would be sterilised by construction of the new Mount Piper Power Station facilities.

1.2 Summary of Environmental Impact

Coal reserves beneath areas designated for the Mount Piper Power Station development have been progressively removed to minimise the quantity of coal sterilised by this development. Unlike most coal mining operations these coal reserves are removed in a relatively short period of time making it possible to programme the mining operation in conjunction with the construction operation.

Neubecks Creek has been designated as the site for the Mount Piper Power Station Ash Dam. Average coal reserves beneath Neubecks Creek have been estimated to be 1.6 million tonnes within the Lithgow seam, approximately 20m below the surface of the valley.

Using the open cut mining technique, the mining operation is expected to take 3 years. At present, coal reserves from other areas affected by the Mount Piper Power Station are being removed prior to the commencement of civil contracts on the surface. This present mining activity, the Ivanhoe No.1 (Huon) open cut, is expected to be completed early in 1983 when it is proposed to commence mining in Neubecks Creek, to provide continuity of work. This will effectively avoid any social and planning consequences which would otherwise accompany a development of this type. The timing of the proposal will also reduce the effects of additional coal haulage by truck to Wallerawang Power Station via the Lithgow - Mudgee Road (Main Road No. 55).

During the proposed mining operation, safeguards described in Section 5 of the Environmental Impact Statement will be implemented to minimise the visual impact of mining operations from the Lithgow - Mudgee Road, and to meet standards established by government authorities to protect the local environment against possible effects of such a mining operation. The effectiveness of these safeguards is described fully in Section 6.

Restoration measures proposed for the mining area will ensure that the mining operations have no long term effect on the local environment. The site's rehabilitation programme has been designed to complement the subsequent use of the area as the site for the ash dam wall across the northern arm of Neubecks Creek. The final landform proposed for the southern mining area between the ash dam and the Lithgow - Mudgee Road will reduce the visual impact of the ash dam wall viewed by the public travelling along this main road.

2.0 INTRODUCTION

2.1 Background

The Electricity Commission of New South Wales is planning to establish a major power station in the Mount Piper area, north-west of Wallerawang. This proposal was the subject of an Environmental Impact Statement prepared in 1980 (Ref 1.), and construction of the project has now begun.

The facilities forming part of this proposed development, and for which development consent has been given, include the Neubecks Creek Ash Dam. This dam will hold fly ash, in the form of an ash slurry pumped from the power station and will cover an area of some 95 ha in the valley of the north arm of Neubecks Creek. Clean settled water will be re-used in the Power Station.

Newcom Collieries Pty. Limited now propose to extract coal by open-cut methods in this valley, part of the proposed mining area coinciding with the area of the ash dam. This therefore places a time constraint on the mine as mining activity must be completed in this area in time to allow for construction of the dam wall and to provide clean water for commencement of power station operations.

Because of the importance of foundation conditions below the dam wall, no coal will be extracted from below the position of the dam wall itself. The mining area upstream (north) of the dam wall will not require restoration as it will become covered by the ash. Overburden material from this section will be used by the contractors in construction of the dam wall.

The mining area extending downstream (south) from the dam wall will require surface restoration and rehabilitation after mining. The location of the proposed open cut mine is shown in Figure 1.

2.2 Objectives of the Proposal

In developing the Neubecks Creek Open-Cut Mine, Newcom Collieries Pty. Limited will be obtaining coal which would otherwise become sterilised by the construction of facilities associated with Mount Piper Power Station.

This coal represents an important energy resource and will be used entirely for electric power generation at the nearby Wallerawang Power Station.

The mining plan has sought to maximise the extraction of coal within the constraints imposed by time and engineering aspects of the ash dam constructon and limitations associated with geology and the extent of former mine workings.

2.3 Alternatives

The possible major alternatives to the development proposal outlined in this document are as follows:

* Mining of a larger area, including underneath the proposed ash dam wall;

* Mining of a smaller area in the southern part, thereby avoiding the need for a diversion of the main channel of Neubecks Creek;

* Not mining coal at all.

Extending the area of coal extraction to include the area underneath the ash dam wall would considerably increase the available quantity of coal. However, this has been ruled out because of the importance of ensuring stable foundation conditions for the dam wall and is therefore not a viable alternative.

By decreasing the extent of coal extraction in the south it would be possible to avoid diverting the main channel of Neubecks Creek. However, because of the significant quantity of coal at shallow depth in this part, an adequate stream diversion has been designed to ensure that the coal can be obtained without adverse environmental consequences and without affecting the flow or quality of water in Neubecks Creek. The value of the coal in this part warrants the expense involved in the stream diversion.

The option of not mining the Neubecks Creek area at all before constructing the Power Station facilities has been carefuly considered. However, the proven value of the coal resource, particularly as an essential fuel for electricity generation, means that its sterilisation cannot be justified and this is therefore an unacceptable alternative.

Other possibilities exist in terms of alternative mining schemes, stream diversions etc. but it is considered that the form of the proposal outlined here meets the objectives in a sensible, efficient and environmentally acceptable way.

The area proposed for mining and its relationship to the Neubecks Creek Ash Dam is shown in Figure 2.

2.4 Scope of Statement

This Environmental Impact Statement, which accompanies the Development Application for the proposed Neubecks Creek Open-Cut Mine, identifies and assesses the direct and indirect environmental impacts which may result from implementation of the proposal.

As outlined in Section 2.1, this Statement relates only to the proposed open-cut mining activity at Neubecks Creek. The development of the proposed power station ash dam in the area is not covered in this submission and has already received development approval.

The Statement has been prepared by Longworth & McKenzie Pty. Limited who were commissioned to carry out the investigation by Newcom Collieries Pty. Limited. It has been prepared in accordance with the New South Wales Environmental Planning and Assessment Act, 1979, and Regulations.

3.0 CHARACTERISTICS AND PRESENT STATE OF THE STUDY AREA

3.1 Location

The site of the proposed Neubecks Creek Mine is located within the Western Coalfields of New South Wales, an established area of both underground and open-cut mining.

The study area is about 18 km north-west of Lithgow and close to the Main Road between Lithgow and Mudgee, as shown in Figure 1. Smaller townships of Wallerawang and Portland lie approximately 7 km to the south and west respectively.

The site of the proposed open-cut mine is within the valley of the north arm of Neubecks Creek on the northern side of the Mudgee Road, and about 1 km to the north-east of the proposed Mount Piper Power Station site.

3.2 Topography

The proposed mine site is contained wholly within the valley formed by the north arm of Neubecks Creek. The valley floor is quite flat and has been cleared for grazing. The slopes of the upper part of the valley and the valley sides themselves are heavily timbered and rise in the north to vertical sandstone cliffs.

The high ridge bordering the valley on the north and west is part of the Great Dividing Range and rises to 1100 m from a valley floor level of 920 m.

3.3 Geology

The Neubecks Creek area lies within and near the western edge of the broad Sydney Basin sedimentary structure. This basin consists of basically flat-lying rocks of Permian and Triassic age and exposures

of these strata dominate the geology and landform of the Western Blue Mountains Plateau which includes the present study area. A generalised stratigraphic succession is shown in Table 3(a).

The plateau surface and flanking massive vertical cliffs are formed in Narrabeen Group sandstones of Triassic age, referred to as the Grose Sandstone. Below this unit the softer sandstone, shale and siltstone of the Caley Formation, also part of the coal barren Narrabeen Group, occurs. These softer beds are more easily weathered and cause undermining of the Grose Sandstone which has resulted in the breaking away of the cliffs along vertical joint lines.

Permian sediments underlie the Narrabeen Group and form the more subdued landscape of the lower adjacent valley sides and floors. This sequence includes the Illawarra Coal Measures which are about 100 m in thickness and contain the coal seams which are to be mined. The lower Permian Shoalhaven Group comprises sandstone and shales without any coal bearing members and does not outcrop in the Neubecks Creek valley.

A detailed stratigraphic succession through the Illawarra Coal Measures in the study area is given in Table 3(b). Three coal seams occur, these being the Irondale, Lidsdale and Lithgow seams which dip gently to the north-east. The Lithgow seam is the most economic being of lower ash content, and is also the lowermost seam, occurring at a depth of about 25 m below the centre of the valley where mining is proposed. In the Neubecks Creek area the Lidsdale and Lithgow seams combine and are collectively referred to as the Lithgow seam.

Older folded Palaeozoic rocks form the basement of the Sydney Basin and outcrop only over a small area in the floor of the Wolgan Valley and within larger valleys to the north and west of the study area.

At the proposed mining site, beneath the valley floor of Neubecks Creek, there is approximately 20 metres of overburden above the Lithgow Coal Seam. This overburden consists of approximately 0.2 metres of alluvium material overlaying sandstones, shales and conglomerates of the Illawarra Coal Measures.

TABLE (3a) SIMPLIFIED GEOLOGICAL SUCCESSION WITHIN THE STUDY AREA

AGE	UNIT	MAX. THICKNESS	LITHOLOGY	OCCURENCE
Quaternary		to 10 m	alluvium	along the valley of the Cox's River and other streams
Triassic	Narrabeen Group	150 m	Massive quartz sandstone and conglomerate, minor shale and siltstone	Main plateau surface and sheer cliff faces
Permian	Illawarra Coal Measures	100 m	Coal, sandstone, shale, conglomerate in thin seams and beds	along valley sides and floor
	Shoalhaven Group	200 m	Shale, sandstone, conglomerate	to the west near Cullen Bullen and south-west of Pipers Flat.

TABLE3(b)
Stratigrahic Succession of the Illawarra Coal Measures
in the Western Coalfield

Group	Formation	Lithology	Thickness (m) Min.	Max.	In Mt. Piper area
Illawarra Coal Measures		Sandstone, mudstone, shale and several thin coal seams.	24.0	43.0	
		Irregular coal seam (many plies of coal and shale).	1.2		
	Ivanhoe Sandstone	Lithic sandstone, quartz rich.	0.3	1.2	1.7
	Irondale Seam	Coal, ash content average 27%.	1.2	2.6	1.2 - 2.1
		Shales	0.3	1.5	1.5
	Bunnyong Sandstone	Flaggy, micaceous silty sandstone.	1.2	3.0	3.0
		Sandstone (sometimes conglomerate) and shales.	10.1	27.0	10.1
	Lidsdale Seam	Coal, upper split of Lithgow Seam, ash content 22%, carbonaceous shale and sandstone.	0.0	3.0	1.0 - 1.2
	Blackmans Flat Conglomerate	Conglomerate contains pebbles to 75 mm, passes to gritty sandstone with pebble bands.	0.0	21.0	4.3 - 6.5
	Lithgow Seam	Coal, ash content average 16% carbonaceous shale.	0.9	6.9	1.2 - 2.1
	Marrangaroo Conglomerate	Conglomerate and coarse sandstone, pebbles to 75 mm.	0.0	21.0	2.6 - 6.4

3.4 Soils

A detailed soils survey has been carried out by officers of the Soil Conservation Service of New South Wales, covering the proposed open-cut mine area and immediate surroundings (Ref 2). Descriptions of the soil types, and assessment of their properties from a mining and rehabilitation viewpoint are included in Appendix A.

The soils in the area proposed for mining include three main types:

(i) heavy, dark floodplain soils (over 300 cm deep and normally saturated) - in the swampy depressions along the creek line;

(ii) duplex yellow soils (over 300 cm deep); and

(iii) yellow leached earths (100 - 200 cm deep) - both occurring on gentle valley footslopes.

The soil surface of the floodplain area is generally stable with only localised sites with minor gully head erosion. Above floodplain level the low hills are covered with native grasses and isolated patches of tree. Generally these areas are stable with isolated patches of sheet erosion on steeper sections of the terrain. Most of the higher ground and steeper slopes surrounding the mining area have been left as natural forest in an undisturbed condition.

3.5 Climate

As a result of the inland location and relatively high elevation, the climate experienced in the study area is generally one with warm to hot summers and cool to very cold winters. Diurnal fluctuations can be quite marked.

Climatic data for the study area has been recorded at Wallerawang Power Station since 1964 and is available in an Electricity Commission Report (Ref 3.). The information (1964 - 1977 period) can be summarised as follows:

Rainfall

Average annual	736 mm
Average annual number of rain days	86
Maximum recorded daily rainfall	93 mm (January 1970)

Dry Bulb Temperature

Mean	11.6 C
Maximum	37.2 C(January 1973)
Minimum	-11.6 C (July 1965; August 1968)

Wet Bulb Temperature

Mean	8.8 C

Evaporation (Class A Pan, 1971-1977 period)

Average annual	1261 mm

Wind (recorded 82 m above ground level, 1968-1977 period)
Seasonal and annual roses for the above period are given in Figure .... and the seasonal wind roses are summarised as follows:

Spring	SW16.1% 19% calms	NW16.0%	W15.1%
Summer	NE20.5% 23% calms	E16.5%	N13.7%
Autumn	NW14.7% 31% calms	SW13.4%	W13.0%
Winter	SW20.8% 27% calms	W16.5%	S12.5%

The wind direction is well distributed with a tendency for south-west to north-west to dominate.

3.6 Hydrology

The site is drained by Neubecks Creek. This stream, which drains from the Great Dividing Range, flows into the Cox's River, Wallerawang Dam and eventually Warragamba Dam.

Neubecks Creek and its tributaries are generally well defined in the upper area of the catchment because of the fairly high relief. However in the cleared section of the north arm catchment, a swampy area exists with the main stream being ill-defined. Areas within the catchment of the main arm have been disturbed by open-cut mining and a number of disused pits catch storm runoff.

The total catchment area draining through the mining area (as defined on Figure 1) is 19.4 km^2. The catchment yield has been estimated using figures derived from other catchments in the region (Ref 4) at 160mm surface water runoff or approximately 1500 Ml per year. Peak flows have been estimated for a 1 in 10 year recurrence interval. Immediately downstream of the mining area, the 1 in 10 year peak flow is approximately 60 m^3/s. Table 3(c) summarizes the catchment hydrology data. This information has been used to determine the clean water diversion and water pollution control measures outlined in Section 5.

TABLE 3(c) CATCHMENT HYDROLOGY DATA

Subcatchment	Area (km^2)	Annual runoff (Ml)	Q Max at sub-catchment outlet (m^3/s)
A	9.2	700	30
B	7.0	530	30
C	3.2	240	60
TOTAL	19.4	1470	60

3.7 Water Quality

Regular surface water monitoring has been carried out in the study area since October 1981. The location of the water sampling points are shown in Figure 4. Neubeck's Creek is classified as Class "C" (Controlled Waters) in accordance with the Clean Waters Act.

The results of the water monitoring programme are listed in Appendix B. The existing surface water quality of the study area is typical of upland catchments in the region. The pH values range from being slightly depressed to neutral, whilst iron and managanese levels are high. The average recorded iron and manganese levels were 3.0 mg/l and 2.1 mg/l, respectively.

It is known that old underground mine workings in the Neubecks Creek area are filled with groundwater. Analyses of mine water from Wallerawang Colliery indicate that the No. 3 workings in the Neubecks Creek area contain water with pH ranging from 7 to 8 and of much higher quality than that from the more easterly (No. 2) mine workings. The concentrations of salts and iron are much lower in the No. 3 workings with sulphates up to 200 mg/l and total iron generally below 20 mg/l.

3.8 Air Quality

The general study area, which includes Lidsdale, Wallerawang, Portland and Cullen Bullen, contains several sources of atmospheric pollution. These include several coal mines, coal storage and transportation features, the cement works at Portland, and the Wallerawang Power Station.

The Electricity Commission operates a network of particulate deposit gauges within a 12 km radius of Wallerawang Power Station. The average deposition over this area is 1 g/m^2/month and 5% of the recorded deposition rates exceed 5 g/m^2/month.

One deposit gauge in close proximity to the proposed mine is situated adjacent to the main Lithgow Road, about 1.0 km south-east of the "Rockview" turnoff. Measurements at this gauge (1977-1980) indicate that dust deposition rates average 2.5 g/m^2/month and range generally between 0.3 g/m^2/month and 5.5 g/m^2/month.

Background sulphur dioxide levels can also be expected to be elevated as a result of the power station, particularly during stable weather situations or atmospheric inversions when contaminants are trapped at lower levels. Atmospheric inversions occur regularly in the study area.

3.9 Acoustics

The existing acoustic environment in the study area is affected by noise from the following sources:

i) Traffic, (coal trucks, passenger and commercial vehicles) on the Mudgee Road and Boulder (Portland) Road.

ii) Coal mining operations at Invincible, Wallerawang, Western Main Underground and Open Cut and Ivanhoe Underground and Open Cut.

iii) Construction work at Mt. Piper Power Station.

iv) Natural noises: birds, insects, frogs etc.

The predominant source of noise in the area is generated by traffic on the Mudgee Road. This, combined with mining operations and construction noise, produces almost constant background noise at most times, peaking in the middle of the day. Beside the road at night, and at distance from the road during the day, bush noises can equal or exceed the noise emanating from other sources. Mining and construction operations in the area continue at night, contributing to night time noise levels. Highest noise levels are produced by trucks on the Mudgee Road.

A noise level survey was undertaken on December 15th, 16th and 17th, 1981, to determine the state of the existing acoustic environment in the vicinity of the proposed mine facility. Further readings were taken at 4.30pm on March 2nd and 19th, 1982. All readings were taken using a Bruel and Kjaer Precision Sound Level Meter, Type 2218, fitted with a Model 1613 Octave filter set. The meter was calibrated and checked using a Bruel and Kjaer Sound Level Calibrator Type 4230 before each set of readings.

Weather conditions during the survey period were fine. Daytime temperatures ranged from 13° C to 28° C, while at night the range was from 10° C to 18° C. Overcast conditions prevailed on the evening of December 15 and March 2, 1982. The sky at all other times was predominately clear. Light early morning fog was present at sample points 2, 3, 4, 5 and 6 on December 16th and 17th, 1981.

Sound levels were measured at six sample points in the area of the proposed open cut mine. Three of these were along the Mudgee Road, one 200 metres from the Mudgee Road, one 1 km from the Mudgee Road in open forest and one 1 km from the Mudgee Road in grassland in the area of proposed mining. The resulting noise levels obtained in the survey represent:

i) Background level, L_{90}, defined as the level exceeded for 90% of the time. L_{90} readings do not include effects of non-continuous events such as passing traffic and bird calls.

ii) Equivalent continuous sound level, L_{eq}, defined as the A-weighted average noise level over a measurement period. L_{eq} readings were made over a 30 minute period. They include non-continuous events.

The locations of the sample points are shown in Figure 4, and the results given in Table 3(d). These show that the ambient levels range from 26-65 dBA, with the majority of readings between 30 and 46 dBA. The highest background noise level, 65 dBA, was recorded at location 4 on the Mudgee Road at 2.10 p.m. on December 16, 1981. Background noise levels peaked at other locations during the same sampling period. The lowest background noise level, 26 dBA was recorded at the two sample points furthest from the Mudgee Road. Equivalent continuous sound levels were measured during the day at two points on the Mudgee Road and one point adjacent to the area of proposed mining. L_{eq}'s of 73.4, 81.5 and 83.8 dBA were recorded beside the road, and a level of 37.7 dBA at the proposed mine site. A peak noise level of 105 dBA was recorded for a coal truck on the Mudgee Road.

Background levels recorded during the follow-up survey were similar to those recorded at the same time during the initial survey, apart from location 1 where insect noise was significantly lower during the second period.

3.10 Flora and Fauna

The vegetation in the area surrounding the proposed open cut mining has been studied by Benson (1979) (Ref.5). Part of this report is included as Appendix C.

TABLE 3(d)

RESULTS OF AMBIENT NOISE LEVEL SURVEY

All values are in dBA. Upper values represent L_{90}'s. Values in brackets represent L_{eq}'s taken over 30 minutes.

SAMPLE POINT	5.15-7.05pm 15.12.81	9.50-11.10pm 15.12.81	4.15-5.25am 16.12.81	8.40-9.45am 16.12.81	1.10-2.35pm 16.12.81	4.00-5.10pm 16.12.81	8.10-9.25pm 16.12.81	5.35-6.50am 17.12.81	10.05am-12.45pm 17.12.81	4.20-4.55pm 2.3.82
1. 1 km east along track 1.6 km north of intersection of Mudgee Road and Boulder (Portland) Road.	36	34	26	46	57	42	41	41	41	31
2. On Mudgee Road 600 m north of intersection of Mudgee Road and Boulder (Portland) Road.	40	30	31	46	55 (81.5)	46	38	39	39 (73.4)	41
3. On track 1 km north-east of "Rockview".	-	-	-	-	52	30	26	37	32 (37.7)	32
4. Adjacent to house 500 m south-east of intersection of Mudgee Road and Boulder (Portland) Road.	52	38	32	44	65	42	41	46	40	41
5. Adjacent to "Rockview"	43	39	38	37	58	42	40	40	50	40
6. On Mudgee Road 500 m north-west of Western Main Colliery.	48	34	30	45	58 (83.8)	43	34	37	35	43

Most of the area to be affected by mining lies along and to the east of the north arm of Neubecks Creek within an area cleared for grazing. Several small areas of Eucalyptus rossii E macrorhyncha - E mannifera woodland will be affected by mining and clean water catch dam construction. A small area of Eucalyptus dalrympleana - E fastigata open - forest will similarly be affected. However, all of these areas lie within the high water boundary of the Mt. Piper Power Station Ash Dam.

Extracts from a report on fauna in the Neubecks Creek area by the Australian Museum (Ref 6), are included as Appendix D. It identifies 24 vertebrate species in the open grassland and swamp areas which are to be mined. These species, found in Plot F, are listed in Table 3(e) with an indication of their relative abundance during the study period. Species found in the areas of woodland and open-forest to be affected are not included in this list, as the extent of habitat that will be destroyed is small. A more comprehensive list of species found in the whole of the valley and upstream of the ash dam is included in the Appendix.

TABLE 3 (e)
VERTEBRATE SPECIES LIST

AMPHIBIANS		
Ranidella signifera	Common Eastern Froglet	Uncommon
REPTILES		
Hemiergis decresiensis		Uncommon
BIRDS		
Ardea novaehollandiae	White-faced Heron	Uncommon
Gallinago hardwickii	Latham's Snipe	Common
Platycercus elegans	Crimson Rosella	Common
Anthus novaeseelandiae	Richard's Pipit	Uncommon
Malurus cyaneus	Superb Fairy-wren	Common
Acanthiza pusilla	Brown Thornbill	Uncommon
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Uncommon
Acanthiza lineata	Striated Thornbill	Uncommon
Climacteris leucophaea	White-throated Treecreeper	Common
Anthochaera carunculata	Red Wattle-bird	Uncommon
Pardalotus punctatus	Spotted Pardalote	Uncommon
Zosterops lateralis	Silvereye	Common
Emblema temporalis	Red-browed Firetail	Common
Gymnorhina tibicen	Australian magpie	Uncommon
Strepera graculina	Pied Currawong	Uncommon
MAMMALS		
Macropus giganteus	Easter Grey Kangaroo	Common
Macropus rufogriseus	Red-necked Wallaby	Uncommon
Vombatus ursinus	Common Wombat	Uncommon
Mus musculus	House Mouse	Uncommon
Oryctolagus cuniculus	Rabbit	Common
Vulpes vulpes	Fox	Common
Sus scrofa	Feral Pig	Common

3.11 Visual Amenity

The study site is located in a region of gently undulating land surrounding drainage courses. These areas are enclosed at variable intervals by timbered ridgelines which serve to create visual and landuse zones.

Active landuse in the area is confined to the flatter, cleared areas associated with the drainage lines. The most obvious landuse forms are pastureland, coal extraction, associated coal treatment works and power generation facilities. The visual amenity of the region is therefore composed of contrasting broad cleared gently sloping valleys and natural forests on steep sided intrusive ridgelines contrasting rural and industrial land use.

Observation of the area from along Mudgee Road reveals many different focal points. These are again contrasting in their natural and man made character. Most outstanding focal points in the region are the Wallerawang power station which is accentuated by networks of power lines converging at this point, and sheer cliffs of rock outcrops seen as an enclosing background to the broad cleared valleys.

The proposed site for the open cut mine is typical of many valleys on the northern side of Mudgee road in that it is enclosed, but the enclosing factors are less dominant here than elsewhere in the region.

The site is a broad based valley tapering to a point at its northernmost extremity surrounded by natural vegetation on sloping hillsides, which at the northern end increase in gradient to become sheer cliffs of sandstone.

The valley floor is undulating grassland and when viewed from the Mudgee Road undulations in the foreground often restrict the extent of view.

Neubecks creek flows towards the east and runs roughly parallel to the Mudgee road. It is accentuated by the surrounding vegetation which consists of tall native and exotic, evergreen and deciduous trees.

At present there are few structures on the site, some old sandstone cottages and temporary mining facilities can be seen at intervals along the Mudgee road.

Figure 5 is a view of the site taken from an elevated position above the Mudgee road. As can be seen from this figure the extent of enclosure is quite limited. The predominant landform is convex with elevation and gradient decreasing from the Great Dividing Range in the background to Neubecks Creek in the foreground. These formations serve to effectively shield views of the site from surrounding residential areas. Cleared areas are confined to slopes of less than 1:10 and with the exception of the creek line these areas are covered with long grasses, reeds, and isolated trees.

The horizon line is elevated and although predominatly horizontal, is broken in parts by convex rock outcrops and a concave formation where the valley meets the horizon line.

The most dominant visual characteristic is the ridgeline formation of interlocking spurs which extend along the valley floor to the horizon.

3.12 Archaeology

The Neubecks Creek area has been examined by a consultant archaeologist to determine whether any sites or features of aboriginal archaeological significance exist in the area. This survey was carried out as part of the overall examination of the areas proposed for the Mount Piper Power Station facilities (Ref 7). An extract of the appropriate section of a letter reporting the results of the survey is contained in Appendix E.

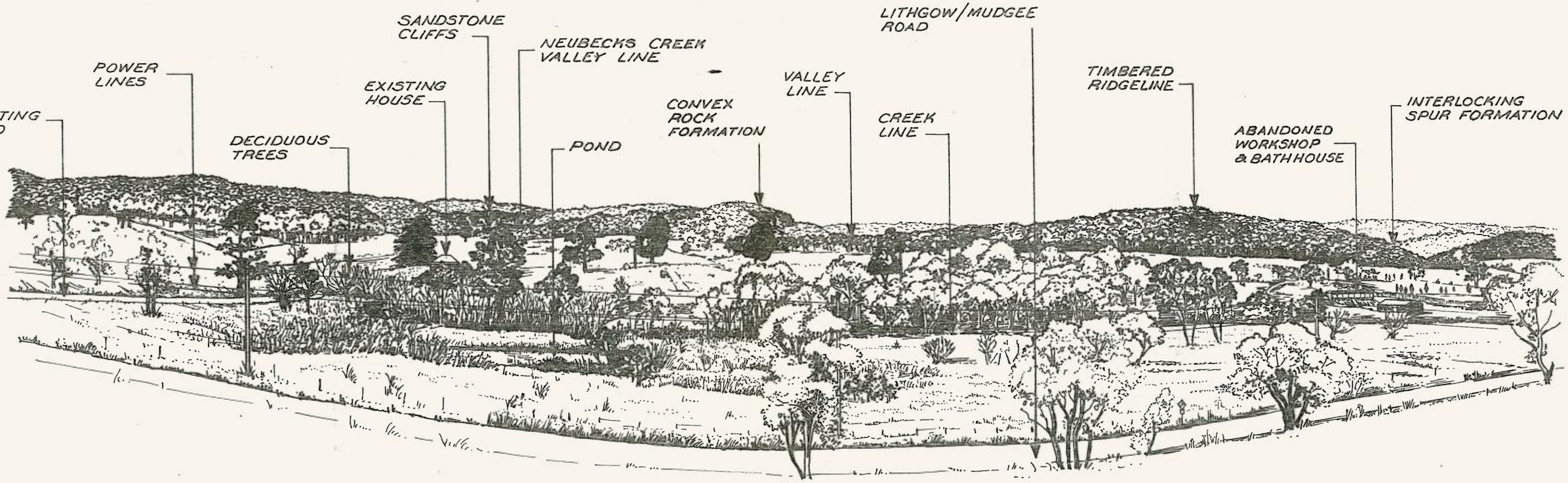
EXISTING ROAD
POWER LINES
DECIDUOUS TREES
EXISTING HOUSE
SANDSTONE CLIFFS
NEUBECKS CREEK VALLEY LINE
POND
CONVEX ROCK FORMATION
VALLEY LINE
CREEK LINE
LITHGOW/MUDGEE ROAD
TIMBERED RIDGELINE
ABANDONED WORKSHOP & BATHHOUSE
INTERLOCKING SPUR FORMATION

FIGURE 5.

The investigation showed that no rock-shelters exist along Neubecks Creek and no artefacts or bones were seen in the shallow eroded sections along the valley floor.

3.13 Traffic Conditions

The proposed mine site is accessible only by way of a 0.5 km track from the main Lithgow-Mudgee Road (Main Road No. 55). In the study area, this main road consists of a single-carriageway with one lane for each direction. It carries a considerable volume of traffic, much of which is associated with the current high level of coal mining activity in the region.

Traffic conditions in the study area were measured in the period 30th November to 17th December, 1981 using two Stevens PP3 11 Print-punch Traffic Recorders. The first recorder (No. 1) was set up on the Mudgee Road 0.5 km north-west of Western Main Colliery. The other (No. 2) was located on the Mudgee Road 0.6 km north of the intersection with Boulder (Portland) Road. The locations of the traffic recorders are shown in Figure 4.

Both recorders measured combined hourly traffic flow from both directions. Average combined hourly traffic flow over the survey period for the main road location adjacent to Neubecks Creek (No. 1) is plotted in Figure 6 for weekday and weekend traffic. Each recorder counted the number of 2-axle vehicle units passing, in the same way that average Annual Daily Traffic flows (A.A.D.T.'s) are measured by the Department of Main Roads.

Table 3(f) gives the Average Daily Traffic Volumes as measured during the survey and also the A.A.D.T.'s as recorded by the Department of Main Roads for the same road sections during 1980.

TABLE 3(f)- Average Daily Traffic Flows (Main Road 55)

Location	Average Daily Traffic 30.11.81 - 17.12.81	A.A.D.T. recorded by DMR for 1980
1.	3094	2460
2.	2226	2240

Additional observational surveys to determine the breakdown of traffic by vehicle type were carried out at recorder No. 1 around 3.00 p.m. on the 16th December, and recorder No. 2 at about 3.30 p.m. on 16th December and 11.30 a.m. on 17th December. Six categories of vehicle type were recorded as follows:

1. 2-axled vehicles; cars, vans less than 30 cwt and light commercials.

2. Medium commercial vehicles, rigid, 2-axles.

3. Heavy vehicles - 3 axles, rigid
   3 axles, articulated
   4 axles, rigid.

4. Heavy vehicles - 4 or more axles, articulated or with trailer (includes coal trucks).

5. Motor cycles.

6. Coaches and buses.

Results of this survey are shown in Table 3(g)

TABLE 3(g) - Sample Survey, Vehicle Type

LOCATION	DATE	APPROX TIME	VEHICLE TYPE CATEGORY (number per hour)						
			1	2	3	4	5	6	TOTAL
1.	16.12.81	3.00 pm.	90	10	2	78	0	0	180
2.	16.12.81	3.30 pm.	102	14	4	42	0	0	162
	17.12.81	11.30 am.	72	3	12	33	0	0	120

It is considered likely that the substantial increase in traffic at point 1 shown in the latest survey (Table 3(f)) is largely due to coal trucks from the nearby open-cut mines which have been recently established and traffic associated with the siteworks for Mount Piper Power Station.

The vehicle type survey supports this interpretation, a large proportion of traffic at point 1 consists of coal trucks which operate from new open-cut mines, such as Ivanhoe (Huon) on the Boulder Road.

3.14 **Land Use and Ownership**

The valley formed by the north arm of Neubecks Creek consists of a cleared area of gentle slopes and swampy flats in the south and moderate to steep timbered slopes rising to sandstone cliffs towards the north in the upper part of the valley.

All cleared land and part of the timbered area is held in private ownership. The surrounding land on the northern, eastern and western sides is part of Ben Bullen State Forest. Most of the cleared area, including Portions ....., has now been acquired by the Electricity

Commission for the proposed mine and ash dam. This includes the property "Rockview". A much larger area, as shown on Figure 2, is to be acquired by the Commission as part of the overall Mt. Piper Power Station project.

Apart from grazing, other activities within the immediate site area include an underground mine entry (used for coal production for Wallerawang Colliery) near the main Neubecks Creek in the south, and a borrow pit in the centre of the cleared area. Very little activity occurs within the adjoining areas of Ben Bullen State Forest, other than minor timber extraction. Only limited vehicular tracks exist within the State Forest, the major one being along the high ridge of the Great Dividing Range about 2 km north-west of the site area.

Underground, coal has been mined from the old Huon Colliery and Wallerawang No. 1 and No. 3 Collieries. The extent of the old mine workings bound the northern and southern extremities of coal reserves in the Lithgow Seam beneath Neubecks Creek, as indicated in Figure 7.

3.15 Regional Planning Context

The proposed Neubecks Creek open-cut mine is in an area zoned Non-Urban 'A' under the current planning scheme covering the Shire of Blaxland, now part of the City of Greater Lithgow. Most land within the study area is zoned similarly, with the exception of a 400 metre wide strip on either side of the Mudgee and Portland roads which is Non-Urban 'B'.

Within the Study Area, development approval has already been obtained to construct an ash dam for the Mt. Piper Power Station. A proposed conveyor for the transport of coal from Angus Place is also located across the study area.

The general Lithgow area is an established coal mining region with a number of both underground and open-cut mines in existence and proposed within the vicinity of the Neubecks Creek area. These include Western Main (underground and open-cut), Wallerawang (underground), Ivanhoe (underground and open-cut), Invincible (underground) and Baal Bone (underground). In addition there are a number of smaller open-cut pits which remain from earlier periods of shallow surface mining throughout the area.

In addition to coal mining and transportation, other major industrial activities in the area include the Wallerawang Power Station, Portland Cement Works and the Mount Piper Power Station (now under construction). The other main types of land use in the region include farming and forestry.

The mine site lies about 18 km north-west of the major urban centre of Lithgow, which in turn is located on an axis between the larger urban centres of Bathurst and the Blue Mountains. The smaller townships of Portland and Wallerawang and the villages of Cullen Bullen and Lidsdale all lie within 8 km of the site, as shown on Figure 1. Isolated farmhouses are scattered along the Lithgow/Mudgee Road from Lidsdale to the Portland Road turnoff, 1 km northwest of the Study area.

Lithgow itself is the main urban and commercial centre of the Western Coalfields region, having a population of about 13,500 and offering a high level of services. Census data show that the population declined significantly from the 1950's to 1976 but the expansion of mining and related activities in recent years has reversed this trend and the population of both the town and the general area has increased during this period.

Studies such as the Greater Lithgow Local Environmental Study (Ref. 8) and the Impact of Mining Developments on the Finances of the City of Greater Lithgow (Ref.9) have investigated the overall needs and pressures generated by these mining and energy developments in total, and the reader is referred to these reports for details of available infrastructure, zoned residential land and other social amenity.

Since these studies were prepared in 1981 there has been a marked downturn in prospects for development in the coal mining and power generation industries. Projects have been deferred and the pressures on urban infrastructure, housing and community services anticipated in 1981 may not occur now or certainly will be more gradual.

Indeed it is likely that there will be a contraction in economic activity in the region and therefore continued development and creation of ongoing employment opportunities is important to maintain the current socio-economic levels in the lithgow region.

4.0 DESCRIPTION OF PROPOSED OPEN-CUT MINE

4.1 General Concept

The planned opencut mining operation for extracting coal from the Neubecks Creek area has necessarily been designed to complement the constructon of the Ash Dam for the Mount Piper Power Station. The mining plan has therefore been bound by constraints of time and space relating to the dam proposal.

Due to foundation requirements the area below and immediately adjacent to the proposed dam structure will not be mined. This constraint effectively divides the area to be mined into two zones - a northern section which will underlie the future ponded waters of the Ash Dam and a more extensive southern section which lies between the dam and the Lithgow-Mudgee Road. These zones will be excavated in two periods.

Because of the required date of completion for the ash dam, it is necessary that mining of the northern (or upstream) section be completed by December 1984. The overburden removed during the mining operation in this section will be largely used in the construction of the ash dam.

Mining the southern area is also affected by the Mount Piper Power Station Development which includes a conveyor for transporting coal from Angus Place Colliery as indicated in Figure 2. This conveyor may need to be completed at an earlier stage, by which time mining operations must be clear of the conveyor route across the study area.

Environmental considerations have also affected the proposed mining operation. Open cut areas and stockpiles must be isolated from catchment runoff, and mined areas in the southern section must be rehabilitated progressively to minimise surface scour and visual impact of mining operation from the road. The mining operation will include final restoration of the site, designed to visually screen the ash dam and the conveyor related to the Power Station Development from the Lithgow-Mudgee Road.

4.2 Coal Resources

The general stratigraphy of the Illawarra Coal Measures is discussed in Section 3.3 and presented graphically in Figure 8.

Of the coal seams which occur in the valley of Neubecks Creek, the Lithgow Seam is the most economic. The Lithgow Seam includes the thinner Lidsdale Seam which, towards the main road and in the Mount Piper area, exists as a separate seam some 5 m above the main Lithgow Seam. The Irondale Seam occurs at some 15 m above the Lithgow Seam and will also be mined, though its thickness and quality deteriorates to the north.

The thicknesses and ash contents of the seams can be summarised as follows:

Seam	Av. Thickness	Av. Ash Content
Irondale	1.5 m	27%
Lidsdale)	5 m	22%
Lithgow)		16%

It is estimated that the total coal production will be approximately 1.6 million tonnes at an overall recovery ratio of 1:4.2 (tonnes: cubic metres).

4.3 Extent of Mining Operations

As discussed in Section 4.1, the extent of area to be mined is limited by factors including the proposed ash dam structure (including a 30 m surface barrier on either side), former underground mine workings (including a 40 m barrier), and the Lithgow-Mudgee Road (including a 20m barrier), as shown in Figure 7.

A total area of 87 ha will need to be cleared and stripped of topsoil for mining operations. This consists of 45 ha in the southern mining section and 42 ha in the northern section, which includes about 3 ha of the Ben Bullen State Forest. The actual surface area of coal to be exposed will total about 30 ha, of which 7 ha will be in the northern area and 23 ha in the southern area. The mining operation will be carried out in a series of stages as indicated in Figure 9. This will effectively minimise the area of exposed workings at any one time.

4.4 Mine Planning

The general pattern of opencut mining proposed for Neubecks Creek and the constraints which apply have been outlined in Section 4.1. The sequence of mining in both the northern and southern zones will take the form of open-cut strips as shown in Figure 9.

In the northern mining area, overburden will be stockpiled separately as porous, and non-porous material for use in the construction of the ash dam wall. Restoration of the open cut after mining operations will be unnecessary as the disturbed areas will be well below crest level of the future ash dam.

In the southern mining area the sequence of strip mining will progress in a southerly direction with overburden from each cut being used to back-fill the previous cut. Topsoil will be stripped and used to resurface the final landform being developed as each strip is mined and backfilled.

The general scheme of mining and overburden handling in the southern zone is shown in section in Figure 10.

To allow for the construction of the ash dam, coal will be mined from the northern section first. It is proposed to maintain a production rate of 15,000 tonnes per week throughout the life of the mine.

The estimated number of weeks required for working each open-cut strip and for delivering the coal, and the number of truck trips required are given in Table 4(a).

4.5 Access

Access to the site from the Lithgow-Mudgee Road is shown in Figure 10. These access roads and related carpark and equipment hard-stand areas will be sealed.

The intersection, where this access road meets the Lithgow-Mudgee Road, will be built to Department of Main Roads requirements with acceleration and deceleration/turning lanes provided on the main road.

4.6 Creek Diversion

The present course of Neubecks Creek transects the proposed open cut mining area. Mining activities will require that the open cut operation be isolated from surface drainage. In order to prevent flooding of the open cut operation, flow in Neubecks Creek will be channelled along the western edge of the northern mining zone. In the southern mining zone, flow in Neubecks Creek will be diverted on completion of stage 4S from its channel through Stage 5S, into a prepared channel through backfilled stage 3S. The diversion channels have been designed to carry a 1 in 10 year return flood determined by hydrological design techniques.

TABLE 4(a) Estimated Tonnages of coal, numbers of weeks for mining and delivery of coal and truck trips required for each open-cut strip.

CUT	NO. OF WORKING WEEKS	WEEKLY R.O.M. COAL EXPOSED	TOTAL R.O.M. COAL EXPOSED	NO. OF WEEKS DELIVERY @ 15,000 TPW STOCK: 3 Wks.	NO. OF DAYS (5 Day Wk.)	NO. OF 22 TONNE TRIPS	NO. OF TRIPS PER DAY
				45,285			
1N	9.539	15,095	144,000	9.6	48	6,545.45	136.4
2N	6.088	16,425	100,000	6.67	33.4	4,545.45	134.4
3N	9.99	13,012	130,000	8.67	54.5	5,909.09	136.4
	25.61	AV. 14,603	374,000	24.93	124.7	17,000	AV. 136.4
1S	9.81	15,692	154,000	10.27	51.4	7,000	136.4
2S	12.49	19,375	242,000	16.13	80.7	11,000	136.4
3S	19.63	13,402	263,000	17.53	87.7	11,954.45	136.4
4S	15.0	17,666	265,000	17.67	88.4	12,045.45	136.4
5S	19.48	19,510	380,000	25.33	126.7	17,272.7	136.4
	76.41	AV. 17,129	1,304,000	86.9	434.9	59,273.6	AV. 136.4

Site Preparation 8 weeks approximately		8	
North Area - 25.61 weeks + 1 week for access road	=	27	to complete
South Area - 86.9 weeks + 8 weeks for restoration	=	95	to complete
	about	130	working weeks

4.7 Site Preparation

The initial stages of activity at the site will involve the construction of access roads and the erection of the office, workshop and amenities block.

Earthworks will then prepare the northern zone for the proposed mining operation. The site preparation will include the following:

1. Diversion of Neubecks Creek and construction of perimeter drains and diversion embankments.

2. Preparation of northern coal handling area and settlement lagoon.

3. Preparation of stockpile areas - clearing and drainage.

On completion of mining in the northern zone, the southern mining area will be prepared in a similar manner.

Re-routing of the major power line across the south area will be necessary at least prior to commencement of the southern area and possibly prior to construction of surface facilities.

4.8 Mining Techniques

Open cut mining will be carried out using a "truck and shovel" operation. Each cut will be excavated using a series of benches with a maximum height of 8 m.

All overburden, with the exception of topsoil, subsoil and rippable material, will require drilling and blasting. Large diameter drill holes will be required for this work and Ammonium Nitrate fuel oil mixture will be used as the chief blasting agent for overburden. Mechanical mixing and loading trucks will be employed for charging the blastholes. Gelignite primers and/or Anzomex boosters would be required to prime the fuel oil columns, which would be initiated by

detonators and cordtex lines. Detonating relays will be used to reduce instantaneous firing charges and to minimize explosion noises and ground and air vibrations. Slurries will be required as wet conditions are expected to be encountered.

The coal will be drilled using a smaller mobile rotary drill and blasting will be carried out in a manner similar to the overburden blasting. After blasting, the coal will be removed by front-end loaders and loaded into rear dump trucks of 85 tonne capacity for transportation to the crusher.

Minewater pumped from the open cuts will be collected in settlement ponds before discharging to Neubecks Creek.

4.9 Coal Handling Facilities

Two separate coal handling areas will be established for the crushing, stockpiling and loading of coal from the north and south mining areas. The positions of the two areas are shown in Figure 9. When coal extraction is completed in the northern area the crusher will be moved to the southern location and coal handling will then take place at that point.

Large (85 tonne) rear dump trucks will deliver the coal from the face to the handling area. It will then be fed through the crusher which has a capacity of 350 tonnes per hour and would be powered either by a 300 Hp generator or electrical power. No further beneficiation will be carried out as the crushed coal will be adequate for power station use.

A radial stacker will be used for final product stockpiling before the coal is loaded into road trucks. The coal stockpile will contain about 1 week's production. In addition, an emergency run-of-mine coal stockpile of above 80,000 tonnes would be required.

Rainfall runoff from these areas will be collected in settlement ponds before discharging into Neubecks Creek.

4.10 Coal Transport

Coal will be taken from the product stockpiles and loaded into 22 tonne capacity road trucks by front-end loaders. The trucks will use the coal haulage access road and the Lithgow-Mudgee Road (MR 55) to transport the coal to Wallerawang Power Station, approximately 6 km to the south-east.

It is proposed to produce and transport coal at a rate of 15,000 tonnes per week for a total of about 112 weeks. The number of days of transportation and number of truck-loads per day for each open cut strip are given in Table 4(a).

This indicates that during the period of operation of the mine, an average of 136 truck loads will be required each day, or approximately 272 truck movements.

4.11 Plant and Equipment

The items of plant and equipment likely to be used in the operation are listed in Table 4(b).

TABLE 4(b)
Expected Plant Required
for Neubecks Creek Open-Cut Mine

4 x 9.6m^3 F/E Loaders
9 x R85t Rear Dump Trucks
2 x 400 kw Dozers
1 x R/T Dozer
1 x Loader, 6 cy. Coal Bucket
1 x Grader
1 x Overburden Drill
1 x Small Coal Drill
6 x Lighting Plants
1 x Water Truck, 18,000 litres
1 x Mobile Crane
1 x Coal Crushing Unit (+ 300HP Generator) 350 T.P.H. Capacity.
4 x 6" Water pumps

4.12 Overburden Stockpiles

In the northern section, overburden will be stockpiled in designated areas near the mine area and also in the excavated open cut as porous, non-porous material, and topsoil (See Figure 10). Both porous and non-porous overburden will then be available for use by the contractors for the dam construction if suitable. The total overburden from the three northern mining cuts is equivalent to the compacted volume required for the dam. The topsoil will be available to surface the ash dam.

In the southern area, overburden will be returned to the open pit after removal of the coal to develop the final landform, designed to minimise the visual impact of the ash dam from the Mudgee Road. However, initially, overburden from 1S and 2SA will be stored outside the open cut to provide the necessary working space at the excavation face. Part of the overburden will be used to develop the final land form for the excavated area and the remainder stockpiled downstream of the southern mining area for filling in Stage 5S at the completion of the mining operation.

Perimeter drains will isolate stockpile areas from surface water runoff from undisturbed areas of the catchment. Surface water runoff from topsoil and subsoil stockpiles will be drained to settlement ponds before discharging into Neubecks Creek.

The amount of sand size particles entrained in runoff from the porous stockpiles will be minimised by the provision of a filter toe along the base of these areas.

4.13 Surface Restoration

As discussed above, restoration and rehabilitation of the land surface after mining will be required in the southern mining zone only. The area disturbed by mining in the northern zone will be entirely covered by the ponded waters of the proposed ash dam.

Surface restoration in the southern zone will consist of grading and re-contouring of replaced overburden followed by the re-application of stockpiled topsoil to a minimum depth of 15 cm. The soil will then be planted, seeded and fertilized according to the general principles of rehabilitation as outlined in Section 5.8. The entire rehabilitation programme will be carried out in accordance with the requirements of the Soil Conservation Service of N.S.W.

Overburden material beneath Neubecks Creek and the conveyor route, which traverse the filled open cut, will need to be compacted to 100% standard compaction as it is placed. This will minimise drainage beneath the creek channel and provide stable footings for conveyor installations.

Water for plant growth and dust suppression will be obtained from catch dams upstream of mining area on Neubecks Creek and from minewater settlement ponds.

4.14 Miscellaneous Facilities

In addition to the mining and coal handling facilities, an office and workshop area will be established on the western side of the southern mining zone, as indicated in Figure 9.

This area of about 5 ha will contain an administration office, amenities building, bulk store and compound, maintenance workshop and servicing and fuelling facilities.

4.15 Hours of Operation and Workforce Numbers

It is proposed that mining will be carried out on a 5 days-per-week 3-shift basis and a Saturday overtime shift. The shifts are as follows:

Day shift:	7 am to 3 pm
Afternoon shift:	3 pm to 11 pm
Night shift:	11 pm to 7 am
Saturday shift:	7 am to 2 pm

Removal of coal and overburden will occur on all shifts but crushing will be only on day and afternoon shifts, Monday to Friday. Coal trucking will also take place during day and afternoon shifts, Monday to Friday only.

Blasting will occur only at a pre-arranged time each day, probably at the 3 pm change of shift.

The number of employees at the site is expected to total 72 persons, which is the current workforce at the Ivanhoe (Huon) open cut. This does not include the drivers of coal trucks taking the coal to Wallerawang. The transport of coal will be carried out on a contract basis.

4.16 Water Supply

Town water will be supplied to the site by tanker for drinking and bathhouse requirements.

Water storages upstream from each open cut area will be constructed to provide water for dust suppression at stockpiles and roads, washing down mining equipment, fire fighting, and site rehabilitation. This supply will be supplemented by water from settlement ponds located at each coal handling area.

4.17 Wastewater Treatment

Wastewater from bathhouse and ablution blocks will be treated using septic tanks and absorption trenches.

Surface runoff from areas affected by oil and grit will pass through an oil separator and grit trap before discharging to a settlement pond for removal of fine material.

Water from the open cut mining operation and overburden stockpile areas will be treated in settlement ponds adjacent to each coal handling area and then discharged to Neubecks Creek in accordance with the requirements of the Clean Waters Act.

5.0 ENVIRONMENTAL SAFEGUARDS

5.1 Soils, drainage and erosion

Surface drainage in the valley of Neubeck's Creek has been separated from mining operations by the channelling of creek flows through open-cut mining areas, and the construction of perimeter drains and diversion embankments around the perimeter of the area of operation.

The base width of the proposed diversion channel through the northern mining section will be 6 metres. The channel will be 1.5 metres deep with side slopes 1 vertical: 1 horizontal excavated in rock. The average gradient of the channel will be 1.5% from below the spillway upstream of the northern mining region to the creek embankment upstream from southern mining zone.

In the southern mining section, the temporary diversion channel will be 25 metres wide below a spillway through the embankment protecting this mining area. The final channel through the rehabilitated mining area will be 30 metres wide.

Channel dimensions have been designed to carry a 1 in 10 year return flood, determined from hydrological design techniques. This design return frequency is considered acceptable as the duration of mining activities proposed is approximately two years.

Procedures included in the mine operation to control surface erosion from disturbed areas of the study area are as follows:-

- Separation of mining operation from undisturbed areas of the catchment.

- Selection of overburden stockpile areas to minimise surface disturbance over steep sloping terrain.

- Limiting surface grades of stockpiles and providing lateral drains when stockpiles exceed 7m.

- Minimising volume of overburden stockpiled outside open cut areas.

- Revegetation of final landform on completion of mining operation.

- Limiting access to areas not affected by mining activities.

5.2 Water Pollution Control, Water Quality and Supply

Water in Neubecks Creek has been classified by the State Pollution Control Commission as Class "C" which provides for a licenced discharge of water into the creek under certain water quality control conditions. There are three possible sources of water contamination at the mine site:

i) silt laden surface runoff from stockpile areas and coal handling areas;

ii) minewater encountered in open cut mining operations;

iii) sewage.

These sources of "dirty water" will be treated in the following ways:-

i) Surface runoff from stockpile areas and coal handling areas will be drained to filter lagoons to contain water from a 1 in 10 year storm over the disturbed areas contributing to each filter lagoon.

ii) Minewater will be pumped into the settlement ponds;

iii) Sewage will be disposed of using a septic tank and absorption trenches;

iv) Water contained in the settlement ponds will be used for irrigation and dust suppression. The remaining water will be discharged into Neubecks Creek under licence from the State Pollution Control Commission.

The mining operation is expected to be a nett supplier of water to Neubeck's Creek downstream from the mine site, but the necessary embankment across Neubecks Creek to divert flow around the mine area, will delay flow into Neubecks Creek through the site.

5.3 Air Pollution Control

The only possible sources of air pollution from the proposed mine will be dust emissions from blasting, coal and overburden handling, roadways and crusher/stockpile area.

Permanent and semi-permanent haul roads will be stabilised by the use of suitable materials for the base and wearing course to prevent the generation of dust. On temporary, loose surface haul raods, water carts will be employed to keep the surface from drying and becoming a source of dust.

All laden coal trucks leaving the site will be required to cover their loads to prevent coal dust and the spillage of coal.

The early re-establishment of vegetation and mulching of reinstated land surfaces will help to minimize the extent of loose ground exposed to the wind.

It is proposed to establish a number of dust deposit gauges in the vicinty of Neubecks Creek to monitor dust fallout. If necessary, further safeguards will be introduced as required. The operation will be required to be licenced under the Clean Air Act.

5.4 Noise and Vibration

Some activities associated with the mining operations at Neubecks Creek will generate substantial levels of noise in the immediate vicinity. The major sources of noise will be from blasting, the crushing and screening plant, drilling rig, bulldozers, truck loading and truck movements.

Although the operation will be carried out on a 3-shift, 24 hour basis, not all activities will occur on all shifts. The handling of coal and overburden on site will ocur on all shifts, including 7 am - 2 pm on Saturday.

The coal crushing plant, however, will operate only on day and afternoon shifts (7 am to 11 pm), Monday to Friday. Similarly the loading and road transport of coal, and the drilling of coal and overburden, will be restricted to these hours.

Blasting will be carried out once every day (Monday - Friday) at a pre-set time, probably at the 3.00 pm change of shift. Blasting will be the major source of high noise levels and ground vibration from the mine. However, to minimise these effects the amplitude of the blast waves will be limited by delay blasting, ensuring that the volume of explosive detonated at any one instant will be relatively small. During blasting in the southern-most strip (5S), it may be necessary to temporarily close the Lithgow-Mudgee Road.

The standard limits on blasting normally imposed by the State Pollution Control Commission refer to the nearest residence and consist of a maximum instantaneous noise (overpressure) level of 115 dBLin and a maximum ground vibration not exceeding a Peak Particle Velocity of 7mm/s. (These limits refer to the hours between 9am and 5pm).

All items of equipment in use at the site will be silenced wherever possible to minimise disturbance. The entire operation will require approval under the Noise Control Act (Section 27).

5.5 Visual Quality

The visual quality of the area as assessed in Section 3.11, has been the basis for the design of emplacement areas and revegetation programmes, to ensure maintenance of the visual environment. Extraction operations and construction of the already approved ash dam wall, will significantly alter the visual amenity. The proposed height and dimensions of the dam wall will serve to produce a false horizon in the middleground of the view seen from Mudgee road. To compensate for this elevated horizontal intrusion across the site, the overburden emplacement has been designed to form two interlocking ridgelines of varying heights and gradients, which will serve to create a similar landscape formation to that which will be hidden by the ash dam wall.

These will then be covered with topsoil to a minimum depth of 150 mm, planted at intervals with indigenous tubestock tree species and then seeded with grass species recommended by the Soil Conservation Service (Ref. 2).

The resultant visual environment will be composed of low grassed hills, forested ridgelines with grassed creek lines surrounded by trees.

5.6 Vegetation

The existing vegetation as seen in the report by Benson in 1979, (Appendix C), shows that the areas proposed for extraction and emplacement are confined to those areas cleared for grazing. There are a number of isolated trees which will be removed during mining activities and it is proposed that this vegetation be chipped and stockpiled for use during the revegetation stage.

Revegetation of the area will proceed immediately upon completion of Stage 2S extraction. This scheme maximises the use of indigenous materials by stockpiling and reusing topsoil and chipped cleared vegetation.

The area to be revegetated will be covered with the stockpiled topsoil to a depth of 150mm on slopes and 300mm on benches. The area shall then be lightly ripped or chisel ploughed across the slope and then sowing shall proceed. The following seed mixes shall be used dependant on the time of application.

Autum - Winter Sowing	kg/ha
Perennial Rye grass	10
Highland bent	5
Phalais	5
Woolly pod vetch	15
Lucerne	5
Spring - Summer Sowing	
Paspalum	5
Hulled couch	5
Cow peas	10
Red Clover	5
White Clover	5

All legume seed to be innoculated with rhizobium and lime pelleted 24 hours prior to sowing.

Bench areas above R.L. 940 and the two creek lines will be planted with Eucalyptus rossii, Eucalyptus macrorthyncha, Eucalyptus mannifera, Eucalyptus dalrympleana and Eucalyptus fastigata to ensure the dominant natural species are maintained.

LM

Upon completion of each phase of seeding and planting the stockpiled mulch shall be spread over the seeded areas and the area watered to ensure germination and rapid growth.

The resultant vegetation will consist of an increase in area under tree canopy and pasture grasses, which will suit restoration of the site to pastoral landuse.

The revegetated areas must be fenced for a minimum of two years to ensure plants will not be destroyed by local fauna.

5.7 Overburden Management

As discussed in Section 4.12, overburden will be stockpiled in designated areas for both the northern and southern mining zones. In the north the overburden will be made available for construction of the ash dam wall and no restoration of mined areas will be required. Some 1.2 million cubic metres of overburden material would be stored in the dump area at an average height of 12 m.

In the southern mining area, overburden from open cuts 1S and part of 2S will be stockpiled in the area shown on Figure 9. Overburden also will be used to establish the southern coal handling area adjacent to the office and workshop area.

The areas designated for overburden storage will be stripped of topsoil in the initial stages and isolated from clean surface waters by a system of cut-off drains. Run-off water from these areas will be collected and directed to settling dams as described in Section 5.2.

The overburden stockpiles will have graded slopes approximately 1 in 3 and it may be necessary to form benches in these slopes to incorporate runoff control works when height of stockpile exceeds 8 metres.

It is not expected that the stockpiled overburden material will lead to problems of leachate generation. No problems of this type have been encountered at the nearby Ivanhoe (Huon) Open Cut operation. The strata which overlie the coal seams include sandstone, shale, siltstone and minor coal bands.

Laboratory testing was carried out previously to determine the leaching characteristics of overburden strata at the nearby Ivanhoe (Huon) Open Cut Mine, which are the same as the strata occuring at Neubecks Creek. Results of this testing programme (Ref 10) show that even with finely-crushed rock subjected to severe leaching tests, materials dissolving out of the rock were minimal. The levels of pH, total dissolved solids, sulphates and hardness were similar to those in surface water samples from the area.

These tests, together with water quality information obtained from water in old mine workings in the Neubecks Creek area (See Section 3.7) show no evidence of potential contamination problems or existing toxic properties within the overburden material.

5.8 Rehabilitation Programme

As discussed above no restoration of the northern mine site will be required and the overburden from this area which is proved to be suitable by geotechnical testing will be used in the construction of the ash dam wall.

The southern overburden emplacement has been designed to allow for commencement of land formation immediately upon commencement of overburden removal. Overburden will be progressively placed as shown in Figures 11,12,13,15,16. Topsoil will be progressively removed and used to surface the progressive development of the final landform. The topsoil will be spread over the finished surface to a minimum depth of 150 mm on slopes and 300 mm along benches. The area will then be seeded with grass mix outined in Section 5.6. Benches above R.L. 940 will be planted with tubestock of selected tree species (see Section 5.6). Excess overburden from Stage 1S and 2SA will be stockpiled as shown for replacement upon completion of all extraction.

A creek diversion, located as shown on Figure 14 will be constructed and the entire area seeded and mulched with grass species nominated in Section 5.6.

Coal extraction, overburden removal and revegetation will proceed in stages until Stage 4 is completed. At this time Neubecks Creek will be diverted through the prepared channel across the filled area of the open cut. On completion of stage 5, the excavation will be backfilled using the stockpiled overburden from stages 1S and 2SA.

The creek diversion mound (see Figure 14) will then be removed and Neubeck's Creek will resume its original course. The north arm of Neubeck's creek will continue along the diverted route to serve as an emplacement drain and the new junction will be located as shown in Figure 16. The rehabilitation programme will continue with 2 years maintenance included after mining is completed to ensure successful stabilization and revegetation.

6.0 ASSESSMENT OF ENVIRONMENTAL IMPACT AND INTERACTION OF PROPOSAL WITH THE ENVIRONMENT

6.1 General

As discussed elsewhere in this report, the general character of the Mount Piper - Neubecks Creek area will be changed markedly by the construction of the Mount Piper Power Station and its associated facilities.

The area proposed for open-cut mining will be substantially affected in this way by the construction of the large ash dam structure only 600 metres north of the Lithgow-Mudgee Road. The power station proposal also includes a coal conveyor passing between the road and the ash dam and crossing under the road immediately to the west. The major power station facilities are on the opposite side of the main road and include the main structure, cooling towers, storage areas, offices and a large coal stockpile area only 400 m from the road.

The proposed southern mining area will be restored and revegetated after mining, as described in Section 5.8 above. It is considered that the changed landform and stream channel in this area will not represent a major impact or detract from the amenity of the area in any way. This is particularly true in the light of the major changes to the character of this area which will result from the Mount Piper Power Station development.

6.2 Landform

Although the proposed post-mining landform (see Figure 16) represents a change from the present contour pattern, the environmental consequences of this alteration are minor.

The restored landform shape has been designed to be entirely congruous with the existing ridgeline and valley system, and to be stable and form a natural screen to the completed ash dam wall.

Slopes on the restored landform will be gentle, with a maximum grade of 1:4. The rehabilitation procedure of filling and grading, topsoil application, seeding and fertilizing will ensure that the new surface is entirely stable and not subject to excessive infiltration.

The main channel of Neubeck's creek will be restored to its original position while the north arm will remain in the creek diversion position shown on Figure 14 to enable it to intercept surface drainage from the rehabilitated slopes. The junction between the two will be as shown in Figure 19. The channels will be constructed with grades similar to those existing and with bed and banks formed to prevent erosion or collapses.

6.3 Site Drainage and Erosion

The proposed mining operation is located within the natural drainage lines for the Neubecks Creek catchment area, and has a drainage network designed to isolate the mining area from the undisturbed portion of the catchment area.

On completion of mining operations, disturbed surfaces within the mining area, below the ash dam will be subjected to a rehabilitation programme. The final landform will include a table drain network for drainage through the site and a planting programme across the surface to prevent surface erosion by wind or rainfall runoff.

6.4 Water Quality

Without proper controls the proposed mining operation has the potential to cause a major impact on Water Quality in Neubecks Creek downstream of the study area because the mining area lies within the drainage line of Neubecks Creek. However the safeguards described in Sections 5.1 and 5.2 have been designed to isolate the mining operation from the catchment drainage and to treat all surface runoff from the mine operation.

Results from tests on minewater and water percolating through overburden stockpiles at adjacent mine sites, indicate that mine water is of good quality, acceptable for discharge into Class "C" waters, and that there is no leachate contamination from stockpile areas. Consequently the main contaminant will be fine sediment from the mine site.

The proposed filter lagoons are considered adequate to provide the necessary treatment to remove this material from the water prior to discharge into Neubecks Creek.

Sewage will be treated by a septic tank and absorption trenches. This treatment is considered adequate for the facilities provided and the short mining period proposed for the site.

6.5 Air Quality

It is likely that some dust will be generated within the site area during mining operations. This could include both fine material from exposed earth surfaces (and from blasting) and fine coal dust from stockpiles and crushing/loading activities.

The safeguards outlined in Section 5.3 are considered adequate to ensure that dust emissions within the site are kept to acceptable levels, as required under the State Pollution Control Commission approvals.

Any problems arising from dust generation at the site would occur primarily during windy weather. The incidence of wind speeds greater than 30 km/hr which might be expected to cause dusting problems is low and is generally from the westerly sector (see Section 3.5 and Figure 3). To the east of the proposed mine area there is no habitation and to the north-west (the other direction subject to stronger winds) the area is undeveloped.

6.6 Noise And Vibration

6.6.1 Operational Noise

Predicting the acoustic environment in the vicinity of an open-cut mining operation is difficult as many of the sound sources are mobile and most are located in different zones and at varying depths below ground level over time.

In assessing the predicted noise impact of the open-cut operation, noise levels for typical items of equipment were from measurements at other mines or from manufacturers specifications. All items of equipment likely to be required for the mine are listed in Table 4(b) (Section 4.11). The major items and their measured or estimated noise levels are shown below in Table 6(a).

TABLE 6(a) Major Items of Plant and Operational Noise Levels

Source	Continuous Noise Level (dBA) at 10 m	Peak Level (dBA) at 10 m
Mobile coal crusher	84	85
Haul Truck (R-85)		87 (with load)
Overburden Drill Rig (Gardner-Denver RDC 30)	87	
Front End Loader (Caterpillar 992 B)		85
Trucks dumping rock		91
Bulldozer (Cat. D9)		90
Coal Truck movements and loading		85

In assessing the maximum likely noise levels, it is assumed that not all the intermittent sources will operate together. Therefore the continuous noises have been taken, together with likely simultaneous other noises in close proximity and summed to give an estimated total effective level of 92 dBA at 10 m.

This maximum effective noise level has then been used to estimate noise levels occurring at distances from the mine and to establish a set of maximum noise contours which are presented in Figure 17.

These contours do not represent levels of noise which will affect the entire area at any one time, but refer to the maximum likely levels which may be experienced in the area at some stage of the open cut operation, which will have a total life of some three years.

In calculating the noise attenuation at distances from the open cut, an attenuation rate of 5 dBA per doubling of distance was used. This is less than the theoretical attentuation rate of 6 dBA and was used to calculate the predicted noise levels under the worst atmospheric conditions such as those produced by winds or temperature inversions. In additon, these attenuaton rates apply to free-field conditions (where atmospheric absorption and ground absorption effects are ignored) from a source at ground level. In the study area the ground surface is undulating to hilly and largely timbered, and operations within the proposed open cuts will be largely below ground level.

From this it can be seen that the projected noise levels are conservative estimates of noise impacts on the environment.

The nearest houses to the proposed mine (excluding those on property to be acquired by the Electricity Commission as part of the overall Mount Piper project) are at Blackmans Flat, to the south-east.

The closest residence is just over 1.0km from the southern overburden storage area, and nearly 2.0km from the coal handling areas, but is partly shielded by the landform. It is possible that this house could receive maximum intermittent noise levels of around 50 dBA from the mine site during operations in the southern-most part.

It is not considered that houses in the Blackmans Flat area will be adversely affected by noise from the Neubecks Creek mine because the acoustic environment in this area is already totally dominated by Wallerawang and Western Main Collieries and by traffic on the main road. Noise levels from the Neubecks Creek coal crushing plant will not exceed 45 dBA (at most) on a continuous basis, with occasional peak levels of about 50 dBA.

6.6.2 Blasting Effects

Blasting will be carried out in accordance with the requirements of the Coal Mines Regulations Act and will also comply with the normal conditions laid down by the State Pollution Control Commission as part of the approval required under the Noise Control Act, 1975.

It is considered that the standard limits (see section 5.4) can be satisfactorily met at Neubecks Creek, as evidenced by measurements taken during blasting operations at the nearby Ivanhoe Open Cut which is of similar size and geology (Ref. 11). Measurements were made at a distance of 1.5 km from the blast point which is equivalent to the minimum distance between the closest residence and the Neubecks Creek mine area.

The overpressure level recorded was 116 dB Lin which marginally exceeded the limit of 115 dB Lin, but was partly due to unfavourable winds. The Peak Particle Velocity recorded was 0.5 mm/s which easily meets the requirement of 7.0 mm/s.

6.7 Vegetation

The revegetation of the extraction, emplacement and stockpile areas will be as described in preceeding sections. The emplacement boundaries are limited to those open grassed areas with only sparse tree cover, and therefore the impact on the natural vegetation during extraction and emplacement will be negligible.

The revegation scheme has been designed to maximise the interaction potential between existing and proposed vegetation as shown in Figure 16. The use of designated tree species at tubestock stage will ensure quick growth and reduce the possibility of degradation of the surrounding natural areas. The use of chipped cleared vegetation with imported pine flake mulch will increase the potential for natural regeneration of surrounding forest species.

The success of the scheme is largely dependent on the maintenance of a constant water supply to revegetated areas and control of exotics which are at present on site. Should this be ensured then the impact of the proposal on the vegetation will be positive in that the natural areas will be extended.

6.8 Fauna

Two fairly rare bird species were found in the study area: the Black-eared Cuckoo and the Origma (Ref 6). No destruction of habitat in which these birds are likely to be found will occur beyond the limited amount already to be destroyed by the proposed ash storage dam.

The greater part of the area to be affected by the proposed open cut mining operations lies within the high water boundary of the proposed ash storage dam. The remaining area, below the proposed dam wall, is largely cleared or otherwise man-affected. Hence no additional habitat destruction will result from mining operations.

A general movement of fauna away from the mine site due to increased noise and activity would be expected during mining operations and later ash dam construction. Certain species, such as the House Sparrow, Passer domesticus, the Australian Magpie, Gymnorhina tibicen, and the Pied Currawong, Strepera graculina are unlikely to be thus affected.

6.9 Visual Amenity

At the commencement of extraction of the northern section of the site the visual amenity will be degraded. Further reduction in the visual quality of the area will occur upon completion of the ash dam wall, as this will restrict the extent of view available from the Lithgow-Mudgee Road. The impact at this stage of the proposal will be significant.

Further impact on the visual environment will occur upon commencement of extraction in the southern area. These activities will be clearly visible from the Lithgow-Mudgee Road and will be emphasised by the ash dam wall which by decreasing the extent of view will increase the scale of the activities relative to the visible surrounds. However these activities are quite common throughout the region and although most are well hidden from public view the addition of these workings would not create any significant contrast to the regional visual quality. The temporary nature of these workings also diminishes the impact.

The rehabilitation programme outlined in Section 5.8 is designed to minimise the time of degradation of the visual environment, by ongoing restoration works. The final landform indicated in Figure 16 is designed to work as an extension of two ridgelines to form two interlocking spurs in the foreground of the ash dam wall as viewed from Mudgee road. As this is a reproduction of existing landforms screened by the ash dam wall the interaction potential of the proposal with the existing visual environment is therefore maximised.

6.10 Land Use

The impact of this open cut mine on future land use will be negligible as the area falls entirely within the large tract of land to be acquired by the Electricity Commission for the Mount Piper Power Station development.

A large part of the valley formed by the north area of Neubecks Creek will be inundated by the proposed ash dam, including the northern mining area. The southern mining zone and coal handling areas will be revegetated as outlined above and suitable for grazing or other forms of passive land use.

6.11 Traffic Considerations

As discussed in Section 4.10, the road haulage of coal from the mine site to Wallerawang Power Station will involve about 270 daily truck movements for approximately 112 weeks. Coal trucking will occur during day and afternoon shifts, from 7.00 am to 11.00pm, on weekdays only.

The current Average Daily Traffic (A.A.D.T.) for Main Road 55 adjacent to the mine site is about 3,000 vehicles per day (see Section 3.13). This total includes 200 to 300 daily coal truck movements to and from the Ivanhoe (Huon) open cut mine.

The proposed Neubecks Creek open cut operations will commence as the Ivanhoe open cut closes down and while the number of daily truck movements for coal haulage to Wallerawang will be the same, the distance will be slightly less and along the same route.

Therefore, because the number of trucks carrying coal from Neubecks Creek will be the same as those currently hauling coal from Ivanhoe open cut, the total coal traffic on Main Road 55 will not increase as a result of this proposal. Similarly, other traffic associated with the new mine such as private cars at shift charges, deliveries etc, will be much the same as that presently travelling to and from the Ivanhoe open cut mine.

It is therefore considered that the proposed Neubecks Creek Mine will cause no additional environmental, safety or road traffic impacts during its life of approximately 3 years.

6.12 Regional Planning and Social Context

As discussed in Section 3.15, the Western Coalfields area, and Lithgow in particular, have experienced substantial growth in recent years through proposed major coal mining and power generation developments. However, this boom situation has seen a downturn over the last few months.

The proposed Neubecks Creek Mine is a relatively small and short term development having a total life of some 3 years only. It will commence operating at the same time as the nearby Ivanhoe open cut mine closes and will have a similar magnitude of operation, workforce size and overall life. In fact it is likely that most of the personnel involved in the Ivanhoe open cut mine will simply transfer to similar positions at nearby Neubecks Creek.

The concept of the new mine starting up as the other finishes has benefits in many ways, particularly as it will allow the availability of similar employment to that currently provided for skilled workers at the closing mine. This is particularly important in terms of the present depressed state of the coal mining industry in the Lithgow area. The employment of 72 skilled workers at Neubecks Creek will help to maintain the economic well being of the Lithgow area and avoid further reduction in economic activity when the Ivanhoe open cut mine closes in 1983.

Because the Neubecks Creek mine will employ the same number of employees with the same skills as the Ivanhoe open cut mine and because Neubecks Creek mine will commence operations when the Ivanhoe open cut mine is closed, no new mining employment will be created in the City of Greater Lithgow by the Neubecks Creek development. Essentially this means that the social and planning

effects of creating a number of new jobs in the area are avoided. No new temporary housing or other services will be required and Newcom Collieries Pty. Limited does not intend to provide any such facilities. Similarly it is not considered that infrastructure payments are relevant to this proposal.

The proposed mine development offers substantial benefits to the community. In addition to providing employment for 72 men, it will enable the extraction of 1.6 million tonnes of coal which would otherwise be sterilised by construction of the ash dam for the power station. The coal is to be used for power generation and is therefore a valuable community resource.

7.0 MONITORING PROGRAMME

7.1 Water Quality

Water sampling of flow in Neubeck's Creek commenced in October 1981. Samples have been taken for water quality testing on several occasions and results are given in Appendix B.

It is proposed that water sampling from Neubecks Creek will continue in order to monitor water quality downstream of the open cut site throughout the duration of mining activities.

7.2 Air Quality

A number of dust deposit gauges are to be installed in the area surrounding the mine site before operations commence. Particulate air quality will then be monitored on a continuing basis to ensure that the safeguards outlined in Section 5.3 are operating effectively.

7.3 Noise and Vibration

All mining and associated activities will be carried out to ensure compliance with approvals under the Noise Control Act. Where necessary monitoring will be undertaken to ensure such compliance.

7.4 Rehabilitation

The success of the revegetation programme and therefore the potential for the area to be restored to its original landuse i.e, pastureland, is largely dependant on the maintenance programme.

Maintenance for the scheme will involve regular watering, replacement of failed tree species, monitoring and removal of all exotic growth, inspection and maintenance of fencelines to protect growth from local fauna and reseeding any areas of failed grass growth. The program should continue for a minimum of two years.

8.0 ACKNOWLEDGEMENTS

The preparation of this Environmental Impact Statement for the proposed Neubecks Creek open cut mine has been undertaken by a team from Longworth and McKenzie Pty. Limited. The main members of the study team were:-

E.T.C. Johnstone, B.A., M.A., M.I.M., M. Aust. I.M.M., M.A.W.W.A., who is the Principal responsible for the study.

R.K. Genders, B.E.
D.O. Johnson, B.Sc., M. App. Sc.
M.A. Schell, B.L. Arch.
I. Shepherd, B.A.
P. Totterdell, B.E.

In addition, the study team wish to acknowledge the helpful assistance given to them by the Electricity Commission of New South Wales, Newcom Collieries Pty. Limited, other mining companies in the area and Mr. Ian Brooks, District Soil Conservationist, Lithgow.

REFERENCES

1. The Electricity Commission of N.S.W., Mount Piper Power Station Environmental Impact Statement, August 1980.

2. Soil Conservation Service of N.S.W., Wallerawang Colliery Open Cut Proposal - Preplanning of Stabilisation and Rehabilitation Aspects, February 1980.

3. The Electricity Commission of N.S.W., Power Development Division Wallerawang Area Climatic Dataset, March 1981.

4. Bell F.C. and M.T. Gatenby, Effects of Exotic Softwood Afforestation on Water Yield, Water Research Foundation of Australia, Bulletin No. 15, 1969.

5. Benson D.H Royal Botanical Gardens and National Herbanium, Sydney Flora Survey - Possible Power Station Development - Western Coalfields, March 1979.

6. The Australian Museum, Faunal Survey of the Mount Piper Area April 1979.

7. Wright R.V.S., University of Sydney, Archaeological Relic Survey March 1979.

8. Kinhill Pty. Limited, Greater Lithgow Local Environmental Study March 1981.

9. Gutteridge Haskins and Davey Pty. Limited, Impact of Mining Developments on the Finances of the City of Greater Lithgow July 1981

10. Longworth and McKenzie Pty. Limited, Environmental Assessment of the Proposed Ivanhoe Open Cut No. 1 (Huon) Coal Mine at Mount Piper, N.S.W. July, 1980.

11. Wilkinson - Murray Consulting Pty. Limited, Ivanhoe No.1 Open Cut Mine, Noise and Blasting Measurements September 1981.

APPENDIX A

SOIL PROPERTIES IN RELATION TO MINING

From:

Wallerawang Colliery Open Cut Proposal-Preplanning of Stabilization and Rehabilitation Aspects, by R.J. Connolly & I.S. Brook, Soil Conservation Service of New South Wales, 1980.

SOIL PROPERTIES IN RELATION TO MINING

	Soil Name	Hydrologic Properties	Mechanical Properties	Fertility	Implications for Mining and Rehabilitation
i)	Heavy, dark, flood plain soil	Internal drainage generally slow. Water table to 1 metre below surface. Alluvial materials probably persist several metre below 3 metres backhoe trenches	B horizon highly structured, mottled clay layer compact	Acid soil but moderately fertile. Physically well structured	Useful "retopsoiling" material to depth of 1 metre. Requires addition of lime and nitrogen fertiliser. In situ soil subject to water-logging
ii)	Yellow duplex soils	Internal drainage slow, but variable due to sand layers. Alluvium may be in excess of 5 metres depth in centre of drainage plain	Loose A horizon with moderately compacted B horizon	Moderately acid soil, low chemical fertility	Darker coloured topsoil with organic matter; useful 'retopsoiling" material. Bleached A_2 horizons erodible and unsuitable as surface materials. Difficult material to work if wet conditions. Materials should be loosely respread avoiding compaction
iii)	Yellow leached earths	Moderate infiltration and moisture holding capacities	Moderately compacted at surface with compaction increasing with depth	Moderately acid soil with low chemical fertility	Surface soil with organic matter is useful for "retopsoiling" with good responses to added fertilisers expected. Compaction should be avoided in respreading materials.

APPENDIX B

Results of Surface Water Quality
Monitoring Programme

SURFACE WATER QUALITY DATA

SAMPLE POINT 1

(Neubecks Creek, immediately below junction with north arm)

	TEST	20/10/81	3/11/81	19/11/81	30/11/81	17/12/81	29/1/82	2/3/82
1.	pH	5.3 5.9	6.0	5.9	6.9	6.4	6.5	
2.	Conductivity umho/cm	132 127	260	200	590	200	510	
3.	Turbidity F.T.U.	100 90	45	40	17	70	20	
4.	Suspended Solids mg/1	526 145	39	4	2	35	3	
5.	Total Dissolved Solids mg/l	173	150	254	214	533	230	445
6.	Colour Co/Pt Units	muddy	700	230	350	60	35	32
7.	Alkalinity mg/l	N.D.	10	7	15	35	35	40
8.	Nitrate mg/l	2.3 2.9	1.3	1.1	0.7	2.4	0.5	
9.	Phosphate mg/l	Trace	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
10.	Sulphate mg/l	18 25	130	65	290	100	223	
11.	Chloride mg/l	N.D.	N.D.	N.D.	40	Trace	N.D.	34
12.	M.B.A.S. mg/l L.A.S.	N.D.	Trace	N.D.	N.D.	N.D.	N.D.	N.D.
13.	Hardness EDTA mg/l	55 60	121	130	344	83	333	
14.	Calcium mg/l	10 8	20	24	53	12	4.9	
15.	Magnesium mg/l	7 10	17	17	53	12	26	
16.	Iron (total) mg/l	2.2 1.5	3.3	2.0	2.5	12.2	0.9	
17.	Manganese mg/l	0.6 0.5	3.2	2.5	1.6	2.3	0.9	
18.	Zinc mg/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
19.	Copper mg/l	N.D.	N.D.	N.D.	N.D.	N.D.	Trace	0.08
20.	Coliforms MPN/100 ml		49	920	39		1600	
21.	E. Coli MPN/100 ml		22	278	17		79	
22.	BOD_5 mg/l	10						

NOTES: * Heavy rain
N.D. - Nil detected

SURFACE WATER QUALITY DATA
SAMPLE POINT 2
(North Arm of Neubecks Creek, immediately above junction)

	TEST	20/10/81	3/11/81	19/11/81	30/11/81	17/12/81	29/1/82	
1.	pH	5.3	6.0	5.7	6.1	7.1	6.5	
2.	Conductivity umho/cm	128	155	280	195	595	230	
3.	Turbidity F.T.U.	100	90	44	42	20	72	
4.	Suspended Solids mg/1	524	166	16	5	6	88	
5.	Total Dissolved Solids mg/l		225	168	290	196	527	251
6.	Colour Co/Pt Units	muddy	700	230	350	70	350	
7.	Alkalinity mg/l	N.D.	10	5	10	40	35	
8.	Nitrate mg/l	2.3	3.5	1.6	1.0	0.7	2.7	
9.	Phosphate mg/l	Trace	Trace	N.D.	N.D.	N.D.	N.D.	
10.	Sulphate mg/l	18	44	162	90	270	125	
11.	Chloride mg/l	N.D.	N.D.	Trace	Trace	Trace	N.D.	
12.	M.B.A.S. mg/l L.A.S.	N.D.	Trace	N.D.	N.D.	N.D.	N.D.	
13.	Hardness EDTA mg/l	55	70	133	100	313	104	
14.	Calcium mg/l	10	16	22	16	56	21	
15.	Magnesium mg/l	7	7	19	10	41	12	
16.	Iron (total) mg/l	1.0	0.8	5.2	2.1	2.0	N.D	
17.	Manganese mg/l	1.2	0.8	4.3	2.6	1.5	3.6	
18.	Zinc mg/l	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	
19.	Copper mg/l	N.D.	N.D.	N.D.	N.D.	N.D.	Trace	
20.	Coliforms MPN/100 ml			13	22	240		
21.	E. Coli MPN/100 ml			22	22	17		
22.	BOD_5 mg/l		10					

NOTES: * Heavy rain
N.D. - Nil detected

APPENDIX C

Extract from

VEGETATION SURVEY OF PROPOSED POWER STATION DEVELOPMENT, WESTERN COALFIELDS

By

D.H. Benson
Royal Botanic Gardens & National Herbarium, Sydney, 1979

Vegetation Survey of Proposed Power Station Site Western Coalfields

Three areas between Wallerawang and Portland were examined in February, 1979 as proposed sites for a power station, ash dam and water supply dam. They were: Area A, an area south of Ivanhoe Colliery and proposed for power station development, Area B, north of Wallerawang Colliery and proposed for an ash dam (and Neubecks Creek mine site), and Area C, a small area south of Western Main Colliery and proposed for a water storage dam.

The Sydney 1:250,000 Geological Sheet shows that the areas are basically all on Permian shale, sandstone, conglomerate and chert with limited areas of Triassic Narrabeen sandstones.

The site dealt with in this statement is Area B. The following relevant section has been extracted from the report.

Area B

The flat country adjacent to Neubecks Creek at the southern end of the area is cleared. The rest of the area is native vegetation. Three natural communities can be recognized.

1. WOODLAND of Eucalyptus sieberi, E. piperita and E. rossii

   This community is confined to the rocky outcrops of Narrabeen series sandstones in the northern half of the area. The vegetation ranges from WOODLAND to LOW WOODLAND depending on exposure. The main tree species are Eucalyptus rossii, E. sieberi, E oblonga and E. macrorhyncha. E. piperita is restricted to sheltered sites.

   The understorey is open with scattered shrubs such as Oxylobium ilicifolium, Persoonia linearis and Acacia terminalis and ground plants such as Dianella revoluta and Lomandra species.

   Large rocky outcrops may be associated with small patches of treeless OPEN-HEATH and LOW SHRUBLAND. Common species are Leptospermum flavescens, Leptospermum arachnoides, Leucopogon muticus and Cassinia arcuata.

2. WOODLAND of Eucalyptus rossii, E. macrorhyncha and E. mannifera.

This community is found on the Permian shales, sandstones and conglomerates which cover a large part of the area, and is similar to the vegetation of Area A. Eucalyptus rossii, E. macrorhyncha and E. mannifera are the most common trees with E. dalrympleana, E. bridgesiana and E. dives occurring on better sites. These last species were probably originally common on the cleared area. On drier sites the understorey is mainly of shrubs such as Acacia terminalis, Boronia microphylla and Oxylobium ilicifolium. Where this community is found on rocky scree slopes below outcrops of the Narrabeen Series sandstone, typical "sandstone" species may also be found including Petrophile pulchella, Caustis flexuosa and Platysace lanceolata.

On the better sites the understorey has shrubs of Acacia dealbata and grasses such as Themeda australis.

3. OPEN-FOREST of E. dalrympleana and E. fastigata

Along sheltered creeks, particularly Neubecks Creek is OPEN-FOREST to WOODLAND with Eucalyptus dalrympleana and less frequently E. dives and E. macrorhyncha.

Generally the understorey is a mid-dense cover of grasses, particularly Echinopogon species and herbs, including Viola betonicifolia, Acaena anserinifolia and Hydrocotyle and Geranium species. Extensive patches of Pteridium esculentum and also common.

Along the creek channel are patches of Leptospermum flavescens up to 3 m high.

In the northern half of the area many of these creeks rise in deep canyons formed below the rocky outcrops of the Narrabeen Series sandstone. Here are patches of TALL OPEN-FOREST or OPEN-FOREST of Eucalyptus fastigata with a dense ground cover of Pteridium esculentum. In moist

sheltered sites, particularly at the base of the rocky outcrops are other ferns including Todea barbara, Blechnum nudum, Culcita dubia and a Cyathea species. Along the creeks are Leptospermum flavescens and Acacia dealbata. This community merges into the E. dalrympleana OPEN-FOREST.

Comments - Area B

This area is understood to be the proposed site for an ash disposal dam. Again development should be concentrated on the cleared area. The botanically most interesting areas are the deep gullies of TALL OPEN-FOREST of Eucalyptus fastigata and the rocky sandstone outcrops above them. These areas are at the northern end of the site and should not be disturbed.

Summary

Although no rare or endangered species were recorded, it is recommended that development be concentrated in the cleared and already disturbed areas. Where possible native vegetation should be retained. This applies particularly to the scarp and ridge above Pipers Flat Creek where vegetation south of the escarpment protection line should be retained, and to the vegetation of the rocky outcrops and canyons at the north end of Area B.

APPENDIX D

Extracts from

FAUNAL SURVEY OF THE MOUNT PIPER AREA

Carried out for

The Electricity Commission of New South Wales

By

The Australian Museum, Sydney

(April 1979)

1. INTRODUCTION

In December 1978 the Electricity Commission of N.S.W. requested the Australian Museum to undertake a survey of the terrestrial vertebrate fauna of three areas, totalling about 15 square kilometres, near Mount Piper (15 km north-west of Lithgow, N.S.W.)

They are under consideration as possible sites for a power station, an ash storage dam and a water storage dam.

The survey was carried out by Dr. Peter Smith under the direction of Dr. Tim Kingston, Curator of the Museum's Department of Terrestrial Invertebrate Ecology. Fieldwork for the survey took place over the periods 15th to 23rd February and 2nd to 8th March, 1979

4. SPECIES LIST

The following species were found to be present in the Neubecks Creek study area, which included the site of the proposed ash dam and the upper parts of the valley.

C - Common
U - Uncommon
P - Present, but status unknown

	NOTES
AMPHIBIANS	
Booroolong Frog Litoria booroolongensis	C
Peron's Tree Frog Litoria peronii	U
Eastern Banjo Frog Limnodynastes dumerilii	C
Spotted Grass Frog Limnodynastes tasmaniensis	U
Brown Toadlet Pseudophryne bibronii	C
Common Eastern Froglet Ranidella signifera	C
REPTILES	
Eastern Long-necked Tortoise Chelodina longicollis	U
Mountain Dragon Amphibolurus diemensis	C
Copper-tailed Skink Ctenotus taeniolatus	C (Only found amongst rocks)
White's Skink Egernia whitii	C (Most common amongst rocks)
Hemiergis decresiensis	C
Lampropholis guichenoti	C
Leiolopisma entrecasteauxii	U
Sphenomorphus tympanum	U (Only found amongst rocks)
Red-bellied Black Snake Pseudechis porphyriacus	U
BIRDS	
Little Pied Cormorant Phalacrocorax melanoleucos	U
Pacific Heron Ardea pacifica	U

White-faced Heron Ardea novaehollandiae	U
Pacific Black Duck Anas superciliosa	C
Whistling Kite Haliastur sphenurus	U
Brown Goshawk Accipiter fasciatus	C
Wedge-tailed Eagle Aquila audax	C
Little Eagle Hieraaetus morphnoides	U
Australian Hobby Falco longipennis	C
Australian Kestrel Falco cenchroides	U
Painted Button-quail Turnix varia	C
Latham's Snipe Gallinago hardwickii	U
Common Bronzewing Phaps chalcoptera	U (Recorded only from calls)
Yellow-tailed Black Cockatoo Calyptorhynchus funereus	C (Feeding extensively on Pinus radiata cones)
Gang-gang Cockatoo Callocephalon fimbriatum	U
Grimson Rosella Platycercus elegans	C
Eastern Rosella Platycercus eximius	U
Fan-tailed Cuckoo Cuculus pyrrhophanus	C
Shining Bronze-cuckoo Chrysococcyx lucidus	C
Southern Boobook Ninox novaeseelandiae	C (Recorded only from calls)
Tawny Frogmouth Podargus strigoides	P (Recorded only from a feather)
Laughing Kookaburra Dacelo Novaeguineae	C
Sacred Kingfisher Halcyon sancta	C
Superb Lyrebird Menura novaehollandiae	U (Recorded only from calls, feathers, and display mound)
Welcome Swallow Hirundo neoxena	C
Tree Martin Cedropis nigricans	C
Richard's Pipit Anthus novaeseelandiae	C
Black-faced Cuckoo-shrike Coracina novaehollandiae	C
Flame Robin Petroica phoenicea	C
Scarlet Robin Petroica multicolor	C

Eastern Yellow Robin Eopsaltria australis	C	
Crested Shrike-tit Falcunculus frontatus	C	
Golden Whistler Pachycephala pectoralis	C	
Rufous Whistler Pachycephala rufiventris	C	
Grey Shrike-thrush Colluricinca harmonica	C	
Leaden Flycatcher Myiagra rubecula	U	
Grey Fantail Rhipidura fuliginosa	C	
Willi Wagtail Rhipidura leucophrys	U	
Eastern Whipbird Psophodes olivaceus	C	
Spotted Quail-thrush Cinclosoma punctatum	U	
Glamorous Reed-warbler Acrocephalus stentoreus	U	
Rufous Songlark Cinclorhamphus mathewsi	U	
Superb Fairy-wren Malurus cyaneus	C	
Pilotbird Pycnoptilus floccosus	U	(Recorded only from calls)
Origma Origma solitaria	C	(Only found on or near sandstone outcrop)
White-browed Scrubwren Sericornis frontalis	C	
Chestnut-rumped Hylacola Sericornis pyrrhopygius	U	
Speckled Warbler Sericornis sagittatus	U	
White-throated Gerygone Gerygone olivacea	C	
Brown Thornbill Acanthiza pusilla	C	
Buff-rumped Thornbill Acanthiza reguloides	C	
Yellow-rumped Thornbill Acanthiza chrysorrhoa	C	
Striated Thornbill Acanthiza lineata	C	
Varied Sittella Daphoenositta chrysoptera	C	
White-throated Treecreeper Climacteris leucophaea	C	
Red-browed Treecreeper Climacteris erythrops	C	
Red Wattlebird Anthochaera carunculate	C	
Noisy Friarbird Philemon corniculatus	U	(Recorded only from calls)
Yellow-faced Honeyeater Lichenostomus chrysops	C	
White-eared Honeyeater Lichenostomus leucotis	C	
Brown-headed Honeyeater Melithreptus brevirostris	U	
White-naped Honeyeater Melithreptus lunatus	C	

New Holland Honeyeater Phylidonyris novaehollandiae	U	
Mistletoebird Dicaeum hirundinaceum	C	
Spotted Pardalote Pardalotus punctatus	C	
Striated Pardalote Pardalotus striatus	C	
Silvereye Zosterops lateralis	C	
European Goldfinch Carduelis carduelis (introduced)	U	
House Sparrow Passer domesticus (introduced)	U	
Red-browed Firetail Emblema temporalis	C	
Diamond Firetail Emblema guttata	U	
Double-barred Finch Poephila bichenovii	U	
Common Starling Sturnus vulgaris (introduced)	C	
White-winged Chough Corcorax melanorhamphos	C	
Australian Magpie-lark Grallina cyanoleuca	U	(Recorded only from calls)
Dusky Woodswallow Artamus cyanopterus	C	
Australian Magpie Gymnorhina tibicon	C	
Red Currawong Strepera graculina	C	
Grey Currawong Strepera versicolor	C	
Australian Raven Corvus coronoides	C	

MAMMALS

Eastern Grey Kangaroo Macropus giganteus	C	
Wallaroo Macropus robustus	U	(Recorded only from droppings on or near sandstone outcrops)
Red-necked Wallaby Macropus rufogriseus	C	
Swamp Wallaby Wallabia bicolor	C	
Brush-tailed Possum Trichosurus vulpecula	U	
Ring-tailed Possum Pseudocheirus peregrinus	U	
Common Wombat Vombatus ursinus	C	
Brown Antechinus Antechinus stuartii	C	
Black Rat Rattus rattus (introduced)	U	
House Mouse Mus musculus (introduced)	C	
Rabbit Oryctolagus cuniculus (introduced)	C	
Fox Vulpes vulpes (introduced)	C	

Dingo/Feral Dog Canis familiaris (introduced?)	U	(Recorded from droppings)
Feral Pig Sus scrofa (introduced)	C	
TOTAL AMPHIBIAN SPECIES	6	
TOTAL REPTILE SPECIES	9	
TOTAL BIRD SPECIES	80	
TOTAL MAMMAL SPECIES	14	

5. POSSIBLE ADDITIONAL SPECIES

5.1 Birds

Additional bird species were seen in localities adjoining the study area. These consisted of three species seen in cleared areas:

Brown Falcon Falco berigora
Feral Pigeon Columba livia (introduced)
Galah Cacatua roseicapilla

5.2 Mammals

a. Brushed-tailed Rock-Wallaby Petrogale penicillata: A few droppings possible from this species were found on a sandstone outcrop in the ash storage site. The species is known to occur in nearby areas.

b. Bandicoot Species (Long-nosed Bandicoot Perameles nasuta or Short-nosed Bandicoot Isoodoon obesulus): A few diggings that were possibly due to bandicoots were found on a Triassic sandstone ridge in the ash storage site.

c. Southern Bush-rat Rattus fuscipes: Rat droppings were found on a sandstone outcrop in the ash storage site. These are most likely from this species.

d. Small Bat Species: Small bats were commonly seen at night in all study areas.

6. DISCUSSION

The Mount Piper area has a fairly rich vertebrate fauna for an area in the N.S.W. Central Tablelands which has been subject to a fair amount of disturbance. A total of 7 amphibian species, 13 reptile species, 85 bird species and 17 mammal species were found in the three study areas during the survey. Particularly well represented groups were the birds and the mammals.

The richest of the three study areas for wildlife was the ash storge site, in spite of its having been very badly burnt by bushfires in December, 1977. This is mainly due to the greater diversity of habitats in that area resulting from its more diverse geology and topography: the power station and water storage sites are in undulating country on Permian deposits while the ash storage site consists of this type of country plus a system of Triassic sandstone ridges and gullies with many rock outcroppings. The much lower numbers of species found in the water storage site result from its small size and uniform vegetation with no cleared areas or wetlands.

APPENDIX E

ARCHAEOLOGICAL RELIC SURVEY

Extract from

a letter reporting the results of a survey carried

out by R.V.S. Wright, consultant to the

Electricity Commission of N.S.W.

Extract from letter dated 28th March, 1979, from Associate Professor R.V.S. Wright, Department of Anthropology, University of Sydney, to the Commercial Manager & Secretary, Electricity Commission of N.S.W. The letter refers to a survey of archaeological relics in three areas assocated with the Mount Piper Power Station development.

'Ash Dam. The Neubecks Creek area. There are no rockshelters up this creek. In the floor of the valley the creek has eroded shallow sections: I saw no artefacts or bones in these sections'.

NEWCOM COLLIERIES PTY LTD

EIS
285

Neubecks Creek open-cut coal mine

Borrower's name	Date	Ext

RAECO

NEWCOM COLLIERIES PTY LTD

EIS
285

Neubecks Creek open-cut coal mine