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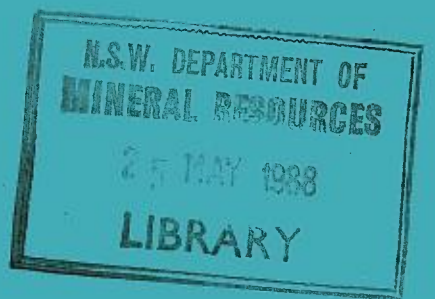
Environmental impact statement for modifications to coal
preparation plant Ivanhoe Colliery no. 2



M83/4142

B.C.S.C. COLLIERIES LTD

Environmental Impact Statement for Modifications to Coal Preparation Plant Ivanhoe Colliery No.2



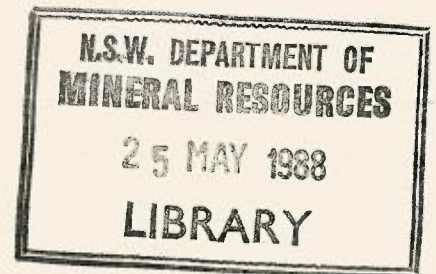
GHD-Planner West Pty Ltd

Consulting Engineers Project Managers

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B.C.S.C. COLLIERIES LTD

**Environmental Impact Statement
for Modifications to
Coal Preparation Plant
Ivanhoe Colliery No.2**



GHD-Planner West Pty Ltd

Consulting Engineers Project Managers

156 PACIFIC HIGHWAY,
GREENWICH, 2065

NOVEMBER -1983

Form 4.

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979 (Section 77 (3) (d)).

ENVIRONMENTAL IMPACT STATEMENT

This Statement has been prepared by or on behalf of BCSC Collieries Ltd being the applicant making the development application referred to below.

The Statement accompanies the development application made in respect of the development described as follows:

Modifications to Existing Coal Preparation Plant for Ivanhoe No 2 Colliery.

The development application relates to the land described as follows:-

No. Street
Locality/suburb
Real property description

Portion	Volume	Folio
108	14083	238
5, 6	484	705

Mining Purposes Leases: MPL285, MPL1178, MPL "Application No 219 Orange", MPL871 (ML47), MPL699 (ML72)

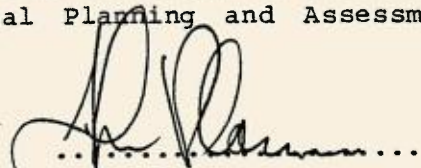
The contents of this statement, as required by clause 34 of the Environmental Planning and Assessment Regulation, 1980, are set forth in the accompanying pages.

Name, Qualifications and Address of person who prepared Environmental Impact Statement

J H Planner, BE, MBdgSc
156 Pacific Highway
GREENWICH NSW 2065

Certificate

I, John Henry Planner, of 156 Pacific Highway, Greenwich, NSW, hereby certify that I have prepared the contents of this Statement in accordance with clauses 34 and 35 of the Environmental Planning and Assessment Regulation, 1980.


.....
Signature

18 November 1983
.....
Date

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1.0

SUMMARY

This Environmental Impact Statement describes the proposed modifications to the existing coal preparation plant at Ivanhoe No 2 Colliery.

The modifications require the relocation of a secondhand washery and incorporation of it into the existing coal preparation plant.

The EIS sets out a detailed description of the existing plant and the proposed modifications and assesses the impacts on the existing environment.

The modifications are considered essential to maintain markets for coal and consequently to maintain employment at current levels.

It is concluded that the modifications can be implemented with a minimal environmental impact based on the data provided in this EIS.

2.0 INTRODUCTION AND BACKGROUND

2.1 Introduction

This Environmental Impact Statement describes the proposed modifications to the existing Coal Preparation Plant at Ivanhoe No 2 Colliery that are considered essential because of changed company markets for coal.

Blue Circle Southern Cement Ltd (BCSC), through its two wholly owned subsidiary companies, Commonwealth Portland Cement Co Pty Ltd and BCSC Collieries Pty Ltd, own and operate the colliery which is located on Boulder Road 4 km east of Portland. (See Site Location Plan No 1).

2.2 Background

The Ivanhoe Colliery No 2 has been in operation for many years as a supplier of coal to the Portland Cement Works located nearby. Until the late 1970's the production from the colliery was limited to approximately 80 000 to 100 000 tonnes per annum from a single shift operation employing approximately 30 men. Up to 70 000 to 80 000 tonnes of this coal was supplied to the Portland cement works with the remaining coal sold on the local market. In 1980 the manpower at the colliery was increased to 52 men to allow production on 2 shifts and a contract was reached with the Electricity Commission for the supply of 100 000 tonnes per annum to the Wallerawang Power Station. An agreement was also reached with Austen & Butta for the supply of 110 000 tonnes per annum. The 2 shift operation enabled a production of 280 000 tonnes per annum to be achieved.

In 1982 with the downturn of the coal market and reduced industrial activity reductions were made in the sale of coal to the Electricity Commission. The contract with Austen & Butta was terminated and the coal demand from the cement works was reduced. To off-set the reduced sales on the local market efforts were made to sell the mine's excess production on the "spot market" to overseas customers. To-date some 75 000 tonnes of coal has been sold by export.

To create coal of a quality suitable for sale on the overseas spot markets it was necessary to upgrade the run-of-mine coal by a selective screening process. Coal from the colliery was crushed in the primary crusher and then screened to allow the separation of plus and minus 20 mm products. The -20 mm products containing an ash content of up to 20% was supplied directly to the power station and the cement works. The +20 mm product having an ash content of 16-17% was crushed in the secondary crusher to a -30 mm product and was stockpiled separately for export sale. The over-sized +100 mm product which is found to be approximately 50% rock and 50% coal, was also produced from the screens at the rate of 200 -300 tonnes per week. There are no facilities at the present time for upgrading this oversized coal and it has been used to extend the existing coal stockpiles base.

Of the three shipments made to the overseas markets, the first shipment achieved its quality parameters. Severe quality problems developed in the last two shipments. Investigations showed that there had been a deterioration in the quality of coal mined in the existing area due to normal geological reasons and varying mining practice. To maintain export quality specifications, it has been necessary to reach agreement with Western Main colliery to enable a quantity of the Charbon Colliery coal to be washed and then blended with Ivanhoe export coal to increase the gross quality. This has proved to be an expensive exercise, making these shipments uneconomic. Experience during the past year has shown that it is not possible for Ivanhoe to remain in the export market without producing a washed coal product using its own resources.

2.3

Alternatives

The company has two alternatives. The first alternative is to install a washery at Ivanhoe such that the export coal can be washed and continued to be sold to overseas markets. This alternative would enable the existing manpower to be maintained as long as export markets can be found for the coal.

The second alternative is to reduce the colliery to a single shift operation with a corresponding reduction in manpower. This level of production would provide sufficient coal to meet the company's contractual commitment to the Electricity Commission and supply to the Portland cement works. The company proposes to install a washery at the colliery as soon as possible and it is considered that the longer this exercise is delayed, the more likely the latter alternative would become a reality.

3.0 EXISTING ENVIRONMENT

3.1 Location

The Ivanhoe colliery surface workings are located on the Northern side of Boulder Road about 4 km from Portland to the west and 1 km from the Lithgow Mudgee road to the east as shown on Site Location Plan No 1.

3.2 Site Description

The existing surface workings are shown on drawing 2160/006 and consist of several buildings (office and showers, workshops, substation, garages, mine drift conveyor, coal preparation facilities (described in Section 3.3), coal stockpile area, water tanks, dam, magazine.

The site slopes gently from Boundary Road to a cleared flat area where most of the surface facilities are located.

The site is partially screened from the road by plantings of exotic pine trees (see Plan 2 and photographs of existing site, Appendix 4).

3.3 Existing Coal Preparation Plant

The attached plan 2160/006 shows the mine surface details and the location of the existing crusher and coal handling facilities. The attached flow sheet Plan No 5 shows the existing coal preparation circuit. The Run-of-mine 900 mm conveyor (A) exits from the colliery and passes to the primary crusher (B). At this point the coal is crushed to -100 mm dropped onto a 900 mm conveyor (E) and elevated above 3 truck loading bins. The coal is then screened through 2 vibrating screens (3) located on top of the bins (7, 8, F). These screens separate out the +100 mm oversized coal, 20 - 100 mm nut coal, and -20 mm fines coal and the 3 products are stored in the bins beneath. The -20 mm fine coal represents 50% of the Run-of-mine total and is trucked directly to Wallerawang Power Station, Portland cement works or to stockpile. This coal has an ash content of approximately 19 - 20%.

The 20 mm to 100 mm nut coal is conveyed from the nut bin (8) on a 900 mm conveyor (M) to a secondary crusher (N) located above an additional truck loading bin (O) . This coal is crushed and stored in this truck bin for delivery to the stockpile.

In addition, the plant has a capacity to screen a special size product. This coal is sized by a small screen (J) located alongside the crushed nut bin which enables the screening of this product to be dumped by a conveyor (K) onto a small stockpile with the oversized and undersized material conveyed to the run-of-mine stockpile conveyor (L) for recirculation to the screening plant.

A bypass crushing system exists which enables overflow coal from the nut bin to drop onto a crusher feed conveyor (G). This coal is discharged into the by-pass crushers (H) and reduced to 25 mm. The crushed coal is discharged on the conveyor (I) for stockpiling.

3.4 Existing Equipment

The following table shows the major equipment used in the existing coal preparation plant.

Existing Coal Preparation Plant
Major Equipment List

<u>Item</u>		<u>Max</u>	<u>Dimensions</u>
<u>No</u>	<u>Equipment</u>	<u>Capacity</u>	
A	Run-of-Mine (ROM) Conveyor	200 tph	900 mm wide
B	ROM Bin	10 tonnes	3 m x 3 m x 7 m high
D	Primary Crusher	200 tph	36"x36" Roll
E	Screen Feed Conveyor	200 tph	900 mm x 55 m
F	By-Pass Raw Coal Bin	130 ton	6.19 m dia x 13 m high
3	Primary Screens (2 off)	100 tph ea	16 ft x 6 ft
7	Fine Coal Bin	100 t	6.19 md x 11.5 m high
8	Nut Coal Bin	100 t	6.19 md x 11.5 m high
G	Feed Conveyor	30 tph	600 mm x 12 m
H	Tertiary Crusher	30 tph	
I	Discharge Conveyor	30 tph	600 mm x 17 m
J	Secondary Screen	30 tph	
K	Discharge Conveyor	30 tph	600 mm x 18 m
L	Return Conveyor	30 tph	600 mm x 17 m
M	Feed Conveyor	64 tph	900 mm x 28 m
N	Secondary Crusher (2 off)	64 tph	
O	Truck Bin	25 tones	3.8 m sq x 11.6 m high

3.5 Land Use and Zoning

Plan No 3 (Appendix 5) shows the broad classifications of zoning and land use; Map 2160/006 (Appendix 8) shows the Mining Purpose leases in detail.

The surface workings are within the Ivanhoe Colliery No 2 holding and are mostly located on Mining Purposes Lease No 285 (Mining Act 1906). The proposed modification to the coal preparation plant would remain in that lease area and would be compatible with present use.

Stockpile areas would be situated on MPL285, MPL1178, and on MPL "Application No 219 Orange" (which is the subject of a current application).

The Storage Dam at Pipers Flat Creek is wholly within the company owned freehold land and the pipeline from the dam to the colliery passes underground through land held under Mining Lease ML3 and comes to the surface on ML47(MPL871) and ML72 (MPL699).

The tailings pipeline will be underground on Mining Lease ML3.

The reject disposal lies wholly on Company owned freehold land. Access to the disposal area passes through Electricity Commission of NSW land and agreement has been reached with the Commission for use and maintenance of the access road.

Plan 3 also shows the adjoining coal mining leases of Invincible, Wallerawang, Western Main, and Eastern Main Collieries. The position of the future Mt Piper Power Station is also shown.

3.6 Climate and Wind

Wind information included in the "Environmental Assessment of the Proposed Ivanhoe Open Cut No 1 (Huon) Coal Mine at Mt Piper", NSW, July 1980 by Longworth & McKenzie Pty Ltd is relevant. The open cut mine is approximately 2 km south of the Ivanhoe colliery No 2. The Reject Disposal area shown on Site Plan No 1 is located within the open cut.

This data is reproduced below.

3.6.1 Wind

Wind information has been obtained from the Bureau of Meteorology for Lithgow, which is the nearest recording station to the site. It is about 17 km directly south-east of the study area (Ivanhoe Open Cut No 1). Monthly summaries of wind speed and direction based on 13 years of records for this recording station have been used to prepare the wind roses shown in Figures 1 and 2 (Appendix 1).

The Electricity Commission has wind speed and direction records for the Wallerawang power station, which is 7 km south-east of the site, (Ivanhoe Open Cut No 1) for the period 1968-1973. These records show very similar patterns to those for Lithgow, although they are continuous records, and thus confirm that the Lithgow wind roses are representative of the wind conditions on the site.

Wind conditions may be summarised as follows:

Summer (January)	No wind direction dominates, with a relatively high incidence of east and south-east winds.
Autumn (April)	Westerly winds are dominant.
Winter (July)	West and south-west winds dominate the wind patterns.
Spring (October)	Westerly winds are dominant, but there are minimal calm periods.

There is a relatively high incidence of wind speeds in excess of 30 km/hour which might be expected to cause dusting problems without adequate controls. Peak wind gusts of up to 84 km/hour have been recorded at Wallerawang and appear to be more prevalent in the late winter and early spring (the winter westerlies).

3.7 Noise

3.7.1 General

The EIS referred to in Section 3.6 contains information relevant to the noise levels emanating from the Ivanhoe No 2 Colliery Surface workings.

Since the date of that survey there have been no significant alterations to the surface facilities at Ivanhoe likely to increase the noise levels from those measured.

The relevant parts of that EIS have been extracted and are reproduced below in section 3.7.2 to 3.7.4.

The existing noise levels at East Portland (see Plan 1, Appendix 2) for location are contained in an EIS for BCSC Collieries Pty Ltd rail loading operations at Portland, NSW for Ivanhoe No 2 Colliery, March '83. The relevant results are discussed in Section 3.7.5.

3.7.2 Noise Survey

In the noise level survey carried out in order to determine the state of the existing acoustic environment in the vicinity of the proposed Ivanhoe open cut No 1 mine readings were also taken close to Ivanhoe Colliery. The survey was carried out over a two day period between 2nd and 4th June, 1980 and included day-time, evening and late-night readings.

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 were excellent during the period of the survey. It was fine, with little or no cloud until the morning of June 4th when a thick cloud cover existed. Winds were very light or absent and readings were taken at all times without wind noise.

Ambient sound levels were measured at seven sample points around the proposed Ivanhoe open cut No 1, near the Ivanhoe colliery and along the main Lithgow-Mudgee Road about 2 km to the north-east (of Ivanhoe Open Cut No 1). Locations of the sample points relevant to the Ivanhoe Colliery No 2 are shown in Site Location Plan 1 (Appendix 2). The resulting noise levels obtained in the survey are shown in Table IV, and these values represent minimum background levels and do not include the effects of non-continuous events such as passing traffic, wind and birds.

TABLE IV

AMBIENT NOISE LEVELS IN THE STUDY AREA (dBA)

NOISE SAMPLE POINT	5-6 pm	11 pm-12 midnight	2-3 am	9.30-10.30 am	12 noon-1 pm	3-4 pm	8-9 pm	6-7am
	2/6/80	2/6/80	3/6/80	3/6/80	3/6/80	3/6/80	3/6/80	4/6/80
1	35	27	27	36	36	27	35	30
2	26	25	26	30	32	27	27	25
3	27	27	25	34	31	31	26	30
4	44	33	36	39	41	40	39	38
5	60	33	41	55	64	53	38	38
6	68	38	40	60	64	61	40	39
7	40	27	30	42	40	40	39	31
Equipment in oper- ation at Ivanhoe Colliery	Crusher and Coal Loading	Fan only	Fan only	Fan and Crusher Only	Crusher and Coal Bin Filling	Fan and Crusher Only	Fan Only	Fan Only

Note: Points 4, 5, 6, 7 Relevant for Ivanhoe No 2 Colliery.
(See Site Location Plan No 1)

3.7.3 Sources of Noise and Ambient Noise Levels

The major activities which contribute to the present acoustic environment in the study area are:

- i) Ivanhoe Colliery
- ii) Road traffic
- iii) Railway traffic
- iv) Western Main open-cut mine

Noise from Ivanhoe Colliery is the major component of the background acoustic environment to the north of the proposed Ivanhoe No 1 Open Cut and dominates noise levels at point 4, 5 and 6 (see site location plan No. 1). Noise levels in the vicinity of the colliery are discussed in Section 3.7.4.

General road traffic in the district can be heard at all sampling points. Close to main roads (point 6 and 7) it is a major, though intermittent, noise source, particularly where heavy vehicles such as coal trucks are involved. Distant traffic noise can be heard while that from the main Mudgee-Lithgow Road to the east affects all points to some degree. Similarly, trains on the Wallerawang-Mudgee Railway to the south of the study area do not significantly contribute to noise levels at points 4, 5, 6 and 7.

The Western Main open cut mine is situated immediately north-east of the Ivanhoe Open Cut No 1 close to the Mudgee-Lithgow Road but noise from this operation has very little impact in the area and affected point 7 only, slightly on one or two occasions.

From the information in Table IV it can be seen that noise levels are substantially higher at those locations close to Ivanhoe Colliery and the Mudgee-Lithgow Road (points 4, 5, 6 and 7) particularly during the daytime when colliery activity and traffic is more intense.

Levels at points 4, 5 and 6 are determined by the equipment in operation at the colliery (as indicated in Table IV) and therefore vary considerably. Point 6 which is close to the colliery was also adjacent to the closest residence to the Ivanhoe Colliery No 2. This residence is unoccupied and is to be demolished to be incorporated into the Mt Piper power station site.

Several residences were situated along the Mudgee-Lithgow Road near point 7 at the time of the survey but these also are unoccupied and to be demolished to be incorporated into the Mt Piper Power Station site. Here, minimum background levels are quite low at night but about 50 dBA during the day. Passing traffic here causes much higher intermittent noise levels and an Equivalent Continuous Sound Level (L_{eg}) of 54.4 dBA was obtained over a half-hour period between 1.00 and 2.00 pm.

The nearest residence to the west of the study area was "Avondale" homestead (See Site Plan No 1), approximately 2 km distant and shielded from the site by a forested ridge. Midday background noise levels here were around 30-38 dBA and were dependent entirely upon traffic and other noise from the Portland area to the west.

3.7.4 Ivanhoe Colliery

As noted in Section 3.7.3 the present operations at Ivanhoe Colliery form the major contribution to noise levels in the immediate vicinity. However beyond a distance of approximately 1 km and in areas shielded by the landform and not intervisible with the colliery the noise levels become greatly reduced and the sounds very distant. In the area of the Ivanhoe No 1 open-cut operation the Ivanhoe colliery No 2 noises are normally very faint or undetectable.

Sample point 6 is situated immediately across the road from the Colliery. Daytime noise levels here are normally in excess of 60 dBA and drop to 38 or 40 dBA through the night. These levels (and those at points 4 and 5) vary considerably according to the equipment in operation at the colliery, which is indicated for each of the sampling times shown in Table IV.

Noise levels are greatest when the coal crusher is operating and this is normally continuous from about 8.00 am to 7.30 pm. At other hours, the mine ventilation fan which operates at all times, is the dominant noise source. Other intermittent noise sources include coal bin loading, truck loading and truck movements which often cause peak levels over 70 dBA at point 6.

Noise level measurements were also taken on one occasion within the colliery grounds at distances of 50 m and 100 m from the crusher. The values obtained are shown in Table V.

Approximate distance from colliery crusher	Measured Noise level (dBA)	Equivalent continuous Sound level, Leq (dBA)
50 m	68	67.8 (over 0.36 hrs)
100 m	59	-
150 m (point 6)	60	60.2 (over 0.37 hrs)

Note: Measurements were made during the afternoon of June 3rd 1980. Equipment in continuous operation included conveyors and crusher. No loading or truck movements were included.

TABLE V Noise Levels at Ivanhoe Colliery

3.7.5 East Portland (See Reference 3)

There are approximately 80 houses at East Portland and the noise level varies between the houses. The dominant noise sources during the daytime are traffic (light vehicles, small trucks, and heavy coal trucks) and rail traffic. At night the dominant noise sources are the cement works and rail traffic. The existing noise level (in terms of LA_{eg} 24) varies from 53-59dB(A).

3.8 Flora & Fauna

The area of the existing coal preparation plant and coal stockpiles is level ground with minimal vegetation. The area of the proposed modifications is within the existing area. The area of coarse reject disposal is the existing Ivanhoe Open Cut No 1 mine with little or no vegetation.

3.9 Roads & Traffic

At present all coal output from Ivanhoe No 2 colliery is hauled via road either westward along Boulder Road to Portland or eastward along Boulder Road to Wallerawang.

3.10 Employment

At present the colliery employs 52 people on a two shift basis, 22 live in Portland and 3 near Cullen Bullen. Most of the remaining workforce reside at Wallerawang and a few live in Lithgow.

4.0 PROPOSED DEVELOPMENT

4.1 Programme

The construction of the proposed modifications would proceed as soon as the necessary approvals have been received. It is anticipated that the modifications will take about 12-14 weeks to complete.

4.2 Plant Description

The proposed modifications are shown on Drawings 269-CP-001 (Appendix 9) and flow sheet 269-CP-008 (Appendix 7).

It is proposed to install a jig washing plant alongside the existing nut bin (8). This plant has been purchased from BHP's John Darling Colliery and would be re-erected on site after upgrading. The existing bin storage, screening plant, primary and secondary crushers and stacking conveyor systems will be re-used as part of the modified coal handling facilities incorporating the washing plant.

ROM coal will be conveyed from the mine to the primary crushing station (B) where a reduction to -125 mm will be carried out. Crushed coal will be collected on another conveyor (E) and transported up to the primary screening plant (3) on top of the product road bins (7, 8, F).

Coal will be discharged into the feed conveyor heat chute (01) divided into two streams in the screen feed chute (02) and directed onto the raw coal sizing screens (03).

Average product, +125 mm and middle deck product, -125 mm +12.7 mm will be directed into the nut coal bin (08) via the coarse coal collection chutes (05). Underflow products will be directed into the fine coal bin (07) via the fine coal collection chutes (06).

The existing bypass crushing system will collect overflow coal from the nut coal bin as required and drop it onto the crusher feed conveyor (G) via the feed chute. Coal will be discharged into the bypass crusher feed chute and reduced in the crusher (H) to -25 mm. Crushed coal will be collected into the crusher discharge chute and stockpiled by conveyor (I).

Coal from the nut coal feed bin (08) will be directed by feed chute (9) into the jig feed launder (11). Feed rate will be controlled by a slide gate (10). In the jig feed launder, water will be added to the coal and sluiced down into the jig wash box (12). Air for pulsation in the jig will be supplied by the jig blower and controlled by the rotary valve system (14).

Reject material from the jig plant will be collected by the screw feed (15) and discharged into the reject elevator (16) which conveys the material up and into the reject bin (18) via the elevator discharge chute (17).

Coal products will be fed from the washbase (19) onto the static (21) screen and discharge chute and directed onto the product dewatering screen (20). -0.5 mm underflow will be collected in the underpan and drop directly into the fines slurry sump (23). Dewatered product will be collected in the discharge chute and will depart on the collection conveyor (35).

Fines slurry in the slurry sump will be pumped by slurry pump (24) up to the classifying cyclones (25). Underflow from the cyclones will pass directly by pipes into the slurry screen feed chute (29) and then onto the slurry dewatering screen (30). Overflow from the cyclones will be collected in a central pipe and discharged directly into the head tank (26). The head tank supplies water which will go directly to the jig wash box (12) and the jig feed launder. The dewatered product from the slurry screen will be directed by chute onto the product collection conveyor (35).

Water make-up to the plant will be supplied by a pipeline from the storage dam located approximately 150 m from the proposed plant location and 20 m higher. Water in the dam will be pumped from a main storage dam located approximately 4 km from the mine site. (See site location plan No. 1)

Washed coal on the collection conveyor will be discharged into the head chute (36) which feeds the coarse coal crushers (37). Crushed product drops into the truck loading bin (39), where it will be transported by truck to stockpile or customer.

When required a proportion of the crushed product may be directed by chute (40) onto the secondary screen (42) or by setting the flop gate (41) discharged via the screen underflow chute to the fine product stockpiling conveyor (45). The secondary screen makes two products, a nut coal that will be collected by chute and directed onto the nut product stockpile by conveyor, (46) and a fine/coarse product that will be collected by chute and directed onto the fine/coarse product stockpile by conveyor (45).

The estimated cost of the proposed modifications is \$760,000.

4.3 Major Equipment List

The following is a list of the major equipment that will exist in the modified coal preparation plant after the proposed modifications. New items and items reused from the existing plant are indicated.

MAJOR EQUIPMENT LIST
(Refer Drawing 269-CP-001)

<u>Item No</u>	<u>Equipment</u>	<u>Proposed Average Throughput</u>	<u>Max Capacity</u>	<u>Dimensions</u>
A)			
B)			
D)			
E	) As for existing			
F	) plant			
3)			
7)			
8)			
J	)			See Item 42
K	) Existing Plant			See Item 45
L	) Items reused for			See Item 46
M	) Proposed Plant			See Item 35
N	)			See Item 37
O	)			See Item 39
12	Jib Wash Box (Wash Box and circuit have max capacity of 150 tph-see Items 12-30 below)	125 tph	150 tph	2 m x 4 m x 6.7 m high
13	Jib Blower			60 hp
15	Screw Conveyor	15 tph	18 tph	4 m long
16	Reject Bucket Elevator	15 tph	18 tph	9 m long
18	Reject Bin	-	55 t	3.6 m x 3.6 m
20	Dewatering Screen	10 tph	132 tph	12 ft x 6 ft
23	Fines Slurry Pump	580 m ³ /hr	705 m ³ /hr	
26	Head Tank	-	2.5 m ³	1.2 m dia
30	Slurry Dewatering Screen	3.7 tph	4.5 tph	
34	Tailings Pump	36 m ³ /hr	44 m ³ /hr	
35	Collection Conveyor	116 tph	139 tph	600 mm x 17 m
37	Coarse Coal Crushers (2 off)	53 tph	64 tph	
39	Truck Loading Bin		25 tonnes	3.8 m sq x 11.6 m high
42	Secondary Screen	58 tph	70 tph	
45	Fines Product Conveyor	37 tph	44 tph	600 mm x 16 m
46	Nut Product Conveyor	23 tph	27 tph	600 mm x 16 m

Note: Items 12 to 30 are from second hand washeries from John Darling and Burwood Collieries in the Newcastle area.

4.4 Quantities of Raw Materials and Product

Quantities are shown on the proposed flow sheet (Drawing 269-CP-008, Appendix 7).

ROM production is 1200 tonnes per day for 280 000 tonnes per annum. Expected sales of unwashed coal to local markets would amount to 120 000 tonnes per annum and the remaining 160 000 tonnes would be washed to produce 140 800 tonnes.

The flow sheet shows the maximum feed into the washery of 150 tonnes per hour based on a peak ROM production of 200 tonnes per hour. Actual average feed into the washery to achieve required washed coal is 70 tonnes per hour compared with the peak feed of 150 tonnes per hour.

Average coarse reject feed will be 8.4 tonnes per hour for 84 tonnes per day. The annual total coarse reject produced will be 19 200 tonnes. The tailings will contain on an average 1.9 tonnes per hour or 4 000 tonnes per annum of fine coal and slimes.

The average water quantity required to operate the plant is 26 cubic metres per hour (m^3/h) (26 000 litres per hour or 260 000 litres per day); with make up water of $13 m^3/h$ plus recirculation of $13 m^3/h$ of tailings water. The tailing water of $19 m^3/h$ will be pumped into the Ivanhoe No 2 Colliery workings. Of this water $12 m^3/h$ will be pumped from the workings to the existing dam which will feed the proposed washery. The additional water requirement is therefore $13 m^3/h$.

4.5 Make-up Water Supply

Several alternatives for make-up water supply were investigated:

- pumping from Huon underground workings

- . pumping from Ivanhoe Colliery underground workings
 - . Fish River pipeline
 - . Pipers Flat Dam.
- a The Huon mine option was discussed with the Electricity Commission (who own the surface land). The Electricity Commission were reluctant to have BCSC use this water as a temporary measure as it might at a later date preclude the Commission from using the water and because the workings might have to be drained prior to the construction of the Mt Piper Power Station Ash Dam. As an assured source for the washery was required this option was rejected.
- b Although water exists in the Ivanhoe Colliery underground, the sources are difficult to find and it was considered not feasible or economic to use this as a source of water.
- c The Fish River pipeline supplies potable water to Ivanhoe colliery and will supply to the future Mt Piper Power Station. Investigations showed that there was not enough spare capacity to supply the washery from this source.
- d Piper's Flat dam was considered the best alternative for the reasons given below.

The water supply for the washery will come from two sources: Recirculation of the tailings water after settlement will provide $13 \text{ m}^3/\text{h}$ and the remaining $13 \text{ m}^3/\text{h}$ per day will come via a 100 mm diameter pipeline to be laid from the Pipers Flat dam. The Pipers Flat dam was constructed originally to supply water to the Portland cement works and the company has a water licence to take $81 \text{ m}^3/\text{h}$ from this source. The dam and catchment area are located on company land (see Plan 3, Appendix 5). A 460 mm pipeline exits from the dam to a pumping station from where the water is pumped via a smaller size pipe to the Portland cement works.

REJECT
DISPOSAL

It is proposed at the point opposite the Ivanhoe No 1 colliery entrance to branch off this pipeline with a 100 mm line which will travel underground through the Ivanhoe No 1 colliery workings some 3.5 km to the Ivanhoe No 2 surface facilities. The water will be discharged into an existing small dam capable of holding some 4000 m³ of water. Recirculated water from the tailings disposal will also be discharged into this dam which will be connected to the washery to supply water at maximum flow rate of 46 m³/h. Average flow rate will be 26 m³/hr.

Figure 4 shows the water flow diagram with average flows based on 70 t/hr of coal through the washery and maximum flows for 150 t/h of coal to the washery.

The figure for average feed rate of 70t/h shows an amount of 6.5 m³/h as unrecovered. This assumes about 65% recovery of water from the tailings and was used to determine the maximum flow rate required from Pipers Flat Storage Dam. It is expected to recover about 90% of the water from the tailings with the remaining 10% being lost due to evaporation or remaining in the slimes.

The stockpile sprays could draw up to 30 m³/h but this would be an intermittent demand and could be met from the Pipers Flat Storage Dam. It is estimated that the sprays could operate about 150 hours/year.

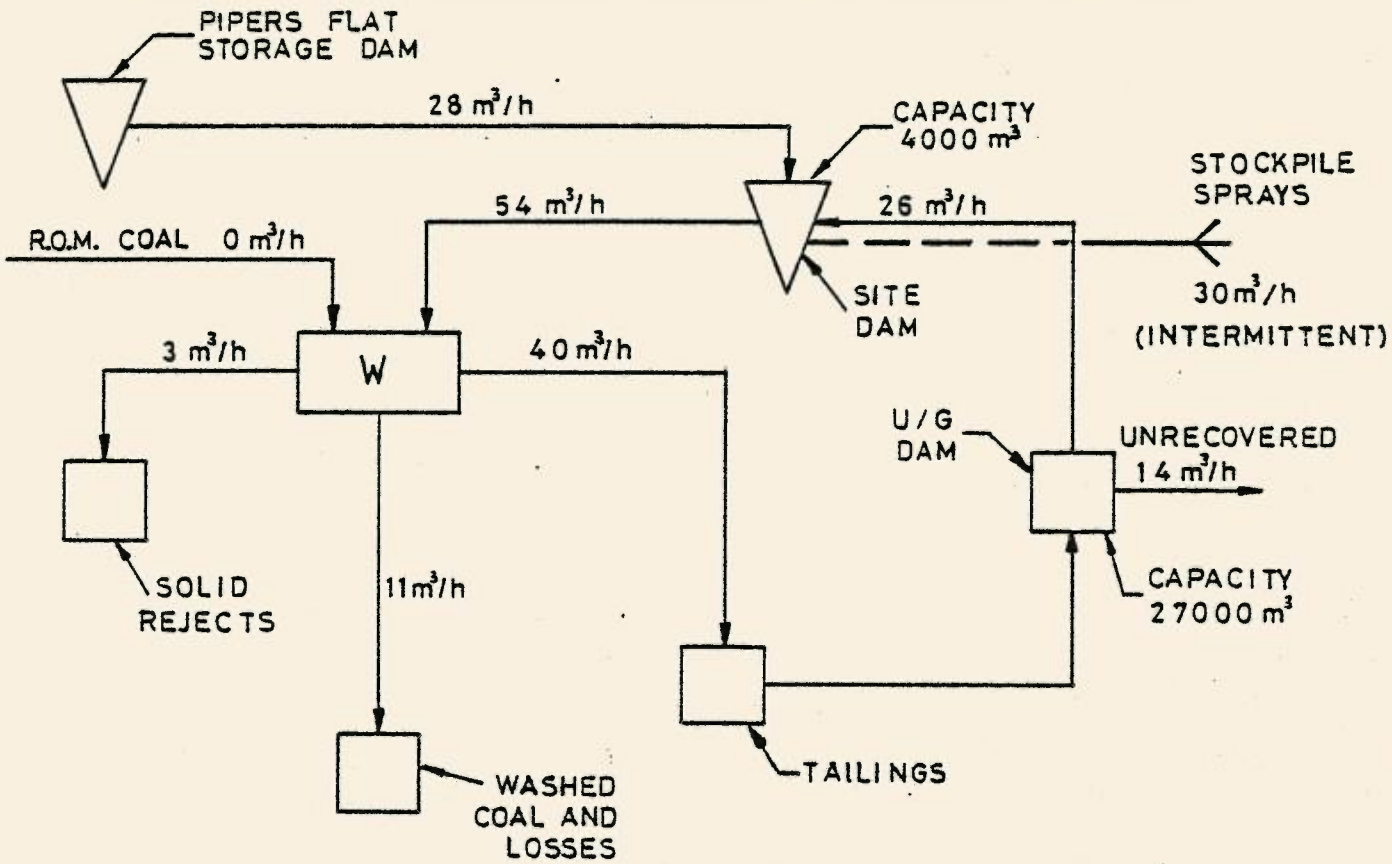
4.6 Reject Disposal

4.6.1 General

Several alternative methods were assessed for the disposal of coarse reject material

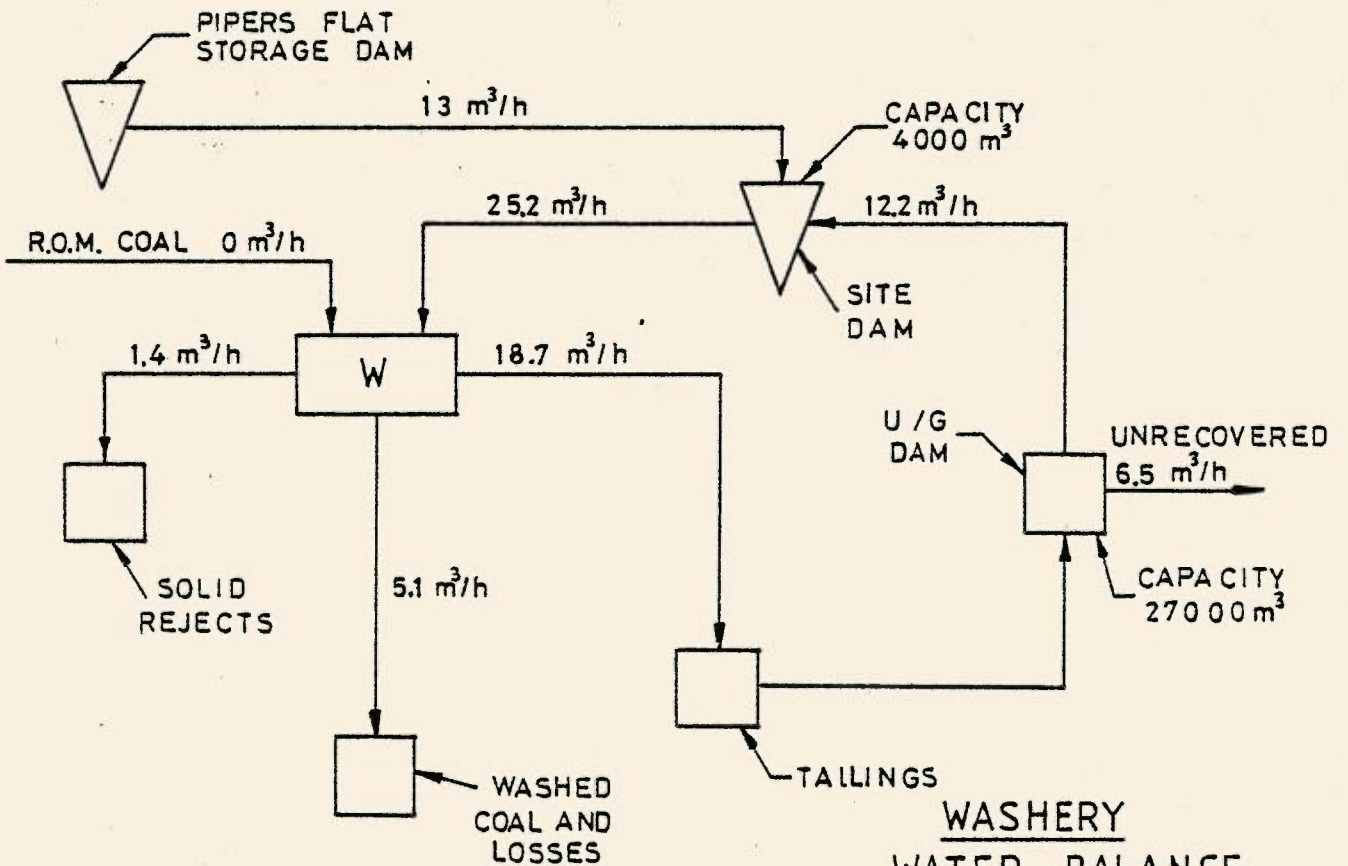
- . crush and pump into disused underground mine areas
- . cart underground by mechanical means
- . place in old open cuts in the vicinity
- . place on colliery site
- . place in Ivanhoe open cut No 1

MAXIMUM FEED RATE - 150 t/h COAL (INTERMITTENT)



(1 m³ OF WATER ≡ 1000 LITRES ≡ 1 TONNE)

AVERAGE FEED RATE - 70 t/h COAL



WASHERY
WATER BALANCE
FIGURE 4

a Technical difficulties were foreseen if the coarse rejects were crushed and pumped underground. The coarse material would settle out quickly and the fine material would flow on creating a need to constantly change piping to locations making this a method difficult to control.

b The use of battery locomotives to cart coarse reject underground was investigated. It would require considerable areas (because of its bulk) to be made available and would necessitate opening up and maintaining underground areas. Investigations have shown that accessible underground areas would allow for the stowage of only 36,000 tonnes. Therefore it is considered only a partial solution for the disposal of rejects (required 19,200 tonnes/year).

The estimated cost per year in terms of capital and manpower is approximately \$220,000/year and this was considered too expensive.

c An old open cut (see Site 1, Plan 1) north of Boulder Road and 1-2 kilometres west of the colliery did not have sufficient capacity (capacity was 40,000 m³) to take all the rejects over the life of the washery. A disused shale pit north west of Portland (see Site 2, Plan 1) on BCSC cement works site did not have sufficient capacity (capacity was 30,000 m³) and would involve trucking through Portland residential streets. These were considered only partial solutions.

d The colliery site covered by Surface Mining Purposes leases is congested and there would be insufficient space to place coarse reject material.

e The Ivanhoe No 1 Open Cut colliery has recently completed operations. The Open Cut mining areas located outside the future Mt Piper power station land and owned by the company were required to be rehabilitated under the Development approval for the Open Cut. Under this Development approval a highwall was left exposed to allow a new entrance to the proposed Ivanhoe No 3 colliery shown on the attached map (No 3/376, Appendix 10).

Due to changes in the open cut proposal requested by the Electricity Commission insufficient overburden remained to allow for rehabilitation to the original plan. A shortage of some 150 000 m³ of overburden has meant that the length of the exposed highwall has been doubled. This rehabilitation of the open cut workings, although near complete has not received final acceptance by the Department of Mineral Resources.

It is proposed that the 19 200 tonnes per annum of coarse reject material from the washery would be dumped alongside the proposed new entry to the Ivanhoe No 3 colliery to enable the shortfall of overburden material to be replaced over a period of 8 to 10 years. This comprises the remaining life of Ivanhoe No 2 colliery.

This alternative offers the advantages of; easy access, it is on BCSC owned land, it enables the further rehabilitation of mined areas and requires only a short travel of trucks on a public road.

The reject material will be carted by truck from the Ivanhoe colliery along the Boulder Road for a length of some 300 m prior to turning into the existing access road to the Open Cut. Access approval has been obtained from the Electricity Commission to transport the reject material via this route.

4.6.2 Trucking

Average coarse reject (see Section 4.4) will be 84 tonnes per day. This will be stored on site in the 55 tonne Reject Bin (18) and transported by truck (25 tonne load) to the disposal area. It is proposed to transport rejects between the hours of 7 am and 6 pm, 5 days per week. Four loads per day are expected on average with up to 6 loads per day maximum.

During normal operations it is not expected to have to store reject material on site.

Because the output of the mine remains at its existing level, the quantity of material leaving site (washed coal plus unwashed coal plus coarse reject) will be no greater than the quantity leaving now (unwashed coal only). Consequently truck movements along Boulder Road will not be any greater and should be slightly less.

Arrangements for use of Boulder Road should remain the same because the traffic volume will not have changed.

Use of and maintenance of the access road from Boulder Road to the disposal site has been agreed with the Electricity Commission.

4.6.3 Reject Placement

Drawing 3/376, Appendix 10 shows the location of proposed washery reject placement. View 9, Appendix 4 shows the existing highwall; reject material will be placed against the northern face of the highwall with the southern end left exposed for a future entrance to the proposed No 3 colliery.

The drawing shows the existing contours and the finished contours of the reject material and final batters.

Existing catch drains direct surface run off away from the proposed placement area. A low bund wall would be placed at the toe of the batter to direct run off away from the reject material.

The north-eastern face of the placement will be defined by a bund of non-porous material to catch and hold run off from the placement area.

This bund wall would be extended upwards as filling progresses and would be rehabilitated as described below.

The reject material will be placed so that rain falling on it will be contained by the bund wall and drain towards a low area near the high wall. Here the water should seep into the already placed reject material or evaporate.

Although it is not expected that water will normally be able to egress from this area, as a precaution a catch dam and settlement basin of approximately 1000 m³ will be constructed below the bund wall as shown on the drawing 3/376 to catch any overflow from a low point in the bund wall or seepage through the bund wall. The catch dam will have a permanent capacity of 500 m³ below an outlet pipe and a reserve capacity of 500 m³ above the outlet pipe. The catch dam will act as a trap for any solids in overflow from the placement area.

The reject area would be rehabilitated to the same standard as required by the Development Application for the Open Cut mine in consultation with the Soil Conservation Service. The area would be reseeded with fertilizers after adding topsoil if necessary from local suppliers.

4.7

Tailings Disposal

Three options are available for the disposal of fine rejects

- . disposal of the raw slurry (95% moisture) in a conventional tailings dam
- . dewatering and placement with the rejects in a landfill operation
- . disposal of the raw slurry underground.

The first option was discarded because of a lack of a suitable site close to the proposed washery site and the undesirability of a surface dam in terms of run off and visual amenity.

The second option was discarded because of the expense which would be very large in comparison with the cost of erecting a secondhand washery. The estimated cost for thickener and solid bowl centrifuge equipment is approximately \$250,000-\$300,000.

The proposed circuit though incorporates mechanical dewatering by cyclone and slurry screen to minimise the quantity of solid tailings, increase the amount of recirculated water, and reduce make-up water requirements.

As previously described, the third option requires that the tailings water of some $19 \text{ m}^3/\text{h}$ ($40 \text{ m}^3/\text{h}$ max) plus the tailing slimes of approximately 2 tonnes per hour would be pumped from the washery into the workings of Ivanhoe No 2 colliery.

4.8 Underground Disposal

Plan Number 4 Appendix 11, shows the location and extent of underground workings and the location (Area A) of proposal tailings disposal area and existing underground storage area.

The Plan shows the present extent of underground water and the area is estimated to contain between 3500 m^3 - 4500 m^3 of water.

Because of the dip 1:40 and the arrangement of the mined areas, mine water has drained to and accumulated in Area A. This area was last mined in the late 1920's. Observation by mine personnel indicates that there is negligible seepage out of this area. The area to the east of Area A is unmined and the floor of area A is a type of conglomerate with a calcareous bond. There appears little risk of the water escaping due to seepage out of the area but advice from another mine in the vicinity indicates that should seepage occur into the conglomerate then neutralisation of any acidity in the water is likely to occur.

The measured pH of the water in the underground dam is 4.5 and the measured pH of the Pipers Flat Dam water is 7.8. The underground dam pH has probably built up over a number of years. Once the washery is operating and there is a continual recycling of water through the washery with make up water from Piper's Flat Dam the pH should stabilise at a lower level.

Should the pH become too high BCSC would investigate the use of dosing equipment to neutralise excess acidity for reasons of possible escape of acid water through seepage and the damage acid water would do to washery equipment and pumps.

The coal to the east of Area A is, at the moment, sterilized because it underlies Boulder Road.

Should Area A prove insufficient in size to deposit all tailings over the life of the washery (subject of course to the dried slimes not being recovered) then Area B to the north of Area A is available for disposal.

This would require sealing of certain drives to contain the slimes in a planned area.

It is proposed that the tailings be pumped underground by a pipeline laid underground and recirculated water returned by an underground pump and pipeline.

The current state of repair in this area of the colliery is good and would be maintained in accordance with the requirements of the Coal Mines Regulations.

The volume available for placement of tailings was calculated assuming in Area A that the height of the worked area was 1980 mm and in-traction rate of coal was 40%.

This underground storage area has a capacity of some 27 million litres ($27,000 \text{ m}^3$) which will enable the settlement of the slimes so that the water can be recirculated for use in the washery. Clean water from this underground tailings storage area will be pumped to the existing surface dam also shown on the plan (see Site Plan 1) so that it can be combined with new water from Pipers Flat dam and pumped to the washery at the rate of $26 \text{ m}^3/\text{h}$ ($54 \text{ m}^3/\text{h}$ max). It is conservatively estimated that $13 \text{ m}^3/\text{h}$ litres per hour can be recirculated.

It has been estimated that the underground tailings dam will enable the slimes to be deposited in this area for a period of between 5 to 8 years. At this time the dam would be relocated to Area B of the Colliery workings so that the slimes can be allowed to dry and recovered for mixing with clean coal for sale as fine product. At the present time, water is pumped from the underground workings for disposal in the existing surface dam which finally passes into the creek. This development proposal would enable all colliery water to be used without any disposal of waste water off the site as is the existing practice.

Other collieries within the Ivanhoe area use underground disposal for their tailings disposal. Gretley Colliery Washery (Peko Wallsend) in the Newcastle area pumps their tailings slurry (20% solids minus 0.5 mm, compared with Ivanhoe 10% and minus 0.25 mm). Slurry is discharged through from one line with two outlets 1/4 mile apart. Water is pumped back from the underground disposal area into a local creek indicating that the solids are settling sufficiently to allow this discharge.

4.9 Power Supply

It is expected that the proposed modifications will increase the steady state demand for power by approximately 250 kVA. There is sufficient capacity available in the incoming cables to provide this.

4.10 Hours of Operation

The existing coal preparation plant operates on a two shift basis. It is planned to operate the modified coal preparation plant (including washery) on a two shift basis normally between the hours of 7 am and 8 pm 5 days per week with a maximum situation to 10 pm. It is expected to operate approximately 225 days per year.

The coal trucking operations will occur in daylight between 7 am and 8 pm 5 days per week and trucking of reject material will be as described in Section 4.6.2.

4.11 Stockpiles

At the termination of the washery circuit are two small conical stockpiles of approximately 200 ton (see Drawing No 269-CP-008). These are temporary stockpiles and the washed coal from these will be spread into larger stockpiles as shown on the Drawing 2160/006. It is proposed that two major stockpiles be established within the area of the existing stockpiles:

- . 60 000 tonnes max, for washed coal
- . 15 000 tonnes max for unwashed coal.

Existing stockpiles can contain up to a maximum of 75,000 tonnes.

The maximum height of stockpiles will be 5 metres.

The stockpiles will be placed by truck and formed by mobile equipment. Reclamation will be by mobile equipment and truck.

The mobile equipment is rubber tyred and consists of two Caterpillar 966 front end loaders with 6 cubic yard buckets.

4.12 Noise Impact

The two dominant noise sources at the existing Coal Handling Plant are the two crushers.

Sound pressure levels are:

- . Primary Crusher 96 dBA
- . Secondary Crusher 90 dBA.

The combined noise level of these two would be 97 dBA.

The major noise source from the washery is expected to be from the air valves of the washing jig. Expected level is 104 dBA at 1 m (or 98 dBA at 2 m).

The combination of this plus the existing noise level of 97 dBA at two metres is 101 dBA.

The two house locations (point 6 and 7 mentioned in Section 3.6.3 no longer exist; they have been incorporated into the Mt Piper Power Station site (see Mt Piper Power Station Environmental Impact Statement by Electricity Commission of NSW).

The three closest house locations are shown on Plan 1 and are at:

Blackman's Flat
East Portland
Avondale
Pine View

The following table (based on a 6 dB loss of sound with doubling of distance) shows the calculated noise levels at these locations with and without the proposed washery.

Location	Distance (m)	Calculated Sound Level dB(A) for Ivanhoe No 2 Colliery		Background Levels without Washery
		without Washery	with Washery	
Ivanhoe Colliery	2	97	101	
Blackman's Flat	3400	32.8	36.8	40 (Estimated)
East Portland	2700	34.6	38.6	53-59 (Ref 3)
Avondale	2700	34.6	38.6	30-38 (Ref 1)
Pine View	2400	35.8	39.8	35 (Estimated)

An increase in sound level of up to 5 dB is regarded as being unlikely to result in significant loss in acoustical amenity and the results of the above table lie within this range.

The background noise level at Avondale is 30-38 dBA and when the forested ridge between Avondale and the Ivanhoe Colliery is taken into account it is estimated that there should be no noticeable effect from the washery operation.

A forested ridge that is close behind the Ivanhoe colliery should reduce the sound levels before they reach Pine View and there should be no noticeable effect from the washery operation at Pine View.

The houses at Blackman's Flat are subject to closer colliery noise sources from Wallerawang Colliery and Western Main Colliery and the noise from the Ivanhoe washery would be well below the background noise produced by these close washeries.

Figure F2 of Mt Piper Power Station EIS indicates a noise level of about 40 dBA at Blackman's Flat.

The houses at East Portland are subject to closer road, rail and cement works noise and the noise from the Ivanhoe washery will be well below the background noise levels.

Therefore the proposed washery at Ivanhoe Colliery should have no significant noise effect at any houses within the vicinity.

5 ENVIRONMENTAL SAFEGUARDS

5.1 Landscape

It is not proposed to alter the landscape in any significant way. The installation of the modifications within a site already containing similar plant and conveyors is not expected to change the landscape quality. The highest point of the modified coal preparation plant does not protrude above the highest point of the existing bins.

The cross country pipelines proposed will be laid mostly underground and should create minimum intrusion into the existing landscape.

Further plantings of trees and shrubs as indicated on Plan 2 will be made along Boundary Road to further screen the existing plant and proposed modifications to the plant.

The coarse reject disposal area is to be rehabilitated in accordance with Clause 4.6.3.

5.2 Water Quality

It is not proposed to release any tailings water from site (see Section 4.7); all water being recycled and reused in the process.

The washery area will be a self-contained sump with a nib wall completely surrounding it.

A recovery pit would be constructed beside the washery to contain overflow from the washery area, hosedown spillage and rainfall. The pit would have a volume of approximately 30 m³. Water would be returned to the washery circuit and fine coal periodically recovered by front end loader to the stockpiles.

Washed coal to be stockpiled on site is expected to contain between 5-10% moisture and there should not be any run off from the stockpiles or bin that would cause contaminated water to leave the site.

The stockpiles will be sprayed (see Clause 5.4) in dry weather and not sprayed in wet weather so there is not expected to be any run off from the spraying operation.

Rejects are to be stored in a bin. The rejects leave the washery at about 15% moisture. Any run off from the bin area should not leave the site.

Run off from the coarse reject placement area is to be contained within the reject placement area (Clause 4.5).

The size of coal stockpiles will not change from the present situation and there has been no noticeable pollution with the present situation and no requests have been received from the SPCC for extra controls.

Therefore the proposed modifications to coal preparation plant should not increase or change rainfall run off from the site over the present situation.

5.3 Flora & Fauna

There should be no impact on the flora and fauna as discussed in Section 3.8.

5.4 Air

Existing Conveyors (A), (E), (G) and (I) that are to remain unchanged in the modified plant are not sheeted on the sides and it is not intended to alter these conveyors.

Coal from the nut bin is fed by chute and sluiced into the jig via a water jet so that the entire proposed new installation will be completely wet process creating little dust. Conveyors (35), (45), 46) are uncovered but because of the facts that the new installation will only be handling wet or damp coal and the conveyors are relatively short and are not handling large quantities, little or no dust should be generated. Coal transportation for the existing export coal is unchanged in this proposal.

Washed coal stockpiles will be damp when formed and should generate less dust than the present stockpiles.

Spray water will be used to reduce dust emissions from stockpiles; an existing 3-4 point manually activated spray system will be used on the stockpiles and a hired water tanker will be used as necessary on stockpile surrounds and on site roads - daily if required.

5.5 Noise

Section 4.12 assesses that the proposed washery should not increase noise levels at any houses above the existing background level as shown in section 4.12.

5.6 Reject Disposal

Reject disposal as indicated by Section 4.6 would be rehabilitated in accordance with the Development Application for Ivanhoe No 1 Open Cut and in consultation with the Soil Conservation Service.

The proposed modifications to the coal preparation plant are to be built on the existing colliery site and do not involve a new site. Tailings disposal is to be underground in disused workings. (See Section 4.8).

6 ASSESSMENT OF ENVIRONMENTAL IMPACTS

6.1 Topography and Visual

The proposed modifications to the coal preparation plant should not significantly alter topography or the visual aspect of the existing colliery surface workings. Proposed plantings should further screen the existing plant and modifications and improve the visual amenity.

Reject disposal will assist the completion of rehabilitation of the Ivanhoe No 1 Open Cut mine.

6.2 Air

The proposed modifications should not increase dust but because some of the original production is now being processed wet, a small reduction may occur.

6.3 Noise

The proposed modifications should not significantly increase noise levels within the plant area or within surrounding areas. All houses are sufficiently distant not to be effected by the noise from the colliery.

6.4 Flora and Fauna

The proposed modifications should not effect existing flora and fauna.

6.5 Roads

With the proposed modifications the same quantity of material will be leaving the colliery site, therefore road transport volume will remain unchanged.

6.6 Employment

The proposed modification should enable current employment levels to be maintained. Without the proposed modifications employment levels at the colliery would fall.

6.7 Energy

It is expected that the proposed modifications would require an extra 250 kVA of electric power.

6.8 Construction

The construction period is likely to last about 12-14 weeks. During this period there could be up to 20 men on site. This would result in some extra traffic on Boundary Road. Accommodation for the workforce is expected to be in Lithgow.

7.0

REFERENCES

- 1 Longworth & McKenzie Pty Ltd, Environmental Assessment of the Proposed Ivanhoe Open Cut No 1 (Huon) Coal Mine at Mt Piper, New South Wales, July 1980.
- 2 The Electricity Commission of New South Wales, Mt Piper Power Station Environmental Impact Statement and Supplementary Information, August 1980.
- 3 Gutteridge Haskins & Davey Pty Ltd, Environmental Impact Statement, Rail Loading Operations at Portland, NSW, for Ivanhoe No 2 Colliery, March 1983.

APPENDIX 1

Wind Roses (Figures 1 and 2)

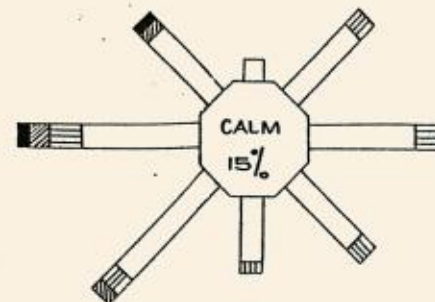
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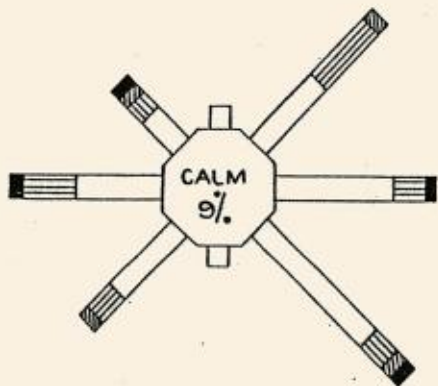


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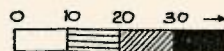
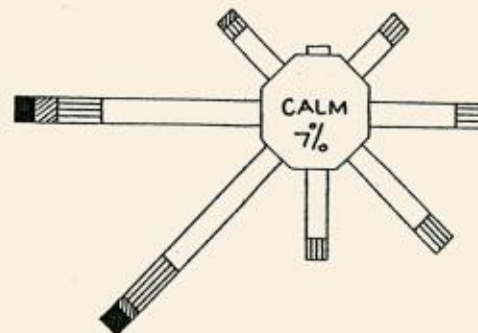
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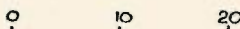
3:00 PM



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WIND SPEED CLASSES
(km/hr)



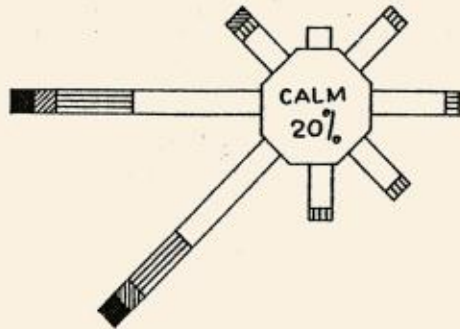
PERCENTAGE OCCURRENCE
OF WIND IN 8
DIRECTION CLASSES

WIND ROSES
FOR LITHGOW
FIGURE 1



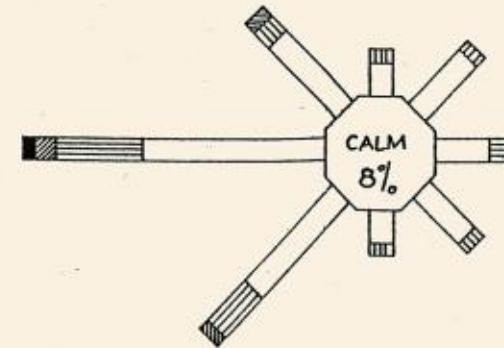
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9:00 AM

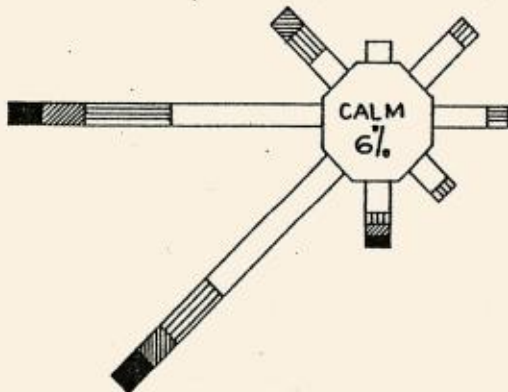


OCTOBER

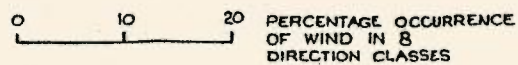
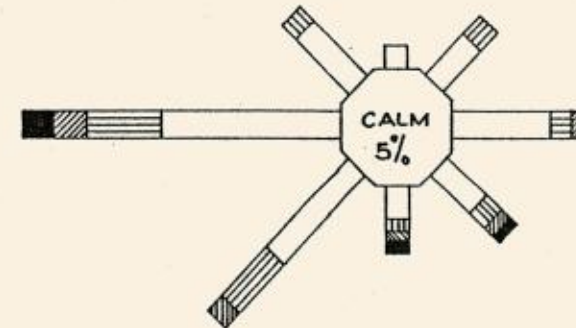
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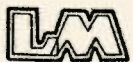
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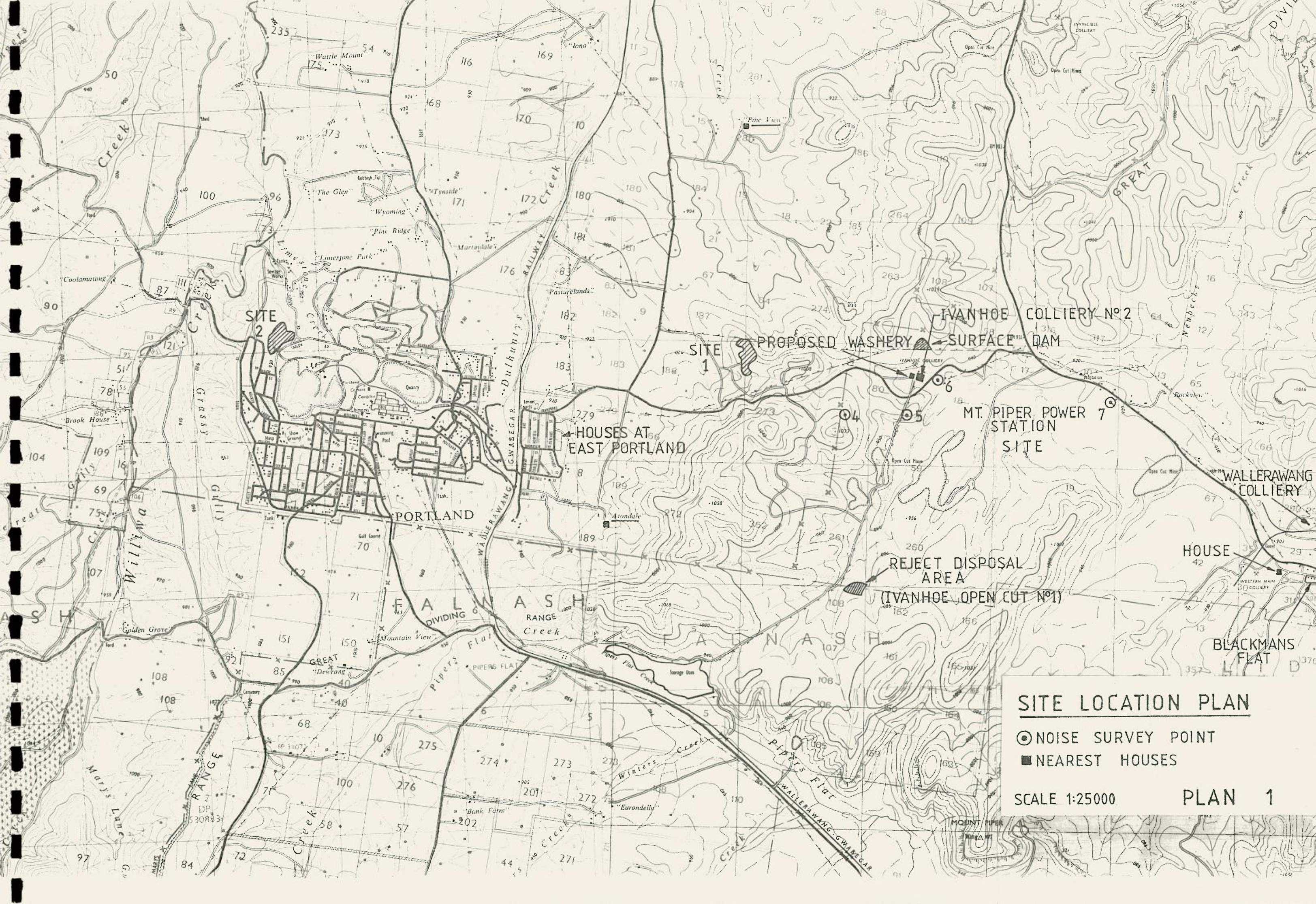


WIND ROSES
FOR LITHGOW
FIGURE 2



APPENDIX 2

Site Location Plan 1



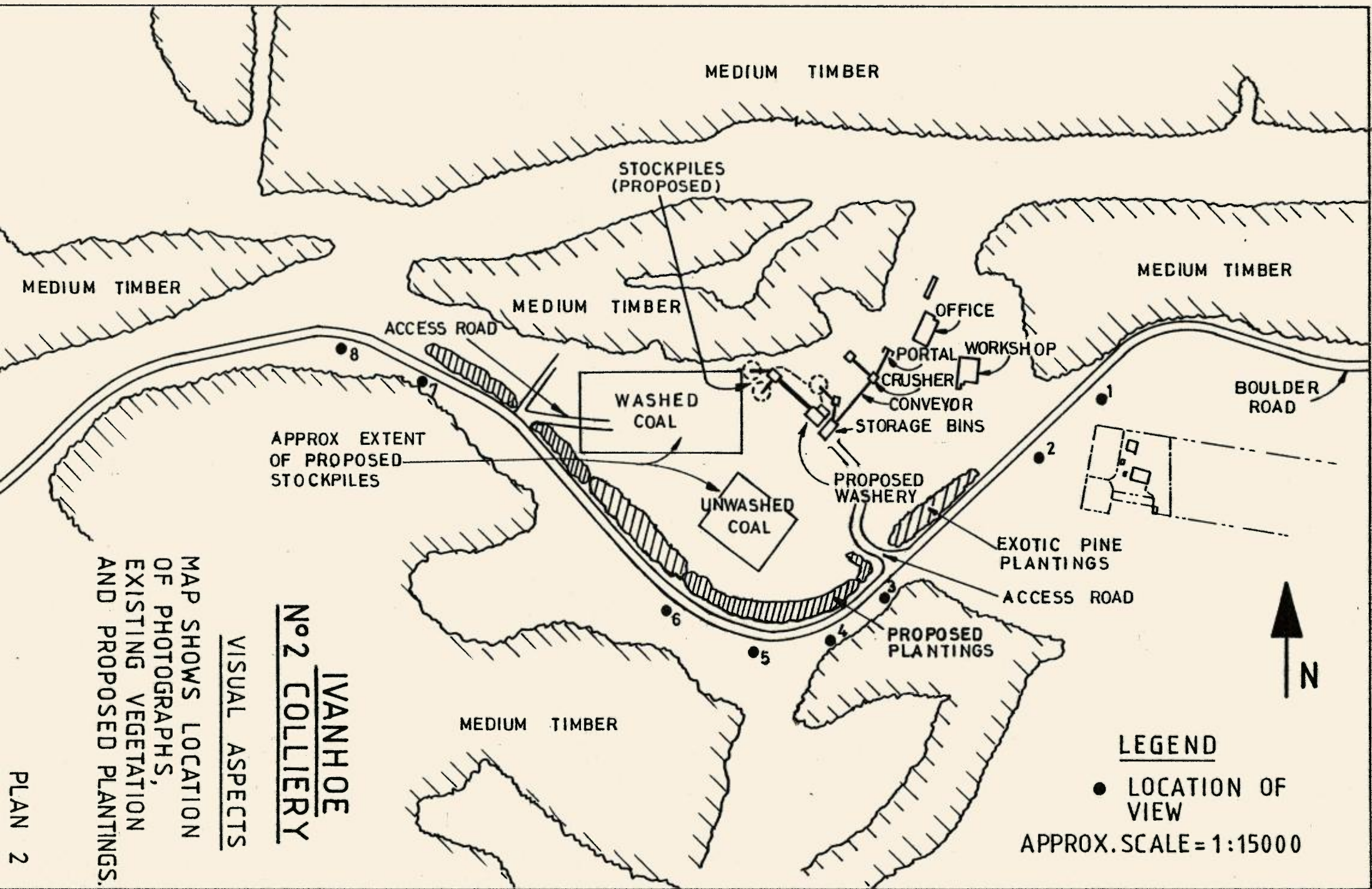
SITE LOCATION PLAN

- ⊙ NOISE SURVEY POINT
- NEAREST HOUSES

SCALE 1:25000 PLAN 1

APPENDIX 3

Visual Aspects, Plan 2



MAP SHOWS LOCATION OF PHOTOGRAPHS, EXISTING VEGETATION AND PROPOSED PLANTINGS.

IVANHOE
No. 2 COLLIERY

APPENDIX 4

Photographs of Existing Site



View 1



View 2



View 3



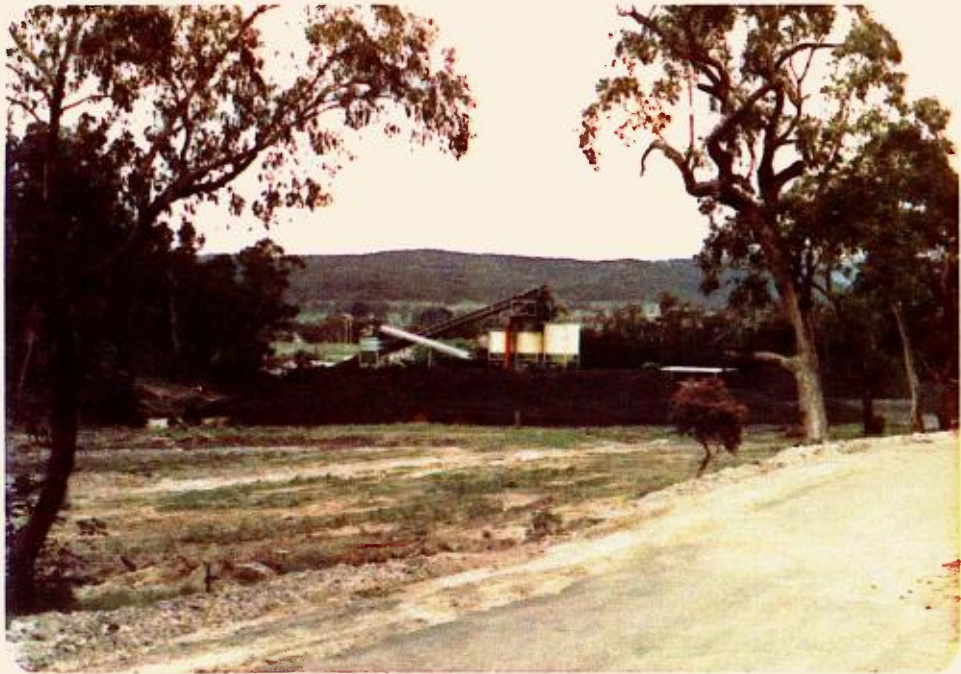
View 4



View 5



View 6



View 7



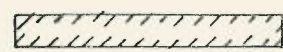
View 8



View 9

APPENDIX 5

Zoning and Land Use Plan 3



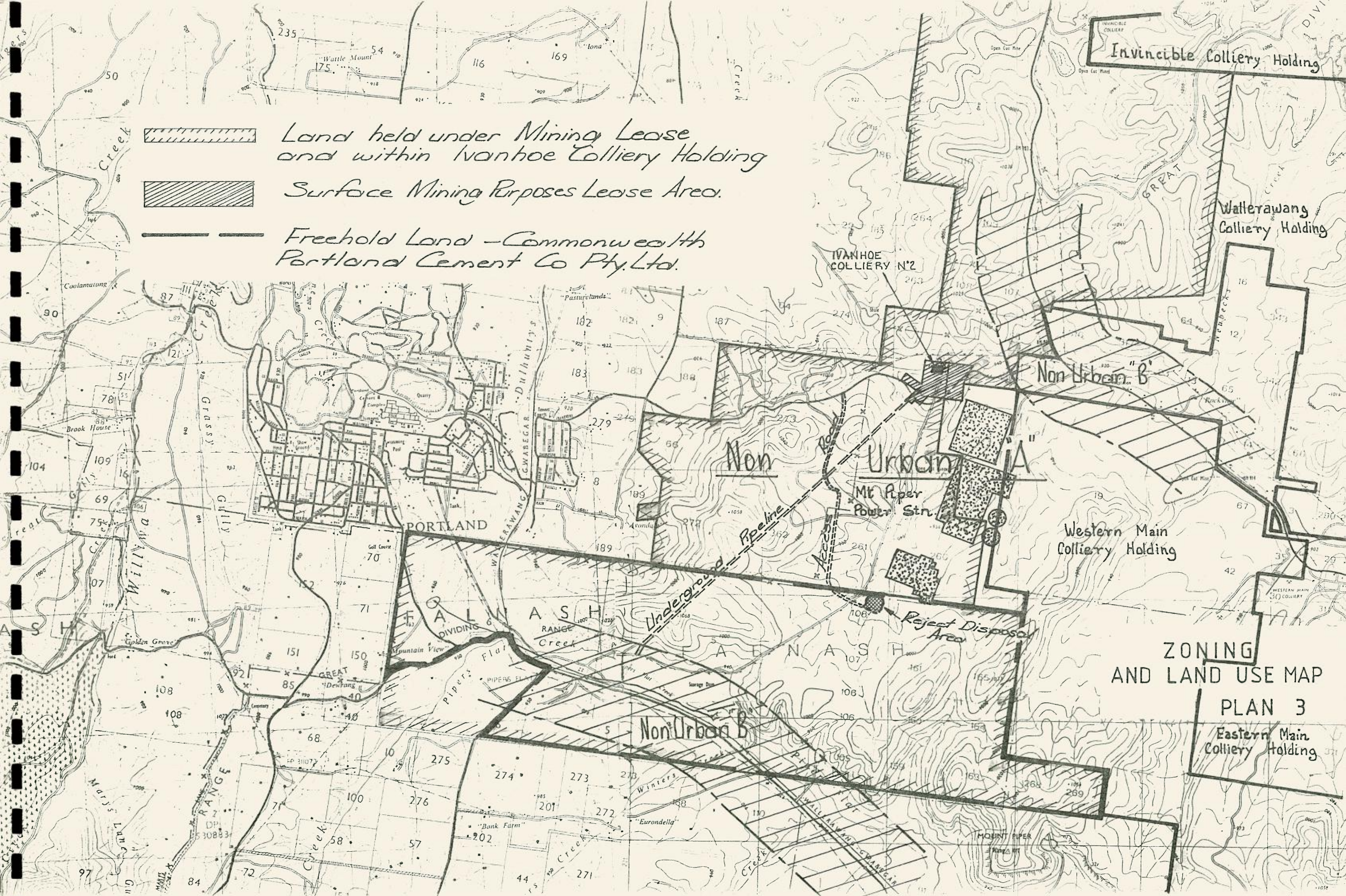
Land held under Mining Lease and within Ivanhoe Colliery Holding



Surface Mining Purposes Lease Area



Freehold Land - Commonwealth Portland Cement Co Pty. Ltd.



ZONING AND LAND USE MAP

PLAN 3

Eastern Main Colliery Holding

Western Main Colliery Holding

Wallerawang Colliery Holding

Invincible Colliery Holding

IVANHOE COLLIERY N°2

Non Urban B

Non Urban A

Mt Piper Power Stn.

Non Urban B

Reject Disposal Area

Underground Pipeline

PORTLAND

ASH RANGE

ASH RANGE

ASH RANGE

MOUNT PIPER

Winters

Eurondella

Bank Farm

58

57

276

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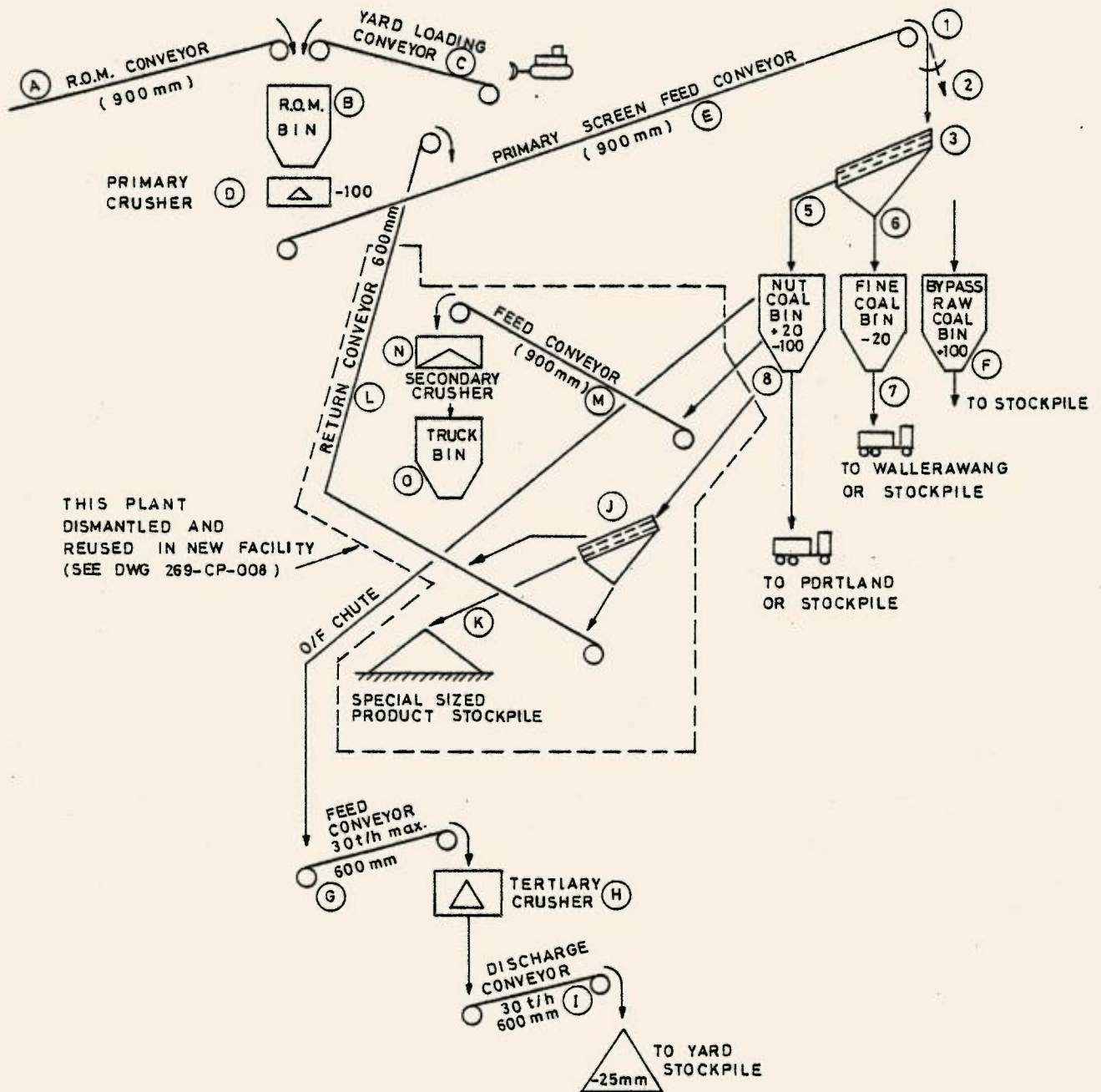
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APPENDIX 6

Existing Flow Sheet Plan 5

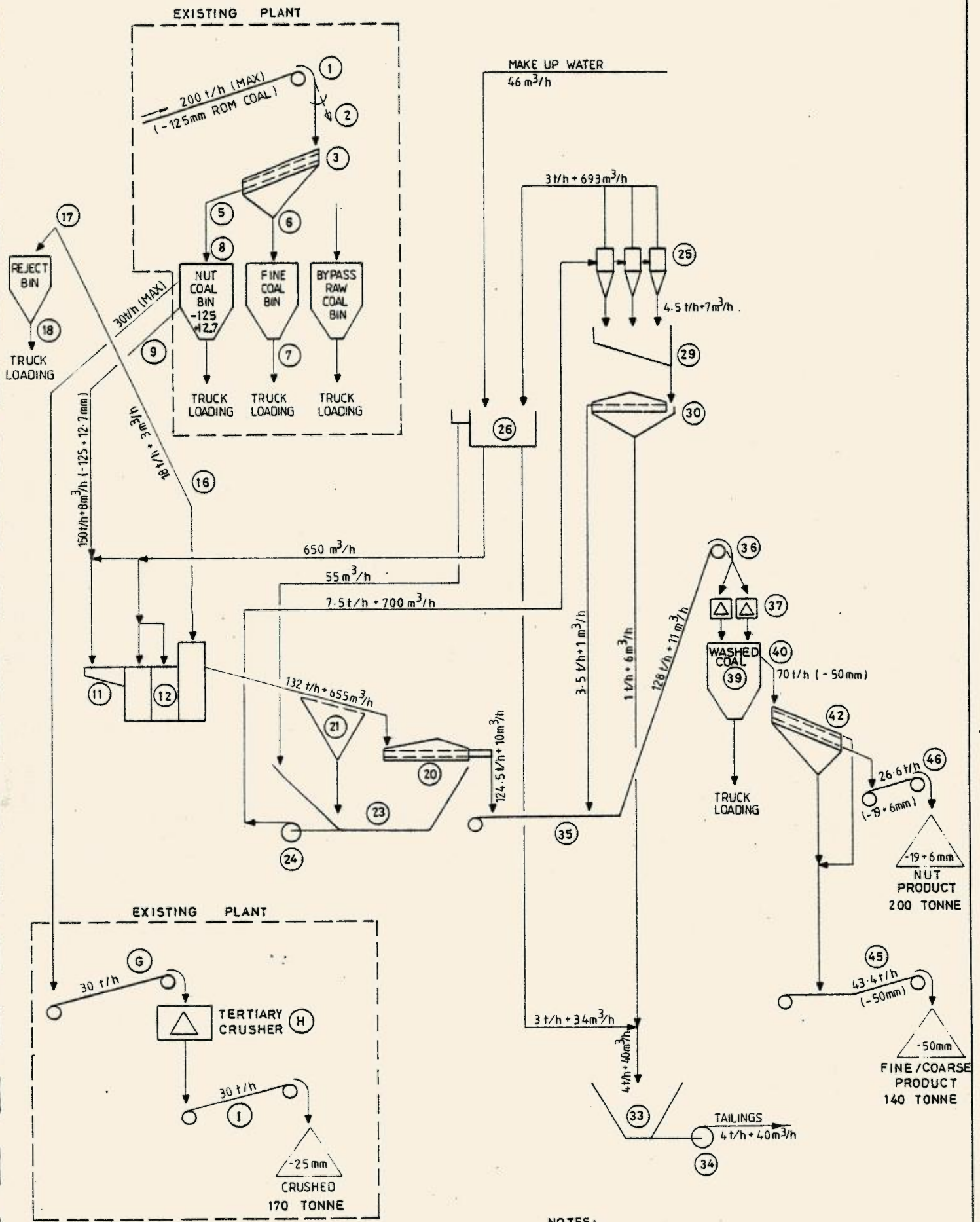


BCSC COLLIERIES LTD
 IVANHOE COLLIERY
 EXISTING
 FLOW SHEET

PLAN 5

APPENDIX 7

Process Flow Sheet 269-CP-08



- NOTES:**
- ① ③④ EQUIPMENT ITEM N°
 - FLOW RATES FOR MAXIMUM FEED OF 150 t/h TO WASHERY (AVERAGE FEED = 70 t/h)

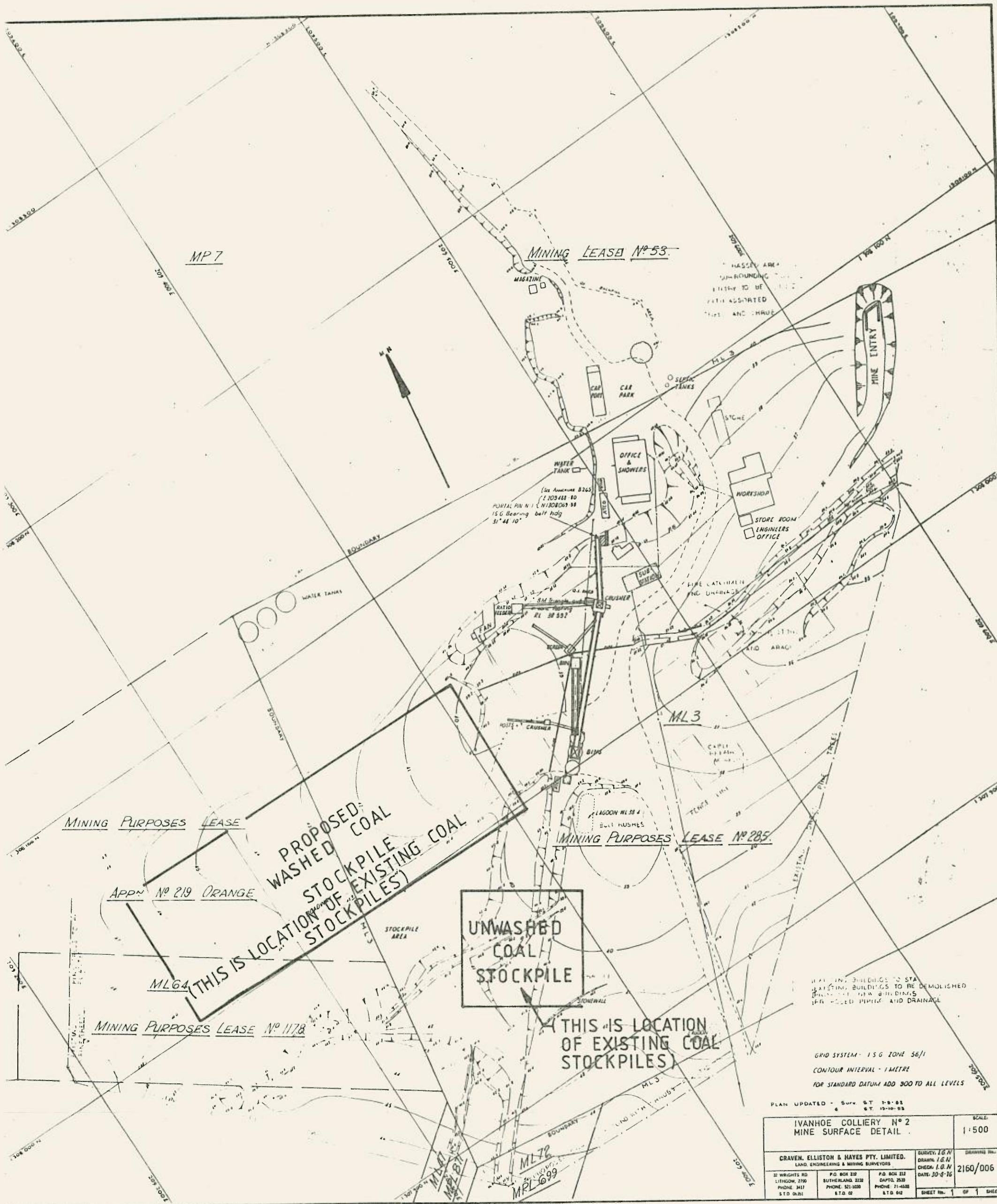
ITEM	DESCRIPTION	REQ'D	MATERIAL	REMARKS
		SCALE	PASSED	DATE
		DRAWN	T.L.	DRAWING NUMBER
		TRACED		
		CHECKED		

PREPARED BY
Solymann and Associates
 SERVICES TO THE COAL INDUSTRY
 SYDNEY AND BRISBANE
 AUSTRALIA

B.C.S.C. COLLIERIES LTD.
 PROPOSED FLOW SHEET
 TEMPORARY PREPARATION PLANT FACILITY
 (-125mm + 12.7 mm) FEED COAL.
 DRAWING NUMBER
269-CP-008

APPENDIX 8

Site Plan - Existing Surface Workings 2160/006



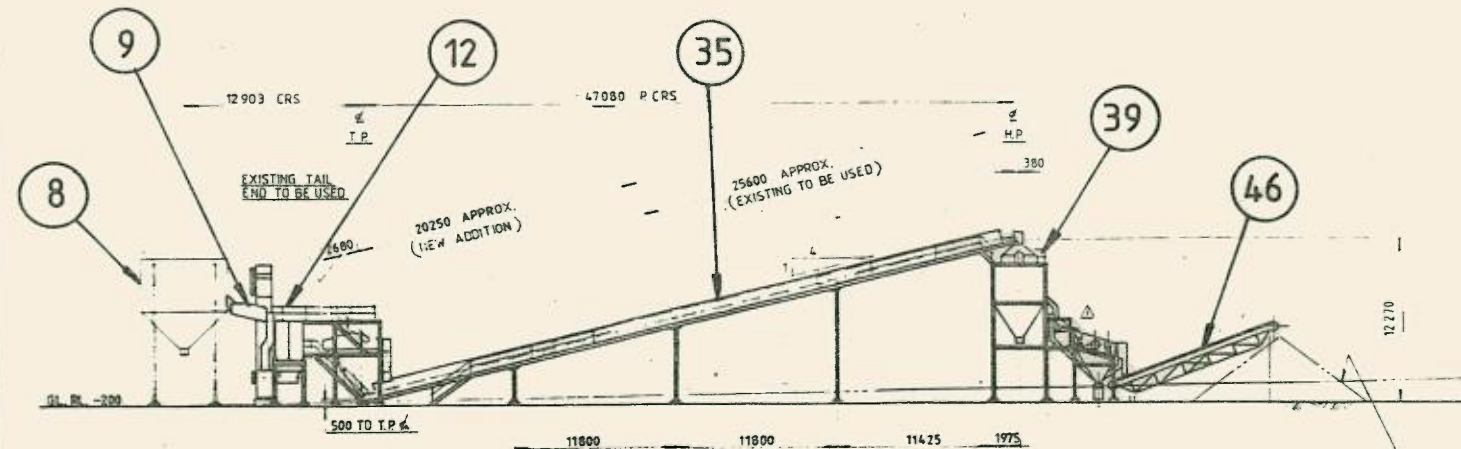
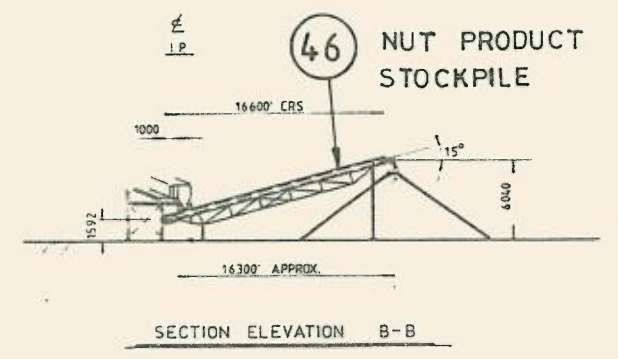
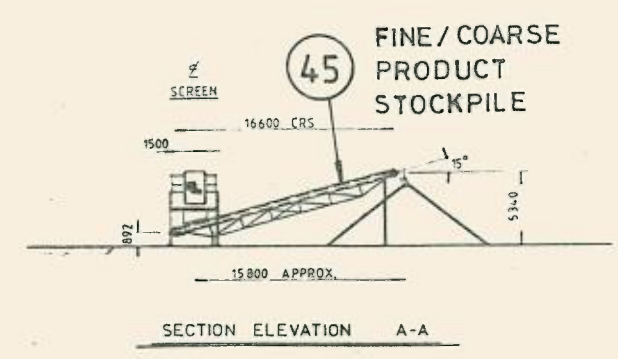
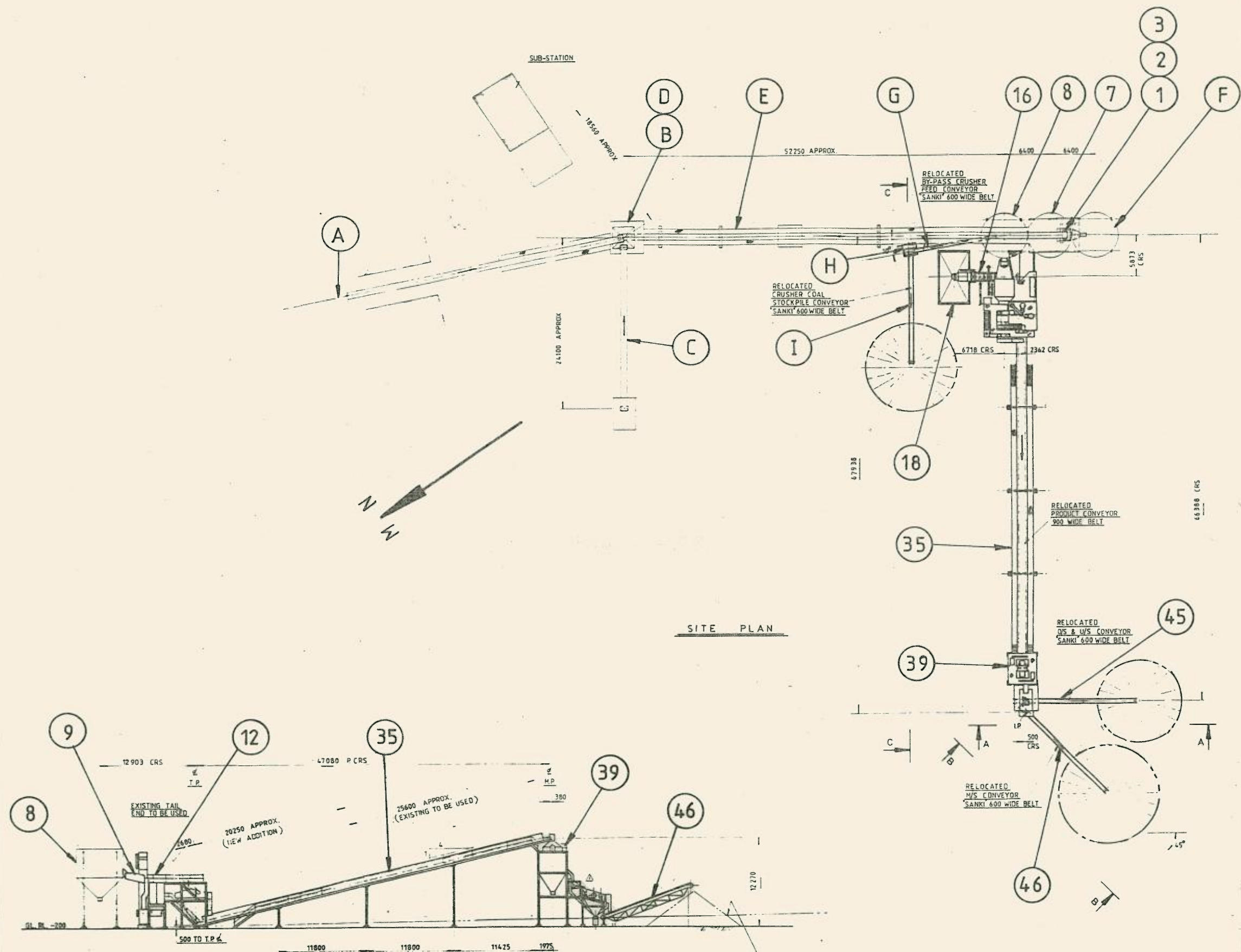
GRID SYSTEM - I.S.G. ZONE 56/1
 CONTOUR INTERVAL - 1 METRE
 FOR STANDARD DATUM ADD 300 TO ALL LEVELS

PLAN UPDATED - Surv. ST 1-8-82
 ST. 10-10-83

IVANHOE COLLIERY N° 2 MINE SURFACE DETAIL		SCALE: 1:500
CRAVEN, ELLISTON & HAYES PTY. LIMITED. LAND, ENGINEERING & MINING SURVEYORS		DRAWN I.G.N. CHECK I.G.N. DATE 30-8-76 DRAWING No. 2160/006
32 WRIGHTS RD LITHGOW, 2790 PHONE 3417 S.T.D. 0361	P.O. BOX 232 BUTHERLAND, 2232 PHONE 521-1020 E.T.O. 01	P.O. BOX 232 DAPTO, 2530 PHONE 71-4553 E.T.O. 012
SHEET No. 1 OF 1 SHEETS		

APPENDIX 9

Site Plan - Proposed Modifications 269-CP-001



NOTE:
 SITE TO BE LEVELED
 BY OTHERS

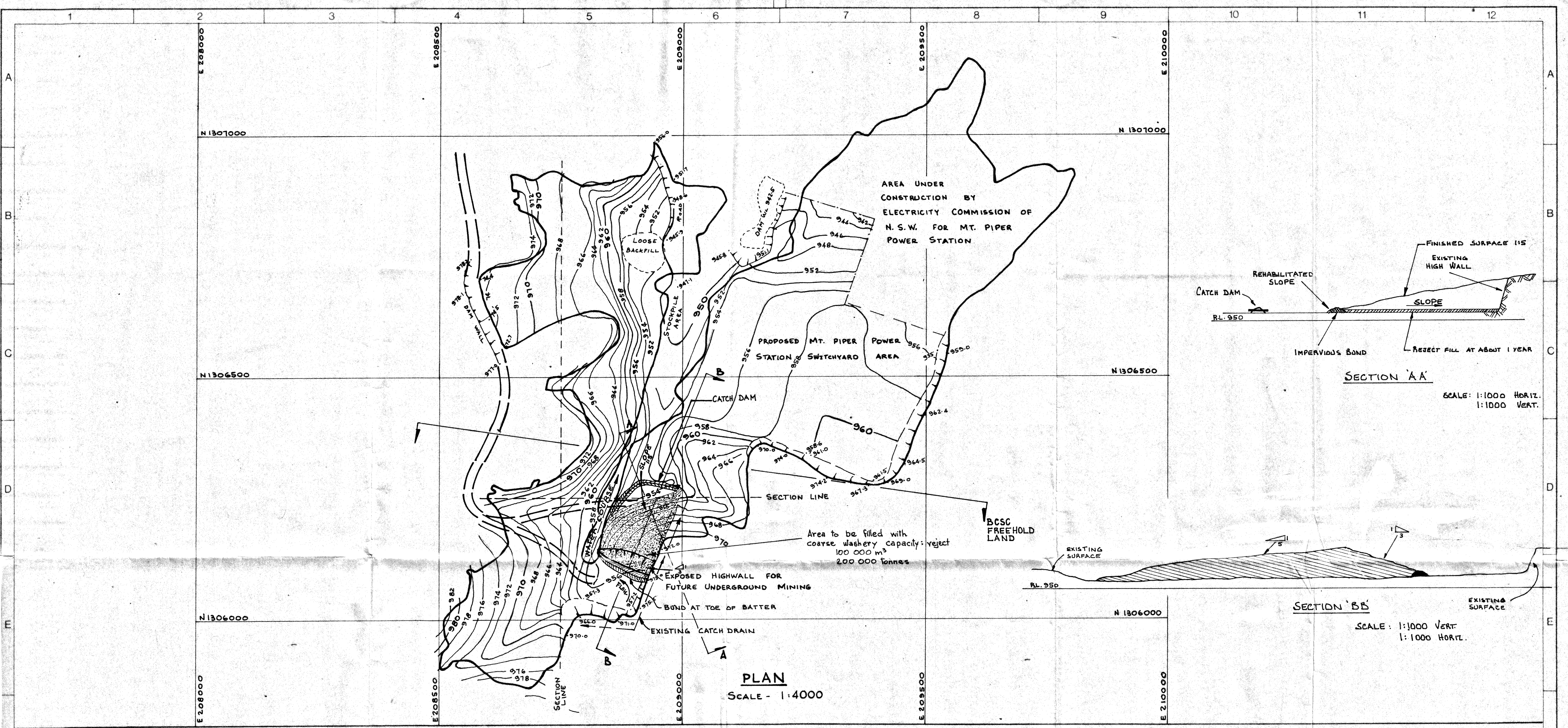
SITE PLAN

SECTION ELEVATION C-C

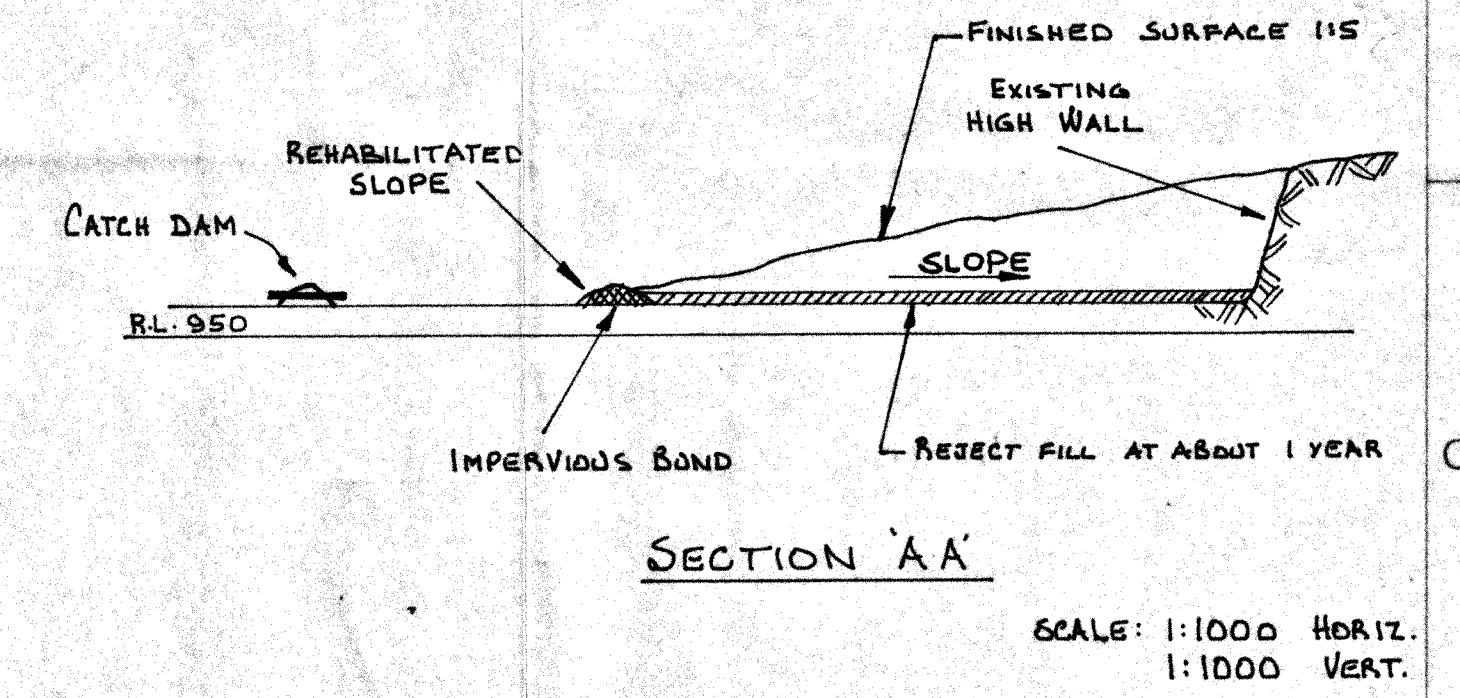
DRAWN: NS 8-9-83		40 DL1 1983	
CHECKED:		Seligman and Associates	
DESIGN ENGINEER:		SERVICES TO THE COAL INDUSTRY	
PROCESS ENGINEER:		BCSC COLLIERIES PTY. LTD.	
APPROVED:		IVANHOE COLLIERIES	
SCALE: 1:200		SITE PLAN AND ELEVATIONS	
REV	DESCRIPTION	BY	DATE
1	FREDER ADDED	P. SCH.	10.10.83
PHOTOGRAPHIC SCALE		CONTRACT No. REV	
		1	
		DRAWING NUMBER	
		269-CP-001	

APPENDIX 10

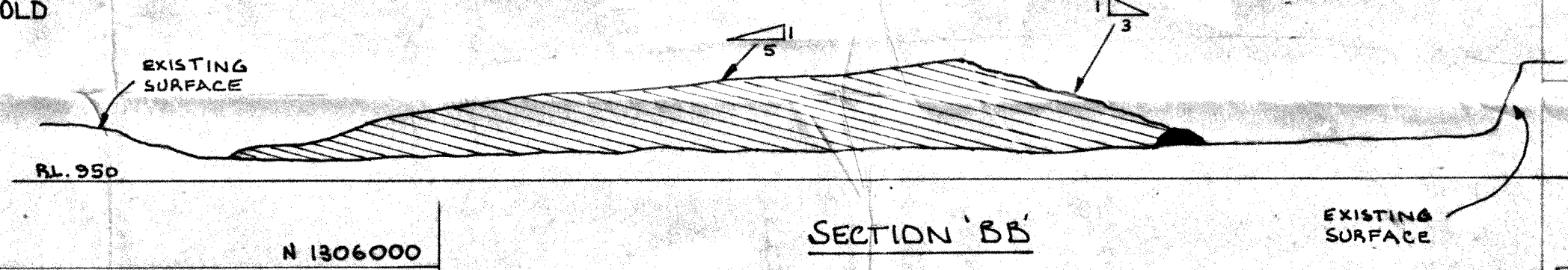
Ivanhoe No 1 Open Cut - Rehabilitation Plan 3/376



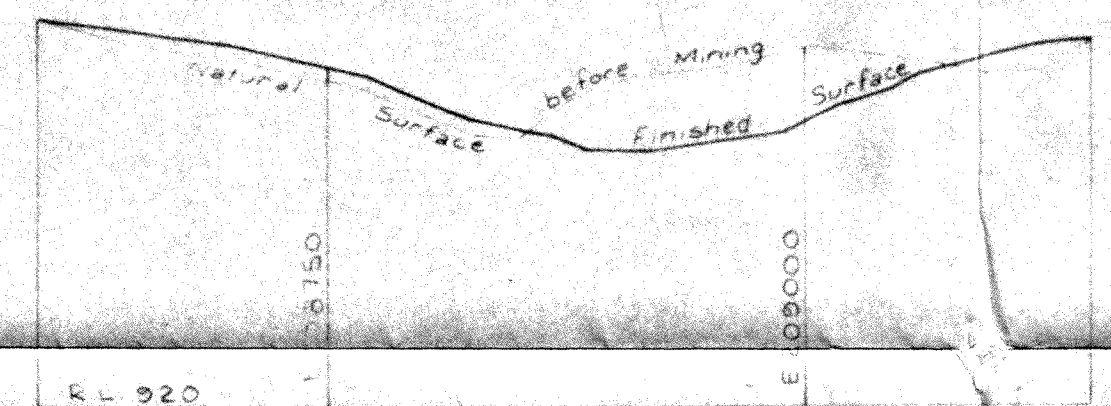
PLAN
SCALE - 1:4000



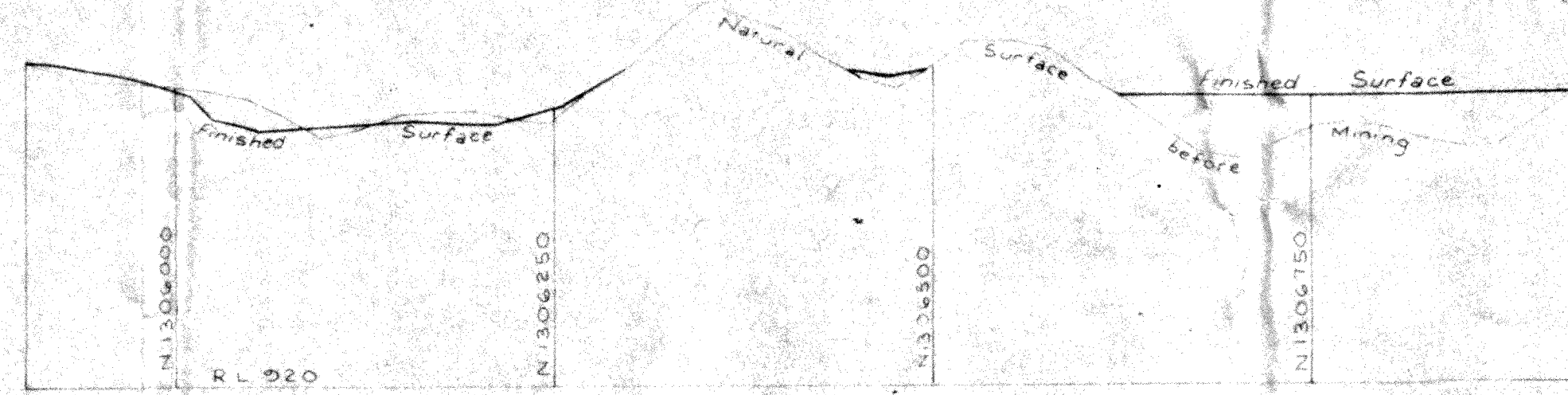
SECTION 'AA'
SCALE: 1:1000 HORIZ.
1:1000 VERT.



SECTION 'BB'
SCALE: 1:1000 VERT.
1:1000 HORIZ.



SECTION ALONG GRID LINE N 1306250
SCALE - HORIZ 1:4000
VERT. 1:1000



SECTION ALONG GRID LINE E 208750
SCALE - HORIZ 1:4000
VERT. 1:1000

I CERTIFY THIS AS A PLAN OF REHABILITATION OF THE IVANHOE OPENCUT N° 1 MINE

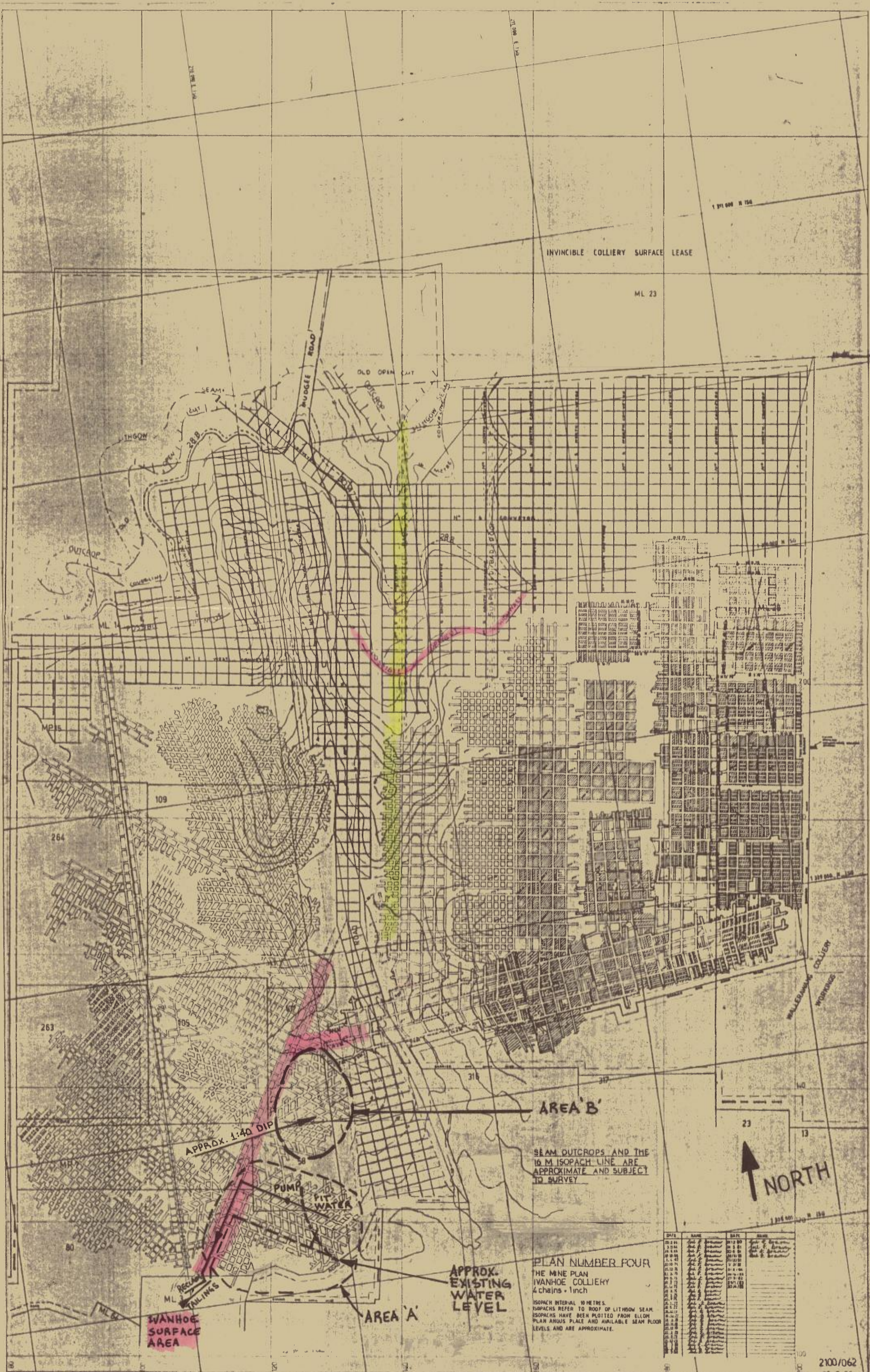
S. D. Nym
REGISTERED SURVEYOR

IVANHOE OPENCUT N° 1			
PLAN OF REHABILITATION			
CRAVEN, ELLISTON & HAYES PTY. LIMITED.			
<small>LAND ENGINEERING & MINING SURVEYORS</small>			
<small>42 BELMONT STREET, P.O. BOX 232 SUTHERLAND 2232 Phone (02) 521 2200</small>			
<small>ASTROLABEL RUTHERFORD LANE LITHGOW 2790 Phone (06) 51 2281</small>			
<small>35 BAAN BAAN STREET, P.O. BOX 212 DAPTO 30 Phone (042) 61 4366</small>			
<small>14 JOHN STREET SINGLETON 2330 Phone (065) 72 2997</small>			
<small>SURVEY</small> ST	<small>DATE</small> 3-8-83	<small>SCALE</small>	<small>DRAWING No.</small>
<small>DRAWN</small> KLF	<small>REVN.</small> G 1129	<small>AS SHOWN</small>	3/376
<small>CHECK</small> X27			

APPENDIX 11

Ivanhoe No 2 Colliery

- Mine Plan showing tailings disposal "Plan Number Four"



INVINCIBLE COLLIERY SURFACE LEASE

ML 23

1 311 000 N 156

OUTCROP

THOON

SEAM

MUDGEE ROAD

OLD OPEN CUT

OUTCROP

SEAM

OUTCROP

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AREA B

SEAM OUTCROPS AND THE 10 M ISOPACH LINE ARE APPROXIMATE AND SUBJECT TO SURVEY

NORTH

APPROX. 1:40 DIP

PUMP PIT WATER

APPROX. EXISTING WATER LEVEL

IVANHOE SURFACE AREA

AREA A

PLAN NUMBER FOUR THE MINE PLAN IVANHOE COLLIERY 4 chains x 1 inch

ISOPACHS REFER TO ROOF OF LITHOUM SEAM. ISOPACHS HAVE BEEN PLOTTED FROM ELLIOM PLAN AND US PLACE AND AVAILABLE SEAM FLOOR LEVELS AND ARE APPROXIMATE.

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BCSC COLLIERIES LTD

E15
487

Modifications to coal preparation
plant Ivanhoe colliery no. 2