EIS 968

AB019636

Environmental impact statement for proposed sand, soil and gravel extraction at Bredbo in the Shire of Cooma-Monaro

ENVIRONMENTAL IMPACT STATEMENT

for proposed

Sand, Soil and Gravel Extraction

at

Bredbo

in the Shire of Cooma-Monaro

prepared for

Lee Aggregates Pty.Ltd.

by

D.P.JAMES

APRIL 1991

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ENVIRONMENTAL IMPACT STATEMENT

Prepared by D.P.James on behalf of
Lee Aggregates Pty.Ltd.,
P.O.Box 397,
Wanniassa, 2903, A.C.T.

This is the second edition of this environmental impact statement and is dated April 1991. The first edition is dated June 1988. Minor spelling and typographical errors have been corrected in the second edition, which has been laser printed.

9 April 1991.

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" Billilingra "
now Corkhill Bros

Form 4.

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

ENVIRONMENTAL IMPACT STATEMENT

This Statement has been prepared on behalf of
Lee Aggregates Pty.Ltd.
P.O.Box 397,
Wanniassa, 2903,
A.C.T.
being the applicant making the development application referred to below.

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

Extraction of Sand, Soil and Gravel

The development application relates to land described as follows:

Portions 1, 1a, 28 and 29 in the Parish of Billilingra and Portion 1 in the Parish of York, all the County of Beresford in the Shire of Cooma-Monaro.

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.

I, Derek Patrick JAMES, of Kogarah, 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.

D.P.James, ARMIT, AMIQ, AIMM.
15/46 Robertson Street,
KOGARAH, 2217.

signature

6 June 1988
date

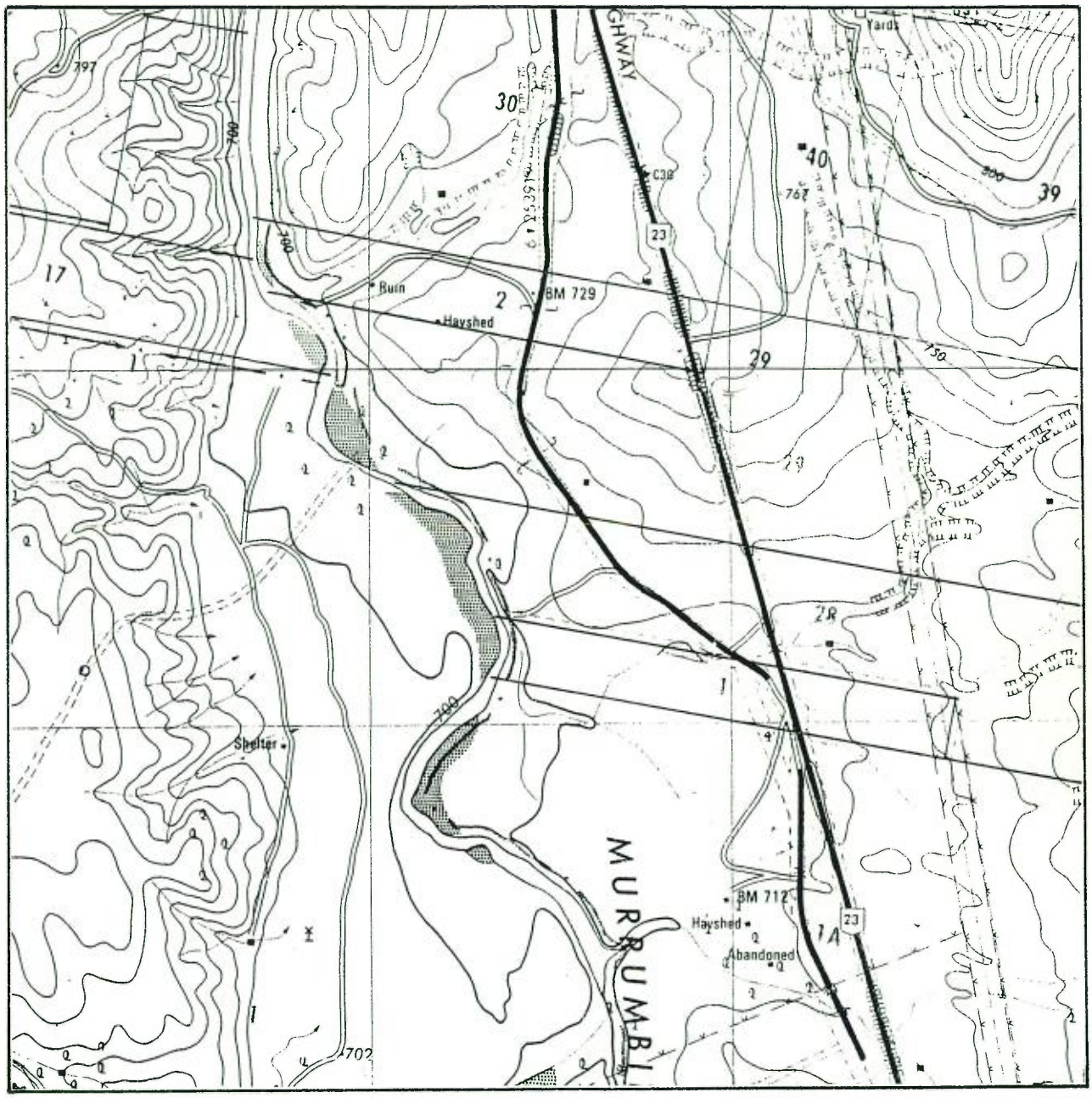


Figure 1. Location of the land. Taken from CMA topographical maps, scale 1:25,000, Bredbo (8726-3-S) and Murrumbucca (8725-4-N).

1. INTRODUCTION.

1.1 General Introduction.

This document forms part of a Development Application to Cooma-Monaro Shire Council for approval to extract soil, sand and gravel from the land described in Appendix 1. The actual development site is only part of the land ; Figure 1 shows the location of the land and the development site and Plan 1 shows the existing topography.

The land is on the banks of the Murrumbidgee River about 5 kms south of Bredbo on the Monaro Highway. At present the land is used for agriculture and for extractive industry. This Application is to expand and upgrade the existing extractive industry.

Consultation with the Director of the Department of Environment and Planning, see Section 9, resulted in that the following matters were required to be specifically addressed:

1. Justification of the need for the proposal with an account of the resources and the projected demand.
2. Impact on the Murrumbidgee River.
3. Interaction of quarry traffic with traffic on Monaro Highway.
4. Results of investigations of sediment movement in the Murrumbidgee River over an annual seasonal cycle, related to the proposal.
5. Assessment of cumulative impact of the proposed extraction on the Murrumbidgee River.

1.2 Summary of Proposed Development.

Full details of the development are given in Section 6 below.

The development is to extract sand and gravel from the bed and banks of the Murrumbidgee River and soil from the banks and flood plain of the same River. The locations of the extraction sites are shown in Figure 1 and in Plan 1. As part of the extraction on the left bank of the River a new river channel will be cut into the flood plain and the river returned to its previous bed.

Soil will be extracted by rubber-tyred front-end loader, type Komatsu W90/2 and loaded into a diesel powered mobile screen, a Finlay Hydrascreen model 50/30E. By screening in this way homogeneous products will be formed. In some cases soil will be mixed with sand to form a range of open textured soil products. Blending of such mixtures is done by passing the partly mixed materials through the powered screen. Sand and gravel will be extracted by the same front-end loader and loaded into trucks for transport to the processing plant. Processing details are given in Figure 2. Processing consists of two circuits:

CIRCUIT 1 contains an Austral triple deck screen to wash and separate the gravel followed by a Finlay Hydrasanda to wash and de-water the sand. This circuit is to produce round river gravel.

CIRCUIT 2 consists of Circuit 1 plus an impact crusher before the Austral screen. This circuit is to produce crushed river gravel.

Wash water will be re-circulated and stored in 2 dams. Initial and make-up water will be obtained from the River. If necessary a flocculant will be used to clarify the wash water. The plant is electrically driven via a Volvo Penta diesel powered generator. Products will be delivered by road. Initial production is estimated to be 55,000 tonnes per annum.

1.3 Development Objectives.

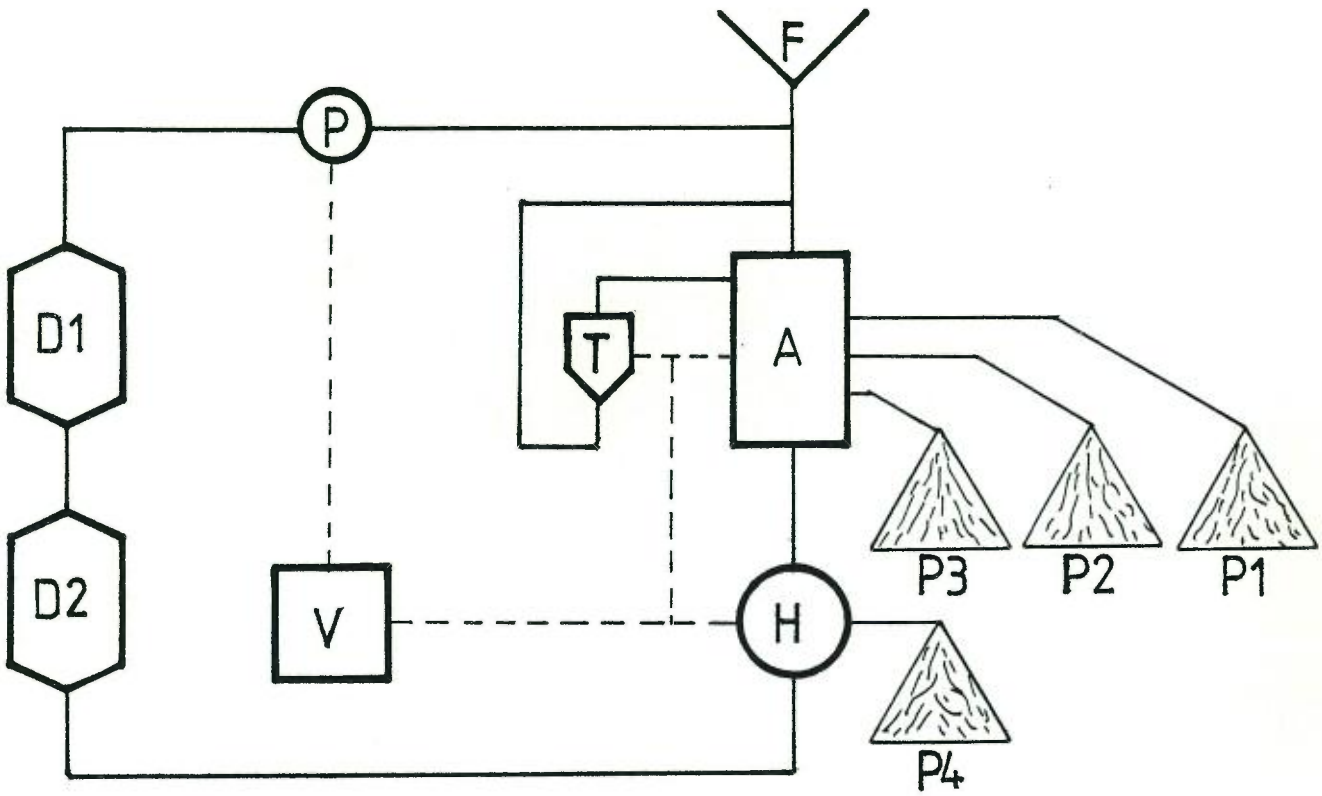
The development has the following objectives:

1. To expand the size and scope of the existing development.

2. To continue to remove extractive material, namely soil, sand and gravel, from the land.

3. To process on the land extractive material into various soil, sand and gravel products for sale in the local and regional markets.

4. To carry out the development in an environmentally sensitive manner.



F	Feed.
A	Austral triple deck screen *
T	Tammerjack crusher *
H	Finlay Hydrasanda sand plant *
P	Water pump *
V	Volvo penta diesel electric generator, 198 KVA.
D1	Dam 1. wash water.
D2	Dam 2. wash water.
P1	Product stockpile, gravel: coarse.
P2	Product stockpile, gravel: medium.
P3	Product stockpile, gravel: fine.
P4	Product stockpile, sand.

* electrically driven

Figure 2. Material processing: plant layout and equipment details.

2. EXISTING ENVIRONMENT.

2.1 Zoning.

The land is zoned Rural 1a under LEP No.1 for Cooma-Monaro Shire, the appointed day for this instrument is 8 Jan.1982, see Government Gazette No.3, 8 Jan.1982. Under this zoning extractive industry is permitted with the consent of Council.

2.1 Landform.

The land is situated between the right bank of the Murrumbidgee River and the Monaro Highway about 5 kms south of Bredbo. In general the landform is of gently rolling hills and river flats. The land is open grass land with some scattered trees. The land varies in elevation from about 730 m.AHD at the Highway to about 690 m.AHD along the River. The land is within the catchment of the Murrumbidgee River Basin, Basin No. 410. The river valley is bounded by the Clear Range (west) and the Black Range (east).

2.3 Land Use.

The land is used for agriculture (sheep grazing) and for extractive industry and conforms to the following land classification systems (1,2):

Soil Conservation Service: Land Capability : Class lV
Dept.of Agriculture : Agriculture Suitability : Class 3

2.4 Climate & Flooding.

Temperature and rainfall details are given in Table 1 for weather stations nearest to the development site. Rainfall is about 600 mm per annum with the winter months having the least rain. Temperatures vary between a mean maximum of 26.8 C in February to a mean minimum of -2.9 C in July. Data are not available for winds, however the predominate wind should be along the river valley from the south. Air drainage should also follow the valley and cause nocturnal winds from the south. The land adjoins the Murrumbidgee river and is subject to flooding by the River. The three river gauging stations nearest to the land are given in Table 2. Flood data for the Lobbs Hole gauge has corresponding high flow rate for Billilingra and Cooma and it can be assumed that flooding at one station would represent flooding at the other station. According to the ACT Water Administration data six floods have occurred in the last 13 years giving a return frequency of about 1 in 2 years, irrespective of the severity of the flood.

2.5 Air Quality.

The land is well vegetated being open grass land set in a rural environment; the air quality is consistent with this setting.

2.6 Water Quality.

2.6.1 Murrumbidgee River.

The land forms the right bank of the River. The River is shallow and contains coarse cobble sized gravel. The nearest river gauging stations are given above, Section 2.4. The River is within the Murrumbidgee River Basin, Basin No.410. The Murrumbidgee River is classified as Class P (Protected Waters) under the Clean Waters Act, 1970. Discharges of effluents into such waters are limited to those with a quality similar to that required as a "raw" source of potable water.

stn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
						mean monthly rainfall in mms							
1a	54	42	67	35	35	30	34	30	41	51	67	71	557
2b	53	45	72	43	37	32	24	26	39	64	54	42	531
3c	62	49	58	45	43	44	38	42	47	58	53	56	595
						mean daily maximum temperature, C.							
1d	25.7	25.1	22.5	18.4	13.0	10.5	9.7	11.1	14.1	17.8	21.0	22.6	17.6
2d	26.4	26.8	24.0	19.2	15.7	11.8	11.3	13.7	15.8	19.4	22.4	25.1	19.3
						mean daily minimum temperature, C.							
1d	11.1	10.6	8.6	4.8	1.3	-0.5	-1.3	-0.2	1.9	5.0	7.1	8.9	4.8
2d	10.2	10.3	8.3	4.0	1.1	-1.2	-2.9	-1.9	1.3	4.1	6.6	8.6	4.0

Station Details.

1	070094	Cooma North SMHEC	839.4	mAHD	1955	1970
2	070278	Cooma, Creek Street	786	mAHD	1973	----
3	070064	Michelago (Soglio)	758	mAHD	1884	----

Period of Record.

a 15 years.
b 13 years.
c 101 years.
d 12 years.

Table 1. Summary of Weather Data, for weather stations nearest to the land. See text Section 2.4.

Station Name	Cooma Pump.	Billilingra	Lobbs Hole
Station No.	410900	410050	410761
Location	upstream	downstream	downstream
Distance	27 kms	4 kms	56 kms
Elevation	730 mAHD	690 mAHD	585 mAHD
Catchment	1810 km	3550 km	5140 km
Authority	Bureau of Meteorology	Dept.of Water Resources	ACT Water Admin.
Recent Flooding	not available	21. 6.75 to 28. 6.75	22. 6.75 23. 6.75 26 .6.75
	not available	15.10.76 to 20.10.76	16.10.76 17.10.76
	not available	20. 3.78 to 23. 3.78	21. 3.78
	*minor	17.10.85	17.10.85
	*moderate	28.11.85	28.11.85
	*moderate	19.11.86 to 21.11.86	19.11.86 21.11.86

* based on comparison of stage heights

Table 2. River Gauging Stations closest to the land. See text, Section 2.4.

The Murrumbidgee River is a prescribed stream under the provisions of Section 21D of the Soil Conservation Act 1938. Trees within the bed or within 20 metres of the banks of the river cannot be destroyed without approval under the Act. The land is not protected land under the Soil Conservation Act 1938. Under Section 23A of the Rivers and Foreshores Improvement (Amendment) Act 1981 approval is required to remove material from the bed, banks or within 40 metres of the banks of the river.

The River is typically 25 to 30 metres wide and 0.5 to 1.0 metres deep. Bedrock outcrops in the River channel in a number of places. Two such places are shown on Plan 1: one within the extraction areas and one immediately down stream of the extraction areas.

Sediment movement within the Murrumbidgee River is the subject of an investigation currently being carried out by the Department of Water Resources (3). This is a long term investigation and the results will not be available for some 3 to 5 years. Extraction of sand and gravel from the River and its tributaries, Bredbo and Umaralla Rivers, has taken place for a number of years without apparent detriment (the determination of such detriment is part of the investigation referred to above). The sand and gravel products from the 8 river based extractors are used in the expanding markets of Cooma and Canberra.

The River is used for trout fishing.

2.7 Noise.

The land is remote and isolated. The nearest residence is about 1.3 kms SW of the land. A Noise Impact Statement is included here as Appendix 2.

2.8 Flora.

The land is open grassland with about 80% vegetative groundcover. Groupings of trees occur along part of the river high bank. Within the river flood plain there is only sparse groundcover and some scattered trees.

2.9 Fauna.

Part of the land is used for grazing sheep. There is evidence of wombats on the land. Other than fences the land offers little restriction to the free passage of fauna. The River acts as a natural but shallow barrier to fauna. Trout are present in the River.

2.10 Traffic.

Access to the land is via a partly surfaced road from the Monaro Highway (State Highway No.19, National Route 23). The access road is an unused part of the Highway since the Highway has been realigned and relocated to the east. Traffic along the Highway is recorded at 2 DMR stations as Annual Average Daily Traffic for the periods as follows:

Traffic Station	1978	1982	1986	1988
08161, Michelago	2250	2370	3135	3641*
08082, Bunyan,Cooma	2370	2393	3009	3395*

* estimated

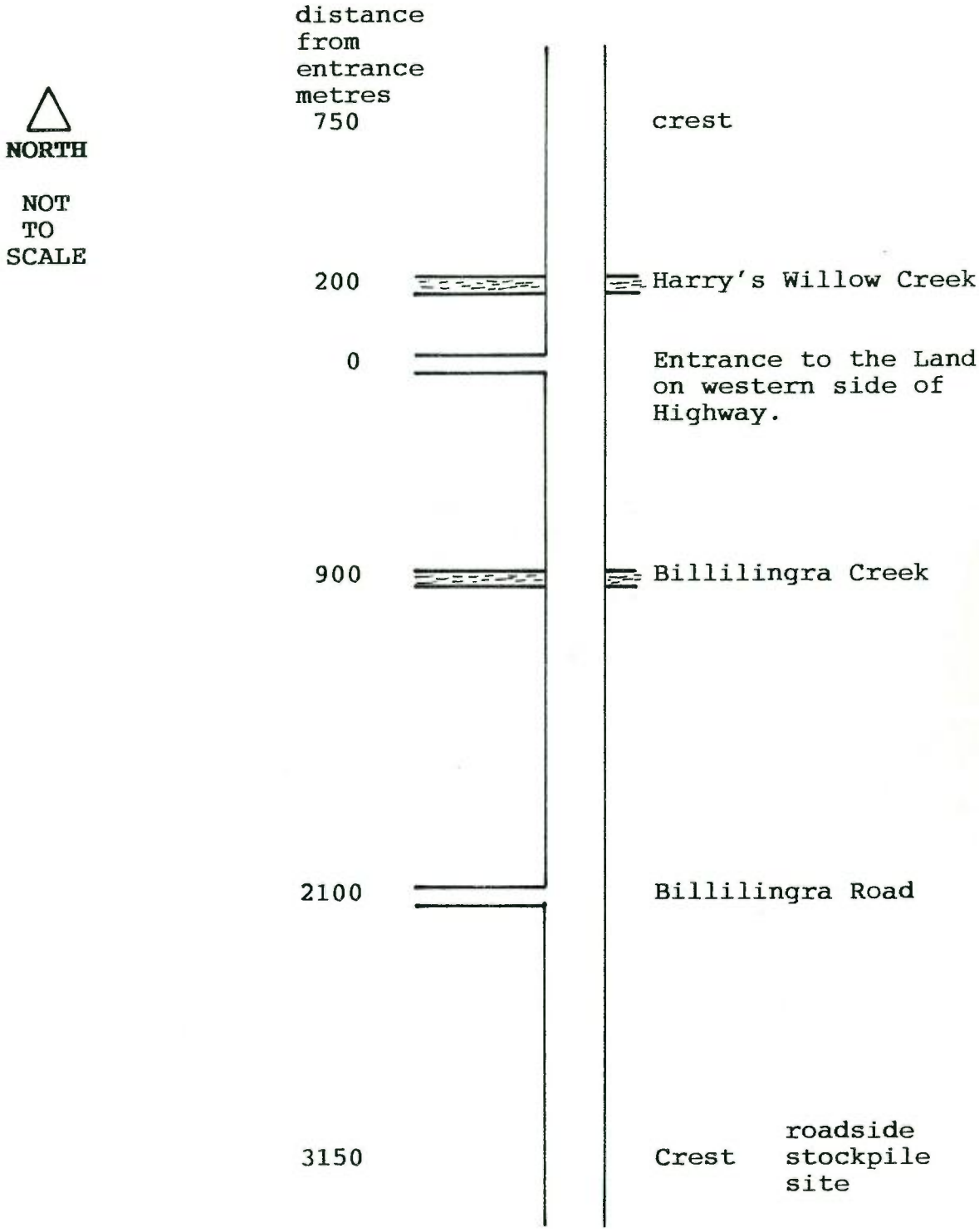


Figure 3. Road and traffic details, Monaro Highway, Bredbo, at the entrance to the land.

The increase in movements for the two stations for the period 1982 to 1986 has been respectively 32.2% and 25.7%. These data have been used to calculate the 1988 estimates of traffic movement.

The access road is on the western side of the Highway about 200 metres south of Harry's Willow Creek bridge. The point of access is at a dip in the Highway and sight distances to the next crests are:

north 750 metres
south 3150 metres

Road details are shown in Figure 3.
Improvements to the Highway are provided for in the Roads 2000 program of the DMR (4). The program objectives are to promote development of the tourist and recreation industries in the Snowy Mountains plans, inter alia, to "strengthen and widen the route with some realignment between Canberra and Bredbo". This work will benefit both tourist and non-tourist traffic.

2.11 Economic Aspects.
The land is suitable located to serve the markets of Canberra, Cooma and the surrounding districts. The resources permit the proponent to enter these market areas with transport cost advantages which in turn allows for competitive delivered cost price. The range of products from the land, namely sand, soil and gravel, allows the Company to service different segments of the construction materials market. The development is the single business activity of the Company and thus maintains direct and indirect employment opportunities in the Company and to the Company's sub-contractors. See also Appendix 4, Extractive Industry.

2.12 Social & Cultural Aspects.
The land has no particular social or cultural significance. The land was granted in the period 1863 to 1883 and has been used for agriculture since then. Neither the landform nor its location have any particular beauty being similar to most land between Canberra and Cooma. The development site on the land is not readily visible from the Highway thus the impact on the visual amenity of the locality is slight.

2.13 Archaeology.
The land has been under european influence since it was first granted in the period 1860 to 1883 and has been used for agriculture since then. The parts of the land to be extracted or already partially extracted are periodically inundated by flooding of the River. These three factors, 100 years of European influence, existing extraction and periodic flooding have removed any Aboriginal archaeological significance the land may have had. Notwithstanding the above an archaeological survey has been requested by the N.P.& W.S. and is currently inhand.

2.14 Soil & Water Conservation Matters.

The removal of soil, sand and gravel from the bed and banks of the River as stated above (Section 2.6) requires approval from the Department of Water Resources. The Department's advice has been sought in preparing this Statement. Excluded from this Statement are the details required to accompany the Application to the Department of Water Resources, namely cross sections of the River and banks where extraction is to take place. Such details will be attached to the "Section 23A Application" to the Dept.of Water Resources. The "Section 23A Application" is normally processed once the development has been determined by Council. The removal of water from the River requires a licence under the Water Act administered by the Department of Water Resources. One licence already applies to the land; a second licence application is in hand.

2.15 Extractive Industry.

Appendix 4 details the extractive industry in the region which services the markets of Cooma and Canberra. The market segments served by the industry are:

horticulture : soil, sand, gravel
concrete : sand, gravel, crushed stone
road materials : sand, crushed hardrock, crushed gravel,

The markets are made up of private and industrial sales as well as local councils and state and federal departments. In the seven resource areas which service the Cooma - Canberra region there are:

26 private suppliers and
8 public suppliers, ie local councils and D.M.R.

There are eight extractors on the Murrumbidgee River and its tributaries between Canberra and Cooma and are as follows:

Murrumbidgee River	Canberra S & G
	Corkhill
	Lee
	Monaro
Bredbo River	Lo Pilato
Umaralla River	Agnew
	Gardiner
	Turner

All extract sand and/or gravel as high grade materials. Generally extractors on the Umaralla River serve the Cooma area and the other extractors serve both Cooma and Canberra. The cumulative impact of these extractors is not known but considering the length of the river and tributaries, the catchment of the river system, the reserves of material and the rate of extraction, say 300,000 cubic metres annually, is thought to be not detrimental to the river system. Lee and Tharwa Sands (see Appendix 4, Table 1) are the only suppliers of washed river sand in the region.

3. ENVIRONMENTAL IMPACTS & PROTECTION MEASURES.

3.1 Land Use.

The extraction of the land will impact on the use of the land by preventing the use of part of the land for agriculture. The impact is slight as the those areas of the land where extraction will take place are a small part of the total land, the agricultural quality of the areas to be extracted is low as the land is generally sparsely vegetated and flood prone. To minimise the impact the land, after extraction will be rehabilitated by shaping to the final landform, see Plan 2, and revegetating according to the details of Appendix 4.

3.2 Climate & Flooding.

Hot, dry, windy conditions which favour the formation of dust may cause an impact on air quality. Such an impact can be minimised by the use of water carts on the haul roads, by water sprays on the screening plant and by restricting the speed of on site vehicles to 20 km/hour. Flooding may have an effect on the development by inundation of the extraction areas and the soil processing area, by scouring of the extraction areas and by scouring of rehabilitated lands before revegetation has taken hold. To minimise such impacts the extraction will begin downstream and proceed upstream; in this way the unextracted lands will act as protection barriers to floodwaters and minimise scouring. Mobile plant and petroleum products will be stored away from the River and above the flood limit. The sand and gravel processing plant will be located above the flood limit.

3.3 Air Quality.

Impacts on air quality are possible from dust and from diesel plant exhaust emissions. Measures to minimise these impacts are:

* a general speed limit for vehicles on site of 20 km/hour to reduce vehicle generated dust.
* watering of the haul roads during dry windy conditions
* the provision of water sprays on the soil screening plant to dampen material as it passes to stockpile.
* a height limit on stockpiles of 6 metres to reduce wind blown dust.
* all sand and soil loads in vehicles to be covered.
* all fixed and mobile on-site diesel powered plant to be correctly fitted and maintained with the manufacturers requirements being the minimum requirements.

3.4 Water Quality.

Impacts on water quality are possible from surface water flowing over the land, from water escaping from the processing system and from contamination by petroleum product used in the fixed and mobile plant. The following measures will minimise and protect against water pollution:

1) mobile plant to be parked about the processing plant overnight to facilitate removal during times of flood,
2) other than for immediate use petroleum products to be stored at the processing plant location and not in or near the extraction location which is flood liable,
3) extraction to be in strips normal to the river channel so that scouring of the workings is minimised,
4) surface water from about the processing plant to be directed into the plant dams.

3.4.1 Murrumbidgee River.

Impacts on the River will be slight and the measures to minimise such impacts are given above in Section 3.4 and below in Section 3.7. As stated above in section 2.6.1 the removal of material from the bed, banks or within 40 metres of the banks of the River requires approval under Section 23A of the Rivers and Foreshores Improvement (Amendment) Act 1981. This Section of the Act is administered by the Catchment Management Unit of the Department of Water Resources. Bedrock outcrops in the River stabalise the location of the river channel.

3.5 Noise.

The development is remotely located and noise impacts on the environment are considered to be minor, see Appendix 2 : the Noise Impact Statement for this development. Protection measures to minimise noise pollution are as follows:

1) operations to be restricted to the following hours,

Mondays to Fridays	7am to 5pm,
Saturdays	7am to noon,
Sundays and Public Holidays	no operations,

2) a speed limit on site of 20 km/hour,
3) the haul roads to be graded and kept in good repair to minimise bouncing of trucks and subsequent generation of noise,
4) diesel plant to be correctly fitted and maintained.

3.6 Flora.

The development will remove the existing vegetation and thus will impact on the floral environment. Although the impact is low it can be minimised by extracting the land in a series of extraction areas and by concurrent extraction of one area with rehabilitation of the last extracted area; in this way the area of land affected by the development at any one time is at a minimum.

3.7 Fauna.

No extraction will take place within the river so no disruption to the piscatorial environment will occur. To minimise any adverse effects when the river channel is relocated it should be done during summer and preferably under low flow conditions. Initially both channels, ie the old and the new, should be open to allow flushing and the old channel then closed off completely over say a one week period. Summer has been chosen for this work as then there is the least likelyhood of fish spawn in the river(5).

3.8 Traffic.

Traffic impacts because of the development are slight. For the land the conditions of access and egress are excellent; the minimum sight distance of 750 metres is double that required for stopping from a speed of 130 km/hour (6). The excellent sight distance for traffic on the Highway and the downward slope may tempt some traffic to travel at speed in excess of the State maximum of 100 km/hour. The entrance to the land at the dip between two crests with the possibility of high speed traffic should be considered by traffic to and from the land. To promote traffic safety "Truck Turning" signs could be erected on the Highway and a "Give Way" sign at the entrance to the Highway

The number of traffic movements generated by the development are estimated to be 20 per day, see Section 6.8. This level of movements is about 0.5% to 0.6% of the traffic estimated to be using the Highway at present and represents a negligible impact on the Monaro Highway. At double the estimated movements the impact is still negligible.

3.9 Energy.

The development will consume energy in the form of diesel fuel used to power the fixed and mobile plant. For energy purposes the development consists of two parts, namely soil extraction and sand and gravel extraction.

Energy Requirements:

SOIL EXTRACTION.

Based on an annual production of 16,500 tonnes,
The loader to extract and load the soil into the screen and to load-out the product into trucks, thus all soil will be handled twice; thus for the loader 34,000 tonnes at 250 tonnes/hour and 40 litres/hour equals 5440 litres of diesel fuel.

SAND & GRAVEL EXTRACTION.

Based on an annual extraction of 38,500 tonnes.
The loader to extract the mixed sand and gravel and load it into boot trucks, the trucks transport the material to the plant where it is washed, sized, stockpiled and loaded-out in trucks for dispatch to customers.

Loader:	38,500 tonnes raw feed at 250 tonnes/hour and 40 litres/hour equals 6160 litres of diesel fuel,
Boot truck:	at 100 litres/day for 200 days equals 20,000 litres,
Processing Plant:	powered by a Volvo penta diesel consuming 150 litres/day for 200 days equals 30,000 litres,
Loader:	38,500 tonnes of product as above 6160 litres.

TOTAL FUEL.

Soil	5,440
Sand & Gravel	62,310
TOTAL	67,750 litres.

TOTAL ENERGY.

Based on a heating value of 38.5 MJ/litre the annual energy consumption is 2600 gigajoules p.a.

4. JUSTIFICATION.

The development is an existing operation and thus forms part of the existing environment. Although the development will expand the size and scope of the operation, the operation will retain its low profile rural character. The environmental impacts of the development are minor and can be minimised by the measures proposed. The development location is remote and isolated and has low visibility from publicly accessible vantage points. The relocation of part the channel back to it's original position will both stabilise the position of the channel and reduce the effects of bank erosion. Rehabilitation of the land after the development will result in pasture improvement for the higher level soil removal areas. The development will have negligible impact on the Highway traffic.

On local economic grounds the development benefits the landowners, the proponent and the proponent's employees and sub-contractors; the latter two groups by maintaining and possibly expanding the proponent's business and hence employment opportunities. Economic benefits also extend regionally to consumers of the development's products in that alternative supplies would be available, hence a competitive market.

The regional demand for extractive materials is about 2 million tonnes per annum which is met by quarries within the region. However not all quarries have the same range of products or the same quality of products. For free market forces to operate it is necessary to have a number of independent suppliers in the market so that the delivered price depends on product quality, production costs, haulage distance and profit. Given that the type and location of the resources vary some quarries will have an varying advantage in parts of the region depending on the significance of the four factors quoted. It is possible that the disadvantage one product may have can be offset by the advantage of a second product.

This particular quarry is already competing in the Cooma and Canberra markets for soil, sand and gravel. The quarry is one of the two regional suppliers of washed river sand, a necessary component in quality premixed concrete. It also supplies various gravel products used also in concrete and concrete products.

These factors of minor environmental impacts and local and regional economic benefits are positive justifications in favour of the development.

5. ALTERNATIVES

5.1 Development Alternatives

The simplicity of the operation precludes any significant alternatives in the development. Moving the processing plant closer to the extraction areas would eliminate or reduce the boot haulage component with a saving in fuel. This alternative is impractical because of loss and damage to the plant and product stockpiles during flooding of the River and possible contamination of the River.

5.2 "No Development" Alternative

The "no development" alternative leaves the development at its existing size and scope. This alternative also leaves the development without the need to rehabilitate land. To operate at the existing level reduces the impacts of the development; such impacts are however slight both at the existing level and at the proposed level. The development, existing and proposed, supplies materials to the local and regional markets. Under the "no development" alternative the market demand would be supplied by other sources.

6. PROPOSED DEVELOPMENT

6.1 Introduction

Extractive industry on the land has been carried out for many years. In 1987 the proponent, Lee Aggregates Pty.Ltd., took over the operation and produce and supply soil, sand and gravel to the local market and the regional markets of Cooma and Canberra. In order to improve the efficiency of the operation as well as to increase the size and scope of it the proponent has undertaken to expand and upgrade the existing development.

Along the old highway a number of survey bench marks are still in place. These marks were used for vertical control of the Plans. Details are as below:

Lands Dept.	SSM 1455	712.499m AHD
DMR	BM 479	707.541m SD*
DMR	BM 480	703.207m SD*
DMR	BM 481	716.002m SD*
DMR	BM 482	719.078m SD*

* marks emplaced in 1955 and assumed to be Standard Datum.

There are five separate areas as shown on Plan 1 associated with this development. These areas are as follows:

Area 1	location of the processing plant, services and stockpiles of sand and gravel,
Area 2	soil extraction: plant and stockpiles,
Area 3	present gravel extraction, right bank
Area 4	future gravel extraction, left bank
Area 5	previous gravel extraction, right bank.

6.2 Extraction Sequence

The areas for extraction are shown on Plan 1. The sequence of extraction is shown in Plan 2. Extraction will commence on the right bank of the river and move upstream removing sand and gravel from the bank above a 1:50 gradient commencing at the normal flow water level. Stockpiles of material from previous extraction will be progressively removed; these materials are generally oversized materials and are located in Area 5 on Plan 1.

6.3 Winning & Processing

Winning of both soil and sand and gravel will be by front-end loader. Soil will be extracted and loaded directly into a diesel powered screen to form screened soil. The screen is mobile and will be positioned close to the working face to minimise haulage. Water sprays on the screen will dampen the soil as it passes to stockpile to minimise dust. Sand and gravel will be loaded directly into boot trucks for transport to the procssing plant. The processing plant is shown schematically in Figure 2. It consists of triple deck vibrating screen to wash and separate the feed into three sized gravel products and undersized sand. The sand passes to a "Hydrasanda" to wash and dewater the sand to form a washed sand product. A mobile impact crusher will be used to crush oversize material which will then pass through the processing plant to form crushed and broken stone products. This procssing will also convert oversized material stockpiled from previous operations on the land and left as a low value by-product to a saleable main product.

Water used in the processing will be recirculated. It will be stored in two dams. If necessary a flocculant will be used to clarify the water.

6.4 Hours of Operation

Operations are limited to the following hours:

Mondays to Fridays	7am to 5pm,
Saturdays	7am to noon,
Sundays and Public Holidays	no operations.

6.5 Employment

The operation will employ 4 people directly; a loader driver, a plant operator, a truck driver and a manager for the operation and sales. Indirect employment for six to eight people will result in the transport and transport maintenance industry.

6.6 Services

There are no services to that part of the land where the operations take place. The telephone is available and has been requested. Water and power are supplied by the operation. A WC and staff facilities are required. Site office and storerooms are located near the processing plant; these are at RL 705 metres AHD some 15 metres above the level of the River.

6.7 Pollution Control

6.7.1 Air

Air pollution hazards are dust and engine exhausts. Control measures are:

1) water sprays on the powered screen to dampen material as it passes to stockpiles,
2) a general speed limit on site of 20 km/hour to reduce vehicle generated dust,
3) watering of the haul roads during dry windy periods,
4) on site diesel plant to be correctly fitted and maintained.

6.7.2 Water

Water pollution control measures are:

1) mobile plant to be parked about the processing plant overnight to facilitate removal during times of flood,
2) other than for immediate use petroleum products to be stored at the processing plant location and not in or near the extraction location which is flood liable,
3) extraction to be in strips normal to the river channel so that scouring of the workings is minimised,
4) surface water from about the processing plant to be directed into the plant dams.

6.7.3 Noise

Noise pollution control measures are:

1) operations to be restricted to the following hours,

Mondays to Fridays	7am to 5pm,
Saturdays	7am to noon,
Sundays and Public Holidays	no operations,

2) a speed limit on site of 20 km/hour,

90,000 + soil

300,000 + s/g

3) the haul roads to be graded and kept in good repair to minimise bouncing of trucks and subsequent generation of noise,
4) diesel plant to be correctly fitted and maintained.

6.8 Traffic

Products from the development will be removed by truck. The haul road consists in part of unsealed road and for the major part of sealed roadway, the latter being part of the old Highway. Truck movements are based on an annual sales budget of 55,000 tonnes. Such a level of activity equates to 200 tonnes per day for 5.5 days per week, 50 weeks p.a. At an average of 20 tonnes per load the daily estimate is 10 loads per day or 20 movements per day. This number of movements equates to about 0.6% of the estimated number of traffic movements on the Highway in 1988. The actual number of quarry truck movements will vary between nil and say, 40 movements. Usually quarry traffic tends to be mainly in the morning.

6.9 Reserves

Sand and gravel reserves have been calculated for extraction of material in Areas 3, 4 and 5 in Plan 1. The limit of extraction is a line commencing at the low flow water level and extending back into the bank at a 1:50 gradient. Soil reserves, Area 2 in Plan 1 also have been calculated. The soil deposits are above and away from the River channel.

AREA 2, SOIL.
30,000 m at 2 metres average depth
volume = 60,000 cubic metres.

AREA 3, SAND & GRAVEL
14,000 m at 3 metres average depth,
volume = 42,000 cubic metres.

AREA 4, SAND & GRAVEL
37,000 m at 3 metres average depth,
volume = 111,000 cubic metres.

AREA 5, SAND & GRAVEL
27,000 m at 2 metres average depth,
volume = 54,000 cubic metres.

Total Soil = 60,000 cubic metres.
Total Sand & Gravel = 207,000 cubic metres.

6.10 Drainage & Erosion Control

Contour drains around the land will deflect surface water away from the development and allow the water to flow over natural surfaces. Within the development surface water will be collected and directed to settling basins in the quarry area. In both the sand and gravel area and in the soil area the settling basins will be above the watertable so that infiltration of the surface water into the groundwater will take place.

Erosion control will be by the same drainage measures above plus by extracting in strips normal to the river channel so that scouring of the workings is minimised.

In the course of extracting Area 4 on the left bank of the River the river channel will be relocated to the west back to its original position. In doing this work the new channel will be formed and then the existing channel will be diverted into it. The two channels will be kept open for about a week to allow flushing of the new channel. After this period the old channel will be closed off and the right bank shaped. In forming the new channel cobble sized oversized material will be emplaced along the right bank to armour the bank and stabilise the location of the channel

6.11 Rehabilitation

Details of rehabilitation are given in Appendix 3. Rehabilitation is to be progressive, ie as an area is extracted and finished with it is to be rehabilitated whilst the next area is under extraction. This method is preferable as it keeps the scope of the rehabilitation to a reasonable size both physically and financially.

Rehabilitation of the sand and gravel areas will consist of removing any plant and rubbish from the area and shaping to a gradient of 1:50. Any mullock heaps or disused/unwanted stockpiles will be knocked down and spread over the land.

For the soil areas a similar procedure will apply, ie spreading of stockpiles and shaping to the required form. Following this work the land will be sown with lucern or other deep rooted surface cover to bind the soil. The actual crop to be sown will depend on the agricultural use to which the land will be put as the land is progressively rehabilitated.

7. ASSESSMENT & CONCLUSIONS

The development is an existing operation and has existing use rights. The expansion of the development and the consequent need for an Environmental Impact Statement indicates the proponent's confidence in the future of the development. The development will give direct employment to 4 people and indirect employment to about 6 to 8 others.

The impacts of the development are an alienation of the land during the course of the work and the removal of flora on part of the land. These impacts are not major impacts. The proposed rehabilitation measures will overcome any floral impacts. The development will have a negligible impact on traffic on the Highway.

The removal of sand and gravel from the banks of the River will not have a major effect on the River. Downstream from the land the River is defined by bedrock outcrops in the river bed and banks so that degradation of the River bed is highly unlikely. Removal of the material increases the local storage capacity of the River.

Relocation of the River bed back to it's original location will decrease the rate of right bank erosion to the benefit of the contiguous landowners.

The pollution control measures are simple and effective and will prevent air, water and noise pollution. The development is remotely located so that impacts on the visual amenity are slight. The remote location also decreases the significance of any noise which may be generated outside the estimated noise levels.

The Canberra - Cooma markets for extractive material are important and expanding and must be supplied by sources within an economic haulage distance. The development already supplies these markets and is expected to continue to do so.

On the River and it's tributaries between Canberra and Cooma there are eight known extractors. All extract sand and/or gravel as high grade materials. The cumulative impact of these extractors is not known but is thought to be not detrimental to the river system.

8. CONSULTATIONS

Consultations either formally in writing or informally by phone or visit have been had with the following organisations. Where available a file or reference number is given.

1. Cooma-Monaro Shire Council.
   Town Planning Department.

2. Department of Planning.
   Environmental Assessment Branch.
   file No.ESE 87/2942

3. Department of Water Resources.
   Catchment management Unit.
   file No.86/9046.

4. N.P.& W.S., South Eastern Region
   Regional Archaeologist.
   file SF:DS:F2018.

5. S.P.C.C. Wollongong Office.
   file No.281,178A/1 GD:TP

9. REFERENCES.

1. Rural Land Capability Mapping, by K.A.Emery,
   Soil Conservation Service of N.S.W.

2. Rural Land Evaluation Manual,
   D.E.P. report 81/29, Nov.1981.

3. Dept.of Water Resources, Catchment Management Unit
   private comm. Jan.1988

4. Roads 2000, South Coast & Monaro Region.
   D.M.R. published Feb.- Mar. 1987.

5. Freshwater Fishes of South-Eastern Australia,
   editor R.M.McDowall pub. Reed, 1980.

6. Interim Guide to the Geometric Design of Rural Roads,
   NAASRA, 1980

New South Wales Government

Department of Environment and Planning

Remington Centre
175 Liverpool Street, Sydney 2000
Box 3927 G.P.O. Sydney 2001
DX. 15 Sydney

Telephone: (02) 266 7111 Ext. 7235
Telex: DEP NSW 176826
Fax No.: 266 7599

Contact: V. Thomson

Our reference: ESE 87/2942

Your reference:

D.P. James and Co.,
P.O. Box 170,
KOGARAH. N.S.W. 2217 10

Dear Sir,

RE: PROPOSED EXTRACTION OF SOIL SAND AND GRAVEL, PORTIONS 1, 1A, 28 AND 29, PARISH BILLILINGRA.

Thank you for your letter of 29 October, 1987, indicating that you are consulting with the Director with regard to the preparation of an environmental impact statement (EIS) for the above development.

2. As development consent is required for the proposal and it is a designated development within the meaning of Schedule 3 of the Environmental Planning and Assessment Regulation, 1980, as amended, an EIS must accompany the development application to the Cooma-Monaro Shire Council. The EIS shall be prepared in accordance with clause 34 of the Regulation and shall bear a certificate required by clause 26(1)(b) of the Regulation (see Attachment No.1).

3. In addition, pursuant to clause 35 of the Regulation, the Director requires that the following matters be specifically addressed in the EIS:

- Justification of need for the proposal with an account of the resources and the projected demand.
- Impact on Murrumbidgee River.
- Interaction of quarry traffic with traffic on Monaro Highway.
- Results of investigations of sediment movement in the Murrumbidgee River over an annual seasonal cycle, related to the proposal.
- Assessment of cumulative impact of the proposed extraction on the Murrumbidgee River.

4. Attachment No.2 is a guide to the type of information most likely to be relevant to the development you propose; not all of the matters raised therein may be appropriate for consideration in the EIS for your proposal; equally, the guide is not exhaustive.

5. In preparing your EIS you should approach Cooma-Monaro Shire Council and take into account any comments Council considers may apply to its determination of the proposal.

6. Should you require any further information regarding this matter please do not hesitate to contact us again.

Yours faithfully,

B. Adams
Manager, Environmental Assessments Branch
As Delegate for the Director

APPENDIX 1

The Land

Legal Description.
All those pieces or parcels of land being the whole of the lands contained within portions 1, 1A, 28 and 29 in the Parish of Billilingra and portion 1 in the parish of York in the County of Beresford in the Shire of Cooma-Monaro.

Title Details Parish of Billilingra.

Port.	Title	Plan	Area ha.	Grant Date	Grant Deed Vol/Folio
1	ref 712987	1321.1765	19.4	17. 6 1867	51/195
1A	ref 712987	M181.1438	194.6	7.11.1863	2/151
2	V8319 F143	B21.1765	23.1	17. 6.1867	51/194
28	V8319 F143	B1439.1765	64.3	1.12.1880	517/248
29	V8319 F143	B1438.1765	121.4	26. 2.1883	651/ 94

Port. 1 and 1A Previous Titles: 7528/32, then 15345/84, then 8319/147,148,149, then cancelled to computer folio 712987

Title Details Parish of York.
Portion 1 , now Lot 1 in DP 750569.

Physical Description.
The land is bounded by the Murrumbidgee River and is about 5 kms south of the town of Bredbo; the Parish of Billilingra is located on the right bank of the River and the Parish of York on the left bank. The right bank is the parish boundary.

Extraction will be of the banks and flood plains of the River.

The land can be located on CMA 1:25000 topographic maps as below:

Bredbo	8726-3-S	grid ref. 930140
Murrumbucca	8725-4-N	grid ref. 930130

APPENDIX 2

NOISE IMPACT STATEMENT.

CONTENTS.

1. Introduction

This Statement forms part of an Environmental Impact Statement for the extraction os soil, sand and gravel at Bredbo. The land is described in Appendix 1 of the Statement and can be located at grid reference 919137 on CMA map Murrumbucca 8725-4-N, scale 1;25000, see Figure 1 of the Statement.

2. Background Sound Level.

The background sound level was determined under the following conditions:

Ambient	: cold, overcast day, 14.5 C, not raining, slight wind, 1330 hours E.S.T. 8 April 1988.
Instrument	: B & K model 2219, microphone type 4130, slow response.
Location	: at extraction site, see Plan 1 of Statement.
Sound Level	: 35 dB(A).

The background level is below the daytime limit for rural land of 45dB(A) (Acceptable) recommended by the SPCC (1).

3. Machinery.

Sound levels for "bystanders at 7 metres according to AS 2012" for machinery in use or proposed to be used are as follows:

front-end loader	: Komatsu model W90	: 75 to 80 dB(A)*
dump trucks	:	: est.85 dB(A)
mobile screen	: Finlay	: 75 to 79 dB(A)
fixed plant	: Austral screen	: 82 to 86 dB(A)*
	: Hydrasanda TW6S	:
	: Tammerjack 2000	:
diesel generator	: Volvo penta 198 KVA	: 75 to 80 dB(A)*

* from measurements made when installed at Capital Quarries, Lake George(2).

The fixed plant consists of a circuit of a Tammerjack impact crusher, an Austral triple deck screen and a Hydrasanda sand plant.

4. Nearest Residences.

The nearest residence is on the left bank of the River about 1300 metres south from the land (3,4,5).

5. Estimates of Sound Levels.

Attenuation due to divergence of the above sound levels have been calculated for the distances below:

	sound levels in dB(A) at:			
	7 metres	15 metres	500 metres	1300 metres
mobile plant	80	74	44	35
fixed plant	86	80	49	41
generator	80	74	44	35

These calculated sound levels at 500 metres are below the daytime extreme limit for rural land of 50 dB(A) recommended by the SPCC (1). At 1300 metres the calculated levels are equal to the background level and/or below the daytime limit for rural land of 45dB(A) (Acceptable) recommended by the SPCC (1). It is unlikely that the sound levels from the development would be significant.

6. Noise Control Measures.

Measures to control the generation of noise are:

1. operations to be restricted to the times below,

Mondays to Fridays	7am to 5pm
Saturdays	7am to noon
Sundays and Public Holidays	No operations

2. diesel powered plant to be correctly fitted and maintained, with the manufacturers standards being the minimum standards,
3. vehicle speed to be limited to 20 km/hour,
4. haul roads to be formed and graded to prevent bouncing and drumming of empty trucks,

7. Discussion.

The land is remotely located although only 500 metres from the Highway in a direct line. The land has a low elevation and is partly screened by trees. The calculated sound levels are low and below or equal to the levels recommended for rural land. The calculated levels are based on measurements made when the equipment was located at a quarry at Lake George. The upper limit of the range of the sound levels produced by the plant was used to calculate the sound levels at 500 metres (the distance to the Highway) and at 1300 metres (the distance of the closest residence).

8. Conclusions.

The background sound level at the land is within the acceptable level for rural land. The calculated sound levels at the nearest residence are equal to the background level and/or below the daytime limit for rural land of 45dB(A) (Acceptable) recommended by the SPCC for rural land. Because of these low sound levels it is unlikely that the sound from the development will be offensive.

9. References.

1. SPCC, Environmental Noise Control Manual, 1985, Chapter 21-1.
2. from E.I.S.supplied by Capital Quarries.
3. CMA map Murrumbucca 8725-4-N, scale 1:25000.
4. CMA map Bredbo 8726-3-S, scale 1:25000.
5. Aerial photo.Michaelago 1:48,000. NSW 2750/15 run 7,12 Jan 79.

10. Declaration.

This Statement was prepared by the undersigned to accompany the Environmental Impact Statement for the extraction of soil, sand and gravel by Lee Aggregates Pty.Ltd. at Bredbo in the Shire of Cooma-Monaro.

6. 6. 88

D.P.James,
P.O.Box 170,
KOGARAH, 2217
(02) 588.2614.

APPENDIX 3

Rehabilitation

CONTENTS.

1. Introduction.

Rehabilitation has two objective namely to restore the land to a state as close as possible to its pre-development condition and to prepare the land for post-extraction land use. Extractive industry by its very nature, that is the removal of materials, is difficult to restore to the pre-development condition.

2. Final Land Use.

It is proposed to rehabilitate the land so that it can be returned to an agricultural land use. The land is used at present to graze cattle and sheep and for the growing of fodder crops.

3. Rehabilitation Sequence.

The sequence of rehabilitation is as below.

1. Rehabilitation is to proceed concurrently with extraction so that as one area has been extracted its rehabilitation will occur as the next area is under extraction.

2. For each area to be rehabilitated, all plant and machinery is to be removed, all rubbish to be removed to a central location and burnt and the residue later buried, scrap timber to be burnt and the ash spread over the land, stockpiled product is to be removed, stockpiled overburden and topsoil is to spread evenly over the land and the landform to conform to the landform given in Plan 2 of the Statement.

3. The seed which is already present in the top soil may not be sufficient to give a complete ground cover in a reasonable time consequently the land is to be sown with the seed mixture below:

Cynodon Dactylon (common couch)	25 kg/ha
Lolium Perenee cv Kangaroo Valley (perennila rye grass)	15 kg/ha
Trifollium Repens (white clover) inoculated with the correct Rhizobium	2 kg/ha
Super Phosphate	100 kg/ha

A nurse crop such as Medicago Sativa (lucerne) at a rate of 1 to 3 kg/ha may be added. The seeded area should be fenced-off until established if stock are run on the land or alternatively stock should be excluded until the grass cover is established.
Variations to the above seed mixture may be necessary to account for future land use as determined by the landowner.

Along the River trees are to be planted to stabilise the bank as well as to enhance the land. The plantings are to be a single row of trees on 3 metre spacings, made up of equal numbers of the trees below planted alternatively:

eucalyptus species	gums native to the locality
callistemon	bottlebrush
leptospermum species	tea-tree species
*casuarina cunninghamana	river she-oak

* if native to the area.

The trees are to be fenced-off until established.

5. Ponds, drains and plantings given in the Plans are to completed as the relevant areas become available.

6. The restoration procedures in and about the River are for the removal of all plant, equipment and stockpiles and the shaping of the bed and banks to an even surface and cross section. With time the environment of the River will revert to an environment similar to the pre-development environment.

7. Finally at the completion of the development all plant, equipment, machinery and stockpiles are to be removed from the land.

4. Bibliography.

The following publications will assist in rehabilitation.

Revegetation: Methods and Management, SPCC Oct.1980.

Trees for N.S.W., Forestry Commission of N.S.W. current edition.

Trees for Southern and Central Tablelands of N.S.W., Brochure X15, Forestry Commission of N.S.W. current edition.

A Guide to Better Pastures in the Temperate Climates, M.W.O'Reilly, pub. by Wright Stephenson & Co. current edition.

APPENDIX 4

EXTRACTIVE INDUSTRY IN THE COOMA - CANBERRA REGION.

Contents.

1. Introduction.

Extractive industry operations are covered by the provisions of the Mines Inspection Act 1901 administered by the Mines Inspection Division of the Dept. of Industrial Relations. For administrative purposes the State is divided into mining districts based on local government areas. Extractive industry in the Cooma - Canberra region is spread over the south-eastern and south-western mining districts. Annually the Mines Inspection Division publishes a list of all operating mines which includes operating quarries.

Alternatively the region may be defined as the area covered by the Canberra (N4,code 062), Cooma (N19,code 064) and Goulburn (N15,code 048) telephone districts.

Table 1 below has been compiled from the following:

Mines Inspection List
Mineral Resources annual returns
Telephone Directory entries
specific knowledge of operating quarries.

Annually all quarries return details of operations, including product quantities, to the Department of Mineral Resources. Extracts from these returns are given in Table 2. This review of the regional extractive industry is restricted to those quarries which are within an economical haulage distance to serve Cooma, Canberra and the areas in between.

2. Quarry Products.

Extractive industry products are

soil : top soil,
sand : fine, coarse, bricklayers and concrete,
gravel : round washed and graded,
: crushed washed and graded,
hardrock: aggregates crushed washed and graded, road base.

Generally soil deposits are located close to rivers or to abandoned river channels. Sand may be located alone in or near rivers and lakes or together with gravel. Sand from lake type deposits tends to fine with a higher silt content. Unprocessed it is suitable for bricklaying. Processing of these sands consists of washing to remove the fine silt. After processing they can be used as fine aggregate in concrete. Sand from sand and gravel deposits typically along the Murrumbidgee River tends to be coarse with little or no silt and is suited for use in concrete. Gravels are

usually river gravels and are processed by washing and sizing to be sold as a nominal size. Alternatively the gravel may be first passed through a crusher to produce broken stone. Such broken stone is preferred in concrete mixes as it gives a stronger product. Gravel is a term used also to cover a range of materials used for roads and includes ridge gravels, shale, conglomerate, and the more friable hardrock deposits.

Hardrock deposits, typically a "blue metal quarry", produce aggregates of various sizes to be used in concrete, asphaltic mixes and road base materials.

3. Operating Quarries.

Operating quarries are listed in Table 1. The quarries are grouped into areas and each is listed with its products. Only one quarry operates within the A.C.T, that at Mugga Road. The exclusion of quarrying in the A.C.T. has been a policy of the Territory Administration. Haul distances are as follows:

	to Canberra	to Cooma
Bungendore	40 kms	--
Yass	60 kms	--
Bredbo	80 kms	35 kms
Braidwood	90 kms	--
Cooma	115 kms	

Quarry products supplied consist of:

soil	top soil, garden loam,
sand	unprocessed fine sand, processed fine sand, washed river sand,
gravel	processed and unprocessed road gravels, shales, round river gravel, crushed river gravel,
hardrock	concrete aggregates, sealing aggregates, fine crushed rock, roadbase materials.

4. Demand.

The demand for quarry materials as with most production varies with economic climate. For the extractive industry the base level of activity is that of normal development within the community such as local building construction and roads. Public sector works particularly major construction and roadworks projects cause significant increases in extractive industry production. In this region the major projects have been the reconstruction of the Hume Highway and the construction of Parliament House.

Production statistics for the period 1986/1987 are given in Table 2 below. From the Table the production totals are:

sand	unprocessed	10,437 tonnes
sand	processed	399,417 tonnes
SAND	TOTAL	409,854 tonnes
gravel	unprocessed	435,900 tonnes
gravel	processed	31,005 tonnes
GRAVEL	TOTAL	466,905 tonnes
AGGREGATE		752,340 tonnes
TOTAL	ALL PRODUCTS	1,629,099 tonnes.

The production statistics are not complete; one major supplier is not listed and if so would raise the total by about 500,000 tonnes of aggregate and gravel to say 2,200,000 tonnes. Within this revised total are supplies to the new Parliament House project which is now finished. If the total is reduced somewhat an annual demand of about 2 million tonnes may be assumed for the region. The market segments are identified by the relative quantities of products and are as follows:

1) road making materials as indicated by the amount of unprocessed gravel,
2) concrete as indicated by the production of processed sand and aggregate.

Soil demand is difficult quantify. Published statistics give 2 suppliers totalling about 8000 tonnes. This small quantity is incongruent with the large number of landscaping (retail) suppliers in the Canberra telephone directory. Table 1 shows 4 soil suppliers.

5. Supply.

The present sources of extractive material are given in Table 1. These sources may be summarised as follows:

for concrete; fine sand from Bungendore, washed river sand from Yass and Bredbo and aggregate from the Canberra area or river gravel from Bredbo,

for roadmaking;local supplies close to the use location for base and sub-base materials and the Canberra area for surface or sealing materials.

The number of major suppliers of extractive materials is as follows:

sand, fine	: 5
sand, washed river	: 2
gravel, washed	: 4
aggregates	: 2
road surface materials	: 2.

The remainder of suppliers are minor and/or re-sellers of materials produced elsewhere. The foregoing is derived from discussions with operators in the industry; it is not possible to derive a complete overview from the data available, ie Tables 1 and 2.

Soil supply in many cases is an adjunct to sand supply. A reasonable assumption is that many of the sand suppliers are also soil suppliers. Table 1 shows 4 soil suppliers.

6. Conclusions.

The present demand for extractive material in the region is about 2 million tonnes per annum. This level of demand will continue under normal economic conditions. The demand is met by suppliers from the region. The demand is in the market segments concrete and concrete products and roadmaking materials of which the concrete markets are the greater. Supplies of river sand and river gravel are necessary parts of the concrete market.

	BRAIDWOOD AREA	**(almost too far for the Canberra market)**			
	Braidwood Quarries	Braidwood	sand	gravel	
	G.M.Sands	Braidwood	sand	soil	
	Lo Pilato Bros	Braidwood	sand		
	Braidwood sands	Braidwood	sand		
	Tallaganda S.C.	Tallaganda		gravel	
	BUNGENDORE AREA	**(serves Canberra)**			
	Alex Yellow Sand	Bungendore	sand		
	Bungendore Sands	Bungandore	sand		
	Canberra S.& G.?	Bungandore	sand		
	Corkhill Bros	Bungandore	sand		
	Yarrowlumla S.C.	Bungandore		gravel	
	Readymix	Bungandore	sand		
	YASS AREA	**(serves Canberra)**			
	DMR Yass	Yass area		gravel	
	Tom Elvin ?	Yass			soil
	Glenlee Quarries	Murrambateman			shale
	Gunning S.C.	Gunning area		gravel	
	Hallam & Medway	Dalton	sand	gravel	
	Tharwa Sands(Hyles)	Yass, Hall	sand		
	Yass S.C.	Yass area		gravel	
	CANBERRA AREA				
	Amey Bros.			roadbase	
	BMG	Mugga Lane		hardrock	
	Readymix	Cooma Rd		hardrock	
	Yarrowlumba S.C.	Queanbeyan		gravel	
	Yarrowlumba S.C.	Yarrowlumba		gravel	
	BREDBO AREA	**(serves Canberra and Cooma)**			
	Canberra S & G	Colington	sand	gravel	
	Corkhill Bros	Colington	sand	gravel	
	Gardiners	Michelago			shale
	Lee Aggregates	~~Bredbo~~ Billilingra	sand	gravel	soil
	Lo Pilato Bros	Bredbo	sand	gravel	
	Monaro Quarries	Bredbo	sand	gravel	
	COOMA MONARO AREA	**(serves Cooma)**			
	Athol Agnews	Bunyan		gravel	
	Cooma-Monaro S.C.	Cooma area		gravel	
	DMR Cooma	Cooma area		gravel	
	Doug Turner	Cooma	sand	gravel	soil
	Gardiners	Numerella	sand		
	OTHER AREAS	**(serves Canberra)**			
	Jugiong Quarries	Jugiong	sand	gravel	

TABLE 1. Extractive industry suppliers in the Canberra Cooma region. Both DMR and Shire Councils(S.C.) obtain and use material within an area and do not export outside the area.

86-87

PRODUCER	PRODUCT TYPE AND QUANTITY IN TONNES.				
	Sand unprocessed	Sand processed	Gravel unprocessed	Gravel processed	Aggreg
Athol Agnews			1300		
Canberra.S.& G.		181193			
Capitol Quarries		5050	18100		
Corkhill Bros		120000			
G.M.Sands	4380	24090	45900	3180	
Hallam & Medway	100	200			
Jugiong Quarries		9000		16000	
Lo Pilato Bros	4380				
Readymix		22000			75234
Tharwa Sands		37884			
D.E.Turner	1577				
DMR Cooma			24431		
shire councils:					
Cooma-Monaro			37084		
Tallagandra			150000		
Yarrowlumba			64085	11825	
Yass			95000		
TOTALS	10437	399417	435900	31005	752340

Table 2. Statistical returns to the Department of Mineral Resources, 1986/1987, for producers supplying to the Cooma - Canberra market.

TO COOMA

ACCESS TO HIGHWAY

MONARO HIGHWAY STATE HIGHWAY 19 NATIONAL ROUTE 23

TO CANBERRA

PORT 2

PORT 29

PORT 28

PORT 1

PORT 1A

OLD HIGHWAY

MURRUMBIDGEE RIVER

PLANT

AREA 1

AREA 2

AREA 3

AREA 4

AREA 5

BEDROCK

BEDROCK

750 740 730 720 710 700 720 710 700 720 710 700 740 730 720 710 700

N

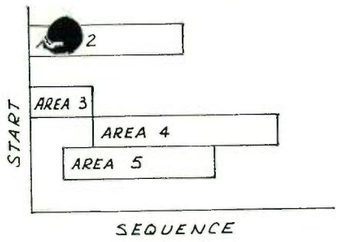
D.P. JAMES & COMPANY

PLAN 1

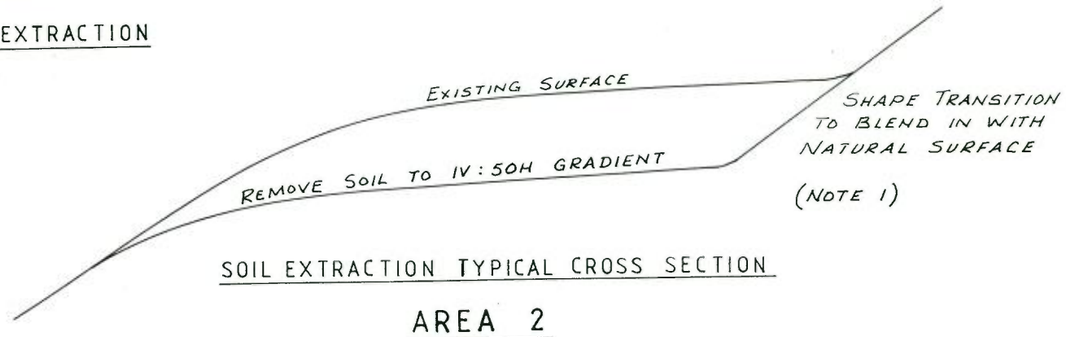
EXISTING TOPOGRAPHY AND EXTRACTION AREAS AT BREDBO, PARISH OF BILLILINGRA EAST OF RIVER RIGHT BANK, PARISH OF YORK WEST OF RIVER RIGHT BANK.

SCALE 1000 METRE GRID JUNE 1988

REFERENCE DRAWING; CMA MAPS 8726-3-S, 8725-4-N

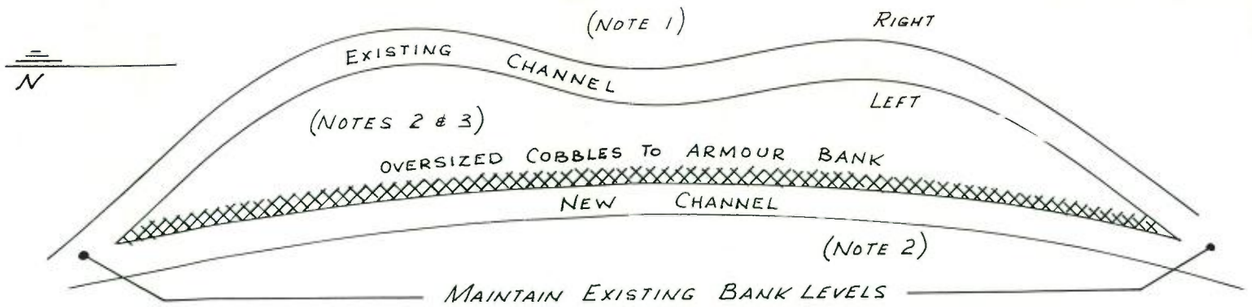


SEQUENCE OF EXTRACTION



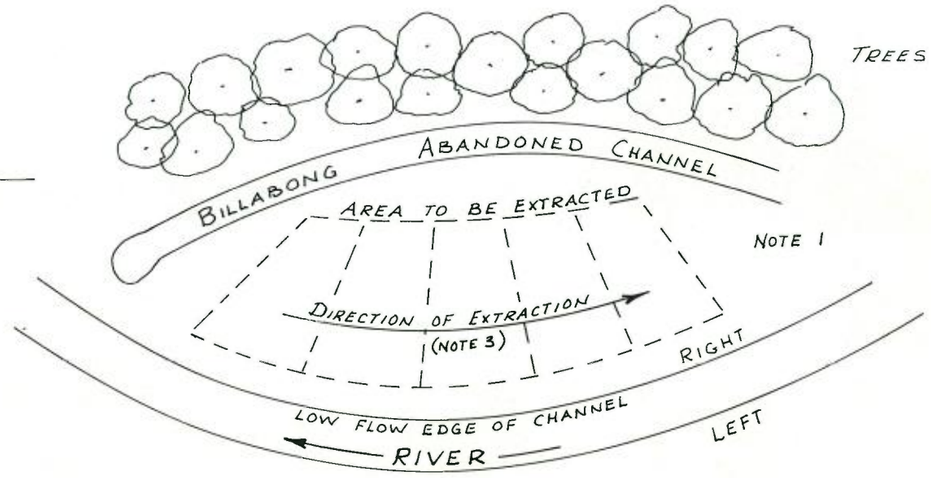
SOIL EXTRACTION TYPICAL CROSS SECTION

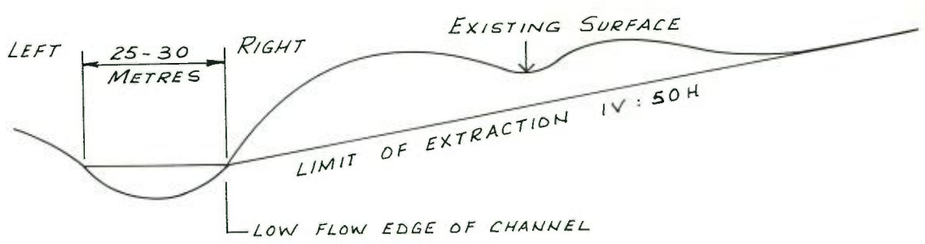
AREA 2



TYPICAL CROSS SECTION

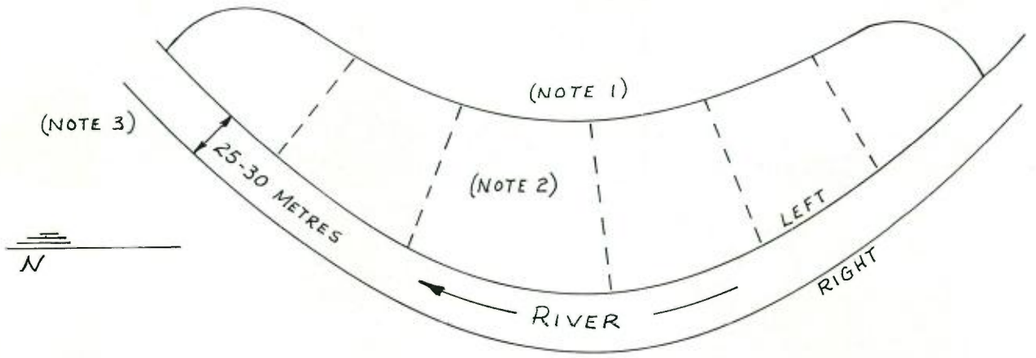
AREA 4





TYPICAL CROSS SECTION

AREA 3



STOCKPILES OF OVERSIZE MATERIAL, REMOVE TO AND PROCESS AT AREA 1

REMOVE AND DISPOSE OF ALL OLD PLANT, RUBBISH ETC.

OVERBURDEN STOCKPILES, KNOCKDOWN AND SPREAD OVER EXTRACTED LAND.

AREA 5

General Notes

1. REHABILITATE ACCORDING TO APPENDIX 3.
2. REMOVE MATERIAL TO 1V:50H GRADIENT.
3. COMMENCE DOWN STREAM AND WORK UPSTREAM IN STRIPS NORMAL TO RIVER.

D.P. JAMES & COMPANY

PLAN 2

OPERATIONAL AND FINAL LANDFORM DETAILS

NOT TO SCALE JUNE 1988