



EIS 689

AB019482

Proposed Cringila emplacement : environmental impact
assessment

NSW DEPT PRIMARY INDUSTRIES



AB019482



DEPARTMENT OF ENVIRONMENT & PLANNING

NSW DEPARTMENT OF
MINERALS AND ENERGY

22 NOV 1990

LIBRARY

Proposed Cringila Emplacement

ENVIRONMENTAL GEOLOGY SECTION
GEOLOGICAL SURVEY OF N.S.W.

ENVIRONMENTAL IMPACT
ASSESSMENT

EIS
689

Proposed Cringila Emplacement

ENVIRONMENTAL GEOLOGY SECTION
GEOLOGICAL SURVEY OF N.S.W.

ENVIRONMENTAL IMPACT ASSESSMENT

DEPARTMENT OF ENVIRONMENT & PLANNING
SYDNEY, 1982

© Crown copyright 1982.

82/67

ISBN 0 724 06540 7

FOREWORD

On 8 October 1980, Australian Iron and Steel Pty. Limited lodged a development application, together with an environmental impact statement, with Wollongong City Council for the proposed use of a site at Cringila for the emplacement of seven million tonnes of coal washery discard, blast furnace slag and steelmaking slag over a period of three to five years. The rehabilitated site would subsequently be made available to the public as a mixed recreational facility. Council placed the environmental impact statement on public exhibition early in 1981.

The development was not designated at the time but it is subject to a direction under Section 101 of the Environmental Planning and Assessment Act, 1979, requiring the development application to be determined by the Minister for Planning and Environment. In accordance with Section 101(4) of the Act, Wollongong City Council has requested that it be afforded the opportunity of a hearing before the application is determined. On 6 April 1982, the Minister announced that an Inquiry would be held.

As a result of its examination of the environmental impact statement, the Department considers that insufficient evidence has been provided to indicate that a satisfactory alternative does not exist to satisfy the Company's immediate needs. Accordingly, the Department has recommended that determination of the application be withheld pending a more thorough examination by the Company of alternative sites for an emplacement, but if the Company can satisfy the Commission of Inquiry that a suitable site for short term use is not available, the proposal, amended to a smaller ultimate capacity, should be considered at the Inquiry.

This assessment report has been prepared by the Department of Environment and Planning and constitutes the Department's consideration of the development application and associated environmental impact statement. This report and the recommendations contained herein constitutes the Department's submission to the Commission of Inquiry.

R.B. Smyth
Director of Environment
and Planning

CONTENTS

1.	INTRODUCTION	1
2.	BACKGROUND INFORMATION	3
3.	THE PROPOSAL	4
	3.1 General	4
	3.2 Emplacement Materials	4
	3.3 Construction Method	5
	3.4 Transport and Access	6
	3.5 Drainage	6
	3.6 Easement Relocation	7
	3.7 Ultimate Landform and Land Use	7
	3.8 Environmental Safeguards	7
	3.9 Changes to the Original Proposal	9
4.	ALTERNATIVES	10
	4.1 Alternative of No Development	10
	4.2 Alternative Methods of Disposal	10
	4.3 Alternative Sites	11
	4.4 Alternative Transport Modes	11
	4.5 Alternative End Uses of the Cringila Site	12
5.	THE EXISTING ENVIRONMENT AND PLANNING CONSIDERATIONS	13
	5.1 Current Planning Control	13
	5.2 Proposed Planning Control	13
	5.3 Regional Land Use	14
	5.4 Site Characteristics	14
	5.5 Climate and Weather	15
6.	REVIEW OF SUBMISSIONS	16
	6.1 Government Departments	16
	6.2 Local Government	18
	6.3 Private Organisations	18
	6.4 Individuals	20
7.	IMPACT OF THE PROPOSAL ON THE ENVIRONMENT	21
	7.1 General Comments	21
	7.2 Transport	21
	7.3 Dust	22
	7.4 Odour	23
	7.5 Water Management	23
	7.6 Noise	24
	7.7 Health	26
	7.8 Visual Impact	27
	7.9 Spontaneous Combustion	27
	7.10 Stability	28
	7.11 Rehabilitation	29
	7.12 Monitoring	30
	7.13 Management	31

8.	CONCLUSIONS	32
9.	RECOMMENDATIONS	35

APPENDICES

Appendix A1 :	Submission of Wollongong City Council	36
Appendix A2 :	Submission of the State Pollution Control Commission	44
Appendix A3 :	Correspondence between the Department and A.I. & S.	47

FIGURES

<u>Figure 1</u> :	Location of the Proposed Emplacement
<u>Figure 2</u> :	Proposed Transport Routes
<u>Figure 3</u> :	Proposed Emplacement Sequence
<u>Figure 4</u> :	Typical Structure During Emplacement
<u>Figure 5</u> :	Cross Section of Northern Gully Emplacement
<u>Figure 6</u> :	Proposed Completed Landform (as amended).

1. INTRODUCTION

Australian Iron and Steel Pty. Ltd. (A.I. & S.), as the next stage of its ongoing coal washery discard and slag disposal programme, propose to use a 32 hectare site at Cringila (See Figure 1). Seven million tonnes of waste would be emplaced in the area over a three to five year period. The rehabilitated site would then be available to the public as a mixed recreational facility.

Because it is a proposal to deal with coal waste, it is subject to a direction under Section 101 of the Environmental Planning and Assessment Act, 1979 requiring any development application to be determined by the Minister for Planning and Environment. However, the proposal did not constitute designated development under the Act at the time of development application and a formal environmental impact statement and public exhibition were therefore not required. A.I. & S. nevertheless commissioned Longworth and McKenzie Pty. Ltd. to prepare an environmental impact statement. This was published in November 1979. On 8 October 1980, A.I. & S. lodged a development application, accompanied by the environmental impact statement, with Wollongong City Council for the proposed development. Council subsequently placed the impact statement on public exhibition and invited written comment.

It soon became obvious that the proposal was not viewed favourably by large numbers of people living and working adjacent to the site. The proposal, and the various groups and individuals opposed to it, received extensive coverage in the press. On 12 March 1982, Wollongong City Council wrote to the Department of Environment and Planning requesting that it be afforded the opportunity of a hearing before the Minister determines the development application. On 26 March 1982, Council conducted a public meeting to discuss the issues at hand. Approximately 200 local residents passed a resolution calling on the Council to recommend to the Minister that he refuse the development application. Amid this controversial setting, the Minister announced in Parliament on 6 April 1982 that an Inquiry would be held.

At its meeting on 27 April 1982, Council's attitude to the proposal was determined. In a letter to the Department dated 6 May 1982, Council indicated that it had resolved, among other things, to forward the development application to the Minister for his determination. Council further resolved that, if the Minister approved the application following the Commission of Inquiry, he should impose a number of specified conditions. Council's letter is reproduced in full as Appendix A1.

The Department of Environment and Planning undertook to prepare an environmental impact assessment of the proposed development as its submission to the Inquiry. To this end, the Department sought additional advice from A.I. & S. and comment from a number of Government Departments having interests or expertise in aspects of the proposal. Note was taken of Wollongong City Council's submission, matters raised in public submissions forwarded to Council and matters covered in the press. Relevant literature on coal washery discard disposal was examined. Field inspections were conducted of a rehabilitated emplacement at Ian McLennan park, active emplacements at Kembla Grange, Primbee Sands, Russell Vale and Madden's Plains, and the site and environs of the current proposal. The conclusions and recommendations presented in this Report result from the information collected.

2. BACKGROUND INFORMATION

Disposal of coal washery discard and other mineral waste has long been a problem in coal producing areas of N.S.W. The most acceptable technique for disposal is still recognised as surface emplacement and, with only minor exceptions, all reject is currently disposed of in such land-fill applications. The majority of existing coal preparation plants in the Southern Coalfields have reject disposal sites which will cater for projected production for at least 12 years. The Steelworks is an exception. In recent years A.I. & S. has utilised sites adjacent to Cringila Primary School, at the Primbee sand mining pits and at Kembla Grange. Kembla Grange is the site currently being developed. Its remaining capacity is adequate for only 1.5 to 2 years of production.

It was because of the critical need to find a long term solution to the waste problem that a Sub-Committee of the Coal Resource Development Committee was established in 1981. The Sub-Committee, called the Coal Washery Reject Disposal Sub-Committee, is made up of representatives of the N.S.W. Combined Colliery Proprietors' Association, several coal companies (including A.I. & S.) involved in waste generation in the Southern Coalfields area, the Department of Mineral Resources, the Electricity Commission of N.S.W., the Department of Environment and Planning and Wollongong City Council.

The Sub-Committee has commenced consideration of the scale and nature of future coal reject and a wide range of future disposal options. Its current activities are geared towards the development of a long term disposal strategy for the Southern Coalfields. The Chairman of the Sub-Committee has advised the Department (by letter dated 28 July 1982) that the Sub-Committee has had no involvement with any current proposals for reject disposal by individual companies. A short-term disposal solution is therefore required by A.I. & S. while the Company seeks and examines long term solutions and the Sub-Committee completes its studies and seeks the implementation of its final recommendations in accordance with its terms of reference.

3. THE PROPOSAL

The proposal is described in detail in the environmental impact statement. The main parameters of the proposal, as identified in that document which was lodged with the development application, are described in brief in Sections 3.1 to 3.8 below. Section 3.9 identifies changes A.I & S. now envisages to the original proposal.

3.1 General

A.I. & S. proposes to use a 32 hectare site at Cringila (see Figure 1) for the emplacement of approximately seven million tonnes (4.2 million cubic metres) of coal washery discard, blast furnace slag and steelmaking slag. The life of the emplacement programme has not been accurately forecast; however, the Company estimates that it will be between three and five years at a rate of approximately two million tonnes per year. The emplacement area would rise to a maximum height of about 40 metres on its western side where it would merge with the Berkeley Scenic Protection Area. The northern boundary would be at the previously constructed emplacement near the Cringila Public School. On the east and south the foot of the emplacement would end 30 metres from residential properties at Lockwood Street, Auburn Parade, Grattan Street and Flagstaff Road.

3.2 Emplacement Materials

Emplacement materials would comprise coal washery discard (785,000 tonnes per year), blast furnace slag (1,115,000 tonnes per year) and steelmaking slag (100,000 tonnes per year). The washery discard would consist mainly of carbonaceous shales and sandstones. It would contain traces of pyrite and ankerite. The bulk of reject would fall into the coarse reject category (less than 75mm diameter) and the remainder would be stone (greater than 75mm diameter). It would have a moisture content between 8% and 12%. The environmental impact statement indicates that it would not be prone to spontaneous combustion and should weather gradually. Percolation of seepage water would be slow enough to maintain groundwater levels in the basal material within acceptable limits for stability.

Blast furnace slag consists mainly of silicates and aluminosilicates of calcium and other bases. The bulk of blast furnace slag is air-cooled resulting in a dense crystalline material. Its sulphur content is low.

Steelmaking slag consists mainly of calcium silicates, magnetite and other spinel solid solutions and calcium ferites. Sea water is used for cooling purposes so the initial leach waters would contain sea water salts.

In addition to the above components, a small quantity of miscellaneous wastes would be emplaced. These may include bricks, iron, blast furnace scrubber sludge and acid pickle waste. A statement by A.I. & S. should be sought at the Inquiry regarding miscellaneous waste types, quantities and properties.

3.3 Construction Method

Construction of the emplacement would be basically by the standard "uphill" method. Aside from having water management and other engineering advantages, this method would ensure that the active face is shielded as far as possible from adjacent residential properties by previously constructed works. The emplacement would be developed in three phases. The southern gully would be filled first, followed by the northern gully and the upper levels of the emplacement. (See Figures 3, 4 and 5). The three stages would blend to give a continuous construction sequence for the entire area. Within each of the three stages, discrete units would be constructed in a cycle of operations. Each cycle would last for three to six months and involve the following:

- . Determination of the extent of unit and marking of the site
- . Extension of culverts, drains and haul roads
- . Clearance and disposal of trees and shrubs
- . Stripping of grass and topsoil
- . Stockpiling of grass and topsoil; or preferably spreading it on the surface of previously completed units.
- . Stripping clay and weathered rock material to required depth and stockpiling, or spreading over previously completed units as required.
- . Inspection of foundation areas for springs or seepages and soft areas. If required, treatment of these by extra drainage or over excavation.
- . Transportation, tipping and mixing (by front end loader) of discard and slag
- . Placement (by front end loader) and compaction (by rubber-tyred vehicles) of discard and slag to 96% of Australian Design Standard 1289 in layers to the limited height of the unit and shaping of the top surface to final landform requirements.
- . Construction or extension of surface drainage features as required.

- . Placement of coal washery discard, clay and topsoil over final landform of emplacement. Clay and topsoil would be placed to depths of 0.3 metres and 150-200 mm respectively. In relatively large flat areas, a 0.3 metre thick layer of coal washery discard would be placed between clay and topsoil.
- . Revegetation with grass, shrub and tree species.

3.4 Transport and Access

Road trucks would be used to transport all wastes from the steelworks to the proposed Cringila emplacement. 320 truck journeys would be necessary each day (640 truck movements). This represents approximately one truck journey beginning each three minutes. Trucks would enter public roads from three points, viz: Flinders Street and Five Islands Road from the Steelworks and Springhill Road from the Steelworks Dump 21. All trucks would travel to a point on Five Islands Road west of John Crehan Park and thence proceed south by a proposed new access road to the emplacement site. Return journeys would make use of a more northerly entrance to Five Islands Road. Most truck movements would occur between 7 a.m. and 6 p.m. Monday to Saturday. However, limited movement would also occur between 6 a.m. and 7 a.m., between 6 p.m. and 10 p.m. and on Sundays and Public Holidays between 8 a.m. and 6 p.m. All public roads proposed to be used for transport would be major arterial roads except for a short segment of residential street at the eastern end of Merrett Avenue. This would be used for some of the blast furnace slag only. Proposed transport routes are indicated in Figure 2.

3.5 Drainage

The proposed drainage design has three elements, viz:

- (i) stormwater run-off would be controlled within catchments of similar size to those presently existing,
- (ii) drainage structures would require minimal maintenance in the long term, and
- (iii) dirty water run-off would be separated from clean water run-off during construction and treated by settlement prior to release.

During construction, temporary underpass drainage culverts would be placed beneath emplaced materials into which clean water runoff would be channeled. A limited amount of surcharging and return storage at the upstream ends have been designed for. A minor part of these underpasses would be retained as a groundwater drainage system, but most would become redundant. Dirty water runoff from the progressing emplacement would be diverted separately to filter lagoons prior to discharge.

It is proposed that stormwater run-off from the completed landform would be diverted via surface drains to the present streams into the drainage channels that flow to the steelworks. However, the final landform of the emplacement would alter the present distribution of stormwater run-off in the Lockwood Street area. The proportion of the run-off that presently flows into a one metre square box culvert laid behind the residences on the southern side of Lockwood Street would be significantly reduced as cut-off drains would divert water into the major stormwater channel to the north. Design water velocity at some sections of the emplacement would be such that lined drains, or drains excavated in bedrock, would be required. Lined drains may consist of pipes or box culverts buried at shallow depths. Drainage structures have been designed to accommodate a one in 100 year storm.

3.6 Easement Relocation

A pair of wood pole transmission lines currently flank the western and south-western edges of the proposed emplacement area. It is intended to relocate the easement, including some six poles, slightly west of its present position. This would allow materials to be emplaced nearer to the south-western ridgeline.

3.7 Ultimate Landform and Land Use

The final landform would appear as a series of batters sloping upwards at 18° with berms appearing every 10 metres in height. On the western (top) side, the emplacement would have flat areas fringed by protective embankments (see Figure 6).

It is proposed that the rehabilitated emplacement would be used as a mixed recreational facility having scope for both active and passive recreation. An oval would be constructed near the south western margin and the rest would be landscape planted. Bicycle tracks and barbeque facilities could also be provided. A new road linking Five Islands and Flagstaff Roads would be constructed along the western edge of the emplacement providing a new through access and access to the recreational facility. Access would also be possible from Jarvie Road, Lockwood Street, Auburn Parade, Grattan Street and Flagstaff Road.

3.8 Environmental Safeguards

A.I. & S. have implemented or propose to implement the following environmental safeguards:

- A comprehensive programme of laboratory testing has been performed on samples of discard and slag and geotechnical analyses have been carried out on site foundations to enable the determination of both engineering parameters and chemical properties necessary for the design of the emplacement.

- . Blast furnace slag found to be hot would be segregated and cooled before inclusion in the emplacement to minimise the chance of emplacement combustion.
- . Subsurface drainage measures and the emplacement structure have been designed to prevent a rise in the water table and thereby preserve the stability of the emplacement.
- . The steepest final slopes proposed are 18.4 degrees and the maximum height of these slopes would be 10 metres. Compaction of waste would be to 96 percent of Australian Design Standard 1289.
- . Top soiling and revegetation of completed areas of the emplacement would be rapid to prevent erosion and dusting.
- . Access roads would be wetted or oiled to avoid dusting.
- . Water carts would be used to prevent dusting on active areas of the emplacement.
- . Discard brought to the site would have a moisture content of four to eight percent which would minimise dusting on transit and after tipping.
- . Cut-off drains would be built around the emplacement to separate clean water from dirty water run-off during construction.
- . Dirty water would be stored in filter lagoons so that fine coal or other materials are extracted before the water reaches the down-stream drainage system.
- . Drainage structures have been designed to pass the peak run-off from a storm having a return period of 100 years.
- . Mechanical equipment working on the emplacement would be fitted with noise silencing equipment.
- . The initial embankment construction in the south of the emplacement area would provide some visual and acoustic screening where residential housing is close. Generally, work would proceed from east to west, substantially behind an embankment beginning at the toe of the emplacement (see Figure 5), thus partially shielding Cringila residents from much of any noise, dust or visual impact generated.
- . Emplacement operations would be limited at nights, Sundays and public holidays.
- . Pipes would be installed in the emplacement to monitor temperature during emplacement operations and for 12 months following emplacement completion.

- . Piezometer holes would be installed in the emplacement to allow the water table to be monitored during emplacement operations and for 12 months following emplacement completion.
- . The final landform proposed for the area has been designed to look natural and fit the surrounding topography. Grass, shrub and tree species would be established to prevent erosion and visually enhance the site.

3.9 Changes to the Original Proposal

Following lodgement of the development application and environmental impact statement to Wollongong City Council, Council suggested some amendments to the landform layout of the final emplacement. The proposal was consequently altered for A.I. & S. by Longworth and McKenzie Pty. Ltd. The new concept involves a final landform providing for two playing fields closer to the existing fields in the north of the site. In achieving this new landform, the capacity of the emplacement has been reduced from 4.2 to 3.6 million cubic metres. The new concept is illustrated in Figure 6. A.I. & S. has not committed itself to any particular strategy regarding access to the rehabilitated site or type of recreational facilities to be provided.

4. ALTERNATIVES

4.1 Alternative of No Development

At present A.I. & S. produces some two million tonnes per annum of coal washery discard, blast furnace slag and steelmaking slag beyond that which can be used for miscellaneous purposes such as aggregate, road bases and backfilling at the Primbee Sand reclamation project. The current emplacement at Kembla Grange, which accommodates these wastes, has very limited capacity. A.I. & S. wishes to reserve the remaining capacity principally for afternoon and night shift operations as the site is remote from residential areas. There is an urgent need, therefore, for a new emplacement site. A.I.& S. has indicated that if a new disposal site or method cannot be achieved, the Steelworks would soon be obliged to cease its operations.

4.2 Alternative Methods of Disposal

Not all washery discard and slag is disposed of in emplacements or used as landfill for recreational facilities. Small quantities of coal washery discard are used for surfacing of private and local roads. Discard is unsuitable for main road construction because of its poor weathering characteristics and relative instability to loads when wet. Blast furnace and steelmaking slag have been used for roadworks and other major projects however and blast furnace slag can also be used as aggregate in concrete. Further uses of slags are currently being developed, such as railway track ballast, road aggregate and raw materials for glass making and brickmaking. Despite existing and possible future uses for washery discard and slag, the needs for same are presently not large enough to absorb all the materials generated. However, recent advances in these technologies should be canvassed at the Inquiry to ascertain whether any has the potential to significantly reduce the need for a surface emplacement at Cringila.

Offshore disposal is handicapped by potential environmental impacts and unavailability of harbour facilities.

Underground disposal would depend on the availability of a suitable worked out colliery in the proximity of the source of reject. However, difficulties could be expected in maintaining a free flow of material through pipes into the mine. Disposal of coarse reject in worked out collieries has not been practical elsewhere in the world. Disposal in active collieries would be impossible without substantial and costly changes in mine layout and equipment and would probably result in considerable sterilization of coal. This is not likely to be a feasible option in the foreseeable future.

Fluidised bed combustion is being investigated by the C.S.I.R.O. and the Joint Coal Board at the Glenlee Washery. This method shows promise as a means of dewatering tailings and of extracting energy from reject material. However, combustion results in only 30 percent reduction in weight of rejects and a somewhat less reduction in volume so would not in itself solve the long term reject disposal problem. The technology is certainly not developed enough to influence the current proposal.

4.3 Alternative Sites

In response to questions posed by the Department, A.I. & S. indicated in a letter dated 30 June 1982 (see Appendix A3) that, apart from the existing disposal area at Kembla Grange the Company does not have any other sites available for the disposal of large tonnages of solid refuse. As indicated in Section 4.1 of this Report, A.I. & S. considers it is important to reserve this capacity for waste generated during the afternoon and night shifts. A.I. & S. intends to continue providing material as filling for the Primbee sand reclamation project and various community projects upon request from local authorities. However, the quantities involved do not afford significant relief to the disposal problem.

The Department considers that there may be alternative sites within the region which are suitable, but not currently available to A.I. & S. for waste disposal purposes. In this regard, A.I. & S. should be questioned at the Inquiry on the practicability and economic viability of using alternative sites which are not currently available to it; for instance, land in the vicinity of the Kembla Grange site or the deep gully immediately to the north of the Berkeley Ridge reservoirs near the Cringila site could be investigated. The Department sought the opinion of the Metropolitan Water, Sewerage and Drainage Board (land owners) regarding the latter site. In its written reply, the Board indicated that it considered the site suitable for emplacement, subject to the relocation of the Board's mains (currently across the property) and special requirements to ensure adequate long term stability. The Board estimates that some 1.9 million cubic metres of solid fill could be placed on the land. While these alternative sites may not have sufficient capacity to be considered as alternatives to Cringila in toto, their use as holding options to meet immediate needs pending selection of a suitable site for long term use would seem more environmentally attractive than the Company's proposal.

4.4 Alternative Transport Modes

Alternative options for transport of washery discard and slag such as use of conveyors or trains can be discarded because of the prohibitive cost (including planning, design, resumptions, materials, construction, etc.) and lack of flexibility available. Such options could only be given further thought if the emplacement area had a considerably longer life expectancy.

4.5 Alternative End Uses of the Cringila Site

Three alternative end land uses were considered by A.I. & S. in its environmental impact statement; viz: a mixed recreational facility, housing development and open space. Of these, A.I. & S. considers the mixed recreational facility is most suitable for the site and the needs of the local community.

5. THE EXISTING ENVIRONMENT AND PLANNING CONSIDERATIONS

5.1 Current Planning Control

That part of the site which is proposed for the emplacement is zoned Non-Urban 1(b) under the Illawarra Planning Scheme. Within this zoning, an emplacement such as that proposed would be permitted with the consent of the responsible authority. The site is bounded on its northern and western sides by further areas of Non-Urban 1(b) zoning. Land adjacent to the eastern and southern boundaries of the site is zoned Residential 2(b) and adjacent to the south-western boundary Residential 2(e).

5.2 Proposed Planning Control

The draft Illawarra Local Environmental Plan was placed on public exhibition by Wollongong City Council from February to June 1981. In the plan, the site proposed for emplacement is zoned Environment Protection 7(d) (Scenic). Within this zoning, an emplacement such as that proposed would be prohibited. This zone was introduced with the objective of giving long term protection to the Berkeley Hill area so that it could serve as a vital green space and buffer between heavy industry and residential development to the south. The land use table associated with the zoning was designed to prohibit undesirable development such as hazardous industry which would be incompatible with the notion of scenic protection and a buffer function. It should be noted that A.I. & S. has formally objected to the proposed zoning in its submission under Section 67 of the Environmental Planning and Assessment Act, 1979. The outcome of the objection is pending Council's review.

The draft Illawarra Regional Environmental Plan has also been prepared and placed on public exhibition from August to October, 1979. The draft Regional Plan has been amended in the light of submissions received (including a submission from A.I. & S.) and is now in an advanced stage of preparation prior to final submission to the Minister. The draft plan contains a number of principles relating to coal washery refuse and industrial waste disposal. The Cringila emplacement, as proposed, meets most of these principles. However, it would be conspicuously incompatible with one of them; viz: that "the emplacement(i) be located away from urban areas and in sites which will not generate traffic in urban areas". The principle "(h)", that the emplacement "be designed to allow future accessibility should there be a demand for the material" would also be difficult to meet in view of the proposed mixing of wastes. Principle "(j)", that alternative sites be considered, also needs to be satisfied.

5.3 Regional Land Use

The Cringila region is dominated by heavy industrial land uses and in particular the steelworks. The major rail and road transport routes converge in the vicinity of the industrial area and considerable traffic movement is apparent. Situated between the steelworks and the proposed emplacement site is the residential area of Cringila and Cringila Public School. Residential development also spreads from the south and south-west of the site to Lake Illawarra. Figure 2 indicates the extent of residential development in the Cringila area. Approximately 50 houses are situated immediately adjacent to the site and there are over 200 in the near vicinity. To the north and north-west of the site, various light industries and active and abandoned quarries dominate the landscape. Immediately to the north is an existing emplacement now used for recreational purposes. This emplacement was developed in the late 1960's and, according to local residents, created adverse environmental impact in the forms of dust, noise and traffic problems. West of the site, Metropolitan Water, Sewerage and Drainage Board water supply reservoirs dominate the highest point in the area. The ridge on which these features are situated has been zoned as a Scenic Protection Area.

5.4 Site Characteristics

The site slopes generally east down from Berkeley Ridge towards the residential area of Cringila. It is drained by two catchments which join in the residential area and flow via the steelworks into Port Kembla Harbour. The proposed emplacement area is almost totally cleared of trees and is currently under-used for grazing purposes. Scars from several small abandoned quarrying operations are apparent, particularly in the north of the site. The natural surface of the site is underlain by 0.3 metres of firm, dark brown topsoil. Beneath this up is up to 1.8 metres of brown and orange brown medium to high plasticity silty clay and, in low areas, 0.6 to 2.5 metres of firm to stiff moist dark grey high plasticity clay. Bedrock consists of latite and, in the west, sandstone. Both latite and sandstone are highly weathered for 1.5 to 2.0 metres below the clays.

Ambient noise levels in the vicinity of the site are moderately high, ranging approximately from 40 to 50 dB(A) during the daytime. Background levels are dominated by continuous steelworks operations. Road traffic, particularly at shift change times, causes the main noise peaks. Peaks range from 58 to 68 dB(A) in the vicinity of the site, but are substantially higher near traffic routes.

Existing air pollution levels (insoluble solids) in the general region are relatively high, largely because of effluents from the steelworks and other industries. However, these levels are substantially less than occurred prior to 1975. In 1974 for instance, monthly averages ranged from 2.5 to 29.1 gm/m²/month whereas in 1978 the range was 0.8 to 4.0. In 1978 the yearly average for Monteith Street Cringila was 2.6 gm/m²/month compared with 1.5 gm/m²/month for George Street Sydney in the same year.

5.5 Climate and Weather

The main elements of climate and weather which are relevant to the current proposal are wind, temperature and rainfall. Wind speed, direction and frequency may influence dusting potential. High temperatures may cause drying out of emplacement materials and jeopardise re-vegetation efforts. Rainfall has relevance for dust prevention, rehabilitation, drainage and potential erosion.

Predominant wind directions are south and north-east in summer and south-west and west in winter. The strongest winds come from the south-west and west. However, the site is partially shielded from that quarter by intervening ridges. Calms occur less than 20 percent of the time. Extremely high temperatures are rare; perhaps three or four days per summer. They are normally associated with moderate north-westerly winds. Average annual rainfall is approximately 1170 mm which is distributed evenly (on average) throughout the year. Droughts and wet periods are common. Because the two catchments on site are small, major flooding does not occur and flood durations are short.

6. REVIEW OF SUBMISSIONS

6.1 Government Departments

Department of Main Roads. The Department submitted the following advice:

- . The spillage of filling materials onto roads from haulage vehicles is of concern and loads should be secured against spillage of this nature or allowances made for regular sweeping and washing of the haulage route.
- . A sufficient length of the departure leg of the proposed access road should be sealed so that debris is not transported onto Five Islands Road. Further negotiations would be required between the applicant and the Department (Divisional Office, Wollongong) regarding this road junction.
- . The proposed transport routes to and from the Cringila site are satisfactory as no haulage is proposed over local streets and intersections on the haulage routes are controlled by traffic signals.
- . The 320 haulage trips per day would not burden the road system.
- . The proposed Cringila site is in close proximity to the steelworks and the haulage distance is much shorter than to the Kembla Grange site.

Department of Mineral Resources. The Department indicated that the metallurgical slag and coal washery discard to be dumped are potentially valuable resources. A number of possible uses for slags and coal washery discard were outlined including, for slags:

- . Construction material
- . Road base
- . Coarse aggregate

and for washery discard:

- . Low-grade fuel for power generation
- . Road base
- . Lightweight aggregate
- . Building boards and blocks

The Department considered that in the short term it will be necessary to continue to dump substantial amounts of these materials. The Department believes that future recovery of the materials would be unlikely because of the planned mixing of same.

Health Commission of N.S.W. The Commission advised that in reviewing the possible health effects of the proposal it is important to distinguish between the effects of the industries which produce the waste and the effects of the disposal of that waste. In this regard, adverse health effects could arise from:

- . Generation of fine dust and a consequent increase in air pollution.
- . Leaching of waste from the emplacement area and runoff into residential areas or waterways used for recreation.
- . Generation of excessive noise.

Of these, the Commission considers air and water pollution can be contained through adoption of proposed safeguards. Noise would be unlikely to reach levels which are known to cause hearing loss, however some disturbance of nearby residents during the emplacement programme would probably be unavoidable.

The Commission sees no objection on health grounds to the Cringila emplacement, subject to the precautions proposed in the environmental impact statement and referred to in its submission being adopted.

Soil Conservation Service of N.S.W. The Service provided advice on the general suitability of the proposed emplacement method and sequence, the long term stability of the materials to be emplaced, the long term viability of the rehabilitation methods proposed and the likelihood of erosion subsequent to completion of rehabilitation. It was in favour of the sequential method of emplacement of small discrete units on a number of grounds, the overall effect being to reduce erosion hazard. The Service indicated that provided adequate standards of compaction, internal and external drainage and a vigorous "pasture" cover are achieved and that these preventative measures are maintained, the likelihood of significant erosion is minimal. However, if surface drains, through blockages or otherwise, cause local concentration of flows, scouring of the batter face could occur. A more serious consequence would be a build up of water levels in the emplacement caused by seepage which could instigate a slope failure.

The Service made the following suggestions with respect to the proposed emplacement:

- . Continual geotechnical inspection and testing should be carried out as each stage of the area is cleared prior to emplacement.
- . Monitoring should be conducted on an on-going basis of compaction densities achieved and water table levels.
- . In addition to toe stability provisions proposed in the impact statement, a layer of coarse stone or larger fraction reject material should be placed at the toe of each embankment to protect the toe from local water flow which would be concentrated against the toe by the rearward sloping berm.

- . A 0.5 metre layer of coarse reject be initially laid down as a drainage blanket in addition to the proposed culverts.
- . On-going repairs and maintenance should be carried out as part of the rehabilitation programme until a vigorous permanent "pasture" is fully established.
- . Special provisions may be necessary to irrigate and fertilize for rehabilitation purposes, in view of possible moisture and nutrient deficits.
- . A detailed rehabilitation plan including proposed surface drainage systems should be submitted to the Service prior to commencement of operations.

State Pollution Control Commission. The Commission's submission is reproduced in full as Appendix A2. It indicates that it is satisfied that the impact on air quality and water quality can be controlled to acceptable limits but it is not yet satisfied that acceptable noise levels can be achieved in close residential areas and it considers development consent should be withheld until it can be shown that offensive noise will not occur in such areas during the proposed development.

6.2 Local Government

Wollongong City Council. Council's submission is reproduced in full as Appendix A1. It includes a limited approval to the proposal for one year only and a comprehensive set of conditions which it considers should be imposed on the applicant should the Minister approve the application following the Commission of Inquiry. These conditions cover general matters, design and drainage, preparation for filling, haulage and access, the filling process, responsibility, control, maintenance and rehabilitation.

6.3 Private Organisations

Australian Labour Party (Balgownie Branch). The Branch objected to the proposed filling operation as it would create excessive pollution and congestion on roads.

Australian Labour Party (Berkeley Branch). The Branch called for rejection of the proposal on the grounds that it would be ad hoc with no planning for future disposal problems. Specific environmental concerns identified included noise, air, water and visual pollution and the high number of truck movements involved.

Australian Labour Party (Corrimal State Electorate Council). The Council called for rejection of the development application and an examination into alternate uses for coal wash and slag.

Australian Labour Party (Dapto Branch). The Branch considered the proposal to dump industrial waste in Cringila as scandalous and called for rejection of the development application.

Australian Labour Party (Illawarra State Electorate Council). The Council advised that its members unanimously agreed with the submission made by Mr. West, M.H.R. (see summary in Section 6.4 of this Report). It considered that the proposal is environmentally indefensible.

Australian Labour Party (Keiraville - Gwynneville Branch) The Branch opposes the dumping of waste at Cringila in view of potential visual, auditory and atmospheric pollution. Every assistance should be given to research projects which examine alternative uses for waste and A.I. and S. should be urged to play a responsible part in the matter.

Australian Labour party (Oak Flats Branch). The Branch objects to the proposal for the following reasons:

- . Noise, water and air pollution would be increased in an area already disadvantaged through heavy industry.
- . Transport problems in the area would become intolerable.
- . Children in the nearby school must suffer from pollution and traffic.
- . No alternative technology has been considered.

Australian Labour Party (Unanderra Branch). The Branch opposes the proposed development as it would involve unacceptable levels of noise, water, air and visual pollution. Transport problems would occur in residential areas. No alternative site or technology has been considered.

Cringila Senior Citizens and Associates Club. In two separate submissions, the Club objected to the proposed development on the grounds of potential impact from traffic and pollution. Reference was made to the previous Cringila emplacement which had adverse environmental effect.

Illawarra Teachers' Association. The Association demanded that the development application be rejected on the following grounds:

- . The potential for children and teachers at Cringila Primary School having to endure several years of dust, noise and visual pollution. In this regard, reference was made to the environmentally unsatisfactory manner in which the previous Cringila emplacement programme was conducted.
- . Noise from the high number of truck movements could affect the learning capacity of the school children.
- . Cringila school children currently live in one of the most polluted areas of Australia and should not have to bear the added burden of the emplacement.
- . A.I. and S. has not examined alternative dump sites or disposal technology.
- . The Cringila site was chosen according to economic and convenience criteria without regard for the welfare of Cringila school children or residents.
- . The ultimate recreational facility would not compensate for the levels of pollution and inconvenience during the dumping period.

South Coast Labour Council. The Council urged that a public inquiry be held to allow full discussion of alternatives to dumping in the highly polluted Cringila area.

Teachers of Cringila Public School. The Teachers demanded that the development application be rejected on the same grounds as indicated by the Illawarra Teachers' Association (see summary above).

6.4 Individuals

D. Gannon (on behalf of 208 concerned residents). Residents registered objection to the proposed development on the grounds that it would be too close to residential areas. Dust, health problems, noise, traffic, dirt on traffic routes and adverse effect on land values were the main concerns listed.

G. Hudson (on behalf of 96 petitioners). The petitioners objected to the proposed development and considered that it would have an adverse effect on:

- . The environment, through air, noise and possible water pollution
- . Land values
- . Traffic problems
- . The Cringila Primary School education programme
- . Residents' general health and well being

They urged that the development application be rejected and that a detailed study be commissioned.

G. Hudson (on behalf of 32 petitioners). A further 32 petitioners objected to the proposed development and sought speaking rights at the inquiry.

S. West, M.H.R. Mr. West, in a detailed submission, objected to the proposed development on the grounds that it is a short sighted approach to an ongoing problem. The main points raised in the submission were that Cringila is an already polluted suburb and considerable additional pollution would be likely for residential areas, road transport of waste would result in traffic congestion and the major area of open space at Cringila would be alienated for at least four years. The environmental impact statement was considered deficient in a number of respects and no consideration was given to alternative sites or alternative technology.

Others A further petition, having 221 signatories, objected to the proposed development on the grounds that it would have deleterious effect on community health and the environment.

In addition to the above submissions and petitions, 179 postcards were addressed to the Minister for Planning and Environment demanding that he reject the proposed Cringila development. 28 roneoed letters, also addressed to the Minister, objected to the proposed development and sought speaking rights at the Inquiry.

7. IMPACT OF THE PROPOSAL ON THE ENVIRONMENT

7.1 General Comments

Many submissions have indicated concern that the current proposal could be construed as a short-term solution to a long-term problem. The Department endorses this view. In the event that the Cringila emplacement is approved and subsequently completed, suitable sites for the long-term disposal of washery refuse may remain unresolved. In this regard, it is important that the Coal Washery Reject Disposal Sub-Committee of the Coal Resource Development Committee come up with long term solutions as a matter of urgency so that the Company can accomplish detailed planning and design and obtain approvals before the Cringila and Kembla Grange sites are exhausted.

Of paramount importance in examining the Cringila proposal is the sensitivity of the site. It is located immediately adjacent to a residential area which houses a significant number of people. The prevailing topography affords no protection from potential impacts to those living closest to the site.

In examining the various environmental impacts of the proposed Cringila emplacement (Sections 7.2 to 7.13), the majority involve matters of concern during the construction phase. Little attention has been given by authors of submissions and others opposing the proposed development to the final landform incorporating community recreational facilities. There would be little doubt that the completed development, as proposed, would bring about some improvement on the current situation of abandoned quarries and prohibited access. In assessing the various impacts of the proposed development therefore, short term environmental degradation must be weighed against the long term environmental benefits. If it is considered that short-term impacts cannot be contained to an acceptable level, it would be appropriate that the development application be refused. On the other hand, if it is considered that short-term impacts can be contained, the development application for the proposal on a suitably reduced scale, as discussed in Section 3.9 of this report, could be conditionally approved, but a decision would also have to take account of the availability of alternatives, proposed zoning, economic criteria and the consequences of not proceeding.

It is with the foregoing in mind that potential environmental impacts are discussed, as follows.

7.2 Transport

In order to transport the proposed volume of waste material from the steelworks to Cringila, 320 truck journeys would be required per day. This is equivalent to one truck in each direction every three minutes for 16 hours. This level of traffic, although significant, represents only eight percent of heavy vehicle movement around the steelworks. In its submission, the

Department of Main Roads indicated that it considers the proposed truck routes along arterial roads are satisfactory. However, certain measures would be required to prevent spillage from trucks and spread of debris near the junction of Five Islands Road and the proposed access route.

To assess the potential impact of trucks on arterial roads it is useful to compare the current transport situation for waste disposal with that proposed for the Cringila emplacement. Waste is currently transported to Kembla Grange via Five Islands Road, the Southern Freeway, Northcliffe Drive and the Princes Highway. The route to Cringila would be very much shorter than this and mostly confined to industrial areas. Although some waste would continue to be transported to Kembla Grange during afternoon and night shifts, it is considered that implementation of the current proposal would, in relative terms, have a beneficial effect on congestion, safety and amenity of arterial roads. However, use of the eastern half of Merrett Avenue for transport of some blast furnace slag would have a detrimental impact on residents of that street.

Trucks would depart from the arterial road system (Five Islands Road) adjacent to John Crehan Park and would travel along a new access road proposed to be built via a steep gully and across Jarvie Road to the north of the site. In order to negotiate the steep grade that would inevitably result from road construction out of the gully, trucks would need low gearing and hence generate significant noise. Such noise would probably be audible from residences along the western end of Jarvie Road.

Fresh in the minds of many Cringila residents is the disturbance caused by trucks during previous emplacement operations in the late 1960's. The currently proposed transport arrangements would be a substantial improvement on those originally encountered as residential streets would be avoided except for the eastern end of Merritt Avenue, and the Department considers this should also be avoided. Nevertheless, after crossing Jarvie Road into the site, the noise and potential dust from truck traffic and dumping could be disturbing to adjacent residents of Cringila. Further reference is made to this aspect, including hours of operation, in Section 7.6 of this Report.

7.3 Dust

Potential sources of dust include the following:

- . Blow-off from loads being transported to the site
- . Surface disturbance by vehicle tyres
- . Dumping operations
- . Earthmoving, stockpiling and stockpiles
- . Waste redistribution, shaping and compaction operations
- . Compacted surfaces, prior to effective rehabilitation

Safeguards proposed to minimise dust from these sources are included in Section 3.8 of this Report.

In its submission, the State Pollution Control Commission indicated that dust levels in streets adjacent to the proposal would rise to a degree and that no air pollution control technology is capable at all times and in all weather conditions of preventing the raising of dust from the transport, handling and emplacement of coal wash and slag. Nevertheless, the Commission is satisfied, having regard to the conditions it can impose on the proponent pursuant to the Clean Air Act, 1961, that emission of air pollutants will not be such as to warrant development consent being withheld on those grounds. In this regard, some options the Commission has under consideration for dust suppression include haul road sealing, truck washing and surface watering.

From the public submissions, it would appear that residents of Cringila fear a recurrence of the dust pollution levels experienced during the previous Cringila emplacement several years ago. Examination of the active emplacement at Kembla Grange, which uses equivalent safeguards to those proposed for Cringila, would tend to suggest that pollution mitigation techniques have improved and fears of serious air pollution may be unfounded. Nevertheless, strict implementation of appropriate safeguards, coupled with a suitable monitoring programme, would be necessary to minimise dust pollution. Of particular concern would be prevention of dust during periods of strong winds including gusts and/or high temperatures. In this regard, it would be beneficial if weather forecasting were to be an integral part of the dust prevention programme so that extra resources could be scheduled for surface watering and other mitigation activities in advance of inclement weather. It is likely that dust mitigation activities would be necessary on some weekends and public holidays regardless of whether or not waste is disposed at such times. Dust mitigation activities could need to continue during periods of strike.

7.4 Odour

In its submission, the State Pollution Control Commission indicated that some sulphurous odours may be experienced if blast furnace slag is emplaced while still hot. A.I. & S., in its environmental impact statement, indicated that any blast furnace slag found to be hot would be segregated and cooled before inclusion in the emplacement. To safeguard against the possibility of unnecessary odours in the Cringila area it would be important to extend this principle to the extent that slag not be transported from the steelworks until it has cooled sufficiently.

7.5 Water Management and Quality

Potential problem areas in the management of water include the following:

- . Discharge of acid or alkaline leachate
- . Discharge of saline water

- . Discharge of turbid water (including carbonaceous material)
- . Flooding
- . Rise in water table

Iron sulphide minerals such as pyrite are considered the most significant pollutants in leachates from coal washery discard. Contact of these minerals with air and moisture can be accompanied by production of sulphuric acid and heavy metal cations. According to the environmental impact statement, analysis of the material to be emplaced has shown a low content of sulphur and other impurities which might cause leachate or other water pollution problems. Proposed emplacement structure and compaction rates should limit infiltration of water and circulation of air thereby minimising acid leachate. Leachate from steel slag may initially have slightly alkaline characteristics. This would have the effect of neutralising acid leachate from coal wash. In any case, neutralisation of wastes collected in siltation ponds would be achieved if necessary.

Sea water is currently used for initial cooling of blast furnace and steelmaking slags. Any leach waters would therefore be likely to contain sea water salts in the early years following emplacement. In view of the proximity of the proposed emplacement to tidal waters and the low ecological status of the creek draining the site to those waters, the potential for trace salt concentrations could not be viewed as a significant problem.

Safeguards against discharge of turbid water and flooding are included in Section 3.8 of this Report. The Department considers these are adequate.

The State Pollution Control Commission in its submission indicated that it considers the proposed emplacement should not have an adverse effect on water quality of the drainage to which it discharges. It should be noted that A.I. & S. would need to make an application under Section 19 of the Clean Waters Act, 1970. In this regard, more detailed advice on the characteristics of wastes and the proposed emplacement design may be sought by the Commission.

The significance of the water table is discussed under Section 7.9 of this Report.

7.6 Noise

Background noise level recordings made by Longworth and McKenzie Pty. Ltd. in the suburb of Cringila suggest that the existing noise environment is of low quality. Continuous steelworks operations influence the background levels and traffic, especially during shift changes, is responsible for noise peaks. In this regard, it is likely that the impact of noise associated with trucks on arterial roads would be negligible. The potential for noise to be of significance becomes far greater at the proposed emplacement site. Although existing background noise

levels are uniformly moderate throughout the Cringila suburb and proposed emplacement site, there are marked differences in existing peak noise levels. Noise sampling stations located on the emplacement site and in the Grattan and Lockwood Streets cul-de-sacs recorded very much lower peak noise levels than on the busier roads near the steelworks. This difference signifies a markedly more favourable noise environment for residents living in the streets adjoining the eastern edge of the proposed emplacement site. It is these residents which would be most affected by noise from proposed construction activity.

The main noise sources would include:

- . Vegetation clearing and top soil stockpiling.
- . Stripping and stockpiling of clay and weathered rock material.
- . Earthworks associated with construction of drainage works.
- . Trucks entering the site and travelling to the active dump zone. (The initial route would be along the ridge top between the two catchments where noise would be maximised).
- . Trucks tipping waste, including the slamming of trays back onto chassis when dumping is complete.
- . Trucks departing from the site. (A relatively steep grade would be necessary in the early years of operation causing trucks to use low gears resulting in higher noise levels).
- . Distribution and compaction of wastes.
- . Replacement of clay, weathered material and topsoil.
- . Water trucks and other miscellaneous vehicles and machinery.

It is proposed that hours of operations, including truck haulage to Cringila, would be concentrated between 7 a.m. to 6 p.m. Monday to Saturday but would also continue between 6 a.m. and 7 a.m., between 6 p.m. and 10 p.m. and on Sundays and Public Holidays between 8 a.m. and 6 p.m. Presumably constant or intermittent noise at nuisance levels would be apparent during all of these times. The Department of Environment and Planning considers the proposed hours and days of operation are highly unsatisfactory for a location adjacent to a residential area. From submissions received, it would appear that the State Pollution Control Commission and Wollongong City Council support this view. The State Pollution Control Commission considers that haulage should be confined to the hours of 7 a.m. to 6 p.m. Monday to Friday and be prohibited on weekends and Public Holidays. Council's recommendations are similar, but provide for a cessation of haulage at 5 p.m. each weekday. As indicated in Section 4.1 of this Report Kembla Grange is to be reserved for night time operations, and the long hours proposed at Cringila should therefore be unnecessary.

It should be noted that a number of Cringila residents work during night shifts at the steelworks or elsewhere and therefore require sleep during daylight hours. Noise levels associated with the proposed emplacement would be likely to disturb such people. Restricting emplacement operations to daylight hours would be of little benefit to them. Children learning at the Primary School adjacent to the site would also be subjected to noise during the day.

Even if operating hours were to be limited to daytime, vehicle movements could still be heard around-the-clock if water tankers are necessary to suppress dust during hot or windy weather.

A danger in limiting the hours of operations at Cringila is that waste, which is produced on a continuous basis, may be transported to Kembla Grange at nights and weekends and returned to Cringila during weekdays. Such double handling, aside from being inefficient, would create extra traffic on arterial roads. (In view of the downturn in the steel industry, and hence slag output, this potential problem may not be relevant).

Certain safeguards against noise are designed into the emplacement design and programme. The "up hill" emplacement technique allows for initial construction of an embankment between southern residential areas and the emplacement site. Further embankments would be constructed in the east as the emplacement activity proceeds up and away from residential areas. Such embankments would have a muffling effect on noise, as recorded in residential areas downstream. A feature of the emplacement programme is the proposal to confine construction activity to discrete units at any one time. This would effectively localise construction activity (and hence construction noise), however transport of waste across the site to the active area would reduce any noise localising effect.

The State Pollution Control Commission indicated in its submission that it is not yet satisfied that A.I. & S. has demonstrated that acceptable noise level can be achieved close to residential areas. In the absence of additional information on projected noise levels the Commission was unable to provide a thorough assessment of potential noise effects. It is important to make clear at this point that the premises would not be scheduled under the Noise Control Act, 1975. Should development approval be given for the proposed emplacement, appropriate safeguards against excessive noise would therefore need to be specified in the conditions of consent. In this regard, a first priority would be to limit the hours and days of operation as suggested by the State Pollution Control Commission and Wollongong City Council.

7.7 Health

The only available information on the potential implications of the proposed emplacement to the health of Cringila residents was provided in the submission prepared by the Health Commission of

N.S.W. A summary of the submission is contained in Section 6.1 of this Report. There is no evidence to suggest that the proposed emplacement could be a hazard to physical health. However, there would appear to be potential for an impact on the amenity of neighbouring residents through nuisance and consequently the psychological effects of the operations need to be taken into account in the determination of the proposal.

7.8 Visual Impact

Although the proposed emplacement site contains a number of visual scars resulting from previous quarrying operations, it does have significant visual appeal due to its undeveloped, "greenbelt" status. The site adjoins the Berkeley Ridge Scenic Protection Area and therefore constitutes part of an elevated area of open space which is visible from much of Wollongong and Port Kembla. The visual appeal of Berkeley Ridge is spoilt only by the water reservoirs on the apex of the ridge and some small abandoned quarries on the slopes. The draft Illawarra Local Environmental Plan (refer to Section 5.2 of this Report) recognises the scenic appeal of the area (as well as its buffer qualities) in recommending that the area be zoned Environment Protection 7(d) Scenic.

Following completion of the emplacement, the scenic appeal of the area would probably be improved. Abandoned quarries would be infilled and the new landform would be merged into the previous emplacement and Berkeley Ridge. Landscaping, if successful, would further enhance the scenery. As with other impacts that would be associated with the emplacement, visual impact would be adverse during the construction period. Stockpiles of overburden, part-completed landforms and unvegetated areas would detract from the area's visual integrity, especially as viewed from adjacent residential areas. Although visual impact would be significant during the three to five year construction period, it is considered that the rehabilitated new landform would be visually attractive and in conformity with the intentions of the zoning proposed in the draft Local Environmental Plan if considered on a long term basis.

7.9 Spontaneous Combustion

Experience with coal washery refuse dumps has shown that some fires in reject material can be extremely difficult to contain and extinguish. The result in such cases may be significant long term air pollution, lack of stability of the emplacement and poor performance of vegetation cover. It is therefore important in designing an emplacement to minimise the likelihood of spontaneous combustion.

Spontaneous combustion is characteristically associated with exothermic heating due to the oxidation of iron pyrite, coupled with high air permeability as a result of inadequate compaction and sealing. The environmental impact statement indicates that the coal washery reject contains only traces of pyrite and that

reject produced by A.I. & S. and others in the South Coast area does not spontaneously combust. The target in-situ dry density of the bulk of the emplaced material is 96 percent of Standard Compaction as determined by Australian Standard 1289. This would be obtained by judicious routing of haulage trucks over previously emplaced materials and be supplemented by compaction equipment if necessary. Such compaction rates and methods appear to have been successful at Kembla Grange to date.

The environmental impact statement indicates that combustion of coal washery reject from the South Coast area requires an external source for ignition. In this regard it is important that slag be thoroughly cooled before being emplaced. Temperature monitoring is proposed as an additional safeguard during emplacement operations and for 12 months following emplacement completion.

7.10 Stability

The structural stability of the emplacement depends on the mobilisation of the shear strength characteristics (effective stresses) of the foundation and emplaced materials which are adversely affected by any build up of hydrostatic pressures therein. The stability is defined as the minimum factor of safety calculated from estimates of the ratio of the moment of the resisting forces (shear resistance) along an assumed slip surface to the moment of the disturbing forces (weight components) on same. This is normally considered adequate for a factor of safety of 1.5. Initial pore pressures are influenced by placement moisture control and compaction, states of stress in the soil element and the rate of dissipation of pore pressures during construction. Any inability to dissipate such pressures or to allow a build up of same and of the water table through inefficient drainage, or of infiltration of water through the foundations or surface could pose as threats to the stability of the emplacement for which appropriate safeguards are required. Homogeneous embankments can become unstable due to saturation of the downstream toe unless the slopes are relatively flat or adequate under drains or a rock toe are provided. Care is also necessary to obtain controlled compaction and to mitigate against any internal erosion through any cracks formed by differential settlement or consolidation of fill on saturation. To prevent water infiltration from below, foundation areas would be inspected for springs or seepages and, if required, treated by extra drainage. The high permeability expected of the emplacement materials and the subsurface drainage measures proposed should prevent high water tables and excessive build-up of water. The proposal to include a 0.3 metre clay layer near the surface would assist in limiting infiltration. The water table would be monitored during construction and upon completion of each stage of the emplacement by use of piezometers. Accelerated weathering tests conducted on the blast furnace and steelmaking slags show only a limited amount of breakdown of particles. The adequacy of proposed compaction levels and the unlikelihood of instability resulting from spontaneous combustion are discussed in Section 7.9.

Potential for surface erosion would be a function of compaction rates, drainage works, batter angles and revegetation. Specifications for these works are included in Section 3.8 of this Report. Compaction rates are also discussed in Section 7.9. An additional measure proposed is to compact the toe of the emplacement to 100 percent of Australian Standard 1289 for reasons of stability and buttressing. Areas under the toe of the emplacement would also be excavated to bedrock. The Soil Conservation Service in its submission indicated that provided adequate standards of compaction, internal and external drainage and a vigorous "pasture" cover are achieved and that these preventative measures are maintained, the likelihood of significant erosion is minimal. The Service pointed out that blockage of surface drains may result in concentration of flows and scouring of the batter face. Surface drains should therefore be maintained, particularly prior to the establishment of a vegetation cover on completed sections of the emplacement.

A geotechnical investigation of the site has been undertaken to evaluate subsurface conditions as described in Section 5.4.3 and Appendix B of the environmental impact statement resulting in the evaluation of sheer strength parameters for use in stability analysis under various conditions. Standard geotechnical tests on emplacement materials are contained in Appendix C for coal washery discard and three types of slag. Section 6.5 of the environmental impact statement states that the stability of the emplacement is not a problem unless the water tables reduce the effective strength of the material but no evidence is provided of the analyses conducted to come to such a conclusion either in the short or long term, or to provide for the possible event of an earth tremor following an extended period of rain. In the circumstances it is considered that such evidence identifying factors of safety for certain stability conditions and the assumptions made for same, should be presented to the inquiry and should be made available for any determination involving approval of the proposal.

The stability of the completed emplacement at Ian McLennan Park, Kembla Grange lends support to the viability of the construction techniques using the same waste materials. The Soil Conservation Service in its submission made several additional recommendations aimed at minimising risk of emplacement instability and safeguarding against erosion. By adding these where relevant to proposed safeguards, the stability of the emplacement would appear to be assured provided a suitable account can be given (at the Inquiry) of calculations used in arriving at conclusions for the stability analysis.

7.11 Rehabilitation

Following shaping of the emplacement and covering with 0.3 metres of clay and 150-200 mm of topsoil, it is proposed to revegetate with grass, shrub and tree species. The grass species envisaged for use is kikuya. Use of irrigation from water reticulated to the site and fertilizers should ensure rapid cover of exposed

surfaces. Evidence from other emplacements in the region indicates the success of grass establishment techniques. Maintenance watering has not been required after initial establishment, even during dry periods.

Most shrub and tree species proposed for use are native to Australia and include Blackbutt, Turpentine, Coral Tree, Illawarra Fig, Morton Bay Fig, Red Bloodwood, Silver Top Ash, Sydney Peppermint, Hickory Wattle, Cabbage Palm and other Eucalypts, Melaleucas and Casuarinas. Trees would be planted from tube stock. These species are largely moisture loving species. In view of the high porosity of materials to be emplaced and the shallowness of soil cover proposed, there is doubt whether such tree and shrub species could be sustained during extended dry periods without artificial watering. In its submission, the Soil Conservation Service suggested that special provisions may be necessary to irrigate and fertilize in view of possible moisture and nutrient deficits. The Department considers that artificial watering during the early establishment years would not necessarily safeguard against desiccation in later years. Evidence from the previous Cringila emplacement, Ian McLennan Park and other emplacements in the region would tend to support the view that tree and shrub species are difficult to establish on such landforms. It is therefore considered that landscaping to provide groves of trees using the species and techniques as proposed may be somewhat optimistic.

The most important principle in rehabilitation at this site would be to establish an adequate grass ground cover. As this seems practicable and as the area is already largely devoid of trees, possible lack of success at tree growing should not be a reason for refusal of the development application. Nevertheless, the aesthetics of the rehabilitated site would be substantially improved if trees can be established. If development consent is granted, A.I. & S. should therefore make every effort to establish trees and experiment with different species, native and exotic, in an endeavour to achieve a satisfactory final result.

Use of Blue gums and the more drought tollerant Red gums may be an appropriate starting point. If even these species fail, the exotic Pepper tree which is well known for its ability to thrive on overburden and reject dumps would be preferable to no trees at all. Substrate conditions could probably be improved for tree growth by increasing the depth of soil cover above slag layers.

7.12 Monitoring

A.I. & S. has undertaken in the environmental impact statement to monitor emplacement temperature and water table levels. It also indicates that readings of various monitoring devices would be taken at monthly intervals from their time of installation until

12 months after the completion of the emplacement. No mention is made of what these monitoring devices are. It is considered important that dust and noise levels be regularly monitored along site boundaries, especially adjacent to residential land. The quality of water leaving the site should also be monitored periodically. Air, water and noise monitoring should be conducted according to parameters set by the State Pollution Control Commission.

Other matters requiring monitoring and general observation include compaction rates, pore pressures, emplacement stability (vertical and horizontal movement) and surface rehabilitation.

7.13 Management

A.I. & S. propose that the rehabilitated landform would be used for a mixed recreational facility. Wollongong City Council has indicated to the Department (by letter dated 15 July 1982) that there is a need for further recreational facilities at Cringila. As indicated in Section 3.9 of this Report, plans for the final landform and facilities have been altered since lodgement of the development application and environmental impact statement. A.I. & S. and the Council have reached agreement on the new landform.

Agreement has not been reached however on details of access to the site, the types of recreational facilities to be provided, management (including maintenance) or eventual ownership. The Department sought the views of both parties on the likely ownership/management of the completed site. Written responses were as follows:

A.I. & S.: "It is intended that the recreation facility when completed will be available to the public. Accordingly, it is the Company's view that ownership of the land should rest with a public body and it is planned that the land when the development has been completed will be donated to Wollongong City Council".

Wollongong City Council: "In regard to the likely ownership/management of the proposed Cringila Recreation Area when completed, the applicant - Company has indicated that it proposes to dedicate the land to Council. A determination as to whether Council will indeed accept the land and under what conditions has yet to be resolved by it."

Council's attitude is further reflected in its recommendation 44 (see Appendix A1) which would require A.I. & S. to maintain the completed landform.

The issues of ownership and management of the completed emplacement site would obviously require resolution at an early stage if development consent is granted.

8. CONCLUSIONS

8.1 A.I. & S. urgently requires a new outlet for disposal of coal washery discard and slags. The most practicable technique currently available for disposal of large quantities of such wastes is surface emplacement. Alternative methods of disposal available would appear to be incapable of coping with the large volumes which need to be disposed. A new emplacement is therefore required.

A.I. & S. claims that apart from the Cringila site, it does not have any available locations for a new emplacement. (See Appendix A3). However, the Department does not consider that sufficient evidence has been provided by the Company to indicate that satisfactory alternative sites to Cringila do not exist in the region to satisfy its immediate needs. A.I. & S. is therefore requested to account for potentially suitable sites which are not currently available to it. Specifically, options in the vicinity of the Kembla Grange site or utilising the unfilled gully at the west of the Cringila site (to the north of the Berkeley Ridge reservoirs) would appear worthy of investigation as holding operations. Consideration could also be given to the sale of the Cringila site in part for residential purposes (where permitted under existing/proposed zoning), the increased value of the land being used to fund the purchase of an alternative site for the deposition of the Company's industrial waste.

Only in the event that a suitable alternative site cannot be practicably established should the Cringila proposal be examined more closely. However it is difficult to believe that A.I. & S. could not in fact find and purchase, or even exchange land for an alternative site more satisfactory for the proposed emplacement. The Department's recommendations in Section 9 of this report are structured accordingly.

8.2 Under the current deemed local environmental planning instrument (Illawarra Planning Scheme) the proposed development would be permitted with the consent of the responsible authority. (In this case the Minister will determine the application under Section 101 of the Environmental Planning and Assessment Act, 1979). However, the development would be prohibited under the draft Local Environmental Plan and be inconsistent with the draft Regional Environmental Plan. Although these plans have not been adopted their intent cannot be ignored. With regard to the draft Local Environmental Plan, the completed emplacement would not be inconsistent with an important objective of the proposed zoning which is to preserve the scenic integrity of undeveloped lands around Berkeley Ridge. In the short-term however the scenic appeal of the site would be adversely affected.

As "in principle" agreement to the Cringila emplacement proposal was first obtained from Wollongong City Council prior to public exhibition of the draft Regional Environmental Plan (November 1978 and August 1979 respectively) it could be argued that A.I. & S. has some claim to success with its subsequent development application. However, given current environmental quality expectations of the general public, approval of the Cringila emplacement should only be possible if departures from the draft Local and Regional Environmental Plans can be justified. Three possible reasons for such justification in this case are:

- (i) The development would be only short-term,
- (ii) The end result would be favourable and consistent with proposed zoning, and
- (iii) The current (unfavourable) economic and employment environments in Wollongong/Port Kembla could be exacerbated if the application is refused.

8.3 An examination of the various environmental impacts that would be associated with the proposed Cringila emplacement indicates that, accepting the results of the stability analysis (see Section 7.10 of this Report), matters of concern would occur only during the construction phase. There would be little doubt that the completed development, if rehabilitated as proposed, would constitute an improvement on the current situation of abandoned quarries and prohibited public access. The decision of whether or not to grant development consent therefore hinges largely on an assessment of the short-term impact verses the long-term benefit to the community.

8.4 Critical in such an assessment is the length of time considered to be "short-term". The environmental impact statement estimates that the construction programme would take three to five years. Any continuation of emplacement beyond such a time frame would be unacceptable. As a significant downturn has occurred in the steel industry since the environmental impact statement was prepared, this period could well be extended. The Department wrote to A.I. & S. in this regard. (See Appendix A3). A.I. & S. advised that the downturn in the steel industry would result in a reduction in the tonnage of slag generated for disposal and also a possible reduction in coal washery discard produced. (The export of surplus tonnages of coal produced from the A.I. & S. mines is being actively investigated by A.I. & S. and in the event of these efforts being successful the quantity of coal washery refuse produced would remain unchanged). A.I. & S. argues that the reduced total tonnage of the emplacement proposal (see Section 3.9 of this Report) would off-set the effect of the expected reduction in waste produced and the completion time would not be affected.

This matter may require additional canvassing during the Inquiry. In this regard, a further factor which may affect the active life of the emplacement is a reduction in operating hours, as foreshadowed in Section 7.6 of this Report.

8.5 Design, construction techniques and environmental safeguards for washery discard and slag emplacements have been developed in recent years to acceptable standards remote from residential areas. The completed emplacement at Ian McLennan Park and the active emplacement at Kembla Grange are testimony to this fact. The main difference between those developments and the proposed Cringila emplacement is the proximity of the latter to residential dwellings and a school. The impacts which would be apparent during construction would be encountered almost exclusively by residents and pupils living and learning adjacent to the site.

8.6 Of the potential environmental impacts discussed in Section 7 of this Report, it is considered that the only impacts for which adequate safeguards could not be provided are noise and visual impact during construction. Of these, noise would be a potentially serious problem to local residents in view of the proximity of the proposed development to large numbers of houses and the unfavourable topographical relationship between the two land uses. In an endeavour to lessen the impact of noise, beyond that which would be possible by adopting the safeguards specified in the environmental impact statement, operations would need to be prohibited at nights, weekends and public holidays. Other possible noise abatement techniques and/or controls should be canvassed with the State Pollution Control Commission at the Inquiry. It should be noted that the licencing provisions of the Noise Control Act would not apply in this instance as the premises is not scheduled under the Noise Control Act. Control over noise could best be formalised through the conditions of any development consent given by the Minister under Section 101 of the Environmental Planning and Assessment Act, 1979.

8.7 Regardless of any approved solution to meeting the Company's immediate needs for the disposal of slags and coal washery discard, there is an urgent need for A.I. & S. to determine an acceptable long-term solution for the disposal of these industrial wastes. This should be initiated immediately so that planning, design and approvals can be achieved before further stop-gap proposals are necessary. The Coal Resource Development Committee has an important role in advising A.I. & S. in this regard.

9. RECOMMENDATIONS

The Department of Environment and Planning recommends:

9.1 That determination of the application for the Cringila Emplacement be withheld pending a more thorough examination by A.I. & S. of alternative sites for an emplacement. Any such site should be more remote than the Company's currently proposed site from residential areas and more compatible with the draft Regional Environmental Plan.

9.2 That with a view to meeting the Company's short term waste disposal requirements, the examination in 9.1 above include a smaller site in the gully to the north of the Berkeley Ridge reservoirs and other sites (as discussed in Section 4.3 of this Report). If a suitable alternative site can be acquired or leased and an emplacement established on that site in the time available to A. I. & S., a fresh development application be submitted to the relevant local council for that development.

9.3 That in the event that A.I. & S. can satisfy the Commission of Inquiry that a suitable alternative site cannot be made available or could not practicably be established in the time available, the Cringila emplacement, as described in the environmental impact statement dated November 1979, and as subsequently amended to a smaller ultimate capacity (3.6 million cubic metres) and new completed landform (as shown in Figure 6), be further investigated by the Commission of Inquiry. In the unlikely circumstance that a better alternative site cannot be found, then the Department would be willing to recommend to the Commission of Inquiry an appropriate set of conditions for a proposal that would result in a smaller ultimate capacity in the form suggested in Section 3.9 of this report.

APPENDIX A1: SUBMISSION OF WOLLONGONG CITY COUNCIL

DEVELOPMENT APPLICATION NO DE80/376 - EMPLACEMENT PROPOSAL BY AUSTRALIAN IRON & STEEL PTY LTD - LOTS A & B DP 160068, LOT 1 DP 558342 AND AN UNNUMBERED LOT IN DP 156370 FLAGSTAFF ROAD AND LOCKWOOD STREET, CRINGILA.

Reference is made to the Department's letter of 19th November 1980 advising that the above development application is not designated development but advising that the application ought to be dealt with as if it was and that the application is subject to Ministerial determination under Section 101 of the Environmental Planning and Assessment Act 1979 (as amended).

I wish to advise that the abovementioned application was considered by Council at its meeting of 27th April 1982 where it resolved that in accordance with Section 101(2) of the Act, development application DE80/376 for consent to the emplacement of coal washery refuse, steelmaking slag and blast furnace slag on the subject land be referred to the Minister for Planning and Environment for his determination.

Council further resolved that the Minister be requested not to determine the application until such time as the matter has been considered by a Commission of Inquiry. The Department is reminded that by letter dated 12th March 1982, Council requested that in accordance with Section 101(4) a Commission of Inquiry be held prior to the determination of the application.

At its meeting of 27th April 1982, Council further resolved that should the Minister approve the application following the Commission of Inquiry, he be requested to impose the following conditions:

PART A - GENERAL

1. This consent is in respect of the placing of coal washery refuse, steelmaking slag and blast furnace slag on the subject land. In this regard this consent will be valid for a period of twelve (12) months only from the date of commencement of tipping.

Prior to expiration of the approval, an application for extension of time may be lodged with Council for its consideration and determination.

Council will, amongst other matters, require the Company to present a full report at this stage regarding its progress in securing alternative disposal sites and/or methods as a long-term strategy.

2. Prior to the commencement of any tipping on the site, a detailed Management Plan shall be submitted to Council for its approval; such plan shall indicate -
 - (i) approximate volumes of waste materials to be placed over a one (1) year period;
 - (ii) location and staging of emplacement for a one (1) year period; and,
 - (iii) details of final configuration that could be achieved at the completion of a one (1) year period should consent not be extended.
3. This limited approval is based on the adoption of the emplacement methods described in the report submitted by Longworth & McKenzie Pty. Ltd dated November, 1979 in respect of preliminary works to be carried out prior to tipping and in respect of the methods proposed for each stage.
4. This consent is without prejudice to the powers and duties of the State Pollution Control Commission and the Department of Industrial Relations and Technology - whose recommendations are to be satisfied at all times.
5. The Company shall indemnify Council from any action, suit or claim arising out of any work which the Company is permitted or required to carry out by virtue of this consent.
6. Tipping shall cease on issue by Council of a "Stop Work" notice. Such notice may be issued if in the opinion of Council's Officers the conditions attaching to this approval have been breached, if danger to persons or property is foreseen, or if Council is of the opinion that the legitimate requirements of the aforementioned authorities are not being satisfied. Such operations shall not be recommenced without the express approval of Council given after such problems as are complained of are rectified.
7. Council reserves the right to modify or add to these conditions if it considers such action warranted in the interests of the public, or the convenience or proper control of operations renders such modification or addition necessary or desirable.
8. For each stage of the development, fully detailed working drawings and specifications, accompanied by all necessary calculations, shall be prepared for submission to and approval by Council prior to the commencement of each stage. All work on the site shall be carried out only in accordance with the approved drawings and specifications or as directed by Council.

9. The Company shall employ Consultants acceptable to Council to prepare the necessary reports, designs, drawings and specifications and to carry out the necessary tests at times, periods and stages specified in these conditions. All such reports, designs, drawings and specifications shall be submitted to Council for approval.

The results of all tests required shall be submitted to Council as soon as they come to hand.

10. Where required or implied in these conditions that various matters be submitted to Council for approval, requests for approval of such matters shall be made to Council in writing and approval shall be deemed not to be given unless given in writing.

PART B - DESIGN & DRAINAGE

11. Generally the eastern face of the dump shall be raised in a series of batters and berms; each batter shall have a slope not exceeding 3:1, the heights between berms shall not exceed 10m and the width of the berms shall not be less than 5 metres.
12. Drainage of the batters and berms shall be designed in such a way as to prevent scour of the dump face; plans of the principles proposed to be adopted for this drainage shall be submitted to and approved by Council prior to the commencement of each stage.
13. Detailed structural design of the dump shall be submitted to and approved by Council prior to commencement of operations; such design shall incorporate drainage measures designed to prevent saturation of the emplaced material, excessive impounding of waters behind emplaced material, details of design of dirty water filter lagoons and scouring or over-topping of the emplaced material. The design shall be accompanied by rainfall and run-off calculations and catchment map.
14. Detailed plans of all clean water pipelines and associated culverts shall be submitted to and approved by Council prior to commencement of operations. All designs shall be on the basis of Council's guidelines for "Stormwater Drainage - Hydraulic Design of Underground Pipe Networks".
15. Notwithstanding the foregoing Council may, during the tipping process, for sufficient reason require that provision be made in the development for retardation and/or retention of stormwater flow to ensure that this development does not cause any accelerated run-off from the site. In such event the Company shall submit a design of the retention basin based on recognised flood routing methods (references to be stated).

16. Diversion drains shall be provided above each proposed active tipping area and the discharge of such drains shall be directed to dirty water filter lagoons.
17. Dirty water filter lagoons shall be constructed and all water passing downstream from the site shall pass through such lagoons or a similar structure behind the filling wall. Engineering drawings and specifications of such dams and other structure shall be submitted to and approved by Council prior to commencement of operations.
18. All design and foundation plans are to be prepared by qualified civil-structural engineers and certified as having been so prepared.

PART C - PREPARATION FOR FILLING

19. All surface soil shall be stripped from the area and stockpiled prior to the commencement of tipping for topdressing the finished dump. Such stockpile(s) shall be adequately protected from erosion and suitably located to Council's satisfaction. Details of the methods proposed to control any erosion or the emission of dust into the atmosphere shall be submitted to Council prior to the commencement of operations.
20. All timber shall be progressively cleared from the site to be filled and all stumps, boulders, root and scrub shall be grubbed out to a depth of 0.5m below the subgrade, and together with all rubbish of every description shall be removed from the site.
21. Site preparation for tipping shall be carried out in limited stages to match the progress of the tipping processes so that the area of disturbed land is kept to a workable minimum.
22. A permanent water supply shall be installed in a manner acceptable to Council at the tipping face and elsewhere as required for use in the suppression of dust nuisance and in fire control. Details of the installation are to be supplied to Council prior to commencement of operations and shall be extended as required.

PART D - HAULAGE & ACCESS

23. Approval is given for the haulage of refuse materials by trucks from the Steelworks to the site via Springhill Road and Five Islands Road and the private haul road over land owned by the Department of Public Works. Entry to and exit from Five Islands Road to the private haul road shall be in accordance with the approved Scheme; under no circumstances shall the point of entry adjacent to John Crehan Park be used as a point of exit.

Merrett Avenue and Lake Avenue North shall not be used for trucks. The Company shall provide a plan for alternate movement and alternate access.

24. Haulage shall be confined to the hours of 7.00 a.m to 5.00 p.m. Monday to Friday. No haulage shall be permitted on Saturdays, Sundays or Public Holidays.
25. A sealed access haul road shall be constructed from the public road system to the tipping site prior to the commencement of operations. Detail plans of such access road shall be submitted to and approved by Council. The plans shall include the specification of construction and details of the proposed junctions with the public road system and shall so be designed and constructed in such a matter as to facilitate flushing to remove dust.

All work of construction is to be carried out to the satisfaction and under the supervision of the City Engineer.

26. The Company shall meet the full cost of construction of any access road.
27. The material hauled shall have a moisture content sufficient to prevent the emission of dust, but limited to prevent the escape of liquid from the haulage vehicle.

PART E - FILLING PROCESS

28. Following preparation of the site the refuse is to be placed at "as dumped" moisture content in maximum lifts of 0.5m which shall then be compacted to 96% of Standard Compaction A.S. 1289 Test E1.1.
29. Tipping shall be in heaps on the compacted berms and no tipping shall be permitted to take place down the slope from a berm. Compaction shall be carried out with a vibrating roller and Field Densities by the Sand Replacement Method and any other method acceptable to Council shall be carried out.
30. A layer of clay or other approved inert and reasonably impervious material not less than 300mm thick shall be laid over the top of the filled area for the purpose of sealing the dump material as a fire prevention measure, and also as a means of retaining moisture required for the survival of vegetation. Unless otherwise approved by Council, such layer shall be "topped" by a further depth of refuse not exceeding 300mm to bring the height of the dump to the designed level.
31. On attaining the designed level of each stage a layer of topsoil, to a depth of not less than 180mm, shall be placed over the filled area.

32. Dust arising from tipping and compaction operations and from vehicle movement shall be kept to a minimum and Council reserves the right to require the carrying out of any work it considers necessary to achieve this aim. Such works shall be carried out within the time stipulated by Council.

The whole of the exposed surface of the dump and all unvegetated areas shall be kept moist at all times.

All sealed roads within the property shall be washed down with clean water at regular intervals as directed by Council from time to time, and run-off from such roads shall be drained through filter lagoons prior to discharge from the property.

PART F - RESPONSIBILITY, CONTROL & MAINTENANCE

33. The Company shall be responsible at all times for....
- a) the prevention and control of fire in the filled area whether caused by spontaneous combustion or otherwise;
 - b) the stability of the filling to ensure that no slip occurs either during or after filling operations and for remedying the situation in the event of failure in this regard; and,
 - c) the prevention of unauthorised use of the site and taking whatever steps Council considers necessary to achieve this, including the provision of adequate signs, security, entrance control and patrol.
34. The Company shall submit to Council, prior to commencement of tipping, detailed plans specifying provisions to be made for the monitoring of the temperature at strategic points within the dump during the filling operation and for a period of not less than three years after completion thereof. Such monitoring programme shall be designed and continued to the satisfaction of Council, and records of monitor readings shall be submitted to Council as soon as they come to hand. Readings shall be taken at three monthly intervals or as directed by Council. If Council is of the reasonable opinion that temperatures generated within the dump are excessive, all tipping operations shall cease and the Company shall undertake whatever action is necessary, as approved by Council, to lower the temperature of the dump to a safe level. Tipping operations shall not recommence until Council is satisfied that temperatures have been lowered to a safe level.

35. To ensure that the required compaction standards are being attained, the Company shall carry out compaction tests at intervals of not more than one month and submit the results thereof to Council immediately upon their receipt. All test results shall be accompanied by Certificates from a registered N.A.T.A. laboratory.
36. The Company shall permit access to Council Officers at reasonable times for the purposes of inspecting the filling operation and carrying out such control tests or readings of air, water, temperature and stability as they consider necessary.
37. The Company shall notify Council upon the completion of the various stages of the development of the dump so that supervisory inspections may be carried out. Such stages shall include the completion of each berm to its designed reduced level.
38. On completion of the various stages of the filling operation and on completion, the rehabilitated areas shall be established and maintained to the satisfaction of Council. Such maintenance shall include the continued growth of planted vegetation, prevention of scour and maintenance of soil and vegetative cover in accordance with the required landscape plan until it reaches the desired standard of growth.
39. The filter lagoons shall be de-silted periodically so as to ensure their continued efficient functioning. Such de-silting shall be carried out in such a manner as to wholly contain all dredged material within the dumping site.
40. The Company shall submit to Council, prior to commencement on tipping, detailed plans specifying provisions to be made for the monitoring of horizontal and vertical geological movement in foundation and dump materials and any variations in sub-surface water levels within the dump during the filling operation and for a period of not less than three years after completion thereof. Such monitoring programme shall be designed and continued to the satisfaction of Council and records of monitor readings shall be submitted to Council as soon as they come to hand. Readings shall be taken at monthly intervals or as directed by Council. If Council is of the reasonable opinion that excessive movement or water levels are occurring within the dump, all tipping operations shall cease and the Company shall take whatever action is necessary, as approved by Council, to reduce such movement or water level to ensure the stability of the dump. Tipping operations shall not recommence until Council is satisfied as to the stability of the dump.

PART G - REHABILITATION

41. All cover soil shall be not less than 180mm deep and every effort shall be made, including fertilisation, to generate the initial grass cover as rapidly as possible, for which purpose maximum advantage is to be taken of seasonal cycles.
42. The grassing of all the banks shall be carried out in a manner acceptable to Council to ensure that the exposed face is kept to a minimum and such face is exposed for only a minimum duration of time. The method to be employed in this regard shall be submitted to Council for approval prior to the commencement of tipping operations.
43. The planting of indigenous trees and shrubs shall be carried out according to a plan to be approved by Council. Such plan shall be prepared by a qualified Landscape Consultant prior to commencement of tipping and shall show the species proposed to be planted.
44. The Company shall agree to design, provide and maintain the final agreed landform.
45. Every endeavour shall be made in the design of the emplacement area to retain the existing fig trees located on the southern area of the site.

Council's attitude to the development is for partial approval in line with the above conditions and will be put as such to the Commission of Inquiry.

In addition to the previously-mentioned resolutions, Council further resolved that at the Commission of Inquiry it will recommend that a door-to-door survey be undertaken by the Department of Environment and Planning to seek the opinion of the residents of Cringila on the proposal with all costs associated with the survey to be met by the Department.

For the Department's information please find enclosed copies of the development application submitted to Council together with two (2) copies of the Environmental Impact Statement submitted in support of the application.

APPENDIX A2: SUBMISSION OF THE STATE POLLUTION CONTROL COMMISSION

The State Pollution Control Commission has identified the following as the major considerations pertinent to its areas of responsibility in respect of the proposed emplacement by Australian Iron & Steel Pty. Ltd., of blast furnace and steelmaking slags and coal wash discard at Lots A and B, D.P. 16 0068, Lot 1 D.P. 558342 and unnumbered Lot D.P. 156370 Flagstaff Road and Lockwood Street, Cringila.

Air Quality

Dust levels in the vicinity of the dump area and in streets adjacent to the proposal will rise to a degree as a result of the proposed activity. Some odours may also be experienced if hot blast furnace slag is placed in this area. This odour would be the typical "rotten egg smell" and would be carried by prevailing winds towards residential areas. A similar problem exists with present slag treatment methods but remoteness from residences prevents it being a nuisance.

No air pollution control technology is capable of at all times and in all weather conditions preventing the raising of dust from the transport, handling and emplacement of coal wash and slag.

Air Pollution Controls

Initially it has been stated that clearing of the land to reduce a potential combustion hazard to the coal washery discard is needed. Burning on site of cleared timber is not permitted under the provisions of an order made by the Minister in accordance with Section 24 of the Clean Air Act.

All sections of main access roads which will be used for reasonable periods throughout individual stages of emplacement should be permanently sealed. It may be necessary to continue a program of progressive sealing as the various stages of the project proceed. Consideration of a truck washer prior to re-entry of trucks to public roads may be necessary.

Permanent sealing of the proposed main haulage access road from Five Islands Road to the Stage I emplacement construction area would be a prerequisite for approval under the Clean Air Act before dumping commences.

A program of continual road watering at all times should be instituted for unsealed haul roads and exposed dump faces. This should extend into periods of inactivity but, especially when prevailing weather conditions are likely to be conducive to the drying out of surface and subsequent raising of dust in strong winds.

Water Quality

The proposal as outlined should not have an effect on water quality of the drainage to which it discharges. Adequate provision of settling basins as stages proceed and diversion of clean stormwater have been covered. Urgent revegetation of completed areas should be encouraged.

Leachate from steel slag has slightly alkaline characteristics but not sufficient to cause alarm. Neutralisation of wastes collected in siltation ponds could be carried out if such was found to be necessary.

No details of other wastes to be emplaced have been provided. It is recommended that these be subject to further approval on an individual waste basis if no other suitable disposal area can be shown to be available.

Noise

The statement does not adequately anticipate the noise levels that are likely to be experienced in residential areas during the proposed hours of operation. Sound levels quoted to be existing are expressed as L90 levels by sound level meter readings only and not by statistical analytical instruments.

Assuming that the L90 means are a genuine measure of existing ambient backgrounds at the locations specified in existing residential areas, a potential noise problem is evident. Examination over the range of operating hours suggests that background noise levels at a number of residential locations drop to as low as 41 dB(A).

Mention is made of an acoustical barrier. No details of its acoustical properties, location and attenuation achievements are made. Such screens are visually obstructive and quite often unacceptable aesthetically to affected residents. No other mention of noise attenuation measures is made nor is any attempt at postulating projected noise levels at the various sampling locations due to any activities involved in the proposal made. No mention is made of limiting individual noise sources such as front-end loaders and haulage trucks.

On the data available, the only operating hours that should be considered are 7.00 a.m. to 6.00 p.m. Monday to Friday.

The location of the haul road and the initial emplacement stages are only 40 metres approximately from houses. This aspect needs closer examination.

Applications under Control Acts

The premises will be scheduled under the Clean Air Act with a classification "coal industry works". The project will therefore be subject to approval by the State Pollution Control Commission

under Section 16. There is a need to seek an application under Section 19 of the Clean Waters Act.

The premises will not be scheduled under the Noise Control Act. Examination of noise problems therefore needs to be comprehensively undertaken prior to any granting of approval.

Other Alternatives

The disposal of coal washery refuse by fluidised bed combustion has been under experiment by the C.S.I.R.O. for some years. No mention is made of this alternative disposal method applicable only to coal washery discard and its resultant energy recovery possibilities. Also, no mention is made of any alternative sites considered for surface emplacement of the waste products under review.

Summary

Although there will be an expected decrease in air quality due to the presence of higher fallout levels of particulate matter in nearby residential areas at times, control of air pollution can be subject to the best practicable means specified by the S.P.C.C. under the provisions of the Clean Air Act.

The provisions for water pollution control appear adequate. With respect to noise control, the proponent has submitted insufficient information on the projected noise levels likely to be experienced in residential areas over the operating hours suggested. Neither has the anticipated noise produced by the heavy earth moving and transport equipment been stated. In the absence of this information we are unable to provide an assessment of this criteria at this time.

Conclusions

The Commission is satisfied, having regard to the conditions it can impose on the proponent pursuant to the legislation it administers, that emission of air pollutants will not be such as to warrant development consent being withheld on those grounds.

The proponent has also demonstrated an ability to prevent the pollution of waters by the proposed activity.

However, the Commission is not yet satisfied that the company has demonstrated that acceptable noise levels can be achieved in close residential areas. Development consent should therefore be withheld until it can be shown that offensive noise will not occur in nearby residential areas whilst any of the proposed activities are undertaken.

APPENDIX A3

CORRESPONDENCE BETWEEN DEPARTMENT AND A.I.S.

The Secretary,
Australian Iron & Steel Pty.Ltd.,
PORT KEMBLA N.S.W. 2505

Dear Sir,

Environmental Impact Assessment - Cringila Emplacement

As you will by now be aware, Wollongong City Council has requested that it be afforded the opportunity of a hearing into the above development, in accordance with Section 101(4) of the Environmental Planning and Assessment Act, 1979. The Minister has consequently announced that an Inquiry will be held before he determines the development application in accordance with Section 101(1) of the Act.

2. The Department of Environment and Planning has undertaken to prepare an environmental impact assessment of the proposed development as its submission to the Inquiry. We are seeking advice from the applicant, Wollongong City Council and various Government Departments to assist us in formulation of the report. In this regard, we would appreciate your comments on the following matters by 30th June, 1982:

- (a) Where has A.I.S. washery refuse and slag previously been emplaced and what long term environmental problems are apparent?
- (b) Where is A.I.S. washery refuse currently being emplaced and is this causing any environmental problems or public concern?
- (c) Having in mind that the proposed Cringila Emplacement is only a short term solution to the waste disposal problem, what plans does A.I.S. have for future disposal?
- (d) What alternative site(s)/method(s) are available for disposal of washery refuse and slag if the Cringila Emplacement is not approved?
- (e) Refer E.I.S. Section 8.1(iv): Has a decision been taken on the method of water application? If so, could you please supply any available information on the proposed system.

(f) Refer E.I.S. Section 8.4: When will the recreational facility be designed and who will design it?

(g) Who will own and manage the proposed Cringila recreation area once emplacement rehabilitation is complete?

3. In addition to your comments on the above matters required by 30th June, we would appreciate your advice, by return mail, on the following:

(a) Has the outlook for steel production changed since the E.I.S. was published? If so, how does this affect the timing of the need for the Cringila Emplacement and its envisaged lifespan? When will you require a new emplacement to accommodate all waste envisaged for the Cringila proposal? How long do you estimate such an emplacement would take to prepare for initial receipt of waste?

(b) We require 12 copies of the two volume environmental impact statement dated November 1978, for our assessment. Where can we obtain these documents?

Yours faithfully,

(Signed 13/5/82)

J. H. Bosward
Acting Head

Environment Protection Division

Mr. J.H. Bosward,
Acting Head,
Environment Protection Division,
Department of Environment & Planning,
DX 15,
SYDNEY NSW

Dear Sir

G16/56 - PROPERTY - ENVIRONMENTAL IMPACT ASSESSMENT -
CRINGILA EMLACEMENT

We refer to your letter of 13 May 1982 advising that the Department of Environment & Planning has undertaken to prepare an Environmental Impact Assessment of the Cringila Emplacement proposal as its submission to the Inquiry to be held prior to the determination by the Minister of the Company's development application.

The specific items raised in your letter are dealt with below, however, it is considered that the following comments are relevant.

Upon receipt of development approval, the Company in 1968 commenced the filling of an area of its land adjacent to and on the western side of the Cringila Public School. At the request of the Principal of the School, the filling was extended to the School property and playing fields established on the level land created. Due to the limited playground area available within the School boundaries, the reclaimed area is now used regularly by pupils of the School.

Following completion of that project, and having in mind the benefit the School obtained from it, discussions were held with officers of the Council regarding the possibility of reclaiming an adjacent area for similar purposes. From these discussions it was ascertained that additional recreational facilities were required in the Cringila area, and that they could in part be provided by the proposed reclamation scheme. Approval in principle to the scheme was sought and obtained from Council, and copies of relevant correspondence with Council on this matter are attached.

On the basis of Council's letter and the earlier discussions with its officers the Company acquired the land the subject of the current development application and engineering consultants, Longworth & McKenzie Pty Ltd were employed to prepare an emplacement proposal for the site and to undertake an Environmental Impact Study of the proposed development.

Some criticism has been levelled at the Environmental Impact Statement because it does not evaluate alternative areas for disposal, however having in mind the discussions that were held with Council's officers and that approval in principle had been

obtained to the filling of the site, the Environmental Study was directed towards determining what impact the proposed development would have on the adjoining areas, how those impacts, if any, could be lessened, and what benefits would result to the community upon completion of the project.

It is considered that the Impact Statement fulfills this requirement and demonstrates that the project can be undertaken without causing environmental problems, and that the creation of much needed recreational facilities in the area will be of benefit to the Cringila community.

The following are our comments on the particular matters itemised in your letter.

- a. From the commencement of operations until 1968 the industrial wastes produced by the Company were used to reclaim low lying land within its boundaries to provide industrial land for the future expansion of the steel industry.

As mentioned previously, in 1968 Development Consent was obtained to fill a valley adjacent to the Cringila Public School. The level area created by the filling has been developed as playing fields which are now being extensively used by the pupils of the School.

Since 1970 significant tonnages of slag and coal washery refuse have been donated to Wollongong City Council for the construction of playing fields and roadworks within the City. Large quantities of slag have also been donated to the Department of Main Roads for filling for road embankments in the construction of its highways and expressways.

Approximately three (3) million tonnes of blast furnace slag has been donated to the Department of Public Works over recent years for its construction projects such as the new Coal Loader presently under construction at Port Kembla.

Since 1967 a large volume of coal washery refuse has been donated to the Department of Lands for the backfilling of a sand reclamation project being undertaken by a contractor on its behalf at Primbee.

During the period 1977-1980 the Company developed a recreation complex on approximately 10 hectares of its land at Kembla Grange and upon completion the land and facilities were donated to Wollongong City Council. The area was named Ian McLennan Park and the facilities provided include two playing fields, amenities building, paved car park and a passive recreation area.

The Company has, over an extended period, donated and delivered free large tonnages of washery refuse to Wollongong City Council for covering garbage at its various municipal waste depots. Apart from the sanitary benefits obtained by early coverage of the garbage due to the availability of the refuse, the cost savings to the Council by the donation of the material and transport have been significant.

As far as we are aware there are no long term environmental problems resulting from the disposal of the slag and washery refuse in the manner described above. It is apparent however that there have been significant economic advantages and social benefits to the community as a result of the donation of the materials. The Company has, apart from the donation of the materials, met part or all of the cost in transporting the material to the various development sites. The availability of the filling and the terms upon which it has been supplied and enabled projects to be undertaken which otherwise would have been delayed or deferred.

- b. Both coal washery refuse and slag are being placed on the company's disposal area situated off West Dapto Road, Kembla Grange. Filling material is also being provided as required for backfilling the sand reclamation project at Primbee. Coal washery refuse is still being supplied to Council as a cover material at its garbage depots.

No environmental problems are being caused by the use of the refuse in these projects and no complaints have been received from the public to the Kembla Grange Filling emplacement project.

- c. It is clear that a long term solution has to be found to the refuse disposal problem in the Illawarra Region and you will be aware that a sub-committee of the Coal Resources Development Committee is currently investigating this matter. It is agreed that the Cringila Emplacement proposal will only provide short term relief to the problem, however if approved, it will allow sufficient time for long term sites, and alternative methods of disposal, to be fully investigated.
- d. Apart from the existing disposal area at Kembla Grange the Company does not have any other sites available for the disposal of the large tonnages of solid refuse produced.

Although some refuse will continue to be supplied as backfilling for the Primbee sand reclamation project, the availability of this area is subject to particular constraints such as demand for sand, rate of dredging etc. and it cannot therefore be considered as an alternative disposal site to the Cringila Emplacement proposal.

The aspect of alternative methods of the disposal of solid waste generated within the Works has been actively pursued by the Company over many years. In this regard blast furnace slag in various forms is now used as a road construction material, a concrete aggregate, as a source of alumina in the manufacture of glass and as a filter material for certain drainage works. However, not all of the slag available can be economically utilised and accordingly it is necessary for the surplus tonnage produced to be disposed of in land reclamation projects.

With regard to Steelplant slag, apart from a small tonnage used by the Company as a railway ballast, no alternative to the land fill method of disposal is practical.

Washery refuse has for many years been disposed of by land reclamation and our investigations have concluded that, at this time, there are no economically viable alternative methods of disposal available.

It is intended to continue donating material as filling for the various community projects upon request from the local authorities, however, the quantities involved do not afford significant relief to the disposal problem when considered in relation to the total tonnage produced.

Other than as mentioned above, there are no alternative methods, or sites, available to the Company for refuse disposal at this time and early approval of the Cringila site is considered essential.

- e. It is proposed to extend a water supply from the Metropolitan Water Sewerage & Drainage Board's existing water main in Jarvie Road to the emplacement site. This service will be used to supply a mobile tanker which will spray the working area and access roads with water on a continuing basis to suppress any airborne dust. This system is presently being successfully operation on our existing disposal area at Kembla Grange.
- f. A preliminary design of the final configuration of the emplacement was prepared by Consulting Engineers, Longworth & McKenzie Pty Ltd and is shown in Figure 57 of the Environmental Impact Statement.

Following the submission of the Environmental Impact Statement, Wollongong City Council suggested some amendments to the final layout and the Consultants prepared a second proposal incorporating these suggestions. A copy of the amended layout is attached hereto (Drawing No. 175800).

Our enquiries, which were made prior to the preparation of the Environmental Impact Statment, established that there is a need for additional recreational facilities in the

Cringila area, however the type of facilities required was not finalised. This was due to the fact that a number of groups in the area, with different ethnic backgrounds, have expressed varying views on what should be provided.

This matter is currently being discussed with Wollongong City Council and the various ethnic groups and once agreement is reached as to what is to be provided, detailed designs will be prepared either by the Company's staff or a qualified consultant.

- g. It is intended that the recreation facility when completed will be available to the public. Accordingly, it is the Company's view that ownership of the land should rest with a public body and it is planned that the land when the development has been completed will be donated to Wollongong City Council.

In regard to Item 3 we advise that a downturn in the steel industry has occurred since the preparation of the Environmental Impact Statement and this will result in a reduction in the tonnage of slag for disposal. It is also possible that there will be a reduction in coal washery refuse produced, however the extent of the reduction will not significantly affect the proposal. The export of the surplus tonnage of coal produced from the Company's mines is being actively investigated and in the event of these efforts being successful the quantity of coal washery refuse produced will remain unchanged.

The Environmental Impact Statement determined that the project will take 3 to 5 years to complete. This assessment allowed for production fluctuations in the industry and took into account the restriction on the times during which material could be placed at the site. In addition, the amended layout of the final configuration reduced the disposal capacity of the site from 4.2 million cubic metres to 3.6 million cubic metres.

In summary the current downturn in the steel industry, while marginally reducing the quantity of refuse which will be produced, will not affect the completion time or diminish the urgent need for approval to proceed with the Cringila Emplacement proposal.

As you are aware, the Company operates on a seven (7) day twenty four (24) hour basis and refuse is produced continually during that period. Because of the restriction on dumping times at the proposed Cringila Emplacement site, that is: between 7am and 6pm Monday to Saturday, it will be necessary to have an alternative site for disposal of refuse during afternoon and night shift periods. It is proposed that the Cringila area will be used for disposal during the day shift period and our existing site at Kembla Grange will be used for disposal of refuse on the back shifts. It is essential therefore that capacity at the Kembla

Grange site be retained for as long as possible to ensure that a site for back shift disposal is available. Further as there are no sites other than the Kembla Grange area available to the Company for disposal, approval of the Cringila Emplacement proposal is required as a matter of urgency.

We trust that the foregoing comments and the information provided in the attachments will assist the Department in its assessment of the project. Should you require any further information or clarification of any aspects of this matter please do not hesitate to contact us.

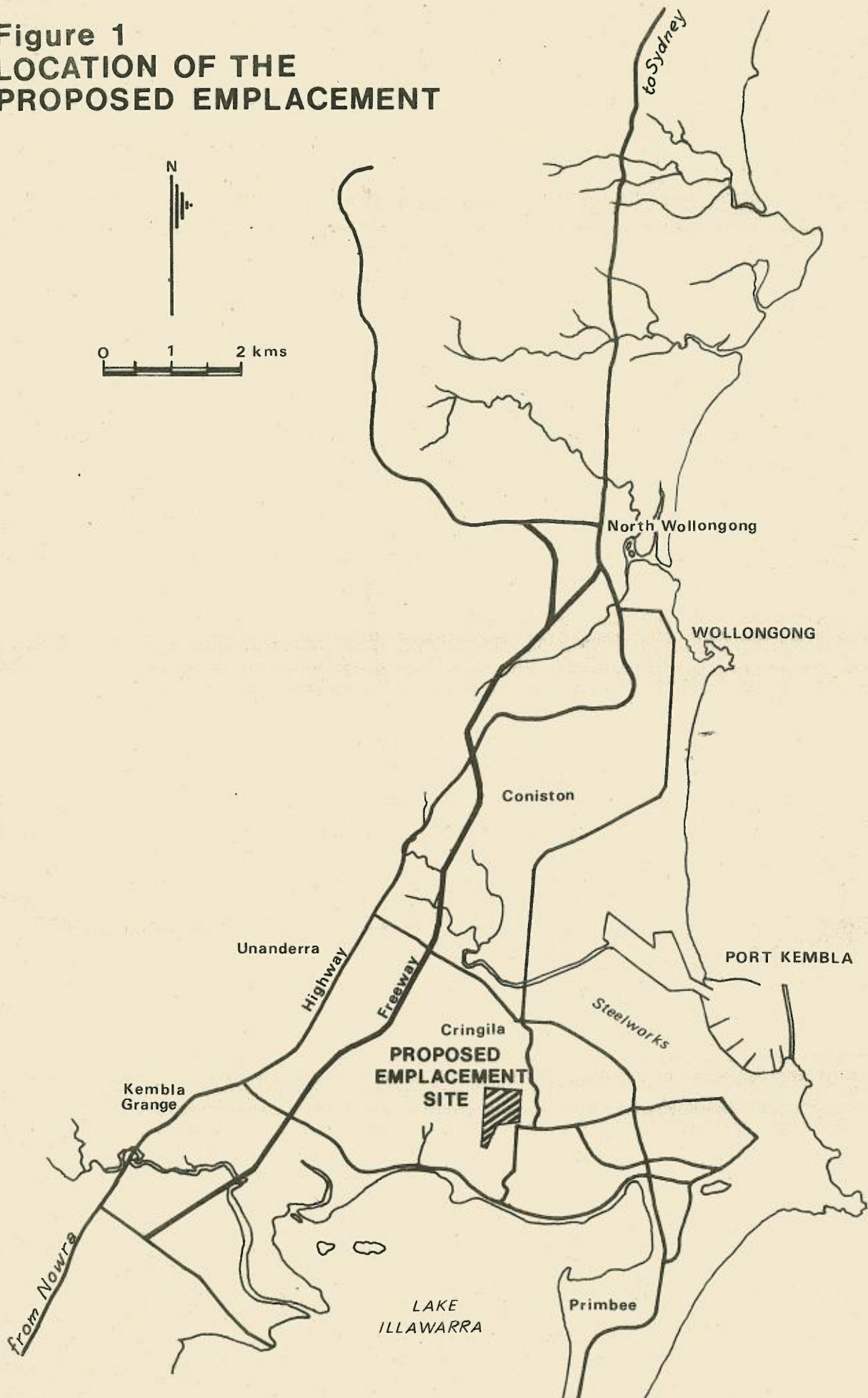
You may consider it worthwhile to inspect our current filling operation at Kembla Grange, which is similar to that proposed at Cringila, and in this regard we will be pleased to arrange for an inspection at a convenient time.

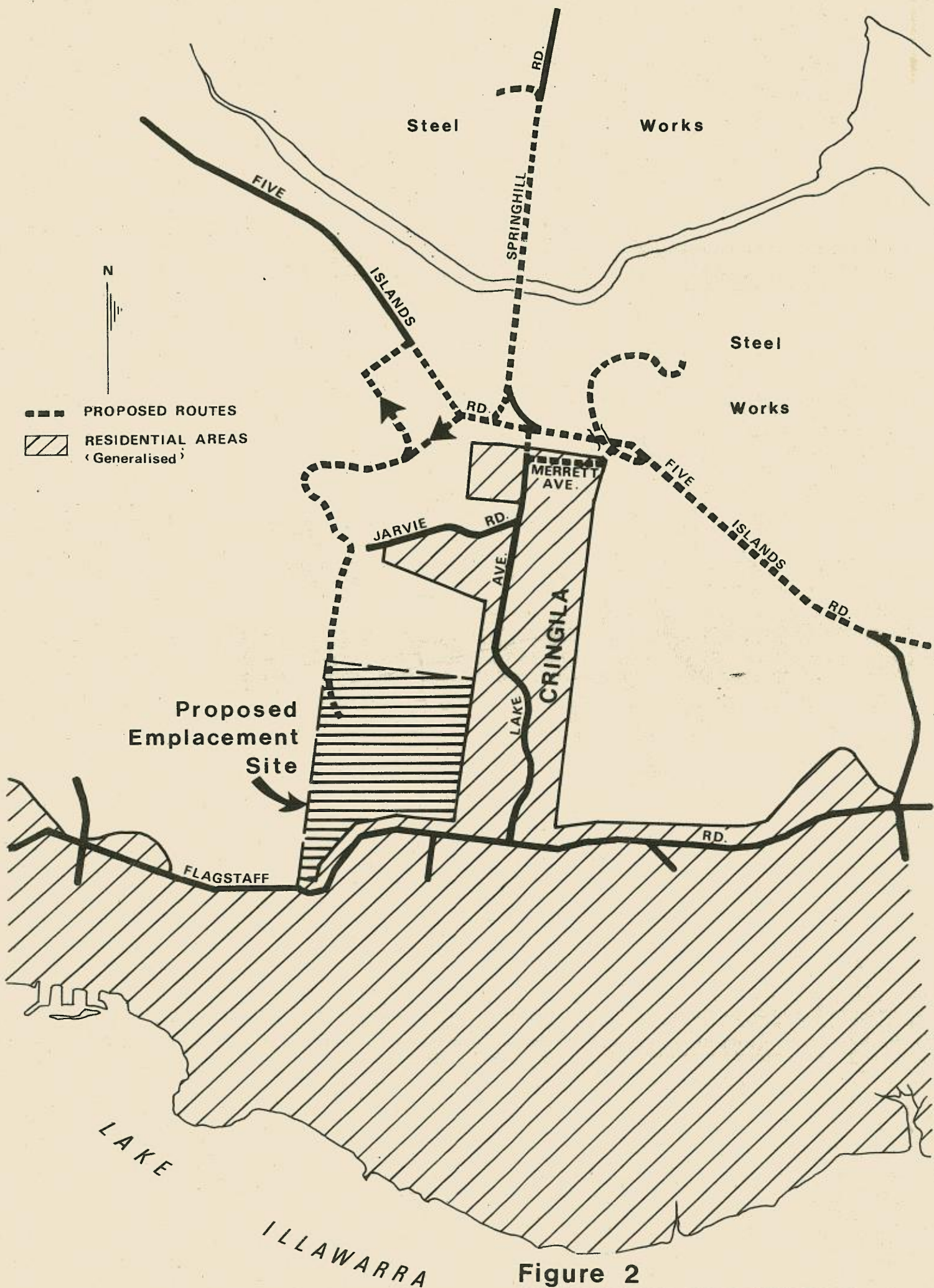
Your request for twelve (12) copies of the Environmental Impact Statement was dealt with in our letter to you on 2 June 1982, in which we enclosed two (2) copies of the Statement.

(signed 30 June, 1982)

Yours faithfully
for AUSTRALIAN IRON & STEEL PTY LTD

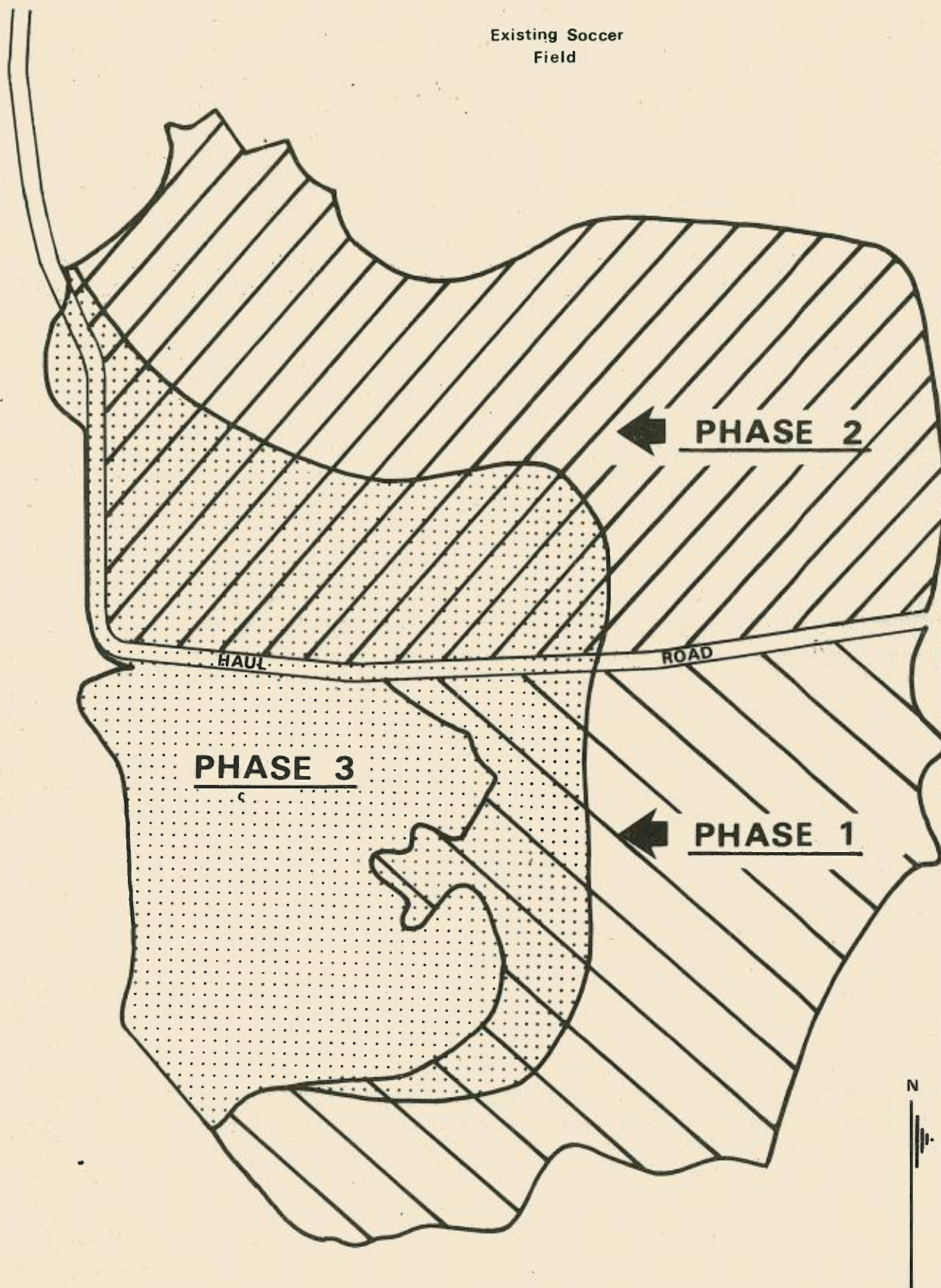
Figure 1
LOCATION OF THE
PROPOSED EMPLACEMENT





**Figure 2
PROPOSED TRANSPORT
ROUTES**

Existing Soccer
Field



LOCKWOOD
ST.

GRATTAN
ST.

0 50 100 metres

Figure 3
PROPOSED EMPLACEMENT
SEQUENCE

NOTE
← represents Drainage

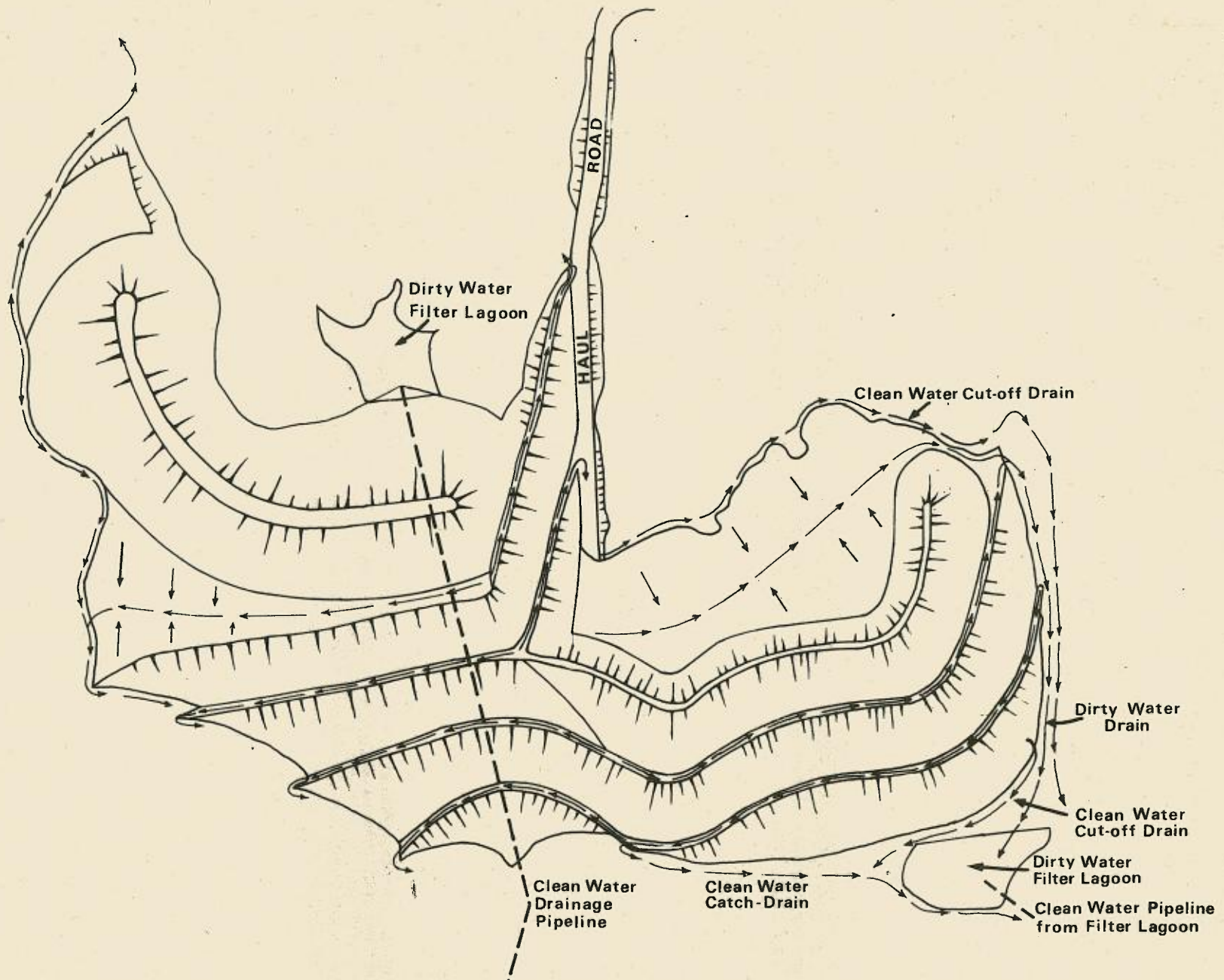
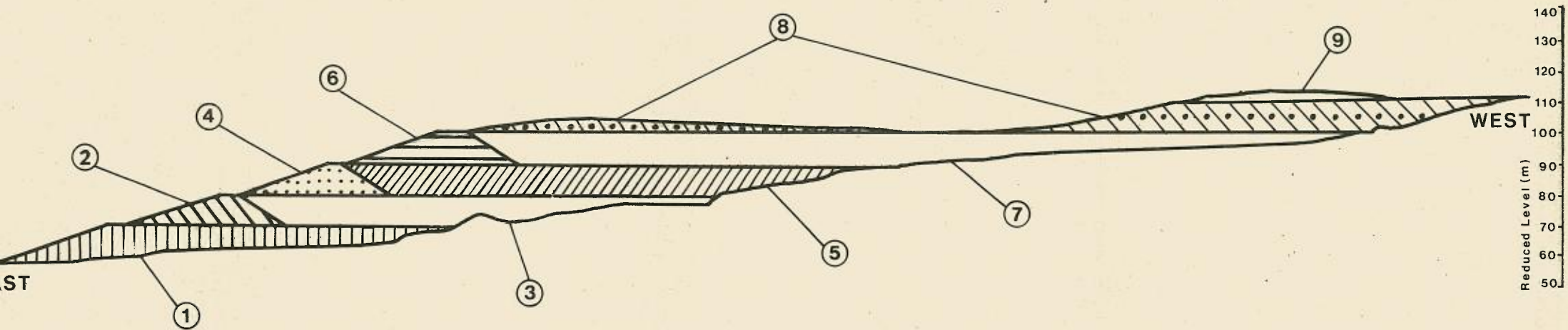


Figure 4
TYPICAL STRUCTURE
DURING EMPLACEMENT
(mid-way through Phase 2)

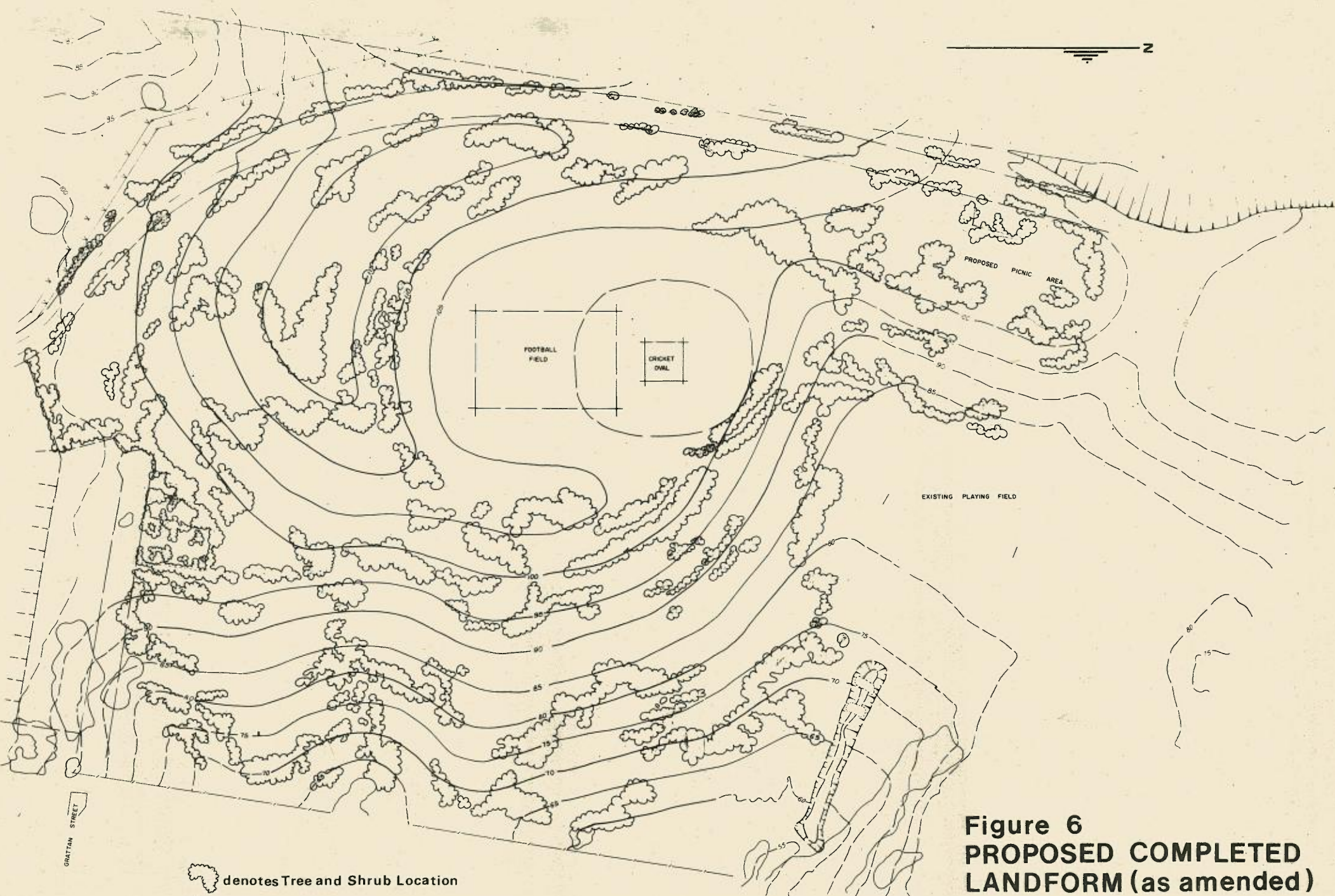
0 50 100 metres




NOTE

⑤ denotes Construction Sequence

Figure 5
 CROSS SECTION OF
 NORTHERN GULLY EMPLACEMENT

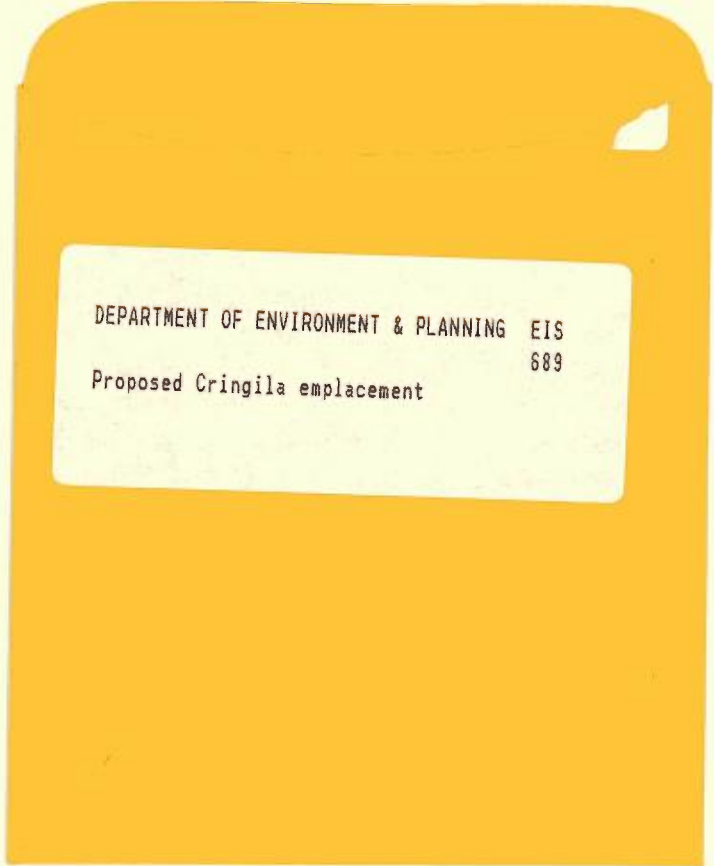


**Figure 6
PROPOSED COMPLETED
LANDFORM (as amended)**

 denotes Tree and Shrub Location

0 20 40 60 80 100 120 metres

EIS 689



DEPARTMENT OF ENVIRONMENT & PLANNING EIS
689
Proposed Cringila emplacement