Limestone mine, quicklime plant and use of existing port facility (Point Murat), Shire of Exmouth

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Whitecrest Enterprises Pty Ltd

Report and recommendations of the Environmental Protection Authority

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Summary and recommendations

This report provides Environmental Protection Authority (EPA) advice to the Minister for the Environment on the proposal by Whitecrest Enterprises to develop a limestone mine and quicklime plant approximately 8 kilometres south of Exmouth and to transport limestone and quicklime from the mine site, through the town of Exmouth, to Port Murat for loading onto ships, using the existing jetty facility.

In the EPA's opinion the following are the environmental factors relevant to the proposal:

- karst landform;
- vegetation and flora;
- terrestrial fauna;
- subterranean fauna;
- groundwater;
- gaseous emissions;
- dust;
- noise;
- marine water quality;
- Ningaloo Marine Park about Point Murat; and
- road transportation.

The conditions and procedures, in the EPA's opinion, to which the proposal should be subject if implemented are, in summary:

(a) the proponent's commitments should be made enforceable;

(b) the proponent be required to address a number of specified issues in its Environmental Management Plan;

(c) arrangements should be developed between the Commonwealth government and the proponent for use of and access to Commonwealth land and waters and that these arrangements should take account of the advice of the Department of Environmental Protection and the Department of Conservation and Land Management;

(d) prior to construction of the quicklime processing facility, the proponent should undertake a study to identify and evaluate alternative sites, then report the findings of the study to the EPA for consideration and, if required, assessment;

(e) the proponent should refer any proposal to increase the export of limestone and/or quicklime from the Point Murat port site beyond 1 million tonnes per annum to the Environmental Protection Authority;

(f) within five years of commissioning the project, the proponent should prepare and subsequently implement a decommissioning and rehabilitation plan which provides for the development of a 'walk away' solution; and

(g) the proponent should be required to implement an environmental system.

The EPA submits the following recommendations:

Recommendation 1

That the Minister for the Environment notes the relevant environmental factors and the EPA objective for each factor as set out in Section 3 of this report.

Recommendation 2

That the Minister for the Environment notes that subject to the satisfactory implementation of the EPA's recommended conditions and procedures of Section 4 of the report, including preparation of an Environmental Management Plan and the proponent's environmental management commitments, the proposal can be managed to meet the EPA's objectives.

Recommendation 3

That the Minister for the Environment imposes the conditions and procedures set out in Section 4 of this report.

Recommendation 4

That the Minister for the Environment notes that there has been a number of previous planning and scientific studies which have recommended extension of the Cape Range National Park. The EPA recommends that the Government give priority to consideration of the proposals in these various reports to extend the Cape Range National Park and to consider other extensions which may be relevant in light of additional information particularly covering the coastal plains and foothills.

Recommendation 5

That the Minister for the Environment notes the EPA's views on the need for an integrated approach between planning and environment for the Cape Range peninsula presented in Section 5 of this report and takes appropriate action to address the EPA's proposals regarding this.

Recommendation 6

That the Minister for the Environment notes that the EPA intends to develop an environmental policy on development within the Exmouth—Cape Range area to assist in the management of the area and the assessment of development proposals.

Contents

	Page
Summary and recommendations	**i**
1. Introduction	**1**
2. The Proposal	**1**
3. Environmental factors	**3**
3.1 Relevant environmental factors	3
3.2 Karst landform	4
3.3 Vegetation and flora	7
3.4 Terrestrial fauna	8
3.5 Subterranean fauna	10
3.6 Groundwater	13
3.7 Gaseous emissions	15
3.8 Dust	17
3.9 Noise	19
3.10 Marine water quality	20
3.11 Ningaloo Marine Park about Point Murat	22
3.12 Road transportation	25
4. Conditions and procedures	**30**
4.1 Proponent's commitments	30
4.2 Environmental Management Plan	30
4.3 Use of Commonwealth land and waters	31
4.4 Quicklime plant	31
4.5 Export of product from Point Murat port facility	31
4.6 Decommissioning and rehabilitation plan	31
4.7 Environmental management system	32
5. Other advice	**32**
5.1 Integrated approach to planning and environment of the Cape Range Peninsula	32
5.2 Proposed environmental policy	34
6. Recommendations	**34**

Table

1. Summary of project characteristics
2. Standard and limits used in the EPP for the Kwinana Policy Area
3. Summary of relevant environmental factors, objectives, proponent's commitments and EPA's opinions relevant to the proposal

Appendices

1. Figures
2. Individuals and organisations that made submissions
3. References and bibliography

1. Introduction

This report is to provide Environmental Protection Authority (EPA) advice and recommendations to the Minister for the Environment on the environmental factors relevant to the proposal to develop a limestone mine and quicklime plant approximately 8 kilometres south of Exmouth and to transport limestone and quicklime from the mine site, through the town of Exmouth, to Port Murat for loading onto ships, using the existing jetty facility.

The proposal to develop a limestone mine and quicklime plant was referred to the EPA in March 1992 and the level of assessment was set at Public Environmental Review (PER). The environmental impact assessment process for this proposal was suspended in February 1993. Following reactivation of the process in May 1995, the PER report (Halpern Glick Maunsell 1995) hereafter called the PER, was prepared and made available for public review from 9 October 1995 to 4 December 1995.

Section 3 discusses environmental factors relevant to the proposal.

Conditions and procedures to which the proposal should be subject if the Minister determines that it may be implemented are set out in Section 4. Section 5 is EPA advice to the Minister and Section 6 presents the EPA's recommendations to the Minister.

Appendix 1 provides maps relating to the proposal. A list of people and organisations that made submissions is included in Appendix 2, and published information is listed in Appendix 3.

2. The proposal

The proposal by Whitecrest Enterprises Pty Ltd (Whitecrest), includes the following key features:

- construction and operation of a metallurgical limestone mine;
- production of quicklime at a quicklime plant to be located at the mine;
- road transportation of limestone and quicklime through Exmouth; and
- shipping of limestone and quicklime from the Point Murat jetty.

Whitecrest is the nominated proponent for the project and is in joint venture for the project with Swan Portland Cement Ltd (Swan). Figures 1 and 2 of Appendix 1 are location maps for the project.

Whitecrest is the holder of Exploration Licences E08/593, E08/828 and Mining Lease M08/145 (Appendix 1, Figure 2). Mining lease M08/145 was granted for a term of 21 years, renewable for a further 21 years. Whitecrest has also applied for Miscellaneous Licence M08/5 encompassing the proposed haul route from the mine to Murat Road and Exploration Licence E08/884.

The Gascoyne Coast Regional Strategy (Ministry for Planning 1996) notes that areas of high grade limestone are present in the Exmouth area. The strategy recognises existing mineral leases for the extraction of limestone and advocates that planning and management of mineral resource development should be in accordance with State Government policy and the Mining Act. The proposal is consistent with the Gascoyne Regional Strategy. The Whitecrest quarry site and haul road are not within any area proposed to be part of the Cape Range National Park.

The limestones which are exposed both within and adjacent to the Whitecrest tenement are part of the Cape Range Group which comprise the basal Mandu (Calcarenite) Limestone overlain by the Tulki Limestone and the Trealla Limestone. The Mandu Limestone will not be intersected by the mining and is not expected by the proponent to be affected by the project. The Tulki and Trealla Limestones which overlay the Mandu Limestone are extremely hard and tightly jointed limestones. These formations have a combined thickness of about 100 m and will be mined. The mining operation will not intersect the groundwater table and a 50 m separation distance from the mine pit floor to the groundwater table will be maintained. The area of mining is

expected to total 70 ha over the first 21 year term. Whitecrest intends to mine beyond this area according to future requirements, subject to necessary environmental assessment and approvals. The total tenement area is 500 ha (D Lewis, Halpern Glick Maunsell, *pers. comm.*).

The proposed quicklime plant is intended to be established on a 2 ha site within the mine area so that the plant will be largely concealed from view from the coastal plain. Two 300 tonne/day vertical shaft lime kilns will be constructed requiring 200,000 tonnes per annum of lump limestone feed from the mine.

Limestone and quicklime will be trucked from the proposed limestone mine to the existing Point Murat deepwater jetty. The PER states, the jetty is jointly owned by the Royal Australian Navy (RAN) and the US Navy and is presently used for the receival of fuel oil supplies for the Naval Communications Station and until recently for the loadout of supplies for offshore oil and gas exploration activities.

The limestone and quicklime will be stored on land adjacent to the Point Murat jetty. A limestone and quicklime reclaim and conveying system is proposed to enable shiploading at an average rate of 1,000 tph. A mobile shiploader will be positioned on the head of the jetty to transfer product to bulk cargo ships. Shiploading will be undertaken on a continuous 24 hour basis and automatic controls will stop the conveyors in the event of emergencies or product spillage. The loading system for quicklime will be fully enclosed. The development of the Whitecrest project will increase the number of ships currently using the Point Murat jetty, require manoeuvring of ships to and from the jetty, and loading of product from the jetty to ships.

The main components of this proposal as described in the PER and subsequent documentation include:

- the mining operation initially producing 200,000 tonnes per annum of crushed limestone (40 mm to 80 mm dimension product) suitable for shipment to a quicklime plant proposed for development by Swan in Kwinana, with the operational design to increase limestone production to 1 Mtpa as demand requires;
- future construction of a quicklime plant with production capacity of 200,000 tpa (requiring supply of an additional 400,000 tpa of limestone feed);
- mining of an area of approximately 2.5 ha per year;
- road transport of both limestone and quicklime through Exmouth townsite to storage areas to be constructed adjacent to the Point Murat jetty;
- provision of product storage and handling facilities located on the north side of the Point Murat jetty (Appendix 1, Figure 3);
- use of the existing Point Murat port to load lump limestone and quicklime for shipping to markets in bulk cargo carriers of up to 40,000 Dead Weight Tonnage (DWT) capacity for both limestone and quicklime. Initial production of 200,000 tpa of limestone will require approximately eight shipments per year. Ultimate production will require approximately 30 shipments per year; and
- shipping will access Point Murat through the Ningaloo Marine Park which was established to protect the Ningaloo Reef;

The PER shows that the mining, quicklime plant and Point Murat facilities would be supported by:

- a 3.5 km powerline (33 kV spur line) to the mine, connected from the 33 kV powerline between Exmouth and Learmonth, and to be located adjacent to the haul road;
- water supply sourced from a bore; and
- a conveyor system to transfer limestone and quicklime from the Point Murat jetty to the bulk cargo carriers.

The provision of gas supply to the quicklime plant is not part of this assessment. Further, the gas supply to meet long term energy requirements and power supply to the quicklime plant and the supply source and location of the gas pipeline are yet to be defined.

Key project characteristics provided in the PER are indicated in Table 1.

Table 1. Summary of project characteristics (source: PER)

Lease wide characteristics	
Estimated resource within mining tenement M08/145 (application)	250 million tonnes
Production of limestone (startup)	200,000 tonnes per annum
Production of limestone (by the year 2001)	1,000,000 tonnes per annum
Production of quicklime (plant capacity)	200,000 tonnes per annum
Average quarry depth	25 m
Area of tenement	500 ha
Area to be mined each year	2.5 ha (approx.)
Gross area to be mined over initial 21 year life of the mining lease	<70 ha
Water requirements	55 m^3/day
Power supply	33 kV spurline (3.5 km)
Haul route from mine to Murat Road	4 km
Haul route along Murat Road to Point Murat	22 km (approx.)
Truck movements	24 vehicles per day (startup-12 hours/day) 120 vehicles per day (ultimate-15 hours/day)
Conveyor ship loading rate	1,000 tonnes per hour
Bulk cargo ship capacity	40,000 DWT

3. Environmental factors

3.1 Relevant environmental factors

It is the EPA's opinion, giving appropriate consideration to the submissions and material listed in Appendices 2 and 3, that the following are the environmental factors relevant to the proposal:

- Karst landform;
- Vegetation and flora;
- Terrestrial fauna;
- Subterranean fauna;
- Groundwater;
- Gaseous emissions;
- Dust;
- Noise;

- Marine water quality;
- Ningaloo Marine Park about Point Murat; and
- Road transportation.

These relevant environmental factors are discussed in Section 3.2 to 3.12 of the report.

3.2 Karst landform

Aspects of karst landform

Regional description

The Gascoyne Coast Region Strategy (Ministry for Planning 1996) describes the landform of Cape Range peninsula as deeply dissected limestone ranges and outwash plains with extensive cave formations. The landscape is referred to as karst, the main characteristics of which include extensive underground drainage and cave systems formed by the percolation of water through limestone sinkholes and the subsequent dissolution of minerals.

Allen (1993) describes Cape Range as a peninsula about 80 km long, 20 km wide with topography reaching a maximum elevation of 314 m at Mt Hollister. Cape Range National Park encompasses 50,581 ha of the western part of the range (Appendix 1: Figures 1 and 2). The limestones which are exposed both within and adjacent to the Whitecrest tenement are described in Section 2 and shown in Appendix 1, Figure 4 of this report. A karst system has developed in the Tulki and Trealla Limestones in response to geological, climate and eustatic factors (Allen, 1993). On the crest of the range, cave systems in the limestone have been deeply eroded and are mainly inactive (except for recharge), but are still active on the flanks of the range and beneath the coastal plain (Allen 1993). The PER indicates that the mining tenement lies on the eastern flank of Cape Range.

The regional water table occurs within a non-homogeneous karstic aquifer system formed by the Mandu Limestone on the crest of the range, the Tulki Limestone on the flanks of the range, and the Pliocene-Recent sediments and/or Tulki Limestone on the coastal plain, all of which are in hydraulic continuity (Allen 1993). The Cape Range karst and subterranean groundwater system is the only subterranean wetland currently listed on the Australian Nature Conservation Agency (ANCA) register of wetlands of national significance (ANCA 1996).

The biogeography of the Cape Range and the importance of the karst formation is discussed by Humphreys (1993); Hamilton-Smith, et al (draft, 1996).

The Department of Minerals and Energy (1995) suggest that there are over 400 caves presently known on Cape Range and there may be many others as yet undiscovered. Hamilton-Smith, et al (draft, 1996) indicate that caves can vary in size from only a few millimetres to sometimes over 100 m in diameter.

Whitecrest tenement

A description and location of the mine site and the geological formations and the limestone sequences is given in Section 2 of this report. Subsequent to preparation of the PER the proponent undertook further exploratory drilling in the lease. Examination of the drill log data from boreholes showed that the cavities encountered were generally less than 0.5m in extent and were filled with red clay sands and were dry.

Proposed extensions to Cape Range National Park

There are several proposals to extend the Cape Range National Park. The proposed extensions if implemented will further protect the karst formation. The extensions are discussed below:

(i) Conservation Reserves for Western Australia - System 9

The EPA considers that there should be a representative system of areas set aside for conservation of flora and fauna that could otherwise be lost as a consequence of development.

In 1975 the EPA published a series of recommendations for conservation reserves for System 9 - the Central West Coast, which includes the Exmouth area (EPA 1975). It was recommended that the Cape Range National Park boundaries be extended (Appendix 1, Figure 5) to include a portion of the coastal plain to the east of Cape Range and Exmouth Gulf coast in the National Park and proposed an extension up the west coast to the north of the existing reserve. The System 9 recommendations do not include the Whitecrest tenement. These proposed extensions were rejected by Cabinet in 1981 on the basis of concerns by the local community and objection from the Department of Minerals and Energy on account of limestone resources in the area.

(ii) Cape Range National Park Management Plan

The Cape Range National Park Management Plan (CALM 1987) prescribed the extension of the National Park to incorporate scenic areas and complete catchments of most watercourses and a physiographic unit in the Park which is highly fossiliferous and of considerable scientific importance. The extensions prescribed by CALM in its Management Plan (Appendix 1, Figure 6) do not include the Whitecrest tenement.

Increased recognition of the conservation significance of the subterranean fauna under the coastal plain has again raised the possibility of the extension of the National Park in this area. This possible extension does not include the Whitecrest tenement.

(iii) Select Committee Report

The Legislative Council Select Committee's First Report on Cape Range National Park and Ningaloo Marine Park (Hon Graham Edwards M.L.C., Chairman 1995) makes a number of recommendations for extensions to Cape Range National Park including a recommendation for an eastward extension of the park as proposed by CALM in its Management Plan. The proposed extensions recommended by the Select Committee do not include the Whitecrest mining tenement.

(iv) Gascoyne Coast Regional Strategy

The Gascoyne Coast Regional Strategy (Ministry for Planning 1996) recommends as follows:

- Extend the Cape Range National Park for the short-term as proposed by CALM in its 1987 Management Plan; and
- Extend the Cape Range National Park in the medium to long term to include the RAAF Bombing Range and the Ningaloo pastoral lease.

(v) Recent EPA assessment

In its recent assessment of a residential development at Exmouth (EPA 1996c), the EPA recommended that the Minister for the Environment note its support for the concept of an eastern extension to the National Park to provide a representative system of areas set aside for conservation. The recommendation does not include the Whitecrest tenement.

EMP and Protocol for Significant Caves

The proponent has committed to an Environmental Management Plan which will incorporate a protocol for notification, documentation and management of any large or significant caves that may be encountered during mining operations (Commitment 38).

The details of the protocol for caves would need to be established prior to mining, in particular what constitutes a large or significant cave. The proponent has identified the following points as a basis for the protocol:

- practical implementation of any protocol must be based on the cavity being of a size readily accessible for inspection;
- blind cavities without extension either vertically or horizontally are unlikely to be environmentally significant; and
- drilling by Whitecrest, on the mining lease showed the cavities encountered were generally less than 500mm in dimension and not extensive. Cavities larger that this dimension may be considered to be more significant.

Submissions received from the Western Australian Museum expressed concern about the likely impacts of the proposed mining on caves, and indicated that particular attention needs to be given to the protocol for notification and management of significant caves.

The Museum considers that all significant caves encountered during the mining should be subject to assessment and documentation, and that there should not be a presumption that mining can proceed should significant caves be found

Assessment

The area considered for assessment of this relevant environmental factor, karst systems, is the Cape Range peninsula. This is the land north of a line between Ningaloo homestead on the west coast and the base of the Bay of Rest on the eastern side, including Cape Range and the Rough Range, an area of approximately 2,200 km^2 (Figure 1). This area is approximately north of latitude 22°30'S.

This is a defined geomorphological unit in which hydrogeology and other factors predisposes the area to karst development.

The EPA's objectives in regard to this environmental factor are "to ensure that the recognised values of karst landforms are adequately represented within the conservation estate and to ensure that where karst landforms are outside of the conservation estate, land use activity is managed to maintain, as far as practicable, the recognised values".

The values considered by the EPA in its assessment of this project are scientific, educational, recreational and cultural.

The EPA notes that the resource to be mined comprises the crystalline Trealla and Tulki Limestones and that a karst system has developed in these formations. The EPA notes that the mining operation will remove limestone and part of the karst system but not intersect the groundwater table. The area of mining within the initial 21 year life of the mining lease is expected by the proponent to total 70 ha. The topographical relief, geology and location of the water table over Cape Range and the mine is shown in Appendix 1, Figure 7.

There are a range of views on the impact of the proposal on the karst landform.

After consideration of the range of views provided by the proponent (PER), scientific reports including Humphreys (1993), government agencies, and others (Appendix 2), the EPA concludes that:

- the karst landform of the Cape Range peninsula is an important element of the environment;
- the Whitecrest minesite is not within the existing or proposed extensions to the Cape Range National Park;
- there is a likelihood that karst features (including caverns) are present on the Whitecrest mining lease and these will be directly affected by the Whitecrest mining proposal. Caves within the mine area would be destroyed through blasting and excavation;
- the proponent has committed to and Environmental Management Plan which will incorporate a protocol for the notification, documentation and management of any large or significant caves that may be encountered during mining operations (Commitment 38). The EPA considers that the protocol needs to be practicable and at this stage believes it should only apply to caves of a size readily accessible for inspection with the likelihood of extending a significant distance either vertically or horizontally;
- in order to maintain the value of karst landform outside of the mine area, the EPA believes the proponent has an ongoing responsibility to manage the area such that the karst processes and landform are not unreasonably affected; and
- proper environmental management and monitoring is required (refer to Section 4.2 of this report).

Having particular regard to:

- the Conservation Through Reserves Committee's System 9 Report, the Cape Range National Park Management Plan (CALM 1987), the Legislative Council Select Committee's First Report on Cape Range National Park and the Gascoyne Coast Regional Strategy (Ministry for Planning 1996);
- various scientific reports, including Humphreys (1993) and parts of Hamilton-Smith, et al (draft 1996);
- the relatively small size of the mine area in comparison with the extent of the existing karst landform within Cape Range, the Cape Range National Park and its proposed extensions;
- the commitment by the proponent to develop a Mine Management Plan and an Environmental Management Plan; and
- the commitment from the proponent to develop a protocol as part of the Environmental Management Plan for the notification, documentation and management of any large or significant caves,

it is the EPA's opinion that subject to the satisfactory implementation of the proponent's commitments, the project can be managed to meet its objectives in regard to this relevant environmental factor.

Further, to ensure that the recognised values of the karst landform are adequately represented within the conservation estate, the EPA recommends that the Government should give priority to consideration of the proposals in the various reports to extend the Cape Range National Park and to consider additional extensions which conserve the karst formation and contribute to the EPA objective.

3.3 Vegetation and flora

Aspects of vegetation and flora

Implementation of this proposal will result in a net area of approximately 3 ha being mined each year. The area to be mined over the initial 21 year life of the mining lease is expected to be about 70 ha. A 4 km haul road from the mine to Murat Road will be required and the stockpile and storage area at Point Murat will encompass an area of 5 ha.

A complete list of flora recorded by the proponent is given is Appendix C of the PER. Several species that are either recognised endemics or rare species were found. Vegetation associations have been described and mapped by the proponent in the PER. In its response to public submissions the proponent maintains that there is no risk of extinction of the species identified as they are either widespread in the project area or not within the area to be developed.

Keighery and Gibson (1993) indicate that the diversity and richness of the floral species in the Cape Range is significant with 630 taxa of the 1,348 known species of the Carnarvon Botanical District (91,046 km^2) occurring throughout. Of these records Keighery and Gibson (1993) state that 143 are only recorded for the District on the Cape Range. Four hundred and eighty four species are found on the peninsula and elsewhere in the district and of these fifty taxa are at the northern end of their ranges, and others are the widespread desertic or coastal elements. The biogeography and composition of the flora of the Cape Range peninsula, described by Keighery and Gibson (1993), indicates that the Cape Range peninsula has 12 endemic taxa and six taxa largely confined to the peninsula and a significant number of taxa on the peninsula at the edge of their botanic range. The peninsula is very rich in flora for an arid area and is an area of very high conservation significance in which very little detailed botanical work has been carried out.

Assessment

The area considered for assessment of this relevant environmental factor, vegetation and flora, is the Cape Range peninsula. This is the land north of a line between Ningaloo homestead on the west coast and the base of the Bay of Rest on the eastern side, including Cape Range and the Rough Range, an area of approximately 2,200 km^2 (Figure 1). This area is approximately north of latitude 22°30'S.

This is a defined geomorphological unit over which vegetation communities form a representative environmental system.

The EPA's objective in regard to this environmental factor is " to protect Declared Rare Flora in accordance with the *Wildlife Conservation Act 1950*, and to maintain the abundance, diversity, geographical distribution, and productivity of vegetation communities".

The EPA's strategy on conservation relies largely on the Conservation Through Reserves study undertaken by the Conservation Through Reserves Committee (EPA, 1975). The study culminated in recommendations for the reservation of land for conservation and recreation purposes. The System 9 study area covering the Central West Coast, including the Exmouth area recommended that the Cape Range National Park boundaries be extended but did not include the Whitecrest tenement (refer to Section 3.4 of this report).

The EPA recognises that the diversity and richness of the floral species in the Cape Range is significant. Elements of the project which pose the greatest impact to vegetation are likely to be those which involve clearing of the 70 ha mine site.

The EPA notes that the proposed mining area of 70ha is about 0.1% of the area protected by the Cape Range National Park and the proposed extension of the park. In addition, the PER indicates that the loss of flora and vegetation resulting from the mining operation will be addressed by a rehabilitation plan which forms part of an overall Mine Management Plan (Commitment 2) for the project.

The PER also states that special consideration will be given to the formulation of construction procedures for the haul road. The haul road will be designed to avoid or minimise disturbance to plant species that are either recognised endemics or are rare including, *Tephrosia* sp, *Eriachne* sp. Cape Range, and *Harneria kempeana rhadinophylla* . Haul road construction will be addressed in the Mine Management Plan (Commitment 2).

Direct disturbance to vegetation through clearing or indirect disturbance as a result of changes to drainage patterns can be reduced through a range of measures including proper design and management of the project . These are reflected in proponent Commitments 1, 2, 12, 13 and 14. However, the EPA considers that the proponent's Environmental Management Plan (EMP) (Commitment 1) should detail the methods and procedures which the proponent will use in achieving its environmental commitments and objectives for flora management. The recommended condition in Section 4.2 of this report reflects this requirement.

Having particular regard to:

- the recognised diversity and abundance of the flora species in the Cape Range;
- the widespread nature of much of the Cape Range flora throughout the Carnarvon Botanical District and the proponent's procedures for avoiding or minimising disturbance to plant species that are either recognised endemics or rare species;
- the Conservation Through Reserves study undertaken by the Conservation Through Reserves Committee;
- the relatively small size of the mining area when compared to the area protected by the Cape Range National Park and also the area of the proposed extension of the park;
- Whitecrest's statutory obligations in relation to Declared Rare Flora species protected under the*Wildlife Conservation Act 1950* ;
- the proponent's commitments to a range of measures which reduce disturbance to vegetation (Commitments 1, 2, 12, 13, &14); and

- the commitment by the proponent to prepare an Environmental Management Plan, and a Mine Management Plan which will include a rehabilitation plan,

it is the EPA's opinion that its objective for this environmental factor can be met provided the proponent describes in detail, within the project EMP, the methods and procedures which will be used to achieve the proponent's environmental commitments and objectives for vegetation and flora management.

3.4 Terrestrial fauna

Aspects of terrestrial fauna

Although Cape Range peninsula is not an intense centre of endemism for vertebrate fauna it is known to support 30 mammal, 84 reptiles, five amphibians and about 200 species of birds (Kendrick 1993). Baynes and Jones (1993) indicate that, biogeographically, the Cape Range peninsula mammal fauna is composed principally of species that were originally widely distributed across the arid zone and that no currently recognised mammal species is restricted to the peninsula.

The PER indicates that loss of habitat is likely to be the major fauna-related impact of the project. The PER, quoting from Kendrick (1993) and Baynes and Jones (1993), indicates that Cape Range has been identified as an area that has the potential to support relict populations of rare fauna species, but has not been the subject of any systematic survey effort for vertebrate fauna.

The proponent's fauna survey recorded a total of 7 species of mammal (3 native and 5 introduced), 14 reptile species and 37 species of birds. Based on its survey results, the proponent considers that:

- none of the species recorded, or the fauna community as a whole, are of regional scale significance;
- none of the species recorded are declared Specially Protected (Threatened) under the *Wildlife Conservation Act 1950*, or are otherwise regarded as being threatened species;
- species diversity with respect to birds and reptiles, is of a scale comparable to the Cape Range National Park; and
- all species recorded are found within Cape Range National Park.

The PER states that should any threatened fauna species be located during clearing or mining activities, discussions will be held with CALM in respect of appropriate management procedures (Commitment 14). In addition, the PER indicates that the loss of fauna habitat resulting from the mining operation will be addressed by ongoing rehabilitation of landforms using local indigenous flora species as the mining operation progresses.

Assessment

The area considered for assessment of this relevant environmental factor, terrestrial fauna and habitats, is the Cape Range peninsula as described in Section 3.2. This is a defined geomorphological unit over which fauna habitats form a representative environmental system.

The EPA's objective for this environmental factor is to "protect Specially Protected (Threatened) Fauna species in accordance with the *Wildlife Conservation Act 1950*, and to maintain the abundance, diversity and geographic distribution of fauna."

The Environmental Protection Authority recognises that the elements of the project which pose the greatest impact to fauna are likely to be those which involve large scale clearing of habitat and which for this project principally comprises the mine site, associated haul road, and storage areas at Point Murat.

Impacts on subterranean fauna are evaluated separately in Section 3.5 and impacts on marine biota are considered in Section 3.10.

Disturbance to fauna habitat through mining or clearing or indirect disturbance as a result of project operations can be reduced through a range of measures including proper design and management of the project . These are reflected in proponent Commitments 1, 2, 14 and 17. However, the EPA considers that the proponent's Environmental Management Plan (Commitment 1) should detail the methods and procedures which the proponent will use in achieving its environmental commitments and objectives for fauna management. The recommended condition in Section 4.2 reflects this requirement.

Having particular regard to:

- the relatively small size of the mining area when compared to the area protected by the Cape Range National Park and also the area of the proposed extension of the park;
- Whitecrest's statutory obligations under the *Wildlife Conservation Act 1950*, and the expectation that in relation to terrestrial fauna there will be no loss of Specially Protected (Threatened) Fauna species;
- the proponent's commitment to a range of measures which will reduce disturbance to fauna habitats; and
- the commitment by the proponent to prepare an Environmental Management Plan which should describe in detail the methods and procedures which will be used to achieve the proponent's environmental commitments and objectives for fauna management,

it is the EPA's opinion that its objective for this environmental factor can be met.

3.5 Subterranean fauna

Aspects of subterranean fauna

Diversity and significance of subterranean fauna on the Cape Range Peninsula

The Cape Range Peninsula area is considered to contain one of the worlds most diverse subterranean faunas in the world despite limited and incomplete sampling relative to other internationally significant karst provinces (WF Humphreys pers com).

The richness of the fauna reflects the diverse geomorphology of the province, supporting a rich terrestrial (troglobitic) and aquatic (stygofauna) subterranean fauna.

Troglobites and Stygofauna are animals fully adapted to living in complete darkness in caves and totally dependent on these environments for survival. Humphreys (1993a), quoted in the PER, states that troglobitic fauna not only occur in caves but also, probably mainly, inhabit interstital and fissure habitats in the rock.

The fauna is ancient and highly adapted to subterranean life. The troglobitic fauna shows evidence of having its origins as fauna from the litter of an ancient rainforest floor (Humphreys, 1993b). The origins of the stygofauna is believed (Humphreys, 1993c) to stem from the time the area was part of the Tethys Sea, formed by the disintegration of the former supercontinent Pangea. The closest relatives of the fauna is now found in the Caribbean and Canary Islands, showing evidence of the effects of continental drift.

The fauna has no close relationships to other faunas on the Southern Hemisphere and is entirely endemic to the Cape Range peninsula and partly Barrow Island. The fauna contains the only southern hemisphere representatives of entire classes, orders, families and genera of crustaceans (ANCA 1996.)

State of knowledge of subterranean fauna on the Cape Range peninsula

The most important document on subterranean fauna of the Cape Range is Humphreys (1993). The information on the subterranean fauna of the Cape Range is based mostly on sampling of caves and existing drill holes. The sampling is not extensive.

Currently some 55 species (33 terrestrial and 22 aquatic) have been identified from the area (WF Humphreys pers. com.) The number of species is expected to increase substantially as more sampling is undertaken.

There are five stygofauna (aquatic) species and four troglobitic (terrestrial) species declared as Specially Protected (Threatened) fauna pursuant to the *Wildlife Conservation Act 1950.* Fauna declared as Specially Protected (Threatened) cannot be taken without authorisation.

The aquatic subterranean species of the coastal plains are likely to be more widely distributed than the terrestrial species because of the high degree of interconnectedness of the cavernous coastal plain limestone. The degree of connection between the eastern and western coastal plains is likely to be limited, and there is evidence of genetic differences.

The terrestrial fauna in the Cape Range are more likely to be confined to a relatively small area (WF Humphreys pers. com.). The sampling to date indicates that the deep gorges of the northern part of the range that divide the cavernous Tulki Limestone have isolated fauna populations and promoted speciation.

As indicated in Section 3.2, there have been several proposals to extend the Cape Range National Park, including the Cape Range National Park Management Plan (CALM 1987), Legislative Council Select Committee Report (Hon Graham Edwards M.L.C., Chairman 1995) and the Gascoyne Coast Regional Strategy (Ministry for Planning 1996). In finalising proposals for extension of the Park consideration needs to be given to ensuring that subterranean fauna is likely to be well represented within the conservation reserve.

Potential impacts from the proposed mining on subterranean fauna

Subsequent to preparation of the PER the proponent investigated existing boreholes located within the tenement for troglobitic fauna and trapped a number of specimens. This survey, which included the baiting of drill holes, found that five of the eight boreholes sampled contained troglobites representing at least four species. Identification of these collected troglobites is presently being undertaken by the University of Western Australia. The results of this work are not available at the time of writing this report.

The proposed mining will remove karst landform over about 70ha, and to an average depth of 25m. This will lead to the loss of troglobitic fauna in the mined area but is not expected to significantly affect fauna outside the area.

The base of the mine will be maintained at least 50m above the watertable. Stygofauna will therefore not be directly affected by the mining, however, could be impacted if groundwater pollution occurred. The proponent has made a number of commitments to manage the storage of materials through properly designed engineering structures to keep the risk of groundwater pollution to a practical minimum.

The proponent has also made a commitment to an on-going programme of sampling, identification and documentation of subterranean fauna on and in the vicinity of the mining tenement. This would be addressed in the Environmental Management Plan (EMP) for the project.

Submissions received from the Western Australian Museum expressed concern about the likely impacts of the proposed mining on subterranean fauna. The Museum considers that all significant caves encountered during the mining should be subject to assessment including sampling for fauna. Further, the Museum considers that there should not be a presumption that mining can proceed should significant fauna be found.

The NPNCA and CALM advised in their submissions that the mining lease area has considerable conservation and landscape values and would be a worthwhile addition to the Cape Range National Park.

The DEP has indicated that, to ensure mining does not result in a loss of species diversity, the proponent should be required to develop and implement a protocol, to the effect that, before mining proceeds in any area sampling is undertaken to determine the existence and speciation of troglobitic fauna in the area, and that further sampling is undertaken to demonstrate that these species exist outside the proposed mining area.

Whitecrest hold the view that the loss of troglobitic fauna within the mining area should be considered to be a consequence of the project but ongoing surveys, investigation and documentation of fauna during mining may then be used to develop appropriate management strategies for this fauna on a regional basis. Whitecrest hold the view that the DEP's proposal is not practical and is based on a research approach rather than reasonable environmental management.

Assessment

The area considered for assessment of this relevant environmental factor, subterranean fauna, is the karst landform of the Cape Range peninsula as described in Section 3.2 of this report.

The EPA's objective in regard to this factor is to:

- ensure that subterranean fauna are adequately protected, in accordance with the *Wildlife Conservation Act 1950*;
- to maintain the abundance, diversity, and geographical distribution of subterranean fauna; and
- to improve our understanding of subterranean fauna through appropriate research including sampling, identification, documentation.

The EPA recognises that the subterranean fauna with the potential to be affected by this proposal include stygofauna and troglobitic fauna and as defined above.

Stygofauna

The EPA notes that the proponent will not mine within 50m of the watertable and therefore the mining should not directly affect stygofauna. The EPA notes stygofauna could be affected if pollution of groundwater occurs. However, the EPA considers that with the 50 m separation between the mine floor and the aquifer in conjunction with commitments to manage the storage of materials through properly designed and engineered structures so as to keep the risk of groundwater pollution to a practical minimum, the risk to stygofauna will be low. Project activities which may effect on groundwater are assessed in Section 3.6 of this report.

Troglobitic fauna

The EPA notes that the sampling of boreholes has shown that troglobitic fauna exist within the mining tenement. Accordingly, implementation of the proposal is likely to result in the taking of some troglobitic fauna.

The proponent must comply with the requirements of the *Wildlife Conservation Act*, relating to the taking any fauna declared as Specially Protected (Threatened). The proponent would need to establish appropriate mechanisms with the Department of Conservation of Land Management, which administers the *Wildlife Conservation Act,* to ensure that these requirements are met.

The proposed mining project would destroy a relatively small percentage of the karst landscape of the region in comparison to that landscape which is within the Cape Range National Park and its proposed extension. If all of the species of troglobitc fauna were distributed throughout the karst landscape there would appear to be very little likelihood of their abundance, distribution and diversity being affected by the proposal. However, although research on the species present and their distribution has so far been limited and thus the information available is also limited, it appears as though the range of some species can be very restricted. Further sampling is likely to result in new species being described, and some of these could be from the area proposed for mining.

At the time of preparing this report, the species list of the animals found in the sampling boreholes on the mining tenement had not been provided to the EPA. However, from past sampling experience in the area, the list may include some species not yet described. As research has progressed, albeit opportunistically, the number of troglobitic species recorded from the Cape Range area has increased and this is likely to continue for some time to come. The data collected to date have also shown that the distribution of a species can be very

restricted. Accordingly, there are some risks involved from the perspective of troglobitc fauna, but these risks can not be quantified.

Noting the apparent restricted distribution of the troglobitic animals, it seems likely that mining in the area could result in the reduction in the genetic diversity of one or more of the species and may even result in the removal of described species. However, borehole sampling which would have to precede any mining operations, may also result in provision of information increasing the range of some species and increasing the number of new species.

The community needs to understand the importance of the karst fauna in terms of its scientific and cultural significance. Additional research is required and additional areas may need to be set aside to provide for the better conservation of the karst fauna of the environment.

After much consideration of this factor, the EPA has come to the view that the risks involved in relation to the possible reduction in species and species diversity if the proposal by Whitecrest to extract limestone from its mining tenement were to proceed are acceptable, provided it is accompanied by an approved research programme and a consideration of the merits of extending the area of the Cape Range National Park. Such a research programme would need to be outlined in an Environmental Management Programme associated with the project. Also, any research programme approved should form part of a co-ordinated and regional research approach for the Cape Range Peninsular to ensure that our knowledge and understanding of this unique suite of animals is continually improved.

Having particular regard to:

- the proponent's statutory obligations to comply with the requirements of the *Wildlife Conservation Act 1950*;
- the relatively small extent of karst landforms which will be destroyed in comparison with potential habitat within the Cape Range National Park and its proposed extension;
- the need to increase knowledge on the abundance, diversity, and geographical distribution of subterranean fauna of the Cape Range Peninsula and the opportunity for this project to contribute further knowledge on subterranean fauna and provide more certainty as part of a regional approach; and
- the proponent's commitment (Commitment 37) that it will undertaking an on-going programme of sampling, identification and documentation of subterranean fauna on and in the vicinity of the mining tenement in accordance with agreed standards and procedures to the requirements of the EPA,

it is the EPA's opinion that the project can be managed to reasonably meet its objective in regard to subterranean fauna provided that steps are taken to extend the Cape Range National Park to include comparable areas of troglobite habitat, and that the proponent is required to contribute towards research programme to increase understanding of subterranean fauna on the peninsula.

In forming this opinion, the EPA acknowledges that there is a risk that the mining could result in a reduction in the genetic diversity of one or more species of troglobitic fauna and may even result in the removal of described species. The EPA considers this risk is acceptable.

The proposed mining will extend over at least 21 years. The EPA considers that mine planning during the life of the project should recognise additional information on the existence and speciation of subterranea fauna on, and in the vicinity of the tenement, as this becomes available, and take this into account as far as practical to minimise impacts of the mining.

The EPA has noted the DEP's position that it considers the proponent should be requested to develop and implement a protocol, to the effect that, before mining proceeds in any area, sampling is undertaken to determine the existence and speciation of troglobitic fauna in the area, and that further sampling is undertaken to demonstrate that these species exist outside the proposed mining area.

Based on information available to it, it is the EPA's opinion that such an approach may be impractical. The voids within the karst landform are thought to be randomly distributed and it is not possible either through borehole drilling or geophysical mapping to readily ascertain the

extent or nature of habitat within the limestone. This places practical limitations on the ability to demonstrate that species located in the area to be mined, also exist outside this area. Such a protocol may also be impractical in terms of the time frame and scientifc resources (taxonomic) required to undertake the sampling programme in sufficient detail and to describe any new species which may be found.

In addition, unless there was a clear understanding and agreement by all parties, prior to mining commencing, about the possible protocol outcomes upon which decisions would be taken, there would be a degree of uncertainty about the process and a potential for a dispute between the proponent and government. These uncertainties and time frames may prevent mining from proceeding if a practical protocol cannot be achieved. The EPA therefore, does not support the DEP proposed approach.

3.6 Groundwater

Aspects of groundwater

The proposed area for mining is within the Exmouth Water Reserve, a proclaimed area under the *Country Areas Water Supply Act 1947* (Appendix 1: Figure 2). The Water and Rivers Commission has assigned this reserve as a Priority 1 groundwater source protection area. Should abstraction by the proponent be required, the provisions of the *Rights in Water and Irrigation Act 1914*, as amended, will apply.

As discussed in Section 3.5 of this report, the limestone aquifer beneath the Cape Range and the coastal plain supports subterranean aquatic fauna, known as stygofauna. A total of twenty two stygofauna species have been identified from the area (W F Humphreys pers. com.). Four of these are listed as Specially Protected (Threatened) pursuant to the *Wildlife Conservation Act 1950*. Given the unique nature of the stygofauna, and the fragility of the freshwater lens which overlies seawater in the karst aquifer, the Water Corporation (1996) suggest that the greatest care must be taken to maintain the aquifer habitat and manage groundwater abstraction in a sustainable way.

The management proposed by the proponent to protect water quality is described in the PER. Management measures proposed include the exclusion of mining within 50 m of the groundwater table, management of fuel storage, storage of substances, spillage management and waste disposal in accordance with regulations.

The proposed quicklime plant operation requires heating of limestone and does not generate any solid or liquid waste or by-product contaminants. The PER suggests that:

- the management measures proposed for storage and transport of quicklime will reduce the potential for spillage to a practical minimum; and
- spillage management measures and the nature of the product itself also reduce the potential for contamination of groundwater.

The WRC advises that:

- in relation to groundwater, the Commission will support approval of mining at the site subject to the proponent providing a commitment to the Minister for the Environment that the deed guaranteeing supply of water to the Water Corporation will be extended to any other operator of the Exmouth Town Water Supply Scheme.
- mineral processing is an unacceptable land use in Priority 1 areas. The proposed quicklime processing facility will pose a significant pollution risk during its construction phase. On-going risks will also result through location of additional plant and personnel at the site and the requirement for haulage of lime in a more readily soluble form through the Water Reserve;

- the PER documentation and subsequent discussions with the proponent indicate that the quicklime processing facility is not constrained by the location of the limestone mine and that alternative sites outside the Water Reserve could be found; and
- the proponent has not adequately demonstrated the necessity to locate the quicklime processing facility within the Exmouth Water Reserve. Therefore, the Commission would support the approval of the quicklime processing facility within the Exmouth Water Reserve if, after assessing the viability of all possible alternative locations for the facility, the proponent demonstrated that the proposed site is the only feasible alternative.

Assessment

The area considered for assessment of this relevant factor, groundwater, is the limestone aquifer beneath the Exmouth Water Reserve.

The EPA's objective in regard to this environmental factor is "to ensure that the quantity of groundwater is maintained to agreed levels, and that the quality is maintained consistent with the draft Western Australian Water Quality Guidelines for Fresh and Marine Waters (EPA Bulletin 711)".

The EPA notes that the project site falls within the Exmouth Water Reserve, a proclaimed area under the *Country Areas Water Supply Act 1947.* In regard to the installation and operation of any bore(s) to abstract water, the Water and Rivers Commission can set conditions of approval on the proponent under the provisions of the *Rights in Water and Irrigation Act 1914.* However, with regard to the impact of mining activity on the Exmouth Water Reserve, the Water and Rivers Commission must ensure appropriate conditions are imposed on the project to protect water quality through other processes such as the Environmental Protection Act or the Mining Act.

Following the Water Authority's original submission, the EPA notes that further negotiation has occurred between the proponent, the Water and Rivers Commission and the Water Corporation. In response to these negotiations, the proponent has provided a number of additional commitments for protection of the groundwater. Proponent commitments relevant to water resource protection now include commitments 1, 2, 7, 10, 21-36 and 48-53. In addition, the EPA understands that Whitecrest is preparing a legal agreement which will include a guarantee to maintain the quantity of groundwater supply consistent with that currently obtainable from beneath the tenement area. It is the EPA's view that the measures proposed by Whitecrest for protection of the groundwater resource which meet the requirements of the lead water management and water supply agencies, viz. the Water and Rivers Commission and the Water Corporation, would also provide protection for stygofauna. Both agencies have agreed that in respect of mining the limestone the commitments meet their water resource protection and supply objectives.

The EPA notes the Water and Rivers Commission's advice regarding the quicklime plant and considers that further studies should be undertaken to ensure that the proposed quicklime plant is located to avoid potential threats to the groundwater resource. In particular, investigations of alternative sites should meet requirements for protection of the Exmouth Water Reserve. The recommended condition in Section 4.4 reflects this requirement.

In relation to the limestone mine only, and having particular regard to:

- the project site being located within the Exmouth Water Reserve;
- the 50 m separation distance from the mine pit floor to the groundwater table and that all reasonable and practical measures will be taken to prevent any spillage reaching groundwater;
- advice from the WRC and WC that the proponent's commitments meet their water resources protection and supply objectives; and
- groundwater being a habitat for stygofauna,

it is the EPA's opinion that its objective for this environmental factor can be met.

3.7 Gaseous emissions

Aspects of gaseous emissions

The quicklime plant will generate atmospheric emissions through the limestone calcination process and the combustion of natural gas. The PER states that the use of natural gas as the calcination heat source will result in negligible sulphur dioxide emissions and the low operating temperature of the kiln burners will result in low nitrogen dioxide emissions. Carbon dioxide emissions will be generated from the limestone calcination (approximately 80%) and from the gas combustion (approximately 20%).

Nitrogen Dioxide

The proponent indicates that under worst case meteorological conditions, ground level nitrogen dioxide concentrations would be 75 $\mu g/m^3$ (1 hour average) at a distance of 200 m from the quicklime plant and approximately 18 $\mu g/m^3$ (1 hour average) at Exmouth. This is less than the National Health and Medical Research Council (NH&MRC) guideline of 320 $\mu g/m^3$ (1 hour average) not to be exceeded more than once a month.

Sulphur Dioxide

"The use of natural gas as the calcination heat source [in the quicklime plant] will ensure that sulphur dioxide emissions are very low (less than 4 mg/m^3)." (Halpern Glick Maunsell, 1995a). Stack emissions at this level would result in ambient levels far below the standards set in the Kwinana Environmental Protection Policy (Table 2).

Carbon Dioxide

It is estimated by the proponent (Halpern Glick Maunsell, 1995a) that annual emissions of CO_2 from the quicklime plant will total around 200,000 tonnes per annum (tpa) or one tonne of CO_2 per tonne of quicklime produced. By way of comparison, the EPA (1991) concluded for a proposed quicklime plant to be located at Nowergup north of Perth, that carbon dioxide emissions, estimated at 260,000 tpa of CO_2 released to the atmosphere or 1.1 tonne of CO_2 per tonne of quicklime produced, was environmentally acceptable. Furthermore, for the same quicklime plant, the EPA (1994) concluded that an increase in quicklime production resulting in carbon dioxide emissions increasing from 260,000 tpa to about 520,000 tpa or 1.1 tonne of CO_2 per tonne of quicklime produced was also environmentally acceptable. The proponent, quoting from SECWA (1990), indicates that carbon dioxide emissions from its project are less than 0.7% of the carbon dioxide emitted from Western Australia.

Assessment

The area considered for assessment of this relevant environmental factor, gaseous emissions, extends from the plant site to the town of Exmouth. Gaseous emissions must be controlled to meet relevant limits at the plant site.

The EPA's objective in regard to this environmental factor is "to ensure that gaseous emissions, including greenhouse gases and odours, both individually and cumulatively, do not cause an environmental or human health problem in the area surrounding the proposed processing plant and meet accepted standards and limits". Further, the EPA considers the proponent should use all reasonable and practicable measures to reduce the discharge of wastes, including gases.

The EPA has promulgated two Environmental Protection Policies (EPPs) for atmospheric pollutants for the Kwinana and Kalgoorlie areas. The EPA uses the Kwinana EPP standards and limits as guidelines for the assessment of new industrial projects (where there are no existing sources) and for existing industrial plants which are seeking approval for modifications (EPA, 1992).

In the Kwinana EPP, a limit is defined as "a concentration not to be exceeded" and a standard is defined as "a concentration which it is desirable not to exceed". The standard is interpreted as the value which the ground level concentration must be below for 99.9% of the time.

The standards and limits for sulphur dioxide and particulates used in the EPP for the Kwinana policy area are summarised in Table 2 below.

Table 2: Standards and limits used in the EPP for the Kwinana Policy Area

Species	Area	Averaging Period	Standard ($\mu g/m^3$)	Limit ($\mu g/m^3$)
Sulphur Dioxide	Industrial Estate	1 hour	700	1400
		24 hour	200	365
		Annual	60	80
	Residential	1 hour	350	700
		24 hour	125	200
		Annual	50	60
Particulates PM_{10}	Residential	24 hour	-	120
		Annual	-	40

It is the EPA's view that proponents should use all reasonable and practicable measures to reduce the discharge of wastes, including gases (EPA, 1996a). Measures such as the incorporation of low NOx technology (eg: low NOx burners) should be examined as part of the quicklime plant design. The EPA notes the commitment made by the proponent to manage project emissions in accordance with the requirements of the DEP (Commitment 46). Detailed specifications for discharge of emissions, monitoring and reporting will be established by the Department of Environmental Protection in licence conditions set under Part V of the Environmental Protection Act.

The EPA notes that the estimated load of carbon dioxide emitted by the project represents an increase of 0.7% in carbon dioxide emissions for Western Australia based on 1990 figures. For an emission of this scale the EPA considers that a proponent should be required to:

1. calculate the greenhouse gas emissions for their project;
2. indicate the measures adopted to limit greenhouse gas emissions for that project;
3. estimate the comparative greenhouse gas efficiency of the project with the efficiency of other comparable projects producing a similar product; and
4. consider entry into the Commonwealth Government's "Greenhouse Challenge" voluntary cooperative agreement programme which includes:
    - an inventory of emissions;
    - opportunities for abating greenhouse gas emissions in the organisation;
    - a greenhouse gas mitigation action plan;
    - regular monitoring and reporting of performance; and
    - independent performance verification.

In view of its position for greenhouse gases described above, the EPA considers that greenhouse gas emissions should be addressed in the Environmental Management Plan required by Commitment 1. The recommended condition in Section 4.2 reflects this requirement.

Having particular regard to:

- estimates which indicate that gaseous emissions will meet relevant standards;
- requirements of DEP licences which will be issued under Part V of the Environmental Protection Act 1986; and
- the EPA's position on greenhouse gas emissions being incorporated in the EMP,

it is the EPA's opinion that its objective for this environmental factor can be met.

3.8 Dust

Aspects of dust

Through consideration of the PER, public submissions, and the proponent's response to public submissions, the following potential impacts of dust were identified:

- potential for dust from the minesite to impact on the town of Exmouth;
- impact of limestone and quicklime dust on vegetation, the community, and occupational health and safety ;
- potential for wind-blown dust from the stockpile at Point Murat to impact on fringing coral reefs;
- escape of dust through the transport of quicklime;
- escape of dust from the calcination plant; and
- impact of fugitive dust on tourism and recreational assets, such as coral reefs and nearshore marine environments.

In its PER and response to public submissions the proponent has indicated:

- dust generated during quarrying and transport operations will be managed by water suppression with regular dampening of the mine floor and haul route in accordance with the requirements of the Department of Minerals and Energy and the Department of Occupational Health and Welfare;
- limestone will be trucked as a lump product. The nature of the limestone is such that it is very hard and will not break up under normal handling operations. The product will be screened prior to transport so that no fine material is transported to the port;
- quicklime will also be trucked as a lump product. As with the limestone, the nature of the resource is such that the lime will not readily break-up or dust. However, as it is essential that moisture is prevented from contacting the quicklime, all trucks will be covered during transport operations;
- the quicklime plant bag filter system has been designed to ensure particulate stack emissions are less than 50 mg/Nm^3 (average at Standard Temperature and Pressure). Actual emission levels are typically around 25 mg/Nm^3 or less;
- the results of dust modelling dust plume modelling undertaken since the PER show that the maximum worst case ground level dust concentration at Exmouth will be 5 µg/m^3 which is well below NHMRC and EPA guidelines (90 µg/m^3 annual average and 1000 µg/m^3 15-minute average respectively);
- the maximum ground level dust concentration downwind of the quicklime plant will be 21 µg/m^3 at a distance of 200 m from the plant and at these concentrations, lime dust will not be visible and it is not expected that deposition will affect vegetation in the Cape Range National Park or proposed extensions;
- the likely risk to the public arises from spillage of quicklime during transport to the port. Procedures will be established by the proponent to isolate and clean up the spillage to avoid the public handling the material;
- the stockpile established at Point Murat will be limited to a height of 20 m. The nature of lump limestone is such that dust will not be generated even under strong winds; and
- the quicklime produced will be transported, stored and shipped as a lump product (40-80 mm dimension). The properties of the Exmouth limestone are such that it will produce lump lime that does not decrepitate (break-up, dust or pulverise) even after intense heating.

Assessment

The areas considered for assessment of this relevant environmental factor, dust, is the mine site, transport route, port site and the Town of Exmouth. These are the areas where any possible dust caused by the project could have an effect.

The EPA's objective in regard to this environmental factor is "to ensure that the dust levels generated by the proposal meet statutory requirements and acceptable standards".

Following advice from the Department of Environmental Protection and noting the proponent's response to questions raised, the EPA considers that dust and particulate emissions from the project are manageable and acceptable. The EPA notes the commitment made by the proponent that appropriate dust control measures will be implemented as necessary during mining, transport and shiploading operations (Commitment 42) in accordance with the Mine Management Plan (Commitment 2). Quicklime will be protected with dust and waterproof covers during all trucking operations and spillage management measures implemented (Commitments 43, 44). The PER states that quicklime will be stored in a sealed shed at Point Murat. Dust levels will be monitored adjacent to the mine and port area to demonstrate compliance with the requirements of the EPA and the Royal Australian Navy (Commitment 45). All mining, processing and shiploading activities will be designed and operated in accordance with provisions required by the DEP (Commitment 46) and all trucks operating on Murat Road shall comply with the Road Traffic Code (1975) (Commitment 47).

Notwithstanding the above, the EPA considers that the proponent's Environmental Management Plan (Commitment 1) should include details of dust management and monitoring and quicklime spillage procedures. The details should enable effectiveness of dust control measures to be determined. The recommended condition in Section 4.2 reflects this requirement.

Having particular regard to:

- guidance provided by the Kwinana EPP air quality standards;
- the proponent's statutory requirement to obtain works approval and licence under Part V of the Environmental Protection Act;
- commitments made by the proponent relating to dust control measures, particularly those related to the transport and storage of quicklime; and
- the commitment by the proponent to prepare an Environmental Management Plan which should describe in detail the methods and procedures which will be used to achieve the proponent's environmental commitments and objectives for dust management and monitoring,

it is the EPA's opinion that its objective for this environmental factor can be met.

3.9 Noise

Aspects of noise

The PER indicates that the mine site is located approximately 8 km from the town of Exmouth and that noise, apart from blasting, will not be heard in the town. Blasting will be carried out in daylight hours only (6am to 6pm) with no more than a single daily blast sequence.

The trucking operation along Murat Road through the town of Exmouth was recognised as a fundamental issue of concern to some residents in Exmouth. One component of concern to residents was noise impacts. Accordingly, the proponent was requested by the DEP to quantify noise impacts from truck movements through Exmouth based on predictions and actual measurements. This work was undertaken by Herring Storer Acoustics in consultation with relevant DEP officers and has been reviewed by the DEP. It is the DEP's view that the study has been conducted appropriately and that the results suggest that noise impacts arising from trucking movements will be within acceptable limits.

It is the proponent's view (Halpern Glick Maunsell 1996), that the study by Herring Storer Acoustics demonstrates that the proposed operation will comply with the L_{10} (18 hour) guidelines of the DEP with calculated noise levels less than 58 dB(A) at a distance of 40 m from Murat Road (this being the distance to the nearest noise sensitive premises).

Halpern Glick Maunsell, (1996) indicate that the trucking operation at start-up will operate 12 hours/day and that at 15 hours/day at ultimate production. On the basis that no truck movements are currently proposed at night the proponent (Halpern Glick Maunsell 1996) also believes that the project will comply with the night time environmental acceptance criteria.

Assessment

The areas considered for assessment of this relevant environmental factor, noise, are the mine site, transport route, port site and the Town of Exmouth. These are areas where any possible increase in noise caused by the project could have an effect.

The EPA's objective in regard to this environmental factor is "to ensure that the noise levels generated by the proposal meet statutory requirements and acceptable standards".

Noise levels for projects within Western Australia are subject to the Noise Abatement (Neighbourhood Annoyance) Regulations 1979 (existing noise regulations), which are currently the prescribed standard for noise under the *Environmental Protection Act 1986*. These regulations specify the Assigned Outdoor Neighbourhood Noise Levels for various types of noise-receiving premises for different times of the day. The EPA will shortly be considering the draft Environmental Protection (Noise) Regulations 1996, currently being prepared by the DEP.

There are currently no statutory regulations that govern road traffic noise. However, Main Roads Western Australia has a policy that traffic noise at residential locations should be restricted to an L_{10} 18 hour of 63dB(A) wherever practicable. The DEP considers that this level should be 58dB(A) wherever practicable. The DEP also considers that instantaneous (maximum) levels should not exceed 80dB(A) and preferably should be closer to 65dB(A) (EPA, 1996b).

The EPA has considered the information provided by the proponent in the PER and in its response to submissions, the findings of the Herring Storer assessment and the advice from the DEP, which indicate that the noise impacts from the proposal (mine and plant operations, construction and increase in heavy vehicle movements) would be manageable. The EPA notes the proponent's commitments that:

- all mining, processing and shiploading activities will be designed and operated in accordance with the noise provisions required by the Noise Abatement (Neighbourhood Annoyance) Regulations (Commitment 46); and
- all trucks operating on Murat Road shall comply with the Australian Design Rule noise emissions ADR 28/01. The proponent will monitor noise associated with the trucking operation along Murat Road and undertake any action to ensure compliance (Commitment 47).

Given the commitments made by the proponent in relation to noise and also the commitment to prepare an Environmental Management Plan (Commitment 1), the EPA considers that the Environmental Management Plan should include details of how the proponent will meet these commitments, in particular, those related to noise management and control.

Having particular regard to:

- limiting blasting to daylight hours;
- no night time truck movements;
- the findings of the Herring Storer assessment;

- the commitment by the proponent to prepare an Environmental Management Plan which should describe in detail the methods and procedures which will be used to achieve the DEP guidelines for acceptable noise levels and the proponent's environmental commitments and objectives for noise management and monitoring;
- pollution control provisions which exist under the *Environmental Protection Act 1986* to control noise associated with this project should a problem arise; and
- commitments made by the proponent to abide by appropriate government regulations and guidelines,

it is the EPA's opinion that its objective for this environmental factor can be met.

3.10 Marine water quality

Aspects of marine water quality

Surrounding the Point Murat jetty is an area of marine waters declared as a Prohibited Area under the *Defence (Special Undertakings) Act 1952,* which is not part of the Ningaloo Marine Park (Appendix 1: Figure 3). Beyond this area is the marine waters of the Ningaloo Marine Park. The potential for adversely affecting the marine water quality associated with loading and increased shipping, including the consequent effect on marine biota and socio-economic activities and opportunities, was raised in public submissions.

No dredging will be required in order to use Point Murat jetty as the berth depth is adequate and the jetty structurally sufficient for handling bulk cargo carriers up to 40,000 DWT capacity.

Limestone or quicklime spill

Occasional minor limestone spillage is possible but this is expected by the proponent to have negligible effect on the water quality. The limestone is inert, unprocessed, country rock and will settle immediately to the sea floor. The sea floor at Point Murat is described in the PER as bare and sandy.

If quicklime spillage occurs, the extent of impact would be related to the volume of quicklime released and the rate of dispersion, but impacts would be temporary and localised.

Hydrocarbon spills

Ships will not be fuelled at Point Murat. The potential for hydrocarbon release is therefore confined to either ballasting activities or to a ship grounding. The RAN currently operates an oil spill contingency plan covering waters adjacent to Point Murat. The plan centres on prevention of oil reaching reef areas and the use of absorbent material to remove excess oil.

An oil spill contingency plan and ballast water management plan will be formulated by Whitecrest in accordance with the requirements of the Department of Transport and the Department of Environmental Protection. Ships associated with the project will carry Prevention and Indemnity Insurance to cover costs associated with any cleanup and/or salvaging operations in the event of hydrocarbon release occurring outside waters under the control of the RAN.

According to the proponent, (Halpern Glick Maunsell 1996), there have been no significant oil spills associated with the 25 years use of the Point Murat jetty by the US Navy.

Ballast water

From past experience it is reasonable to expect the discharge of ballast water may affect the marine water quality. Ballast water carried on ships from overseas locations and discharged into Australian ports has been shown to contain a range of non-indigenous marine organisms. The Australian Quarantine and Inspection Service (1995) has introduced a set of voluntary guidelines aimed at minimising the risk of introduction of these organisms. Shippers will be required to establish a Compliance Arrangement with AQIS to ensure acceptable ballast water procedures are maintained through effective ship management. A ballast water management

plan will be formulated in accordance with the requirements of the Department of Transport and the Department of Environmental Protection.

Assessment

The area considered for assessment of this relevant factor, marine water quality, is the State and Commonwealth waters of the Ningaloo Marine Park on the eastern side of Exmouth Peninsula and south of North West Cape.

The EPA's objective in regard to this environmental factor is "to ensure that the proposal meets ANZECC marine water quality guidelines for protection of aquatic ecosystems as defined in Bulletin 711 (EPA 1993)".

The EPA notes:

- advice from the proponent that the management of marine water quality will be included in the Environmental Management Plan (Commitment 1) for the project;
- an oil spill contingency plan will be prepared which will complement the existing RAN oil spill contingency plan and provide for special procedures to be followed for the protection of Bundegi Reef (Commitment 3);
- a Ballast Water Management Plan will be prepared and will be incorporated within compliance arrangements to be established between Whitecrest's shipping operators and AQIS (Commitment 4);
- a marine survey and subsequent monitoring will be carried out for the Point Murat area (Commitments 40 & 41);
- the potential for materials spillage is considered by the proponent to be low with no long term impact on fish or marine life; and
- that no dredging is required.

As the proposal involves both Sate and Commonwealth lands and waters, the EPA considers that arrangements should be developed between the Commonwealth government and the proponent for use of and access to Commonwealth land and waters. These arrangements should take account of the advice of the DEP and the Department of Conservation and Land Management.

Having particular regard to:

- the number of shipping movements as a result of this proposal;
- the past experience of 25 years of shipping at Point Murat jetty when no adverse impact occurred;
- the proponent's commitments to develop an Oil Spill Contingency Plan and a Ballast Water Management Plan;
- the low potential for materials spillage and long term impacts on fish or marine life due to any spillage;
- the fact that no dredging will be required; and
- the proponent's commitment to conduct a marine survey and carry out future monitoring of the Point Murat area,

it is the EPA's opinion that its objective for this environmental factor can be met provided that:

- the project Environmental Management Plan (EMP) details the methods and procedures which will be used to achieve the proponent's environmental commitments and objectives for marine monitoring and reporting, and includes provision for modification of operations and/or remedial action where necessary (Section 4.2).

3.11 Ningaloo Marine Park About Point Murat

Aspects of Ningaloo Marine Park about Point Murat

The area about the load out jetty at Point Murat lies within the Ningaloo Marine Park. The Ningaloo Reef is a fringing barrier coral reef enclosing a shallow lagoon on the western side of the Cape Range Peninsula some 1200 km north of Perth. In order to protect the high conservation values of this coral reef system, and to enhance recreational use of its resources, the area has been reserved as the Ningaloo Marine Park (CALM 1989). The Ningaloo Marine Park covers an area of 4,300 km^2 and includes both State and Commonwealth waters, and a section of the coastal strip to the south of Cape Range National Park (Ministry for Planning 1996).

The Whitecrest ship load out facility is planned to be located at the existing Point Murat jetty at the northern end of the Marine Park, south of North West Cape (Appendix 1: Figures 1 and 2). The project requires shipment of limestone and quicklime from the Point Murat jetty in bulk cargo carriers of up to 40,000 DWT.

The Australian Heritage Commission (AHC) considers that any increase of shipping in the area of the Ningaloo Marine Park and Reef Tract will also increase the possibility of spillage thus potentially adversely impacting national estate values.

The PER indicates that nine marine habitats have been described in Exmouth Gulf and that only two of these habitats, beaches and sandy sea floor, exist in the vicinity of the Point Murat jetty and can therefore be affected by the project. The PER regards neither of these habitats as unique or significant. An additional habitat is the jetty itself, where abundant fish life is attracted to the marine growth on the jetty structure. Coral reefs, such as Bundegi, and nearby soft coral and sponge gardens are considered highly important marine features in public submissions.

Public submissions were concerned that increased shipping movements in the Ningaloo Marine Park could affect marine water quality through oil spills, deballasting and other sources which could impact on the adjacent Ningaloo Reef and Bundegi Reef.

The impact of the proposal on marine water quality is discussed in Section 3.10 of this report.

Assessment

The area considered for assessment of this relevant factor, Ningaloo Marine Park about Point Murat, is the State and Commonwealth waters of the Ningaloo Marine Park on the eastern side of Exmouth Peninsula and south of North West Cape.

The EPA's objective in regard to this environmental factor is "to maintain the Ningaloo Marine Park environmental values and ensure the management is consistent with the Ningaloo Marine Park Management Plan 1989-1999 (CALM 1989)".

The EPA recognises the local and national importance of the Ningaloo Marine Park and believes it is managed to meet the Government Vision 2000 statement and to specification set out in the Ningaloo Marine Park Management 1989-1999, Management Plan No 12 (CALM 1989).

More recently, the Gascoyne Coast Regional Strategy (Ministry for Planning 1996) shows land use which compliments the Vision 2000 and Ningaloo Marine Park Management 1989-1999.

The area about Point Murat jetty is of concern. An oil spill about the jetty could cause some pollution and subsequent impacts to coral reef and other parts of the marine ecology.

The Point Murat jetty is an area of marine waters declared as a Prohibited Area under the *Defence (Special Undertakings) Act 1952* and is not part of the Ningaloo Marine Park (Appendix 1: Figure 3). The PER indicates, that the Point Murat jetty is located midway between the northernmost extent of Ningaloo Reef (fronting the Indian Ocean) and Bundegi Reef (fronting Exmouth Gulf), providing unobstructed shipping access to the jetty. According to the PER, the nearest point of the Ningaloo Reef is 5 km west of the Point Murat jetty near

North West Cape and Bundegi Reef lies 2.5 km to the south of the Point Murat jetty within Exmouth Gulf.

The Ningaloo Marine Park was established as two contiguous components by the State under the *Conservation and Land Management Act 1984*, and Commonwealth using the National Parks and Wildlife Conservation Act 1974. It is managed by the Department of Conservation and Land Management (CALM) as one unit under an agreement supported by the Australian Nature Conservation Agency (Ministry for Planning 1996).

The State waters component of Ningaloo Marine Park is separated into management zones within which user activities are defined and regulated. The area around the Point Murat jetty is zoned Recreation and encompassing that zone is a General Use Zone. Shipping is permitted within the General Use Zone and, within the Recreation Zone, ships, (ie: vessels with a gross tonnage in excess of 500t) have right of passage to Point Murat jetty (CALM 1989).

To complement zoning and management of the State component, Commonwealth waters are to be managed as a General Use Zone and permitted uses include shipping (Commonwealth of Australia 1990).

The Ningaloo Marine Park, Ningaloo Reef Tract, Islands of Exmouth Gulf and Rowley Shelf, and Fairy Queen Wreck are places listed on the Register of the National Estate.

The Ningaloo Marine Park is extensive and covers some 4300 km^2 and extends from North West Cape to Amherst Point in the south. The area adjacent to the Point Murat jetty forms a small but important part of the Marine Park.

The PER suggests at the start of the project, that about 8 ships per year will be required to transport the 200,000 tonnes of limestone. The shipping will increase to about 30 ships per year to transport the 1,000,000 tonnes of limestone at the upper limit of the annual production (Section 2). The increased shipping may increase the actual risk of an adverse oil spill, but management procedures should maintain the current risk level. The PER also suggests that in respect of maritime operations the project will conform to international best practice, including shipping operations under a Compliance Agreement with the Australian Maritime Safety Organisation (AMSA).

In the 25 years of operation of the Point Murat jetty with some 5 to 9 ships per year there has been no recorded adverse spill which affected the Ningaloo Marine Park. However, the Australian Heritage Commission and the public perceive that there will be an increased risk of an adverse oil spill arising from the increased ship traffic.

The EPA notes advice from the PER and subsequent documentation (Halpern Glick Maunsell 1996) that:

- the proponent's activities in respect of maritime operations will conform to international best practice, including:
  - compliance with all existing requirements of the Australian Quarantine and Inspection Service (AQIS) regarding discharge of ballast water; and
  - shipping operations under a Compliance Agreement with the Australian Maritime Safety Organisation (AMSA);
- shipping has accessed the Point Murat jetty since proclamation of the Park and that the WA Plan of Management for Ningaloo Marine Park specifically indicates that shipping is permitted in the General Use Zone of the Park and that ships have right of passage to Point Murat jetty through the Recreation Zone (CALM 1989). The EPA recognises that the Commonwealth waters of the Ningaloo Marine Park are regarded as a General Use Zone where shipping is a permitted use;
- the Point Murat jetty has been in operation for over 25 years with no known adverse impact on the Ningaloo Reef or the surrounding environment; and
- the project will initially require 8 shipments each year and at ultimate production of 1.0 Mtpa, around 30 shipments would be required each year with shipping frequency of around one ship every 2 weeks.

Having particular regard to:

- the public concern for the values of the Ningaloo Marine Park,
- the local and national importance of Ningaloo Reef;
- the Marine Park, *Ningaloo Marine Park Management 1989 - 1999. Management Plan No. 12, Department of Conservation and Land Management*;
- the number of annual shipping movements as a result of this proposal;
- the past experience of 25 years of shipping at Point Murat jetty when no adverse event occurred; and
- past use of Point Murat jetty and the limited restrictions on shipping in the Ningaloo Marine Park,

it is the EPA's opinion that its objective for this environmental factor Ningaloo Marine Park can be met provided that:

- there is an Environmental Management Plan; and
- the public is kept informed.

3.12 Road transportation

Aspects of road transportation

Transport of materials from the mine through the town of Exmouth to Port Murat has emerged as a key social issue of concern to the community of Exmouth.

The transport corridor runs for 22 km along Murat Road from approximately 8 km south of Exmouth through to the Point Murat jetty. The proponent indicates that the existing land uses along this corridor include the town of Exmouth, the Naval Communications Station and the VLF communications towers near Point Murat. A number of proposed future developments along the transport corridor are also identified including the Exmouth Boat Harbour, expansion of the Exmouth townsite and development of additional infrastructure along Murat Road in the existing town. The main impacts with this aspect of the proposal identified in the PER are traffic safety, noise and dust on existing land users. No transport impacts are envisaged by the proponent upon the Naval Communications Station or the VLF towers.

The PER indicates that the principal area of possible traffic conflict will be the 1.8 km of road through Exmouth, where it is fronted by light industrial and commercial premises and short term accommodation facilities.

A number of the public submissions received were concerned with the transportation of materials by heavy vehicles along Murat Road and through the town of Exmouth. In summary, public submissions indicated concerns regarding the:

- number of heavy trucks movements through the town of Exmouth and potential conflict with other road users and pedestrians, including safety;
- the impact of the proposed level of trucking on existing businesses, proposed developments, the tourist industry, and residents lifestyle;
- the impact of noise and dust associated with trucking on the community and the potential for spillage;
- management measures proposed to ensure traffic and pedestrian safety; and
- alternative route options for transport such as by-pass or selection of a port location south of the town of Exmouth.

Dust and noise associated with the road transport component of the project has already been dealt with in Section 3.8 and 3.9 of this report.

The trucking operation at start-up will comprise one triple-trailer haul unit operating 12 hours/day, 6 days/week with an average traffic contribution of 24 vehicles per day or 2 movements per hour (total both directions). This represents 2% of the average daily traffic flow north/south of Exmouth and around 1% of the average daily traffic flow through the town. Total truck movements will be less than the current average daily heavy vehicle movements on Murat Road (estimated to be 5% of the general traffic flow) (Halpern Glick Maunsell 1996).

At ultimate production, four haul units will be required to operate 15 hours/day, 6 days/week with an average traffic contribution of 120 vehicles per day or 8 vehicles per hour. This represents less than 8% of the forecast average daily traffic flow north/south of Exmouth (ie: less than 4% of the average flow through town (Halpern Glick Maunsell 1996).

The proponent has indicated in the PER, and in response to submissions that it intends to cooperate with the Shire of Exmouth and Main Roads Western Australia to progressively upgrade facilities on Murat Road within Exmouth to enhance both traffic and pedestrian safety. This is expected by the proponent to include widening at key intersections, footpath extensions, trucking operations in accordance with road rules, separation distances from other road users, road maintenance and construction works and appropriate signage (Halpern Glick Maunsell 1996).

Specifically, the proponent will consult with the Shire of Exmouth, Main Roads Western Australia, and the Royal Australian Navy:

- in respect of use and maintenance of Murat Road (Commitment 5);
- to ensure that traffic procedures are put in place to ensure traffic safety, including, progressive widening of Murat Road, installation of turning lanes, signage, footpath works, construction of acceleration and deceleration lanes etc (Commitment 54); and
- to contribute towards road maintenance requirements (Commitment 55).

As an alternative to using the Port Murat facility, which necessitates the transport of trucks through Exmouth, the proponent has referred to the EPA a proposal for construction of a barge loading facility near Mowbowra Creek south of Exmouth. The EPA has yet to determine the level of environmental impact assessment required for this new proposal. However, if approved, the barge loading facility will eliminate the need for the proponent to truck its product through the town of Exmouth.

Assessment

The area considered for assessment of this relevant factor, road transportation, is Murat Road, primarily the 1.8 km section within the Town of Exmouth. This is the area where the social surroundings could be affected by road transportation from the proposal.

The EPA's objective in regard to this environmental factor, road transportation, is "to ensure that the increase in traffic activities resulting from the project does not adversely impact on the social surroundings".

The EPA is aware that there is significant concern within the community about the potential impacts of heavy vehicle movements along Murat Road through the town of Exmouth on lifestyle, local tourism, land values and socio economic effects. The EPA understands that concern is based upon a perception about noise, dust, safety and amenity.

The noise and dust impacts have been evaluated in Sections 3.8 and 3.9 and have been considered to be environmentally acceptable. To this extent the proposal does not adversely affect the social surroundings and meets the EPA's environmental objective. However, the perceptions of the community may still remain. Accordingly, the EPA considers that the proponent's proposal to export limestone and/or quicklime from the Point Murat port site should be limited to 1 Mtpa so that there is an upper limit to the number of truck movements through the town of Exmouth. Section 4.5 of this report reflects this requirement.

Having particular regard to:

- community concerns regarding safety;
- the commitments provided by the proponent in respect to traffic management and road safety; and
- the limit of 1 Mtpa,

it is the EPA's opinion that its objective for this environmental factor can be met. The EPA notes the referral by the proponent for an alternative port location south of Exmouth at Mowbowra Creek and recognises that if the Mowbowra Creek port site obtained environmental approval and necessary approvals required from other agencies, that community concerns in regard to road transportation would be greatly reduced.

Table 3: Summary of relevant environmental factors, objectives, proponent's commitments and EPA's opinions relevant to the proposal

Environmental factor	Objective	Proponent's commitments	EPA opinion
1. Karst systems.	To ensure that the recognised values of karst systems are adequately represented within the conservation estate. To ensure that where karst systems are outside of the conservation estate, land use activity is managed to maintain, as far as practicable, the recognised values.	EMP (Commitment 1) and MMP (Commitment 2) to address on-going management. Proponent to develop a protocol for notification, documentation and management of caverns discovered during mining (Commitment 38).	Proponent's commitments are considered adequate. To ensure that the recognised values of the karst landform are adequately represented within the Conservation estate, the Government should give priority to consideration for extension of the Cape Range National Park.
2. Vegetation and flora	To protect Declared Rare Flora, consistent with the provision of the *Wildlife Conservation Act 1950*, and ensure the abundance, diversity, geographical distribution, and productivity of vegetation communities are protected.	EMP to be prepared (Commitment 1). Rehabilitation (Commitment 2). Construction activities confined (Commitment 12), clearing of vegetation minimised (Commitment 13), and location of rare and endangered species of flora and fauna during clearing or mining (Commitment 14).	The EMP (Commitment 1) should detail the methods and procedures which the proponent will use in achieving its environmental commitments and objectives for vegetation and flora management.
3. Terrestrial fauna	Specially Protected (Threatened) Fauna species should be protected consistent with the provision of the *Wildlife Conservation Act 1950*.	EMP to be prepared (Commitment 1). Management procedures for fauna (Commitment 14).	The EMP (Commitment 1) should detail the methods and procedures which the proponent will use in achieving its environmental commitments and objectives for fauna management.
4. Subterranean fauna.	•to ensure that subterranean fauna are adequately protected, consistent with the provisions of the *Wildlife Conservation Act 1950*; •to maintain the abundance, diversity and geographical distribution of subterranean fauna ; and • to improve understanding of subterranean fauna through appropriate research including sampling, identification, and documentation.	EMP to be prepared (Commitment 1). Commitments to protect the aquifer will assist in protection of stygofauna (Commitments 2, 7, 10, 21-36, 48-53). Survey and document subterranean fauna throughout life of project (Commitment 37).	Proponent's commitments are considered adequate provided that it is accompanied by an approved research programme and Government gives priority to consideration for extension of the Cape Range National Park.
5. Groundwater.	To ensure that the quantity of groundwater is managed to agreed levels, and that quality is maintained consistent with the draft Western Australian Water Quality Guidelines for Fresh and Marine Waters (EPA Bulletin 711).	A range of commitments to meet the requirements of the Water and Rivers Commission and the Water Corporation (Commitments 2, 7, 10, 21-36, 48-53).	Proponent's commitments are considered adequate for mining. The proponent should investigate alternative locations for the quicklime plant.

6. Gaseous emissions (including greenhouse gases).	To ensure that gaseous emissions, including greenhouse gases and odours, both individually and cumulatively, do not cause an environmental or human health problem and meet accepted standards and limits. The proponent should use all reasonable and practicable measures to minimise the discharge of wastes, including gases.	All mining, processing and shiploading activities will be designed and operated in accordance with the noise, dust and emission provisions of the EP Act 1986 (Commitment 46)	The proponent's EMP should include requirements for greenhouse gas emissions.
7 Dust.	To ensure that the dust levels generated by the proposal meet statutory requirements and acceptable standards.	Dust control measures in accordance with the MMP (Commitments 2, 42). Quicklime protected with dust and waterproof covers during trucking operations (Commitment 43). All activities in accordance with relevant legislation (Commitment 46). Dust monitoring (Commitment 45, 47).	The proponent's EMP should include details for dust management and monitoring.
8. Noise	To ensure that the noise levels generated by the proposal meet statutory requirements and acceptable standards.	All project activities in accordance with Noise Abatement (Neighbourhood Annoyance) Regulations 1979 (Commitment 46). Monitoring of noise along Murat Road (Commitment 47).	The proponent's EMP should include details for noise management and monitoring.
9. Marine water quality	To ensure that the proposal meets ANZECC marine water quality guidelines for protection of aquatic ecosystems as defined in Bulletin 711 (EPA, 1993)	Prepare an EMP (Commitment 1). Prepare an Oil Spill Contingency Plan (Commitment 3) and a Ballast Water Management Plan (Commitment 4). Undertake Marine survey in vicinity of Point Murat Jetty (Commitment 40) and monitor marine operations (Commitment 41)	The proponent's EMP should include requirements for marine monitoring and reporting. Arrangements should be developed between Commonwealth and State government for use of and access to Commonwealth land and waters.
10. Ningaloo Marine Park.	To maintain the Ningaloo Marine Park environmental values and ensure the management is consistent with Ningaloo Marine Park Management Plan 1989-1999 (CALM, 1989)	Prepare an EMP (Commitment 1). Prepare an Oil Spill Contingency Plan (Commitment 3) and a Ballast Water Management Plan (Commitment 4).	Proponent's commitments are considered adequate provided that there is an EMP and the Public is kept informed.
11. Road transportation	To ensure that the increase in traffic activities resulting from the project does not adversely impact on the social surroundings.	Consult with the Shire of Exmouth, Main Roads Western Australia and the Royal Australian Navy in respect of use and maintenance of Murat Road (Commitment 5). Ensure that traffic procedures are put in place to ensure traffic safety, including, progressive widening of Murat Road, installation of turning lanes, signage, footpath works, construction of acceleration and deceleration lanes etc (Commitment 54). Contribute towards road maintenance requirements (Commitment 55).	Proponent's commitments are considered adequate. The EPA notes that if the Mowbowra Creek port site obtained environmental and other approvals, the community concerns would be greatly reduced.

4. Conditions and procedures

In the EPA's opinion, the proposal should be subject to the following conditions and procedures if implemented:

4.1 Proponent's commitments

The proponent's commitment's set out in the PER and subsequently modified (letter of 31 October 1996), as summarised in Table 3, should be made enforceable conditions.

4.2 Environmental Management Plan

That, prior to construction, the proponent should prepare the Environmental Management Plan (EMP) required under Commitment 1. The EMP should detail the methods and procedures which the proponent will use in achieving its environmental commitments and objectives for the mine site, port facility and transport route, and include provision for modification of operations and/or remedial action where necessary. The EMP should include, but not be limited to, the following:

1. Notification and management of significant caves;

   The EMP should incorporate a protocol for notification, documentation and management of any large or significant caves that may be encountered during mining operations.

2. Research on subterranean fauna;

   The EMP should define a research programme including sampling, identification and documentation of subterranean fauna on and in the vicinity of the mining lease.

3. Marine monitoring and reporting;

4. Product containment measures and contingencies for product spillage;

5. Protection of flora and fauna, including fire and weed management;

6. Greenhouse gas emissions (quicklime plant);

   At appropriate times, the proponent should address the following matters relating to greenhouse gas emissions:

   - calculate the greenhouse gas emissions associated with their proposals (using the generally accepted methods);
   - indicate the measures adopted to limit greenhouse gas emissions for that project;
   - estimate the comparative greenhouse gas efficiency of the project (per unit of product and / or other agreed performance indicators) with the efficiency of other comparable projects producing a similar product; and
   - consider entry (whether on a project-specific basis, company-wide arrangement or within an industrial grouping, as appropriate) into the Commonwealth Government's "Greenhouse Challenge" voluntary cooperative agreement programme. The agreement would include, an inventory of emissions; opportunities for abating greenhouse gas emissions in the organisation; a greenhouse gas mitigation action plan; regular monitoring and reporting of performance; and independent performance verification.

7. Surface water monitoring and management;

8. Dust

   - Dust management measures for the mine, port facility and transport route, including quicklime spillage procedures.
   - A monitoring and audit programme for dust emissions as a means of gauging the effectiveness of dust control measures.

9. Noise

   - Noise management measures for the mine, port facility and transport route.
   - A monitoring and audit programme for noise emissions as a means of gauging the effectiveness of noise control measures.

10. Rehabilitation of disturbed areas

11. Social impacts

To reduce social disruption to the Town of Exmouth, the proponent should maintain formal liaison and monitoring processes at appropriate times with the Shire of Exmouth.

12. Development of a comprehensive monitoring, management and reporting programme for the above.

to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

4.3 Use of Commonwealth land and waters

That arrangements should be developed between the Commonwealth government and the proponent for use of and access to Commonwealth land and waters and that these arrangements should take account of the advice of the DEP and the Department of Conservation and Land Management.

4.4 Quicklime plant

That, the proponent should undertake a study in relation to the proposed quicklime processing facility which:

(a) identifies and evaluates alternative sites with a primary objective of protecting groundwater values;

(b) includes public and government agency consultation; and

(c) reports its findings, including an indication of a preferred site(s) which meets relevant environmental objectives, to the EPA for consideration and, if required, assessment.

4.5 Export of product from Point Murat port facility

That the proponent should refer any proposal to increase the export of limestone and/or quicklime from the Point Murat port site beyond 1 million tonnes per annum to the Environmental Protection Authority.

4.6 Decommissioning and rehabilitation plan

The PER indicates that progressive rehabilitation will be an integral part of site works and a major component of the development of the mine from its earliest stages. The major objectives of the rehabilitation programme will be to:

- restore the environmental value of any disturbed areas which are not required to remain cleared for operational purposes so that they complement adjacent undisturbed areas. This will be achieved by establishing a cover of vegetation that is as representative of the indigenous vegetation as practicable; and
- ensure public safety through meeting the requirements of DME.

Rehabilitation areas will be monitored for any necessary follow-up work required to protect and sustain the developing vegetation and will continue until such time as the vegetation is shown to be established and self sustaining. The success of revegetation will be monitored annually.

The EPA considers in regard to the mine site, that although the preliminary indications for management have been outlined, more detailed studies are still required. These studies will better define the long term performance characteristics and rehabilitation potential of the mine site and clarify the effect of its operation on the environment.

Therefore the EPA recommends that within five years of commissioning the project, or at such later time considered appropriate by the Minister for the Environment on the advice of the Environmental Protection Authority, the proponent should prepare and subsequently implement a plan which:

- describes the process for the decommissioning and rehabilitation of the project area; and
- provides for the development of a 'walk away' solution for the decommissioned mine site, the quicklime plant, haul road, port site and associated infrastructure,

to the requirements of the Environmental Protection Authority on the advice of the Department of Environmental Protection, the Department of Minerals and Energy and the Water and Rivers Commission.

Note: A 'walk away' solution means that the site shall either no longer require management at the time the proponent ceases operations, or if further management is deemed necessary, the proponent shall make adequate provision so that the required management is undertaken with no liability to the State.

4.7 Environmental management system

The proponent should be required to prepare and implement an environmental management plan and environmental management procedures in order to implement the proposals and manage the relevant environmental factors to ensure the EPA's objectives (Section 3) are met. The plan should adopt quality assurance principles (such as those adopted in Australian Standards ISO 9000 series) and environmental management principles (such as those adopted in the voluntary Australian Standards ISO 14000 (Int): 1995 series), with appropriate monitoring and auditing to ensure compliance with this condition.

5. Other advice

5.1 Integrated approach to planning and environment of the Cape Range peninsula

The Cape Range peninsula is an area of special environmental importance for a number of reasons, and its management requires an integrated approach. In this regard, the following reports and features of the area need to be taken into account the:

(a) Gascoyne Coast Regional Strategy;
(b) Government statement setting out New Horizons in Marine Management;
(c) Legislative Council's Select Committee's First Report on Cape Range National Park;
(d) Symposium on the Biogeography of Cape Range;
(e) draft report on Karst Management Considerations for the Cape Range Karst Province;
(f) Structure Plan for the Exmouth/Learmonth area being developed by the WA Planning Commission;
(g) Cape Range National Park, and proposals for its extension;
(h) Ningaloo Marine Park;
(i) presence of the Exmouth Water Reserve; and
(j) the array of activities either being undertaken or proposed in the multiple use areas, such as town, tourism, mining, oil and gas exploration, aquaculture and fishing.

The integrated management approach needs to be based on environmental and biogeographic regions such as watersheds even though they are small by most standards, and include the adjacent waters especially the Ningaloo reef. The important environmental factors of the area should be of prime consideration and be given attention in the planning process.

As set out in section 3.2, one of the most important factors of the Cape Range peninsula is its karst landscape (small voids through to caves, ranging in size from millimetres to metres) formed primarily as a result of selective chemical dissolution of limestone by natural waters. As identified in section 3.5 these voids are the habitat for an array of very small, mostly invertebrate, subterranean animals which have an ancient set of taxonomic relationships, and thus the landscape has high scientific value. Some of the animals live in the air voids in the ground above the water table and others live in the voids filled with water.

The voids within the limestone landscape of the area are thought to be randomly distributed, and thus it is not possible either through borehole drilling or geophysical mapping to understand the extent or nature of the habitat. Also, it is not known whether the various species are widely distributed or whether they are restricted to very small areas. Accordingly, there will be uncertainty associated with each proposal which has the potential either to physically remove part of the landscapes (limestone quarrying, urban development, harbour development, etc) or to affect the water balance (water extraction).

Further research, undertaken over time, will gradually add to our understanding of the distribution of the animals living in the karst landscape, but this can not be done quickly for a variety of reasons, including the random distribution of the voids and the small number of researchers, both field and taxonomic, available in this specialised area. In the meantime, projects, if developed, are likely to result in the taking of some of these subterranean animals of scientific importance.

The challenge before us as a society is for all of those with an interest in the karst nature of the Cape Range peninsula – government officers, planners, developers, researchers and community groups – to recognise the scientific importance of the array of animals in the karst landscape, as small as they might be as individuals, and to progress research and management in a manner which provides for continuous understanding of the subject and continuous improvement in the management strategies. As set out by the International Union for the Conservation of Nature and Natural Resources in one of its guidelines for cave and karst protection, "effective planning for karst regions demands a balanced consideration of economic, scientific and human values, within the local cultural and political context and in a way which is congruent with that context."

The foregoing has focussed on the karst landscape as an important element of the Cape Range Peninsula. However, this is just one of a number of important aspects which need to be considered in the long term management of the area, not only because of the current development proposals but also because there are likely to be an array of proposals presented for consideration over time.

The EPA proposes that the Government takes action to:

(a) give high priority to the planning process for the area and ensure that this is integrated with the environmental considerations through a joint approach by the planning and environmental authorities;

(b) ensure that land use is defined in a timely manner;

(c) give priority to a consideration of the proposals in various reports to extend the Cape Range National Park and to consider other extensions which may be relevant in the light of additional information which may now be available;

(d) apply the principles and goals in the National Strategy for Biodiversity to sustainable development, planning and appropriate management of the area;

(e) require projects and operators within the Cape Range area to develop and implement environmental management plans and systems approaching or equal to or better than the requirements of Standards Australia ISO14000 (draft) series. To complement these standards, memoranda of understanding and codes of practice may be developed;

(f) encourage research and management to be undertaken in a manner which provides for continuous improvement of understanding of the important elements of the environment and continuous improvement in environmental management, and noting that where appropriate the industry and developers should contribute to the research;

(g) pursue the management of the Cape Range peninsular as a whole-of-government approach with a view to all interested parties – government officers, planners, developers, industry, researchers and community groups – recognising the importance of the area and the need for an integrated approach to environmental management of the highest standard. This should include the development and implementation of consistent, integrated environmental management programmes by all land managers and developers across the peninsular. The Exmouth Coastal Strategy (Shire and CALM) provides a good example of integrated management, and these principles should be extended across the peninsular.

(h) establish a technical Environmental Management Group, comprising relevant government agencies and the Shire, to advise it on, and facilitate:

- integration of environmental management for the peninsula;
- on-going research and investigation needs; and
- review of performance of individual environmental management programmes for the peninsula.

If established, the Group could review and report on on-going performance of the EMP for the Whitecrest mine, if it is implement.

5.2 Proposed environmental policy

With increasing development in the Exmouth-Cape Range area, there is a need for improved environmental policy for the area, particularly in relation to karst landscape and subterranean fauna. In response to this the EPA intends to develop an environmental policy for the Exmouth-Cape Range area to assist the assessment of development proposals, and overall environment management of the area.

6. Recommendations

The EPA submits the following recommendations:

Recommendation 1

That the Minister for the Environment notes the relevant environmental factors and the EPA objective for each factor as set out in Section 3 of this report.

Recommendation 2

That the Minister for the Environment notes that subject to the satisfactory implementation of the EPA's recommended conditions and procedures of Section 4 of this report, including preparation of an Environmental Management Plan and the proponent's environmental management commitments, the proposal can be managed to meet the EPA's objectives.

Recommendation 3

That the Minister for the Environment imposes the conditions and procedures set out in Section 4 of this report.

Recommendation 4

That the Minister for the Environment notes that there has been a number of previous planning and scientific studies which have recommended extension of the Cape Range National Park. The EPA recommends that the Government give priority to consideration of the proposals in these various reports to extend the Cape Range National Park and to consider other extensions which may be relevant in light of additional information particularly covering the coastal plains and foothills.

Recommendation 5

That the Minister for the Environment notes the EPA's views on the need for an integrated approach between planning and environment for the Cape Range peninsula presented in Section 5 of the report, and takes appropriate action to address the EPA's proposals regarding this.

Recommendation 6

That the Minister for the Environment notes that the EPA intends to develop an environmental policy on development within the Exmouth—Cape Range area to assist in the management of the area and the assessment of development proposals.

Appendix 1

Figures

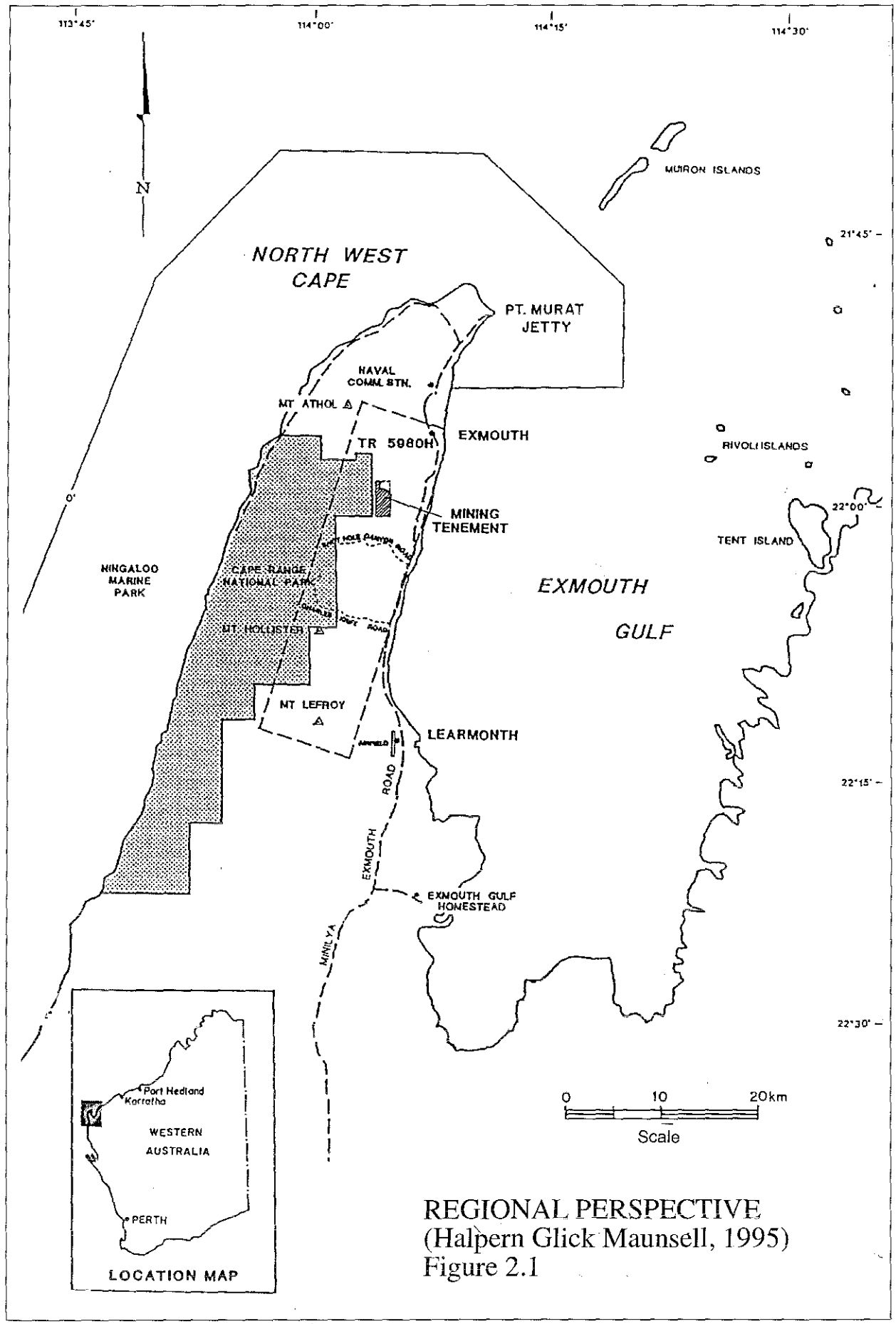

Figure 1. Location of project tenements (Source: Halpern Glick Maunsell, 1995a).

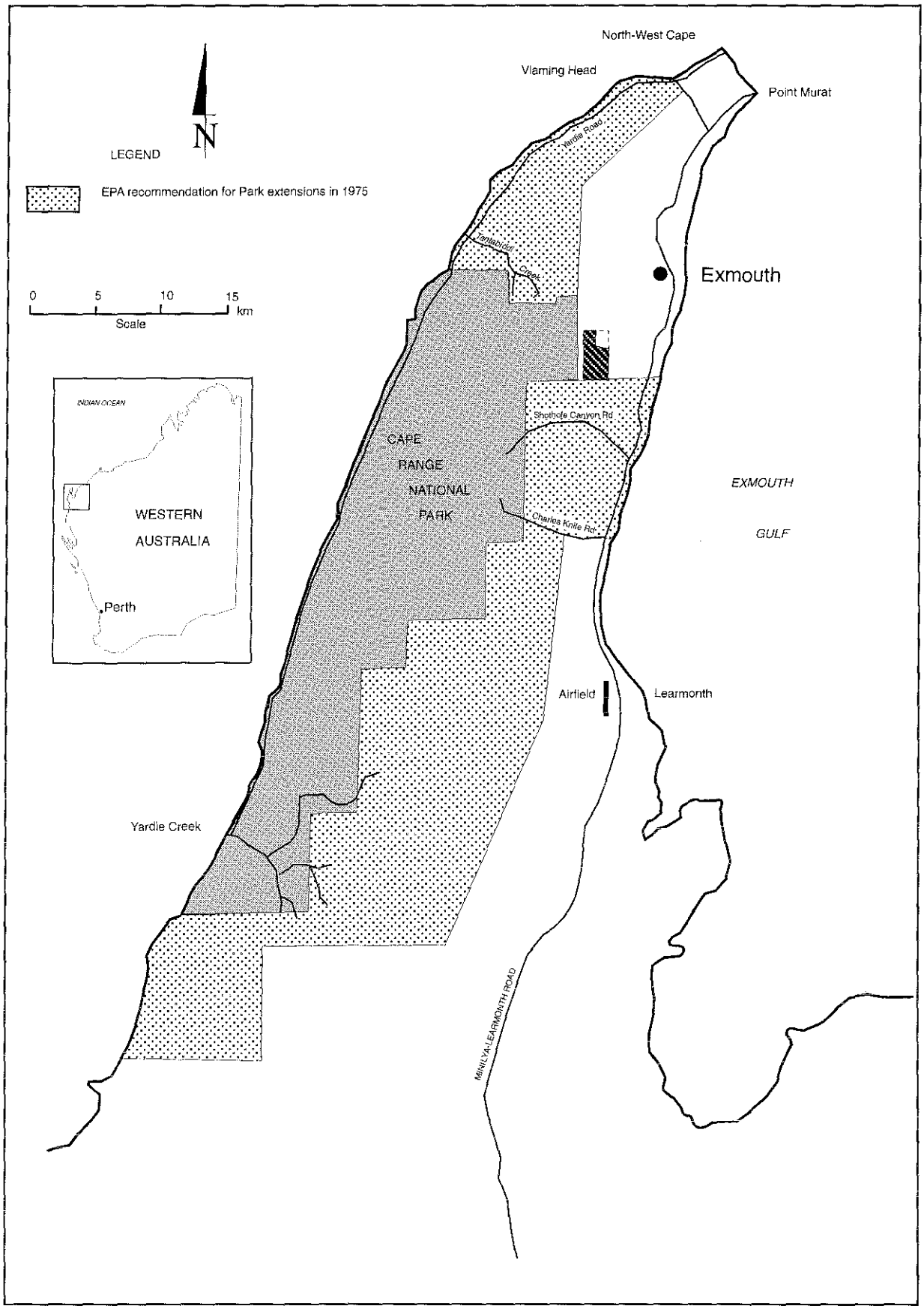

Figure 5. EPA recommendations for extensions to Cape Range National Park (1975).

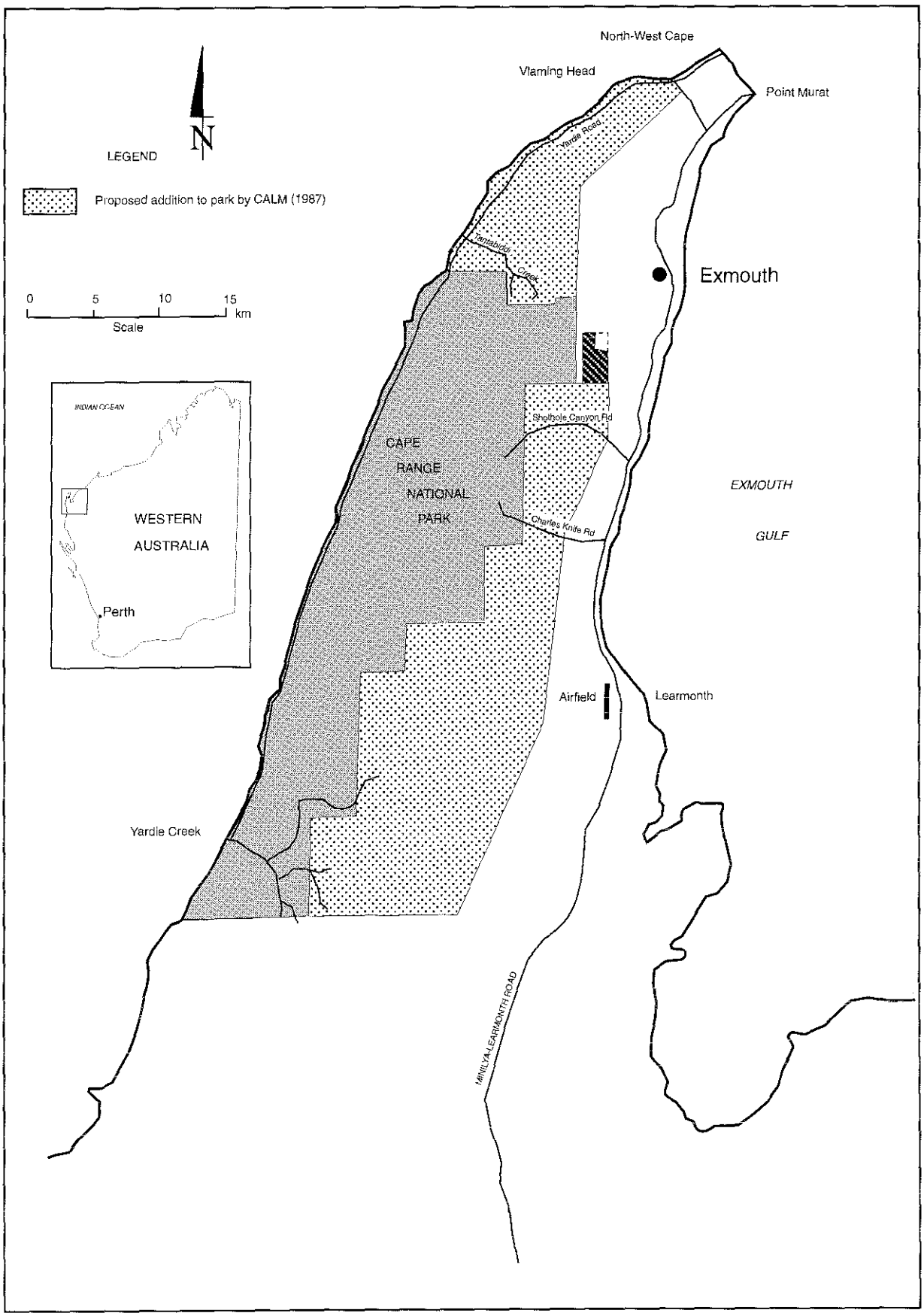

Figure 6. CALM prescription for extensions to Cape Range National Park (1987).

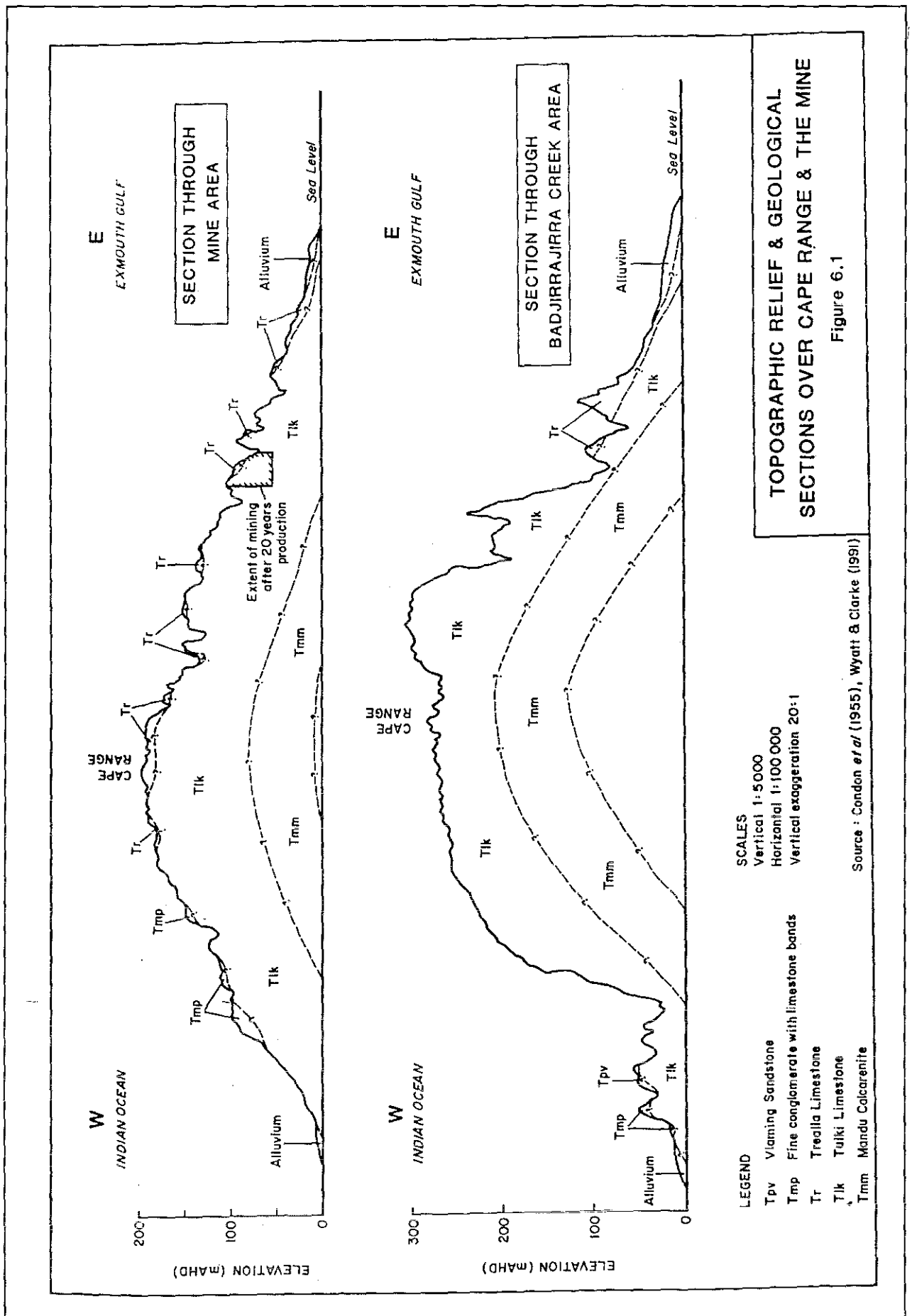

Figure 7. Topographical relief, geology and location of the water table over Cape Range and the mine (Source: Halpern Glick Maunsell).

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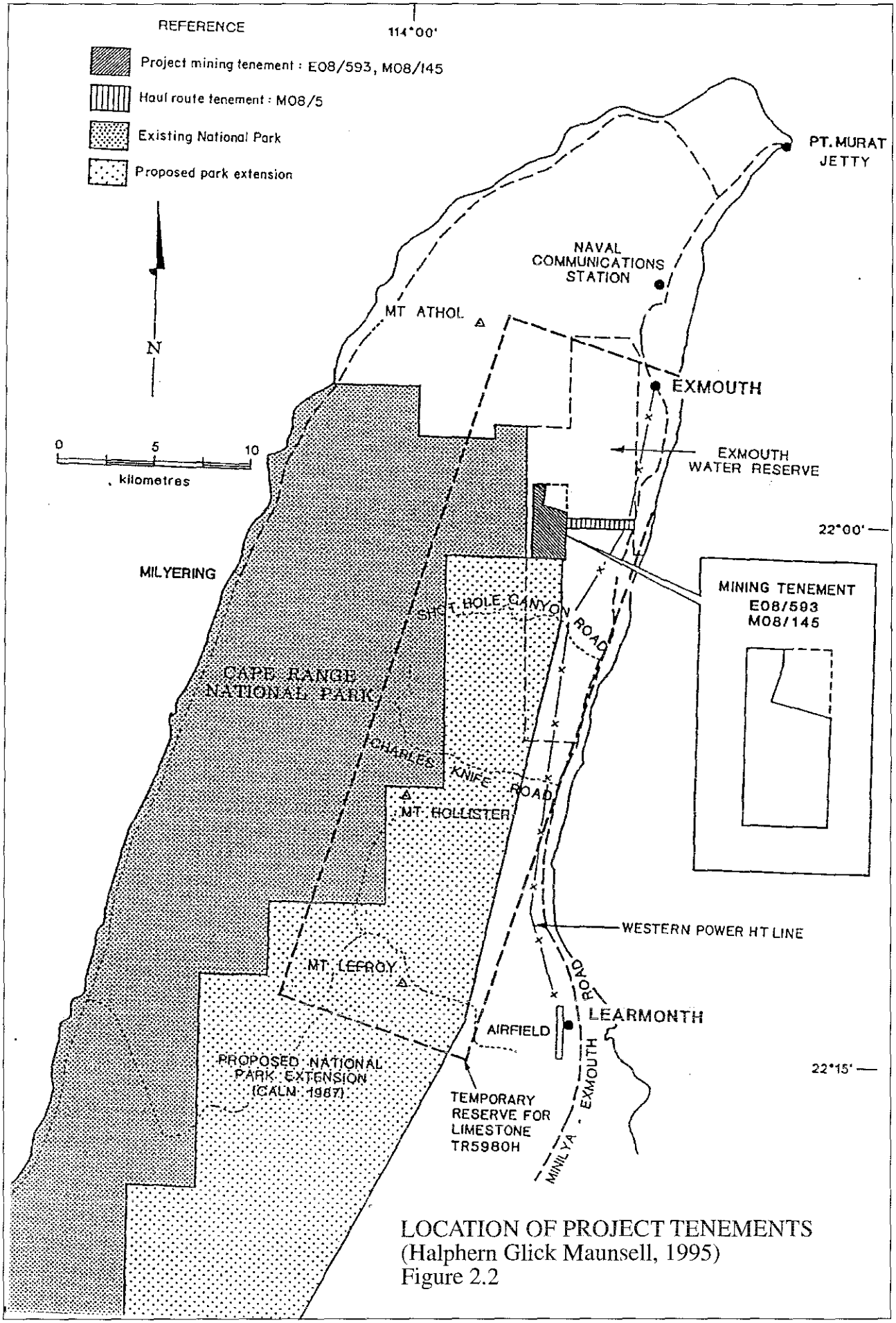

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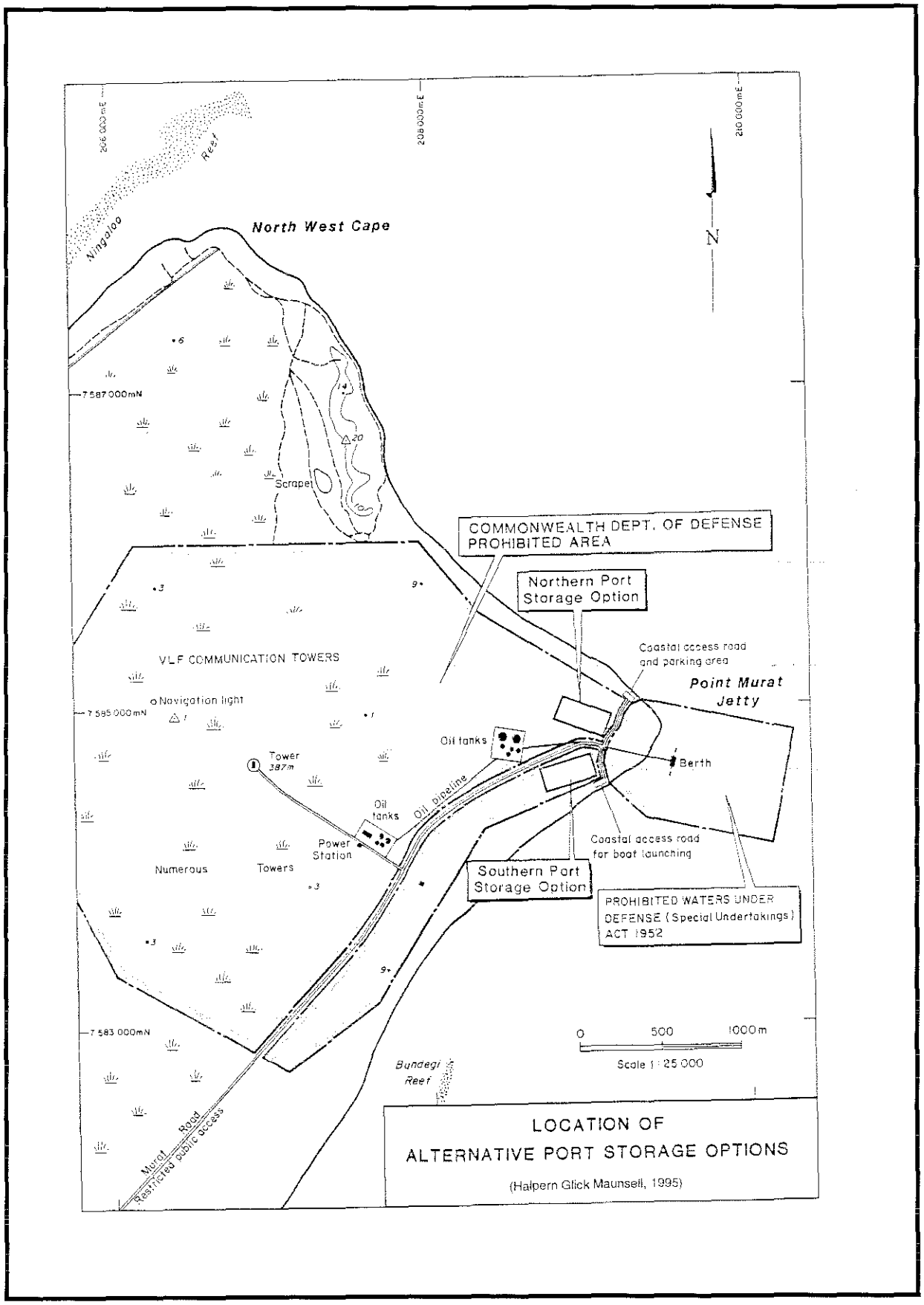


Figure 3. Point Murat (from Halpern Glick Maunsell, 1995).

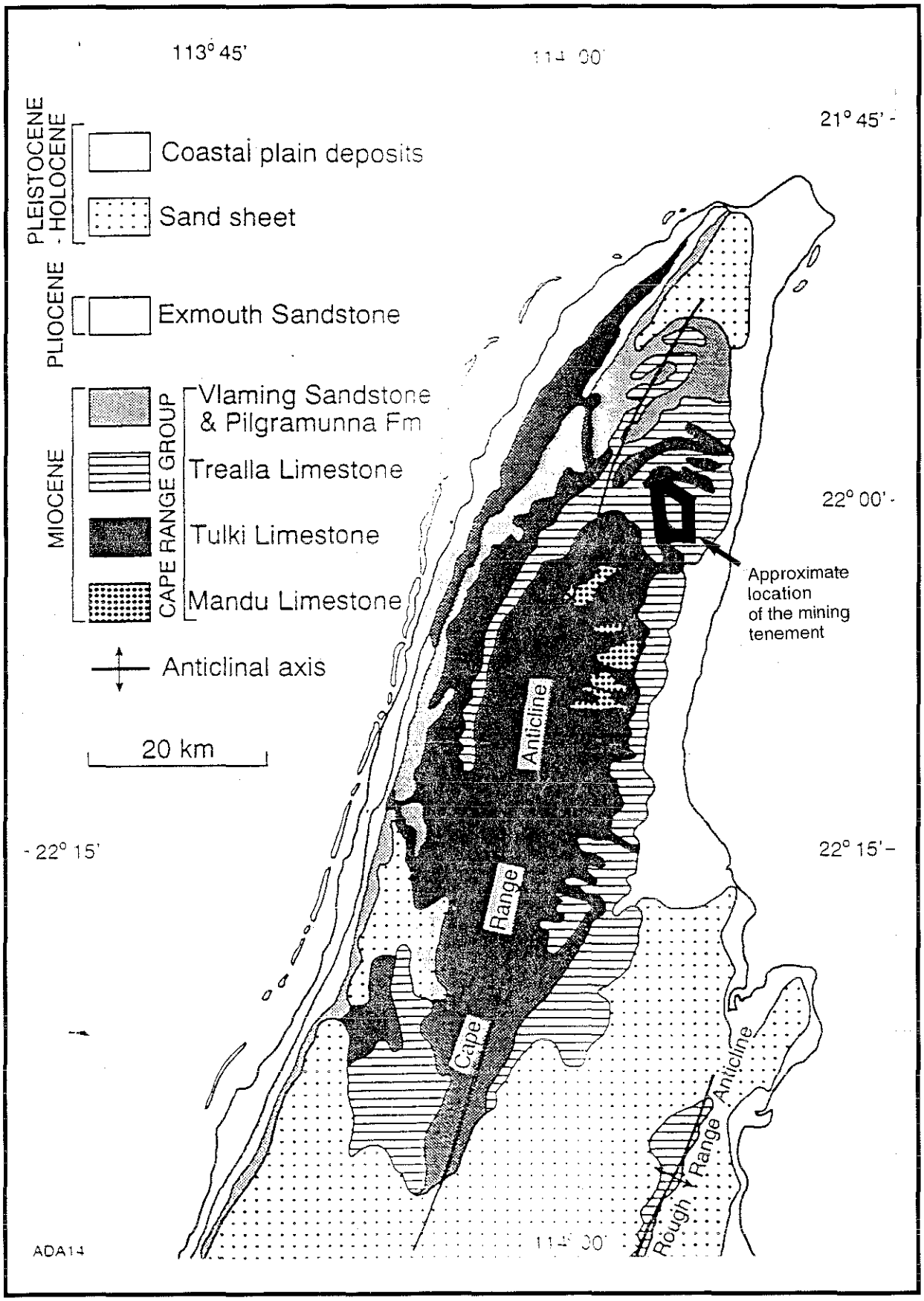
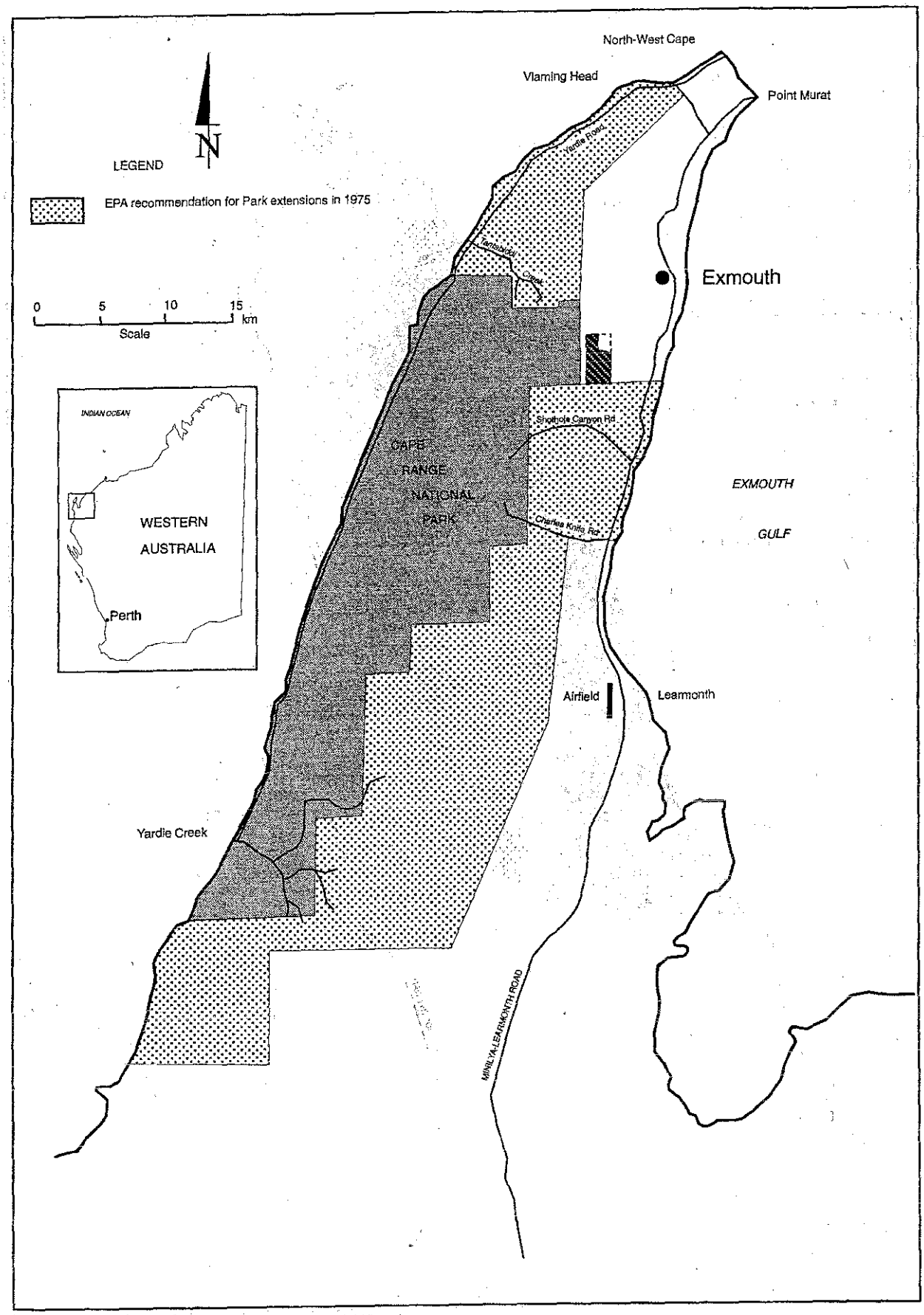


Figure 4. Generalised geology (from Allen, 1993).



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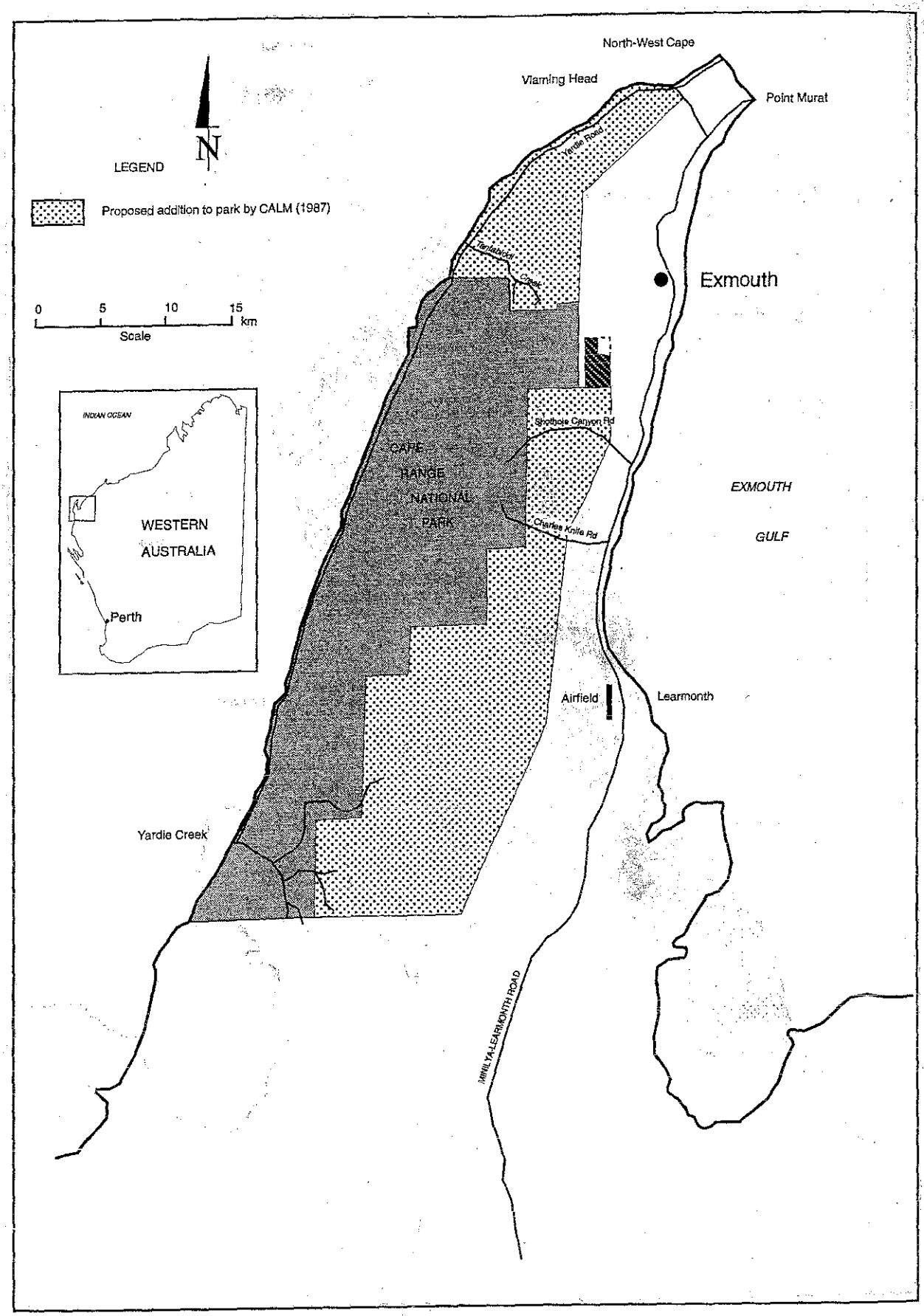

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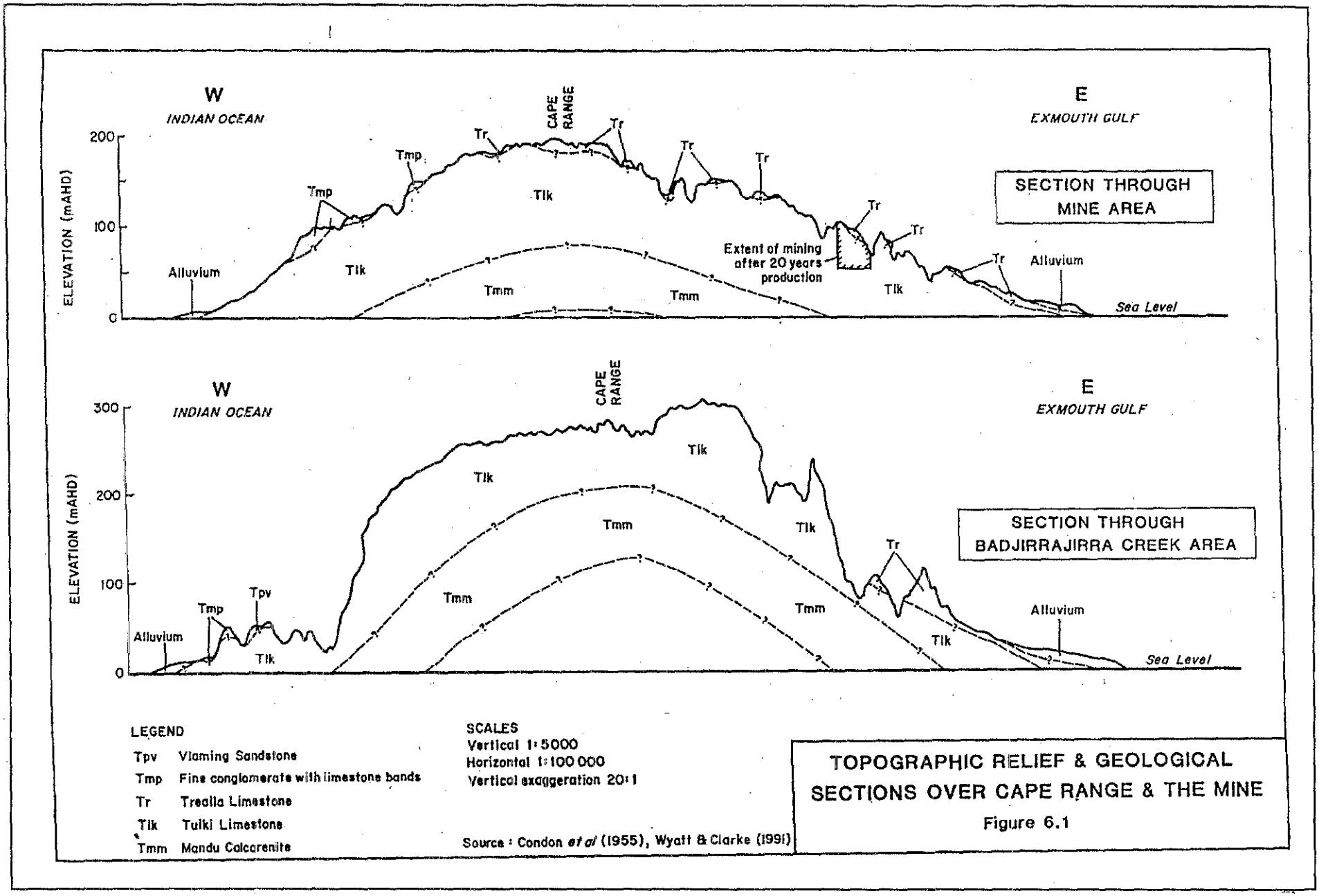

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