THE NORTHERN TERRITORY OF AUSTRALIA

Copy No. 1

CONFIDENTIAL

CABINET DECISION

NO. 649

Submission No.: 566

Title: YULARA TOURIST VILLAGE

Cabinet approved:

a) the commencement of the development of the Yulara tourist village, generally in accordance with the Development Plan of December, 1978;

b) the programming and construction of the N.T. Government component of facilities for the village, aerodrome and associated roadworks through Northern Territory Civil Works Programme, under the sponsorship of the Territory Parks and Wildlife Commission;

c) advancement of the proposed aerodrome and associated works ($2,530,000) to the 1979/80 Capital Works Programme; and

d) the employment of a Project Liaison Officer on a contract basis by the Territory Parks and Wildlife Commission to represent the Commission during the design, documentation and construction of the project.

(M.R. FINGER),
Secretary to Cabinet.

10 April, 1979.

CONFIDENTIAL

THE NORTHERN TERRITORY OF AUSTRALIA

Copy No. 1

CONFIDENTIAL

FOR CABINET

SUBMISSION NO. 566

Title:	YULARA TOURIST VILLAGE
Cabinet Member:	The Honourable P.A.E. Everingham, M.L.A. Chief Minister
Purpose:	To approve commencement of construction of the Yulara Tourist Village, aerodrome and associated engineering services.
Relation to existing policy:	Conforms with existing policy on planning for the proposed village (Decision No. 281 of April, 1978 refers)
Timing/ legislative priority:	Urgent. No legislative requirements
Announcement of decision, tabling, etc.:	Appropriate publicity should be given following a favourable decision
Action required before announcement:	Await receipt of public review comments which close on 9 April, 1979
Staffing implications, numbers and costs, etc.:	Necessitates the engagement of a Project Liaison Officer on a contract basis for the term of the project (estimated cost $30,000 per annum)
Total cost:	Interim Stage (1984) - $12.50 m Ultimate Stage (1986) - $15.57 m

CONFIDENTIAL

YULARA VILLAGE

Comment by Under Treasurer:	I would recommend that the Cabinet adopt the Report as the basis of its further development at Yulara; agree in principle to the development; approve the immediate employment of the project coordinator so that the preliminary documentation can begin.
	P. J. Temple for A B ASHLEY UNDER-TREASURER
	Approved/Not Approved
Signed:	
Date:	29/3/79
Comment by Public Service Commissioner:	
	Approved/Not Approved
Signed:	
Date:	

CONFIDENTIAL

YULARA TOURIST VILLAGE

Comment by Under Treasurer:	
	Approved/Not Approved
Signed:	
Date:	
Comment by Public Service Commissioner:	. Need to consider capacity of Transport and Works to perform role of Project Liaison Officer. . In view of time span for construction suggest liaison with this office regarding level and terms of employment for Project Liaison Officer.
	~~Approved/Not Approved~~
Signed:	R.G. HORN for PUBLIC SERVICE COMMISSIONER
Date:	26/3/79

CONFIDENTIAL

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CABINET SUBMISSION - YULARA TOURIST VILLAGE

DEPARTMENT OF LAW

There are no constitutional barriers to this proposal.

There appear to be no legal barriers to this proposal, although regard should be had to the vesting of the national park in the Director of the National Parks and Wildlife Commission, and the Aboriginal land claim under the Aboriginal Land Rights (Northern Territory) Act to the national park, townsite and surrounding unalienated Crown land.

G R NICHOLSON
Crown Solicitor

29 March 1979

THE ISSUES

1. Approval is sought to commence construction of the Yulara Tourist Village, aerodrome and associated engineering services generally in accordance with the Development Plan of December, 1978 (attachment "B").

BACKGROUND

2. By Decision No. 281 of April, 1978, Cabinet endorsed the following guidelines for the planning of the Yulara Tourist Village :-
   (a) the planning and construction of the Yulara Village to service the Uluru (Ayers Rock/Mt. Olga) National Park be undertaken by the Northern Territory Government with a target completion by 1984;
   (b) the Northern Territory Government will construct the infrastructure services to provide for its own building requirements and to provide serviced leases for private development of tourist facilities, with a target completion by 1982; and
   (c) the management and control of the tourist village to be under the control of the Territory Parks and Wildlife Commission.

3. Contracts are in the process of being let for the interim access road and water supply works ($500,000) as approved by Decision 560 of January, 1979. Cash expenditure of $300,000 should be achieved in 1978/79.

4. The Yulara Village Development Plan of December, 1978, has been widely circulated throughout Government, interested organisations and the tourist industry generally. The report has also been made available for public review throughout Australia, with comments being requested by 9 April, 1979.

The public review meets some requirements of the Town Planning Board and the Commonwealth Department of Science and Environment.

CONSIDERATION OF THE ISSUES

5. The need for the new village has been the subject of numerous investigations, committees of inquiry, reports and considerations by Governments for the past ten years. The importance of the proposed village to tourism in Australia and in particular to the Northern Territory is significant and requires a variety of facilities up to an international standard.

6. The target completion dates envisaged in Decision 281 have been incorporated in the Development Plan's programming network and are achievable if there is an early commencement of construction in 1979/80.

7. The existing airstrip at the base of Ayers Rock has been a major concern for many years. The recent announcement of the introduction of F27 aircraft to operate the route necessitates advancement of construction of the proposed new aerodrome to 1979/80. Design of the aerodrome has commenced and it is expected that tenders could be called in June, 1979.

8. Stage I of the Petermann Road (Erlunda to Angus Downs) is currently under construction. Stage II has been programmed separately on the 1979/80 Civil Works Programme and the road should be completed by December, 1981 which assists the completion of the village infrastructure services. The completion of the first new campground at the village site has been programmed to cater for the anticipated upsurge in road visitors following completion of the new road.

9. A major implication of this important development in the arid region is the control of environmental standards and impacts,

during the design and construction stages. It is also important to integrate the Government and private developments at Yulara in terms of design and construction. A Project Liaison Officer will be employed by the Territory Parks to represent the views of the Commission and provide necessary liaison with the Department of Transport and Works during the design and construction stages.

10. An Aboriginal land claim has been made over the National Park and surrounding region, including the village site. This claim is being contested on the basis that the village site is a proclaimed townsite. A decision of the Government to proceed with construction of the Village could influence the hearing of the land claim. If the land claim is successful it may be possible to negotiate a lease, as has been done in the Alligator Rivers Region.

OPTIONS

11. The first option available is to not move the existing tourist facilities. This would require considerable improvement and expansion of the existing facilities and has substantial environmental and cost implications. It would also have a severe adverse effect on tourism in Australia in view of the national importance of the "Rock". This option is contrary to all recommendations made by numerous authorities over the past ten years.

12. The alternative option is to relocate all tourist facilities to the Yulara townsite. This option is the most economical solution to cater for increasing numbers of visitors to the Park and still conserve the national attractions of the Park. Initially, it is proposed that the village should be constructed to an interim stage to accommodate a total population (visitors and residents) of 4200 persons with a target completion of 1984.

Should tourist projection figures prove realistic over the next few years, the Development Plan allows for further expansion of the village to provide for a maximum of 6100 population by the end of 1986.

THE PUBLIC IMPACT OF THE RECOMMENDATION

13. Indication of a favourable decision on early commencement of the Village has been favourably received by the tourist industry. Commencement of a project of this size will assist the currently depressed construction market in the Central Australian region.

FINANCIAL CONSIDERATIONS

14. The preliminary estimates of cost for the project detailed in the attached Development Plan, are summarised as follows:-

	Interim Stage (1984)	Ultimate Stage (1986)
Village Services	7.02 m	8.45 m
Government Buildings (excluding Commonwealth)	2.78 m	4.42 m
Aerodrome	2.20 m	2.20 m
Telecommunications	.50 m	.50 m
	$12.50 m	$15.57 m

15. Estimated annual cash requirements for the interim stage development, excluding the Petermann Road, are as follows:-

1979/80	1980/81	1981/82	1982/83	1983/84
$2.70 m	$4.47 m	$1.59 m	$2.04 m	$1.40 m

16. Inclusion of this project in the Northern Territory Civil Works Programme is subject to agreement with the Commonwealth on a satisfactory base level for Civil Works. This matter is currently

under discussion with Commonwealth officers who have indicated their support for this project because of its national significance.

17. In discussions with Treasury officials it is not proposed that the level of subsidisation for services at Yulara Village, following construction and leasing, should be any greater than other communities in the Northern Territory. This matter will be the subject of a further submission on the management of the tourist village by the Territory Parks and Wildlife Commission.

CO-ORDINATION

18. The Departments of the Treasury, Chief Minister, Law, Transport and Works, Community Development and Industrial Development, and the Public Service Commissioner have been consulted and their respective comments are reflected in this submission and the attachments. (Attachment "A")

A

PUBLICITY

19. Appropriate publicity should be prepared for national release to all media if a favourable decision is given.

TIMING

20. An early favourable decision on this submission will ensure achievement of the completion dates envisaged in Decision 281 and the Development Plan Programming network. It will also enable early commencement of works through inclusion on the 1979/80 Civil Works Programme.

21. It is recommended that Cabinet approve:-

(a) The commencement of the development of the Yulara tourist village, generally in accordance with the Development Plan of December, 1978;

(b) the programming and construction of the N.T. Government component of facilities for the village, aerodrome and associated roadworks through Northern Territory Civil Works Programme, under the sponsorship of the Territory Parks and Wildlife Commission.

(c) Advancement of the proposed aerodrome and associated works ($2,530,000) to the 1979/80 Capital Works Programme.

(d) the employment of a Project Liaison Officer on a Contract basis by the Territory Parks and Wildlife Commission to represent the Commission during the design, documentation and construction of the project.

The Honourable P.A.E. Everingham, MLA
Chief Minister.

ATTACHMENT "A"

MEMORANDUM

TO: DIRECTOR
TERRITORY PARKS & WILDLIFE COMMISSION

DATE: 26/3/79

FROM: DIRECTOR GENERAL

REF: 78/185

RE: DRAFT CABINET SUBMISSION - YULARA TOURIST VILLAGE

Comments by this department concerning the above are as follows:

Page 3/4, Para 3. Final Submission will no doubt take into account any public comment resulting from public review throughout Australia.

Page 4, Para 8. Mr Lynagh considered it important that Stage 2 of Petermann Road be brought forward to time-in with heavy traffic which would be utilizing the road during the construction phase. If the road was not sealed high freight costs would result. This could be a major deterrent to construction.

Mr Dacey believed the freight/cost factor was exaggerated and whether the road was sealed or not would make little impact on construction costs. A cost-benefit analysis would result in more delays. Additionally, if Petermann Road was sealed it would result in a premature upsurge of visitors to the park before camping and other facilities were available. This would be most undesirable from a control and environment point of view.

Territory Parks and Wildlife should re-examine this aspect and clearly ascertain the advantages/ disadvantages of bringing Stage 2 forward. These findings should be spelled out in the Submission.

Page 5, Para 9. There is firm support for T.P.W.C. to be responsible for the planning, construction and management of the village. It was agreed that the experience and calibre of the proposed project officer would be critical to achieve the most economical and effective construction, and co-ordination of village development.

It was important that consultation take place between T.P.W.C. and the Office of Special Development Projects (which should accrue considerable experience from Jabiru) and with the Town Planning Board, Department of Lands and Housing.

Page 5, Para 10. The submission skims over the significance and relevance of the Aboriginal Land Claim. While it is noted that the village-site is a proclaimed town-site the question of what would happen if the Land Claim over the National Park was found in favour of the Aboriginals, is left begging.

....2/

The implications of a successful Aboriginal Land Claim over the National Park needs to be fully spelled out.

Pages 5-6, Para 11. The argument concerning the importance of a National Park and the proposed village could be strengthened by pointing out the village's significance to tourism on a National basis. Many overseas visitors come to Australia to see "the reef" and "the Rock" - all States stand to gain from the spin-off that these attractions generate.

Page 8, Para 16. The alleged support of Commonwealth officers in relation to financial arrangements should be checked with Treasury. While it is agreed there was sympathy for the proposals, no commitment has been made.

Aboriginal Involvement

While not immediately relevant to the current Submission, the need for Aboriginal representation and involvement, other than being mere peddlers of artifacts, requires consideration and planning. The attitude of the Commonwealth Government (folio 187) also requires taking into account. Adequate provision for participation by Aboriginals in the project might offset some of the criticism implicit in Commonwealth attitudes. Aboriginal involvement should be thoroughly investigated and specific proposals embodied in later Submissions concerning Village Park management proposals. These should embrace appropriate training and employment opportunities in hotel/motel services and catering, village servicing contracts, Park Rangers, etc. It is also considered that there ought to be direct Aboriginal representation in any village management committee or body that might later be established.

(M.R. FINGER)

Telex: ELANT 85 338

Telephone: 81 4488

Our Ref : 78/1809
Your Ref: 79/62

SECRETARY,
DEPARTMENT OF INDUSTRIAL DEVELOPMENT

P.O. BOX 5160,
DARWIN, N.T. 5794
AUSTRALIA

26 March 1979

Director
Territory Parks & Wildlife
Commission
P O Box 38496
WINNELLIE N T 5789

(Attention : Mr T M Dacey)

I refer to your memo of 20 March about the Yulara Tourist Village, of which I have made a quick study.

I can see no reason to alter the draft except that Cabinet may well query what is to be done about accommodating the increasing numbers of tourists until the village is completed. Will existing operators be permitted and encouraged to expand their facilities?

It would seem important for that particular issue to be clarified.

C G ADAMS
Secretary

NORTHERN TERRITORY OF AUSTRALIA

DEPARTMENT OF TRANSPORT AND WORKS

P.O. BOX 2520,
DARWIN, N.T. 5794

REFERENCE:

28th March 1979

The Director,
Territory Parks & Wildlife Commission,
P.O. Box 38496,
WINNELLIE N.T. 5789

ATTENTION: MR. T. DACEY

DRAFT CABINET SUBMISSION - YULARA TOURIST VILLAGE

This Department has been involved throughout the development of the proposal to relocate tourist facilities to the Yulara Townsite. We fully support the cabinet submission as drafted and have no further comment to make at this stage.

C.J. FULLER
Deputy Secretary

NORTHERN TERRITORY OF AUSTRALIA

DEPARTMENT OF TRANSPORT AND WORKS

P.O. BOX 2520.
DARWIN. N.T. 5794

REFERENCE:

30 March 1979

The Director,
Territory Parks and Wildlife Commission,
P.O. Box 38496,
WINNELLIE N.T. 5789

ATTENTION: MR. T. DACEY

YULARA TOURIST VILLAGE

I refer to your verbal enquiry on the likely cost saving achievable by delaying the Yulara Tourist Village project until the Petermann Road is completed.

We concede that freight costs may be slightly higher owing to the current state of the road, however we believe this is only minimal as the project is largely labour orientated. Any economies which may be effected in this way would be more than offset by an increased project cost due to inflation.

It should also be taken into consideration that the current tendering situation is extremely competitive and any delay to the project would jeopardise the opportunity to take full advantage of the market.

S.J. BUTTERWORTH
for Director of Works

ATTACHMENT 'B'

566

ULARA PROPOSED TOURIST VILLAGE

DEVELOPMENT PLAN

December 1978

YULARA

Proposed Tourist Village

Development Plan

Prepared for

Territory Parks and Wildlife Commission

by

Yulara Interdepartmental Planning Team

December 1978

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TERMS OF REFERENCE

Within the guidelines of the Project Development Brief prepared in February 1977 as part of the Feasibility Report on the proposed Yulara Tourist Village, the Planning Team is to undertake the following tasks:

(A) Prepare a Town Plan for the proposed Yulara Tourist Village within the boundaries of the proclaimed townsite;

(B) Prepare a Development Plan for the proposed Village, aerodrome, roads and ancillary engineering services;

(C) Ensure that the Report deals with those matters required by Section 4.1 of the Administrative Procedures under the Environment Protection (Impact of Proposals) Act 1974-1975, and

(D) Ensure that the Development Plan takes account of the needs of the Uluru National Park as set out in the proposed Plan of Management currently being prepared by the Australian National Parks and Wildlife Service.

Planning should be undertaken on the basis that the Village is intended only to service visitors to the Uluru National Park and should not be undertaken on the basis of the Village becoming a regional or sub-regional centre.

PLANNING TEAM

***R.A.C. Bramley** *(Team Leader)* Department of Environment, Housing and Community Development	*Tourism and Planning*
F.J. D'Arcy Department of Construction	*Physical Planning and Design*
***M.J. Dennett** Department of Construction	*Engineering*
***P. Morris** Department of Construction	*Environmental Planning*

In addition, the following persons provided specialist inputs to the project either as members or the original planning team in 1976-77 or as direct contributors to this report:

***D.W. Brett** — *Town Planning* NT Town Planning Unit (formerly DEHCD)	**N. Griffiths** — *Engineering* Department of Construction
D.A. Briggs — *Conceptual Planning* Edwards Madigan Torzillo Briggs International Pty. Ltd.	***T.J. Hirsch** — *Architecture & Planning* Department of Construction
***Dr. A. Comar** — *Town Planning* NT Town Planning Unit	***G. Ride** — *Park Planning & Liaison* Territory Parks & Wildlife Commission (formerly NTRB)
***T.M. Dacey** — *Client Liaison* Territory Parks & Wildlife Commission (formerly DNT)	**M.R. Rolfe** — *Conceptual Planning* Edwards Madigan Torzillo Briggs International Pty. Ltd.
P.A. Duffy — *Project Planning* Department of Construction	**J.C. Smith** — *Hydraulics* Department of Construction

In acknowledging the contribution of the above persons, the Planning Team takes full responsibility for the final content of the report.

*Members of the original interdepartmental planning team, November 1976 to February 1977.

INTRODUCTION

BACKGROUND:

Ayers Rock is one of the most important natural tourist attractions in Australia. However, the poor standard of the present tourist facilities and their close proximity to Ayers Rock itself is damaging the environment of the Uluru (Ayers Rock - Mount Olga) National Park and preventing the satisfactory development of a valuable tourist resource.

In 1972, as part of the proposals to alleviate the environmental impact of the growing number of visitors and to facilitate the management of Uluru National Park, it was recommended that all tourist facilities should be relocated outside the National Park.[1] The proposed site was first recommended at about the same time following an environmental study by the Arid Zone Research Institute.[2]

Subsequently in November 1973, the House of Representatives Standing Committee on Environment and Conservation tabled a report also recommending that the existing Village and airstrip be relocated outside the National Park. In March 1974, following the Standing Committee's recommendations, the Federal Government approved, inter alia, the establishment of an interdepartmental committee (the Ayers Rock Advisory Committee) to advise and assist the Northern Territory Reserves Board to implement the development of a comprehensive plan of management including proposals for siting the tourist village and aerodrome in the preferred area north of the present Park boundary.

This Committee (ARAC) established a sub-committee to inspect possible sites in July 1974. The sub-committee was unanimous in its selection of the present sites for the Tourist Village and the aerodrome. The full Ayers Rock Advisory Committee endorsed the sites selected at its next meeting and instigated action to have the area reserved from future alienation. The site was formally cleared by the Aboriginal Central Land Council in September 1975. The name of 'Yulara'* was officially approved and gazetted in December 1975 (Northern Territory Government Gazette no. 49 refers) and the present townsite comprising 104 sq. kilometers was proclaimed by the Governer-General on 29 July 1976 (Australian Government Gazette no. G32 of 10 August 1976 refers).

The existing motels and hotels in the National Park were resumed by the Northern Territory Reserves Board during 1975-76 and, with the exception of the Ayers Rock Hotel, have been re-leased until 31 December 1984.

In July 1976, following advice that no funds were available to retain consultants to plan the new Village, ARAC decided to seek expertise from within government to advance the planning of the new Village. An interdepartmental planning team was established in November 1976 to report on the technical, economic and environmental feasibility of developing a new tourist village. The team reported in February 1977[3] that the proposal was feasible and that, although the tourist economics only show a marginal return, viable tourist operations could be established in the new Village provided that Government funded the construction of the Village services and utilities.

Shortly afterwards, in March 1977, the House of Representatives Standing Committee on Environment and Conservation reiterated the need to relocate the Village outside the Park boundary as soon as possible and expressed concern at the continuing delay in implementing this recommendation.[4]

In July 1977, Federal Government agreed in principle to the concept of a new tourist village, subject to confirmation of the proposed site by the Minister for the Northern Territory, following consultation with the Minister for Environment, Housing and Community Development. The Government also agreed to the establishment of an inter-departmental planning team to prepare a town plan and development plan, including recommendations on the financing and future control and management of the new Village.

*'Yulara' is an Aboriginal word of the local Pitjantjatjara language group meaning 'howling dingo'. The selected village site is close to the Yulara rockhole and hill which are associated with the 'Dingo Dreaming' of Aboriginals recognised as having an affiliation with the area.

Terms of Reference for the reformed Yulara Inter-Departmental Planning Team were agreed at an inter-departmental committee meeting on 8 March 1978. In April 1978, the Northern Territory Government affirmed its commitment to the Village concept by vesting responsibility for the management and control of the Village in the Territory Parks and Wildlife Commission, endorsing planning guidelines for the development of the Village and recommending that funds be provided from the 1978/79 Northern Territory Budget for the development of the Village.

The Planning Team completed a Conceptual Planning Report in June 1978.[5] This report contained three planning options, and both the inter-departmental committee and the Northern Territory Town Planning Board endorsed the Planning Team's preferred option, subject to certain detailed amendments.

Subsequently, in September 1978, the Territory Parks and Wildlife Commission briefed the Planning Team to complete the following tasks:

(i) Prepare an interim report by 16 October 1978 on the current status of Village planning and recommend on priorities for initial works during 1978-79.[6]

(ii) Prepare a final Plan and Development Program by 31 December 1978 *(this document).*

The October Status Report was widely circulated to all Territory and Commonwealth departments and instrumentalities concerned, to the media and to the tourist industry and comments made in response to the Status Report are reflected in this document.

Also in October, the Final Report of the House of Representatives Select Committee on Tourism was published. The Committee made the following recommendations in relation to Ayers Rock:

(a) The Government in consultation with the Northern Territory Administration take urgent steps to overcome the existing delays in the development of the Uluru National Park, and

(b) The proposed tourist village be proceeded with forthwith as a matter of urgency and that adequate funds be provided for the development of the village.[7]

These matters are currently under consideration by the Commonwealth Government and, in setting out the detailed planning proposals, cost estimates and staging program for the new Village, this report will provide a basis for future negotiations between the Commonwealth and Territory Governments.

This report builds on, and is consistent with, the earlier documents referred to and with the contracts for initial works now being prepared on the basis of the October Status Report. The next step is the detailed design and documentation of the Village infrastructure and government facilities.

ENVIRONMENT LEGISLATION:

In keeping with Commonwealth legislation to protect the environment[8], the Yulara Inter-departmental Planning Team has been required to assess the likely impact of the Village planning proposals on the surrounding environment.

This document, although not titled an environmental impact statement, does cover all matters required to be dealt with by environmental impact statements as set out in paragraph 4.1 of the Environmental Protection Administrative Procedures.[9]

From an environmental standpoint, the planning proposals for the Yulara Tourist Village demonstrate that adequate measures are being taken:

(i) to protect the existing natural environment both within and around the actual Village site area;

(ii) to considerably improve and enhance many aspects of the existing environment within the Uluru National Park; and

(iii) to create a new village environment and amenity commensurate with tourist industry demands within a remote and arid location.

During the preparation of this report, advice has been sought from numerous authorities and organisations regarding environmental aspects of the development. The names of persons and organisations consulted are appended in the Acknowledgements at the back of the report.

SYNOPSIS:

This Development Plan is consistent with earlier reports referred to above and with the proposed initial works that are now being documented. Details of the village structure plan, services and costs are prefaced by a recapitulation on the need for the Village (Chapter 1), followed by discussion of the factors determining the size and location of the Village (Chapters 2 and 3).

Chapter 4 describes the planning and design principles, the Structure Plan itself and sets out development guidelines in respect of specific aspects of the development.

Village services and utilities are described in Chapters 5 to 7. The environmental implications of the development and recommended safeguards are evaluated in Chapter 8 and details of both public and private sector development costs and cash flows are set out in Chapter 9.

Major findings and recommendations on particular matters are contained in the relevant section of the report and are highlighted by the use of bold type.

1. NEED AND FUNCTION

1.1 NEED FOR A NEW VILLAGE

Throughout the seventies, the number of international and domestic visitors to Ayers Rock has increased dramatically from about 25,000 in 1969-70 to 66,000 in 1977-78.

The growth in the number of visitors is having increasingly severe impacts on the environment within the Uluru National Park (Ovington et al, p.41). Certain popular visitation points and their access roads and tracks now attract more people and vehicles than can be accommodated without substantial environmental damage. Impacts on the physical environment include the compaction of soils on and beside roads, tracks and parking areas resulting in erosion, dust pollution, the destruction of vegetation and the disturbance of fauna.

The existing tourist facilities are, in the main, poorly designed and in poor physical condition and their continued presence in close proximity to Ayers Rock is in direct conflict with the long term management objective of the Australian National Parks and Wildlife Service (ANPWS), which is to protect the unique natural, cultural, scientific and scenic resources in the Park.

This conflict and the need to relocate the tourist facilities outside the National Park has long been recognised and was most recently highlighted by the House of Representatives Select Committee on Tourism which reported that 'Present conditions, particularly in the camping area, are deplorable' and went on to express 'its concern at the long delay in commencing the proposed tourist village at Uluru and at the delay in the preparation of the plan of management for the Uluru National Park' (Select Committee on Tourism, p.26).

Urgent interim works are being carried out within the National Park to improve the water supply system, sewage disposal, power supply and campground facilities; however, the relocation of tourist accommodation and services outside the National Park is still necessary for the following reasons:

Park Management:

- It will facilitate the rehabilitation of natural flora and fauna in the area surrounding Ayers Rock;
- It will permit better control over access to the National Park and the distribution of visitors within the Park; and
- It will relieve Park staff of tasks which divert them from their principal interpretive and environmental management functions.

Visitor Experience:

- It will improve the visitor experience by permitting the removal of many of the man-made features at the base of Ayers Rock;
- It will provide the opportunity to create a better environment which could be designed to heighten the visitor's understanding and appreciation of the fragile nature and scarce resources of arid outback areas; and
- By accommodating visitors some distance from Ayers Rock and Mount Olga, it will enable visitors to appreciate the broader physical impact of the monoliths in the landscape and then afford a progression of views as people enter the Park and approach the monoliths.

Economic Factors:

- The relocation of the tourist facilities to a less environmentally sensitive area will help to reduce the amount of funds required for rehabilitation and conservation works;

- Most of the existing buildings will require major maintenance over the next two to five years and the early development of the new village will eliminate the need for major maintenance expenditure;
- Such maintenance would, in turn, only tend to prolong the life of the existing settlement resulting in increased environmental management costs within the National Park.

The alternatives to relocating the tourist facilities are either to contain the existing facilities at their present size and standard or to improve and expand the existing facilities.

The first option would result in freezing the visitor capacity at the existing level (or possibly even lower to prevent overloading of ablution blocks in the campgrounds), the perpetuation of poor accommodation standards and continued environmental damage in the immediate vicinity of Ayers Rock. This option would be unacceptable to the tourist industry, the National Park administration and the community at large.

The second option is contrary to current practice of excluding human settlement from areas of special natural significance. Already the effect of the existing facilities on the Park ecology is reaching unacceptable levels and increased tourist accommodation could not be tolerated without costly protective works.

Furthermore, the existing development is unplanned and inefficiently distributed and replanning could not be reconciled with over-riding Park management priorities. Expansion in the present location would require costly design solutions to minimise the visual impact and more intensive Park management techniques to control visitor movement at night as well as during the day, and to combat increased litter and noise problems.

In the context of regional infrastructure, no benefit in terms of reduced traffic volumes through the National Park would be derived from the realignment of the Petermann Road if the tourist facilities are retained in their present location. Furthermore, the tourist accommodation would be remote from the proposed new aerodrome which is located outside the National Park some 26 km north west of Ayers Rock. (See Plan 1)

This option is equally unacceptable on environmental, park management and economic grounds.

1.2 VILLAGE FUNCTION

By agreement between the Minister for the Northern Territory and the Minister for Environment, Housing and Community Development, the new Village is intended only to service visitors to Uluru National Park. The level of services provided in the Village is consistent with the role of Uluru National Park in the Central Australian tourist system.

In the main, visits to Uluru National Park are of short duration and this pattern is unlikely to change greatly because such a high proportion of visits are part of package tours. However, once the Stuart Highway is completely sealed, a greater number of independent car and caravan travellers, who are likely to stay for longer periods, can be expected to visit Ayers Rock.

Visitors usually arrive in the afternoon and, after checking into their accommodation, generally have an exploratory tour of Ayers Rock before viewing their first sunset. The second day usually encompasses observing sunrise on the Rock, a tour and/or climbing the Rock, a tour of the Olgas and viewing sunset either on the Olgas or Ayers Rock again.

Although it will involve some additional travel time to Ayers Rock, it is not anticipated that the relocation of the Village will change the basic visitor activity pattern. The only current activity that is likely to be significantly affected is that of viewing sunrise on Ayers Rock. Because of the extra time involved in travelling to the Sunrise Dune, this will entail motel guests rising very early to breakfast before departure. Alternatively, arrangements could be made for guests to take a packed breakfast with them or to barbecue a breakfast in the Park in order to avoid a trip back to the Village before spending the day in the Park.

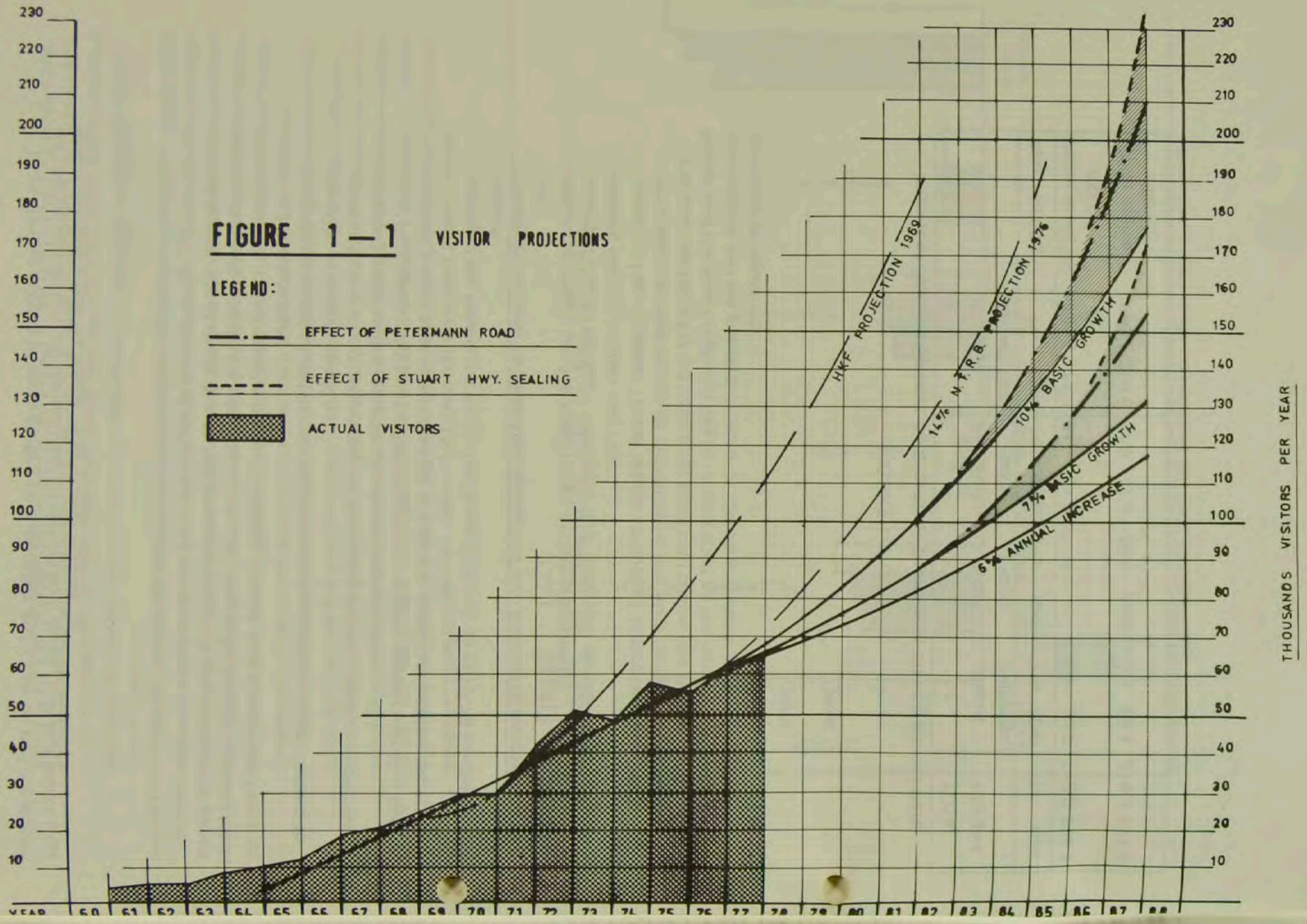


FIGURE 1 — 1 VISITOR PROJECTIONS
LEGEND:
EFFECT OF PETERMANN ROAD
EFFECT OF STUART HWY. SEALING
ACTUAL VISITORS
HKF PROJECTION 1969
N.T.R.B. PROJECTION 1976
14% BASIC GROWTH
10% BASIC GROWTH
7% BASIC GROWTH
6% ANNUAL INCREASE
THOUSANDS VISITORS PER YEAR
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10

Each of these options involves staffing cost penalties and it may be that the pattern will change and visitors will instead view sunrise on both Ayers Rock and Mount Olga from viewpoints within the Village. (See photos, Chapter 3).

1.3 TOURIST TRENDS

The annual number of visitors to Ayers Rock has grown from 4,332 in 1960-61 to over 66,000 in 1977-78 as illustrated in Figure 1-1. Over recent years the compounded average annual rate of visitor growth has been in order of 6% p.a. An average annual compound growth rate of 10% was used in the 1977 Feasibility Report to project future visitor numbers. In this report a range of between 7% and 10% is predicted based on 'on-going' factors namely:

- Increasing population and increased propensity for people to travel (subject to prevailing economic conditions);
- Increase in tourist numbers especially as a result of more aggressive overseas marketing and possible reduction in international air-fares;
- Lower excursion air-fares within Australia plus more direct air links with Alice Springs.

In addition a number of specific factors will have a significant positive impact on travel to Ayers Rock over the next 10-15 years, namely:

- Sealing of the Petermann Road - first stage (108 km) on 1978-79 capital works program.
- Construction of new Tarcoola-Alice Springs rail line, anticipated completion end of 1981.
- New aerodrome to service Ayers Rock - no firm programming.
- Sealing of Stuart Highway - completion date uncertain, earliest Planning Team estimate mid-1985, latest mid-1992.
- Provision of an upgraded Tourist Village - proposed completion date, 1984.
- Introduction of wide-bodied jet aircraft flying into Alice Springs - early 1980's.

The potential impact of the three most significant factors (the Petermann Road, new Village and the Stuart Highway) has been quantified on the basis of certain growth assumptions and the potential increase in visitors and visitor nights in 1987-88 is illustrated in Figure 1-2.

FIGURE 1-2

Impact of Specific Factors on Growth of Tourism to Uluru National Park

	1 Basic Growth Rate		2 Petermann Road		3 New Village		4 Stuart Highway		TOTAL 1+2+3+4	
Year 1987-88	7%	10%	7%	10%	7%	10%	7%	10%	7%	10%
Visitor Numbers (000's)	131.6	178.4	24.7	31.7	*	*	16.7	22.7	173.0	232.8
Visitor Nights (000's)	263.2	356.8	37.0	47.6	28.8	39.0	50.3	68.1	379.3	511.5

* No increase in visitor numbers is anticipated, only increased length of stay.

This shows that by 1987-88 the combined impact of these three factors alone could increase the number of visitors by 30-35% and the number of visitor nights by just over 40%.

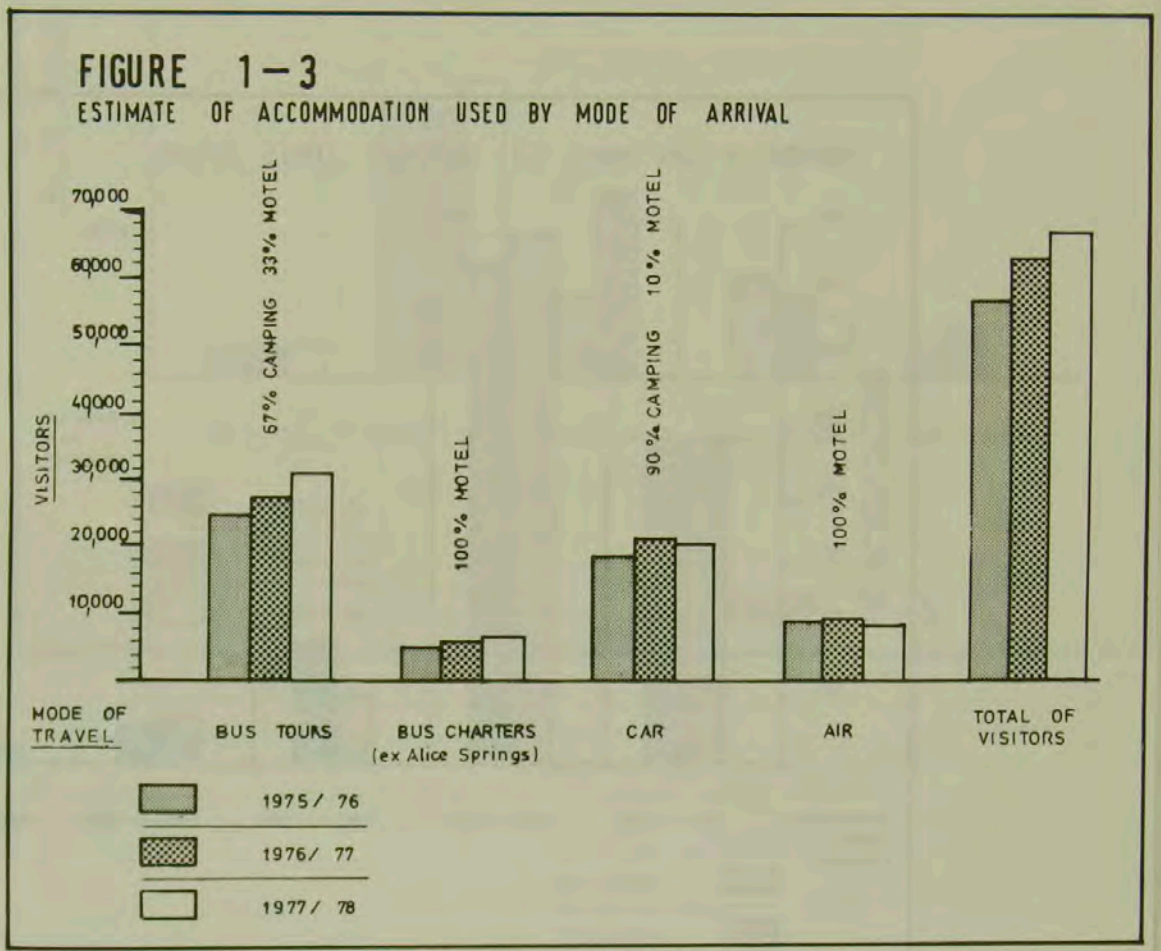
At the present time, tour operators advise that travel to 'the Centre' is inhibited by a shortage of suitable accommodation in Alice Springs, Ayers Rock and en route from South Australia.

Therefore, even bearing in mind the possible constraints imposed by the anticipated increase in oil prices and possible saturation of the domestic tourist market for holidays in the interior, a basic 10% annual growth rate over the next decade is realistic provided that the amount of tourist accommodation is increased. Evidence from other places (e.g. the Barrier Reef) also suggests that projection of historical trends may not reveal the full magnitude of the growth potential once facilities are expanded and improved.

The 66,000 visitors to Ayers Rock in 1977-78 represents about half the total visitors to Alice Springs and that proportion has been consistent over recent years. Last year, thirteen percent of the visitors to Ayers Rock arrived there by air, fifty-seven percent by coach (either on tours or overnight charters out of Alice Springs) and the remaining thirty percent by private car. This modal split has also been consistent over recent years and Figure 1-3 illustrates the type of accommodation used by visitors arriving by different modes of transport.

FIGURE 1-3

ESTIMATE OF ACCOMMODATION USED BY MODE OF ARRIVAL



The present overnight accommodation capacity at the National Park is 2,080. Of these, 1,800 persons (86.5%) are accommodated in campgrounds and 280 in motels (13.5%). Visitors generally stay for one and a half to two days which generated approximately 100,000 visitor nights in 1977-78 of which about 60% were spent in the campgrounds and the balance in the motels.

The visitation pattern is extremely seasonal. The dominant domestic tourist season is from April to September with marked peaks in the May and August school holidays. In contrast, the overseas tourist season runs from October to March and therefore offers an opportunity to improve off-season occupancy levels at the new Village through the development of package tours to 'the Centre'.

The degree of seasonality in the visitation pattern is illustrated in Figure 1-4 which shows that for over half the days in the year, occupancy levels are less than 25% of existing capacity and over the last three years have only exceeded 75% capacity on six days. Over the same period since 1975-76, the percentage of annual visitors experiencing occupancy levels of 75% (and consequent overcrowding of campground ablution facilities) has not exceeded 9%. (See Figure 1-5) In view of the small proportion of visitors affected and the limited number of days on which these conditions occur, economic considerations would suggest that some degree of over-crowding in campground ablution blocks at peak times should be tolerated.

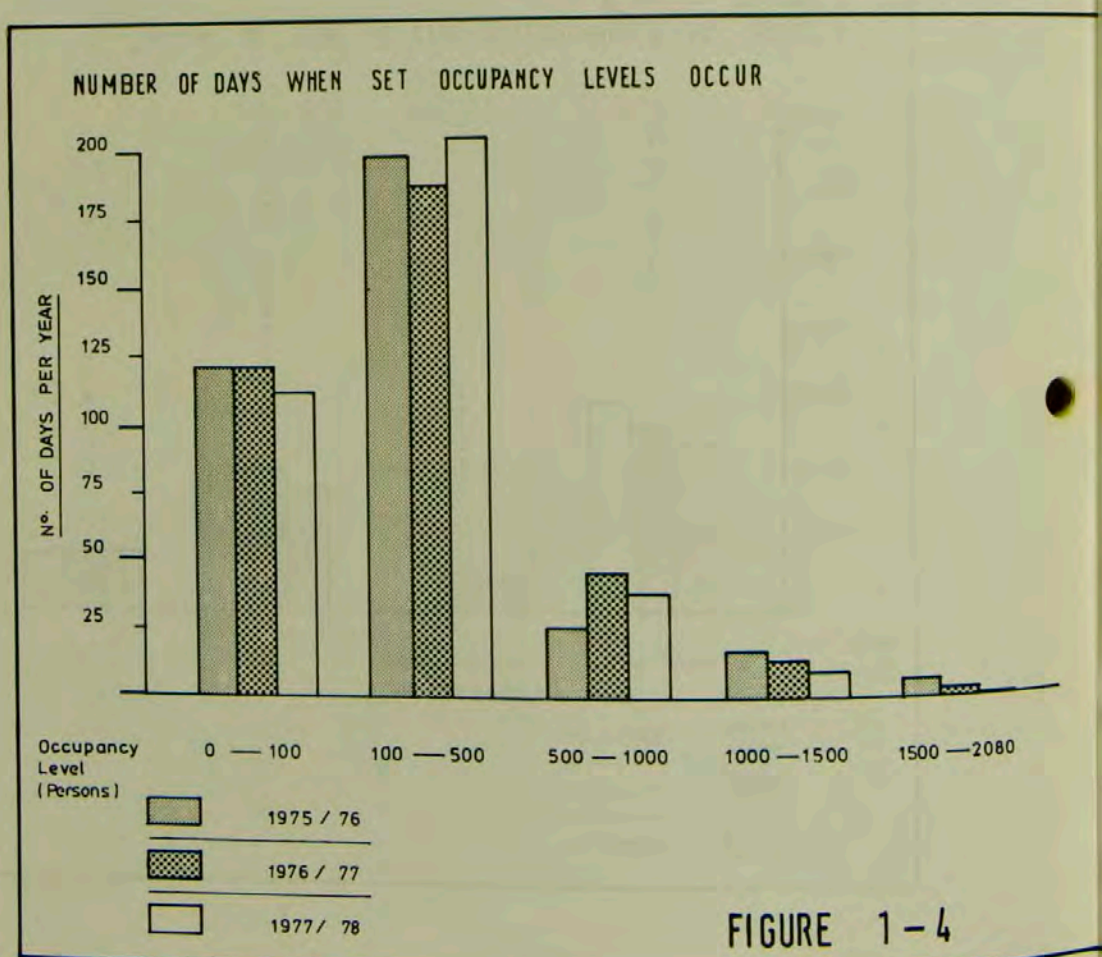


FIGURE 1-4

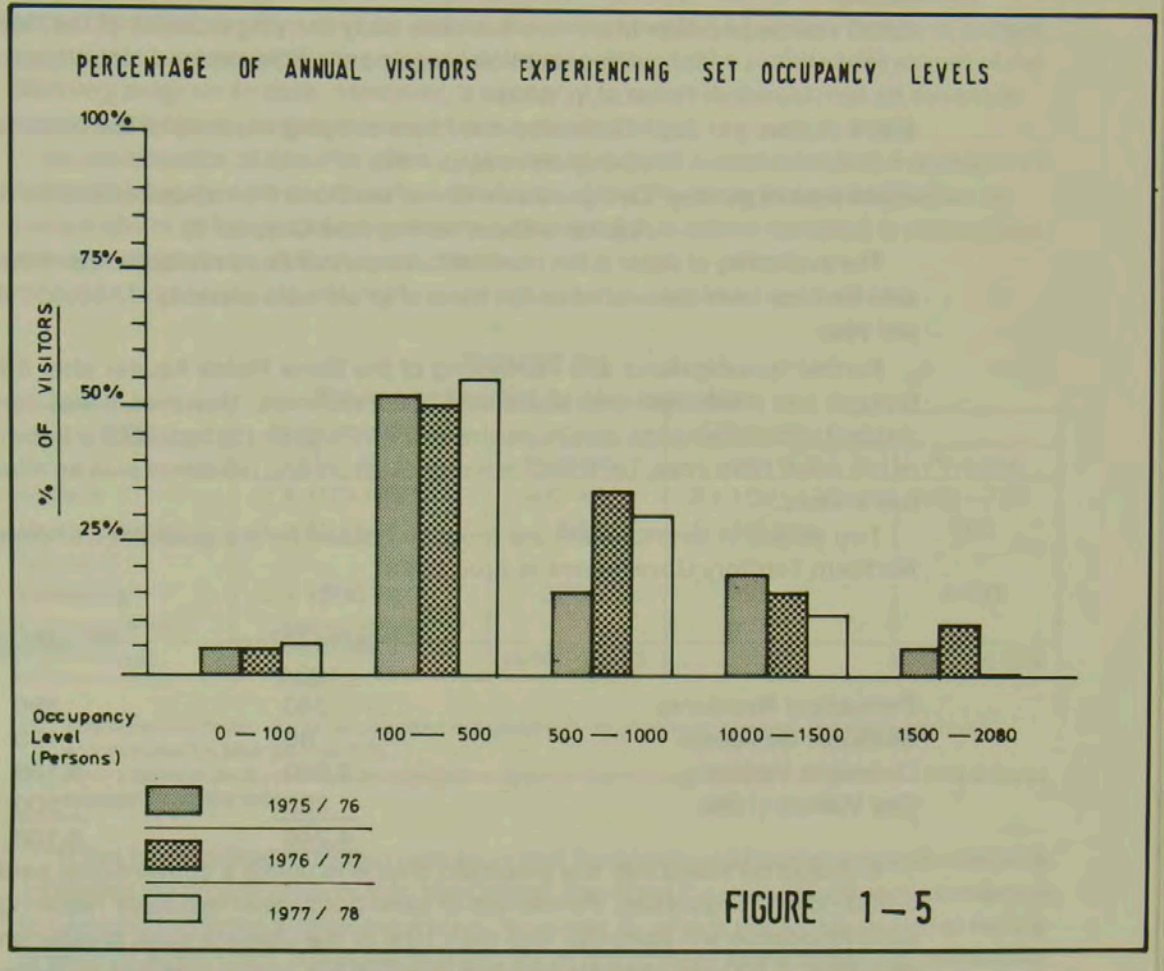

PERCENTAGE OF ANNUAL VISITORS EXPERIENCING SET OCCUPANCY LEVELS
100%
75%
50%
25%
% OF VISITORS
Occupancy Level (Persons)
0 — 100
100 — 500
500 — 1000
1000 — 1500
1500 — 2080
1975 / 76
1976 / 77
1977 / 78

FIGURE 1–5

2. VILLAGE SIZE

2.1 CRITICAL PLANNING CONSTRAINTS

In order to appreciate the significance of the alternative rates of tourist growth projected in Chapter 1, it is useful to relate them to certain critical planning thresholds which affect both the development of the National Park itself and the associated tourist facilities. The following critical constraints on daily capacity have been established based on the seasonal visitation characteristics described in Chapter 1 and it should be recognised that the ultimate capacities indicated could not be supported on a year-round basis.

2,700 visitors per day - Maximum desirable daily carrying capacity of the National Park with present management resources and techniques (Ovington et al, p. 132).

5,000 visitors per day - Estimated maximum carrying capacity of the National Park (Ovington et al, p. 139).

5,600 visitors per day - Designed safe limit of the Dune Plains Aquifer and the South-East Aquifer without mining (see Chapter 6).

The availability of water is the most critical constraint on development and the designed safe limit has been calculated on the basis of an ultimate capacity of 585,000 visitor days per year.

Further investigations and monitoring of the Dune Plains Aquifer after it has been brought into production may reveal additional reserves. However, it was considered prudent to determine the maximum size of the Village on the basis of the known capacity of the water resources, i.e. 5,600 overnight visitors and residents plus an allowance for day visitors.

Two stages of development are proposed based on the guidelines endorsed by the Northern Territory Government in April 1978:

	Interim Stage - 1984	Ultimate Stage
Permanent Residents	240	380
Seasonal Residents	80	120
Overnight Visitors	3,560	5,100
Day Visitors (10%)	360	500
	4,240	6,100

It should be noted that the proposed Village is unlike a conventional settlement of 5,000 - 6,000 population. Permanent or semi-permanent residents requiring built accommodation will comprise less than 10% of the ultimate peak population. The remaining 5,100 are short stay visitors of which it is anticipated that no more than 900 (18%) will be accommodated in built accommodation. The remainder will bring their accommodation with them in the form of tents, campervans and caravans or rent similar accommodation in the campgrounds.

2.2 TOURIST ACCOMMODATION

The four existing motels at Ayers Rock have approximately 280 beds and the working capacity of the campground is 1,800, i.e., 13.5% of current visitor accommodation is in motels and 86.5% is camping.

Statistics over recent years indicate that approximately two-thirds of visitor nights are spent in the campground and one-third in motel accommodation which illustrates the higher year-round occupancy rates achieved by the motels. Almost 90% of motel guests and about 50% of campers arrive in organised groups, i.e. about two-thirds of all visitors travel in groups. This pattern is unlikely to change significantly. Any reduction in overland package tours from the South resulting from the sealing of the Stuart Highway and improved accessibility for private vehicles is likely to be compensated for by the general increase in airline passengers to Alice Springs who will continue on to Ayers Rock in groups by road or air.

Tour operators have indicated that the existing types of accommodation at Ayers Rock (either economy motel or camping) do not cater for the full range of tourist accommodation needs either for individuals or tour package groups. Time and budget constraints have prohibited a survey of visitor accommodation preferences as part of the planning program to date. However, a survey of this sort is considered an essential prerequisite to any negotiations with potential lessees.

In the absence of specific survey data, the proposed accommodation mix shown in Figure 2-1 has been established on the basis of the Planning Team's evaluation of current visitor patterns and projected trends and reflects advice obtained in discussions with representatives of the tourist industry.

FIGURE 2-1
Proposed Tourist Accommodation

Type	Interim (1984)		Ultimate	
	Unit Size	Persons	Unit Size	Persons
Motels	2 x 100-120 rms	400-480	3 x 100 - 120 rms	600 - 720
Hostel/Bunk-house (1)	1 x 40 rms	80	1 x 90 rms	180
Camping/ Caravan Park	2 x 1500 pers Campgrounds	3000	(2)	4200
Total		3480 - 3560		4980 - 5100

(1) This accommodation could be operated independently or in conjunction with the single resident accommodation (see Section 2.3).
(2) The camping capacity can be expanded either by extending the original leases or granting a third lease as appropriate at the time.

It has been indicated by tour operators that the shortage of tourist accommodation is inhibiting the growth of tourism to 'the Centre'; therefore the ratio of built accommodation to camping has been slightly increased. However, in view of the highly seasonal nature of visits to Ayers Rock, it was felt that any major adjustment to the mix would jeopardise the likelihood of achieving viable year-round room occupancy levels.

Motel Size and Standards: Responses from the tourist industry suggest that proposed motels should contain a minimum of 100 guest rooms and, assuming single storey development, 120 rooms is probably the effective maximum number. This size lends itself to efficient staffing arrangements and beyond this size distances from the check-in point to guest rooms become excessive.

The motels are expected to cater predominantly to package groups and the size proposed lends itself to division into blocks of approximately 20 rooms to accommodate coach or air package groups on a twin-share basis.

It is anticipated that all guest rooms will be of similar size and standard, (including private bathrooms), and that tariffs will be related more to the level of service provided than the size or quality of guest rooms. We were advised that at destinations such as Ayers Rock, where stays are of short duration, the total motel complex, particularly the public areas and facilities, are of more importance than the standard of the guest rooms.

Improvements to telecommunication links as described in Section 7.7 will enable all motels to be linked to nationwide referral systems.

Hostel/Bunkhouse Accommodation: To accommodate that segment of the budget market who may not wish to camp, a site has been allocated for a hostel or bunkhouse type of development. This site adjoins the single staff accommodation and these facilities could possibly be operated jointly. The standard of accommodation envisaged is shared bathrooms and toilets with a self-service dining room or possibly basic cook-your-own facilities.

Campgrounds: Each of the two Interim Stage campgrounds will be developed in six modules of approximately 250 person capacity centred around an ablution block. The year-round base load is expected to be 25% of total capacity which will require each campground to operate one or two ablution blocks on a year-round basis and bring additional modules into operation in response to seasonal demands. It is estimated that approximately two-thirds of the camp sites will have to be designed to be able to accommodate coach groups and the balance will be specifically designed for either cars and campervans or for caravans. At present, there is very little caravan traffic owing to the poor condition of both the Stuart Highway from Port Augusta and the existing road from Erldunda. However, the sealing of those highways will assuredly lead to an increase in caravan traffic to Ayers Rock and this should be recognised when determining individual site sizes and servicing requirements.

Each campground will be served by a reception office, camp store and snack bar.

2.3 RESIDENT ACCOMMODATION

The breakdown of accommodation types proposed is based on the expectation that employers in the new Village will continue to express a preference for single workers and this is reflected in the Resident Accommodation Schedule (Figure 2-2).

FIGURE 2-2
Proposed Resident Accommodation

Type of Staff	Interim (1984)			Ultimate		
	Govt Sector	Private Sector	Total	Govt Sector	Private Sector	Total
Permanent Married.	15	20	35	18	32	50
Dependents.	45	60	105	54	96	150
Houses	*15*	*20*	*35*	*18*	*32*	*50*
Permanent Single.	18	81	99	28	116	144
Single Rooms	*18*	*81*	*99*	*28*	*116*	*144*
Seasonal Single.	15	61	76	18	102	120
Other (Shared) Units	*8*	*30*	*38*	*9*	*51*	*60*

Married families will be accommodated in single family houses located either in a residential enclave or in association with their employment.

It is assumed that permanent single employees will require individual accommodation but that seasonal employees might be expected to share accommodation (possibly on-site caravans in the campgrounds). Owing to the remote location of Yulara, the cost of self-contained single accommodation is likely to be prohibitive; therefore it is anticipated that there will be a need for hostel type accommodation with single rooms, shared bathrooms and communal dining facilities.

As indicated in Section 2.2, this could be operated jointly with budget tourist accommodation and a Village Hostel of this type could relieve the motels, which will be the largest employers of single staff, of the substantial capital cost of providing accommodation for their own employees.

2.4 ABORIGINAL ACCOMMODATION

The need to make provision for the accommodation of Aborigines has been discussed with officers of the Department of Aboriginal Affairs. At this time, it is difficult to predict how many Aborigines may wish to settle at the Yulara Village and whether those who do will want to live right in the Village (perhaps in association with an outlet for Aboriginal artefacts) or live on the fringes of the Village.

Advice from the Department of Aboriginal Affairs indicates that possibly sixty to seventy Aborigines may ultimately wish to locate in or adjacent to the Village and that a number of fairly extensive sites within about one kilometre of the Village centre should be identified for Aboriginal use.

2.5 SERVICES AND AMENITIES

As a general principle, it is proposed that small service establishments and retail outlets be accommodated within larger buildings. This will minimise the total number (and cost) of buildings required and provide additional sources of revenue for the owners of larger, essential buildings.

The following Village services are proposed:

Government Sector:

Visitor Centre (providing information on Visitor accommodation and services, Park orientation and information material and a theatrette)
Government and Village Administration Offices
Police Station
Fire Station
Medical Centre
Resident Community Hall/School.

Private Sector:

Supermarket/Variety Store
Service Station/Hardware Store
Art Gallery/Museum
Bank
Bakery/Snack Bar

Small service and retail outlets incorporated in larger buildings might include Airline Offices, Souvenir Shops, Pharmacy, Hairdresser, etc.

In addition, a number of other facilities will be located in the Village service area, namely:

Government Sector:

Maintenance Workshop and Storage Area.

Private Sector:

Warehousing (including Bulk Refrigerated Store)
Major Vehicle Repair Workshop
Laundry.

3. SITE LOCATION AND CHARACTERISTICS

3.1 SITE SELECTION

The 1977 Feasibility Study examined six locations which had been considered as possible sites for the Tourist Village since 1969.[10,11] An assessment of the positive and negative qualities of each of these sites using six groups of criteria reconfirmed that the Yulara site, originally identified by the Arid Zone Research Institute (Hooper et al, p.25), offered the most advantages and has no specifically identifiable disadvantages.

The following groups of criteria were used to assess the sites (Feasibility Report, p. 7-8):

Ecological: Land systems, soils and topography, flora and fauna, erosion risks.

Aesthetic: Minimal intrusion in the landscape combined with good views of Ayers Rock and Mount Olga.

Aboriginal: Acceptability to the Aboriginal Central Land Council.

Locational/Regional: Relationship to the National Park, road and air access, site availability, suitable location for community facilities, travelling distances between the Village site, Ayers Rock and Mount Olga.

Technical/Servicing: Availability of water, dune stability, foundation requirements, servicing feasibility.

Park Management: Tourist logistics and control, environmental management.

FIGURE 3-1 Site Evaluation Matrix

SITES / CRITERIA	1 HARRIS KERR FORSTER	2 YULARA TOWNSITE	3 KINNAIRD HILL DE ROHAN AND YOUNG	4 SEDIMENTARIES	5 PARK ENTRANCE	6 CURTIN SPRINGS
ECOLOGICAL	Within significant land system. Close to Sedimentaries' fauna habitat.	Insignificant land system. No special flora or fauna habitats.	Within a significant land system.	Within a significant fauna habitat and land system.	Within a significant land system.	Insignificant land system.
AESTHETIC	Good views of Ayers Rock & Olgas but would intrude on landscape when seen from summit of Ayers Rock.	Good views of Ayers Rock & Olgas and does not intrude on landscape when seen from summit of Ayers Rock.	Good views of Ayers Rock only. Site prominent when seen from summit of Ayers Rock.	Poor view of Ayers Rock. Olgas not visible.	Good view of Ayers Rock,Olgas not visible, but site would intrude on landscape when seen from summit of Ayers Rock.	Ayers Rock and Olgas not visible.
ABORIGINAL		Not a sacred site. Cleared by Aboriginal Land Council.		Within possible Aboriginal land claim area. Not a known sacred site.		
LOCATIONAL/ REGIONAL	Within Nat.Park (14km NW of Ayers Rock). Midway between Ayers Rock & Olgas. 13km from new aerodrome.	Outside Nat.Park (12.5km NW of Ayers Rock). Closer to Ayers Rock than Olgas. Within declared townsite under Crown Lands Ordinance.8km from new aerodrome.	Within Nat.Park (8km NE of Ayers Rock). Closer to Ayers Rock than Olgas. 17km from new aerodrome.	Outside Nat.Park but within proposed Park extension. (17km NW of Ayers Rock) Closer to Ayers Rock than Olgas. 7km from new aerodrome.	Within Nat.Park (8km E. of Ayers Rock). Closer to Ayers Rock than Olgas. 25km from new aerodrome.	Outside Nat.Park (72km E. of Ayers Rock). Closer to Ayers Rock than Olgas. 92km from new aerodrome.
TECHNICAL SERVICING	Land system unstable but adjacent to Dune Plains Aquifer.	Technically feasible. Close to Dune Plains Aquifer.	Technically feasible.	Technically feasible.	Land system unstable.	
PARK MANAGEMENT OBJECTIVES	Inside National Park. Conflict with management objectives.	No conflict.	Inside National Park. Conflict with management objectives.	Possible conflict if Sedimentaries added to Park.	Inside National Park. Conflict with management objectives.	No conflict.

N.B. See Plan 1 for location of sites evaluated.

The qualities of the six sites considered are summarised in Figure 3-1 which is derived from the original matrix (Feasibility Report,p.9) on the basis of which it was recommended that the Village be located in the south-east quadrant of the Yulara Townsite (Feasibility Report, p. 64).

The Yulara site combines the following merits:

- It is situated outside the National Park;
- It is close to the Dune Plains Aquifer;
- It is located between the new aerodrome site and the National Park;
- It is located approximately midway between the new Petermann Road alignment and the northern boundary of the National Park;
- It is outside the view corridor between Ayers Rock and Mount Olga but conveniently close to both;
- It is located within the proclaimed Yulara townsite;
- It is neither a sacred site nor one of any particular significance to Aborigines and has been cleared by the Aboriginal Central Land Council;
- It presents no special technical problems beyond those normally encountered in constructing roads, services, drainage and building foundations in the areas surrounding the Park.

No other location combined this number of positive attributes.

3.2 RELATIONSHIP OF THE SITE TO ULURU NATIONAL PARK

The site of the proposed Tourist Village is approximately two kilometres from the National Park boundary,thus satisfying the Australian National Parks and Wildlife Service (ANPWS) requirement for a minimum buffer zone of one kilometre between the Village and the National Park.

Excellent views of both Ayers Rock (12 km in a SSE direction) and the Olgas (25 km in a SW direction) can be obtained from the Village site, which is sufficiently close to both monoliths to permit appreciation of their texture and their wider physical impact in the landscape (see Figures 3-2, 3-3, 3-4 and 3-5), yet far enough away that the Village will not be evident when viewed from the summit of Ayers Rock.

The Village will be linked to the Park by a single access road which will have an entrance station at the Park boundary to control entry to the Park and direct visitor movement within the Park. Basic information about the Park and a general orientation display will be provided in the Village. The 'resource-based' interpretive facilities will be located within the Park. In overall terms, the site location should in no way conflict with the park management objectives of the ANPWS which has responsibility for the operation and management of the Uluru National Park.

3.3 SITE CHARACTERISTICS

Soils and Topography: The site is located within the Simpson Land System identified by Perry, Mabbutt et al [12] in 1962. It consists of sand plains and sand dune areas which dominate most of the Ayers Rock - Mount Olga surrounds except for the actual monoliths themselves, the foothills and run-on plains surrounding the monoliths, the Sedimentaries and the Mount Connor area. The irregular dune fields and sand plains forming the Village site comprise land units 5d1 and 5d2 as described by the Arid Zone Research Institute (Hooper et al, p. 38-39).

FIGURE 3-2
Sunset on Ayers Rock from Visitors Centre Dune with Casuarinas in Foreground

FIGURE 3-3
Sunrise on Ayers Rock from Central Dune Crest

FIGURE 3-4
Mount Olga from Central Dune Crest, Midday

FIGURE 3-5
Sunrise on Mount Olga from Visitor Centre Dune looking across the Western Valley

The dunes, rising up to 13m in height, are dominated by ridges running north-south, between which run sandhills and swales. The soils of the dune crests are of uniform red siliceous sands whereas the dune flanks grade to red earthy sands and increase in texture towards the swales which comprise medium textured red earths. The slopes of the dune flanks are greater on the easterly faces, up to 25% more than on the westerly faces. The dune sands are extremely permeable and infertile but the more clayey red sands in the lower areas afford a slight decrease in permeability and a general increase in fertility. The land units within which the site is located are representative of the region and of the arid zone of Central Australia in general.

Vegetation: There are three principal components of vegetation found within the site area; those on the dune crests, the dune slopes and within the swales. The dune crests are shrub dominated *(Grevillea stenobotrya* with *Eremophila* spp) and are characterised by a distinctive small tree (*Gyrostemon ramulous*) and a small bloodwood (*Eucalyptus* sp) which although infrequent are prominent. The dune slopes primarily consist of soft spinifex (*Triodia pungens*) with various low shrubs including *Thryptomene* and *Hibiscus* spp. Feathertop spinifex (*Plectrachne schinzii*) also occurs on the steeper slopes. The swales generally contain randomly-spaced desert oak (*Casuarina Decaisneana*) and desert poplar over a ground storey of either soft spinifex (*Triodia pungens*) or hard spinifex (*Triodia basedowii*). There is no swale mulga within the site area and there is also a general absence of shrub associations within the site swales.

Many of the vegetation species found throughout the site area are ephemeral and therefore the density of cover is largely dependent upon seasonal rainfall. Also, after extensive natural fires, the density of ground and upper storey cover is considerably reduced.

The three principal components of the site vegetation are extensively replicated elsewhere.

Fauna: The general variety of fauna expected to be found within the site area includes all groups of reptiles, red kangaroo, marsupial mice, rodents, rabbits, martins, wrens, swallows, wood swallows, pigeons, doves, parrots, cockatoos, honeyeaters, magpies, rainbow birds, king-fishers, mistletoe birds, pardalotes, butcher birds, frogmouths, quail, plover, bustards and song-larks.

With respect to fauna, the Village site is generally indistinguishable as a habitat of specific significance as the fauna within the site area is typical of many thousands of hectares of sand plains. By comparison, the Sedimentaries and the mulga plain between Mount Olga and the Sedimentaries both represent a significant habitat for ground and scrub birds.

Erosion and Stability: Under natural conditions, the dunes are generally stable in the long and the short term. Unvegetated loose sand surfaces undergo minor fluctuations of form due to displacement of sand in response to seasonal patterns of effective winds, but the changes are insufficient to threaten adjacent structures.

Provided that they are not located in saddles, where funnelling of wind around buildings would be accentuated by the natural ground contours, the scale of the proposed buildings should have no general effect on the wind regime beyond a distance of approximately five times the building height downwind. Uncontrolled movement of pedestrians or vehicles on the sand dunes adjoining the campgrounds and circumjacent to the Village will tend to cause sand drift and a possible flattening of dune crests and appropriate precautions will need to be taken to prevent this occurring. [13]

4. VILLAGE DESIGN

4.1 PLANNING AND DESIGN PRINCIPLES

A comprehensive set of design principles was established early in the planning process. These were subsequently used to evaluate a range of design options developed by the Planning Team.

The design principles were divided into two categories, namely:

- Environmental Planning Principles, and
- Physical Planning Principles.

Within each category, specific criteria were determined to be of either primary or secondary importance and were weighted accordingly. These are described below:

Environmental Planning Principles:

Primary:

Nature and Form	- design to be in harmony with existing land forms.
Vegetation	- maximise retention of existing trees, shrubs and ground cover.
Drainage	- minimise disturbance to, and maximise use of, existing drainage channels.
Erosion	- minimise potential wind erosion.
Effect on Sand Dunes	
(a) Development	- no building on dune crests nor on slopes exceeding 1:30
(b) Remoulding	- as far as practical, minimise any remoulding of dunes.
Access to Sand Dunes	- ensure that pedestrian access to dune crests is controlled.
Visitor Movements	- inhibit uncontrolled visitor movements beyond the Village.

Secondary:

Wind	- maximise cooling effects and minimise nuisance from blown dust and sand.
Sun	- location and orientation of buildings should minimise amount of direct and reflected heat.
Noise Impact	- minimise noise nuisance especially from vehicles.
Visual Impact	- minimise visual impact of buildings and service infrastructure.
Air Pollution	- minimise air pollution, especially from vehicles, by eliminating as much as possible the need for movement by vehicles within the Village.
Fire Control	- utilise road system to form fire breaks, afford maximum protection to major buildings and use dunes to cut off views of any perimeter fire breaks.

Physical Planning Principles:

Primary:

Visitor Orientation	- design and layout should be simple and facilitate visitor orientation.
Vehicular Movement	- minimise need for intra-village vehicle movements to improve safety and minimise the need for casual parking areas.
Pedestrian Movement	- provide direct, safe pedestrian routes and acceptable walking distances between accommodations and main Village facilities.
Permanent Residents	- locate close to Village core but physically separated from tourist accommodation.
Aborigines	- provide at least two extensive locations no more than 1 km from Village core.
Visitor Centre	
(a) Views	- locate so as to afford views of Ayers Rock and Mount Olga.
(b) Prominence	- locate in a prominent position at entry point to Village.
Coach Parking	- provide well-defined but unobtrusive coach parking areas as required.
Coach Pick-up/Set-down	- provide at least 3 coach pick-up/set-down points, one at the Visitor Centre and one at each of the interim stage motels.
Engineering Services	- optimise efficiency and economy in provision of internal roads and engineering services.
Service Area	
(a) Separation	- provide a separate Village service/industrial area.
(b) Access	- provide independent access to service area.

Secondary:

Motels	- provide three separated motel sites.
Campgrounds	- provide three camping areas at least one of which could be linked with a motel site.
Motel/Campground Siting	- locate motels and campgrounds in such a way that they will not prejudice each other's business operations.
Supermarket/Variety Store	- provide main facility within Village core.
Convenience Shopping	- allow for each campground to be served by small convenience store.
Small Retail Facilities	- small retail and service outlets should be incorporated into larger buildings.
Staging	- ensure coherent building groups and relationships at all stages of development.
Expansion Capacity	- layout should permit possible long-term expansion beyond present planned capacity.

During the planning process, two other fundamental design approaches were developed in addition to the adopted concept. Both of these concepts incorporated the north-south link road between Petermann Road and the National Park as part of the internal village road system, one using a simple linear approach and the other an internal loop road. However, on the basis of the design principles outlined above, the adopted concept offered the best total design solution.

4.2 DETAILED SITING CONSIDERATIONS

A number of locational factors had a bearing on the initial siting of the Village within the Yulara townsite; principally its position between the National Park and the proposed new aerodrome and Petermann Road to the north plus the fact that it is a convenient distance from both Ayers Rock and Mount Olga.

Having identified the general location, a number of more specific siting considerations had a significant influence on the structure of the Village. These are discussed below:

Wind: In order to minimise the nuisance from blown dust and sand, it was decided not to develop in the wide exposed valley running down the west of the site but to use the reticulate dunes to shield the campgrounds (which are likely to be the greatest source of dust and blown sand) from the prevailing south-easterly winds (see Wind Graph, Plan 2).

The location of the village service area is physically separated from the Village by sand dunes and this separation is reinforced by the prevailing winds which will carry odours and noise emissions away from the Village.

Drainage: (Mabbutt, p. 8-9). The overall drainage flow is from south to north (see Plan 2). The broad western valley has a very gentle fall and drains a large catchment area. Water tends to collect in the more impervious interdunal flats and shallow flooding may occur in linear depressions serving large catchments. These tendencies will be accentuated by compaction and the increased run-off from buildings, roads and areas of hardstanding. Therefore all buildings and campgrounds are located in the reticulate dunes to the east where catchments are smaller and gradients generally a little steeper. This will reduce the risk of flooding, especially in the campgrounds.

Longitudinal Dune: (Mabbutt, p. 2-4) The distinctive longitudinal dune formation running down the western side of the site is considered to be a more sensitive and significant landform than the reticulate dunes to the east. The trend and continuity of the longitudinal dune suggests that it was formed along the boundary of a sand depositional area on the east side with a less sandy area of continuing run-off to the west.

The net transport of sand is more significant on this dune than on the reticulate dunes and sand drifting would be markedly increased if it was exposed to heavy trampling by tourists. Therefore, because it appears to intercept the drift of finer alluvial sand from the west and also provides a small, and possibly significant, sheltering effect from occasional strong westerly winds, it was considered important to afford the longitudinal dune maximum protection by isolating it from the Village.

Furthermore, by placing the Village well to the east of this dune it serves as a visual screen and a physical barrier between the Village and the Sedimentaries. This will help to prevent unauthorised and uncontrolled penetration into the Sedimentaries and adjacent mulga groves which constitute an important fauna habitat.

North-South Link Road: In engineering terms the broad valley down the western side of the site offers a much easier and more economical route for the north-south link road than cutting through the reticulate dunes to the east (as well as providing an impressive vista on the final approach to the Village). Continuation of this road down the valley in a south-westerly direction provides a direct and technically simple access route into the National Park which does not encroach into the viewplane to Ayers Rock when seen from the Village.

4.3 DESIGN BASIS AND DESCRIPTION

General Principles: The structure and form of the Village has been largely influenced by four major considerations. Firstly the physical characteristics of the site as described above in Section 4.2; secondly the inhospitable aspects of the desert climate; thirdly the fact that three-quarters of the village population will be transient occupying either mobile accommodation or tents; and fourthly, the need for the basic concept to be sufficiently flexible to allow for unforeseen future circumstances without compromising the fundamental design.

Yulara is not a conventional settlement. Apart from perhaps forty to fifty families it is not 'home'. For single workers it is a passing scene and at most a 'semi-home'. Most tourists will be from cities and in contrast to their normal environment the Village should be dispersed, related to nature and offer a relaxed style of living.

The Village is largely enclosed by a group of reticulate dunes (see Plan 3). This will reinforce the sense of 'place' in what is a very uniform type of landscape and enable viewing platforms to be erected on the peripheral dunes giving uninterrupted outlooks to Ayers Rock and Mount Olga over natural desert landscape. (In this regard it should be noted that the route of the Park access road recommended by the ANPWS brings it into the foreground of the viewplane to Ayers Rock. This road cannot be entirely screened from sight, therefore vehicle movements and especially headlights at dusk will seriously detract from the unspoilt nature of the outlook to Ayers Rock).

The western flanks of the sand dunes have a longer, more gentle slope than those on the east side, therefore the campgrounds have been located on these western dune flanks which are well drained and suitable for pitching tents. This also affords them protection from the prevailing south-east winds. The main buildings are generally set close to steeper eastern dune flanks that are not exposed to long wind fetch.

A fundamental principle of the design is that through traffic and service traffic between the National Park and the service area should not pass through the Village. Therefore the north-south link road by-passes the Village.

By taking advantage of the natural terrain and locating this road on the west side it permits newly arriving traffic to make a left turn into the Village. An additional advantage arising from routing the north-south link road to the west of the Village is that the 'through road' principle will not be compromised by any unforseen future expansion of the Village. The layout of the Village permits expansion to the east or north-east which will not endanger the longitudinal dune discussed above.

Village Components: (See Plan 3)

Visitor Centre: The Visitor Centre is prominently located and provides a focal point on entering the Village. It is situated at the foot of a sand dune with a broad dish-shaped crest which is more suited to accommodating large numbers of people than other dune crests in the Village. This makes it an ideal adjunct to the Visitor Centre.

Village Centre: The Village Centre will be more of a focus for essential services (police, fire, medical, post office, bank) and administration than a conventional shopping centre. It will contain the main supermarket/variety store, but small outlets for convenience goods, souvenirs and retail services will be dispersed throughout the Village in campgrounds and motels. The Visitor Centre will be the main focus of tourist attention in the Village Centre and space has been provided nearby to accommodate an art gallery/ museum and other complementary uses.

The service station has been located on the south side of the village entrance road to afford maximum convenience for people refuelling on departure.

Campgrounds: The total campground capacity is 4,200 persons, therefore in order to reduce the overall impact of the camping grounds they have been divided into three separate components each curved around the western flank of a sand dune. In this way the full extent of the camping area will not be apparent.

Motels: Three separate motel sites have been allocated. These are situated along the south east flank of the Village, thus permitting uninterrupted outlook to Ayers Rock. The sites are physically separate and each is located close to dune crests which afford good views and provide a physical barrier between the motels and the campgrounds.

Village Residents: Family housing is grouped around two small dunes on the north-west perimeter of the Village in order to minimise intrusion and disturbance from tourist activities. The school and resident social centre are located in this area which is also situated on the direct route of service lines between the Village and the service area.

Hostel-type accommodation is envisaged for the anticipated high proportion of single employees. The site for single staff accommodation is located on the west side of the Village between the family housing and the Village Centre. It adjoins an area allocated for low cost tourist accommodation and this will enable two components to be operated jointly if desired.

Aboriginal Areas: Based on initial advice on Aboriginal requirements and estimated numbers, three areas have been indicated for Aboriginal use. However, all of these may not be required and the concept is sufficiently flexible to permit some degree of adjustment when Aboriginal needs are more precisely known.

Service Area: The Village service area containing all nuisance and industrial-type activities has been isolated in a dune enclosure about 1 km north-west (i.e. downwind) of the Village.

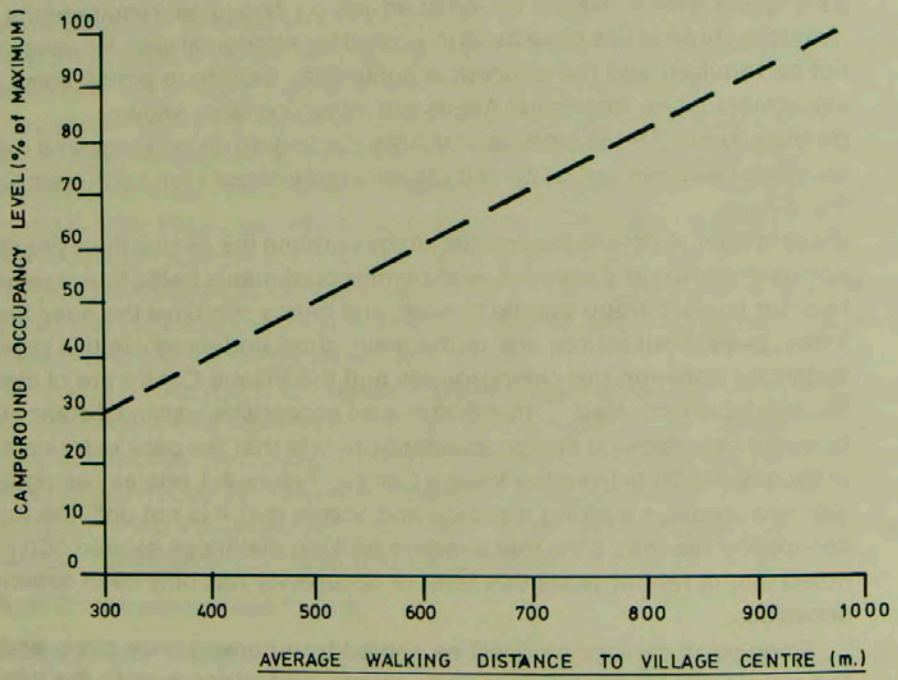
Circulation: A double loaded circuit road around the central dune provides access to all accommodation and services, and permits continuous traffic flow (see also Section 5.5). In order to encourage people to walk, and hence minimise the need for casual parking areas, pedestrian routes are, in the main, short and direct. In this regard walking distances between the campgrounds and the Village Centre are of most concern. Studies have indicated [14] that 800 m is an acceptable walking distance for most people, however campground design standards dictate that the peak use camping areas will be in excess of 800 m from the Village Centre. Figure 4-1 relates campground occupancy levels to average walking distance and shows that it is not until the total campground occupancy reaches 80% that average walking distances exceed 800 m. It should be noted that in recent years this level of occupancy has only been experienced on a few occasions.

Since each campground will be served by a convenience store, and any major shopping trips are likely to be made by car, pedestrian trips to the Village Centre will generally be of a recreational nature.

Parking: All motels, campgrounds and resident areas will be served by off-road parking. The only other area which will generate a need for parking will be the Village Centre. Separate car-parking areas have been provided for the Visitor Centre and the government office/shopping facilities. The Visitor Centre parking area will accommodate 30 cars including some pull-through spaces for caravans, and the administration/retail car park will accommodate 80 cars. In addition, a bus parking area with space for 35 buses in pull-through bays has been provided to accommodate buses bringing groups to the Visitor Centre and for assembling bus parties to visit the National Park. (It is anticipated that ultimately independent travel into the National Park by car may be prohibited at peak periods to reduce traffic volumes within the Park). Locally based buses may also be parked here when not in use.

FIGURE 4—1

CAMPGROUND OCCUPANCY LEVELS AND AVERAGE WALKING DISTANCE



Staging: Early development will progress around the circuit road from the Village Centre and the distribution of buildings is such that the eastern portion of the circuit road need not be completed until required by later stage development. The basic layout permits longer term expansion to the east or north east and a reasonable degree of flexibility to interchange or adjust some of the later stage components according to needs at the time.

4.4 DEVELOPMENT GUIDELINES

This section contains some indicative guidelines relating to specific development aspects. Certain of these will need to be further developed during the detailed design stage and effective mechanisms established to implement them. In this respect project management procedures and responsibilities should be determined without delay.

Survey Date: It should be noted that the topographic base mapping used in this report is partially derived from Australian Survey Office 1:2500 scale photogrammetric contour mapping of Ayers Rock North (Sheets 29-38 and 29-39) and partially from a 1:10,000 scale formline plan compiled without control. The contours are not sufficiently accurate for detailed design.

Currently the following additional survey work is being carried out:

- The Department of Lands and Housing is extending the photogrammetric contour plans in addition to carrying out field survey for the initial construction.
- The Australian Survey Office in Darwin is arranging to peg the northern boundary of the National Park.
- The Commonwealth Division of National Mapping is producing a contoured overlay for its 1978 orthophoto map of the area.

All of the above sources should be contacted for the latest survey information.

For consistency in the surveying work at Yulara, bench-marks and a co-ordinate grid system have been adopted by the Northern Territory Department of Lands and Housing and the Australian Survey Northern Territory office. This system is tied to the national Australian Mapping Grid (AMG) and Australian Height Datum (AHD) systems. It is being used for present work at the site and all future surveying briefs should be consistent with it.

The adopted grid is as follows (metres):

Northing	Easting	Concrete Bench Mark	A.H.D. Level
0.000	6000.000	CB1	530.02
2218.032	4754.899	CB3	521.39
4794.727	5279.270	CB5	520.29
6707.564	4917.373	CB6	511.76
8534.660	4704.065	CB10	511.36
10768.704	3752.941	CB13	506.54
12535.411	3459.852	CB15	499.30
13319.275	1283.986	CB18	499.04
-7564.100	11099.169	Ayers Rock	

Reference for Benchmarks is Field Book 574/121 - 1974 (Australian Survey Office) Level Books 1462, 1463 - 1974. CBI is shown on Plan 1.

A benchmark for connection to the existing Petermann Road survey is also shown on Plan 1. It is BM185A. It is at Petermann Road chainage 185900 metres offset 30 metres left of centre line. Level is 499.258 AHD top of picket.

For connection to Water Resources surveying, Bore G37 Registered Number 10490 shown on Plan 1 has AMG Co-ordinates 694172.1383E, 7203148.800N and RL top of casing 517.05 AHD.

The Uluru National Park boundary will be pegged late in 1978 or early in 1979. Until then its exact Co-ordinates will not be known. The theoretical AMG Co-ordinates of the Yulara townsite are:

Corner	Easting	Northing
North West	694 462	7 217 265
North East	702 444	7 217 149
South East	702 251	7 204 225
South West	694 277	7 204 342

The southwest corner is at Latitude 25° 15' 52"
Longitude 130° 55' 45"

Availability of Construction Materials: Water for construction purposes will be available from the Dune Plains Aquifer and will be piped to ground and elevated tanks in the service area.

Natural sand clays and dune sands on the site are satisfactory foundation and filling material, and have some uses for very low traffic roads and paths.

A preliminary materials search has been carried out by the Department of Construction This report titled "Materials Search - New Ayers Rock Village Area", was prepared by the Department of Construction, Alice Springs. (File 73/131 of November 1975).

Additional work associated with the construction and sealing of Petermann road and the Tarcoola-Alice Springs railway line is likely to be of assistance in the supply of concrete and sealing aggregates.

Satisfactory aggregates have been located in the Sedimentaries area at the western boundary of the town site (see Plan 1). Because this area is proposed for addition to the National Park there will be strong resistance to opening a quarry there, however carefully located and controlled. Alternative sources will be much further from the Village.

Quartzite gravel of good quality has been found by the Department of Construction inside the townsite boundary just west of the Village (see Plan 1). This could be discreetly worked and screened although it is inside a valued mulga area.

Coarse sand for concrete and other construction purposes has not been found within 50 km of the site, and may have to be carted from Britten Jones or Armstrong creeks.

In general, materials supply problems are normal for remote area work, and have been allowed for in the estimates.

Landscaping: As far as possible modification of the natural landform, especially the dunes, is to be avoided. Any extensive remoulding of the landscape will not only destroy plant cover in the areas where earth is moved from, but will also destroy vegetation in areas where sand is stockpiled or respread. In addition, the resulting unstabilised areas will be a source of blown sand on which it will be difficult to re-establish vegetation, especially in extended dry periods. Earth remoulding should therefore be kept to an absolute minimum.

For areas which have to be disturbed, there are methods of stabilising loose sand such as a thin cover of dilute bitumen emulsion which will temporarily hold the surface, provided it is not trampled, thus giving plants an opportunity to become established.

During the very early stages of development there will be some surplus capacity in the Dune Plains water supply and this could be used to water trees, shrubs and other ground cover in order to establish supplementary vegetation around certain key areas such as the Visitor Centre, the Village Centre parking areas and the perimeters of the campgrounds. The investigations referred to later in Section 6.3 should be extended to identify suitable fast growing and salt tolerant species for this purpose.

Architectural Guidelines: The design of permanent buildings in the Village will be influenced by three main factors: the landscape, the desert climate, and the high cost of construction.

In designing buildings the characteristics of the dune landscape should be allowed to predominate. Buildings should be low profile generally one storey, but occasionally two. They should be sited on the gentle dune flanks on slopes generally not exceeding 1:40 (Mabbutt, p.10). This will avoid interference with drainage patterns in the swales, minimise the need for cut and fill and the danger of erosion arising from disturbance of steeper dune slopes.

The colour and texture of building finishes should be in neutral tones which are in harmony with the surrounding desert environment (and in contrast to the ever-changing kaleidoscope of colours and shapes in the campgrounds.)

The combination of elevation and the desert climate causes high diurnal temperature ranges and severely inhibits the growth of shade trees and the potential to use landscaping to complement buildings.

Limitations on the availability of water, especially for landscaping purposes (see Section 6.3 for discussion on water budgets) suggest that buildings should be tightly clustered and inward looking with planting confined to small courtyard areas.

The best construction technique for desert climates is that of mass. Insulated panel walls are not as effective and the temperature gradients are not as good as for those given by sheer mass. Also traditional methods of construction would give a more substantial and permanent character to the buildings.

However, since construction at Yulara will be costly, a balance will need to be struck between on-site labour costs and transportation costs. A combination of traditional nature-aided techniques and modern industrial building techniques will therefore probably be necessary. The Village concept disperses the major building complexes among the dunes, thus permitting variations in materials and design character within the overall design theme.

It is essential that all buildings at Yulara are designed for low energy use (see Section 7.4). The high cost of electrical generation and the limited availability of water for air-conditioning will require that all buildings be heavily insulated and deeply shaded, but with some means to permit sun penetration to warm interiors after cold nights.

5. ROADS

5.1 VEHICLE MOVEMENTS

Analysis of figures relating to the mode of arrival of visitors to the National Park in recent years indicates that approximately:

55% arrive by bus
30% arrive by car, van or similar and
15% arrive by air (from Alice Springs).

This distribution of arrival modes is changing and will change further depending on tourist needs and the standard of the aerodrome, the Petermann Road and available accommodation. Last year, for example, the percentage of visitors arriving by bus increased by 4%. However, the sealing of the Petermann Road, which is now in progress, will encourage more people to bring their own vehicles from Alice Springs, especially caravans.

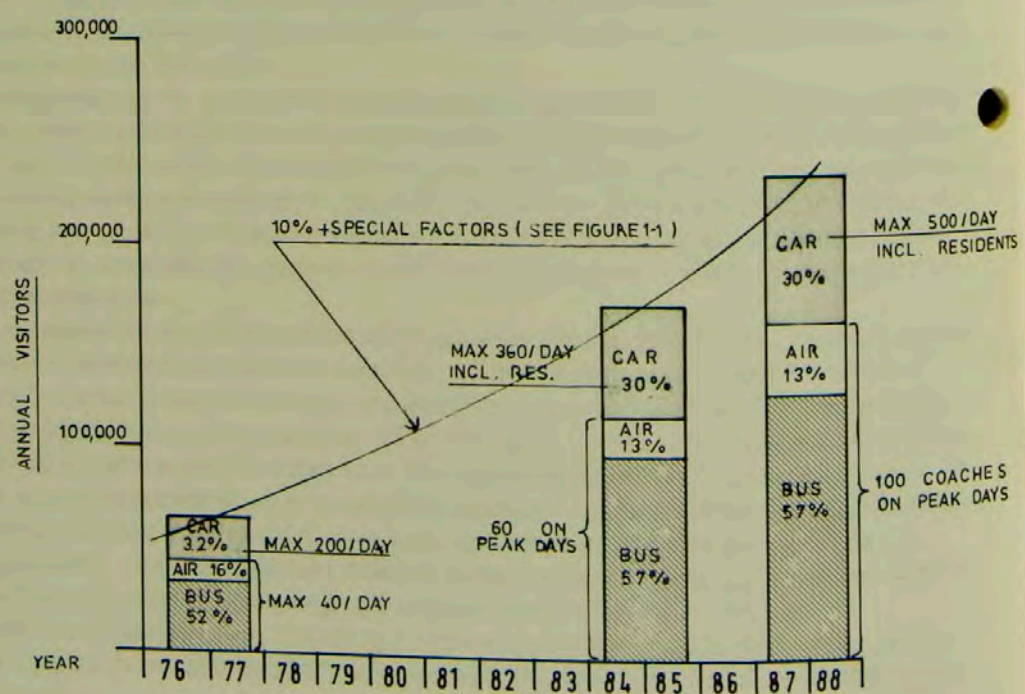
Also, the proportion of air passengers is likely to increase in response to the improvement in air services both to Alice Springs and, when the new aerodrome is built, to Ayers Rock.

Present analysis indicates that during the busiest season at the interim and ultimate development stages of the Village, the following numbers of tourist vehicles may be expected in the Village (see Figure 5-1):

	Interim Development	Ultimate Development
Buses/day	60	100
Cars, Caravans etc./day	300	400

FIGURE 5—1

NUMBER OF VEHICLES GENERATED BY MODE OF ARRIVAL



In addition, vehicles belonging to residents of the Village, and garaged in the Village, may be expected to be of the order of 60 vehicles in the interim stage and 100 vehicles in the ultimate stage. In terms of road system capacities, these volumes are very low and no traffic congestion problems are foreseen, provided that the road system within the Village is designed to cater for the anticipated peaked pattern of vehicle movements. The peaked pattern, especially at sunset, would be too high for safety and maintenance on unsealed roads.

The road system has been designed to cater for a large number of buses. It is simple for the unfamiliar visitor to follow and takes into consideration safety, tourist operations, park management, local and regional planning needs.

5.2 PETERMANN ROAD

As shown on Plan 1 a contract of $2.9 million has been let for the first 108 km of the Petermann Road to a sealed standard (6.2m wide). This contract, let in October 1978, is for the section from Erldunda on the Stuart Highway to Angas Downs. A further 132 km to Yulara remains to be built and sealed, via Curtin Springs and a new alignment outside the National Park.

It is expected, but not yet programmed, that the remainder will be completed by the end of 1981. This should be co-ordinated with the development of the Village (to avoid overloading the National Park with campers) and with the establishment of a new entry point into the National Park once the Petermann Road is completed to Yulara.

Forward planning for Northern Territory roads show the Petermann Road continuing from Yulara via the new aerodrome site around the northern boundary of the Sedimentaries and the National Park and on to Docker River. This will eliminate through traffic from the National Park in accordance with the management objectives of the ANPWS.

Although this continuation is not designed or programmed, any work on the existing road from the National Park to Docker River should take account of the proposed new route.

5.3 CONSTRUCTION AND SERVICE ACCESS

Construction traffic will require access to the Village site in advance of the completion of Petermann Road. This was discussed with the ANPWS and the Northern Territory Department of Transport and Works in October 1978 and **a construction access route has been agreed as shown on Plan 1.** This access follows the Sedimentaries Track before diverging in a north-east direction along the proposed route of the north-south link road to the Village service area.

In order to avoid construction traffic passing through the National Park, the Department of Transport and Works was requested to consider building the Curtin Springs to Yulara section of Petermann Road to formed gravel standard early in the program. However, this was not considered practical in terms of cost and construction programming and because of the effect of dust on roadside vegetation.

Access to the Dune Plains water bores and pipeline will also be obtained via the Sedimentaries Track and then along the pipeline via a minimal standard track. Future service access to the bores can be either via this route or south from the bores to the Ayers Rock - Mount Olga road as suggested by the ANPWS. (See Plan 1).

On the instruction of the ANPWS, the construction access route proposed makes maximum use of existing tracks and involves minimum works within the National Park.

The Department of Transport and Works have briefed consultants to design and document the construction road to gravel standard (and the Dune Plains water bores and pipeline) for proposed construction in 1979.

5.4 ACCESS ROAD TO ULURU NATIONAL PARK

This report **recommends that the permanent access road into the National Park should follow the alignment of the proposed construction and service access via the Sedimentaries track** (see Plan 1 and Section 5.3) with the Park entrance station located on the Park boundary south-west of the Village site. From this point it is proposed that access to Ayers Rock be obtained via Sunset Strip and to the Olgas via the existing Mount Olga/Docker River Road.

In contrast to this direct link the plan of management for Uluru National Park, now in preparation by the ANPWS, will recommend that the entrance station be located at the south-east corner of the Yulara townsite and that the Park access road should follow a route east of a line between the south-east corner of the townsite and the north-east fringe of the mulga groves adjacent to Ayers Rock (see Plan 1). This will result in all journeys from the Village to Sunset Strip and Mount Olga being routed around Ayers Rock, adding 15 km to the journey to Sunset Strip and 22 km to the journey to Mount Olga.

Also, until the Petermann Road is extended west from Yulara, all traffic to Docker River and beyond will be obliged to detour around Ayers Rock. The westward extension of Petermann Road from Yulara is not included on the current Northern Territory roads program and, based on existing traffic volumes, is unlikely to attract early priority for construction.

It is understood from discussions with officers of the ANPWS that the plan of management will designate the western zone of the Park as a wilderness area and the lengthy access route proposed is considered to be the most effective means of minimising penetration into this part of the Park. In doing so, it will greatly increase the number of vehicle movements around Ayers Rock because all the trips that are made to Sunset Strip and Mount Olga will involve forward and return journeys around Ayers Rock.

In order to facilitate park management activities and provide a more direct emergency route from Mount Olga to the Village, the ANPWS has suggested that the initial construction access road (i.e. the permanent route proposed in this report) be retained as a gravelled private road controlled by a locked gate.

The ANPWS has advised that the road standard within the National Park will be as for the Petermann Road (6.2m sealed pavement) with the design speed reduced to 70 km/h.

5.5 VILLAGE ROADS

The north-south link road has been briefed to consultants to be of the same standard as Petermann Road, i.e. a 6.2m sealed pavement with gravel shoulders, although the interim construction will be to gravel standard only. National Association of State Road Authority Standards apply to all roads.

The Village entrance road and the main circuit road should be 7.4m wide. This allows for 1.0m clearance between passing buses and 0.8m between the buses and the pavement edge.

Estimates for these two heavily trafficked roads include barrier kerbing to prevent vehicles from being driven off the sealed pavement. Adequate off-road parking space for buses, caravans and car parking was allowed for in the detailed planning (see Section 4.3).

Other Village roads could be reduced to a 6.2m sealed pavement with gravel shoulders, with sealed widening on curves used by buses travelling to motel sites, etc. The main road to the service area should be a 6.2m sealed pavement with lesser standard roads to the rear of the service area.

Pavement estimates have been based on 150mm gravel on a compacted subgrade, with a prime and single seal.

6. WATER SUPPLY

The design basis for the Village water supply draws on a series of reports by the Water Resources Branch of the former Department of the Northern Territory (see references 15, 16, 17, 18 and 19). Details of the proposed water supply system are contained in a report to the Planning Team prepared by Mr. J.C. Smith of the Department of Construction. [20]

This Chapter is essentially a summary of that report.

6.1 WATER AVAILABLE

There are two principal groundwater resources in the vicinity of the proposed Yulara Tourist Village, the Southern Aquifer and the Dune Plains Aquifer (see Plan 1).

Southern Aquifer: The Southern Aquifer is at the base of Ayers Rock, and the total annual yield from this resource is 200,000 kL per annum.

The water quality from the Southern Aquifer varies with Total Dissolved Solids (TDS) ranging from about 700 mg/l to 3000 mg/l, with the higher figure coming from a lower level aquifer.

By careful management, a supply with a TDS of less than 1500 mg/l should be obtainable. Water of this quality is generally acceptable although flouride levels are slightly higher than those recommended by the World Health Organisation (WHO). This is not a serious problem, and this water source, which is used by Ayers Rock residents and visitors at present, is therefore considered to be acceptable for drinking without treatment.

Dune Plains Aquifer: The Dune Plains Aquifer, about 10 km north west of Ayers Rock, has a recharge potential of about 100,000 kL per annum. This figure should be considered as the yield of the aquifer. However, it may be possible to extract a further 200,000 kL per annum by mining the aquifer. The storage available in the aquifer would indicate that mining could continue for 200 years, but salinity would rise progressively.

Before the pipeline from the Southern Aquifer is constructed, the Northern Territory Water Resources Branch intends to undertake a further investigation of the area north of the proven Dune Plains Aquifer to ensure that all possible sources of water near to the Village have been identified. The Dune Plains Aquifer is more saline than the Southern Aquifer, with TDS varying from about 1400 mg/l to 3500 mg/l and hardness from about 530 mg/l to 900 mg/l.

Sulphates, nitrates and fluorides from some bores in this aquifer are also above WHO levels. These high levels of TDS and hardness affect taste and lathering; high sulphates affect digestive systems and waters with a high nitrate content are unsuitable for small children. However, officers of the NT Water Resources Branch believe it will be possible to provide a water supply from the Dune Plains with a TDS less than 1500 mg/l.

It is recommended that a yield of 200,000 kL per annum of acceptable water from the Southern Aquifer and a yield of 100,000 kL per annum of marginal quality water from the Dune Plains Aquifer be adopted and further investigations of both quality and quantity be undertaken.

6.2 WATER DEMAND

A Department of Construction report of February 1976, [21] recommended that due to the limited water resources, **water consumption should be restricted to an overall average of 360 litres per capita per day (lcd.)**

The Water Resources Branch report of February 1977 (Lally & Read) gives the present water usage at Ayers Rock as 150 lcd for campers, 450 lcd for motel guests, and 1400 lcd for local residents, giving an overall water consumption rate of 435 lcd. The high rate for local residents is due mainly to garden watering.

Because campers comprise two-thirds of the population and use at present only 150 lcd, a higher figure is available for other users, within a 360 lcd overall budget. Providing that a reasonable selection is made from the water conservation measures suggested later, the budget proposed is sufficient for the comfort of residents and visitors.

Ultimate peak usage with a village population of 5,600 persons based on 450 lcd for residents and motel visitors and 150 lcd for campers would be as follows:

65,000 kL	(residents domestic use only)
97,000 kL	(motel occupants)
56,000 kL	(campers)
218,000 kL	(per year)

This assumes 66% occupancy of 900 motel beds, and an average daily number of campers of 1050 throughout the year. This figure is considered an upper limit for annual domestic consumption at the village.

This would leave a reserve of 82,000 kL per year from the present assessed yield of the Dune Plains Aquifer for the establishment of vegetation and other uses.

6.3 CONSERVATION AND TREATMENT

Various possible water conservation methods have been considered. These include consumer education measures, plumbing control devices, collection and reuse of rainwater, reuse of treated sewage effluent, restrictions on air-conditioning and lawns, desalination and dual supply reticulation systems.

Education: Visitors and residents should be made aware of the limited water resource and be encouraged to conserve water. A display relating to the water supply system could be provided at the Visitor Centre. Frequent meter readings should be made and interpreted for residents.

Plumbing Controls: The main plumbing controls available for restricting water usage are spring-operated taps, shower heads with flow restricting orifices, and dual flushing or reduced flushing toilet systems.

Rainwater: The quantity of water available from roofed areas is both limited (mean annual rainfall at Ayers Rock is 262mm) and unreliable. Although its quality might appear to be better than borewater, it is prone to contamination by birds, animals and mosquitoes.

Reuse of Sewage Effluent: Reuse of treated sewage effluent is an option for plant watering and the sandy soil is suitable for irrigation with sewage effluent. However, because of the relatively high salinity of sewage effluent after treatment in lagoons (TDS 3000 mg/l), only salt-tolerant plants could be grown. Botanists of the Primary Industry Division of the NT Department of Industrial Development have undertaken to investigate species of plants that could be grown with such effluent salinity levels.

Restrictions on Air-conditioning and Lawns: Evaporative coolers add 180 lcd to a typical Northern Territory domestic usage of 300 lcd. Lawns add about another 500 lcd for a house in a Northern Territory town (Department of Construction, Water Utilisation at Ayers Rock, p. 2). The use of air and water-based condensors for air-conditioning and minimising areas of lawn are obvious ways of conserving water.

Desalination and Dual Reticulation: Whether it is necessary to desalinate the Dune Plains water supply will depend on the quality of water obtained once bores are brought into production. Although the WHO places an upper limit on TDS of 1500 mg/l, a supply with TDS of up to 2000 mg/l could be considered acceptable for the initial period of the Village, 1981-1984, but if the TDS continues to be greater than 2000 mg/l, a desalination plant will be required.

The cost of desalination using reverse osmosis has been included in the preliminary estimate. Other desalination systems have been investigated, but reverse osmosis appears the most appropriate method. However, provision should be made for the tendering of alternative systems.

Until there are production bores operating for a considerable period and more is known of the quality of the water from the two borefields, it is not possible to determine the size of desalination plant that might ultimately be needed for the planned size of the Village. However, for cost estimation purposes, a desalination plant of 410 m^3/day for Dune Plains water has been assumed. Another option is to use a small desalination package plant to produce small quantities for babies, tea making, hairwashing etc.

Discarded water from the desalination process will be highly saline and it is proposed that this would be disposed of in an evaporation basin adjacent to the sewage treatment plant.

An estimate for a partial dual supply system for watering public and motel garden areas utilising the untreated Dune Plain water has also been included for consideration. This system involves a small elevated reservoir of 100,000 litres, a lift pumping station, and dual reticulation as detailed (Smith, Fig. 3).

Summary: In spite of extensive work on the subject by officers of the NT Water Resources Branch and the Department of Construction, it will not be possible to finally determine the best water conservation methods until the quality and quantity of Dune Plains water is proven in use.

Even when water quality and quantity is better known, it is considered better to permit the various government and private developers to select water conservation measures from the above options, within a given water budget. This can be controlled by scaled charges increasing steeply with over-use.

It is recommended that a staged water supply be developed with decisions on desalination, dual reticulation and other water conservation measures being made progressively as more Dune Plains supply information becomes available and that developers be permitted to select water conservation options under controlled conditions.

6.4 STAGING OF WATER SUPPLY

The Southern Aquifer will continue to be used exclusively for the existing Ayers Rock development until 1984, and will continue to supply this area even after most facilities are removed.

In 1979, the Northern Territory government proposes to provide a water supply from Dune Plains for construction purposes, for establishing some shade trees and later for use in camping areas (see Plan 1).

On the basis of recommendations on initial works prepared in October (Status Report, p. 56), consultants to the NT Department of Transport and Works have been instructed to prepare contract documents for this initial water supply as follows:

- -Equipping two bores in the Dune Plains Aquifer (Bore G37 R/N 10490 and a new bore 200m south);
- -Supplying 4 litres per second from each bore to an elevated tank in the Village service area, via approximately 7 kilometres of 150 mm diameter A.C. or P.V.C. buried main.
- -For the interim stages, 0.5 ML ground level storage is included with a squatter's tank of 50,000 litres for elevated storage.

The total ground storage for the Dune Plains supply could be increased to 1.5 ML later in the construction program, and a 250,000 litre elevated storage is proposed later in the construction period when the Village reticulation is installed.

The two Dune Plains bores will suffice for Yulara until 1984. By then it will be necessary to provide water for new motels and residents at the Yulara site, which will require a high quality supply. Therefore, unless further investigations in the area north-east of the Dune Plains are fruitful, the pipeline from the Southern Aquifer should be constructed by this date. This will involve equipping appropriate bores and the construction of a 200 mm diameter A.C. or P.V.C. buried pipeline some 19 km in length, and provision of another 1.5 ML ground level storage tank for emergency and fire storage (providing a total ground level storage capacity of 2 peak days supply at full development).

When water from the Southern Aquifer is brought to the Village, its use should be confined to domestic purposes only. It would then be possible for limited public and motel garden areas to be watered from existing or new Dune Plains reticulation mains. A dual system on this basis including pumps and a small elevated reservoir has been costed separately.

6.5 WATER RETICULATION

The reticulation system is shown diagrammatically on Plan 4 (see Smith Report for details). It comprises buried mains of 250, 200, 150, 100 mm diameter, fire hydrants at 100m intervals along the main in developed areas, service valves and pipelines to domestic meters. The elevated tank and ground level tanks are of steel construction and roofed. A fire booster pumping station and domestic lift pumping station to pump from the ground level to the elevated tank are provided. Cables for automatic operation of the bore pumps with tank levels should be laid with the rising mains.
Estimates are based on the preliminary design as described above.

7. OTHER SERVICES AND UTILITIES

7.1 SEWERAGE

For a population of up to 6,100 people of whom less than 10% are permanent residents, the sewage can be disposed of by either, or a part combination, of three systems:

- Deep sewerage collection discharging into anaerobic and aerobic lagoons;
- Septic tank systems with effluent disposal by aerobic lagoon;
- Vacuum system using anaerobic and aerobic lagoons.

The final effluent from all systems can be used for garden reticulation (see Chapter 6) providing:

- it meets a bacterial oxygen demand (BOD) requirement of 30 parts per million: and
- it is chlorinated sufficiently to reduce the coliform density to less than 1000 per 100 mL of liquid.

Deep Sewerage: For a village of this size, deep sewerage would be the ideal method of sanitary waste disposal.

To work properly, without high maintenance costs, deep sewerage relies basically on a good and reasonably constant flow for the conveyance of raw sewage.

As the service area is about 2km away from the Village site and the terrain is reasonably flat, a complete gravity system is not feasible and a combination of gravity and pumping will be required, relying on the Village electricity supply for its power source.

The major problem arising from the use of deep sewerage would be the fluctuating population. Constant flows are desirable to avoid blockages in the system. The lagoons will have to be staged, and used according to population fluctuation.

By providing a series of pumping stations strategically placed to minimise gravity mains, the Village can be reasonably easily serviced by a raw sewage system. Any area not in use should be flushed out and locked up, leaving only clean water in the system. This then only requires a regular maintenance check on water seals and pumping pits etc, because pumps may sieze if not in reasonably constant use.

Flushing is necessary to clear the lines and the pumping pit of any solid matter. If this is not carried out, the raw sewage will turn septic within 24 hours, causing hydrogen sulphide generation, and other problems.

This hydrogen sulphide gas will be given off from any sewage allowed to remain and become septic in any pit or pipe, due to low seasonal flows or lack of the above maintenance. This is corrosive and the smell is offensive, requiring a well sealed and carefully designed system.

Septic Tank System: Septic tanks with effluent disposal through an aerobic lagoon can be more suited to a fluctuating population because, since only water is conveyed, the system can remain dry when not in use.

To obviate the necessity for deep excavation, the septic tanks must be located close to each service facility, requiring a pumping pit at each tank (approximate number 30). These pumping pits and rising mains are smaller and hence less expensive than for a fully pumped raw sewerage system.

A septic tank system has the following disadvantages:

- the capital cost of the septic tank construction;
- if shut down for long periods of time, the contents of the septic tanks solidify, causing problems prior to reopening;
- removal and disposal of the septic tank contents.

Septic tanks with local disposal by leach drains or transpiration beds are widely used domestically, but are not considered economic or satisfactory at the Yulara scale.

Vacuum System of Sewage Disposal: A vacuum system has been used at Shay Gap (population about 1000), a small mining town in the north-west of West Australia for about seven years. Until recently it was reasonably maintenance-free but lately it has been incurring fairly high maintenance costs.

The system was investigated for water conservation reasons, but it is not recommended because it has the following disadvantages in relation to Yulara:

- it requires experienced personnel for operation and maintenance;
- it is unusual technology and not proven for widely fluctuating numbers;
- public acceptance of a vacuum flush is low.

Summary: A deep sewerage system is considered most suitable for the following reasons:

- Cost estimates show that the deep sewerage system is less expensive than a septic tank system providing the costs of supplying the septic tanks are taken into consideration.
- Operation is simple and almost completely automatic, the only manual requirement being the change-over of the lagoons and the flushing of a local area prior to shut down. Periodic flushing of sanitary fixtures is also necessary to maintain the water seals and to activate the pumps, which otherwise could seize.
- Unlike a septic tank installation, there will be no residue to dispose of apart from the cleaning of the lagoons (required once every 10 years or so).
- Ease of connection of new services.
- General maintenance could be carried out by the resident electrician or plumber as only two types of pump would be used and a spare of each could be held in stock. As each pumping pit is automatic and on a dual pump system, no major breakdown should occur.

In spite of the above advantages, there are specific disadvantages of the deep sewerage system proposed for Yulara (see Plan 4).

The seven pumping stations and long line to the disposal area, caused by the flat site and intervening dunes, is not ideal and is made worse by the fluctuations in population.

The site and population complications are unavoidable and there may be no better solution than the one recommended. Nevertheless, some possibilities should be further explored during detailed design. For example, for the early stages of development, lagoons could possibly be located in the future development area north-east of the Village - much closer but, like the preferred disposal site, favoured by prevailing winds.

It might be possible to reduce the number of pumping stations by deeper (more expensive) sewers, or by some use of septic tanks instead of the pumping station at the service area.

7.2 GARBAGE AND WASTE DISPOSAL

The existing method of waste disposal employed at Ayers Rock is by landfill. Rubbish is collected by means of a purpose made garbage collection truck and then dumped into open trenches. The rubbish is then burnt and later covered with soil.

The generation of refuse from the Yulara Village is estimated to be 3 kg per person per week. This is equivalent to approximately 300 tonnes or 500 cubic metres per annum for the Village at its ultimate population.

Available Methods of Waste Disposal: The disposal of waste can be accomplished by use of one or a combination of the following processes:

- Sanitary landfill
- Pulverisation
- Compaction
- Incineration
- Pyralysis
- Composting
- Recycling/Resource Recovery.

Most of the processes listed above necessitate the installation of expensive plant and involve high operation and maintenance costs. Other factors such as remoteness of the Yulara Village, lack of any market for by-products and high transport costs for recycling of components also have a bearing on the choice of a disposal method. Sanitary landfill and incineration are the only practical methods for Yulara.

Sanitary Landfill: Sanitary landfill is a method of solid wast disposal based on sound engineering principles designed to minimise environmental pollution. The technique involves the spreading of waste in thin layers and covering with soil each working day to prevent objectionable odours, windblown debris, and the breeding of flies and vermin.

Sanitary landfill is generally accepted as the most economical means of refuse disposal and notes on the operation of landfill sites prepared in December 1976 by the Local Government and Services Branch of the Department of the Northern Territory are available for guidance.[22]

Advantages:

- Economy; the initial investment is low in that no sophisticated equipment or structures are required; also running costs are low.
- Complete disposal; sanitary landfill is a complete method of disposal in itself. Other methods (such as incineration) may reduce the volume but still require final disposal of residue by landfill.
- Flexibility; variations in the type and quantity of waste do not have a major effect on landfill operation.

Disadvantages:

- Public acceptance; badly managed landfill sites create a poor public image.
- Land requirements; landfill requires larger areas of land than other means of disposal.
- Fire; even when buried, burning waste can be difficult to extinguish.
- Gas generation; concentrations of the gases produced by decomposing garbage can be a problem but in normal landfill operation they disperse naturally in small quantities without causing any problems.
- Leachate; untreated domestic wastes are a potential water pollutant. Water passing through wastes tipped on landfill sites can produce a polluting percolate which may leach out of the waste and into surface or underground waters.

Problems associated with leachate are more likely to occur in areas of high rainfall (say 1000 mm per annum). The rainfall at Yulara is so low (262 mm per annum) that the probability of pollution of underground water is very slight. However, the possibility of leachate percolating into the underground water supply has been recognised. The general flow of the groundwater in the Dune Plains Aquifer is from the north-west to the south-east although this flow pattern may vary once bores are in production. The Dune Plains Aquifer is situated approximately 5 km south-west of the Village service area where the landfill site will be located. It is confined to a discrete area and the uppermost aquifers are some 40-50m below the surface, therefore there is no risk of pollution.

The gazetted Yulara townsite is bordered by the Uluru National Park, and Vacant Crown Land subject to an Aboriginal land claim, part of which may become an extension to the National Park. Therefore, **any site for sanitary landfill should be within the townsite boundary.**

Consideration should also be given to the possible congregation of birdlife at a sanitary landfill site. In order that birds do not become a hazard to aircraft, landfill sites should not be located on runway approaches.

Incineration: Incineration is the treatment of wastes where the combustible portions are burnt at high temperature leaving a sterile, innocuous residue with a substantial reduction in volume and weight.

Basically, an incineration plant consists of a reception area and hopper where wastes are received, and fed into a furnace for combustion. The current trend is to automatic stoking, mobile grate incinerators in lieu of the more conventional manual stoking static hearth type incinerators. The material is initially ignited in the furnace and then continues to burn until feeding ceases and all combustible material has been spent. The residue is then normally disposed of by landfill.

An incinerator at Yulara Village with a capacity of 545 kg per hour with automatic loading and ash removal could cost in the order of $360,000. Such an installation would be designed for operation by one person and would incorporate appropriate flue emission controls.

Advantages:

- Only a small site area is required for the establishment of the facility;
- A substantial reduction in the weight and volume of waste product;
- The end products are odour free and inoffensive;
- Risks of fire, vermin, flies and windblown debris from the landfill site are avoided;
- The process can, under some circumstances, provide heat energy for use in the local community. However, the small scale of operation and the seasonal fluctuations of population at Yulara make utilisation of heat energy difficult and uneconomical.

Disadvantages:

- High maintenance and operation costs;
- High capital investment cost.

Summary: The high capital cost of incineration, together with the high maintenance and operation costs of the system, preclude its use at Yulara. **Thus, although sanitary landfill has some disadvantages, it offers the best garbage disposal solution at Yulara.** On a properly managed site, a tip area of 1 Hectare should last for over a decade.

The selected landfill site shown on Plan 3 is well screened from view and isolated. Proper management is still necessary for health and aesthetic reasons.

7.3 DRAINAGE

The proposed Village site is located among sandhills, with a gentle slope from the sandhills to lower areas between dunes known as swales. The area has a further general gentle slope from south to north.

The mean annual rainfall at Ayers Rock is 262 mm. A greater proportion of rainfall occurs in the months of November to March. The mean number of wet days for a year is 42, these being spread fairly uniformly over all months.

Approximate site contours have been produced from aerial photography and development areas are planned clear of existing drainage paths shown on Plan 2. Camping areas have been located on the most suitable natural slopes for drainage purposes.

It is an error to assume that drainage is unimportant in low rainfall sand dune areas. Because rainfall is low, normal drainage channels and creeks do not develop and water lies and flows in wide areas on the less permeable soils between dunes.

A drainage design for the Village is required which does not interfere unnecessarily with this natural pattern. Concentration of run-off creates local high volumes and flows which cause scour. Such concentrations cannot be handled by natural drainage channels and are unnecessarily expensive because of the pipes and structures required.

At Ayers Rock, the deeply eroded circuit road not only ponds water after rain, but acts as a drainage dam, cutting off water from downstream vegetation, causing it to die. This demonstrates the need to properly form and surface all Village roads, and the importance of natural drainage to vegetation and soil stability.

The low rainfall at Ayers Rock will allow overland drainage to be utilised extensively in the drainage of the Village site. There is some infiltration into the sandy soil but development will increase run-off. Run-off from roofs can be collected in tanks to be used as required.

Drainage of sites will generally be by overland flow using the existing natural system with minimum modifications incorporated into the design of the roads. There are three basic drainage concepts which could be used at Yulara, each of which is briefly discussed below.

Kerb and Gutters with Piped Drainage: The low rainfall does not warrant the large capital expense involved in this system. Concentrated flows of water are produced at pipe outfalls which may cause environmental damage. Furthermore, low rainfall and intermittent flows combined with dust and dirt give maintenance problems with underground drains.

Raised Road Formation with Table Drains and Culverts: The capital costs involved are relatively low although culverts would be required at all crossings. However, problems are experienced with concentrated flows of water at outfalls, similar to those described above.

Road with Shallow Table Drains and/or Minimum Raised Formation: This system utilises a standard type two-way crossfall pavement. If run-off is not great, overland flow is intercepted at the edge of the formation, whereas in heavy rain existing drainage patterns predominate. Its main advantage is low cost, as no pipework is required, only floodways. Sealed shoulders and floodway maintenance are required and the crossfall and table drain keeps the road subgrade dry, except in low floodway sections. Roads could become temporarily impassable for light traffic in heaviest rains and buildings must be located clear of existing drainage routes. It is the most economical of all systems and causes minimum disturbance to the existing drainage pattern. Road sweeping could be necessary after heavy rain to clear debris.

Summary: The first two drainage options described above were discarded on cost grounds. **Shallow table drains and/or minimum raised formations have been adopted for the Village** and two basic road cross-sections have been used (see Plan 4).

Type 1 is recommended for most roads, comprising a 6.2m sealed crowned formation with 1:48 crossfall, gravel shoulder finishing about 75 mm above natural surface with a gentle flank and/or table drain. This is used for most roads except as described in Section 5 and below.

Type 2 is a 7.4m sealed crowned formation with similar crossfall and a 150 mm high barrier kerb finishing about 75 mm above natural surface.

This kerb is not for drainage purposes but to control traffic, parking and access to development along the main entrance and circuit road of the Village. It requires very frequent breaks in the kerb to prevent concentration of water.

Both cross sections would be replaced by a floodway section where they cross natural drainage paths (about four locations). This section finishes at ground level and has a wider sealed shoulder to resist erosion and simplify maintenance.

7.4 ENERGY SUPPLY

The Northern Territory Electricity Commission (NTEC) is responsible for the generation and supply of electricity in the Territory.

Historically, the Commonwealth Government has provided money for capital works and has subsidised running costs except for some private ventures such as at Gove.

No decision has yet been made on arrangements to apply at Yulara, but the NTEC will either operate or approve the system to be used.

The NTEC has therefore provided the following planning information and estimates to the Yulara Planning Team, [23] using the October Status Report as a brief, plus supplementary information provided in November 1978.

Supply: A central power station will supply the Village with electric power via an underground reticulation system to various load centres within the Village. **Electricity generation should be by means of diesel generators.** Other alternative energy sources were briefly studied but in consideration of the following points, these alternatives are not recommended.

Solar energy can be converted into electricity by several means; however, the technology is not yet developed to the stage where economic operation can be guaranteed for power requirements of this magnitude.

Gas, although not yet available, is considered a suitable energy source for electricity generation. The gas could be burned in gas turbines; however, in the size range contemplated, it would not be an economical proposition.

The power station would include the following:

- A building of approximately 45 x 15 metres with a 15 tonne crane for maintenance works. Space should be available for future extension to house a further two units.
- A fuel storage tank of 400 tonne capacity to be installed in the first stage development. This would allow approximately two months storage during the peak season and four months during the off peak season. Another fuel storage tank would be included for the final stage of development.
- Initially, four generating sets of 750 kw should be installed. This would allow one set for maintenance purposes during the peak season. Annual overhaul should be planned during off peak. Two additional sets should be included in the final stage of development (see estimate of loadings, Fig.7-1).

Generating sets, wherever possible, should be standardised in respect to capacity and types for ease of maintenance and interchangeability of parts. Engine speed preferably should not be more than 750 rpm and the engines would operate on diesel fuel.

The mode of operation would be fully automatic. Routine maintenance would be carried out on site, however, staff to carry out annual overhauls would be brought in from Alice Springs. This would reduce the high overhead costs of maintaining all staff at the Village.

The Station complex would require an area of 100 x 100 metres to cover access road and fuel tanks installation and radiators.

Since the Status Report of October 1978 was vague in some areas relating to types and sizes of electrical loads, NTEC made a number of basic assumptions in order to obtain a meaningful estimate of loads and the cost of reticulation. These are listed below:

- Whilst houses will be constructed in a style to limit energy use, it has been assumed that some space heating will still be employed.
- Electricity will be used for domestic cooking.
- Considering the above factors along with the fact that, due to similar expected life patterns of the inhabitants, and the small number of dwellings, diversity would not be great. The ADMD (average diversified maximum demand) is therefore 4 KVA.

FIGURE 7-1

Electrical Loadings

	Initial - 1984				Ultimate			
	Prime Season		Off Season		Prime Season		Off Season	
	Min KVA	Max KVA	Min KVA	Max KVA	Min KVA	Max KVA	Min KVA	Max KVA
1) Two Motels (Ultimate 3 Motels)	240	480	60	120	360	720	90	180
2) Hostel/Single Staff Accomm.	45	90	11	23	45	90	11	23
3) Caravan Park	125	420	31	106	200	680	50	170
4) Campgrounds	9	27	2	7	20	60	5	15
5) Staff Accommodation	180	360	100	200	300	600	180	360
6) Houses	35	140	35	140	50	200	50	200
7) School	-	75	-	75	-	75	-	75
8) Commercial & Govt.	100	500	100	500	100	500	100	500
9) Services	90	280	50	140	120	250	90	180
TOTALS	824	2,372	389	1,311	1,195	3,175	576	1,703

- Caravan Sites; allowance has been made for initially 250 caravan sites with an ultimate of 400. (There is no real indication in the report as to the expected ultimate number of caravan sites, therefore this figure has been obtained by extrapolating along the same lines as those used in the report for the motels.)
- Camp sites; power has not been made available to tent sites, allowance has been made only for ablution blocks.
- In estimating maximum and minimum demands, the base load figure given in the report of 25% for camp sites is taken as the minimum.
- Service to the bores is estimated on the basis of an Overhead 11 KV line, with the last kilometre only being underground. It is felt that the location of this line is such as to avoid any deleterious aesthetic effects.
- Service to the aerodrome is also estimated for as an overhead line for the same reasons as given above. (An alternative cost is given for this to be underground.)
- A price has been indicated for low voltage reticulation throughout the campgrounds. This has been added only to give an indication of the scale involved and is not seen as a component to be met by the Government developer involved.

The above assumptions are considered by the Planning Team to be consistent with other elements of the development plan.

At the detailed design stage, the merits of overhead/underground lines or locally generated power at the bores and airfield can be further evaluated.

NTEC has provided a schematic High Voltage reticulation network, which has been included on Plan 4 and cost estimates which are included in Chapter 9.

7.5 VILLAGE FOOTPATHS AND VIEWING PLATFORMS

Pedestrian Movements: Design for pedestrian movement should observe the following principles:

- a need to avoid pedestrian/vehicular conflicts;
- a need to keep walking distances short, because of high daytime temperatures;
- a need to restrict pedestrian movement in environmentally sensitive areas, e.g. on the sand dunes.

The main pedestrian movements in the Village are expected to be:

- within and around camping areas;
- from the campgrounds to the Village Centre;
- from the motels and campsites to viewing areas on top of the sand dunes.

Vehicular/pedestrian conflict has been minimised and facilities are located so that most pedestrians will not have to cross more than one road.

Large numbers of pedestrians may be expected to walk to viewing areas on top of sand dunes within the Village. To avoid degradation of the dunes, it is essential that access to these be restricted to carefully located and well-designed trails or paths.

Footpaths: A network of footpaths will be required to connect the accommodation areas to viewing platforms and the Village Centre.

Footpaths at road level should not disturb the road and natural drainage patterns.

Paths should be typically 1.7 metre wide with 75 mm thick sealed gravel, stabilised natural material or possibly concrete.

Access to the viewing sites on the dunes poses a special problem. Paths have been located to provide convenient access to the best viewing points as shown on Plan 3. Relatively gentle slopes of about 1 in 15 have been obtained by angling the paths up selected dune slopes, but sections of up to 1 in 3 will require steps.

Cut and fill of the dunes must be avoided to minimise erosion, so the paths will either follow the natural surface or be elevated.

Elevated paths have an artificial appearance, and cause localised wind scour by funnelling wind around or beneath the structures and would be more expensive than ground level paths. Ground level footpaths similar to those at road level are considered preferable.

Despite careful design of the footpath system there will be some disturbed areas (e.g. following construction) and natural areas accessible to pedestrians. The disturbed areas should be covered with staked horizontal brushwood to aid plant regeneration and to deter pedestrians and the more expansive natural areas protected by brushwood barriers.

Viewing Platforms: These features of the Village warrant special design. They may be paved in the same way as the footpaths, terraced or elevated, and will probably require fencing or brushwood barriers to keep visitors off the dune slopes.

An adequate number are provided on the plan including a large platform at the Visitor Centre dune incorporating informational displays so that there should be no reason for visitors to use other dune areas.

It is recommended that, subject to the availability of adequate construction supervision, a prototype viewing platform and access ramp should be designed and constructed at an early stage of development and used to monitor the effects of erosion.

7.6 AERODROME

During 1976, the Department of Transport (DOT) and Construction (DOC) produced a joint report relating to the development of a new aerodrome to serve the Ayers Rock - Mount Olga National Park.[24]

The existing aerodrome was considered to be unsatisfactory and its replacement by an all weather aerodrome for larger aircraft was therefore required as a matter of urgency. Development proposals for the National Park also required that the aerodrome be located outside of the National Park.

Existing Facilities: The existing aerodrome was built and is currently licensed and maintained by Connair Pty. Ltd., and is located close to and to the north of Ayers Rock. It consists of a graded strip of natural material 1210 m long by 90 m wide with gravel ends 300 m by 30 m on a bearing of 106° Magnetic. It has a gravel apron and taxiway, a small prefabricated fibreglass terminal building, control tower and a fuelling bowser.

During periods of wet weather the central section of the strip, which is poorly drained becomes unserviceable causing the aerodrome to be closed.

Due to the length of the strip, the aerodrome can only cater for aircraft up to Heron type (14 passengers) although on occasions it takes DC3 aircraft at restricted loadings. Connair utilises DC3's at Ayers Rock particularly during the peak holiday periods; however, during hot weather they suffer a weight penalty for take-off due to the inadequate length of the existing strip. Any work on the existing aerodrome to expand facilities and maintain approach clearances etc., conflicts with the basic requirement to preserve and protect flora and fauna within the National Park.

Ayers Rock projects through the clearance plane which surrounds the existing aerodrome, and the Department of Transport has developed special procedures to ensure that adequate terrain clearance is maintained for circuit traffic and to reduce the risk of traffic conflict in the vicinity of the Rock. Due to the proximity of Ayers Rock, wind turbulence can be a problem particularly when the wind is from the south-east.

Although aircraft incidents are rare, it should be appreciated that wind turbulence is a hazard, that the Rock itself infringes the desirable aerodrome clearance requirements and that the present aerodrome is poorly sited from an operational viewpoint.

Traffic Forecast: Because of rapid changes in the aviation and tourist industries, the nature of aircraft and number of movements is difficult to forecast.

In recent years, the Department of Transport has provided an air traffic control service at the existing airport at peak periods, because of heavy volumes. In April 1978, there were 400 aircraft movements at Ayers Rock. Recently, scheduled flights from Perth to Alice Springs and Alice Springs to Queensland have begun, and developments such as this are likely to affect air traffic to Ayers Rock.

Forecasts indicate that the new aerodrome should permit unrestricted operation of F27 aircraft as a first stage.

Wind Statistics: Wind directions and velocities have been measured by an anemometer installed at Site B1 and indicate that for a runway in the area, an alignment of 110° to 130° True is the preferred direction.

Site Evaluation: Five sites were considered in detail in the joint report (DOT/DOC, p.10) before the selection of Site B1 as the preferred location for the new aerodrome. All sites were in an area approximately 20 km north-north-west of Ayers Rock to the east of the Sedimentaries and approximately 5 km from the proposed Village site. The topography of the area is generally flat but with scattered sandhills up to 20 m high.

Of the five sites considered, Site B1 was selected for the following reasons:

- The site is located outside of the National Park.
- It will permit economical first stage development to F27 standard on the required alignment and is capable of extension to provide for a much larger aircraft if the need arises.
- Aircraft approaches can be arranged to be clear of Ayers Rock and the proposed Village site and therefore aircraft noise levels at the Village will be limited to an acceptable standard.
- The site is in a position convenient to both Ayers Rock and the proposed Village site.
- Access to the Village can be economically provided.
- The site and flight paths will cause minimum disturbance to flora and fauna.

Functional Requirements: Recently the Department of Transport has revised the functional specification for the aerodrome based on information that became available after the 1976 Study. The revised Specification was contained in an advice to the Department of Construction in May 1978 [25] The major revisions are listed below:

- The main runway length has been decreased from 1950m to 1600m for initial development for F27's. This length is considered adequate for the Alice Springs/Yulara stage length.
- Based on the aim of building facilities adequate for traffic 5 to 10 years after the airport is built, it is considered that the initial development works should be based on F27 aircraft and not Heron aircraft.
- As in the 1976 report, it is considered that the main runway, taxiway and apron pavements should be sealed in view of the dry climate, and expected volume of aircraft traffic which would cause undue erosion of a gravel surface.
- The main strip width has been increased from 100m to 150m for initial development in accordance with the standards referred to.
- Provision for three F27's on the apron has been included instead of for two F27's in the 1976 report and is considered warranted to cater for traffic for say 5 to 10 years after the airport is built.
- The 1976 report provision for parking for four light aircraft is considered grossly inadequate in view of the 10 to 20 light aircraft parked in busy times over the last few years at the existing airport.
- The long term functional requirements are based primarily on B727-200 aircraft. The largest size of aircraft to be accommodated and the volume of aircraft movements are two highly significant factors in determining the location of facilities. It appears prudent to us to utilise a larger size of aircraft than may
- now be envisaged for the planning of the airport in view of forecasts of future traffic and the uncertainty that any limitation on the number of visitors to the National Park would be adhered to in the future.
- Although the secondary runway has not been included as required in the initial development works, it may be more satisfactory to construct both runways at the same time together with the light and heavy aircraft aprons and taxiways. The wind data from the anemometer at Site B indicates that a secondary runway for light aircraft is required to achieve a high airport usability for that class of aircraft.

Other main elements extracted from the revised functional requirements at the initial stage are:

- Initial bitumen sealed runway 1600m x 30m with turning widenings, in a 1720m x 150m flight strip;
- Sufficient apron for three F27 aircraft plus 30 light aircraft;
- Initial navigation aids to be wind indicator and emergency night lighting flares only. Non-directional beacon and distance measuring equipment possibly required.
- Terminal building for one arriving and one departing F27 with some type of air traffic control cabin;
- Engineering services.

Development Cost: Estimates are based on the above brief. Following comment from tour operators that night lighting would permit return of visitors to Alice Springs after viewing the sunset, a separate cost advice of $200,000 has been prepared for conventional aerodrome night lighting.

In the Department of Transport's May communication referred to above, advice from the Commonwealth Minister for Transport, Mr. P.J. Nixon, of 13 September 1977 is quoted as follows:

'In regard to the construction of a new aerodrome, funding will be the responsibility of the Department of Northern Territory, but my Department will continue to assist in the siting and functional specification of the aerodrome facilities.'

The communication also contained the following supplementary advice:

'The above statement by the Minister essentially refers to any runway, taxiway, apron, terminal building etc. works but does not necessarily include any aircraft navigation, communication and landing aids and air traffic control facilities which may be required in the future. The provision of such aids and facilities is dependent on the volume and type of operations at an airport and their provision at the Yulara Airport would be studied subsequent to the commencement of operations at the airport.'

In addition to the capital cost of the aerodrome shown in Chapter 9, it should be noted that there will be regular annual costs of approximately $10,000 to $15,000 to cover operation and routine maintenance. In addition, there will be a major maintenance cost of the order of $100,000 for resealing of the runway every seven to ten year.

7.7 TELECOMMUNICATIONS

Existing Facilities serving Ayers Rock: Three existing motels at Ayers Rock are served by a high frequency radio link to Alice Springs, as part of four radio networks serving the Alice Springs Area. These four networks serve some 80 outlying properties, connecting them to the conventional telephone system elsewhere in Australia through the Manual Assistance Centre at Alice Springs Telephone Exchange.

Because of the unavoidable sharing of a very few frequencies by the many users, and frequent loss of clear reception due to weather and other interference, the level of service is low and there are long delays.

There is a waiting list for extra connections to the existing four networks and Telecom has no plans for a fifth.

The Territory Parks and Wildlife Commission rangers have reasonably efficient contact with their headquarters in Alice Springs through high frequency radio.

Planning for the New Village: In discussions with tourist industry representatives in Alice Springs, great concern was expressed about the provision of adequate telecommunication services in the new Village. Therefore, following the endorsement of the preferred planning concept in June 1978, Telecom Australia were advised of details of the new Village proposals and asked for their recommendations and cost advice.

The following advice was received from the District Telecommunications Office in Darwin:

'I refer to your correspondence requesting Telecom Australia to provide advice on the level of communication facilities that should be provided at the Village. The matter was referred to the Planning and Programming Branch of the Engineering Department for their advice.

A Village of this nature with an expected ratio of ten to one (10:1) as between short term tourists and permanent residents, and located in an isolated area presents a unique situation without precedent. Accordingly, it is not possible to predict with a high degree of confidence the likely communication needs. However, best estimates based on the information supplied in your letter are that some thirty (30) speech circuits would be needed to carry telephone traffic between the Village and our network at the time of completion of Stage 1, rising to approximately forty four (44) circuits at the completion of Stage 2.

The expenditure that would be incurred in providing the facilities needed for the above trunk circuit provision is estimated at approximately $1,500,000. Telecom Australia would most likely provide such trunk circuits under our Trunk Spur Line policy which means that the cost of trunk provision would be met by the body requesting the facilities.

A telephone exchange with cable reticulation covering the Village area would be necessary, together with special Public Telephone facilities to cater for an expected high generation of out going telephone traffic by the tourists. The cost of provision of these facilities is likely to be of the order of several hundred thousand dollars. Subject to an economic study indicating that such investment would provide an economic return, these costs would be met by Telecom Australia.

There is a need for consultation with us early in the planning stage in relation to cable and conduit reticulation and the reservation of sites for the telephone exchange and trunk radio relay system terminal. The radio system terminal site would, as discussed, have to be mutually agreed upon environmentally but of course is subject to a preliminary design study by our Radio Section.

With regard to our programming and resources capability, we would require a minimum lead time of four (4) years to plan and execute a communications project of this nature.

We would welcome any contact from team members or other appropriate people on any matter and I trust there is sufficient information contained to allow completion of your current task.'

The Darwin District Officer further advised that a private direct high frequency link from Yulara to Alice Springs of two channels could be provided for about $10,000, subject to licensing approval. This would have at most two 'telephone' handsets and Telecom's advice is that this would be unreliable. Present facilities at Ayers Rock could be relocated at Yulara.

In seeking levels of cost and service quality between the two extremes indicated above, the planning team obtained advice from Communication Systems Australia (CSA) who suggested two other options as described below:

'The first system we offer is a U.H.F. repeater link. Similar systems are at present being operated in the North West by the Mining Companies and have proved very reliable.

This system will enable the booking office at Alice Springs to contact the hotels individually through a central control point in the new town site. None of the hotels will hear the other hotels' conversation.

The system will be designed to enable the Master Control to locate any breakdown in the repeater thus minimising the time the system is off the air.

Maintenance of the above system will be negligible as efficient solar panels will be used for charging high quality maintenance free batteries.

As an alternative to the above, we offer a TROPO SCATTER system, which deletes the need for multiple repeater towers as it only requires one at either end, thus minimising maintenance costs over a period.

Because of the sophistication of this equipment the price variation is considerable.

Offer (1) U.H.F. Repeater Link

Total costs of Equipment (listed for 13 repeater stations along Petermann Road and Stuart Highway) is $226,860.

Offer (2) Troposcatter System

After exhaustive enquiries, we estimate the above system to cost between $375,000.00 and $400,000.00.

All relative information, equipment costs, drawings, installation costs etc., are being forwarded to us from the U.K. On receiving this information we can give you a more detailed quotation.

Offer (1) does not include installation or commissioning costs. These can be made available on inspection of both the sites and locations of the towns.

Note: We wish to point out that the above estimates and recommendations are conservative and for budgetary purposes only.'

C.S.A. further advised that development of either system to private limited telephone (four channel), telex, expansion at Alice Springs and connection to Telecom Manual Assistance Centre were all technically feasible, subject to Telecom and Licensing approvals.

Installation of Offer (1) would add (say) $60,000.

Summary: After further discussions with officers of Telecom Australia in Melbourne, it seems apparent that there is no satisfactory low or medium cost solution because the Village is located so far from Alice Springs, which is the nearest point on the Telecom network. Also a point to point system, apart from providing only limited connections to the Telecom Australia network, does not lend itself to use by other customers along the Stuart Highway and the Petermann Road.

The present channel limitations on lower cost services suggest that a central communications system operated by Village management at both Yulara and Alice Springs offers the most realistic short term solution both in terms of cost and level of service.

It is recommended that Telecom Australia and the private sector should be requested to undertake more detailed studies and costing of telecommunication options during the detailed design stage of Village planning.

8. ENVIRONMENTAL EFFECTS

8.1 CURRENT SITUATION

At present, all building and engineering services required to satisfy the needs of both permanent population and tourists to the Uluru National Park are located within the Park boundaries and mostly adjacent to the northern and eastern flanks of Ayers Rock itself. These facilities include; motel accommodation, caravan and campgrounds, ablution blocks, visitor centre, general store, permanent housing, workshops, the airstrip, sewage lagoons, and rubbish dump, etc.

Such existing facilities close to the major attraction of the Park coupled with continuing trampling by tourists are resulting in environmental quality changes which are now a matter of considerable public concern. Public enjoyment of the Park is presently being gained at the expense of some Park features and with the current level of management resources the environmental quality of the Park is being progressively degraded.

In considering the potential environmental effects of a new village development outside the National Park, account should be taken therefore not only of the physical and social effects of the new village development, but also the effects accruing from removing much of the existing development out of the Park itself.

8.2 REMOVAL OF EXISTING FACILITIES

The major environmental effects of removing the existing facilities from their present location within the National Park are all of a beneficial nature and include the resultant ability to:

- reorganise the existing transport system within the Park;
- reduce the proliferation of roads and tracks near to the major park features;
- regenerate existing vegetation loss;
- allow greater control of tourist movements;
- remove many of the existing visual intrusions, dust pollution, odours and litter;
- rehabilitate the environmental quality of those features and areas already significantly degraded; and
- enhance the wilderness qualities and visitor experience of the National Park.

Through the incorporation of these and other potential environmental benefits into an appropriate Management Plan for the National Park, there is the very real opportunity to have the general environment quality of the Park substantially upgraded and maintained for future generations.

8.3 POTENTIAL IMPACTS

In general, the major potential environmental impacts of the new Village relate to the physical aspects of vegetation, fauna, surface drainage and fire, the social aspects in respect of Aborigines and the aesthetic aspects of visual, noise and air pollution. The actual construction of the Village will also result in adverse environmental effects unless stringent environmental safeguards for the construction phases are established and rigorously implemented.

Vegetation: The principal vegetation components of the site are described under Section 3.3 While they are not unique to the site itself, they do play a major ecological role particularly with respect to stabilisation of the dune system. Therefore, measures must be taken to strictly control pedestrian movement and to encourage plant regeneration. Otherwise, significant vegetation loss will occur resulting in exposed dune systems; increased sand movement; flattening of dune crests and erosion; dust generation, atmospheric pollution and loss of natural fauna habitats.

Timber litter (i.e. dead wood on the ground and standing live and dead timber) is also an important ecological factor in Central Australia. Removal of timber litter from the ground destroys focal build-ups of soil and moisture, favourable to the growth of ground vegetation. Once this is removed, sheet and gully erosion is accelerated. **During Village construction, therefore, removal of ground and standing timber litter should be kept to an absolute minimum. Once the Village is in operation, bans must then be placed on the collection of timber litter by tourists and Village residents for camp fires, etc.**

Dust from actual Village construction as well as general vehicular movement potentially serves as a hazard to plant growth both adjacent to building structures and alongside roads and pathways. Dust can only be avoided by sealing all major roads.

Fauna: The site area is believed to contain few rare fauna species, however, due to the loss of native fauna which has already occurred within the National Park, it is expected that some similar occurrences will take place within the new Village site area as a result of building construction and human intrusion.

The introduction of pets and feral animals has already occurred in the National Park. The most serious feral animals in the National Park are the domestic cat and the European rabbit, which are also the most difficult to control. Other animals which from time to time are a danger to native species are camels, cattle, foxes, horses, donkeys and dogs. (Hooper et al, p. 22).

The risk of further introduction of feral animals into the National Park should be avoided by imposing a complete ban on domestic pets in the new Village. Pet animals still arriving in visitor vehicles must be kept under control and, in this respect, consideration should be given to the establishment of an animal pound within the new Village.

From time to time, Rangers from the National Park may need to shoot feral animals and perhaps some native animals such as red kangaroos during plagues. Apart from these shootings, all other shooting in and around the new Village should be banned.

Surface Drainage and Erosion: Water run-off areas from sand dunes and small water courses within the swales are ecologically important especially to preserve the abundance and general health of vegetation. Village development may disturb the natural drainage patterns of the area to some degree, resulting in possible scouring, vegetation loss and erosion. Interruptions to the flows of water by roads in particular result in poor growth of ground vegetation on one side of the road in contrast to comparative luxuriant growth on the other side. This occurrence is already well apparent adjacent to some of the roads within the National Park.

Roads in the Village will be designed to minimise erosion and to cause minimum interference to natural drainage channels (see Section 7.3).

Fire: Natural or wild fires occur within the Ayers Rock region every 15-20 years and they represent an important part of the ecological cycle. These fires can however be extremely serious and lead to complete changes in the composition of the vegetation if a large build up of dry vegetation has been allowed to occur.

Therefore periodic controlled burns will be required within and around the Village as a fire protection measure. These burns should be co-ordinated with any controlled burning programs in the National Park and the Sedimentaries and be supervised by botanists or ecologists in order to avoid undesirable ecological or visual impacts.

Aborigines: Aboriginal considerations are the most important human/cultural aspect associated with the development of the new Village and ongoing consultation with Aboriginal representatives will be necessary throughout the detailed planning and design of the Village.

Visual Impact: Although the general visual impact of the Village upon the landscape can be minimised through use of appropriate design and building material controls, some visual impact will inevitably result from general littering, the number and movement of vehicles (especially coaches) and the removal of ground cover for roads, parking and camping areas.

Noise Pollution: The establishment of the Village will raise the general noise level in the site area, principally due to vehicle noise. However, Village services (e.g. the power house) have been designed and located to minimise noise impacts within the Village area. As a result, overall noise levels should be less than those presently experienced at Ayers Rock where residual noise levels will also be reduced with the removal of tourist facilities.

8.4 POTENTIAL BENEFITS

The major benefits to be gained from the new Village development relate to both the environmental advantages to be gained from removing the existing tourist facilities out of the National Park (see Section 8.2), and to the opportunity which exists in planning for a completely new and appropriately located Village incorporating sound environmental and physical planning principles from the outset (see Section 4.1).

Therefore, provided that appropriate environmental safeguards are adopted and uncontrolled surfaces are minimised, the modification of the immediate site environment is acceptable and will reduce the impact of tourism on the region overall and on the National Park in particular. In order to ensure that adequate safeguards are implemented from the outset the following investigations are **recommended:**

- **that further investigations be made of techniques for safeguarding the natural environment during the site planning and construction stages (including the means by which these can be enforced);**
- **that investigations be undertaken into the methods available for policing and controlling entry of pets into the new Village;**
- **that studies be undertaken into the most ecologically appropriate technique of controlled fire burns including recommendations on their frequency, supervision and management, and**
- **that further consultation and discussions be held with the Aboriginal community at the time of finalising Village planning and design** (see also Section 2.4).

9. COST ESTIMATES AND DEVELOPMENT PROGRAM

Cost estimates have been prepared for all the works in this development plan at 1978 prices. These preliminary estimates have been based on the best available advice from the Northern Territory or other specialists in the various fields.

The estimates prepared for the 1977 Feasibility Study and those in this development plan have proved to be consistent, and there has been additional justification from independent checks such as Northern Territory Electricity Commission input, the letting of the Petermann Road contract, and other recent contracts in remote areas of the Northern Territory.

Estimates have been separated into the interim (1984-85) and the ultimate stages, as briefed, and further broken up into Annual Cash Flows in Figure 9-4.

9.1 COST OF ENGINEERING SERVICES

Regional Works

These are external items essential to the Village but not part of it:

- *Petermann Road* (See Section 5.2, Plan 1)

Erldunda-Angas Downs 108 km (in construction)		$2.90M
Angas Downs-Village N-S Link road 132 km		$4.60M
Village N-S Link - Aerodrome 4.5 km		$ .18M
	Total	$7.68M

- *Aerodrome* (See Section 7.6)

Prime and double sealed F27 standard on 200 mm gravel - no buildings but including fencing and roads	$2.00M

- *Telecommunications* (See Section 7.7)

Full service by Telecom	$1.50M

- *Work Inside National Park*

Any work inside the Park such as roads from Ayers Rock and Mount Olga to the Village boundary are the responsibility of the Australian National Parks and Wildlife Service. However, initial construction access and Dune Plains water supply work serving the Village is included below.

The ANPWS preferred access road is 17 km in length. The estimated cost is $680,000, of which 14 km ($560,000) is inside the Park and 3 km included below. Other work such as demolition and restoration inside the Park has not been estimated.

Village Services

These estimates allow for normal town services of sealed roads, water, sewerage, drainage, and power supply to the boundaries of motel sites, camping areas and other Village facilities. Connection to these services and on-site work is part of building estimates, unless otherwise shown:

- *Roads* (See Chapter 5)

Initial construction access from Service area to Sedimentaries track (unsealed) 5.7 km	$0.14M
North-South Link road;from Petermann Road to Service Road 0.8 km	$0.03M
Sealing Service road and N-S link to Park Boundary 5.3 km	$0.08M
Road from N-S Link road to ANPWS preferred entrance 3 km	$0.12M

Village roads Type 2 (Plan 4) 3 km including kerbing	$0.20M	
Village roads Type 1 3.1 km	$0.16M	
Government provided parking for cars and buses	$0.10M	
	Total Village roads	$0.83M

- *Water Supply* (See Section 6 and Ref. 20)

Initial Dune Plains water supply: 2 bores, 7 km pipeline to storage at Service area.	$0.44M	
(Together with the first Roads item above, comprises the initial works being documented for 1979 construction)		
Dune Plains reticulation and treatment: Allows for desalination ($300,000), storage, pumps and part reticulation	$1.08M	
Southern Aquifer pipeline to Village (18 km, $630,000) plus further storage and reticulation	$1.17M	
Second class supply for gardens and other purposes comprising a further elevated reservoir and part reticulation (Option only if Dune Plains supply is untreated)	$0.22M	
	Maximum total water supply	$2.69M

- *Sewerage* (See Section 7.1)

5.2 km rising main, 2 km gravity main, 7 pumping stations	$0.36M	
Unlined lagoons	$0.13M	
	Total	$0.49M

- *Garbage Disposal* (See Section 7.2)

Access road and fencing		$0.01M

- *Drainage* (See Section 7.3)
(including floodways and allowance for culverts, open and piped drains. N.B. kerbing is in road estimates) $0.05M

- *Energy Supply* (See Section 7.4 and NTEC)

First stage civil works	$0.1M	
building	$0.4M	
fuel tank	$0.2M	
4x750 kW gen. sets	$1.5M	
Total first stage generation		$2.20M
Final stage building extension	$0.25M	
2x750 kW gen. sets	$0.75M	
fuel tank	$0.20M	
Total second stage generation		$1.20M

Distribution Costs

9.5 km HV network to sub-stations	$0.58M	
LV to houses	$0.06M	
Streetlighting 5.6 km	$0.09M	
Remote area allowance.	$0.13M	
(to Dune Plains 8 km Overhead 1 km Underground $170,000 excluded)		
(to eastern aboriginal sites excluded)		
(supply to aerodrome $280,000 Underground, $75,000 Overhead excluded)		
Total Distribution	$0.86M	
Total energy supply		$4.26M

- *Village Footpaths and Viewing Platforms*

(See Section 7.5)

Footpaths to Village centre and viewing platforms 3.8 km.	$0.05M	
Viewing Platform (Prototype)	$0.07M	
Total		$0.12M

FIGURE 9-1

Cost of Engineering Services : Summary Table

	To Interim Stage	To Ultimate Stage
	$M	$M
Regional Works		
Petermann Road	7.68	7.68
Aerodrome	2.00	2.00
Telecommunications	1.50	1.50
Village Services		
Roads	.77	.83
Water Supply	1.52	2.69
Sewerage	.40	.49
Garbage	.01	.01
Drainage	.05	.05
Energy supply	3.06	4.26
Footpaths and Viewing Platform	.08	.12
Total Village Services	$5.89M	$8.45M

9.2 COST OF GOVERNMENT BUILDINGS

The analysis used in the 1977 Feasibility Study (Supporting Technical Document No.3)[26] provides valuable background to the estimates for government and private sector buildings and facilities.

Building areas are in accordance with government scales and previous Northern Territory experience or consultation in the case of fire, police, medical and similar buildings.

Apart from a small administrative staff in the Village centre, most government staff will be employed in the Service Area and the National Park.

Accommodation types and standards are similar for both public and private sector employees.

Costing is based on the National Building Cost Index which takes account of changes in costs with time and location. Prices are at current 1978 values with a district allowance appropriate for Ayers Rock.

FIGURE 9-2

Cost of Government Buildings : Summary Table

Facility	*Site Area m2*	*Building Area m2*	*Car Park Spaces*	*Building Cost $/m2*	*Building Cost $ million*
VILLAGE					
Visitor Centre and Ranger's Office	3,000	1,000	35 Buses 20 Cars 10 Caravans	700	0.70
Police Station	600	300	6 Cars	600	0.18
Fire Station	300	120	10 Cars	500	0.06
Medical Centre	800	500	8 Cars	700	0.35
Australia Post	400	200	4 Cars	600	0.12
Telecom	200	100	4 Cars	600	0.06
Aboriginal Affairs	100	50	4 Cars	700	0.04
Other Commonwealth Offices	100	50	4 Cars	700	0.04
NT Government Offices	200	100	8 Cars	700	0.07
School	10,000	300	10 Cars	700	0.21
Community Hall		200		700	0.14
AERODROME					
Aerodrome Terminal Building	1,000	250	2 Buses 10 Cars	500	0.13
Aerodrome Maintenance Workshop	200	50	2 Cars	400	0.02
SERVICE AREA					
Maintenance Shop	2,500	1,000	10 Cars	400	0.40
Storage Building	2,500	1,000	1 Road/Train 2 Cars	400	0.40
HOUSING					
Houses (18)	1,200ea	130 ea	2 Cars ea	400	0.94
Single Staff Accommodation (28)	6,300	15m2/ Unit	14 Cars	700	0.29
Aboriginal Housing (Unknown)					
OTHER WORKS					
Centre Viewing Platform					0.15
Other Viewing Platforms (7)				50,000x7	0.35
Overall Allowance for Government site works and landscaping					0.10
TOTAL	49,800	7,980			$4.75M

Notes: 1. Houses and other works are assumed to be built in large contracts.

2. The cost of government-provided parking is included under Engineering Services (Roads).

3. It is assumed that seasonal government staff will be housed in caravans.

9.3 PRIVATE SECTOR DEVELOPMENT COSTS

Using principles from the Supporting Technical Document No.3[26] costs have been derived for motels, campgrounds, shops and similar facilities expected to be provided by the private sector, assuming that the government provides services to the site boundary. These costs are summarised in Figure 9-3.

9.4 DEVELOPMENT PROGRAM:

The Outline Development Network (Figure 9-4) shows a proposed development staging consistent with tourist growth forecast and target dates in the planning brief.

The program can be varied according to changes in capital availability and actual tourist growth. For example, if agreement on future government funding arrangements is delayed, the proposed expenditure of $0.5 million on initial works in 1978-79 will permit the establishment of overflow camping at Yulara to relieve peak season pressure on existing facilities. The site will be served by Dune Plains water and a gravel access road and would only need temporary toilet facilities to permit rough camping. On completion of the Petermann Road these works will enable the Village site to become the main camping facility regardless of progress on other Village components. Poorer quality camping areas in the National Park could then be closed. Naturally, careful control will be required to protect the Village site from environmental damage during these early stages.

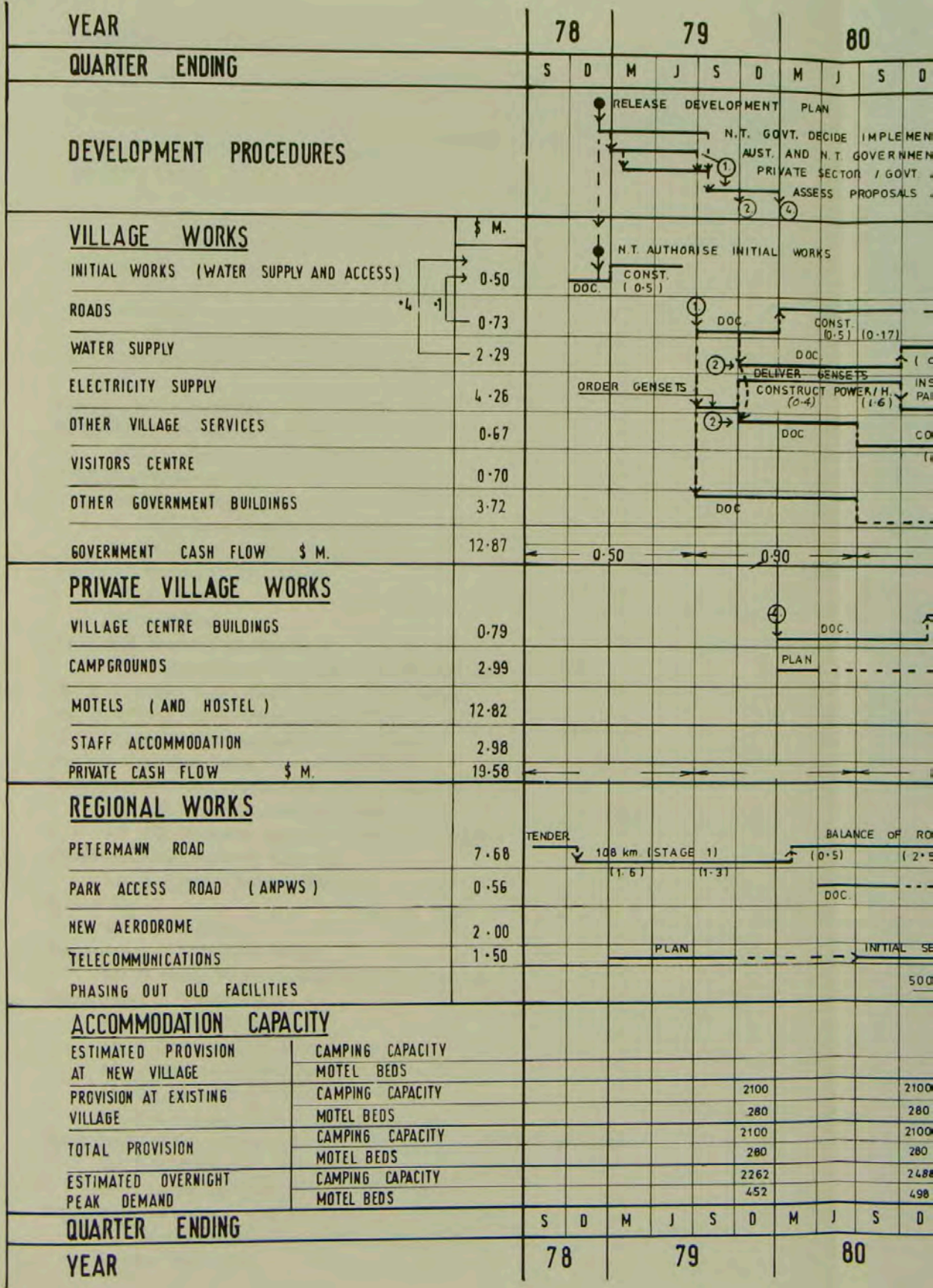
Similarly, limited reticulation of services could be advanced to provide for progressive occupation prior to 1984-85 with careful planning to avoid prejudicing later work.

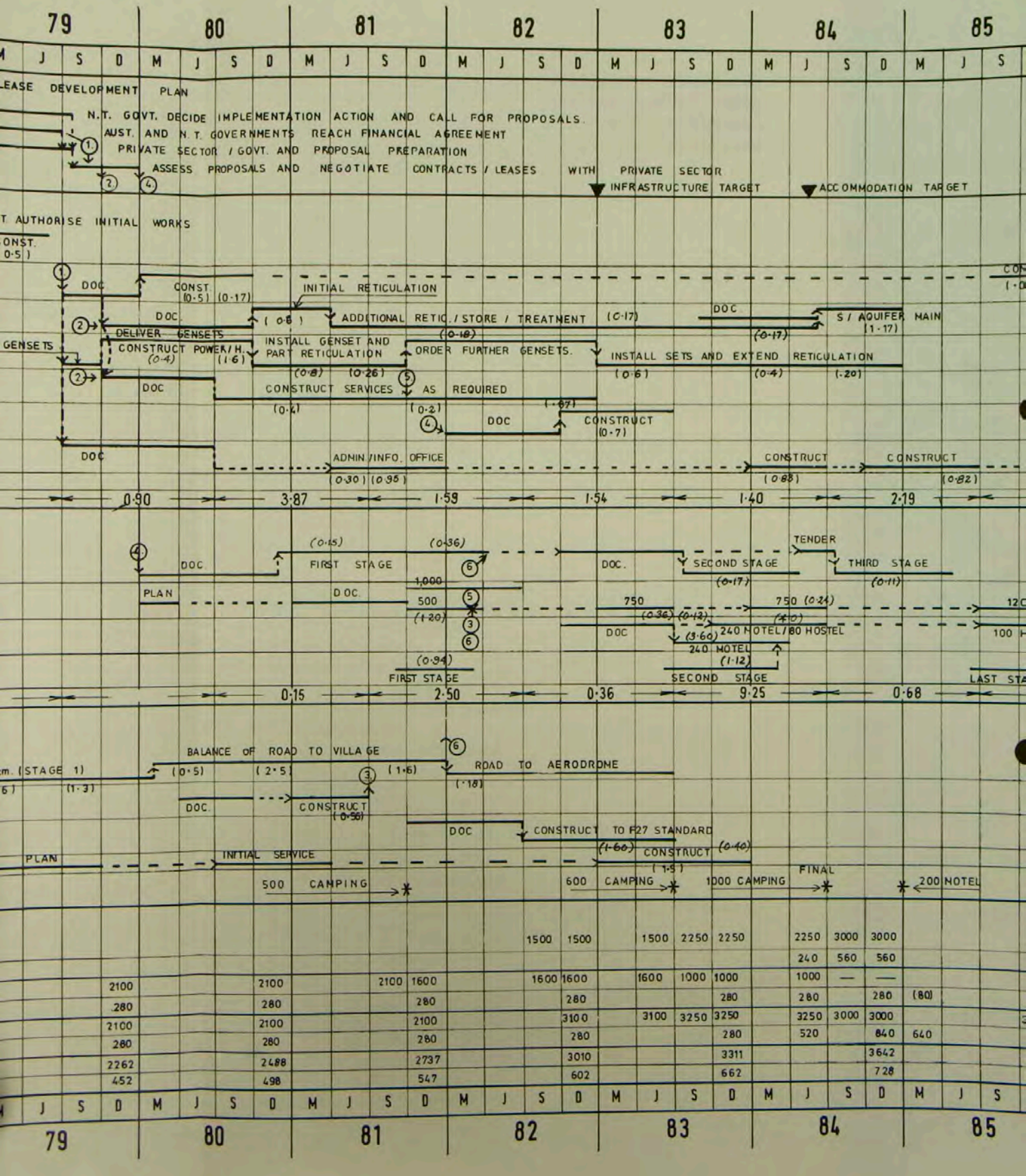
FIGURE 9-3

Private Sector : Development Costs (Ultimate)

Facility	*Capacity (Persons)*	*Building Area m2*	*Unit Cost $/m2*	*Building Cost $Million*	*Parking Spaces*	*Site Costs (incl. Parking) $Million*	*Total Cost $Million*
TOURIST ACCOMMODATION							
- Motels	720	14,400	750	10.80	15 Buses 180 Cars	0.10	10.90
- Hostel/Bunkhouse	180	2,700	700	1.89	2 Buses 70 Cars	0.03	1.92
- Campgrounds	4,200	-	-	-	60 Buses 450 Cars	0.71	))
Office/Store		3 x 200	600	0.36			) 2.99
Ablution Blocks		16 x 200	600	1.92			)
	5,100			$14.97M		$0.84M	$15.81M
VILLAGE CENTRE							
- Supermarket/Variety Store		1,000	500	0.50	22 Cars	)	
- Service Station/Hardware		200	600	0.12	10 Cars	)	
- Art Gallery/Museum		100	500	0.05	5 Cars	) 0.01	
- Bank		100	500	0.05	5 Cars	)	
- Bakery/Snack Bar		100	600	0.06	5 Cars	)	
		1,500		$0.78M		$0.01M	$0.79M
STAFF ACCOMMODATION	(Units)						
- Houses	32	130 each	400	1.66	2 Cars each	0.07	1.73
- Single Staff Units	116	15m2/unit	700	1.22	60 Cars	0.03	1.25
	148			$2.88M		$0.10M	$2.98M

Notes: 1. Houses and other works are assumed to be built in large contracts.
2. It is assumed that seasonal staff will be accommodated in the motels or in caravans.
3. Although space has been allocated in the Village service area for private service activities, these elements have not been costed since they are not critical to the development of the Village.


YEAR
78
79
80
QUARTER ENDING
S D M J S D M J S D
DEVELOPMENT PROCEDURES
RELEASE DEVELOPMENT PLAN
N.T. GOVT. DECIDE IMPLEMEN
AUST. AND N.T. GOVERNMEN
PRIVATE SECTOR / GOVT
ASSESS PROPOSALS
VILLAGE WORKS
$ M.
INITIAL WORKS (WATER SUPPLY AND ACCESS) 0·50
ROADS 0·73
WATER SUPPLY 2·29
ELECTRICITY SUPPLY 4·26
OTHER VILLAGE SERVICES 0·67
VISITORS CENTRE 0·70
OTHER GOVERNMENT BUILDINGS 3·72
GOVERNMENT CASH FLOW $ M. 12·87
·4
·1
N.T. AUTHORISE INITIAL WORKS
DOC.
CONST. (0·5)
DOC
CONST. (0·5) (0·17)
DOC
DELIVER GENSETS
ORDER GENSETS
CONSTRUCT POWER H. (0·4) (1·6)
DOC
DOC
0·50
0·90
PRIVATE VILLAGE WORKS
VILLAGE CENTRE BUILDINGS 0·79
CAMPGROUNDS 2·99
MOTELS (AND HOSTEL) 12·82
STAFF ACCOMMODATION 2·98
PRIVATE CASH FLOW $ M. 19·58
DOC.
PLAN
REGIONAL WORKS
PETERMANN ROAD 7·68
PARK ACCESS ROAD (ANPWS) 0·56
NEW AERODROME 2·00
TELECOMMUNICATIONS 1·50
PHASING OUT OLD FACILITIES
TENDER
108 km (STAGE 1)
(1·6)
(1·3)
BALANCE OF RO
(0·5)
(2·5
DOC.
PLAN
INITIAL SE
500
ACCOMMODATION CAPACITY
ESTIMATED PROVISION AT NEW VILLAGE
CAMPING CAPACITY
MOTEL BEDS
PROVISION AT EXISTING VILLAGE
CAMPING CAPACITY 2100 2100
MOTEL BEDS 280 280
TOTAL PROVISION
CAMPING CAPACITY 2100 2100
MOTEL BEDS 280 280
ESTIMATED OVERNIGHT PEAK DEMAND
CAMPING CAPACITY 2262 248
MOTEL BEDS 452 498
QUARTER ENDING
S D M J S D M J S D
YEAR
78
79
80


79
80
81
82
83
84
85
LEASE DEVELOPMENT PLAN
N.T. GOVT. DECIDE IMPLEMENTATION ACTION AND CALL FOR PROPOSALS.
AUST. AND N.T. GOVERNMENTS REACH FINANCIAL AGREEMENT
PRIVATE SECTOR / GOVT. PROPOSAL PREPARATION
ASSESS PROPOSALS AND NEGOTIATE CONTRACTS / LEASES WITH PRIVATE SECTOR
INFRASTRUCTURE TARGET
ACCOMMODATION TARGET
T AUTHORISE INITIAL WORKS
ONST. 0·5)
DOC
CONST (0·5) (0·17)
INITIAL RETICULATION
DOC
(0·8)
ADDITIONAL RETIC. / STORE / TREATMENT (0·17)
DOC
S / AQUIFER MAIN (1·17)
GENSETS
DELIVER GENSETS
CONSTRUCT POWER/H. (0·4) (1·6)
INSTALL GENSET AND PART RETICULATION
(0·18)
(0·17)
ORDER FURTHER GENSETS.
INSTALL SETS AND EXTEND RETICULATION
(0·8) (0·26)
(0·6)
(0·4) (·20)
DOC
CONSTRUCT SERVICES AS REQUIRED
(0·2)
(·67)
(0·2)
DOC
CONSTRUCT (0·7)
DOC
ADMIN /INFO. OFFICE
CONSTRUCT
CONSTRUCT
(0·30) (0·95)
(0·83)
(0·82)
0·90
3·87
1·59
1·54
1·40
2·19
(0·15)
(0·36)
TENDER
DOC
FIRST STAGE
DOC.
SECOND STAGE
THIRD STAGE
(0·17)
(0·11)
PLAN
DOC.
1,000
500
(1·20)
750
750 (0·24)
(0·36) (0·12)
(·40)
DOC
(3·60) 240 MOTEL/80 HOSTEL
240 MOTEL (1·12)
100 H
(0·94)
FIRST STAGE
SECOND STAGE
LAST STA
0·15
2·50
0·36
9·25
0·68
BALANCE OF ROAD TO VILLAGE
m. (STAGE 1)
6)
(1·3)
(0·5)
(2·5)
(1·6)
ROAD TO AERODROME
(·18)
DOC.
CONSTRUCT (0·56)
DOC
CONSTRUCT TO F27 STANDARD
(1·60)
CONSTRUCT (0·40)
(1·5)
PLAN
INITIAL SERVICE
FINAL
500 CAMPING
600 CAMPING
1000 CAMPING
200 MOTEL
1500 1500 1500 2250 2250 2250 3000 3000
240 560 560
2100 2100 2100 1600 1600 1600 1000 1000 1000 — —
280 280 280 280 280 280 280 (80)
2100 2100 2100 3100 3100 3250 3250 3250 3000 3000
280 280 280 280 280 840 640
2262 2488 2737 3010 3311 3642
452 498 547 602 662 728
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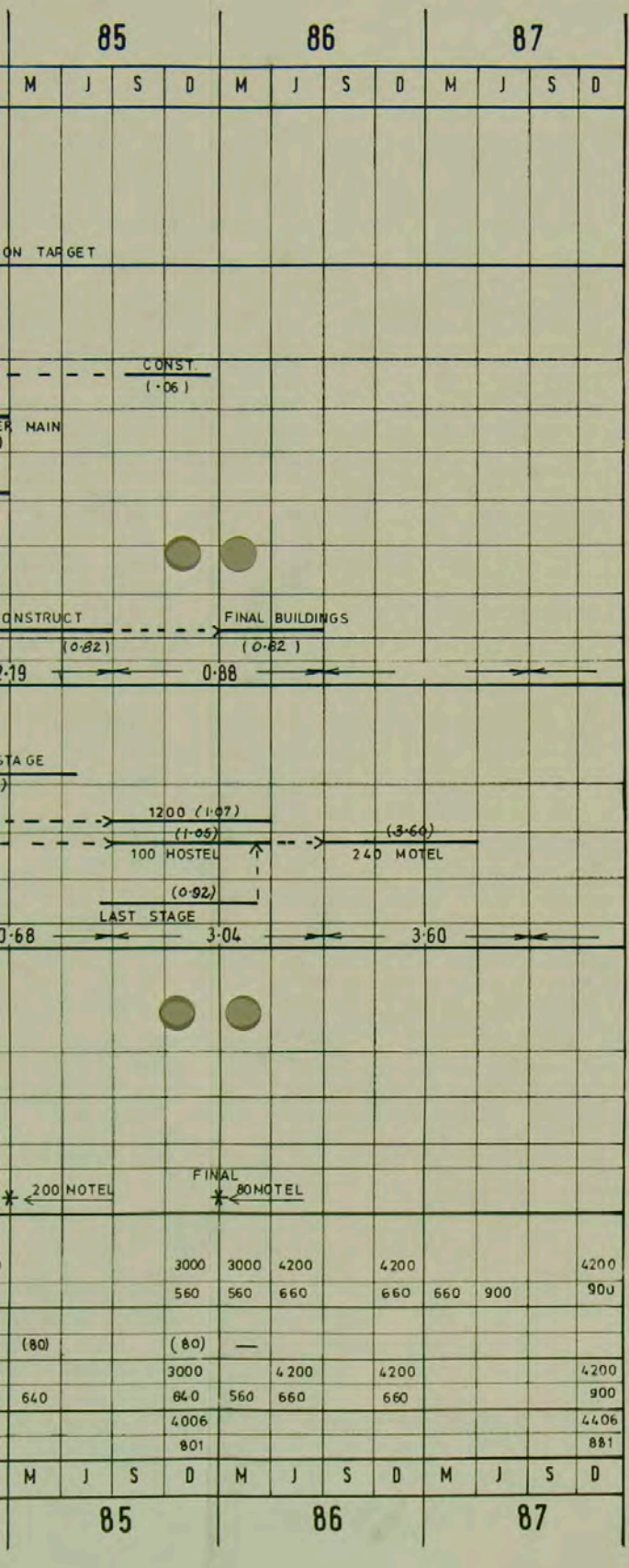

NOTES:

1. E.I.S. WAIVED AT DISCRETION OF FEDERAL MINISTER. INFORMAL PROCEDURES ARE IN EFFECT.
2. DOC INCLUDES DESIGN AND TENDERS

MILESTONES:

① FINANCIAL AGREEMENT WITH FEDERAL GOVERNMENT
② PRIVATE SECTOR ACCEPTANCE OF LAYOUTS
③ SEALED ACCESS TO PARK
④ COMPLETE LEASE AGREEMENT
⑤ SERVICES AVAILABLE
⑥ PETERMANN ROAD COMPLETE TO NEW VILLAGE

YULARA TOURIST VILLAGE

FIGURE 9-4
OUTLINE DEVELOPMENT NETWORK

Prepared for: TERRITORY PARKS AND WILDLIFE COMMISSION

Prepared by: YULARA INTERDEPARTMENTAL PLANNING TEAM

DATE: NOV. '78

HN 78/45

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- Mr. B.A. Gluyas, General Marketing Manager

Ansett-Pioneer
- Mr. R. Bennett, General Manager

Arid Zone Research Institute, Alice Springs
- Mr. P.K. Latz

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- Mr. N.C. Gare, Assistant Director
- Mr. B. Leaver, Project Co-ordinator

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- Mr. N. Wilson

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- Mr. J.R. Sawyer, Distribution
- Mr. F. Eva, Power Generation

Northern Territory Town Planning Board
- Mr. R. Fountain, Chairman

Northern Territory Tourist Board
- Mr. J. Newland, Director of Tourism

H.C. Sleigh Ltd.

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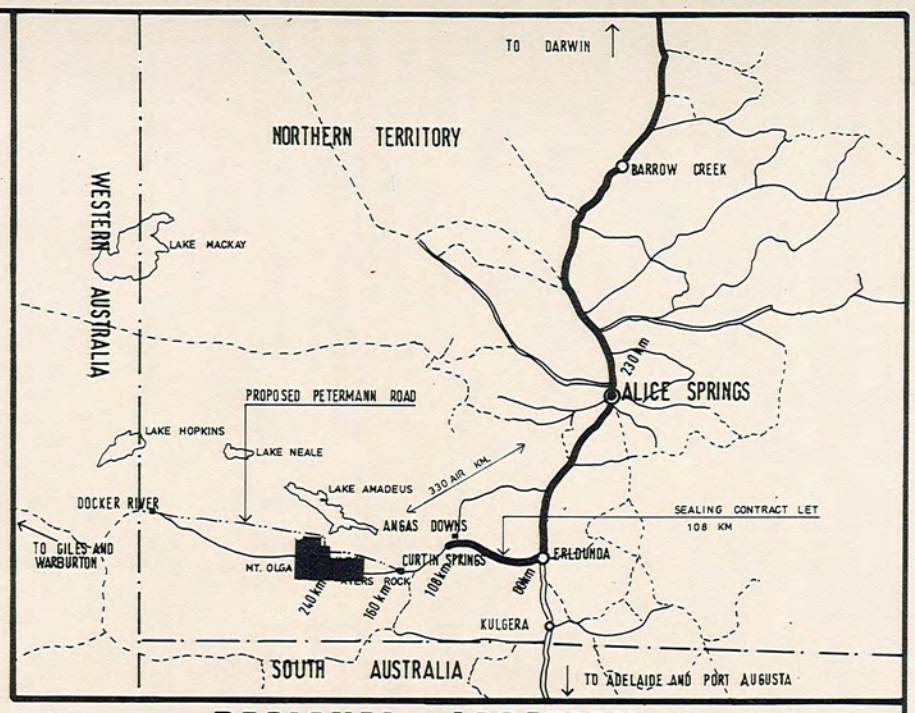


REGIONAL LOCATION

PROPOSED NEW ALIGNMENT TO DOCKER RIVER

POSSIBLE EXTENSION OF NATIONAL PARK

PROPOSED AERODROME (SITE B1.)

YULARA TOWNSITE

TOWNSITE BOUNDARY

SEDIMENTARIES

NULGA

POSSIBLE GRAVEL SOURCE

0·5ML GROUND LEVEL STORAGE TANK

SEDIMENTARIES

SEDIMENTARIES SITE (4.)

INITIAL WORKS

TRACK

BURIED

150mm ø

DUNE PLAINS WATER PIPELINE

CONSTRUCTION ACCESS

PREFERRED PARK ACCESS

3km

7.5 km

1km BUFFER ZONE

4·5km

NATIONAL PARK BOUNDARY

(APPROXIMATE — NOT SURVEYED)

Park Entrance Station (Alternative Locations)

BORE G37 RN10490

NEW BORE 200m. South

POSSIBLE FUTURE SERVICE ACCESS

DUNE PLAINS AQUIFER

SURVEY MARK CB 1.

PROPOSED AMPWS ACCESS ROAD

HKF Site (1.)

TO MT. OLGA, approx 8 km.

EXISTING DOCKER RIVER ROAD (Ayers Rock to Mt. Olga 27km)

existing track

7.6km

KHDRY Site (3.)

11km

SUNSET STRIP

ULURU NATIONAL PARK

EXISTING AERODROME

MOTEL

MOTEL

MOTEL

MOTEL

MOTEL

climb

AYERS ROCK

14km

18·5km

20km

BORE 29

SOUTHERN AQUIFER

TO CURTIN SPRINGS, Site (6) and Park Entrance, Site (5)

0·5ML ELEVATED STORAGE TANK

SURVEY MARK BM185 A

PETERMANN ROAD

VILLAGE TO ERLDUNDA, 240km

YULARA VILLAGE SITE

100km

YULARA TOURIST VILLAGE

LOCATION PLAN

NOTES:

1. (3.) INDICATES OTHER VILLAGE SITES CONSIDERED (See Section 3·1)
2. ▲ SURVEY MARKS (See Section 4·4)

Prepared for: TERRITORY PARKS AND WILDLIFE COMMISSION

Prepared by: YULARA INTERDEPARTMENTAL PLANNING TEAM

DATE: NOV. '78

PLAN N° 1

BAR SCALE:

1000 500 0 1000 2000 3000 metres

N

TO AERODROME

PETERMANN ROAD

MAIN DRAINAGE LINE

SECONDARY DRAINAGE LINE

SECONDARY DRAINAGE LINE

SECONDARY DRAINAGE LINE

PRIME VIEWPOINT WITHIN TRE VILLAGE SITE

EXTENSIVE DISH SHAPED ELEVATED AREA

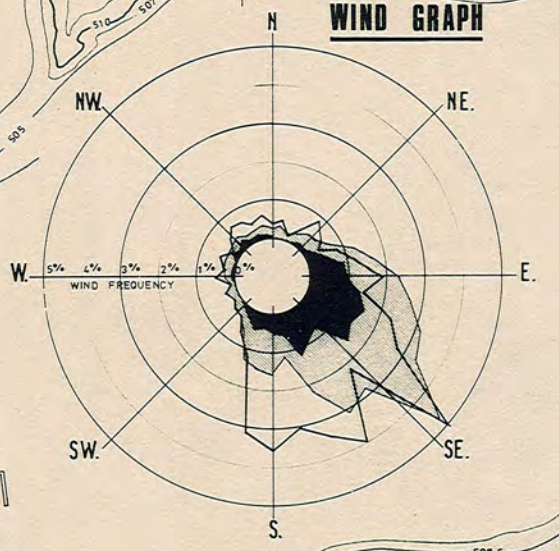
DIRECTION OF MOUNT OLGA Approx. 25 kms.

MAIN DRAINAGE LINE

TO NATIONAL PARK

DIRECTION OF AYERS ROCK Approx. 12 kms

WIND GRAPH



YULARA TOURIST VILLAGE

SITE FEATURES PLAN

WIND GRAPH LEGEND

- WINDS 1–6km/h = 44 % OF TIME
- WINDS 7–12km/h = 40 % OF TIME
- WINDS 12–35km/h = 16 % OF TIME

LEGEND

- No development — Slopes exceed 1:30
- Ayers Rock not visible
- °/. View of Mt. Olga
- °/. View of Ayers Rock
- Village Roads
- Possible Future Roads

Prepared for: TERRITORY PARKS AND WILDLIFE COMMISSION

Prepared by: YULARA INTERDEPARTMENTAL PLANNING TEAM

DATE: NOV. '78

PLAN Nº 2

BAR SCALE

100 50 0 100 200 300 Metres

N

YULARA TOURIST VILLAGE

STRUCTURE PLAN

SEWAGE LAGOONS (250M.X 100M.)
2Ha.
POSSIBLE DESALINATION EVAPORATION POND
POWER HOUSE
WATER STORAGE & TREATMENT AREA
SERVICE AREA
GARBAGE DISPOSAL LANDFILL AREA
1Ha.
WORKSHOPS AND STORAGE
SERVICE ROAD
GATE
EMERGENCY ACCESS
TO AERODROME
PETERMANN ROAD
POSSIBLE LONG TERM EXPANSION AREA
RESIDENT HOUSING (FAMILIES)
COMMUNITY HALL / SCHOOL
CAMPGROUND (1200 PERSONS)
ABORIGINAL AREAS
RESIDENT HOUSING (SINGLE PERSONS)
CAMPGROUND (1500 PERSONS)
HOSTEL / BUNKHOUSE (VISITORS)
NORTH SOUTH LINK ROAD
VILLAGE CIRCUIT ROAD
ABORIGINAL AREA
MAIN VIEWING PLATFORMS
CAMPGROUND SERVICE ROAD
VISITOR CENTRE
VILLAGE ENTRANCE ROAD
CAMPGROUND (1500 PERSONS)
MOTEL
VILLAGE CENTRE PARKING
SERVICE STATION
VIEWING PLATFORMS AND WALKWAYS
MOTEL
MOTEL
TO NATIONAL PARK

VILLAGE CENTRE KEY:

1	SHOPS (ART GALLERY / BANK / SNACK BAR)
2	SUPERMARKET
3	POST AND TELECOM
4	N.T. AND COMM. OFFICES
5	POLICE AND FIRE
6	MEDICAL

Prepared for: TERRITORY PARKS AND WILDLIFE COMMISSION
Prepared by: YULARA INTERDEPARTMENTAL PLANNING TEAM

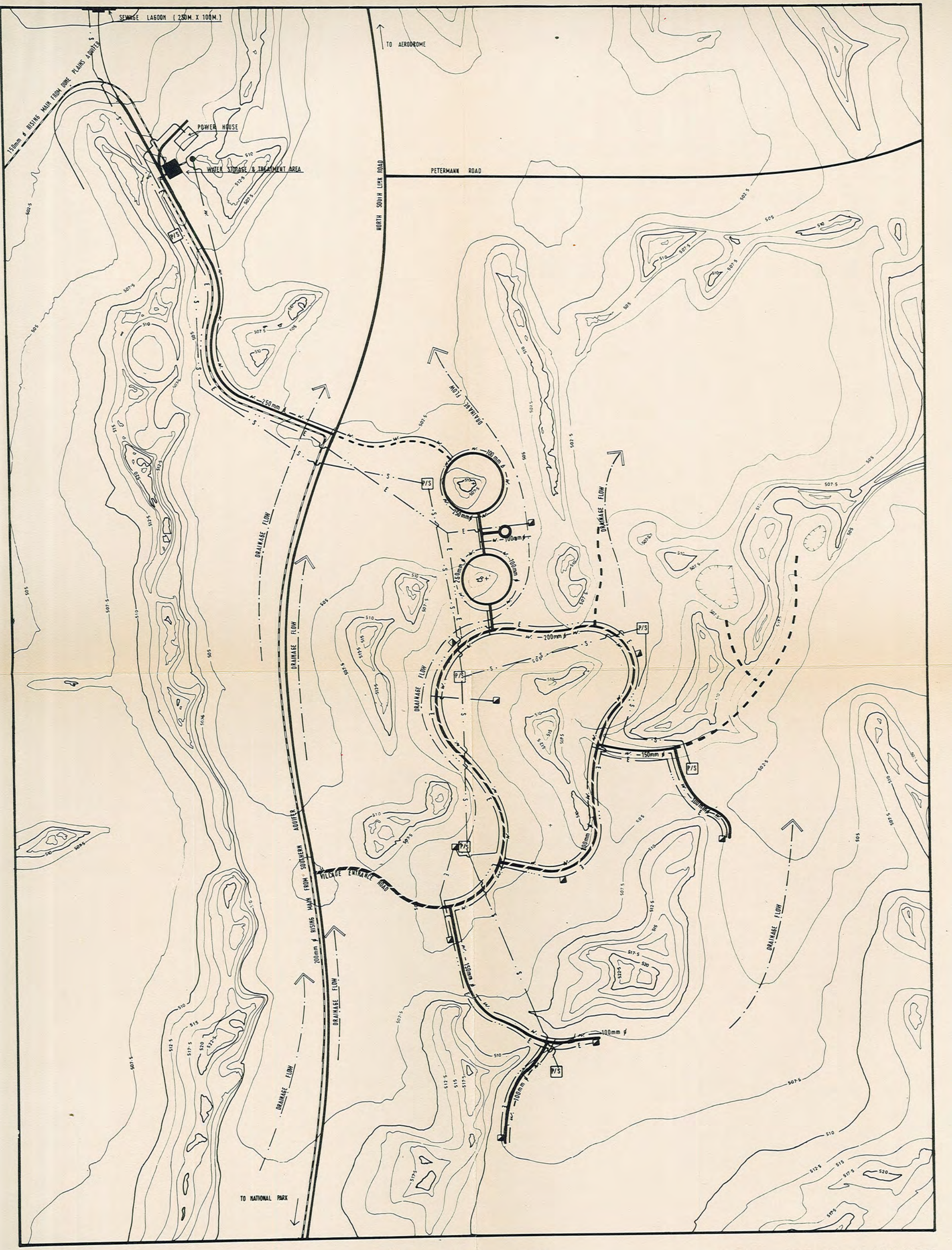
DATE: NOV. '78 PLAN Nº 3

BAR SCALE
100 50 0 100 200 300 Metres

N

YULARA TOURIST VILLAGE

SERVICES PLAN



NOTE :

SERVICES SHOWN ARE SCHEMATIC ONLY TO SHOW PRINCIPLES AND BASIS OF ESTIMATES LOCATIONS ARE SEPARATED FOR CLARITY

LEGEND

- W — WATER MAINS, Valves hydrants & details not shown.
- E — HIGH VOLTAGE ELECTRICAL MAINS
- S — SEWER MAIN
- ELECTRICAL SUBSTATION
- P/S — SEWER PUMP STATION
- TYPE 1. ROAD (See section 5 & 6)
- TYPE 2. ROAD (See section 5 & 6)
- POSSIBLE FUTURE ROAD

Prepared for: TERRITORY PARKS AND WILDLIFE COMMISSION

Prepared by: YULARA INTERDEPARTMENTAL PLANNING TEAM

DATE: NOV. '78

PLAN N° 4

BAR SCALE 100 50 0 100 200 300 Metres

N