Brisbane Airport: Interim Report on International Terminal

Report

This Report represents part of a full-scale study by BTE, at the direction of the Minister for Transport, of the development requirements for Brisbane Airport. The full report will be issued at a later date and will present a detailed examination of the civil aviation requirements of the region and the appropriate expansion/replacement program.

Subject
Series
Date
A to Z
Search
Results
Print
Exit
GO BACK

BUREAU OF TRANSPORT ECONOMICS

BRISBANE AIRPORT:

INTERIM REPORT ON

INTERNATIONAL TERMINAL

MARCH 1974

CONTENTS

SUMMARY

This report represents part of a full-scale study by BTE, at the direction of the Minister for Transport, of the development requirements for Brisbane Airport. The full report will be issued at a later date and will present a detailed examination of the civil aviation requirements of the region and the appropriate expansion/replacement program.

This interim report is confined to the question of the most appropriate way of providing a new international terminal. After a preliminary consideration of four alternatives for replacing the present international terminal, the two most appropriate alternatives are subjected to detailed comparison on a net present value basis. It is concluded that on this basis, and also having regard to the desirability of keeping open as many options as possible concerning the longer term plan for Brisbane Airport, the most appropriate action is to construct a new terminal near the north-east end of the present runway. This is the site proposed for a maintenance area for development concept Qc recommended by the Commonwealth-State Committee of Enquiry in its 1972 report.

CHAPTER 1

INTRODUCTION

Origin of the Study

In September 1973, the Minister for Transport referred the redevelopment of Brisbane Airport to the BTE for study. The Bureau was requested to investigate and report on :

(i) the likely future civil aviation requirements of the Moreton region;

(ii) the extent to which these requirements should be met by further expansion at the present site or the provision of a second or alternative airport; and

(iii) the appropriate characteristics of airport facilities and the timing of new construction.

In examining the above matters, the BTE was asked to take full account of aircraft operational requirements, noise nuisance and effects on surface transport.

The BTE's investigations need to be considered against the background of previous reviews of Brisbane Airport in recent years.

Previous Reviews of Brisbane Airport

In February 1971, a joint committee consisting of representatives of the Australian Government, the State of Queensland, Local Governments and the Brisbane City Council was formed to study and report on the development of airport facilities to serve the City of Brisbane. Its terms of reference were : to revise and update the requirements of Brisbane Airport, to ensure that the airport continued to operate without causing undue noise nuisance in existing urban areas, and to ensure that the development of other than existing urban areas remained compatible with aircraft operations.

After a first-stage screening of nine basic alternatives[1] (which, with variations on the basic concepts, totalled 17 separate analyses), the Advisory Committee subjected three basic concepts to more detailed study :

P - within the existing boundaries

Q - astride the northern boundary

R - still further to the north

With variations on these basic concepts, 11 alternatives were compared in detail. The Committee recommended [2] that Concept Qc (two widely spaced parallel runways and one cross runway with associated development on the Serpentine site) should be the basis of the master plan of Brisbane Airport, because that scheme :

- provided for the development of a high-capacity airport which would cater for the aviation needs of Greater Brisbane until the turn of the century;
- was compatible with planning envisaged for the Brisbane Metropolitan area;
- reduced aircraft noise nuisance to the city and closely settled residential areas;
- raised the height limitations on the central city and Spring Hill areas; and
- could be integrated with existing airport facilities throughout its development.

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(1) Six were within the existing boundaries (including 600 additional acres then being acquired in Pinkenba), one was astride the northern boundary, and two were within the Serpentine area.

(2) Commonwealth of Australia, State of Queensland, City of Brisbane, Advisory Committee Report on the 1970-71 Review of Primary Airport Facilities to Serve the Future Needs of Brisbane, January 1972.

The Committee went on to recommend that the first stage of areodrome construction works, together with associated road access and engineering services, should be undertaken in the order of :

(i) the new east side runway;

(ii) health, customs and immigration facilities, passenger accommodation, aircraft, and car parking in the new building area;

(iii) the balance of the terminal area; and

(iv) the cross runway.

The proposed layout of Concept Qc is shown in Annex B. The timing recommended by the Committee for the completion of the first stage of this facility was the end of 1979.

The Coombs task force report of June 1973 made reference to the proposed redevelopment of Brisbane Airport(1) and questioned the validity of the traffic forecasts on which the arguments for development were based. It suggested : that the growth of passenger traffic and hence aircraft movements could be slowed down if more appropriate policies were followed; that it could be expected that the growth rate in aircraft movements would be substantially reduced with the introduction of wide-bodied jets later in this decade; and that the number of aircraft movements at Brisbane Airport could also be reduced by a deliberate policy of transferring general aviation operations to other airfields. The report also made reference to the following possibilities concerning the redevelopment of Brisbane Airport(2) :

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(1) Report of the Task Force Appointed by the Prime Minister the Honourable E.G. Whitlam, QC, MP, Review of the Continuing Expenditure Policies of the Previous Government, June 1973, Item 41, pp 149-151.

(2) Ibid., pp 150-151.

(a) Defer the project for a specified period.

(b) Decide on the timing of the project on receipt of the Urban and Regional Development Committee Report.

(c) Carry out the necessary minimum of site preparation to enable construction of some new terminal facilities at the long-term optimum position(1), while prolonging as far as possible the use of the existing terminals, runways, and airway facilities.

(d) As a concomitant of (c), commission a detailed cost-benefit analysis of the nature, standard, sequence, and timing of further development of the site and facilities, with full regard for the possibility of damping demand at Brisbane Airport by the use of alternative facilities.

Outline of Overall BTE Study of Brisbane Airport

In September 1973, the Minister for Transport directed the BTE to undertake a detailed analysis of the likely future civil aviation requirements for the Moreton Region, and the most appropriate development plan to meet these requirements. The full terms of reference were cited at the beginning of this Chapter.

The BTE analysis comprises the following steps:

(i) Forecast annual passenger and aircraft movements at Brisbane airport through to year 2000-01.

(ii) Using these forecasts, estimate the scale of future airport requirements (runway, apron, terminal capacity) at specific dates.

(iii) Formulate alternative strategies for meeting those requirements (including the sequence and timing of individual developments within those strategies).

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(1) Master Plan Qc as recommended by the 1972 Advisory Committee Report.

(iv) Compare the benefits, costs or consequences of each strategy. This comparison will include land acquisition costs, airport construction and operating costs, airport user costs, airport access costs, and the impact of aircraft noise nuisance and building height restrictions along the approach paths of the existing or proposed runways. The implications of each strategy for the long-term development of Brisbane Airport will also be considered.

(v) Consider non-investment alternatives for coping with future demand (i.e. changes in operations or pricing policies).

At this time, steps (i) to (iii) are well advanced. However, following the recent Brisbane floods, the Departments of Transport and Housing and Construction consider that the effects of flood drainage on any future major development of the airport should be reviewed as detailed flood data becomes available.(1) This review, to be carried out in conjunction with local authorities, is well in hand and should be completed by the end of the year. It is considered, therefore, that the BTE should await the outcome of this review before completing its study.

The BTE has been advised that a decision on replacing the present international terminal cannot wait until the likely completion date of the full study. Quite apart from questions of capacity, it is considered that industrial relations, passenger comfort and airport security require a new terminal no later than summer 1975-76 and that, for this goal to be met, initiating steps must be taken now.

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(1) Whilst both Departments have advised that the 1974 flood experience confirmed the previously determined general lines of approach in terms of floodway and airport engineering, they believe that clearly there is a need to review flood control in the whole Kedron Brook catchment area. This, in turn, could modify existing flooding and airport site preparations design detail.

Accordingly, the BTE is issuing this interim report.

Scope of This Report

This report is confined to a consideration of the most appropriate way of providing Brisbane with a new international terminal. The BTE evaluations of this matter have been undertaken in such a way that the conclusion is independent of whatever conclusions are arrived at as a result of the overall study concerning Brisbane's longer term civil aviation requirements.

CHAPTER 2

CURRENT CAPACITY AND FUTURE REQUIREMENTS

The Need for a New International Terminal

The present international terminal is a World War II wood and galvanised iron igloo hangar of inadequate size and standard. Its capacity of 250 passengers every half hour is already exceeded at certain times and there is no scope for accommodating future growth. The present building cannot be further extended or modified within the area available, which is confined by the adjoining domestic terminals on either side (see Annex A). The Department of Housing and Construction has advised that the present building is a structural hazard in high wind conditions, a fire hazard, and sub-standard in terms of working conditions, passenger comfort, and airport security.

A decision on the most appropriate way of providing a new international terminal for Brisbane cannot be made without reference to the other airport facilities and likely future requirements. Accordingly, a description of these other facilities and their adequacy in relation to future demands follows.

Runway Capacity

The present runway arrangement is shown in Annex B. The main runway runs north-east to south-west, is 2,400 metres long and should be capable of handling peak hour movements until at least the 1990's.

The secondary cross runway runs north-west to south-east, is 1,500 metres long and is capable of handling aircraft up to Fokker Friendship size.

Apron Capacity

The present apron space provides 10 domestic jet positions and one international 707 position, which is barely sufficient for present peak demand but requires occasional use of domestic apron space for international flights.

The area available for future apron expansion without compromising the cross runway (see Annex A) is insufficient to provide for likely growth in peak requirements for both the domestic and international operators. Without the international operators, apron extensions would however provide for the needs of both domestic operators until into the 1980's.

Domestic Terminal Capacity

The present locations of the domestic terminals are shown in Annex A, along with the locations of hangars and other facilities.

The existing domestic terminals would require improvements to cope with the peak passenger loads associated with the introduction of wide bodied aircraft, which are due to enter service by 1976. Even if it is ultimately decided to implement a Master Plan like that recommended in the 1972 Advisory Committee Report (Concept Qc) the lead time (detailed design, siteworks, construction) for such a project would mean that expansion of the existing domestic terminal facilities would be required. The existing International Terminal, being situated between the Ansett and TAA terminals, provides a convenient site onto which Ansett and/or TAA could expand, as well as providing the domestic operators with some relatively minor increase in apron frontage and carpark space.

Maintenance Area Capacity

The present maintenance hangars are too small to handle wide bodied aircraft. Both domestic operators have indicated that they propose to establish new maintenance facilities at Brisbane Airport. The existing site (see Annex A) is not large enough to accommodate larger maintenance facilities. In any event, the area presently occupied by maintenance facilities will be required for domestic terminal and apron expansion (irrespective of the longer term development of the airport) within the next decade.

The most appropriate site for the new maintenance facilities appears to be the proposed Master Plan Qc maintenance area. This area is convenient to, while not compromising, both the existing runways and possible future runways (see Annex B).

Possible Longer Term Developments

As noted in Chapter 1, the question of a long term Master Plan for the development of Brisbane Airport was the subject of study and report by the 1970-71 Commonwealth State Advisory Committee. This Committee recommended a Master Plan known as Qc, with the runway configuration shown in Annex B. Air Transport Group of the Department of Transport is planning in detail for the implementation of the Plan by the early 1980's.

The basis on which Plan Qc has been advanced is not imminent saturation of the existing runway capacity, but rather the constraints on terminal and apron development at the existing site, and the noise and height restrictions associated with current operations. It is part of the BTE's overall brief to review this plan and the desirable rate of implementation of this or any alternative longer term strategy. BTE is not yet in a position to report on these general issues. However, it seems reasonable, in deciding on the appropriate form and location of a new international terminal, to keep open as many options as possible. So far as possible, the scale and location

of the new international terminal should neither anticipate early abandonment of the existing runway, nor should it unnecessarily compromise possible future development.

To sum up, there is an evident need for a new international terminal. A decision on the appropriate means of replacing the existing building should have regard to the constraints on development at the existing terminal area, and possible longer term development strategies, which will bring to account the not inconsiderable remaining life of the existing runway, along with its noise and height restriction problems.

CHAPTER 3

EVALUATION OF ALTERNATIVES FOR THE NEW INTERNATIONAL TERMINAL

Proposals for a New Terminal

Once the need for a new international terminal is accepted, the only questions that arise from an economic evaluation point of view are the appropriate scale and location of the new facility.

It is customary to design airport buildings to accommodate 10 years growth, and preferably to adopt a design which is amenable to further extension. The building proposed by Air Transport Group, at a cost of $1.625 m, is designed to accommodate 480 passengers at 20 minutes separation, compared with present capacity of 250 passengers at 30 minutes separation. Having regard to future trends in aircraft size and international passenger travel, planning on this scale does not seem extravagant, and BTE has concentrated on the question of the optimum location for the new facility (there being a substantial difference in the site works and aircraft operating costs associated with some alternative locations).

The Alternative Locations

Four alternative sites on which the new facility could be constructed were considered: the existing site; the north-western side of the present main runway; Master Plan Qc maintenance area; and Master Plan Qc terminal area.

Only the latter two alternatives were costed and evaluated. The first two alternatives were rejected for the following reasons:

(a) The construction of a new International Terminal Building on the existing site would result in increased peak hour apron congestion, restrict expansion of the present domestic facilities, and could result in the premature closure of the cross runway or the premature construction of new domestic terminals on an alternative site(1).

(b) Construction of a new terminal on the north-western side of the runway would be more costly than one on the other side, without offering any compensating advantages. Compared to the construction of an International Terminal complex on Master Plan Qc maintenance area, it would involve more costly site works, more difficult access to the present domestic terminal area, and the construction of a second parallel taxiway. The area available for future expansion on both these sites, without compromising present or planned facilities, is of a similar size. Therefore, the construction of an International Terminal complex on Master Plan Qc maintenance area would be an operationally equal but less costly location compared with the north-western side of the main runway.

There are thus two practical alternative locations for the construction of a new International Terminal complex :

(i) An International Terminal with aprons and supporting services within Master Plan Qc maintenance area. The limit of cost estimate is $3.7 million.

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(1) The area available for apron expansion, without compromising the present cross runway, is restricted by the approach splay of the main runway to the west, the approach splay of the cross runway to the east, the cross runway to the north, and the Pinkenba railway line and industrial development to the south.

(ii) An International Terminal with aprons and supporting services on the proposed international terminal site of Master Plan Qc. The limit of cost estimate is $7.3 million.

Comparison of the Alternatives

It might be thought that, on the cost figures just mentioned, constructing the new terminal on the maintenance site is clearly preferable and the matter can be left there. However, there are some trade-offs involved. Although the maintenance site is very conveniently located to the present runway, it is not so conveniently located to the possible future main runway. Also, it may constrain the future development of maintenance facilities on that site, and the scope for any further expansion of international terminal facilities on that site may be restricted(1). For those reasons any development on this site may have a limited life.

On the other hand, building on the Master Plan Qc terminal site would be disadvantageous while the present runway is in use but could clearly be more appropriate if the Qc main runway was in use.

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(1) Refer to Annex B. After allowing for the currently proposed airline maintenance facilities, Regional Training College and Line Depot, sufficient area is available on which to construct a new International Terminal complex with an apron area capable of simultaneously parking five large international aircraft nose in to the terminal. Provision of major additional apron space, or major extensions to the Terminal building itself, may require acquisition of adjoining land presently occupied by the Army, or else resiting of the proposed Training College and Line Depot. Alternatively, if it is decided to abandon the present cross runway, the eastern side of the main runway south of the proposed maintenance site would be freed, allowing room for some limited expansion of the International Terminal and apron area, as well as expansion of the domestic terminal area.

Accordingly, it is necessary to make a net present value comparison of the two alternatives, taking account of the present operational disadvantages of the Qc terminal site and the prospect of a building on the maintenance site having a limited life. The comparisons were made at two discount rates (7 and 10 per cent) and two alternative assumptions about life of a building on the maintenance site (5 years and 10 years). It is considered that both assumed life spans, but especially the 5 year assumption, are conservative to that alternative, on the grounds that even if Master Plan Qc were to receive approval for implementation, total construction is unlikely to be completed within 10 years. For simplification, it is assumed that once the life at the international terminal on the maintenance site is ended, a new building is constructed on the Qc terminal site. This renders the subsequent time stream of costs identical for both alternatives.

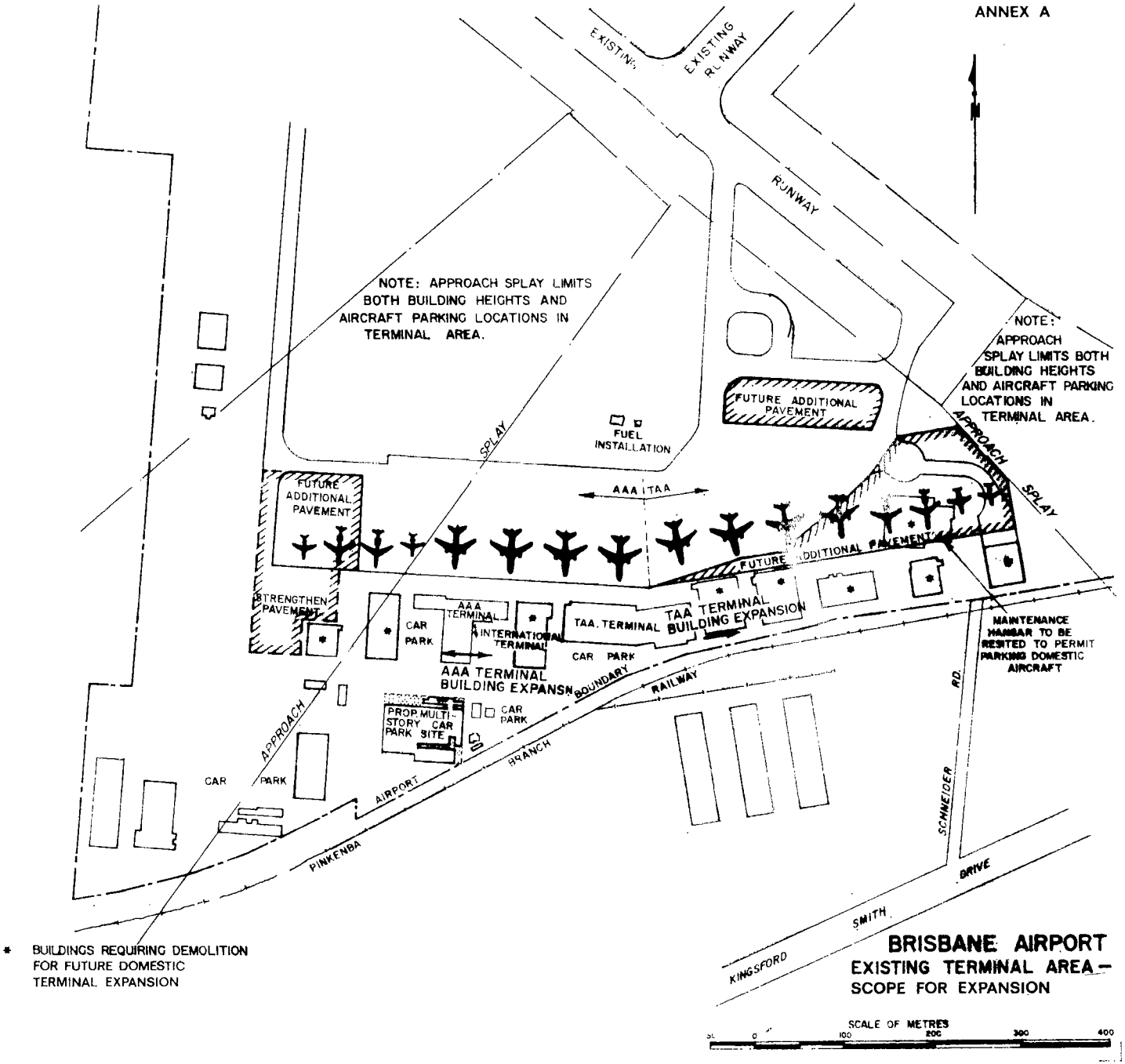
The actual net present value comparisons are set out in Annex C. It will be noted that, for both discount rates and both assumed life-spans, the maintenance site is the preferred alternative, resulting in discounted cost savings of $0.8 m to $2.6 m. The cost penalty associated with the Master Plan Qc terminal area is accounted for by additional site preparation, provision of a long link taxiway and the consequent additional aircraft taxi-ing costs to be met by the international airline operators.

Actually, the real savings would be in excess of the above estimates, because of several elements not assessed. There would be additional costs to be met by operators in moving transfer passengers, freight and support equipment between a new international terminal and existing domestic/aircraft maintenance area. Although such costs would have to be incurred in relation to both terminal locations, they would be greater for a terminal on the Qc terminal site. Furthermore, a terminal on the latter site would be in the approach path of the existing runway and would consequently impose a substantial noise nuisance on airport employees and passengers.

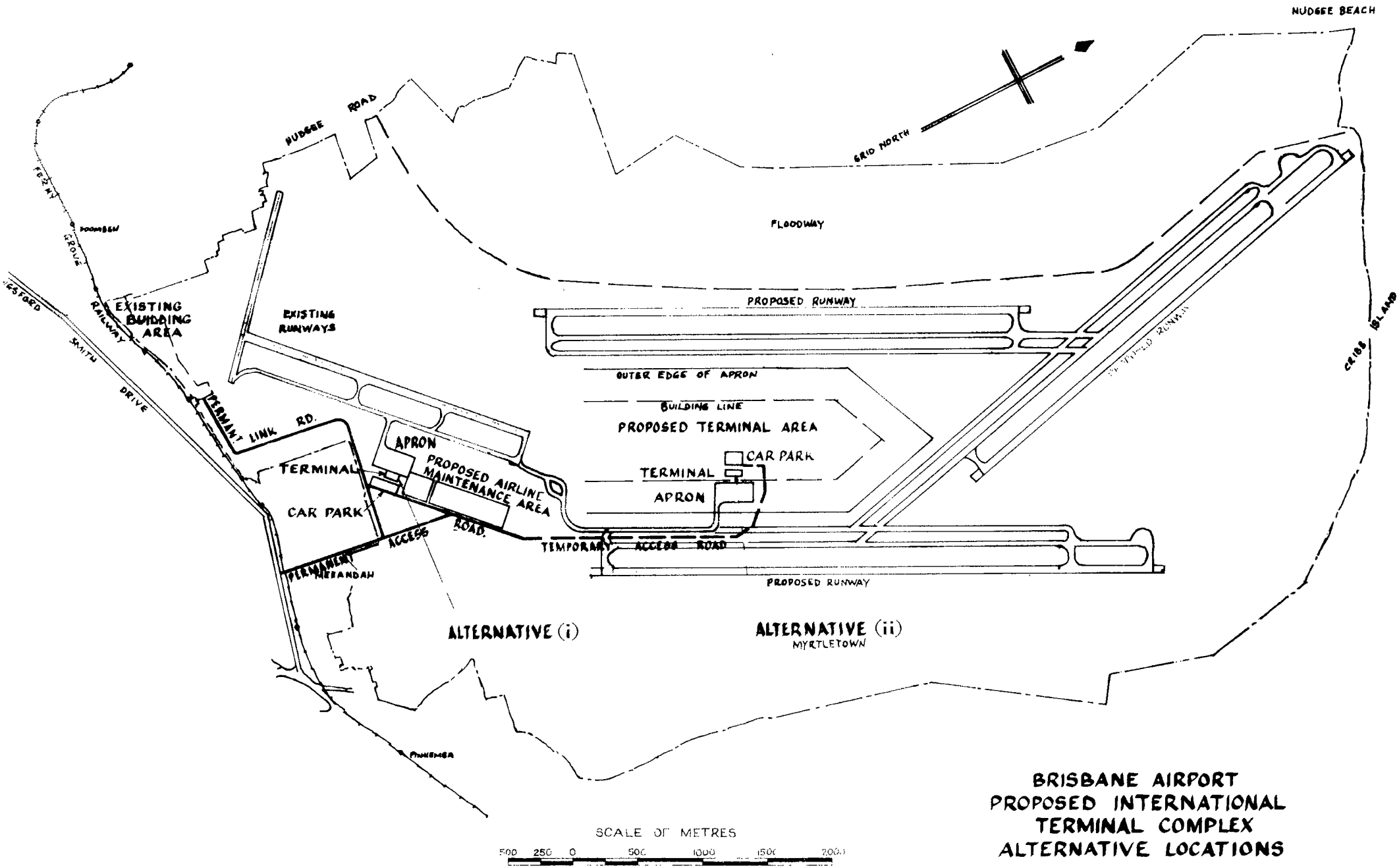
Conclusion

The replacement of the present International Terminal by a complex on Master Plan Qc maintenance area is cheaper than building on the Qc terminal site, and has a further advantage of keeping options open as to the nature and timing of overall redevelopment proposals for Brisbane Airport. It is also clearly preferable to the other alternatives of rebuilding on the existing site or building on the north-west side of the present main runway, although detailed calculations have not been performed for these sites. This conclusion holds regardless of the outcome of the overall BTE study concerning long-term strategies for the redevelopment of Brisbane Airport.

ANNEX A



* BUILDINGS REQUIRING DEMOLITION FOR FUTURE DOMESTIC TERMINAL EXPANSION



BRISBANE AIRPORT PROPOSED INTERNATIONAL TERMINAL COMPLEX ALTERNATIVE LOCATIONS

AS AT 27-12-73

ANNEX C

COMPARISON OF NET PRESENT VALUE COST OF ALTERNATIVE LOCATIONS

For the purpose of the following calculations, the alternatives are defined as :-

(i) Immediate construction of an International Terminal on the Master Plan Qc maintenance area, with the construction of an international terminal on Master Plan Qc terminal area deferred for a stated number of years.

(ii) Immediate construction of an International Terminal on Master Plan Qc terminal area.

At the end the period, the International Terminal on Master Plan Qc maintenance area would provide the bonus of an old building, apron space etc. which could be put to some other use if this complex were relocated in another area. Accordingly a salvage value is shown for these facilities.

TABLE C.1 - COMPARISON OF NET PRESENT VALUE COST OF ALTERNATIVE LOCATIONS

($ million)

Cost	10 year life				5 year life			
	10 per cent discount rate		7 per cent discount rate		10 per cent discount rate		7 per cent discount rate	
	Maintenance site	Terminal site	Maintenance site	Terminal site	Maintenance site	Terminal site	Maintenance site	Terminal site
Initial cost								
(a) Terminal	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625
(b) Site preparation, services, roads and car park	0.675	1.875	0.675	1.875	0.675	1.875	0.675	1.875
(c) Apron/access taxiway and runway/taxiway fillets	1.400	3.800	1.400	3.800	1.400	3.800	1.400	3.800
	3.700	7.300	3.700	7.300	3.700	7.300	3.700	7.300
Less salvage value of terminal facility on maintenance site								
(a) Terminal	0.695		0.695		0.695		0.695	
(b) Site preparation, services, roads and car park	0.405		0.405		0.405		0.405	
(c) Apron/access taxiway and runway/taxiway fillets	0.970		0.970		0.970		0.970	
	2.070		2.070		2.070		2.070	
Discounted to present worth	0.725		0.985		1.170		1.380	
Net discounted cost of terminal on maintenance site	2.975		2.715		2.530		2.320	
Plus present value cost of constructing a terminal on Master Plan Qc terminal area	2.185		3.710		4.530		5.205	
Plus present value of extra aircraft taxi-ing costs		1.500		1.700		0.900		1.000
Total present value	5.790	8.800	6.425	9.000	7.060	8.200	7.525	8 300

with Terminal site passenger and freight ground movements between international and domestic terminals and aircraft ground movements to