Kingscote Airport

Infrastructure Study Report

Kangaroo Island Council

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Tonkin CONSULTING

a better approach

Document History and Status

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1 Introduction

1.1 Scope of Report

This document is a report on the engineering investigations that have been undertaken into the infrastructure requirements and associated estimated capital costs to upgrade Kingscote Airport for four (4) separate future development scenarios. This airport is the only point of entry to Kangaroo Island for regular passenger transport (RPT) aerial services.

The work was undertaken on behalf of the Kangaroo Island Council, the owner and operator of the Kingscote Airport. The Study brief was jointly developed by Pacific Aviation Corporation and the Council.

1.2 Purpose of Report

The State Government (via the Kangaroo Island Futures Authority) is undertaking a series of wide ranging reviews to determine appropriate strategies for the future development of the Island. The potential for increased visitation, particularly by overseas and interstate tourists, has been recognised as a major component of future local economic activity.

Kingscote Airport is one of only two major points of entry onto Kangaroo Island, the other being ferry services. The efficiency of air services is crucial for future development of and growth in visitation to the Island.

Outputs from this Study (i.e. capital and ongoing cost estimates for the various future development strategies) will be input to a number of cost benefit analyses and other broad ranging policy development processes with a view to determine the most appropriate strategy for future economic development on Kangaroo Island, the most efficient aerial transport service for its community and the tourism traffic, and the appropriate level of development of Kingscote Airport.

1.3 Study Brief

The project brief was outlined in Tonkin Consulting's letters dated 31 August 2012, and amended by further letter dated 11 September 2012 and e-mail dated 17 September 2012. However, the exact requirements of the Kangaroo Island Council have been further determined through ongoing discussion, and through receipt of advice of the requirements of third parties (e.g. Pacific Aviation Corporation, Econsearch, etc.). Accordingly, scope management has remained a key issue throughout the course of the project investigations.

1.4 Study Methodology

The four future development scenarios considered in this Study are detailed in Section 3.1 hereunder. Scenario 1 was simply to maintain the status quo at Kingscote Airport. As Tonkin Consulting developed Kangaroo Island Council's asset management plan for this airport, the methodology for this scenario was simply to draw upon the costs estimates developed in that past work, updating where necessary.

Scenarios 2, 3 and 4 involved upgrading the airport to cater for larger aircraft. The methodology adopted for these future development scenarios was to undertake preliminary geometric design work and indicative pavement design for the required airside extensions, determine terminal building spatial requirements at the element level, and then finally derive estimates of capital cost.

2 Background and Context

2.1 The Present

The vast majority of visitors to and from Kangaroo Island must do so via one of only publicly available means, namely:

- Via Kingscote Airport, the only place on the island serviced by RPT air services. All arrivals at this airport emanate from Adelaide Airport, and similarly all departures from Kingscote are destined for Adelaide.
- Via Sealink Ferry, which operates between Cape Jervis on the South Australian mainland approximately 100km south of Adelaide and the port of Penneshaw approximately 60km east of Kingscote by road.

Whilst overall visitor numbers to Kangaroo Island have enjoyed an upward trend over the last decade, total passenger numbers through Kingscote Airport have fallen slightly over the same period. Various reasons have been put forward for this declining share of the air traffic mode. These include, but are not limited to:

- Lack of convenience – particularly for overseas visitors – in having to transit through Adelaide Airport.
- Current marketing advantage enjoyed by Sealink, in that they can arrange, upon initial enquiry - and in addition to ferry booking - appropriate “packages” for visitors including accommodation on Kangaroo Island, and land transport - both on the Island and between Adelaide and Cape Jervis. The operator of aerial RPT services to Kingscote from Adelaide does not offer such broadening of its usual operational scope.

At present, the RPT service to and from Kingscote is via Saab 340 aircraft – 34 seater turbo-prop plane.

2.2 The Future

The South Australian Government has recognised the significance of Kangaroo Island as a destination for international and interstate visitors, and is of the belief that there is great potential for increased visitation. Various studies are underway into those factors that could limit future visitation to the Island. Kingscote Airport has been identified as a key area for future study.

Essential prerequisites for the success of those strategies aimed at driving up visitation to the Island would be appropriate facilities and efficient and convenient air services to Kingscote Airport. The latter point (efficient air services) applies particularly, although not exclusively, for overseas visitors. Kingscote Airport in the future would need to be the destination for flights emanating from, and origin point for flights to, other Australian cities such as Melbourne and Sydney.

Aviation economics will dictate that the possible future longer haul flights operating to and from Kingscote will be by larger aircraft (70 seat turbo-prop aircraft, regional jets or single aisle mainline jets). To meet possible future needs, a full review of airside facilities, terminal building, third party services and landside infrastructure at Kingscote is necessary.

This Report outlines those initial reviews, as undertaken for this Study. Infrastructure requirements for four different future development scenarios have been determined, and indicative capital cost estimates associated with each have been prepared. These have been presented in Section 8 below.

The details of the four scenarios considered are listed in Section 3.1 below.

3 Future Development Scenarios

3.1 Scenario Outlines

The Study Brief required that the airport infrastructure requirements for four (4) future development scenarios be examined. These scenarios were as outlined below:

- **Scenario 1**

  The level of investment required to maintain Kingscote Airport on an as-is basis assuming continued use of Saab 340 aircraft for RPT services, with occasional use by larger aircraft with individual permits.

- **Scenario 2**

  The level of investment required to accommodate ATR72 & Q400 aircraft operating sectors (at full passenger and cargo payload) as far as Melbourne.

- **Scenario 3**

  The level of investment required to accommodate regional jet services (up to Code 3C) operating sectors as far as Perth.

- **Scenario 4**

  The level of investment required to accommodate single-aisle mainline jet services (B737 / A320) to sectors as far as Perth.

3.2 Design Aircraft

For the purposes of this Study, a "design aircraft" has been selected for each scenario. The following sub-sections outline the reasons for the selection of the options considered for each scenario.

3.2.1 Scenario 1

Kingscote airport was designed for Fokker F27 turbo prop aircraft (approximately 50 seats and gross weight of 20.8 tonnes). However, the only RPT operator now servicing Kingscote has used the smaller Saab 340 turbo prop aircraft (34 – 36 passengers and gross weight 13.2 tonnes).

Selection of a design aircraft for this scenario requires some level of speculation regarding future operators. The smaller class of turbo-prop aircraft are no longer being manufactured to historical levels. The F27 (20.8 tonnes) is essentially obsolete, and production of the newer Fokker F50 (58 seats and 20.8 tonnes) ceased in 1996. Production of the Saab 340 has also ceased, in 1999. The last Bombardier Dash 8 300 (56 seats and 18.9 tonnes) was manufactured in 2008.

It is difficult to determine the type of aircraft that will provide RPT services between Adelaide and Kingscote when the present Rex Airlines Saab 340 aircraft reach the end of their service life. Perhaps this duty would be taken up by smaller (18 passengers) twin-engine commuter aircraft. Suffice to say the existing airport infrastructure and facilities would be well placed to accommodate such aircraft, assuming that maintenance of the asset continues.

Given this uncertainty, the conservative selection of the Saab 340 has been made as the "design aircraft" for this scenario.

3.2.2 Scenario 2

The ATR72 (62 – 74 seats and 23 tonnes) and Bombardier Q400, otherwise known as the Dash 8 400 (68 – 78 seats and 29.3 tonnes) are the most common of these larger turbo prop type aircraft operating in Australia with the range to operate between Kingscote and Melbourne

It is reasonable that the latter aircraft (the larger) be adopted to provide an element of conservatism for pavement and terminal building design for this future development scenario.

Federal Government requirements for passenger and baggage screening will be invoked by either of these aircraft (required for aircraft with maximum weight in excess of 20 tonnes). Refer to Section 6.2 herein.

3.2.3 Scenario 3

Regional jet aircraft (Code 3C) operating in Australia would include the Embraer EMB 170 (70 - 78 seats and 36 tonnes), the British Aerospace BAe-146-300 (100 passengers and 41 tonnes) and the Fokker F 100/70 (107 seats and 41.7 tonnes). Such aircraft are capable of non-stop operation between Kingscote and Perth.

A check of the Australian aircraft register lists only three (3) EMB 170 aircraft in operation at present. Hence, the chances of that aircraft operating out of Kingscote are extremely remote.

Alternatively, there are approximately forty-two (42) F100/70 aircraft registered in Australia (to Skywest and Alliance Airlines). Accordingly, this would appear to be the only realistic choice for a regional jet at the present time for this development scenario.

It should be noted that the availability of registered Code 3C aircraft are currently limited in Australia. However should the current trend of gradual increases in aircraft size continue then current Code 2C aircraft will most likely become classified as Code 3C.

3.2.4 Scenario 4

Single-isle mainline jet services in Australia are predominantly provided by Boeing 737 800 (162 – 175 seats and 79.25 tonnes) and Airbus 320 (148 – 180 seats and 77 tonnes) aircraft. These are very similar in terms of total weight and number of passengers able to be accommodated.

The former has been adopted for this scenario, its slight additional weight providing some conservatism in design.

Both of these aircraft are Code 4C aircraft and this class is currently the dominant aircraft used for interstate travel.

4 Site Investigations

4.1 Outline

A site investigation was undertaken on Monday October 8, 2012. The purpose of this investigation was to familiarise Tonkin Consulting with the existing site infrastructure and better understand its limitations and potential requirements for upgrade. In particular, a number of existing drainage culverts beneath runway 01 / 19 were investigated to assist in structural assessments.

4.2 Existing Drainage Culverts Beneath Runway 01/19

Existing design drawings show two buried drainage culverts beneath the existing Runway 01 / 19; a 1350mm diameter class 'X' reinforced concrete pipe (1350 RCP) located at the junction of runway 15 / 33; and a 1200mm diameter class 'X' reinforced concrete pipe (1200 RCP) located at approximately the midway point of runway 01 / 19. The locations of these can be seen in the Airport Layout Plan in Appendix A.

The location of the 1350mm diameter pipe is at the intersection of Runways 01 / 19 and 15 / 33, and is in the touchdown zone for aircraft landing on Runway 01 / 19 from the south. Accordingly, this pipe in particular could be subject to subject to impact loading additional to that due to wheel loadings by themselves.

The condition of the pipes has been included in periodical condition assessments of the existing airport facilities, and they are currently deemed to be in good condition.

The pipes were assessed to provide confidence that under the increased loadings of the design aircrafts the pipes would not be damaged. The major concern is that if the pipe were to suffer structural damage then there would be a risk of collapse of the runway above the pipe.

In order to undertake structural assessment of these pipes it was necessary to excavate and confirm the cover of the pipe and the materials and quality of the backfill through visual inspection. A backhoe was used to excavate a test pit above each pipe approximately 1.0 metre from the edge of the runway seal. Photographs of the test pits and their locations can be seen in Figure 4-1 and Figure 4-2 on the following page. Both excavations were located on the upstream side of the runway to ensure that the minimum cover from top of pipe to the surface was established.

The excavation works confirmed the cover to top of each pipe was 800mm at the location of the test pit. The backfill was confirmed to be very well compacted sand to approximately 400mm above the top of pipe with the remainder of the backfill consisting of a well compacted gravel and sand mixture to the surface.

The cover quoted above is the minimum cover under the runway for each culvert. Allowing for cross-fall in the runway pavement and longitudinal fall in the pipes themselves, the cover would increase to slightly above a metre at the runway centre-line, and would be well in excess of 800mm for the majority of their length beneath the runway. Adoption of this minimum figure for pipe cover in the structural assessment work has therefore provided an element of conservatism in the calculation of live loads.

In addition to the aforementioned pipes a number of other pieces of drainage infrastructure were identified. A 600mm concrete pipe crosses beneath taxiway 'A' between runway 01 / 19 and the terminal apron. Another concrete pipe estimated to be 675mm in diameter runs adjacent to the terminal and has a number of grated inlet pits used to pick up surface water from the apron. Design drawings show that these pipes have only 500 – 600mm of cover.

Figure 4-1 1350 pipe excavation and location

Figure 4-2 Diameter 1200 pipe excavation and location

Furthermore, a number of abandoned concrete pipes were noted during the site inspection. Five pipes of approximately 300mm diameter cross Runway 01 / 19. Three of these are located beneath the existing extent of seal with the remaining two located at either end of the runway but not beneath the extent of seal. However these two pipes are located within the runway clearway. The cover to the top of these pipes was estimated to be approximately 500mm.

It should be noted that neither the 600mm, 675mm or the 300mm pipes were excavated to confirm backfilling material and condition, or cover.

4.3 Assessment of Culverts for Future Development Scenarios

Following the site investigation structural assessment of the existing 1350 RCP and the 1200 RCP was undertaken for Development Scenarios 2, 3 and 4. The structural assessment was undertaken in accordance with AS3725 Design for Installation of Buried Concrete Pipes (2007). The assessment is based on a multiple wheel load distribution being applied to the pipe, as each strut has two wheels. The main rear struts were used as the critical loading as these provided a larger load than the front strut. In addition to the load due to mass of the aircraft, a dynamic loading factor of 20% was applied to account for the impact in accordance with that Standard. The design cover to each pipe took into account the increased cover due to increased pavement thicknesses for each Scenario.

The structural assessment indicated that the existing 1350 RCP and the 1200 RCP are structurally adequate to withstand the increased loads due to future use of:

- Q400 aircraft with no pavement overlay (Scenario 2).
- F100 aircraft with a 150mm pavement overlay (Scenario 3).
- B 737-800 aircraft with the proposed 300mm pavement overlay (Scenario 4).

In addition, the loading capacity of the existing 600mm and 675mm pipes and 300mm pipes were considered. It should be noted that structural assessment of these pipes was not undertaken. Based on the large loads of the relevant design aircraft and the relatively small diameters and lesser covers of these pipes it is highly likely that these pipes could be overstressed under future development scenarios 2, 3 & 4. Accordingly, was decided that, for the purposes of this Study, allowance for remedial works would be made in the capital cost estimates.

To protect the 600mm and 675mm pipes it is proposed that a reinforced concrete slab be constructed beneath the new pavement layer to mitigate the increased loads. It is proposed that a slab 2000mm wide by 300mm thick would be suitable for this purpose. Reinforcement of SL81 on the bottom of this slab has also been allowed for.

To ensure that the disused 300mm diameter RC pipes do not fail under increased loadings associated with future larger aircraft, the Study capital cost estimates allow for these pipes be in-filled with controlled low strength material.

5 Airside Facilities

5.1 Preamble

This section deals with all airside facilities requirements for future development scenarios 2, 3 & 4. Matters addressed include extensions to Runway 01 / 19, Taxiway A and the Apron geometry; pavement and seal design; and navigational aids.

The current RPT aircraft servicing Kingscote airport do not re-fuel at Kingscote. Future re-fuelling facilities for RPT aircraft has also been discussed.

Two factors may limit the maximum length of Runway 01 / 19 that can actually be constructed. These are aircraft noise and vegetation clearance. These factors have also been discussed in detail, although these possible practical limits have been ignored in the assessment of infrastructure requirements and capital cost estimation for each of the above future development scenarios.

5.2 Runway 01 / 19 Dimension Requirements

5.2.1 Existing

The existing runway is sealed, 1402m long by 30 wide and in a 1693m long x 150m wide graded runway strip. The existing clearways at the northern and southern ends are 183m and 108m respectively.

The layout plan for Kingscote Airport is presented in Appendix A hereto. This runway, Taxiway A and the Apron were all designed for Fokker F27 aircraft and a 15 year pavement life. Current aircraft providing RPT services to Kingscote are smaller and hence Scenario 1 (maintenance of the status quo) requires no upgrading or capital injection. However, re-surfacing and maintenance in accordance with Council's Asset Management Plan will be required.

5.2.2 Scenario 2 – Bombardier Q400

Formal advice received from Qantaslink states for direct flights to Sydney or Melbourne a runway length of 1550m with 60m clearways and obstacle clear gradient of 1.9% would suffice. This implies a 148m extension of the runway, and this Study assumes that this would take place at both ends. The required width of the runway would be 30 metres. A 150m wide graded runway strip will still apply.

Figure 2 in Appendix B depicts the airside facilities required for this scenario.

5.2.3 Scenario 3 – Fokker F100

Advice is still awaited from Alliance Airlines on the runway length requirements for flights ex Kingscote to Melbourne, Sydney and Perth. However, previous advice from that company in relation to possible direct flights from Prominent Hill to Melbourne (a route of 1260km) provides a reasonable basis for this Study as set out below. In that previous case, the formal advice given was that a 2100m runway with an additional 100m of stop way would be required.

By way of comparison, Kingscote to Melbourne is 700km and Kingscote to Sydney is 1252km (very similar to the 1260km above). The length required at Kingscote would be less than Prominent Hill due to reduced ambient temperature. Bureau of Meteorology data below shows the highest average maximum for January is 40.2 at Coober Pedy (100km north of Prominent Hill) compared to 28.9 at Kingscote. The data for Coober Pedy and Kingscote are presented in the tables below. (No historical records are available for Prominent Hill).

Coober Pedy

Summary statistics for all years Information about climate statistics

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Lowest	34.3	31.5	28.4	24.5	19.3	16.4	14.6	18.3	21.3	24.6	28.5	30.0	26.3
Highest	40.2	38.3	33.3	31.1	24.3	19.7	21.6	24.0	27.6	30.7	34.9	36.1	28.4

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Kingscote

Summary statistics for all years Information about climate statistics

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Lowest	23.9	24.2	21.9	19.3	17.1	15.1	14.1	14.6	16.2	17.8	20.4	21.5	19.5
Highest	28.9	29.1	28.3	24.1	20.1	17.1	16.3	17.7	19.8	22.3	28.2	27.1	22.0

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Product Code: IDCJAC0002 reference: 07796386

Accordingly, a runway length of 2100m has been adopted for the purposes of this Study. This is believed to be conservative for flights ex Kingscote to Sydney, although it may be slightly deficient for flights to Perth. However, there are significant external approvals to be obtained in future to enable such an extension to be implemented. Refer to the vegetation clearance matter raised in Section 5.2.5 below.

Such runway length implies a 698m extension over the existing sealed runway length, which would be mainly to the south but include the maximum practical extension to the north. It would also require land acquisition by Council south of the airport. Finally, vegetation clearance or trimming will be required on privately owned land to the south of the airport.

A runway width of 30m is still acceptable for these Code 3C aircraft, although 3m wide compacted and erosion resistant gravel shoulders will also be required. Again, 60m long clearways have been assumed for each end. A 150m wide graded runway strip will still apply.

Figure 3 in Appendix B depicts the airside facilities required for this scenario.

5.2.4 Scenario 4 – B 737-800

Formal advice from operators of A737 800 aircraft as to requirements for flights ex Kingscote to Perth has not been received at time of writing. Nevertheless, a reasonable precedent exists which can be used as a basis to progress the Study.

Prior to the extension of the Adelaide airport runway (to 3100m) in 1998, flights direct to Perth previously operated off the then 2500m long runway. These flights to Perth were weight-limited only on very hot days. As Kingscote's maximum temperatures are below Adelaide's, a runway length of the order of 2500m should be adequate for flights as far as Perth.

This runway length represents a 1098m extension over the existing sealed runway length, the vast majority of which would be to the south but include the maximum practical extension to the north. Significant land acquisition would be required to the south of the airport. A large amount of vegetation clearance would be required and there may be difficulty securing the necessary approvals for same. (Refer to Section 5.2.5 below). There would also be significant noise nuisance to the south of the airport. (Refer to Section 5.3 below).

B 737 800 and A 320 single-isle mainline jets are classed as Code 4 aircraft. Accordingly, a 45m wide runway would be required. 60m long clearways at each end have also been adopted. It should be noted that the Sunshine Coast airport has a dispensation for B737 operations with a 30m runway. Scenario 3 with a similar dispensation from the Minister may allow some C4 aircraft to operate with a shorter runway length than for the B737.

Figure 4 in Appendix B depicts the airside facilities required for this scenario.

Whilst capital cost estimates have been prepared for this 2500m long runway option, it is by no means certain that the necessary approvals could ever be secured for this development scenario (i.e. B737 flights as far as Perth). The issues are discussed in Sections 5.2.5 and 5.3 below.

5.2.5 Practical Limitation on Runway Length

Runway length available if maximising use of existing runway strip

The maximum length of runway that could be constructed within the existing runway strip of length 1693m whilst allowing for a 60m minimum required clearway at each end is 1573m. This is sufficient for Scenario 2 only.

Runway Length Available Within Existing Aerodrome Boundary

Extension of the runway strip to the north is constrained by Arranmore Road being located approximately 102m north of the existing clearway end. Allowing for a future 2.1m high security fence on the road reserve road boundary would result in a future obstacle gradient of 2.1% from the current end of clearway. The desirable maximum gradient is 2%

In addition any further extension to the north will run into obstacle clearance issues, in particular tall Eucalypt trees growing along the Cygnet River. Approval to remove or trim these trees is likely to be difficult to obtain.

At the southern end, the existing boundary is approximately 328m south of the southern end of runway strip of Runway 01. (Note that a drain is located 158m south of the existing runway, and that a new pipe will be required beneath any runway extension across it). Allowing 100m clearance from a future security fence, the maximum extension would be 228m (that is equal to 328m - 100m).

Accordingly, the maximum available runway length within the existing aerodrome boundary would be 1801m (= 1573m derived above + 228m). This is insufficient for both Scenarios 3 and 4.

Maximum Runway Length Assuming Property Acquisition

A further extension would be limited to the south only, assuming that Arranmore Road would need to remain in place. Significant trees along the Cygnet River are also likely to prove to be a constraint to development in that direction.

An extension to the south is potentially limited by:

- Low area and dwellings 1740m from the existing runway end
- Noise on residences and bowling club
- Obstacle clearance issues due to many large trees.

The noise issue is discussed in more detail in Section 5.3 below.

Survey data shows a range of large trees in the vicinity of the above houses. These extend in height to 24.73m above the existing clearway. Extending the runway 600m to the south to a total length of 2000m would increases the gradient over the trees to 2.19%.

Extending the runway to 2500m total length greatly increases the amount of clearing that would need to be undertaken to provide an appropriate approach gradient. The likely problems in securing the necessary approvals for clearing large numbers of trees tends to suggest the practical runway limit is of the order of 2000m, and that Scenario 4 is unlikely to be a viable option.

5.3 Noise Associated with Code 4 Aircraft

There are a number of dwellings located 3150m - 3300 from the start of takeoff Runway 19.

AS 2021 *Acoustics—Aircraft Noise Intrusion—Building Siting and Construction* shows a potential noise level at the dwellings of 88 dB(A) for B737 / A320 taking off to the south from a 2500m long runway.

For aircraft landing to the north and assuming the runway length is 2500m, the distance from the residences to the threshold would only be 800m. The potential noise from a B737 / A320 on landing at the location of residences is 97 dB(A).

On the other hand, for a 2000m runway length the peak noise on the extended runway centreline reduces to 92 dB(A) in the vicinity of the above dwellings.

This would suggest that, in the case of B737 and A 320 jets (i.e. Scenario 4), noise is a potential issue and a runway length greater than 2000m may not be viable.

5.4 Taxiway A

The existing width of Taxiway A is 15m. The required taxiway width is 18m for Code 3C aircraft except that this can be reduced to 15m in the case of aircraft with a wheel base of less than 18m. This applies equally to F100 and Q400 (Scenarios 2 and 3). Note Q400 is listed as Code 3D but CASA have granted a national exemption for the aircraft to be considered as Code 3C.

However for Scenario 3, it will be necessary for 3m wide compacted and erosion resistant shoulders to be provided. For Scenario 4, the Taxiway A seal will need to be increased in width to 18m.

Fillets from Runway 01 / 19 are adequate for larger aircraft.

5.5 Apron

The existing Apron can adequately cater for the aircraft parking needs for development scenarios 1 and 2.

In determining the apron width for Scenario 3 it has been assumed that it will be necessary to simultaneously and independently park 1 x F100, 1 x F50 or Q400 and 1 x PC12 aircraft. It has also been assumed that it will be necessary to design to ensure passenger protection from jet blast by providing appropriate clearances to limit exposure to 60kph maximum.

The outer (southern) edge of the Apron is considered by CASA as taxiway as it allows aircraft to traverse from one part of the aerodrome to another part. The taxiway strip width for Code C is 26.5m from centreline.

The minimum width of this combined taxiway / apron is required to allow for ½ taxiway width + taxiway strip width from centreline + aircraft wingspan + object clearance + walkway width. This equates to 9m + 26.5m + 28m + 4.5m +3m = 71m.

The width of the existing Apron from the fence to the outer southern edge is generally 68m decreasing to a minimum width of 63m towards the eastern end. Consequently, widening for Scenario 3 is required. In addition the western end of Taxiway A would need to be realigned slightly to line up with the new southern edge of the apron.

For Scenario 4, the required width of the apron would be even greater – by the increased wingspan of B 737 800 aircraft over the F100, that is, a further 12m. Consequently, an apron width of 85m has been adopted.

5.6 Indicative Design – Pavement & Seal

5.6.1 Existing Pavement Design

The design structure for the existing runway and taxiway pavements comprised:

- Surface 2 coat 10/7 bituminous spray seal.

- Base 100 - 150mm (min. thickness) blended crushed basalt and natural limestone gravel compacted to 98%MMDD.
- Sub-base 150 - 200mm natural limestone gravel CBR 35.
- Selected fill 220mm sand CBR 10 compacted to 96% MMDD.
- Sub-grade clay nominal CBR 6 compacted to a depth of 150mm to 95% MMDD

The original pavement design aircraft was the Fokker F27 with an all up weight of 20,000kg at a tyre pressure of 550kPa and a 15 year life design life.

5.6.2 Design Basis

Normally at the end of the design life, it is not expected that an existing pavement would require replacement or even tyning up and re-compacting. Certainly, there is no evidence that such radical treatment would be required anywhere on the Kingscote Runway 01 / 19. Accordingly, for the design of overlays for upgraded pavements a minimum CBR of 35 has been adopted for the existing sub-base pavement material (that is the material 150mm to 300mm below the existing surface level.

Similarly, for areas of new pavement, it has been assumed that the pavement structure will comprise a selected fill layer of CBR 10 sand, a sub-base of CBR 35 pit rubble and a base course (assumed soaked CBR of 60-80).

The following lists details the possible design aircraft and the required pavement thickness for the various CBRs in the existing pavement structure.

Aircraft	Max Weight kg	Tyre Pressure KPa	Pavement thickness mm on CBR 6	Pavement thickness mm on CBR 10	Pavement thickness mm on CBR 35	ACN (6)
BAe 146 2	40,600	880	593	436	175	24
B737 800	79,243	1413	797	568	270	51
Dash 8 400	29,347	972	510	370	160	18
EMB 190	50,460	1014	640	470	203	30
Fokker F27 F50	20,412	580	433	310	116	12
Fokker F100	44,680	980	655	483	196	30

NOTES

Pavement comprises subgrade CBR 6, sub-base CBR 10 and base CBR 35

Design thickness based on 1200 annual departures

COMFAA assumes BC surface layer (not used in Australia other than heavy jet pavements)

For heavy aircraft 75mm BC surface layer at 1.5 equivalency, 38mm added to COMFAA result

5.6.3 Indicative Pavement Thickness and Surfacing Treatments

New Pavements

Based on the above requirements, the adopted design for new pavements (i.e. runway lengthening and widening) for the future airport development scenarios are as set out in Table 5-1:

Table 5-1 New Pavement Thicknesses

	Pavement Course Thicknesses (mm)		
Development Scenario	2	3	4
Design Aircraft	Bombardier Q400	Fokker F100	B 737-800
Select Fill (CBR 10)	150mm	180mm	230mm
Sub-base (CBR 35)	220mm	330mm	270mm
Base	150mm	150mm	300mm
Total	520mm	660mm	800mm

Overlay Section

Again based on the above requirements, the adopted design of the overlay thickness for those existing pavement areas in need of strengthening under the future development scenarios is as follows:

Scenario 2: Nil requirement (because the existing base appears sound and there is adequate thickness over the existing CBR 35 sub-base material).

Scenario 3: 150mm

Scenario 4: 300mm

Note that these thicknesses are the same as the base course thicknesses for the respective development scenario – a decision made in the interests of construction convenience.

It has also been assumed that existing pavements to be overlaid would have the existing bitumen surfacing removed or pulverised and mixed into the base material immediately prior to the placement of the overlay course.

In relation to Scenario 2, where no overlay is proposed over the existing pavements, it is assumed (and recommended) a program of close monitoring will be implemented to assess the performance of the existing pavement sections once the Q400 aircraft commence operations.

Surfacing Proposals

It is envisaged that a multi-coat bituminous spray seal (10mm / 7mm) would be provided for Scenarios 2 and 3, but a final sand / emulsion coat would be required for the latter. This is a common norm for airports of this standard in Australia.

However, for Scenario 4, a 40mm thick asphaltic concrete surfacing layer with maximum aggregate size of 14mm has been assumed. There are a few examples in Australia of where mainline jet aircraft have operated from spray sealed runways, but such instances are rare and are usually only a short term situation.

Scenarios 3 and 4 will both require a sealed surface extending beyond each runway end for at least 15m as blast protection.

Taxiway A and Apron

Pavement and surfacing requirements for these areas for each Scenario 2, 3 and 4 will be the same as that proposed for Runway 01 / 19 in the respective scenario.

Grooving – AC Surfaces

For the AC surfacing adopted for the Scenario 4 design, it is also assumed that grooving will be required on Runway 01 / 19 to ensure adequate skid resistance for the safe operation of B 737 aircraft.

5.7 Operational Considerations

The following operational considerations have been assumed for all airport development scenarios:

- Runway End Safety Area 90m x 60m wide at each end of runway strip
- Approach surface 150m inner edge 15% splays cleared to below 2% to NPA
- Take off surface 180m inner edge 12.5% splays, cleared to below 2%
- Transitions 1 in 7 clearance from 150m runway strip edge clear to height 45m.

5.8 Navigational Aids and Lighting

It is assumed that for Scenarios 2, 3 and 4, Runway 01 / 19 would be required to cater for non-instrument approach by Code 3C and Code 4 aircraft.

However, there are existing NDB and GPS systems already available for instrument approach operation.

The airport is equipped with wind direction indicators. The existing illuminated wind direction indicator (IWDI) will be retained for all development scenarios. However, a new unlit wind indicator will be required at the southern end of Runway 01 / 19 for each of Scenarios 2, 3 & 4, as that runway is extended further south.

There is no formal requirement for slope guidance for Scenarios 1, 2 or 3, but given the use of existing A-TVASIS this would be retained. However, the facility at each end of Runway 01 / 19 will need to be relocated for each of the Scenarios 2, 3 and 4 (because the position of the runway ends will be altered).

Regrettably, this system is an obsolete one and spare parts are now becoming increasingly difficult to procure. It is therefore proposed that for all scenarios the existing A-TVASIS system be replaced with an A-PAPI system to design aircraft wheel clearance over threshold.

Runway 01 / 19 is equipped with runway lights. Those on the sides are required to be installed at an even 60m spacing and hence the recent installation needs to be extended for Scenarios 2, 3 and 4. In addition, the threshold lighting will need to be relocated to suit the new runway end locations.

5.9 Refuelling Facilities

Fuel is currently not available at Kingscote Airport. Presumably the existing RPT operator has determined that it is more economical for its flights operating from Adelaide to rely on the facilities there.

However, for longer flights from Kingscote – such as those implied in future development Scenarios 2, 3 and 4 – the economic imperatives are likely to change, and refuelling facilities are likely to be required. Such facilities could be provided by the airport operator (Kangaroo Island Council), by the operator of the future longer range flights, or by a third party.

In this Study, allowance has been made for the capital cost of establishing a fuel storage and dispensing facility, complete with impervious bunds to prevent accidental discharge to the environment. The assumption implicit in such allowance is that the facility would be owned by Council and located on airport land, which would avoid the need for sub-lease arrangements. It has also been assumed that Jet A1 fuel only (suitable for turbo-prop and light jet use) would be available from this facility - not all types of aircraft fuel.

Without knowledge as to neither the demand patterns for aviation fuel, nor the frequency of re-supply (assumed to be via B-double road tanker from Adelaide via the ferry) sizing the on-site storage facility must involve some conjecture. For the purposes of this study, it is assumed that a similar unit to that recently contemplated for the Prominent Hill airport would suffice at Kingscote Airport. This comprises:

- 55,000 Litre Jet A1 self contained, above-ground, horizontal storage tank. The tank construction consists of a steel outer tank wrapped around a steel inner tank with interstitial space between the two tank faces. (This dual skin arrangement avoids the need for bunding).
- Jet A1 bridging receipt facility.
- Transfer pump, filter, water separator unit, and valves.
- Separate Jet A1 dispensing station comprising of filter monitors, flow meter, hose reel and aircraft loading hose/nozzle.
- Electrical switchboard.
- Quality control shed.

The 36m maximum allowable flexible hose length means that only one aircraft park position could be serviced by this re-fuelling facility. If more than one aircraft required fuel, it would be necessary to shift aircraft around. Alternatively, it would be necessary to increase the investment and provide some fixed, buried delivery reticulation piping to another aircraft parking area and a second flexible hose. The Study makes no allowance for such additional investment.

Finally, no allowance has been made in this Study for any operating cost or depreciation for the facility. It is assumed that such ongoing costs would be balanced by any profit made in the sale of such fuel, resulting in a financially neutral situation.

6 Terminal Building

6.1 Description of Existing Building

The existing terminal building at Kingscote Airport is a single storey building approaching 30 years in age. It has an internal floor area of approximately 330 square metres. Verandas on all sides of the core building do provide significant additional usable space.

A drawing depicting the floor plan of this existing building is presented in Appendix A.

The terminal building incorporates a single, common arrivals / departure lounge, with no means of incorporating a secure, "sterile" area necessary if departing passengers and their hand luggage are to be X-ray screened in future. Baggage handling facilities (both make-up and reclaim) do not comply with current practice. There are no checked-in baggage screening facilities.

The structure contains only modest toilet facilities and offices for airline operators, car hire companies, etc. There is no café or even a kiosk facility.

6.2 Need for Passenger and Baggage Screening

Current federal legislation relating to security screening of RPT airline passengers and their baggage is based on the gross weight of the aircraft operating the service. At this stage security screening is required for passengers and their baggage if the gross weight of the RPT aircraft is in excess of 20 tonnes. These requirements came into effect from 1 July 2012.

No exemptions have been granted to this requirement by the authority concerned.

This means that, if there is any upgrading of service to Kingscote Airport along the lines of future development scenarios 2, 3 and 4, passengers and their checked-in luggage will need to undergo security screening.

This fact will be a primary driver for the expansion of the Kingscote airport terminal building. Clearly, there will be other drivers such as a need cater for increased passenger numbers as well as the imperative to make the facility as contemporary as passengers would expect.

6.3 Building Spatial Requirements for Future Development Scenarios

An estimate of the spatial requirements for the various components of a terminal building has been prepared for each Scenario 2, 3 and 4. This has been based on commonly used design parameters within the industry. It allows for the design aircraft for a particular Scenario to be on the ground simultaneously with a Saab 340 aircraft which provides the current service from Adelaide, with passengers embarking on and disembarking from both planes in the same relatively short time span. It also allows for the available seats on both planes to be 80% occupied on both arrival and departure.

Other design parameters / assumptions include:

- Space adjacent to the check-in counters needs to cater for 40% of departing passengers at 2 m^2 each, 50% of whom have an accompanying friend at 1.5m^2 each.
- An additional 10% of the gross area thus derived is allowed for circulation space.
- The baggage make-up area will require 2m^2 per departing passenger.
- The secured gate lounge will require 1.5m2 for each departing passenger, plus 1m2 for a friend for 30% of the departing passengers.
- An additional 20% of the gross area thus derived is allowed for circulation space.
- The baggage reclaim area will require 1.2m2 per arriving passenger, plus 1m2 for a friend for 30% of the arriving passengers.

- An additional 20% of the gross area thus derived is allowed for circulation space.
- The arrivals hall will require 1.25m2 for each arriving passenger, plus 1m2 for 30% of each of the arriving passengers.

Clearly, spatial allowance also needs to be made for other facilities such as offices for the airport manager, each air service operator and car hire companies; other concessions; café and alfresco; toilets; plant rooms; interview rooms, etc.

This estimate of the spatial requirements is presented in Table 1 in Appendix C. The right hand column shows - for comparative purposes only – the intended spatial provisions being provided in the new Port Lincoln Airport terminal building. Discussion on this point is provided in Section 6.4.4 hereunder.

6.4 Building Floor Layout Proposals

6.4.1 Scenario 1

It has been assumed that for Scenario 1 the terminal will continue to function as it currently does. This implies that no cost, other than ongoing maintenance and incidental costs, will be required as part of this scenario.

6.4.2 Scenario 2

The design aircraft for this scenario, the Dash 8 400, can seat up to 78 passengers. The existing terminal caters for aircraft of capacity of 36 passengers. In addition, and as discussed in Section 6.2, scenario 2 will require security screening of passengers and their luggage. To provide a facility that functions efficiently and effectively the terminal will be need to be significantly expanded.

A proposed terminal layout can be seen in Figure 5 in Appendix B. This layout makes provision for an incoming (or outgoing) Dash 8 400 as well as an outgoing (or incoming) SAAB 340. This equates to a total of 114 passengers.

This layout aims to retain as much of the existing terminal as possible to minimise costs. The current terminal is most predominantly constrained to the north, with car parking and major services infrastructure being located to the northern side of the terminal. To the south is the apron, and to the east is bus parking. With the expanded terminal it will be likely that bus parking will become increasingly important.

A grassed reserve is located to the west of the terminal and is a logical space into which to expand the terminal building. The space currently has a number of services which would require relocation. These include a fire hydrant and associated stop valve and fire hose reel, and two water taps. These can be relatively easily relocated.

It is proposed that the majority of the existing terminal will become the arrivals lounge. The existing hire vehicle desks, offices and toilets can all be maintained and their use can be maintained. The Rex check-in desk will need to be relocated to the departure lounge to ensure efficiency. The existing check-in desk area can be for additional supplier desks and kiosk. External space adjacent to the kiosk could also be used as an outdoor eating area.

The new area will comprise of a departure lounge and check-in area. An entry / exit door will be provided for this area from the northern roadway. Adjacent to the check-in area is the passenger screening, which will lead into the secure lounge with an associated air lock. A set of toilets will be provided within the secure area to reduce the number of people entering and exiting this area.

A baggage screening area is also provided. An area is provided outside the baggage screening area for loading onto a vehicle for the baggage to be transferred to the aircraft. This area will need to be fenced and secured from the public space.

A kiosk has been provided between the existing and new terminal areas.

The floor space provided by this layout roughly equates to the estimated requirement shown for Scenario 2 in Table 1 in Appendix C.

The new terminal as detailed in Figure 5 in Appendix B will extend south and will require the existing security fence delineating the apron to be shifted south by approximately 5.5 metres.

6.4.3 Scenario 3

The proposed terminal layout is very similar to the Scenario 2 layout discussed above but with an additional area of 95m^2 in the arrivals hall and an additional 90m^2 under-roof baggage reclaim area. The area between this extended arrivals hall area and the secure lounge could potentially be used as an extension to the kiosk.

These “additions” to the Scenario 2 proposals are also depicted in Figure 5 in Appendix B.

Similarly to scenario 2, the layout makes provision for an incoming (or outgoing) Fokker 100/70 as well as an outgoing (or incoming) SAAB 340. This equates to a total of 143 passengers. The details of the calculated space can be seen in Section 6.3.

The new terminal will extend south as with scenario 2 and will require the existing security fence delineating the apron to be shifted south by approximately 5.5 metres.

6.4.4 Scenario 4

The design aircraft for this scenario, the Boeing 737, can seat up to 170 passengers.

The estimated spatial requirements for Scenario 4 as shown in Table 1 in Appendix C are very close to actual size of the new terminal building currently under construction at the Port Lincoln Airport. (Refer to the right hand column in that Table). The floor plan and elevations and the construction cost for that new building is set out for public consumption on the District Council of Lower Eyre Peninsula web site, along with the Business Case Report for that project.

Accordingly, no attempt has been made in this Study to prepare a terminal building layout for Scenario 4. The publicly available information would appear to be directly relevant to Scenario 4 in this present Study.

It is most likely that due to current site constraints to the north and west that the terminal will expand to the west and to the south. This will require additional apron augmentation works as well as relocating the existing helicopter pad and removal of the abandoned control tower. Fencing will also be required to be relocated.

Figure 6 in Appendix B depicts the approximate dimensions of the Port Lincoln Building over the site for the existing Kingscote Airport terminal building. This gives a comparison of the relative sizes of the existing building and the apparent terminal requirement for Scenario 4.

However, because the existing building would need to continue to operate efficiently whilst the new building was being constructed, a more practical siting would be clear of, and to the west of, the existing terminal building. Some protrusion onto the existing Apron area would be implied, and this fact has been reasonably accounted for in the Scenario 4 apron design and capital cost estimate.

7 Landside Facilities

7.1 Car Parking

7.1.1 Description of Existing Facilities

The existing car parking facility is located to the north of the terminal. Tonkin Consulting undertook a car park layout design in 2010 for the Kingscote Airport. This layout is shown in Appendix A. It is understood that at the time of writing this report the majority of the upgrades associated with this layout had been completed with the intention of completing the remaining upgrades in the near future.

The public entrance is from Arranmore Road and the facility is split into three distinct areas. The most eastern area is reserved for bus parking and access. At present, five formally marked bus parks are available.

The central area provides five bays of nine 60-degree angle parks and one bay of six standard 60-degree angle parks and two 60-degree disabled parks, totalling 53 parks. At present this is the area most used for parking as it provides the closest parks to the terminal entrance. Two zebra crossings provide safe access between the parking area and the terminal.

The most western area consists of five bays of 25 No. 90-degree parks, totalling 125 parks.

A ring road surrounds the parking area.

Lighting of the existing car park exists and is deemed to be sufficient.

Through discussions with current airport management and from visual inspection it is apparent that the current car parking facility is significantly under-utilised. Current users of the car parking facilities are generally confined to local users and hire car parking. At present the majority of tourists utilise a third party for transport, either by bus or by an eco-tour with a driver picking them up upon arrival.

7.1.2 Future Car Parking Requirements

As mentioned previously it is apparent that the existing car parking facilities are significantly under-utilised. The current facility has a total of 178 car parks currently available for public car parking, including two disabled car parks. It is intended that hire cars for pick up will also use the parking available in this facility.

Determination of future car park needs requires some conjecture as to the likely vehicle use of the passengers arriving on the larger flights from interstate. The vast majority of people arriving by interstate flights are likely to be tourists and will therefore require transport via one of the following methods:-

- Hire car;
- Tourist coach;
- Eco Tour Vehicle (private tour guide);
- Picked up by a friend.

The final option of being picked up by a friend is considered to be of minimal likelihood in comparison to the other three options. Therefore the requirements for upgrading the parking facility needs to consider these three options individually as they each have different requirements for parking.

7.1.3 Parking for Eco-Tour Vehicles

It is anticipated that a large number of tourists travelling from interstate are likely to be met by private tour guide in a regular vehicle, most likely a four wheel drive. Potential exists for a trailer in these types of tours. These tourists will be picked up at the terminal by their guide.

A tour operator will require short term parking with relative ease for loading of baggage into the vehicle or trailer. As the facility currently exists, the western area is the most logical place to park a vehicle with a trailer as it provides two 90 degree parks end to end. A number of parks in the southern-most bay could be reserved for 'trailer parking' if required.

It is expected that the number of vehicles utilising trailers will be limited, so the main focus will be on single vehicles requiring short term parking. It is recommended that short term parking should be located as close as practically possible to the area being accessed, with longer term parking utilising the furthest parks. The closest available parks to the proposed upgraded terminal exit are the parallel parks adjacent the terminal, followed by the angle parks in the central area.

The parallel parks adjacent to the terminal would most logically be reserved for pick up where the driver is not required to leave the vehicle. This would most likely be used by taxis or by locals arriving home or people being picked up by locals. In the case of the eco-tours it is likely that the tour operator will meet and greet their clients within the terminal, so it is therefore not recommended that the parallel parks be used for this purpose.

Instead it is recommended that the angled parks would be the most suitable parks for the eco-tour guides travelling without a trailer, as well as short term pickup where drivers are leaving their vehicles.

Safety must be a priority when considering any parking facility. Two zebra crossings exist outside the existing terminal entrance to the terminal. This is deemed to be sufficient given for ongoing use.

Tourist Coaches

As previously mentioned the existing facility includes five parks for coaches or buses in the eastern area. Buses enter through the main public entrance from Arranmore Road. They then make a left turn into the entrance to the bus parking area. Through discussions with airport management it appears that buses and coaches of all sizes currently utilise these parks, and it is rare for all parks to be used concurrently. The bus parks will generally only be used for a relatively short time when an aircraft lands.

Given the projected numbers of increased tourists arriving from interstate on aircraft of passenger capacity of 78, 107 or 170 it is very likely that the number of buses arriving simultaneously is going to increase. However it is not expected that more than five buses will be a regular event. Furthermore, if the parks were reserved for buses of a certain minimum capacity, say 24, the smaller buses could utilise the parks in another area. Similarly to the eco-tours, two 90 degree parks end to end could be converted to provide parking for the smaller buses.

To cater for the rare occasion where more than five large busses are present a holding zone could be implemented. This would involve marking an area for a bus to wait until a park became available. Based on the current layout it is expected that four coaches could wait in the existing bus area access road without disrupting any other traffic. Some busses could also park behind occupied bus bays, although it is acknowledged that in doing so they would not be free to leave until the bus parked in front of them leaves.

Hire Cars

Through discussions with airport management the number of hire cars parked at the airport during peak season is approximately 30 vehicles. This large number is partially attributable to the fact that these companies do not have alternative depots or bases as is more commonly the case in other centres.

This situation will require monitoring by Council as the number of visitors to the Island arriving by air increases, and the associated demand for hire cars to be collected and dropped off at Kingscote Airport rises.

7.1.4 Additional Car Parking Proposals

Based on the existing level of car park use it appears that the existing car parking facilities could be better utilised to improve efficiency. It is believed that no significant upgrades to the existing car parking facilities are required, other than minor road marking and signage augmentation.

7.2 Infrastructure Services

7.2.1 Electricity

Electricity is currently provided to the site from Arranmore Road. A transformer is located in a section of the reserve opposite the existing terminal entrance. Current electricity demands of the site are unknown however it has been assumed that scenarios 2, 3 and 4 will require a new transformer to provide adequate supply. Increased electrical demands will be due to:-

- Increased electrical demands inside the upgraded terminal;
- Increased lighting for the upgraded runway;

An amount for a new transformer has been allowed for each of Scenarios 2, 3 and 4. However, no contact has been made with SA Power Networks to establish whether there is a need for upstream headworks, and whether a capital contribution would be sought.

7.2.2 Water Supply

The site is currently supplied by a 32mm water meter at the north-western corner of the site. In addition, there is apparently a separate fire service (since there are existing fire mains and fire hydrants adjacent to the terminal building), although the size of this main has not been established.

The peak water demands of the site should not be significantly increased by the upgrade. Increased water demands will be due to:-

- A second set of toilets and higher use of toilets;
- Extra lighting associated with the increased floor area of the building
- New kiosk area (cold rooms, refrigeration, cooking equipment, etc.);

Perhaps a more significant issue would be fire-fighting demands, should the larger future terminal building require sprinklers in line with Building Code of Australia. However, it is expected that the existing fire service could adequately serve that type of system.

It is not anticipated that the water supply infrastructure to the site will be required to be increased. If necessary, an option for ensuring a constant source of potable and / or fire water in future would be to have on-site storage tanks and booster pumps arrangement. The tank would be filled from the existing mains supply during low demand periods. Instantaneous water demands for the new terminal would be drawn from the on-site tank by the booster pump.

On this basis no allowance has been made for upgrades to the water supply infrastructure.

7.2.3 Liquid Waste Disposal

The liquid waste from the terminal is currently disposed of to a septic tank. This has a liquid overflow tank located in the fenced off area at the north eastern edge of the car park facility adjacent to the bus parking area access road. This empties into a soakage trench to the north.

The new toilets and kiosk areas would most likely require a either a separate septic system, or the current system would need to be upgraded to allow for the additional volume of liquid waste being produced within the terminal.

An amount has been allowed for either the upgrade of existing system, or provision of a separate system. This amount differs for each option as the size of the septic tank and associated infrastructure will vary based on the number of predicted users.

7.2.4 Communications

The existing terminal has adequate communications for operating as an airport terminal. A larger terminal building may require additional phone and data lines. It is assumed that these would be applied for through Telstra in the normal way, and that no unusual capital contribution would be sought by that authority.

A communications tower is located to the west of the existing terminal and is clear of the proposed footprint of the upgraded terminal. It is not foreseeable that the communications infrastructure will require to be upgraded as part of Scenarios 2, 3 or 4 and therefore no allowance has been made for this.

8 Capital Costs Estimates

8.1 Introduction

Based on the findings of the previous sections of this report a cost estimate has been produced for each of the four scenarios. The cost estimates show the capital costs of the work assuming that the works are not to be staged, i.e. Stage 2 does not lead into Stage 3, rather the capital cost estimates for both scenarios 2 and 3 are based on upgrading the existing infrastructure to that design option. In addition a summary of anticipated annual costs have been presented for budgeting purposes.

8.2 Methodology

8.2.1 Development Scenario 1

Scenario 1 does not include any capital expenditure, and as such no construction cost estimate has been produced. Maintenance costs and depreciation values have however been presented. The maintenance costs are based on Kangaroo Island Council's current maintenance spending of the airport. Depreciation values are based on Tonkin Consulting's Kingscote Airport Infrastructure Valuation Report produced in October 2009 (Ref: 20080694RA2-B).

8.2.2 Development Scenarios 2 – 4

Scenarios 2, 3 and 4 have each had a construction cost estimate produced. Quantities for new infrastructure are based upon the layouts produced as part of this report. Quantities of existing infrastructure (such as existing runway pavement thickness) have been taken from historic documents and on site investigations.

Unit rates have been compiled from a number of sources. Various rates have been made available through Tonkin's previous Kangaroo Island Council asset management work. Other rates have been specifically sourced as part of this report. Where no other means for sourcing rates was available Tonkin Consulting has used rates obtained through similar projects. An appropriate 'KI Factor' has been added to these rates to cater for the provision of services and/or materials on Kangaroo Island as opposed to the main land.

A contingency of 12.5% has been included as part of the calculations, as "brown-field" construction projects inherently have unforeseen costs. In addition, given the nature of these estimates being based on concept designs it is more likely that unforeseen costs could be revealed during construction.

8.3 Summary of Costs for Each Development Scenario

Table 8-1 shows a summary of the capital expenditure costs for scenarios 2, 3 and 4.

Table 8-1 Capital Cost Summary for Scenarios 2, 3 and 4

Item	Scenario 2	Scenario 3	Scenario 4
Preliminaries	$615,000	930,000	$2,015,000
Site Preparation and Earthworks	$71,666	$401,864	$1,065,278
Stormwater	$134,712	$634,112	$634,112
Pavement	$2,436,900	$5,850,284	$15,956,578
Lighting	$362,800	$544,300	$584,300
Terminal	$3,917,250	$4,492,125	$8,804,000
Design Fees	$400,000	$600,000	$1,450,000
Total (Excluding GST)	***$7,938328***	***$13,452,685***	***$29,924,967***

Item	Scenario 2	Scenario 3	Scenario 4
Contingencies (12.5%)	*$992,291*	*$1,681,586*	*$3,740,621*
Total (Including Contingencies)	*$8,930,620*	*$15,134,271*	*$33,665,588*
GST (10%)	*$893,062*	*$1,513,427*	*$3,366,559*
CITF Levy (0.25%)	*$24,559*	*$41,619*	*$92,580*
Total (All Inclusive)	***$9,848,241***	***$16,689,317***	***$37,124,727***

A more detailed breakdown of these costs can be seen in Appendix D.

As expected that major items for all scenarios are pavement upgrade and terminal upgrade.

8.3.1 Basis for Capital Cost Estimates

The capital cost estimates above and further detailed in Appendix D are expressed in October 2012 Australian dollar terms. They include 10% GST. They are based on current, known statutory requirements, and on the latest versions of Standards Australia publications.

No allowance has been made for extraordinary circumstances, such as excavation in rock, controlling and disposing of groundwater inflows, dealing with contaminated soils, etc.

Judgements have been made as to down-time and inefficiency associated with dealing with air traffic during construction of airside works. Allowance has been made in the estimates for the terminal building extension for Scenarios 2 and 3 for maintenance of safe and efficient operation of the existing building whilst the extension are being constructed.

8.3.2 Scenario Cost Comparisons

As mentioned previously the scenarios have not been staged, i.e. Scenario 2 does not precede the construction of Scenario 3. However this section provides some discussion on the feasibility, when constructing Scenario 2, of increasing the standard of that work so that it would also meet Scenario 3 needs. The benefit of such consideration is the avoidance of future re-work and wastage, should it be decided to further upgrade the airport at some future time. For instance, consideration could be given to constructing the scope of pavement work required for Scenario 2 to the higher Scenario 3 standard. If it was decided in future to further upgrade the airport to cater for Scenario 3, the work then would comprise the necessary scope extension only, and there would be no need to re-work that undertaken previously for Scenario 2.

A similar logic could be applied between Scenarios 3 and 4 pavement requirements. This logic would be more difficult to put into practice for the terminal building. Rather, it is more likely that consideration be given to constructing a larger building that actually required for a particular scenario. For instance, consideration could be given to constructing the Scenario 3 terminal building at the Scenario 2 development stage.

Table 8.2 below sets out the proposed pavement construction for each development Scenario, and the associated per square metre cost of new pavements. It also shows overlay requirements (over the existing pavement), and their per square metre cost.

Table 8-2 Pavement Element Comparison (All prices exclusive of GST, contingencies, etc.)

Item	Scenario 2	Scenario 3	Scenario 4
Sand Layer	150mm	180mm	230mm
Sub-base layer	220mm	330mm	270mm
Base-course layer	150mm	150mm	300mm
Cost of new pavement (per sqm)	**$49.00/sqm**	**$62.40/sqm**	**$75.40/sqm**
Overlay layer	Nil	150mm	300mm
Cost of overlay layer (per sqm)	**$0.00/sqm**	**$15.00/sqm**	**$30.00/sqm**

In short, no overlay is required over the existing pavement to cater for development Scenario 2 – merely a new bitumen surface. An additional 150mm thick pavement course would need to be constructed on the Scenario 2 pavements to cater for Scenario 3. This additional cost would amount $1,052,000 excluding GST, but the only savings in such early investment would be avoidance of the loss of the initial bitumen seal. The cost of the seal would be approximately $800,000 excluding GST, but if it is near the end of its service life its effective value at the time of the upgrade to Scenario 3, the effective "loss" would be much less than that and possibly effectively zero.

Consequently, there appears to be no financial benefit in constructing pavements suitable for Scenario 3 now when development scenario 2 is being adopted as the proposed strategy. A similar conclusion can be reached in relation to providing pavements suitable for Scenario 4, when the adopted strategy is Scenario 3.

In relation to the terminal building, it will be seen from the capital cost estimates that provision - at the Scenario 2 development stage - of a building over-sized so as to cater for a future upgrade of the airport to Scenario 3, would involve an early investment of approximately $700,000. In addition, there would a small penalty associated with increased annual cost associated with the larger building.

8.4 Annual Costs

Annual costs will consist of both the cost of maintaining the airport infrastructure, the depreciating value of the assets that make up the airport, and other ongoing costs that will apply to the running of the airport. For the purposes of this report no allowances have been made for the provisions of services or utilities.

8.4.1 Maintenance Costs

In addition to capital costs, the maintenance costs for each scenario (including Scenario 1) have been considered. These are summarised in Table 8-3.

Table 8-3 Summary of Maintenance Costs

Item	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Runway Pavements	$11,500	$12,800	$16,200	$26,300
Apron Pavements	$2,500	$2,700	$2,700	$3,000
Stormwater	$2,000	$3,000	$3,000	$3,000
Terminal	$37,500	$151,000	$162,500	$306,900
Lighting	-	$5,000	$6,800	$8,100
TOTAL	**$53,500**	**$173,500**	**$190,200**	**$346,300**

It should be noted that maintenance costs have only been allowed for items of infrastructure that have been included as part of the upgrades. Therefore maintenance for infrastructure such as

the unsealed runways has not been included in these estimates as no upgrade of these has been considered.

The Scenario 1 maintenance costs have been obtained directly from Kangaroo Island Council and reflect the current budget for maintenance on the relevant pieces of infrastructure at the existing airport.

To obtain the estimates for Scenarios 2, 3 and 4 the existing maintenance budget has been proportionally applied to the increased size of the upgraded infrastructure. For example, the existing maintenance budget for the Scenario 1 terminal is $37,500. The terminal for Scenario 2 is approximately four times larger (in terms of floor space) and therefore the budget for maintenance has been assumed to be four times that of the existing budget.

The dollar values applied to the maintenance costs for each scenario are in current day value and have not taken into account inflation over time, nor have they made allowance for major replacements.

8.4.2 Depreciation Costs

The cost of annual depreciation of the airport assets can be calculated by defining the current value of all assets and the remaining useful life of those assets. For Scenario 1, this information has been obtained from a Tonkin Consulting investigation into asset valuation of the Kingscote airport.

For Scenarios 2, 3 and 4 these values have been calculated by dividing the capital cost of the upgraded assets defined as part of this study by the design life of these assets. In addition, the design life of existing assets has been adjusted to suit their particular situation post-construction (e.g. the useful life of an existing top pavement layer can reasonably be extended where it is to be overlaid). Scrapped assets have been have had their value written off.

The following design life has been assigned in these depreciation calculations to the various new assets below:

- X-ray screening equipment 20 years
- The re-fuelling facility 30 years
- Humeceptor for re-fuelling apron 50 years
- Scenario 2 spray seal 15 years
- Scenario 3 spray and emulsion sand seal 15 years
- Scenario 4 hot mix surface 25 years
- New base course layers 50 years
- New sub-base layers 100 years
- Existing pavements beneath overlays 100 years

Table 8-4 shows the estimated annual depreciation costs in present day values for each scenario as part of this study.

Table 8-4 Annual Depreciation Values

Scenario	Annual Depreciation Value
Scenario 1	$271,289
Scenario 2	$479,763
Scenario 3	$547,384
Scenario 4	$947,896

8.4.3 Security Screening Costs

In addition it is estimated that an annual running cost of $800,000.00 would apply for the upgraded security screening for Scenarios 2, 3 and 4. This value is based on the assumption that six personnel will be required for an average of four hours per day (2 outbound flights and manning required for 2 hours for each flight), 365 days per year to run the security screening process. At an estimated $80 per hour, this equates to approximately $700,000.00 per year, with an allowance for an additional $100,000.00 per year for annual incidental costs associated with the screening process (e.g. equipment servicing and calibration, training of new personnel, etc.).

This annual value is consistent with the anticipated cost (informally advised) to operate these passenger and baggage screening services at Port Lincoln Airport costs of a newly installed screening process.

8.4.4 Annual Costs Summary

When combined with the maintenance costs associated with each corresponding scenario as well as the running costs of the security screening process, Table 8-5 shows the estimated total annual cost of the airport for each scenario.

Table 8-5 Total Annual Costs

Scenario	Total Annual Costs
Scenario 1	$ 334,789
Scenario 2	$1,453,263
Scenario 3	$1,537,584
Scenario 4	$2,094,196

8.5 Anticipated Cash Flow

Irrespective of the Scenario adopted, it is feasible for the construction of the upgrade project to be undertaken in a single financial year. Generally favourable weather conditions could be expected between 1 October and 31 May. Also, there is no reason why the airside facilities and the terminal building construction could not take place concurrently.

However, that implies that all design work would have been completed in the previous financial year, and possible some commitment would be made to preparatory works. This could equate to 10% of the total project value.

In addition, all construction work would be subject to a 12-month defects guarantee, possible amounting to 5% of the total project value. This portion would not have to be expended until the year following construction.

In summary, project cash flow is likely to be spread over 3 years as follows:

- Year 1 Design and Preparatory Works 10% of total project cost
- Year 2 Construction 85% of total project cost
- Year 3 Defects Guarantee Period 5% of total project cost

8.6 Local Expenditure Proportion

It was assumed that scenarios 2, 3 and 4 were of significant enough size that a major civil contractor from the main land would most likely be awarded the contract. Therefore the majority of the wages would not be retained on the Island.

Table 8-6 on the following page shows a summary of the spending for each of these scenarios both on and off Kangaroo Island. These costs are inclusive of GST and contingencies.

The following items summarise which costs were believed to be completely local expenditure:-

- Supply of sand material;
- Supply of pavement material (excluding rock for spray seals and hot-mix seals);
- Contractor employee accommodation and meals.

Table 8-6 Summary of Spending Breakdown

	Island Spending	Mainland Spending	% of Total Spending Retained on KI
Scenario 2	$677,566	$9,170,675	6.9%
Scenario 3	$2,836,087	$13,853,230	17.0%
Scenario 4	$7,918,284	$29,931,322	21.3%

From Table 8-6 it can be seen that as the size of the upgrade increased, so does the local spending. This is largely due to the increased size of the runway and thus the increased volumes of pavement material required for these scenarios. In addition it should be noted that the larger projects will also require a longer construction period and/or more contractors. This means that local spending on accommodation and food will also increase during the construction period.

The foregoing analysis almost certainly under-estimates the Kangaroo Island component of the project cost. It is highly likely that Adelaide based contractors would make some use of local labour, plant and subcontractors. Not all activities would require highly skilled or specialised resources. However, it is difficult to quantify this additional local content. Some assumptions in this regards could reasonably be made during the economic analysis, but no guidance is able to be offered herein.

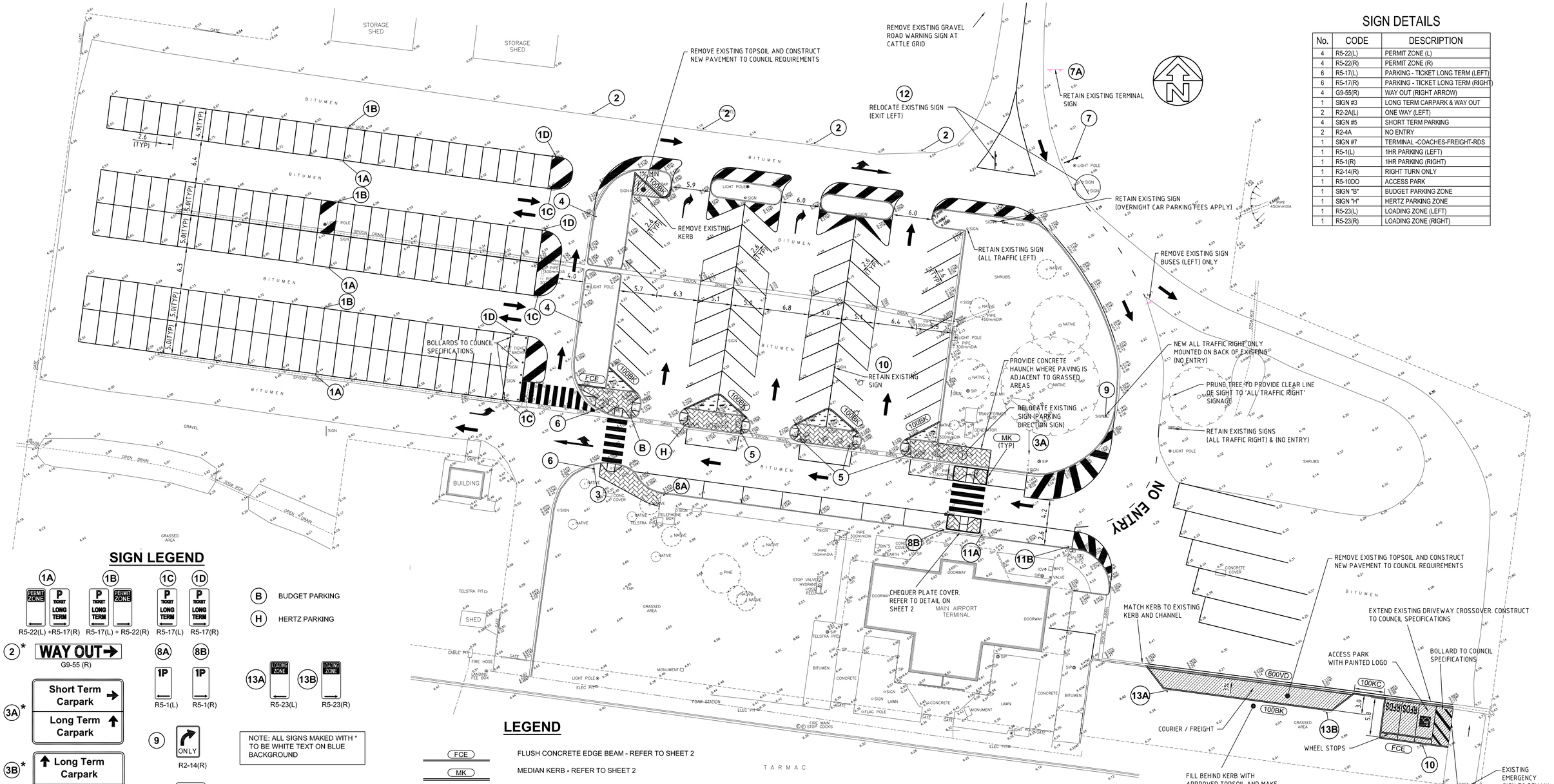
Appendix A

Kingscote Airport – Current Infrastructure

Airport Master Plan

Existing Terminal Building

Landside Facilities



SIGN DETAILS

No.	CODE	DESCRIPTION
4	R5-22(L)	PERMIT ZONE (L)
4	R5-22(R)	PERMIT ZONE (R)
6	R5-17(L)	PARKING - TICKET LONG TERM (LEFT)
6	R5-17(R)	PARKING - TICKET LONG TERM (RIGHT)
4	G9-55(R)	WAY OUT (RIGHT ARROW)
1	SIGN #3	LONG TERM CARPARK & WAY OUT
2	R2-2A(L)	ONE WAY (LEFT)
4	SIGN #5	SHORT TERM PARKING
2	R2-4A	NO ENTRY
1	SIGN #7	TERMINAL -COACHES-FREIGHT-RDS
1	R5-1(L)	1HR PARKING (LEFT)
1	R5-1(R)	1HR PARKING (RIGHT)
1	R2-14(R)	RIGHT TURN ONLY
1	R5-10DO	ACCESS PARK
1	SIGN "B"	BUDGET PARKING ZONE
1	SIGN "H"	HERTZ PARKING ZONE
1	R5-23(L)	LOADING ZONE (LEFT)
1	R5-23(R)	LOADING ZONE (RIGHT)

SIGN LEGEND

1A, 1B, 1C, 1D — R5-22(L) + R5-17(R); R5-17(L) + R5-22(R); R5-17(L); R5-17(R)

B — BUDGET PARKING

H — HERTZ PARKING

2* — WAY OUT → (G9-55 (R))

8A, 8B — R5-1(L), R5-1(R)

13A, 13B — R5-23(L), R5-23(R)

3A* — Short Term Carpark → / Long Term Carpark ↑

3B* — ↑ Long Term Carpark / WAY OUT →

9 — ONLY (R2-14(R))

NOTE: ALL SIGNS MAKED WITH * TO BE WHITE TEXT ON BLUE BACKGROUND

4 — ONE WAY ← (R2-2A(L))

5 — P SHORT TERM

10 — ACCESS PARK (R5-10DO)

6 — NO ENTRY (R2-4A)

11A, 11B — R5-22(L), R5-22(R)

14* — EMERGENCY SERVICES ENTRANCE / KEEP CLEAR / VEHICLES WILL BE TOWED

7* — Terminal ↑ / All Coaches / All Freight RFDS

7A* — Terminal ↑

12* — ← EXIT

LEGEND

- FCE — FLUSH CONCRETE EDGE BEAM - REFER TO SHEET 2
- MK — MEDIAN KERB - REFER TO SHEET 2
- 100KC — 100 KERB & CHANNEL - REFER TO SHEET 2
- 100BK — 100 BARRIER KERB - REFER TO SHEET 2
- 600VD — 600mm WIDE VALLEY DRAIN - REFER TO SHEET 2
- KERB RAMP - REFER TO SHEET 2
- CONCRETE PAVERS. COLOUR, TYPE AND PATTERN TO COUNCIL REQUIREMENTS
- NEW PAVEMENT TO COUNCIL REQUIREMENTS
- NEW LANDSCAPING. SAWCUT AND REMOVE EXISTING PAVEMENT. PROVIDE NEW KERBING AND LANDSCAPE TO COUNCIL REQUIREMENTS. (TYP)

PLAN

1:300

5 0 5 10 15 20 25 Metres

NOTES:

1. TRAFFIC CONTROL DETAILS TO BE INSTALLED IN ACCORDANCE WITH AUSTRALIAN STANDARD AS 1742 MANUAL OF TRAFFIC CONTROL DEVICES AS MODIFIED BY THE TSA "CODE OF TECHNICAL REQUIREMENTS FOR THE LEGAL USE OF TRAFFIC CONTROL DEVICES" (DECEMBER 1999), AND THE TSA "PAVEMENT MARKING MANUAL". (MARCH 2007).
2. ALL DIMENSIONS QUOTED ARE TO THE CENTRE OF LINEMARKING OR TO THE FACE OF THE KERB.
3. ALL LINEMARKING 0.1m. WIDE UNLESS OTHERWISE SHOWN.
4. FOR SIGN INSTALLATION DETAILS, REFER TO DTEI MASTER SPECIFICATION PART 249 "INSTALLATION OF SIGNS".
5. ALL EXISTING PARKING SIGNAGE TO BE REMOVED UNLESS SPECIFIED OTHERWISE.
6. REFER TO SHEET 2 FOR KERBING AND OTHER DETAILS

REVISION	AMENDMENT / REASON FOR ISSUE	APPROVED	DATE
1	ISSUED FOR COMMENT		

NOTES:

ALL LEVELS TO A.H.D.

100mm ON ORIGINAL DRAWING — DO NOT SCALE

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APPROVED COMPANY ISO 9001 Quality Management Systems QMS Certification Services

SCALE: 1:300	SHEET SIZE: A1
DESIGNED: BS	DRAWN: SA
PROJECT MANAGER:	SENIOR DRAFTER
SURVEYED: ALLSURV	SURVEY DATE: 20.08.10
APPROVED:	
DATE:	

KANGAROO ISLAND COUNCIL

KINGSCOTE AIRPORT CARPARK
GENERAL CONSTRUCTION

FILENAME:	JOB NUMBER	SHEET NUMBER	REVISION
20101069__PLAN.DWG	2010.1069	1	1

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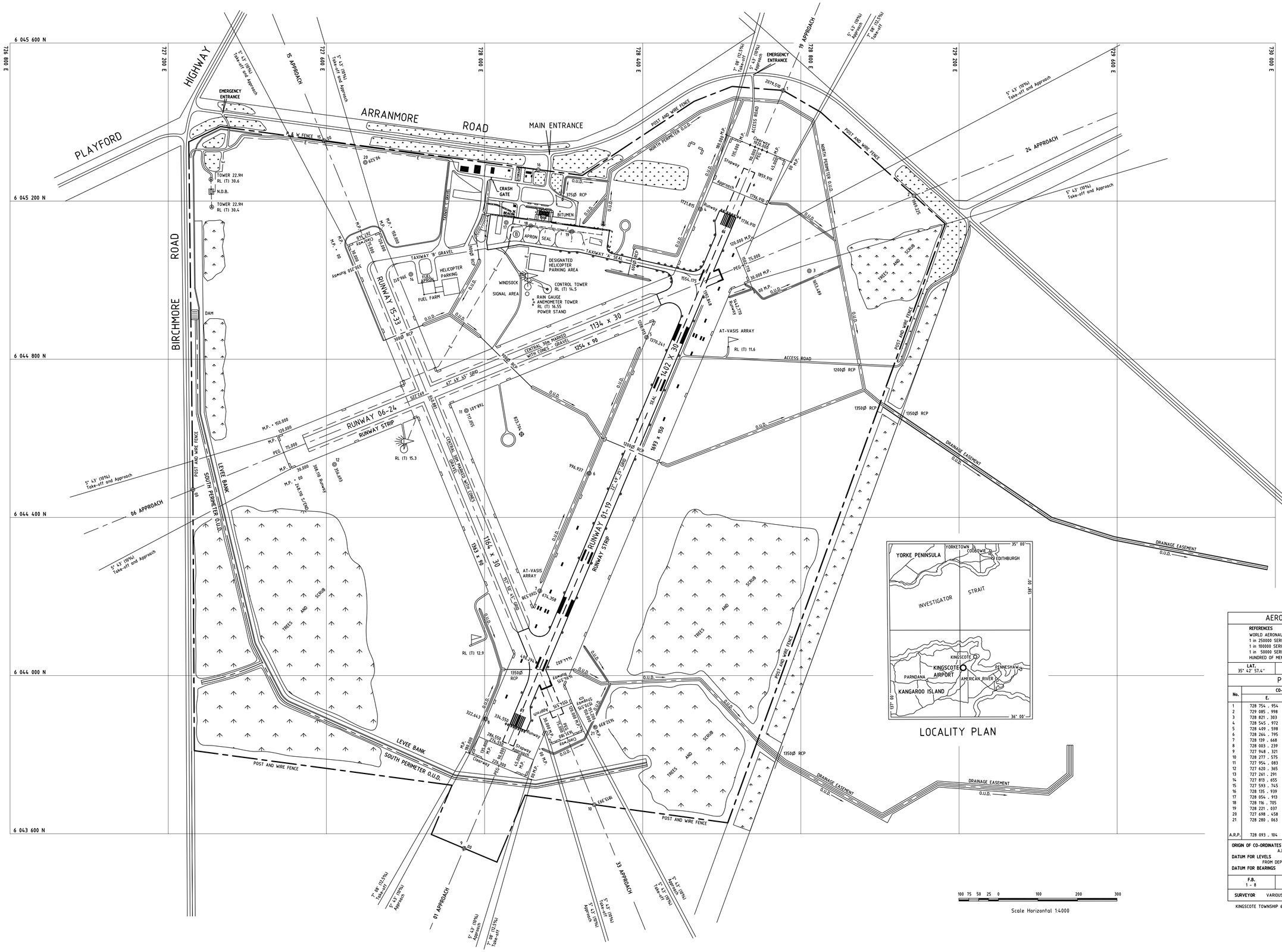

LOCALITY PLAN

Scale Horizontal 1:4000

CONVERSION
TRUE: 1° 28' 22" EAST OF GRID
MAG: 4° 45' APPROX EAST OF GRID

AERODROME DATA

REFERENCES
WORLD AERONAUTICAL CHART 3459 PT. AUGUSTA
1 in 250000 SERIES KINGSCOTE
1 in 100000 SERIES 6426 KINGSCOTE
1 in 50000 SERIES 6426-IV KINGSCOTE
HUNDRED OF MENZIES-COUNTY OF CARNARVON

LAT.	LONG.	ELEV.
35° 42' 57.4"	137° 31' 17.4"	7.3m

P.S.M. DATA

No.	CO-ORDINATES E.	CO-ORDINATES N.	R.L.
1	728 754 . 954	6 045 479 . 900	5.745
2	729 085 . 998	6 045 213 . 637	6.333
3	728 821 . 303	6 045 023 . 491	5.533
4	728 545 . 972	6 045 119 . 769	6.205
5	728 409 . 598	6 044 855 . 722	6.041
6	728 264 . 795	6 044 511 . 646	5.876
7	728 139 . 668	6 044 214 . 324	5.608
8	728 003 . 239	6 043 890 . 147	6.407
9	727 948 . 321	6 043 563 . 208	6.537
10	728 277 . 575	6 043 673 . 550	5.855
11	727 954 . 083	6 044 670 . 128	6.288
12	727 620 . 365	6 044 534 . 138	6.981
13	727 261 . 291	6 044 470 . 099	DESTROYED
14	727 813 . 655	6 045 015 . 024	6.393
15	727 593 . 745	6 045 353 . 064	7.321
16	728 135 . 939	6 045 279 . 520	6.238
17	728 054 . 913	6 045 145 . 864	UNDER SEAL
18	728 116 . 705	6 045 137 . 496	UNDER SEAL
19	728 221 . 037	6 045 123 . 366	5.589
20	727 698 . 458	6 045 297 . 954	7.138
21	728 280 . 063	6 043 869 . 509	6.139
A.R.P.	728 093 . 104	6 044 611 . 582	6.291

ORIGIN OF CO-ORDINATES A.R.P. CO-ORDINATES ARE ZONE 53 A.M.G. CONNECTED TO TRIG. STN. T1/836
DATUM FOR LEVELS APPROXIMATE AUST. HEIGHT DATUM FROM DEPT. OF LANDS B.M. 6426/1271 R.L. 1.797
DATUM FOR BEARINGS GRID NORTH ZONE 53 A.M.G.

F.B.	L.B.	STADIA
1 - 8	1 - 14	1, 2 & 3

SURVEYOR VARIOUS D.A.S. & D.O.T. STEED & POLL

KINGSCOTE TOWNSHIP 6.5 N.M. BEARING 51° MAG. FROM A.R.P.

REVISION	AMENDMENT / REASON FOR ISSUE	APPROVED	DATE
B	PARKING POSITION ADDED TO APRON AREA - PARKING CLEARANCE REVISED	JLD	05.01.04
A	LAYOUT PLAN SUPERSEDES 95.0355 (REF 97.0498 AND 98.0414)	JLD	17.10.03

100mm ON ORIGINAL DRAWING

ALL LEVELS TO A.H.D.

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SURVEYED: VARIOUS	SURVEY DATE: 17.1.96
DESIGNED: DC OF K	DRAWN: J L DAVEY
PROJECT MANAGER: R. AREN'S	SENIOR DRAFTER: D MURRAY
DRAWING STATUS: APPROVED	
APPROVED: R. AREN'S	
DATE: 17.10.2003	

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KINGSCOTE AERODROME
LAYOUT PLAN

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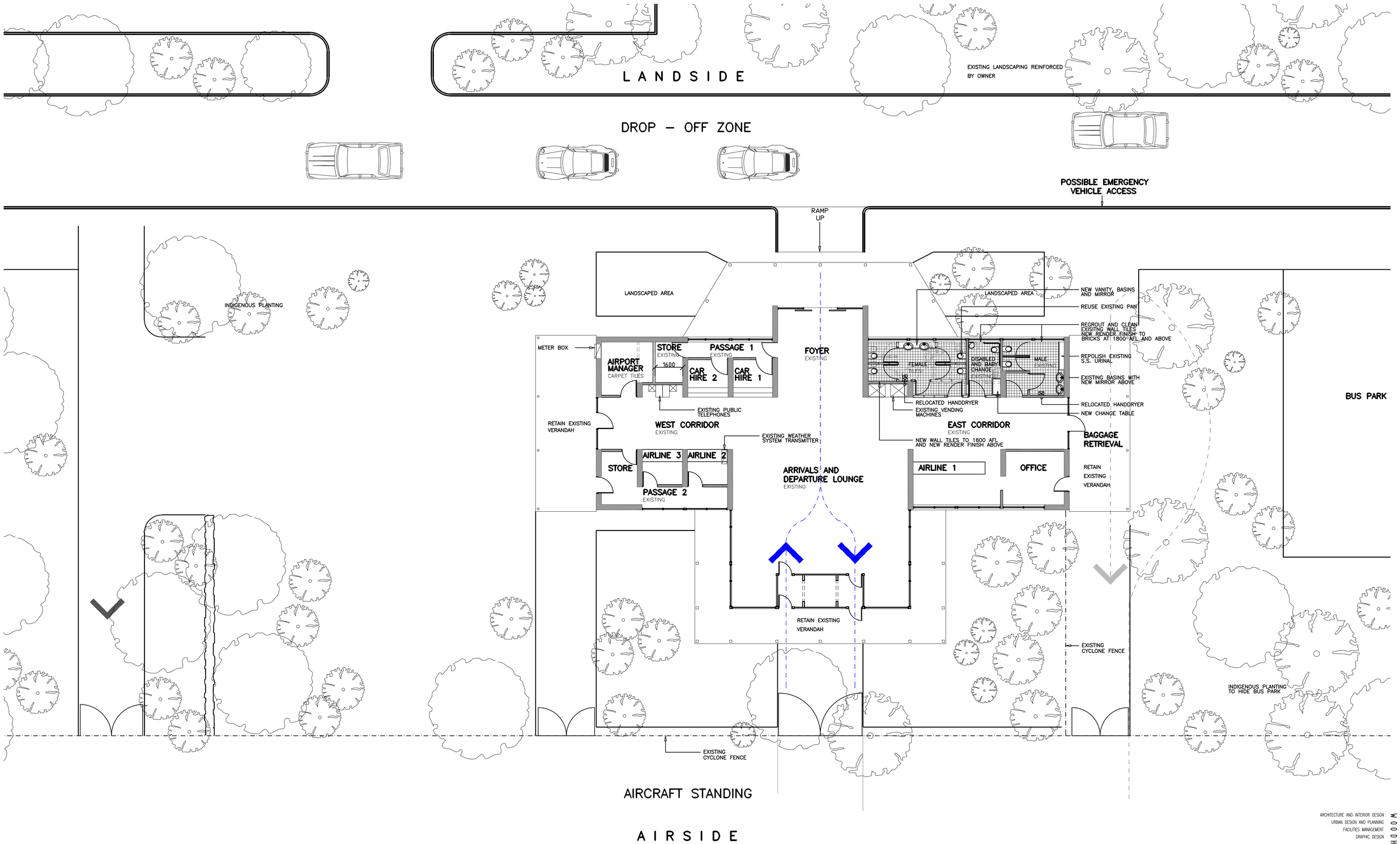


EXISTING MASONRY WALL

NEW BRICK MASONRY WALL (RENDERED FINISH)

NEW PARTITION WALL

PRELIMINARY

KINGSCOTE AIRPORT - TERMINAL REDEVELOPMENT

STAGE ONE PLAN

1

Date 12 APRIL 2002 **Dwg No** 01-1653-SK01 **Revision** -

0 10 20 40
Metres

ARCHITECTURE AND INTERIOR DESIGN
URBAN DESIGN AND PLANNING
FACILITIES MANAGEMENT
GRAPHIC DESIGN

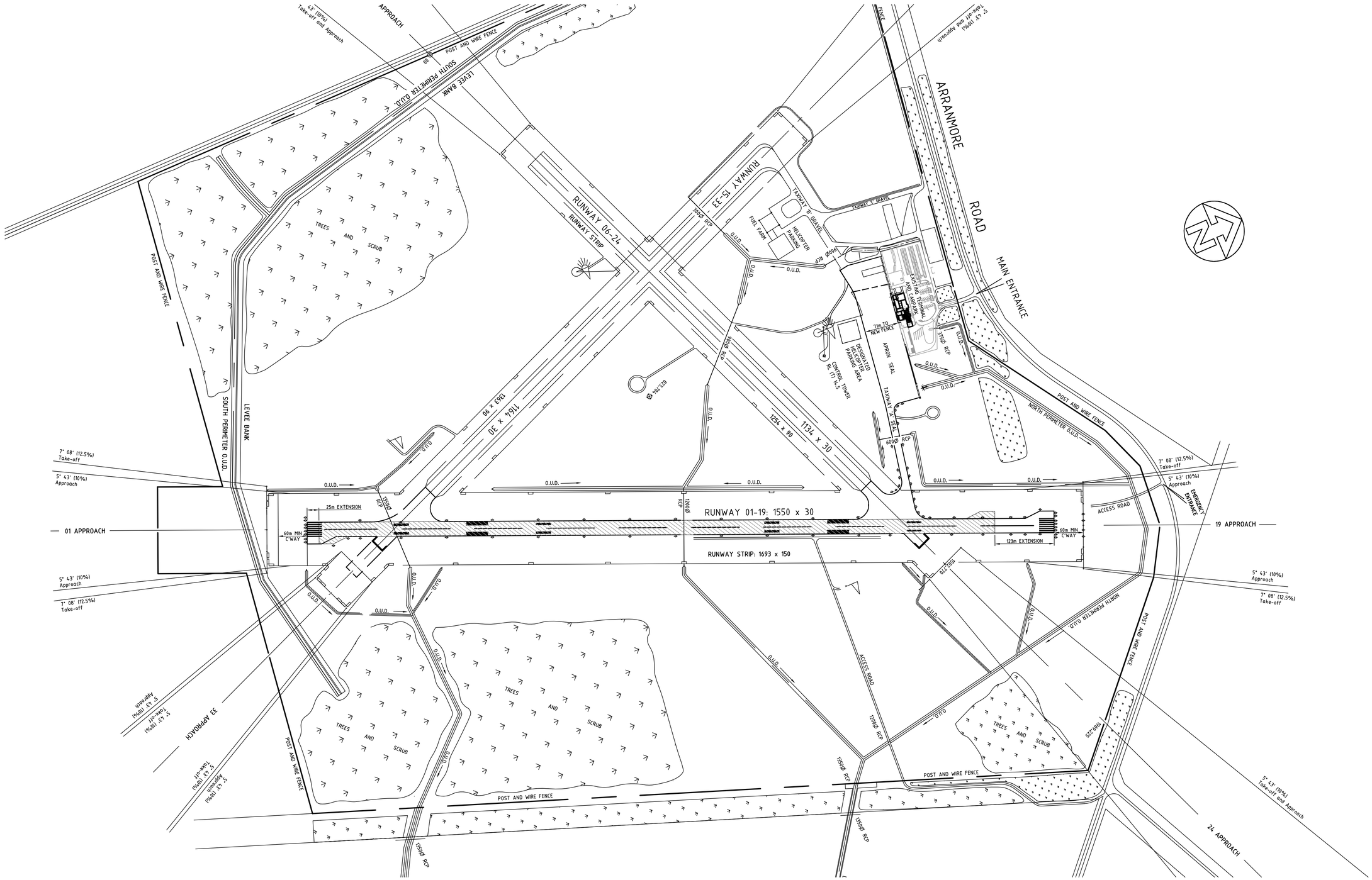
WOODHEAD INTERNATIONAL

Appendix B

Kingscote Airport

Future Infrastructure - Sketch Plans

Note: There is no Figure 1 included in this Report



EXTENT OF EXISTING RUNWAY

SCENARIO 2 (BOMBARDIER Q400)

SCALE 1:400

10 0 10 20 30 Metres

FIGURE 2

KANGAROO ISLAND AIRPORT INFRASTRUCTURE STUDY

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Job No:	2012.0935
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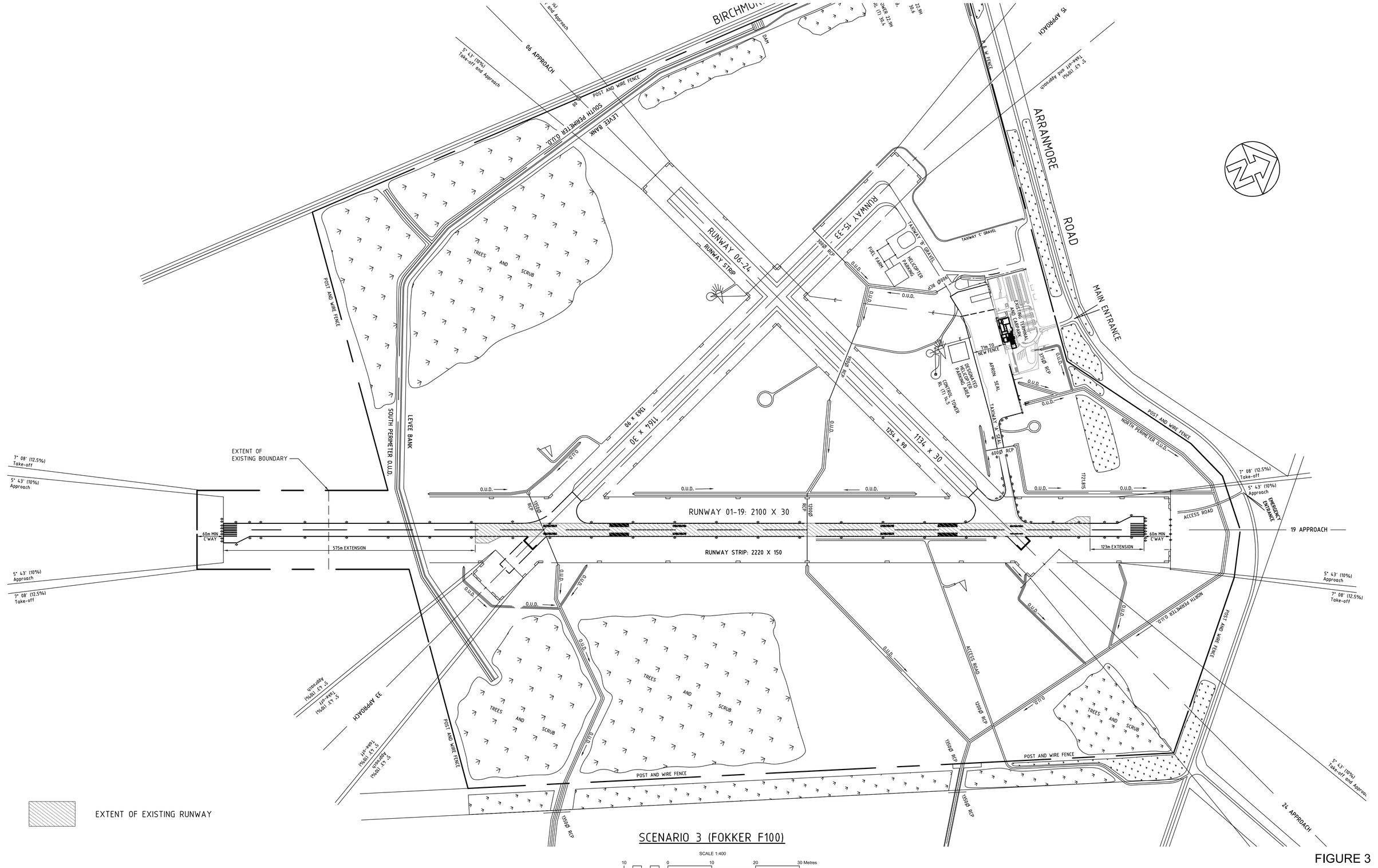
Revision	1
Drawn:	P.S.
Date:	Oct 2012
Scale:	1:400

KANGAROO ISLAND COUNCIL

KINGSCOTE AIRPORT

CONCEPT PLAN



SCENARIO 3 (FOKKER F100)

SCALE 1:400

10 0 10 20 30 Metres

FIGURE 3

KANGAROO ISLAND AIRPORT INFRASTRUCTURE STUDY

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Job No:	2012.0935
Filename:	20120935_SCENARIO3_2100.DWG
Revision	1
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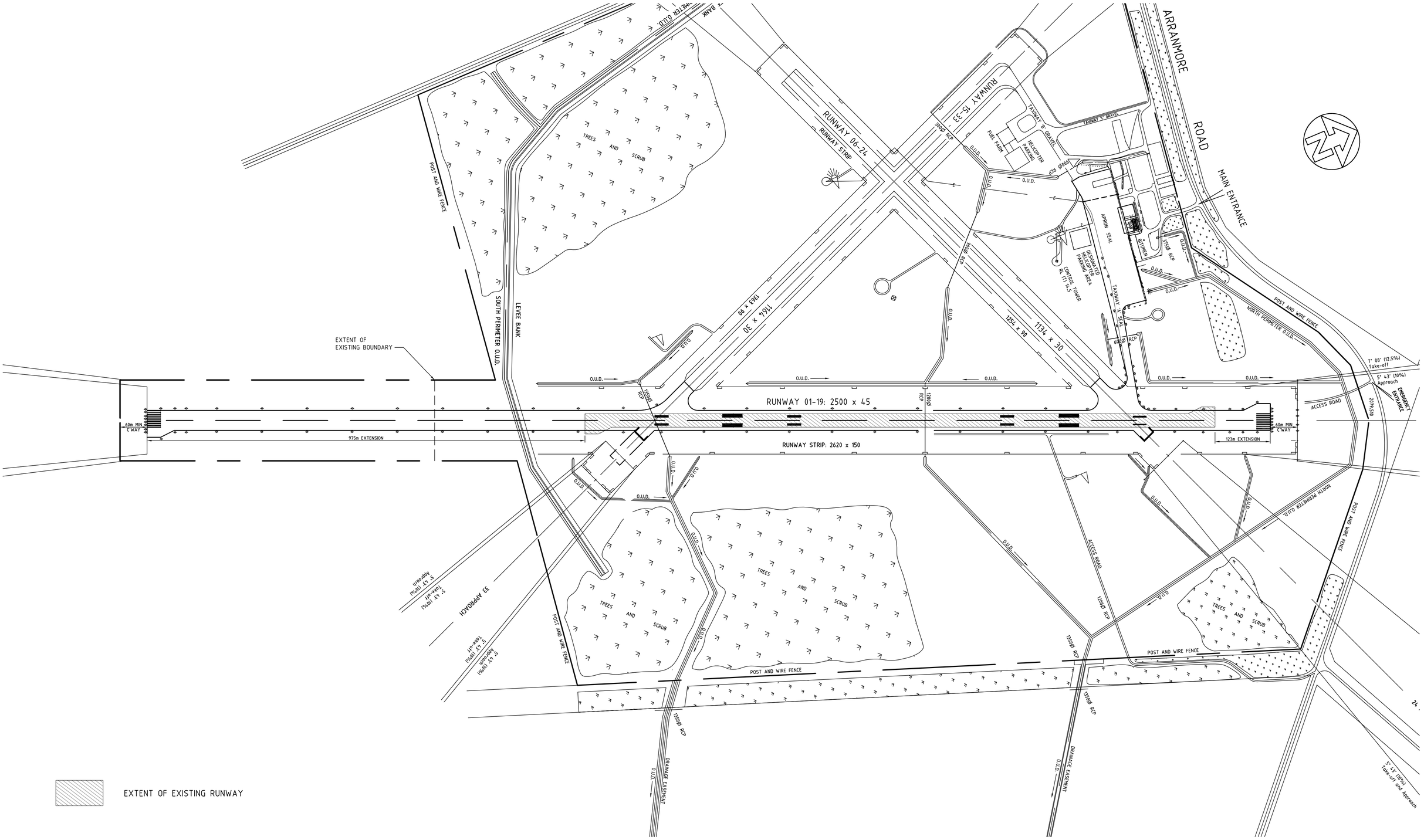
Date:	Oct 2012
Scale:	1:400

KANGAROO ISLAND COUNCIL
KINGSCOTE AIRPORT

CONCEPT PLAN



EXTENT OF EXISTING RUNWAY

SCENARIO 4 (BOEING 737-200)

SCALE 1:400

10 0 10 20 30 Metres

FIGURE 4

KANGAROO ISLAND AIRPORT INFRASTRUCTURE STUDY

T:\2012\20120935 KINGSCOTE AIRFIELD REVIEW - KANGAROO ISLAND COUNCIL\3_DEV\1 ACAD\20120935_SCENARIO4_2500.DWG [2500] 31-Oct-2012 - 4:35pm

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Revision	1
Drawn:	P.S.
Date:	Oct 2012
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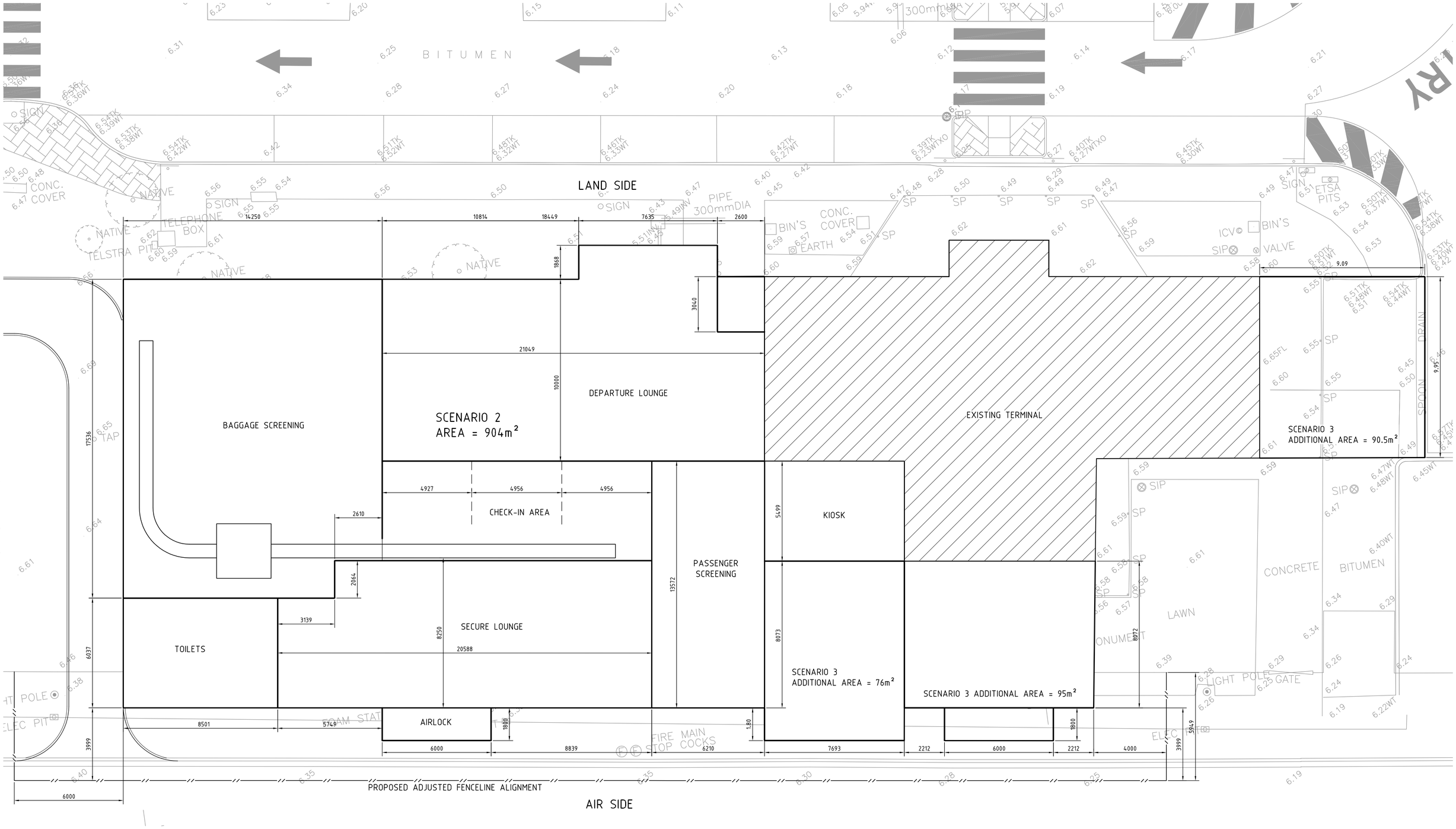
KINGSCOTE AIRPORT

CONCEPT PLAN



0 1 2 3 4 5 6 7 8 9 10 Metres

SCALE 1:100

FIGURE 5

KANGAROO ISLAND AIRPORT INFRASTRUCTURE STUDY

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Job No:	2012.0935
Filename:	20120935_BUILDING_OUTLINE.DWG
Revision	1
Drawn:	P.S.
Date:	Oct 2012
Scale:	1:100

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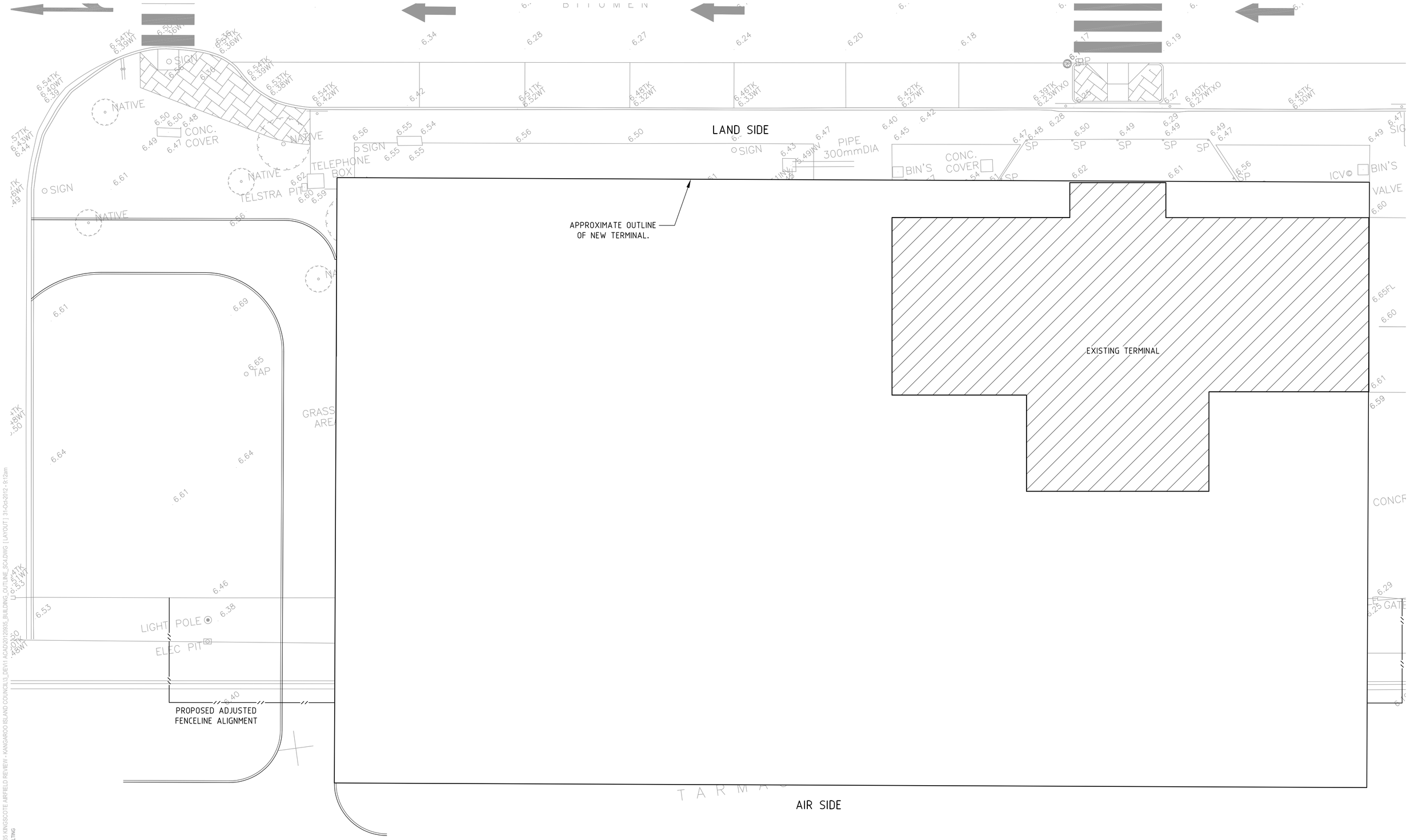
KINGSCOTE AIRPORT

SCENARIO 2 CONCEPT PLAN (INC. SCENARIO 3 ADDITIONS)



SCALE 1:100

FIGURE 6

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Filename: 20120935_BUILDING_OUTLINE_SC4.DWG
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Date: Oct 2012
Scale: 1:100

KANGAROO ISLAND COUNCIL
KINGSCOTE AIRPORT

SCENARIO 4 CONCEPT PLAN

Appendix C

Calculations

- **Terminal Building - Estimated Spatial Requirements – Scenarios 2, 3 & 4**

Kangaroo Island Council

Kingscote Airport Infrastructure Study

Terminal Building

Estimate of Spatial Requirements - Scenarios 2, 3 & 4

Rev 1
10-Oct-12

Calculation Basis - Building Spatial Requirements				Scenario 2 - Bombardier Q400 with Saab 340 being catered for simultaneously	Scenario 3 - Fokker F100 with Saab 340 being catered for simultaneously	Scenario 4 - B 737 with Saab 340 being catered for simultaneously	Comparison - New Port Lincoln Terminal Building
No. of Seats (both planes)				78 + 36 = 114	107 + 36 = 143	170 + 36 = 206	
Assumed Occupancy				80%	80%	80%	
Passenger Nos. for Design				91	114	165	
Building Component	**Proportion of Passengers**	**Building Design Parameter**	**Unit**				
Passenger Check-in & Ticketing	0.4	2	m2 / passenger	73	92	132	
plus allow for friend (50%)	0.5	1.5	m2 / friend	68	86	124	360
plus circulation allowance		10	%	14	18	26	
Check-in counters		3 No.	3m x 5m	45	45	45	70
Baggage Make-up (incl. X-ray screening)	1	2	m2 / passenger	182	229	330	415
Freight Store				10	12	15	40
Security Office				12	12	12	10
Secured Gate Lounge							
Passenger Screening				40	50	60	72
Lounge	1	1.5	m2 / passenger	137	172	247	
Allowance for friend	0.3	1	m2 / passenger	27	34	49	220
Circulation allowance		20	%	33	41	59	
Baggage Reclaim	1	1.2	m2 / passenger	109	137	198	
Allowance for friend	0.3	1	m2 / passenger	27	34	49	330
Circulation allowance		20	%	27	34	49	
Arrivals Hall	1	1.25	m2 / passenger	114	143	206	
Allowance for friend	0.3	1	m2 / passenger	27	34	49	180
Circulation allowance		20	%	28	35	51	
Miscellaneous							
Airline Offices				30	40	50	50
Car Hire Offices				50	50	50	50
Other Concessions				0	10	20	0
Airport Manager				15	15	15	0
Interview Rooms				15	15	30	21
Toilets				40	55	80	137
Plant Rooms				6	6	10	0
Entrance Airlock				20	20	20	20
Café				72	72	140	130
Alfresco				0	0	0	55
Total Floor Areas (m2)				**1224**	**1492**	**2117**	**2160**
				Scenario 2	**Scenario 3**	**Scenario 4**	**Proposed - Port Lincoln**

Appendix D

Capital Cost Estimates

- Scenario 2
- Scenario 3
- Scenario 4

Kingscote Airfield Review
Kangaroo Island Council
Construction Cost Estimate for Option 2, Bombardier Q400

Tonkin CONSULTING
a better approach

Revision: B
Estimated: TG/MDS
Reviewed: BEM

Job No. 2010.1278
26-Oct-12

Item	Description	Comment/Assumptions	Unit	Quantity	Rate	Total	Cost - KI	Cost - Mainland
1.0	**Preliminaries**							
1.01	Establishment		Item	1	$ 125,000.00	$ 125,000.00	$ 12,500.00	$ 112,500.00
1.02	Demobilisation (including clean up)		Item	1	$ 90,000.00	$ 90,000.00	$ 9,000.00	$ 81,000.00
1.03	Administration, PMP, EMP, QMS, OHS		Item	1	$ 85,000.00	$ 85,000.00	$ 8,500.00	$ 76,500.00
1.04	Engineering - Setting out/Survey		Item	1	$ 25,000.00	$ 25,000.00	$ 22,500.00	$ 2,500.00
1.05	Testing (as specified)		Item	1	$ 60,000.00	$ 60,000.00	$ 6,000.00	$ 54,000.00
1.06	Service location		Item	1	$ 20,000.00	$ 20,000.00	$ 18,000.00	$ 2,000.00
1.07	Insurances: Construction work & Public Liability		Item	1	$ 40,000.00	$ 40,000.00	$ 4,000.00	$ 36,000.00
1.08	Silt Control		Item	1	$ 15,000.00	$ 15,000.00	$ 1,500.00	$ 13,500.00
1.09	Traffic Control		Item	1	$ 40,000.00	$ 40,000.00	$ 4,000.00	$ 36,000.00
1.10	Tree clearing/trimming in flight path		Item	1	$ 15,000.00	$ 15,000.00	$ 15,000.00	
1.11	As-Constructed Surveys		Item	1	$ 20,000.00	$ 20,000.00	$ 18,000.00	$ 2,000.00
1.12	Accommodation and Meals		Item	1	$ 80,000.00	$ 80,000.00	$ 80,000.00	
	Sub-Total					$ 615,000.00	$ 199,000.00	$ 416,000.00
2.0	**Site Preparation and Earthworks**							
2.01	Strip top soil (100mm), stockpile, and respread on completed batters	Applicable to all areas of earthworks	m2	6168	$ 7.88	$ 48,573.00		$ 48,573.00
2.02	Excavate material for runway extension and lengthening (520mm), stockpile on site		m3	3207.36	$ 7.20	$ 23,092.99		$ 23,092.99
2.03	Place and compact stockpiled fill adjacent runway	To match new finished runway level, grade at max 2.5%	m3	0	$ 9.30	$ -		$ -
2.04	Place and compact imported fill adjacent runway	To match new finished runway level, grade at max 2.5%	m3	0	$ 37.50	$ -		$ -
	Sub-Total					$ 71,665.99	$ -	$ 71,665.99
3.0	**Stormwater**							
3.01	Supply and construct protective concrete slab above existing 600mm RCP	2000mm wide, 300mm thick, 20,000mm long 25 MPa reinforced concrete slab	m3	12	$ 337.50	$ 4,050.00		$ 4,050.00
3.02	Supply and construct protective concrete slab above existing 675mm RCP underneath Apron Seal	2000mm wide, 300mm thick, 280m long 25 Mpa Reinforced concrete slab. Assumed pipe will require protection. Check can be done to determine if structural loading will exceed pipe capacity at later stage.	m3	168	$ 337.50	$ 56,700.00		$ 56,700.00
3.03	Pit adjustments of 675mm RCP underneath Apron Seal	Class D - V grates and concrete surround. Supply and install new surrounds.	each	3	$ 2,079.00	$ 6,237.00		$ 6,237.00
3.04	Infill existing 300mm RCP with controlled low strength material	Flowable Self levelling cementitious material - Rawlinsons 2012	m3	53.0	$ 210.00	$ 11,133.02		$ 11,133.02
3.05	Supply and Install Humeceptor Gross Pollutant Trap		Item	1	$ 56,592.00	$ 56,592.00		$ 56,592.00
	Sub-Total					$ 134,712.02	$ -	$ 134,712.02
4.0	**Pavements**							
	Runway Pavement							
4.01	Shape and compact existing sub-grade		m2	6,168	$ 7.50	$ 46,260.00		$ 46,260.00
4.02	Supply, place and compact 150mm sand		m2	6,168	$ 12.00	$ 74,016.00	$ 51,811.20	$ 22,204.80
4.03	Supply, place and compact 220mm PM2/20 QR		m2	6,168	$ 22.00	$ 135,696.00	$ 94,987.20	$ 40,708.80
4.04	Supply, place and compact 150mm PM1/20		m2	6,168	$ 15.00	$ 92,520.00	$ 64,764.00	$ 27,756.00
4.05	Profiling of Existing Seal - Disposal on site		m2	56,159	$ 12.00	$ 673,908.00		$ 673,908.00
4.06	Supply and place 2 coats of 10/7 spray seal (including Prime Coat)	0.9L/sqm cut-back bitumen for prime coat	m2	62,327	$ 13.28	$ 827,702.56		$ 827,702.56
	Apron Pavement							
4.07	Shape and compact existing sub-grade		m2	0	$ 7.50	$ -	$ -	$ -
4.08	Supply, place and compact 150mm sand		m2	0	$ 12.00	$ -	$ -	$ -
4.09	Supply, place and compact 220mm PM2/20 QR		m2	0	$ 22.00	$ -	$ -	$ -
4.10	Supply, place and compact 150mm PM1/20		m2	0	$ 15.00	$ -	$ -	$ -
4.11	Profiling of Existing Seal - Disposal on site		m2	20,805	$ 12.00	$ 249,660.00		$ 249,660.00
4.12	Supply and place 2 coats of 10/7 spray seal (including Prime Coat)	0.9L/sqm cut-back bitumen for prime coat	m2	20,805	$ 13.28	$ 276,290.40		$ 276,290.40
4.13	Supply and place spray sealed pavement from baggage collection area to apron	Assumed 150mm of Rubble, 150mm of base course and 10/7 spray seal	m2	125	$ 50.78	$ 6,347.50		$ 6,347.50
4.14	Linemarking		item	1	$ 49,500.00	$ 49,500.00		$ 49,500.00
4.15	Relocation of Helicopter Parking Area		item	1	$ 5,000.00	$ 5,000.00		$ 5,000.00
	Sub-Total					$ 2,436,900.46	$ 211,562.40	$ 2,225,338.06
5.0	**Lighting**							
5.01	Supply and Install new runway marker lights	assumed lighting on figures indicative of actual lighting requirements	each	6	$ 5,000.00	$ 30,000.00		$ 30,000.00
5.02	Relocation of existing apron and taxiway A marker lights		lin m	26	$ 3,500.00	$ 91,000.00		$ 91,000.00
5.03	Relocation of end of runway threshold lights		item	16	$ 4,800.00	$ 76,800.00		$ 76,800.00
5.04	Supply and Install new Precision Approach Path Indicator (PAPI)		each	1	$ 150,000.00	$ 150,000.00		$ 150,000.00
5.05	Apron lighting		Item	1	$ 15,000.00	$ 15,000.00		$ 15,000.00
	Sub-Total					$ 362,800.00	$ -	$ 362,800.00
6.0	**Building**							
6.01	Building Construction	Includes substructure, superstructure, internal fitout, fencing relocation	m2	904	$ 3,000.00	$ 2,712,000.00	$ 135,600.00	$ 2,576,400.00
6.02	Security equipment		item	1	$ 1,000,000.00	$ 1,000,000.00		$ 1,000,000.00
6.03	Supply and Install Septic System		item	1	$ 35,250.00	$ 35,250.00		$ 35,250.00
6.04	Relocation of Services		Item	1	$ 20,000.00	$ 20,000.00		$ 20,000.00
6.05	Upgrade of refueling facility		item	1	$ 150,000.00	$ 150,000.00		$ 150,000.00
	Sub-Total					$ 3,917,250.00	$ 135,600.00	$ 3,781,650.00
7.0	**Design Fees**							
7.01	Detailed Design Fees	5% of construction fees	Item	1	$ 400,000.00	$ 400,000.00		$ 400,000.00
	Sub-Total					$ 400,000.00	$ -	$ 400,000.00
	TOTAL CIVIL WORKS (EX GST)					$ 7,938,328.47	$ 546,162.40	$ 7,392,166.07
	CONTINGENCIES 12.5%					$ 992,291.06	$ 68,270.30	$ 924,020.76
	TOTAL CIVIL WORKS inc. CONTINGENCIES (EX GST)					$ 8,930,619.53	$ 614,432.70	$ 8,316,186.83
	GST (10%)					$ 893,061.95	$ 61,443.27	$ 831,618.68
	CITB (0.25%)					$ 24,559.20	$ 1,689.69	$ 22,869.51
	GRAND TOTAL(inc GST & CONTINGENCY)					**$ 9,848,240.69**	**$ 677,565.66**	**$ 9,170,675.03**

Note: **This is a preliminary cost estimate and has been prepared based on information provided to Tonkin Consulting and upon experience and historical unit rates. Tonkin Consulting takes no responsibility for any variations**
- Latent conditions
- Changes in scope
- Market conditions (i.e. competition, escalation)
- No allowance for site contamination and remediation
- No allowance for Rock excavation
- No allowance has been made for the staging of these works
- No allowance has been made for landscaping or revegetation
- Assumed that items supplied from mainland but installed by local contractors will be assigned a ration of 20% KI to 80% mainland

Note: **The following items included in the estimate are provisional only:-**
- Earthworks quantities
- Road areas

Note: **Tonkin Consulting recommend that a professional Quantity Surveyor be engaged if assurance of cost is required and project budget estimates allowing for these factors are required.**

Note: **Rates adjusted for Kingscote Regional Indices**

Kingscote Airfield Review
Kangaroo Island Council
Construction Cost Estimate for Option 3, Fokker 100

Tonkin CONSULTING
a better approach

Revision: B
Estimated: TG/MDS
Reviewed: BEM

Job No. 2010.1278
26-Oct-12

Item	Description	Comment/Assumptions	Unit	Quantity	Rate	Total	Cost - KI	Cost - Mainland
1.0	**Preliminaries**							
1.01	Establishment		Item	1	$ 180,000.00	$ 180,000.00	$ 18,000.00	$ 162,000.00
1.02	Demobilisation (including clean up)		Item	1	$ 150,000.00	$ 150,000.00	$ 15,000.00	$ 135,000.00
1.03	Administration, PMP, EMP, QMS, OHS		Item	1	$ 100,000.00	$ 110,000.00	$ 11,000.00	$ 99,000.00
1.04	Engineering - Setting out/Survey		Item	1	$ 40,000.00	$ 40,000.00	$ 36,000.00	$ 4,000.00
1.05	Testing (as specified)		Item	1	$ 70,000.00	$ 70,000.00	$ 7,000.00	$ 63,000.00
1.06	Service location		Item	1	$ 25,000.00	$ 25,000.00	$ 22,500.00	$ 2,500.00
1.07	Insurances: Construction work & Public Liability		Item	1	$ 50,000.00	$ 50,000.00	$ 5,000.00	$ 45,000.00
1.08	Silt Control		Item	1	$ 25,000.00	$ 25,000.00	$ 2,500.00	$ 22,500.00
1.09	Traffic Control		Item	1	$ 50,000.00	$ 50,000.00	$ 5,000.00	$ 45,000.00
1.10	Tree clearing/trimming in flight path		Item	1	$ 50,000.00	$ 50,000.00	$ 50,000.00	
1.11	As-Constructed Surveys		Item	1	$ 30,000.00	$ 30,000.00	$ 27,000.00	$ 3,000.00
1.12	Accommodation and meals		Item	1	$ 150,000.00	$ 150,000.00		$ 150,000.00
	Sub-Total					$ 930,000.00	$ 199,000.00	$ 731,000.00
2.0	**Site Preparation and Earthworks**							
2.01	Strip top soil (100mm), stockpile, and respread on completed batters	Applicable to all areas of earthworks	m2	22668	$ 7.88	$ 178,510.50		$ 178,510.50
2.02	Excavate material for runway extension and lengthening (510mm), stockpile on site		m3	11560.68	$ 7.20	$ 83,236.90		$ 83,236.90
2.03	Place and compact stockpiled fill adjacent runway	To match new runway level, grade at max 2.5%	m3	11560.68	$ 9.30	$ 107,514.32		$ 107,514.32
2.04	Place and compact 150mm x 3m Quarry Rubble adjacent runway, apron and taxiway A	To match new runway level, grade at max 2.5%	m3	2173.5	$ 15.00	$ 32,602.50	$ 22,821.75	$ 9,780.75
	Sub-Total					$ 401,864.22	$ 22,821.75	$ 379,042.47
3.0	**Stormwater**							
3.01	Supply and construct protective concrete slab above existing 600mm RCP	2000mm wide, 300mm thick, 20,000mm long 25 MPa concrete slab	m3	12	$ 337.50	$ 4,050.00		$ 4,050.00
3.02	Supply and construct protective concrete slab above existing 675mm RCP underneath Apron Seal	2000mm wide, 300mm thick, 280m long 25 Mpa Reinforced concrete slab. Assumed pipe will require protection. Check can be done to determine if structural loading will exceed pipe capacity at later stage.	m3	168	$ 337.50	$ 56,700.00		$ 56,700.00
3.03	Pit adjustments of 675mm RCP underneath Apron Seal	Class D - V grates and concrete surround. Supply and install.	each	3	$ 2,079.00	$ 6,237.00		$ 6,237.00
3.04	Infill existing 300mm RCP with controlled low strength material	Flowable Self levelling cementitious material - Rawlinsons 2012	m3	53.0	$ 210.00	$ 11,133.02		$ 11,133.02
3.05	Supply and lay DN 1350 RCP at intersection of south perimeter O.U.D and runway		lin m	150	$ 3,300.00	$ 495,000.00		$ 495,000.00
3.06	Supply and install DN1350 precast concrete headwalls		each	2	$ 2,200.00	$ 4,400.00		$ 4,400.00
3.07	Supply and Install Humeceptor Gross Pollutant Trap		Item	1	$ 56,592.00	$ 56,592.00		$ 56,592.00
	Sub-Total					$ 634,112.02	$ -	$ 634,112.02
4.0	**Pavements**							
	Runway Pavement							
4.01	Shape and compact existing sub-grade		m2	22,668	$ 7.50	$ 170,010.00		$ 170,010.00
4.02	Supply, place and compact 180mm sand		m2	22,668	$ 14.40	$ 326,419.20	$ 228,493.44	$ 97,925.76
4.03	Supply, place and compact 330mm PM2/20 QR		m2	22,668	$ 33.00	$ 748,044.00	$ 523,630.80	$ 224,413.20
4.04	Profiling of Existing Seal - Disposal on site		m2	56,159	$ 12.00	$ 673,908.00		$ 673,908.00
4.05	Supply, place and compact 150mm PM1/20		m2	78,827	$ 15.00	$ 1,182,405.00	$ 827,683.50	$ 354,721.50
4.06	Supply and place 2 coats of 10/7 spray seal (including Prime Coat)	0.9L/sqm cut-back bitumen for prime coat	m2	78,827	$ 12.73	$ 1,003,467.71		$ 1,003,467.71
4.07	Supply and Place Sand Emulsion Coat		m2	78,827	$ 6.37	$ 501,733.86		$ 501,733.86
	Apron Pavement							
4.08	Shape and compact existing sub-grade		m2	1,685	$ 7.50	$ 12,637.50		$ 12,637.50
4.09	Supply, place and compact 180mm sand		m2	1,685	$ 14.40	$ 24,264.00	$ 16,984.80	$ 7,279.20
4.10	Supply, place and compact 330mm PM2/20 QR		m2	1,685	$ 33.00	$ 55,605.00	$ 38,923.50	$ 16,681.50
4.11	Profiling of Existing Seal - Disposal on site		m2	20,805	$ 12.00	$ 249,660.00		$ 249,660.00
4.12	Supply, place and compact 150mm PM1/20		m2	22,490	$ 15.00	$ 337,350.00	$ 236,145.00	$ 101,205.00
4.13	Supply and place 2 coats of 10/7 spray seal (including Prime Coat)		m2	22,490	$ 12.73	$ 286,297.70		$ 286,297.70
4.14	Supply and place spray sealed pavement from baggage collection area to apron	Assumed 150mm of Rubble, 150mm of base course and 10/7 spray seal	m2	125	$ 50.78	$ 6,347.50		$ 6,347.50
4.15	Supply and Place Sand Emulsion Coat		m2	22,490	$ 6.37	$ 143,148.85		$ 143,148.85
	15m Runway Extension							
4.14	Supply, place and compact 150mm sand		m2	900	$ 12.00	$ 10,800.00	$ 7,560.00	$ 3,240.00
4.15	Supply, place and compact 150mm PM1/20		m2	900	$ 15.00	$ 13,500.00	$ 9,450.00	$ 4,050.00
4.16	Supply and place 2 coats of 10/7 spray seal (including Prime Coat)		m2	900	$ 12.73	$ 11,457.00	$ 8,019.90	$ 3,437.10
4.15	Supply and Place Sand Emulsion Coat		m2	900	$ 6.37	$ 5,728.50	$ 4,009.95	$ 1,718.55
4.17	Linemarking		item	1	$ 82,500.00	$ 82,500.00		$ 82,500.00
4.18	Relocation of Helicopter Parking Area		item	1	$ 5,000.00	$ 5,000.00		$ 5,000.00
	Sub-Total					$ 5,850,283.82	$ 1,900,900.89	$ 3,949,382.93
5.0	**Lighting**							
5.01	Supply and Install new runway marker lights	assumed lighting on figures indicative of actual lighting requirements	each	22	$ 5,000.00	$ 110,000.00		$ 110,000.00
5.02	Relocation of existing runway marker lights		each	29	$ 3,500.00	$ 101,500.00		$ 101,500.00
5.03	Relocation of existing apron and taxiway A marker lights		each	26	$ 3,500.00	$ 91,000.00		$ 91,000.00
5.04	Relocation of end of runway threshold lights		each	16	$ 4,800.00	$ 76,800.00		$ 76,800.00
5.05	Supply and Install new Precision Approach Path Indicator (PAPI)		item	1	$ 150,000.00	$ 150,000.00		$ 150,000.00
5.06	Apron lighting		Item	1	$ 15,000.00	$ 15,000.00		$ 15,000.00
	Sub-Total					$ 544,300.00	$ -	$ 544,300.00
6.0	**Building**							
6.01	Building Construction	Includes substructure, superstructure, internal fitout, fencing relocation	m2	1089	$ 3,000.00	$ 3,267,000.00	$ 163,350.00	$ 3,103,650.00
6.02	Security Equipment		Item	1	$ 1,000,000.00	$ 1,000,000.00		$ 1,000,000.00
6.03	Supply and Install Septic System		item	1	$ 55,125.00	$ 55,125.00		$ 55,125.00
6.04	Relocation of Services		Item	1	$ 20,000.00	$ 20,000.00		$ 20,000.00
6.05	Upgrade of refueling facility		item	1	$ 150,000.00	$ 150,000.00		$ 150,000.00
	Sub-Total					$ 4,492,125.00	$ 163,350.00	$ 4,328,775.00
7.0	**Design Fees**							
7.01	Detailed Design Fees	5% of construction fees	Item	1	$ 600,000.00	$ 600,000.00		$ 600,000.00
	Sub-Total					$ 600,000.00	$ -	$ 600,000.00
	TOTAL CIVIL WORKS (EX GST)					$ 13,452,685.05	$ 2,286,072.64	$ 11,166,612.41
	CONTINGENCIES 12.5%					$ 1,681,585.63	$ 285,759.08	$ 1,395,826.55
	TOTAL CIVIL WORKS inc. CONTINGENCIES (EX GST)					$ 15,134,270.69	$ 2,571,831.72	$ 12,562,438.97
	GST (10%)					$ 1,513,427.07	$ 257,183.17	$ 1,256,243.90
	CITB (0.25%)					$ 41,619.24	$ 7,072.54	$ 34,546.71
	GRAND TOTAL(inc GST & CONTINGENCY)					**$ 16,689,317.00**	**$ 2,836,087.43**	**$ 13,853,229.57**

Note: **This is a preliminary cost estimate and has been prepared based on information provided to Tonkin Consulting and upon experience and historical unit rates. Tonkin Consulting takes no responsibility for any variations**
- Latent conditions
- Changes in scope
- Market conditions (i.e. competition, escalation)
- No allowance for site contamination and remediation
- No allowance for Rock excavation
- No allowance has been made for the staging of these works
- No allowance has been made for landscaping or revegetation
- Assumed that items supplied from mainland but installed by local contractors will be assigned a ration of 20% KI to 80% mainland

Note: **The following items included in the estimate are provisional only:-**
- Earthworks quantities
- Road areas

Note: **Tonkin Consulting recommend that a professional Quantity Surveyor be engaged if assurance of cost is required and project budget estimates allowing for these factors are required.**

Note: **Rates adjusted for Kingscote Regional Indices**

Kingscote Airfield Review
Kangaroo Island Council
Construction Cost Estimate for Option 4, Boeing 737

Tonkin CONSULTING
a better approach

Revision: B
Estimated: TG/MDS
Reviewed: BEM

Job No. 2010.1278
26-Oct-12

Item	Description	Comment/Assumptions	Unit	Quantity	Rate	Total	Cost - KI	Cost - Mainland
1.0	**Preliminaries**							
1.01	Establishment		Item	1	$ 500,000.00	$ 500,000.00	$ 50,000.00	$ 450,000.00
1.02	Demobilisation (including clean up)		Item	1	$ 325,000.00	$ 350,000.00	$ 35,000.00	$ 315,000.00
1.03	Administration, PMP, EMP, QMS, OHS		Item	1	$ 300,000.00	$ 275,000.00	$ 27,500.00	$ 247,500.00
1.04	Engineering - Setting out/Survey		Item	1	$ 50,000.00	$ 50,000.00	$ 45,000.00	$ 5,000.00
1.05	Testing (as specified)		Item	1	$ 150,000.00	$ 150,000.00	$ 15,000.00	$ 135,000.00
1.06	Service location		Item	1	$ 25,000.00	$ 25,000.00	$ 22,500.00	$ 2,500.00
1.07	Insurances: Construction work & Public Liability		Item	1	$ 100,000.00	$ 100,000.00	$ 10,000.00	$ 90,000.00
1.08	Silt Control		Item	1	$ 40,000.00	$ 40,000.00	$ 4,000.00	$ 36,000.00
1.09	Traffic Control		Item	1	$ 150,000.00	$ 150,000.00	$ 15,000.00	$ 135,000.00
1.10	Tree clearing/trimming in flight path		Item	1	$ 50,000.00	$ 50,000.00	$ 50,000.00	
1.11	As-Constructed Surveys		Item	1	$ 75,000.00	$ 75,000.00	$ 67,500.00	$ 7,500.00
1.12	Accommodation and allowances		Item	1	$ 250,000.00	$ 250,000.00		$ 250,000.00
	Sub-Total					$ 2,015,000.00	$ 341,500.00	$ 1,673,500.00
2.0	**Site Preparation and Earthworks**							
2.01	Strip top soil (100mm), stockpile, and respread on completed batters	Applicable to all areas of earthworks	m2	72168	$ 7.88	$ 568,323.00		$ 568,323.00
2.02	Excavate material for runway extension and widening (500mm), stockpile on site		m3	36084	$ 7.20	$ 259,804.80		$ 259,804.80
2.03	Place and compact stockpiled fill adjacent runway	To match new runway level, grade at max 2.5%	m3	25500	$ 9.30	$ 237,150.00		$ 237,150.00
2.04	Place and compact imported fill adjacent runway	To match new runway level, grade at max 2.5%			$ 37.50	$ -		
	Sub-Total					$ 1,065,277.80	$ -	$ 1,065,277.80
3.0	**Stormwater**							
3.01	Supply and construct protective concrete slab above existing 600mm RCP	2000mm wide, 300mm thick, 20,000mm long 25 MPa concrete slab	m3	12	$ 337.50	$ 4,050.00		$ 4,050.00
3.02	Supply and construct protective concrete slab above existing 675mm RCP underneath Apron Seal	2000mm wide, 300mm thick, 280m long 25 Mpa Reinforced concrete slab. Assumed pipe will require protection. Check can be done to determine if structural loading will exceed pipe capacity at later stage.	m3	168	$ 337.50	$ 56,700.00		$ 56,700.00
3.03	Pit adjustments of 675mm RCP underneath Apron Seal	Class D - V grates and concrete surround. Supply and install.	each	3	$ 2,079.00	$ 6,237.00		$ 6,237.00
3.04	Infill existing 300mm RCP with controlled low strength material	Flowable Self levelling cementitious material - Rawlinsons 2012	m3	53.0	$ 210.00	$ 11,133.02		$ 11,133.02
3.05	Supply and lay DN 1350 RCP at intersection of south perimeter O.U.D and runway		lin m	150	$ 3,300.00	$ 495,000.00		$ 495,000.00
3.06	Supply and install DN1350 precast concrete headwalls		each	2	$ 2,200.00	$ 4,400.00		$ 4,400.00
3.07	Supply and Install Humeceptor Gross Pollutant Trap		Item	1	$ 56,592.00	$ 56,592.00		$ 56,592.00
	Sub-Total					$ 634,112.02	$ -	$ 634,112.02
4.0	**Pavements**							
	Runway Pavement							
4.01	Shape and compact existing sub-grade		m2	72,168	$ 7.50	$ 541,260.00		$ 541,260.00
4.02	Supply, place and compact 230mm sand		m2	72,168	$ 18.40	$ 1,327,891.20	$ 929,523.84	$ 398,367.36
4.03	Supply, place and compact 270mm PM2/20 QR		m2	72,168	$ 27.00	$ 1,948,536.00	$ 1,363,975.20	$ 584,560.80
4.04	Supply, place and compact 300mm PM1/20		m2	72,168	$ 30.00	$ 2,165,040.00	$ 1,515,528.00	$ 649,512.00
4.05	Profiling of Existing Seal - Disposal on site		m2	56,159	$ 12.00	$ 673,908.00		$ 673,908.00
4.06	Supply, place and compact 300mm PM1/20 overlay on existing pavement		m2	56,159	$ 30.00	$ 1,684,770.00	$ 1,179,339.00	$ 505,431.00
4.07	Supply and place 40mm AC14 hotmix asphalt		m2	128,327	$ 30.59	$ 3,926,067.03		$ 3,926,067.03
	Apron Pavement							
4.08	Shape and compact existing sub-grade		m2	4,200	$ 7.50	$ 31,500.00		$ 31,500.00
4.09	Supply, place and compact 230mm sand		m2	4,200	$ 18.40	$ 77,280.00	$ 54,096.00	$ 23,184.00
4.10	Supply, place and compact 270mm PM2/20 QR		m2	4,200	$ 27.00	$ 113,400.00	$ 79,380.00	$ 34,020.00
4.11	Supply, place and compact 300mm PM1/20		m2	4,200	$ 30.00	$ 126,000.00	$ 88,200.00	$ 37,800.00
4.12	Profiling of Existing Seal - Disposal on site		m2	20,805	$ 12.00	$ 249,660.00		$ 249,660.00
4.13	Supply, place and compact 300mm PM1/20 overlay on existing pavement		m2	20,805	$ 30.00	$ 624,150.00	$ 436,905.00	$ 187,245.00
4.14	Supply and place 40mm AC14 hotmix asphalt		m2	25,005	$ 30.59	$ 765,008.97		$ 765,008.97
4.15	Supply and place spray sealed pavement from baggage collection area to apron	Assumed 150mm of Rubble, 150mm of base course and 10/7 spray seal	m2	125	$ 50.78	$ 6,347.50		$ 6,347.50
	15m Runway Extension							
4.16	Supply, place and compact 150mm sand		m2	900	$ 12.00	$ 10,800.00	$ 7,560.00	$ 3,240.00
4.17	Supply, place and compact 150mm PM1/20		m2	900	$ 15.00	$ 13,500.00	$ 9,450.00	$ 4,050.00
4.18	Supply and place 40mm AC14 hotmix asphalt		m2	900	$ 30.59	$ 27,534.82		$ 27,534.82
4.19	Grooving asphalt (extra grip)		m2	128,327	$ 12.00	$ 1,539,924.00		$ 1,539,924.00
4.20	Linemarking		item	1	$ 99,000.00	$ 99,000.00		$ 99,000.00
4.21	Relocation of Helicopter Parking Area		item	1	$ 5,000.00	$ 5,000.00		$ 5,000.00
	Sub-Total					$ 15,956,577.52	$ 5,663,957.04	$ 10,292,620.48
5.0	**Lighting**							
5.01	Supply and Install new runway marker lights	assumed lighting on figures indicative of actual lighting requirements	each	30	$ 5,000.00	$ 150,000.00		$ 150,000.00
5.02	Relocation of existing runway marker lights		each	29	$ 3,500.00	$ 101,500.00		$ 101,500.00
5.03	Relocation of existing apron and taxiway A marker lights		each	26	$ 3,500.00	$ 91,000.00		$ 91,000.00
5.04	Relocation of end of runway threshold lights		each	16	$ 4,800.00	$ 76,800.00		$ 76,800.00
5.05	Supply and Install new Precision Approach Path Indicator (PAPI)		Item	1	$ 150,000.00	$ 150,000.00		$ 150,000.00
5.06	Apron lighting		Item	1	$ 15,000.00	$ 15,000.00		$ 15,000.00
	Sub-Total					$ 584,300.00	$ -	$ 584,300.00
6.0	**Building**							
6.01	Building Construction	Includes substructure, superstructure, internal fitout, fencing relocation	m2	1886	$ 4,000.00	$ 7,544,000.00	$ 377,200.00	$ 7,166,800.00
6.02	Security equipment		item	1	$ 1,000,000.00	$ 1,000,000.00		$ 1,000,000.00
6.03	Supply and Install Septic System		item	1	$ 90,000.00	$ 90,000.00		$ 90,000.00
6.04	Relocation of Services		Item	1	$ 20,000.00	$ 20,000.00		$ 20,000.00
6.05	Upgrade of refueling facility		item	1	$ 150,000.00	$ 150,000.00		$ 150,000.00
	Sub-Total					$ 8,804,000.00	$ 377,200.00	$ 8,426,800.00
7.0	**Design Fees**							
7.01	Detailed Design Fees	5% of construction fees	Item	1	$ 1,450,000.00	$ 1,450,000.00		$ 1,450,000.00
	Sub-Total					$ 1,450,000.00	$ -	$ 1,450,000.00
	TOTAL CIVIL WORKS (EX GST)					$ 29,924,967.34	$ 6,382,657.04	$ 24,126,610.30
	CONTINGENCIES 12.5%					$ 3,740,620.92	$ 797,832.13	$ 3,015,826.29
	TOTAL CIVIL WORKS inc. CONTINGENCIES (EX GST)					$ 33,665,588.25	$ 7,180,489.17	$ 27,142,436.58
	GST (10%)					$ 3,366,558.83	$ 718,048.92	$ 2,714,243.66
	CITB (0.25%)					$ 92,580.37	$ 19,746.35	$ 74,641.70
	GRAND TOTAL(inc GST & CONTINGENCY)					**$ 37,124,727.45**	**$ 7,918,284.43**	**$ 29,931,321.94**

Note: **This is a preliminary cost estimate and has been prepared based on information provided to Tonkin Consulting and upon experience and historical unit rates. Tonkin Consulting takes no responsibility for any variations**
- Latent conditions
- Changes in scope
- Market conditions (i.e. competition, escalation)
- No allowance for site contamination and remediation
- No allowance for Rock excavation
- No allowance has been made for the staging of these works
- No allowance has been made for landscaping or revegetation
- Assumed that items supplied from mainland but installed by local contractors will be assigned a ration of 20% KI to 80% mainland

Note: **The following items included in the estimate are provisional only:-**
- Earthworks quantities
- Road areas

Note: **Tonkin Consulting recommend that a professional Quantity Surveyor be engaged if assurance of cost is required and project budget estimates allowing for these factors are required.**

Note: **Rates adjusted for Kingscote Regional Indices**