Sydney Airport
2000 Valuation Review

for the Australian Competition and Consumer Commission (ACCC)

Peer Review Report

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Executive Summary

Opus International Consultants limited (Opus) has undertaken a peer review of the 2000 valuation of Sydney Airport civil infrastructure and building facility assets. The review considered the appropriateness of the methods used, the suitability of assumptions made, and the accuracy of the valuation. Recommendations have been made for changes to some input variables. Where there has been a lack of information to support assumed valuation parameters, and there is uncertainty about the potential effects of these assumptions, recommendations have been made for further elaboration and review.

The review team concluded that the 2000 valuation was based on appropriate methods and had been completed to high professional standards. Reliability of the valuation directly reflects the accuracy of information that was available. Some assets are well documented and have detailed inventories. There are also some assets for which very little relevant information is available. The team has identified a number of aspects where it has recommended changes. Differences were identified in several areas including:

(a) Values assumed for some input variables

(b) Lack of information to support some of the parameters used in the analysis

(c) Uncertainty about the potential effects of assumptions

The main recommendations and potential impacts are summarised below.

Allowance for Other Costs

Allowance for other costs such as professional fees and financial charges are included in the valuation as a percentage increase applied to the construction cost. The percentage used has a significant effect on the overall value, increasing $20M for every 1% increase in the allowance. The review has identified that the current allowance is potentially underestimated. Opus recommends that a detailed review be undertaken to confirm the value of this allowance. Potential changes could increase Optimised Replacement Cost (ORC) and Optimised Depreciated Replacement Cost (ODRC) by up to $100M.

Inventory and Quantities

The 2000 valuation was based on an update of the 1998 valuation, relying on exception reporting to account for significant changes that occurred in the interim. Opus recommends that the next valuation be developed from first principles based on (and tied to) a complete, up-to-date and verified set of CADD drawings from which quantities can be automatically measured.

Information Management

The information sources researched as part of this review were sometimes disparate and difficult to locate. Opus recommends that all information related to the valuation is co-located for ease of future reference.

Recommendations relating to specific asset groups are summarised as follows:

Runways, Taxiways and Aprons

Revisions are recommended for some valuation parameters to better reflect expected life cycles, replacement costs and optimised assets. The recommendation with the most significant impact on the pavement valuation is the placing of a residual value on the asphalt layer to recognise its ongoing contribution to pavement strength.

- Reduce subgrade cost. (ORC -$8.6M, ODRC -$4.6M)
- Reduce basecourse cost (ORC-$4.3M, ODRC -$2.2M. *Indicative - runway only*)
- Adjust thicknesses, lives and residual values. (ORC +$1.3M, ODRC + $61.1M)
- Use minimum depreciation rate of 1% for economic write-off (ODRC + $11.2M)

Airfield Grass

Airfield grass has been valued on the basis of turfing. A reduction in unit cost is recommended along with a revised life cycle to reflect maintenance funding.

- Reduce unit cost rate (ORC -$13.8M, ODRC -$7.5M)
- Increase life (increase in ODRC)

Runway Platform and Sea Protection

An optimised replacement of the platform for the main runway would involve a significant reduction in the quantities of fill, sea protection works and area of grass. The basis for the current valuation is unclear and appears to be overstated. Further elaboration and review of these assets is recommended.

- Reduce the unit cost of sea protection works (decreased ORC and ODRC)
- Increase the life of the sea protection works (increase in ODRC)

Roads and Carparks

The asset inventory for this category lumps information together for each asset type. Verification of quantities has not been possible. It is recommended that a more detailed inventory be developed. Two specific high valued assets in this category are the elevated roads at both the Domestic and International Terminals. Both appear to have an overstated value. It is recommended that the replacement cost of these two structures be recalculated.

Airfield Lights

The useful life for lighting equipment is overstated in the current valuation

- Reduce the life of lighting equipment (ODRC - $3.7M)

Passenger Terminal Buildings

Both the old and new parts of the terminal structure should be considered to have identical remaining lives. Also, centralising the location of services within the terminal building would effectively reduce the length of the services tunnel.

- Use a single remaining life for the structure (ODRC + $4.4M)
- Reduce the length of the services tunnel (ORC – $3.1M and ODRC - $1.9M)

Other Buildings

Some buildings are no longer required for their original purpose and are now being used simply as a storage area. Also, an unusual sequence of remaining lives has been specified for some buildings. A more generic specification is recommended. The services of the elevated water tank, while still used, could be provided by a less costly alternative.

- Recalculate replacement value to reflect current lower use of buildings (reduced ODRC)
- Revise the lives for structure, fitout and building services (minor impact)
- Value an optimised replacement for the elevated water tower (minor impact)

Main Services

Only minor changes are recommended for the main services assets.

- Review basis for current charging (impact unknown)
- Include value for lateral connections from water mains (minor increase in ORC and ODRC)
- Decrease diameter for gas main (ORC - $0.6M)
- Review fuel main assets (Potential ORC - $0.5M)

Fixed Plant and Equipment

Optimisation would centrally locate services for the terminal building, reducing the effective length required for the services tunnel. There would be a corresponding reduction in the amount of mechanical services.

- Reduce services to correspond with the shortened tunnel length (ORC - $6.6M)

1 Introduction

1.1 Overview

The Operator of Sydney (Kingsford-Smith) Airport, being Sydney Airport Corporation Limited (SACL), has applied to increase charges for aeronautical services. Part of the justification for the proposed increase is a revaluation of assets undertaken for SACL by Maunsell McIntyre Pty Ltd (MMPL). The Australian Competition and Consumer Commission (ACCC) has engaged Opus International Consultants Ltd (Opus) to undertake an independent review of SACL's 2000 valuation in terms of accuracy.

This report has been structured to address the key elements of the review process:

Section 1	explains the background and scope of the review
Section 2	outlines the process and approach taken by MMPL in developing the 2000 valuation for Sydney Airport.
Section 3	describes the approach taken for this review
Sections 4 to 14	detail the findings of the review, identifying and discussing areas of potential variation and outlining the basis of our understanding for each asset group. A response by Maunsell McIntyre Pty Ltd in regard to the issues raised is also included (refer below).
Section 15 & 16	presents the conclusions and recommendations

Comments from MMPL in response to issues raised by Opus International Consultants Ltd are shown in italic font and contained in a box.

MMPL (Dec 2000)

1.2 Review Brief

The review focuses on the accuracy of the key valuation outputs that impact on pricing; namely Optimised Depreciated Replacement Cost (ODRC) and depreciation.

The scope of work required includes:

- Familiarisation with airport layout and available information.
- Review of the process used to prepare the SACL asset valuation schedule.
- Review of adequacy of the information used.
- Verification of SACL ownership of assets.
- Assessing the reasonableness of the applied unit cost rates.

- Independent assessment of asset values.
- Liaison with relevant parties including MMPL, Rawlinsons, SACL and airline representatives.
- Preparation of a review report.

1.3 Review Team

The Opus team that undertook the review are:

John Vessey (Team Leader) - Valuation

Travis Gilbertson - Information Management & Valuation

Ian Greenwood - Pavements

Peter Thorby - Buildings

Gavin Dunn - Building Services

Bruce Rodway was engaged as a consultant to provide specialist advice on airport pavements.

More detail on the team, their responsibilities and interrelationships with other parties involved in the review exercise is provided in Appendix A.

1.4 Background

1998 Valuation In 1998 MMPL undertook a valuation of Sydney Airport assets, including all civil infrastructure and building facility assets. They firstly developed an asset register using Sydney Airport plans and from site observations. This was subsequently developed into a valuation schedule (MS Excel spreadsheet).

Rawlinsons (Aust) Pty Ltd was engaged to assist with developing replacement cost rates to be applied to the assessed quantities. SACL book values were adopted for assets where inventory details were insufficient to independently assess realistic replacement costs.

2000 Revaluation The same project team undertook a revaluation of airport assets as at the 30th June 2000. This revaluation was based on updating the 1998 valuation to include significant changes resulting from new developments, such as the AS2000 project, and various parallel capital works.

The methodology developed involved:

a) indexing costs to June 2000 values
b) addition of all capital works since the 1998 valuation;
c) removal of assets destroyed or abandoned (disposals);
d) appropriate adjustment for depreciation.

Field verification was carried out to confirm the extent of asset change since the 1998 valuation (additions and deletions) and to validate remaining lives based on observed condition. The assets included at SACL book value in the 1998 valuation, were independently re-valued for the 2000 valuation.

2 2000 Revaluation Methodology

The 2000 revaluation prepared by MMPL is based on Optimised Depreciated Replacement Cost (ODRC). This process involved four main steps. These are:

a) Development of an asset inventory (quantum of assets).

b) Estimation of the current replacement cost.

c) Adjustment to reflect an optimised arrangement.

d) Depreciation to reflect remaining life.

2.1 Asset Inventory

The asset inventory was developed using:

- Plans, reports and other technical information obtained from SACL officers.
- SACL asset database.
- Liaison and discussion with SACL officers.
- Field observation.

Assets were classified into parent assets and where appropriate, subdivided to sub-component level, to facilitate accuracy of cost estimation and enable application of appropriate depreciation methodology. The valuation schedule has been developed in a Microsoft Excel spreadsheet, separated into individual worksheets for each asset group. Assets are assigned unique identification and description fields. These include:

- SACL account number/code.
- SACL asset register number (from Activa register).
- MMPL asset number.
- Name identifying either the parent, sub-component or specific item.
- Description of asset.
- Location in terms of grid references.

Asset groups are presented in Table 1.

Table 1 : Asset Groups

Account Number	Account Description
510	Runway, Taxiways and Aprons including grassed areas
515	Roads and Carparks including landscaping
516	Fences and Gates
520	Lights and Visual Aids
530	Passenger Terminal Buildings
540	Other Permanent
550	Temporary Buildings
560	Main Services including water, sewerage, stormwater, electricity, gas and fuel
570	Aerobridges
580	Fixed Plant and Equipment
660	Work in Progress

2.2 Replacement Costs

Replacement costs were:

- Based on recent-on-site competitively tendered construction works.
- Drew on Rawlinson's extensive database of construction costs and Rawlinson's experience in the detailed build-up of those costs.
- Adjusted to reflect the scale and prestige associated with the Sydney Airport facility.
- Adjusted where necessary to reflect the long run price trend with removal of any short term spikes such as those produced by the Sydney Olympics and the increased demand to complete construction works prior to the 1 July 2000 introduction of GST.
- Updated to current values using appropriate price indices.
- Adjusted to allow for other costs such as professional fees and financial charges.

2.3 Optimisation

The level of optimisation was confined to replacement of assets with modern equivalent technology assuming "brownfields" development. For practical reasons, location was treated as fixed, and the configuration assumed to be near optimal. Costs were assessed to reflect an optimised construction sequence and adjusted to allow for the difficulties associated with a "brownfields" environment. No adjustments were made for elimination of surplus assets, obsolescence or over design.

2.4 Depreciation

The assets are depreciated on a straight-line basis from their initial optimised replacement cost to a zero residual value at end of their useful life. The remaining life of assets was estimated taking into account:

- Field observations of condition.
- Consideration of current use, age and operational demand.
- Operational status within the current airport planning.
- Discussions with SACL operational officers.

The useful life of assets was calculated by adding the current age to the assessed remaining life. These calculated lives were then checked to be within the bounds inferred from codes and standards (lower) and through quality, maintenance and optimised use (upper).

3 Review Methodology

3.1 Overview

Considerations taken into account by Opus in undertaking the review of the SACL valuation included:

- The contribution of the asset to the purpose of SACL.
- Whether, or not, the asset would be replaced.
- The form or manner in which it would be replaced (optimisation).
- The minimum cost of replacing the services rendered to SACL by the asset.
- Where the asset would not be replaced, what selling price or salvage value could be realised.

An outline of the methodology adopted follows:

a) Familiarisation with the airport facility and available relevant information.

b) A review of the methodology used for the SACL valuation.

c) Identification of the source of all valuation inputs.

d) A review of valuation inputs and assumptions.

e) Verification of valuation outputs.

f) Discussion with airline representatives to identify their concerns with the current valuation.

g) Identification and reporting of variances with the SACL valuation.

3.2 Detailed Methodology

The detailed review methodology developed by Opus was divided into three stages:

1. Desktop study of asset register and valuation schedules (MMPL office)
2. Site familiarisation, inventory reconciliation and asset inspection (Sydney Airport)
3. Desktop reconciliation and data accuracy assessment (SACL office, Opus office)

The detailed methodology in respect to the valuation schedules is presented in Table 2.

Table 2 : Review Methodology

Valuation Item	Purpose	Specific Tasks	Stage
Asset Description	Register complete	Obtain site plan/map	1
		Reconcile inventory off available plans	1
		Reconcile inventory during site inspection	2
	Description accuracy	Reconcile asset register with valuation schedules	3
Measurement	Accuracy	Scale off maps	1
		Site Measurement	2
Unit Costs	Realistic costs	Develop comparison schedule	1
		Source basis for MMPL cost rates	1
		Opus assessment (contracts/Rawlinsons/experience)	3
Age	Accuracy	Reconcile with asset register	3
		Source basis where necessary	1/3
Remaining Life	Realistic life	Source basis for MMPL remaining life	1
		Opus assessment (other airports/IMMS)	3
		Condition review	2
		Performance review	3
		Future demand/use	3
		SACL development strategy	3
		20 year maintenance/renewal programme	3
		Changes in technology	3
Useful Life	Realistic life	Source basis for MMPL useful life	1
		Opus assessment (other airports/IMMS)	3
Residual Value	Realistic Replacement	Assess residual value	3
Depreciation	Methodology	Depreciation method appropriate	3

3.2.1 Asset Register Completeness

An inventory check was carried out to ensure that all assets had been included in the schedule and that descriptive details were recorded correctly.

Familiarisation involved a thorough review of all the supporting documents, SACL 2000 Valuation (Volumes 1, 2a, 2b and 2c), drawings, layout plans, reports and aerial photographs. Familiarisation also involved discussions with both Maunsell and SACL officers involved in the valuation exercise and a guided bus tour of the total facility. A list of people contacted is provided in Appendix B.

3.2.2 Measurement Accuracy

Asset quantities were verified by scaling areas / dimensions off plans and drawings. Field inspections were carried out to confirm that location, category and description had been appropriately coded and that the listed quantities appeared realistic. Field measurements were made where practical. Check lists were developed to facilitate the task and to ensure all asset groups were covered.

3.2.3 Replacement Costs

(a) *Unit Costs*

The basis of the unit cost rates used in the valuation was researched. This involved a review of the detailed build-up of these costs.

(b) *Other costs*

A review was undertaken of the allowances included for other costs such as development fees and charges. These include:

- Professional fees for planning, investigation, design and construction supervision.
- Preliminaries and site establishment.
- Management and financial charges calculated over the construction timetable

The loading applied to the valuation to allow for these other costs has a significant impact on the overall value. Each 1% change in the loading results in a $20M change in value. There are two key aspects to this:

(i) the allowance for each component of cost, and

(ii) the timing of these costs.

With respect to the first aspect, Table 3 compares the allowances from various sources, showing that there is a range of opinion on what should be allowed for these costs. The allowances are expressed as a percentage (%) of the construction cost.

Table 3 : Comparison of Cost Allowances

Cost Component	SACL		BARA		Opus	
	Infrastr.	Build.	Infrastr.	Build.	Infrastr.	Build.
Preliminaries	5	10	3	10	3	10
Builders Margin			1.5	5		
Site Allowance				3		
Professional Fees	10	12	2.5	6	6 - 12	12
Management	2	2			2	2
Financial Charges	4	4			5*	5.5*
Total Allowance	21.9%	29.3%	7.2%	26.1%	15.6-22.5%	30.9%

* *assumes a WACC of 8%*

SACL Total Allowance = (1 + prelim+ prof fees) x (1+mgmt+financial) -1

BARA Total Allowance = (1 + prelim) x (1+builders margin) x (1+ site allowance) x (1 + prof fees) -1

Opus Total Allowance = (1 + prelim) x (1 + prof fees +mgmt)+ financial -1

BARA has suggested that the allowance for professional fees is considerably less for infrastructure assets compared to buildings. This would only be correct for assets that require little planning, investigations, design and supervision, such as the airfield grass. BARA has chosen not to consider or include an allowance for either SACL management costs or financial costs. These are real costs and must be allowed for.

With respect to the second aspect (timing of costs), this is also a key issue. The current allowance provides a one-year period from the start of construction until the asset is available for use. This assumption is appropriate for incremental development or renewal work. It is however far too short for the initial greenfields stage of development where a two-year construction period would be more realistic. This would add another 5% to the costs (ie $100M).

This raises another important issue. With the allowance for other costs being higher for initial development than for renewal, the difference is not depreciable. For example, the 'other cost' component of the greenfields development may have been $550 million, using a two year construction period. However, when all of the components of the initial construction are replaced or renewed, over a one year construction period, the 'other cost' component of the individual items summed together may amount to $450 million. This latter figure is depreciated, whereas the $100 million difference remains as an undepreciated cost component of the original construction. The allowance for other costs should therefore be subdivided into depreciable and non-depreciable components. The amount allowed for in the current valuation is effectively the depreciable component. In addition to this, is potentially another 5% non-depreciable component that would be incurred as part of the original construction. (While non-depreciable from a condition perspective some depreciation should be made for "economic" write-off. Refer to section 4.7)

> *In the Valuation 2000 report Maunsell McIntyre have assumed that preliminaries, builders margin and site allowances have been included in the rates for the construction of the individual assets and have not referred to them in their report. However, MMPL have referred to professional fees separately to indicate the additional cost of these fees on the rates used in the valuation.*
>
> *Management and financial fees have been added separately in the valuation spreadsheet as they are generally considered to be an actual cost to the Owner.*
>
> *Rawlinsons have advised that the percentages vary in respect to "Other Permanent Buildings" and "RTA's, Roadways, etc."*
>
> *MMPL*

Because the valuation is particularly sensitive to this allowance, it is important that its components are clearly explicit and well researched.

Recommendation 3.2.3(b)	Undertake a detailed review of the allowance for other costs taking appropriate account of: - the range of costs to be allowed for - variation in allowance for some asset groups - the timing of these costs - depreciable and non-depreciable components of these costs
Valuation Impact	Potential increase in ORC and ODRC of $100M.

(c) ***Optimisation***

The optimisation process seeks to minimise the cost of replacing the services offered by SACL, given the age and condition of the existing assets and recognising the incremental process (brownfields) associated with airport development. The current valuation limited optimisation to replacing current assets with modern equivalents.

The review process has attempted to extend the level of optimisation to include consideration of eliminating surplus capacity, obsolescence and over-design. The question of optimality of layout and location are being considered by others (Sydney Airport Revised Draft Aeronautical Pricing Proposal) and have been assumed optimal for the purpose of this review.

3.2.4 Asset Age

Where possible, information was obtained on the construction dates for the assets or asset components. These were compared to the ages shown in the valuation schedule. Judgement was used during site inspections to reconcile the age information listed in the valuation schedule with that apparent from observation.

3.2.5 Remaining Life

Remaining lives were then typically calculated by subtracting age from estimated useful life. The appropriateness of these remaining lives was then reviewed given the following

- observed condition of the asset (field inspection).
- future use of the asset (SACL development strategy).
- Planned replacement programme (20-year maintenance plans).
- Expected changes in technology.

3.2.6 Useful Life

The useful lives assigned to assets were checked to be within the range expected for each particular asset group.

> *We have used physical lives when depreciating asset values. Commercial or Economic write-off may well override the physical lives.*
>
> *MMPL*

3.2.7 Residual Value

Consideration was given to the appropriateness of the assumption in the current valuation of zero residual value for all assets.

3.2.8 Valuation Methodology and Depreciation Assessment

The ODRC valuation methodology is now a reasonably standardised and widely accepted procedure. This review covers the application of these procedures to the Sydney Airport facility and compliance with the valuation guidelines developed by Ernst & Young. The potential for variation is not so much with the methodology itself, but in its application. In particular, with the underlying assumptions and input variables used for the valuation.

3.3 Valuation Outputs

To ensure that numerical calculations of asset value are correct, all valuation spreadsheets including the numerous calculation fields and dynamic links, were verified.

3.4 Airline Concerns

A meeting was held with airline representatives (BARA) to discuss concerns they had with the current valuation. BARA presented a report of their recently completed audit review of the 1998 SACL valuation undertaken by MMPL. Their findings were based on the detailed consideration of a selected sample of assets. The issues raised in the BARA report have been taken into consideration and commented on in this review.

3.5 Review Report

This report should be regarded as an “exception” report. Those aspects of the valuation found during the review to be appropriate or materially insignificant have not generally been commented on. The report identifies issues regarding the accuracy of the SACL 2000 revaluation and makes an assessment of the likely impact on the valuation of particular components.

4 [510] Runways, Taxiways and Aprons (RTAs)

4.1 Quantities

RTA pavement areas were measured by scaling off hard copy drawings. While most areas sampled reconciled with those in the valuation schedule, there were some that were different. Subsequent discussion with MMPL indicated that in the course of the original valuation they discovered discrepancies between areas of known geometry with those measured from hard copy drawings. This raised doubt in terms of the accuracy of those drawings, resulting in a revision to the original SACL measurements for the valuation. No subsequent information on actual measurements was available for the reviewers to verify these quantities.

BARA also suggested that there are discrepancies with areas of taxiways and aprons, car parks, roads and fences.

By way of more background comment, MMPL have responded that "The measurement of the taxiway and apron areas were taken from the SACL database, however, these areas were checked by measuring the areas with a planimeter and by scale on hard copy drawings. The remeasured areas tendered to produce results that were not consistent with the known geometry of some sections of the RTA's and those areas originally measured from the CADD based files. As a consequence the SACL measurements were adopted as being more accurate than the measurements obtained from plan prints. We would be hesitant to alter those areas before a more substantial review of areas using the original CADD based files"

MMPL

Recommendation 4.1	That the original CAD drawing files be updated with current surveyed measurements and the pavement areas be recalculated from the updated CAD files.
Valuation Impact	Unknown but potentially a significant impact.

4.2 Unit Costs

The unit costs used for valuing the pavement assets were derived by Rawlinsons based on an itemised construction schedule for each category of pavement. These schedules were reviewed and found to be appropriate with differences mostly small. Some noted exceptions are:

Subgrade The subgrade excavation rate of $15/m^3 is considered high considering the quantum of work and the bulk earthwork operation required. Also the assumption that 20% of all pavement area requires a 2m undercut, is considered unreasonable considering the good subgrade conditions (apart from the Northern Pond area).

Basecourse The rate of $150 / m^3 (varies between 130 to 185) is higher than expected. SACL has indicated that recent work at the airport would suggest a rate of $130 / m^3. Other sources lead us to believe that an even lower rate could be more realistic. As an indication of sensitivity, the impact of using a basecourse rate of $100 / m^3 for the runway assets, has been assessed (see results below).

Recommendation 4.2

(a) Remove assumption that a 2m undercut is required over 20% of the pavement area.

(b) Reduce the basecourse cost rate to $130 / m^3

Valuation Impact

Valuation impact assessments are calculated on Runways only for indication of affect.

(a) ORC - $8.6 M
ODRC - $4.6 M
(RSGA_1, RSGA_2, RSGC_3 = $20/*$m^2$)*

For an indication of sensitivity, $100 / m^3 has been used in the following assessment.

(b) ORC - $4.3 M
ODRC - $2.2 M
(RBCA_1 = $66.23/*$m^2$, RBCA_2 = $55.30/*$m^2$*, RBCC_3 = $19.72/*$m^2$*)*

4.3 Comparison of Pavement Assumptions

A comparison of the pavement parameters assumed for the 2000 SACL valuation, with those proposed by BARA and Opus are presented in Table 4 for each RTA pavement category.

Table 4 : Pavement Parameter Comparisons

Element	Thickness (mm)			Life (years)				Residual Value (%)			
						OPUS				OPUS	
	SACL	BARA	OPUS	SACL	BARA	Pre 1962	Post 1962	SACL	BARA	Pre 1962	Post 1962
Runways – Asphalt Wearing Course											
Asphalt	60-160	60	50	12-14	14	14	14	0	0	0	67%
B/C	450-650	600	600	60-70	∞	75	∞	0	100	0	100
S/G	NA	NA	NA	58-100	∞	75	∞	0	100	50	100
Runways – Concrete Wearing Course											
Concrete	400	450	400	50	50	50	50	0	0	0	0
B/C	150	200	200	50	50	50	50	0	0	0	25
S/G	NA	NA	NA	100	∞	50	∞	0	100	50	100
Taxiways											
Asphalt	50	50	50	12	10 -15	14	14	0	0	0	67%
B/C	(1) 300-650	500	300 - 600	60	∞	75	∞	0	100	0	100
S/G	NA	NA	NA	60	∞	75	∞	0	100	50	100
Aprons											
Concrete	300-450	450	300-400	32-50	50	50	50	0	0	0	0
B/C	200-300	200	200	32-50	50	50	50	0	0	0	25
S/G	NA	NA	NA	40-100	∞	50	∞	0	100	50	100

(1) 300mm is scheduled on new taxiway "U" adjacent to runway 16L34R

Element	Thickness (mm)		Life (years)		Residual Value (%)	
	SACL	OPUS	SACL	OPUS	SACL	OPUS
Shoulders and Runway Overruns						
Asphalt	25	25	12	14	0	0
Aggregate	275-500 (2)	200	58-70	∞	0	100
Subgrade	NA	NA	58-70	∞	0	100

(2) 275mm on overruns and 500mm on shoulders

4.4 Flexible Pavements (Asphalt)

Flexible pavements at Sydney Airport comprise layers of compacted rock aggregates (basecourse and subbase) over the foundation soils (subgrade), surfaced with a relatively thin layer of asphaltic concrete (AC). The asphalt layer spreads vertical loads, resists lateral loads and provide waterproof protection to the underlying pavement layers and foundation soils from rainwater, which would soften them.

4.4.1 Pavement Thickness

To support international class aircraft such as the Boeing 747 "Jumbo" jet, a 600mm thick pavement is required over the sandy soils present at Sydney Airport.

Thickness of the asphalt overlay must take into account the forecast wheel loading demand over its expected life. However it is more usually governed by the practical construction limitations that the asphalt layer be at least 2.5 times the size of the largest stone contained within, and to be sufficiently thick to prevent sliding over the underlying asphalt due to horizontal forces applied during breaking and cornering. For heavy duty pavements an asphalt thickness of 40 to 50 mm is generally required to meet these minimum requirements. (25mm is often used for lightly trafficked pavements)

The recommended thickness for valuation of the flexible pavements is 600mm of granular material with a 50mm asphalt wearing course.

Runway pavement thickness of 160 mm Asphalt wearing course is a short transition section between the rigid concrete pavement in the end zone, and the main flexible pavement of the runway where the wearing course is 60 mm asphalt.

Opus further notes that this additional thickness is redundant with respect to an optimised replacement.

Overrun pavement thickness replacement cost has used the design for the parallel runway as most appropriate, that is, a base course 275 mm thick.

The shoulder and blast shoulders have a different thickness of base course material, namely 550mm for shoulders and 300mm for blast shoulders as per the design for the parallel runway being the most appropriate.

Opus further notes that given the likely loading/risks, a 550mm thickness could be considered as over-designed.

New taxiways "U" and "T5" are Code C taxiways not Code E as are the remainder of the taxiways, they are lightweight taxiways and are considerably thinner than normal domestic taxiways, and use two layers of base course total thickness of 300 mm, due to the lighter aircraft loading such as A320 and DHC-8. International flexible taxiways have a multi-layered base course of 650 mm and domestic taxiways have a multi-layered base course 550 mm thick. Maximum base course thickness for all concrete aprons is 200 mm.

Base course materials are usually made up of one, two or three layers of base courses of different materials. Normally the bottom layers would be referred to as subbase but they have been amalgamated in the valuation into one cost centre with each layer priced in the rate make-up. The exception to this is the Northern Ponds standoff apron where particular subgrade problems required a layer of between 1100 and 1800 mm thick of sub-base under the base course material.

MMPL

4.4.2 Pavement Life

Pavement deterioration occurs from a combination of loading and environmental effects. It is the latter that usually dictates the frequency of maintenance treatments. The asphalt surface shrinks and cracks over time due to the environmental affects of heat and ultraviolet light. This is because the bitumen gradually loses some of its component oils by evaporation, and ultraviolet light causes changes to the molecular structure resulting in a loss of flexibility. In its embrittled condition, aircraft wheel loads cause fatigue cracking at an increased rate. Pavements must be resurfaced with asphalt at approximately 15-year intervals to restore flatness, integrity and waterproofness. Timing varies depending a number of factors, but generally ranges between 12 and 15 years. An average cycle of 14 years is considered realistic.

If the crushed rock (basecourse and subbase) pavement layers have been constructed using hard, chemically durable rock, then the compacted foundation soils should not deteriorate or "wear out" in the way that the asphalt surface layer does. During the 12 to 15 years use between overlays, the aggregates are permanently compressed by the aircraft loads, producing a loss of shape at the pavement surface, but suffer no deterioration in the material itself. In fact, the pavements strength (defined as its capacity to resist deformation and to effectively protect the foundation soils from which loads) generally increases because its composition of material is more compact. Thus, once the shape, integrity and waterproofness of the pavement surface has been restored by overlaying with asphalt, the pavements "life" is effectively reset.

These assumptions would be appropriate for all Sydney Airport pavements constructed since 1962. These comprised high quality basecourse materials overlaying a well-compacted high strength sand subgrade formation. The integrity of these lower pavement layers has and is being effectively maintained through appropriate SEST (Surface Enrichment Sprayed Treatment) to rejuvenate the bitumen surface, patching to correct surface profile defects and regular asphalt overlays. Some of the basecourse laid post 1962 has exhibited slight deterioration. However, the net effect of successive overlays is likely to overshadow the effects of the current rate of deterioration.

Pavements constructed prior to 1962 used a lower quality aggregate (Prospect Dolerite) which contained chemical impurities and has subsequently exhibited signs of deterioration. These pavements will eventually require replacement and re-establishing the integrity of the subgrade formation. In the absence of a detailed investigation, a 35-year time horizon for this replacement has been assumed for this review.

> ***Basecourse*** *– Pavements laid pre 1962, that is the phase 1 development, have been constructed with materials some of which have proven over time to be less suitable for the use. In particular these pavements include the base course for runway, 07-25, part of runway 16R-34L north of General Holmes Drive and taxiways part B4, part C, D, part F and G. Some other localised areas were also constructed during this time.*
>
> *The pavement material has reached an advanced state of deterioration caused in part by weak materials, load conditions and by periodic high ground water levels, some of the stones in this material can be broken by hand. The rate of deterioration, of the base course materials, has been reduced to manageable levels by increasing the thickness of the wearing course. However these materials will continue to deteriorate, albeit at a slower rate until they eventually need to be replaced.*
>
> *The problems with the pre 1962 pavements have resulted in the development of a testing program for all runways, taxiways and aprons. This program has identified some deterioration of the base course materials of the pavements laid in the post 1962 period. The material used in these pavements is a harder and more durable material than that used pre 1962, but is still showing signs of deterioration but to a lesser extent.*
>
> *From a long term perspective, we have only a limited idea what the future will produce. The airlines have ordered new generation aircraft, including the A340 and B777-300, which will begin operations about 2002, these aircraft types will increase the wheel loads from about 22.5 tonnes to 27 tonnes, an increase of some 20% in wheel loads. The effect of this increase in wheel loads is unknown at this time and will require extensive investigation and possible strengthening works prior to the arrival of the aircraft and certainly detailed monitoring once the aircraft are in use.*
>
> *Continual testing and monitoring of all pavement strata will be required for the foreseeable future, particularly once the new aircraft commence operations.*
>
> ***Subgrade*** *– Recompaction of the subgrade will also be required before placing any new base course material. Proof rolling to locate unsuitable material would depend on the age of the original pavement, the reasons for replacement and perception of the original subgrade preparation. Settlement of the subgrade would require proof rooling and build up of the subgrade platform for construction of the base course material. Compaction, to current densities, of the subgrade under full inundation would be required regardless of the reasons for base course replacement.*
>
> *MMPL*

4.4.3 Residual Value

The wheel load demands placed on the RTAs has steadily increased over time as a result of the progressive increase in aircraft size and frequency. Pavement strengths have been sufficient to accommodate these increased demands through successive overlays of asphalt. The asphalt underlays continue to contribute to the pavement strength capability, continuing to retain value until the pavement is either demolished or abandoned. This retained value is recognised by allocating a residual value to the upper layer of asphalt.

The overlay process requires that the surface of the previous asphalt layer is milled. The depth of milling varies from 25mm at the centre to around 10mm where the pavement abuts the shoulder. This effectively leaves an average thickness of 33mm of the previous layer (originally 50mm thick) to contribute to strength capacity. In other words, the asphalt wearing course has a residual value of 67% of the cost of its replacement. (Optimisation requires that the residual value should reflect the minimum cost of providing equivalent strength. However the cost difference between 33mm of asphalt and a larger thickness of basecourse is unlikely to be material.)

The basecourse and subgrade for the post 1962 pavements are assumed to be non-depreciable and hence retain a residual value of 100% of replacement cost. The basecourse and subgrade for pre 1962 pavements are assumed to have a zero and 50% residual value respectively. The 50% residual value for the subgrade reflects that not all areas will require re-establishment and those that do are likely to make use of waste basecourse. These are likely to cost less than the original construction.

> *Some items may have a residual or scrap value at the end of their useful life, but this would be reflected in the value of the demolition costs associated with the removal of the building.*
>
> *All salvageable material from the RTA's is stockpiled and reused in new works where possible. The associated cost savings are reflected in the contract value of new works.*
>
> *MMPL*

The assumed valuation parameters for flexible pavements are presented in Table 5.

Table 5 : Flexible Pavement Parameters

Component	Thickness (mm)	Life (years)		Residual Value	
		Pre 1962	Post 1962	Pre 1962	Post 1962
Asphalt	50	14	14	0	67%
Basecourse	600	75	∞	0	100%
Subgrade	—	75	∞	50%	100%

Recommendation 4.4 Change the valuation parameters to reflect the design criteria presented in Table 5.

Valuation Impact
ORC + $0.4M
ODRC + $51.0M

4.5 Rigid Pavements (Concrete)

Concrete pavements are used in the apron areas where there is a likelihood of fuel spillage from parked aircraft (aviation fuel tends to soften and damage bitumen based materials). Concrete is also used at each end of the runway, providing superior strength and characteristics to cope with the high lateral wheel loads.

For the concrete hardstand areas, the concrete slabs are assumed to have a 50-year life expectancy and zero residual value. The underlying basecourse layer is assumed to be partially sacrificed during demolition and removal of the slabs and will require replacement and recompaction. As with the flexible pavements, for those pavements constructed pre 1962, the basecourse material is likely to be of low quality and require complete replacement. The assumed valuation parameters are presented in Table 6.

Table 6 : Rigid Pavement Parameters

Component	Thickness (mm)	Life (years)		Residual Value	
		Pre 1962	Post 1962	Pre 1962	Post 1962
Concrete	400	50	50	0	0
Basecourse	200	50	50	0	25%
Subgrade	—	50	∞	50%	100%

Recommendation 4.5	Change the valuation parameters to reflect the design criteria presented in Table 6.
Valuation Impact	ORC + $0.4M ODRC + $10.1M

4.6 Shoulders and Runway Overruns

Shoulder and overrun pavements are only under rare circumstances, subjected to heavy wheel loading. They need to be strong enough to support the rare trafficking by aircraft that accidentally run off, without damaging the aircraft. An additional consideration is the potential use of the shoulders by fire tenders in the event of an emergency. The shoulder may be damaged but this can be easily repaired. To achieve this, common practice is to make the shoulders about half the thickness of the adjacent full strength aircraft pavement. The assumed thickness for an optimised replacement shoulder is 250mm of basecourse and 25mm of asphalt.

Shoulders are resheeted at the same time as the runway or taxiway to ensure uniformity of surface across the entire width of the pavement. Overlays for the main pavement area usually vary in thickness from 65mm at the centreline to around 35mm at the outer edge adjacent to the shoulder. With milling depth of around 10mm, the required thickness of the shoulder overlay is therefore limited to 25mm to restore continuity of surface levels.

Any local failures where the occasional, accidental wheel loading strays onto the shoulder area would be patch repaired as part of the routine maintenance activity ie. this work would be expensed rather than capitalised and hence it would be inappropriate to include a depreciation allowance. The basecourse and subgrade are therefore assumed to be maintained indefinitely.

The assumed parameters for the shoulder and overrun pavements are presented in Table 7.

Table 7 : Shoulder Pavement Parameters

Component	Thickness (mm)	Life (yrs)	Residual Value
Asphalt	25	14	0
Basecourse	250	∞	100%
Subgrade	NA	∞	100%

> *Shoulders are resheeted at the same time as the runway or taxiway to ensure uniformity of surface across the entire width of the pavement.*
>
> *MMPL*

Recommendation 4.6	Change the valuation parameters to reflect the design criteria presented in Table 7.
Valuation Impact	Incorporated with the changes in Tables 5 & 6

4.7 Economic Write-Off

Physical condition is unlikely to be the determining factor in setting the useful lives for the lower pavement layers of good quality basecourse and subgrade. These components of the pavement asset by their very nature and maintenance regime have very long time horizons. Changes in technology are more likely to drive their eventual replacement or obsolescence. It is from a commercial perspective, good practice to provide “economic write-off” to cover these technological risks. What will the transport future be in 50 to 100 years time? Given the changes that have occurred over the last century, there is a real chance that RTAs as we now know them, will no longer be fully functional or may not be required at all. An annual depreciation of 1% to cover this risk is considered minimum for the RTA assets.

All assets have been given finite lives in the 2000 valuation. Even with the current maintenance regime we do not believe that the assets are sustained in perpetuity either from an engineering or an economic point of view.

History has shown that nothing is definite and airports have been made obsolescent well before their useful life has expired.

We do not believe that the actual condition of the pavement strata can be ignored to give credence to a theoretical perspective. In any event there must be an economic life to the assets in question as one, the site is a leased site from the government, and two, no one knows what will happen to airport transport in the next 50 years, other reasons could make the airport redundant at any time.

We have used physical lives when considering asset valuation. Proposed future development costs and early write-off of assets should be treated at the time of the development.

MMPL

Recommendation 4.7	Adopt a minimum 1% depreciation for all RTA subgrades and basecourse constructed post 1962. (Depreciation of pre 1962 pavements already exceeds this proposed minimum)
Valuation Impact	ORC nil ODRC + $11.2 M

4.8 Cooks River Bed

Much of the early constructed RTAs overlie the original riverbed of the now realigned Cooks River. Some of these pavements have been constructed over a layer of esturine silts, some 2 metres below the surface. Allowance for this can be included in the subgrade cost for these pavements or by assuming an increased thickness of subbase material. The valuation assumes that 20% of all pavement areas are subject to a 2m undercut in addition to the pavement excavation.

Recommendation 4.8	Adopt increased cost rates for the subgrade (or thickness of subbase) component of RTAs constructed over Cooks River Bed.
Valuation Impact	Increase in ORC and ODRC

4.9 Airfield Grass

4.9.1 Unit Cost

The SACL 2000 valuation has costed the airfield grass assets based on the “turfing” method of construction. This is a relatively expensive method ($17/m^2) compared to other common techniques such as field seeding, which is considered to be a more appropriate method for an optimised replacement option.

Recommendation 4.9.1	ORC should be based on a lower more appropriate cost rate
Valuation Impact	ORC -$13.8 M (based on $8/m^2) ODRC - $7.5 M

4.9.2 Quantity

The area of grass used in the valuation should take into account the optimised sizing of a replacement causeway for runway 16R–34L (section 4.10).

Recommendation 4.9.2	Use an area of grass consistent with an optimised platform for runway 16R-34L.
Valuation Impact	Reduced ORC

4.9.3 Depreciation and Useful Life

MMPL has indicated that drought, flooding and sea spray can result, and have resulted, in some areas of grass being killed off necessitating replacement. On this basis the airfield grass asset has been fully depreciated over a 25 year life cycle.

Grass replacement is usually carried out by "turfing" to avoid potential problems with bird attraction that can occur with grass seeding. However, most of this work is undertaken as routine maintenance and funded as an operating expense. Consequently it would be inappropriate (double counting) to also include a depreciation provision.

Flooding or spray with salt water will kill the grass and sections of the grassed areas of the parallel runway have been poisoned and killed by salt spray. It is also possible that an extended period of very low rainfall could require replacement of some if not all grass areas, for instance the drought of the mid 1990's killed sections of grass because sufficient water could not be provided. Flooding of the grassed drainage retention basins can cause uneven settlement and subsequent ponding and grass being replaced by other plant growth that then dies off leaving open sand areas. Regrading of these areas will require replacement of the grass. Weed growth is also difficult to control and will eventually lead to loss of grass.

All these possibilities have already occurred and large areas have required replacement of the grass well before its 25 year useful life.

Within operational zones grass turf must be used airside and is now a standard. For operational reasons instant access must be available over all areas that cannot occur if seeding and mulching is used. Seeding and mulching of airside areas is not recommended for several reasons. Spray grass does not take on sand, mulching is susceptible to wind gust and jet engine blast and could cause problems to jet engines and seeding will also attract birds that are one of the biggest problems around airports and airports are continually attempting to minimise anything that attracts bird life.

MMPL

Recommendation 4.9.2	Zero annual depreciation allowance.
Valuation Impact	The net effect of a reduction in ORC (4.9.1) and a decrease in cumulative depreciation is for potentially no change in ODRC. Annual depreciation will be reduced.

4.10 Runway Causeways and Sea Protection Works

4.10.1 Optimisation

Dredging work and breakwater construction has been undertaken over the years as part of the development of the nearby Sea Port. This has led to significant changes in the sea conditions experienced at the seaward end of the parallel runways compared to those which existed when the original 16R–34L runway was built. If that runway was being replaced now, the platform formation and sea protection works would more closely resemble that of the parallel runway 16L–34R.

SACL officers have revealed that there are some operational problems (e.g. seaspray, access permissions etc) associated with runway 16L–34R. An optimised replacement for 16R–34L would have an increased platform height and edge clearances, compared to 16L-34R, but significantly less than those which currently exist. Although not stated explicitly in the SACL valuation report, MMPL has indicated that the platform and sea protection at the southern end of the main runway 16R-34L have been valued as if replaced with an asset similar to runway 16L-34R, thus effectively eliminating over-design and redundancy currently embodied in the current asset.

In the absence of quantity or cost information to support the basis for the current valuation, Opus has undertaken rough order costings of an optimised replacement. These calculations appear to indicate that the current cost rates significantly overstate replacement cost.

Recommendation 4.10.1	That the quantities (formation level and width) and cost rates for sea protection works be reviewed in more detail.
Valuation Impact	Potential reduction in ORC and ODRC values.

4.10.2 Depreciation and Useful Life

(a) Rock Walls

Seawalls are situated in a highly aggressive environment with rock armouring continuously being worn down and damaged. This rock layer and armour units (Tribars) alone provide the structures resistance to waves. The underlayers and core may be regarded as non-deteriorating, particularly as breakdown produce of the armour layer adds to and reinforces the underlayers.

The armour relies to a large extent on interlocking between whole units for its performance. Wave action continually damage and degrade this protection requiring replacement of units to restore and maintain protection. This constant process of renewal is capable of extending the life of the structure in perpetuity. The rock protection works and armour units are assumed to have a replacement life of 75 years. The underlying layers are assumed to be fully protected and therefore a non-depreciable component of the sea protection asset.

The rock protection layer is likely to be repaired on an ongoing basis as part of regular routine maintenance activity. Repairs would be expensed rather than capitalised and as such, including a depreciation provision for this item would be inappropriate.

Recommendation 4.10.2(a)	*Rock armour*	ODRC equilibrates at half ORC after 40 years. Annual depreciation is zero.
	Under-layers	Non-depreciable
Valuation Impact	Potential increase in ODRC and a decrease in annual depreciation.	

(b) Concrete Sea Walls

The concrete sea walls, unlike the rock walls, will eventually require total replacement. A similar life expectancy as to the rock armour of 75 years is considered to be reasonable. Residual value would be zero. The current valuation assumes a 68 year life.

Recommendation 4.10.2(b)	The current assumptions are reasonable.
Valuation Impact	No significant effect on the current valuation

4.10.3 Runway Fill

No detail was available as to what assumptions had been made in deriving the quantities of fill used in the valuation. It has not been possible to review this item.

Recommendation 4.10.3	Quantities should be reviewed from a optimised replacement perspective.
Valuation Impact	As the fill costs are subsumed in the land valuation the overall impact on the valuation is unlikely to be significant.

4.10.4 Economic Write-Off

Because of the potential equivalent value of the formation platform and associated sea protection works in alternative use, it would not be appropriate to make provision for "economic write-off".

4.11 Miscellaneous Items

The following inconsistencies have been identified during the review:

a) A standard allowance of 5% of pavement value has been included for service conduit. This amounts to approximately $50M for the RTA assets, which appears to be high for just conduit.

A total length of 663km of lighting cable exists on the airside, of which some is laid in pairs. Assuming 350km of conduit at $15/m equates to $5.3M dollars. However, not all existing cable is laid in conduit, therefore a value of around $5M may be appropriate.

> *The services allowances includes for concrete encasement of conduits under pavement, pits and covers and trenching and conduit installation. A check of the services allowances in the valuation shows that there is $4.689M for runways, $9.123M for taxiways and $8.417M for aprons. A further check of costs for services conduits etc installed for taxiway "J" shows a cost of $343K for an area of 18,772 m^2 or $18.32 per m^2. The actual average valuation rate for runways is $11.40 per m^2, and for taxiways is $10.60 per m^2. It is considered that the allowance for services in the valuation is conservative.*
>
> *MMPL*

b) Y003 – half concrete and half AC as opposed to current spreadsheet coding of 100% AC

> *The valuation has generally allowed for all taxiways to be constructed as flexible pavements with an asphalt wearing course, base course and prepared subgrade. Taxiway Y003 was constructed as part curfew pavement and part concrete pavement but has been valued as a flexible taxiway pavement. The new international taxiways "H & J" have been constructed as rigid pavements and "Y" which crosses or joins them was also constructed as concrete except where curfew pavement has been constructed alongside runway 07. We accept that "Y" should have been valued as concrete pavement, this will increase the valuation of this asset.*
>
> *MMPL*

c) Y001 – observed as concrete not AC as in spreadsheet.

> *See previous comment.* *MMPL*

d) J1001 standoff area is missing from spreadsheet (approximately 12000 m^2 of AC plus pavement)

> *Standoff apron J1001 is included in the taxiways section with Taxiway J001* *MMPL*

e) Current valuation depreciates the full depth of AC surfacing, rather than just the top component that is replaced.

> *The resheeting of flexible wearing courses allows for a minimum of 40 mm with an average of 50 to 70 mm of new wearing course. The valuation only values the normal wearing course of 50 or 60 mm, not the total wearing course that would be in the order of 100 to 120 mm thick or a minimum of 90 mm for a nominal 60 mm wearing course pavement.*
>
> *MMPL*

f) Runway 16R34L RESA areas in spreadsheet dated as 1957. FWP indicates Northern RESA as 1955 and Southern RESA a 1972.

> *Accepted* *MMPL*

g) Taxiway G003 (Maunsell Asset No 2065) which has an AC wearing course. Currently coded as having a UL of 50 years, as opposed to 12-14 years for other similar assets.

> *Accepted* *MMPL*

h) Some of assets with a concrete wearing course (TWCC_DOM and TWCC_INT) have a UL of 11 years, as opposed to 50 years for other similar assets.

Accepted	*MMPL*

i) Shoulders and runway overrun areas have similar lives to the main runway components. Scheduled as lineal metres, however with some shoulders now being widened, a square metre rate would be more appropriate.

Accepted	*MMPL*

j) Engine and compass warm-up bays (part of assets 348 – 355) Taxiways K004 and KA005 are partially redundant.

The taxiways are still used for "Compass Swinging"	*MMPL*

k) Taxiway T1001 (Asset No 392 – 395) area has been incorrectly transferred from drawing FSS-6887 as 13,642m² rather than 13,462m².

Accepted	*MMPL*

l) Apron DOM3002 (Asset No 448-451 and 1821) is coded as AC on a granular base. Observed in field to be AC over a concrete pavement based on form of cracking pattern and advice from SACL staff. Composition needs to be taken into account when determining the useful life of the asset.

> *Apron DOM3002 was an asphalt pavement before resheeting in February 1999. It is possible that there are some areas of concrete pavement under the asphalt but at least a large section of the apron is flexible and the whole apron has been optimised as a domestic flexible apron. SACL's RTA database shows the apron as flexible.*
>
> *MMPL*

m) Apron Intl Freight (Asset No 1836). No basecourse or subgrade components scheduled.

> *This asset No. 1836 is an bonded asphalt levelling strip to raise an older pavement to the same level as the new.*
>
> *MMPL*

n) Apron Intl North (Asset No 1874). No basecourse or subgrade components scheduled.

Asset No. 1874 is a bonded concrete overlay similar to previous item.	*MMPL*

o) Apron Intl North (Asset No 1875). No basecourse or subgrade components scheduled.

Asset No. 1875 is a bonded asphalt overlay similar to previous item.	*MMPL*

Recommendation 4.11	Address issues raised
Valuation Impact	Unknown

5 [515] Roads and Carparks

5.1 Quantities

The assets in this category have been lumped for the purposes of valuation. This amalgamation of assets has made it impossible to audit quantities.

Recommendation 5.1	Improve inventories for group 515 assets.
Valuation Impact	Unknown

5.2 Useful Life

All assets in this category, including grass, trees, footpaths, walls, roads and carparks, have been given a 25-year useful life. The review of these components has considered the appropriateness of this life for individual asset types within this group.

We accept that different useful lives could have been used for the assets in this category.

MMPL

5.3 Grassed Areas

MMPL valuation provides for turfing of all grassed areas within this category. This is considered acceptable for landscaping of the landside areas.

The valuation assumes a useful life of 25 years. Grass on the landside could be expected to last indefinitely, given appropriate maintenance. However, given the likelihood of future changes to layouts, a 25 year functional life is reasonable.

Recommendation 5.3	No change to current valuation
Valuation Impact	Nil

5.4 Roads

The road structure allowed for in the valuation appears unreasonable. Valuation assumes 2 layers of AC, 50 and 30mm over 100mm of basecourse and 500mm of subbase. Would expect 50mm AC over a granular base, rather than two AC layers.

Amalgamation of individual elements made auditing of quantities impossible.

> *The structure allows for a heavy-duty road constructed over sand, with subgrade preparation and compaction. The base and subbase courses provide the wearing course base for this construction.*
>
> *It is normal Roads and traffic Authority practice to use two layers of asphalt in the wearing course, the lower layer using a larger stone in the order of 20 mm with the surface course using 10 or 14 mm stone and by either "open" grade or "dense" grade asphalt.*
>
> *We believe that our road profile is reasonable and optimal for the site.*
>
> *Roads other than the main roads could probably be constructed to a lesser standard but this would depend on the usage. Most of the airport roads are subject to heavy duty traffic including construction traffic and fire safety equipment and as such require a very stable platform.*
>
> *Changing traffic demands for all areas of the airport see constantly changing road layouts. Whilst 25 years may be too short a useful life in many instances it is too long for others. For instance the access road to the Control Tower built in 1992-4 was recently completely reconstructed (early this year), a useful life of only 6-8 years*
>
> *MMPL*

5.5 Trees

BARA have based replacement cost on replacing mature trees with saplings/shrubs. We believe that mature trees do have an additional value. Based on the Australian/NZ draft code DR 99307 "Amenity Trees – Guide to Valuation" July 1999 the $1000 per tree used by MMPL in the valuation, appears to be a realistic value. It could be argued that the large heritage trees have considerably more value. However given the limited access preventing the public from appreciating these trees, the $2000 per tree value used by MMPL appears reasonable.

> *In many instances mature new trees have been installed when opening up new works and landscaped areas. When the landscaping around the new carpark and environs for the SIT was completed recently, mature trees were planted to give a completed look to the area. The same occurred in 1992 when Terminal C and Pier C were constructed. When Qantas Drive was extended to O'Riordan Street mature trees were also used between the public areas and airport areas.*
>
> *A mature landscaped barrier was required between the new works and the airport buildings.*
>
> *The mature heritage trees in some areas of the airport have been valued at the same optimum rate for replacement with similar bur much younger trees.*
>
> *MMPL*

Recommendation 5.5	No change to current valuation
Valuation Impact	Nil

5.6 Traffic Islands/Footpaths

Insufficient detail to enable audit.

25-year useful life appears to be too short for physical life, although it may be appropriate owing to obsolescent as traffic flows and road layouts (including those beyond SACL control) change.

Changing traffic conditions see a constantly changing road layout that also affects traffic islands. Whilst 25 years is too short for some islands it is far too long for others.

MMPL

Recommendation 5.6	No change to current valuation
Valuation Impact	Nil

5.7 Walls

There are numerous retaining walls of approximately 500mm height around the terminals, carparks and roads that do not appear to be scheduled in the register.

Most of the walls mentioned are part of the terminals, buildings and car parks and have been assumed to be included in the asset construction costs.

MMPL

Recommendation 5.7	No change to current valuation
Valuation Impact	Nil

5.8 Carparks

We suspect that some of the 1998 measurements have been scaled off using the wrong scale. The A3 drawings are reductions from a 1:500 scale. The scheduled rates appear to be consistent with the use of a 1:500 scale, rather than the reduced scale of around 1:1250. In particular:

- Enclosure on Kyeemagh Ave (Maunsell Asset No 581) is scheduled at 315m² but measures at 660m²
- Enclosure at Former Control Tower (Maunsell Asset No 585) is scheduled at 72m² but measures at 200m²
- Carpark at New Control Tower (Maunsell Asset No 563) is scheduled at 313m² but measures at 1600m²

We have checked the areas mentioned in the issues report as per the following::

- *Enclosure on Kyeemagh Avenue (MAN 581) has been scaled at 330 m². This is approximately the area in the valuation.*
- *Enclosure for Former Control Tower (MAN 585) has been scaled at 164 m² approximately twice the area in the valuation.*

Car park to the new control tower (MAN 563) on plan 87 closely approximates the area used in the valuation. The balance of the area is included in the accumulated area for the car parks shown on plan 77.

MMPL

Recommendation 5.8	Adjust for MAN 585. Improve inventory for carparks
Valuation Impact	Minor increase in ORC and ODRC.

5.9 Elevated Road at Domestic and International Terminals

The replacement cost for the elevated road at the domestic terminal appears overvalued at $40M.

There appears to be some redundancy in the elevated road at the international terminal where the reason for the construction of the extra lane is no longer valid.

Recommendation 5.9	The cost of the elevated road at Domestic terminal be reviewed. That the optimised structure appropriate for replacement of the elevated road at the International terminal be reviewed.
Valuation Impact	Potential decrease in ORC and ODRC

6 [516] Fences and Gates

Comparison of lengths on F33-387, plans 14 and 24, to those in MMPL calculations indicates significant variation. Values in calculation sheets in MMPL work (Section 3 Appendix 2B of the 2000 Valuation) do not appear to take into account the double sided nature of the centre median guardrail, although this may already be in the valuation from the 1998 review.

No detail is available on the length, type, size and location of fencing, making an audit of quantities impossible. Unit cost rates appear reasonable.

> *The issues noted refer to assets measured in the 1998 valuation. Since these assets haven't changed no 2000 measurement has been made.*
>
> *MMPL*

Recommendation 6	No change to the current valuation
Valuation Impact	Nil

7 [520] Lighting and Visual Aids

7.1 Valuation Review

The current valuation for the Lighting and Visual Aids assets ($56M), is based on a recent valuation prepared by recognised experts Sinclair Knight Mertz (SKM). As part of the review, discussions were held with Mr John Peterie, the Airport Lighting Supervisor of SACL.

These discussions confirmed that the scope of the valuation reconciled with the perceived quantum of assets and a sample check confirmed the valuations for the lighting systems. These discussions did highlight that the useful life of the full range of light fittings had been over-stated as had the total length and valuation for lighting system cables.

Most cables installed are rated at less than 5000V but recent and new cables are being installed rated at 5000V. The MMPL valuation allows for a total of 663km of cable at $1.50/m. Mr Peterie estimated a total length of cable more like 750km at a value of $2.30 plus installation. Considering that 620km may be a more accurate assessment of the optimised installation length and that most cables are older lower specification cables, the valuation given for the cabling would appear to be reasonable.

Mr Peterie also commented on the practice of backfilling the lighting cables. Most cables were direct buried; some by cutting slots into the tarmac, but the preferred method is to install the cables in conduit. Only a small length of cables at so called black spots have been installed in conduit. The cables are small, 6.5mm^2, and are generally run interlaced.

The provision for conduit has been over allowed for under asset class 510. If all lighting cable were installed in conduit this would require about 400km of 50mm conduit. However the amount of conduit actually installed is significantly less than this.

Mr Peterie disagreed with the useful life of most of the light fittings and the lighting equipment. These items have all been given a useful life of 40 years but in practice he suggests that these would last between only 15 and 30 years, with an average of around 20 to 25 years. We have confirmed Mr Peterie's opinion by independent advice. This reduced life would apply to approximately 80% of the total valuation of this asset class.

Recommendation 7.1	That the useful life for light fittings and lighting equipment be reduced from its current 40 years to 25 years.
Valuation Impact	ORC = $Nil ODRC = - $3.7M

A significant component of the total valuation is for Lighting Equipment ($16 million of $56 million). We have no detailed breakdown of the value for this and cannot comment on its accuracy.

The valuation used is a recent valuation carried out by Sinclair Knight Mertz. SKM have a recognised expertise to value this work and Maunsell McIntyre relied on this in accepting SKM's valuation. *The useful life of light fitting of 20 years is accepted. We have allowed for this in the modified valuation, refer to spreadsheet of the 1998 valuation reference material. However we didn't differentiate in the valuation spreadsheet.* *MMPL*

8 [530] Passenger Terminal Buildings

8.1 Structures

Sydney International Terminal comprises four main structures constructed in 4 major developments over the past 30 years. The major structures are the described as Terminal B, Terminal C, Pier B and Pier C. Each of these structures is essentially a three level structure, with some plant rooms located on a fourth penthouse level.

8.1.1 Remaining Life

Typically the design life of structures is determined by consideration of the expected physical loads to which the structure will be subjected and the ability of the structure to continue to resist those loads over an extended period of time. Considerations include the probability of critical events such as extreme winds or earthquakes, settlement of foundations over time, and the durability of construction materials. These considerations are embodied implicitly in building codes and a design life of 60 years is often assigned to new structures in the absence of a rational design. However the useful life of a structure is usually determined more by its functional obsolescence than lack of structural integrity, and the useful life of the building may often be continually extended by replacement of fitout and services without significant structural changes.

Considering the substructure and superstructure items for Terminals B and C, and Piers B and C, the valuation has assigned a useful life (UL) of 60 years, both for the earlier structures and the work completed since 1998. As a consequence the older structures have shorter remaining lives (RLs) than those completed recently.

We have considered whether it is appropriate to consider these as separate structures for the purpose of assigning remaining life.

After recently reading a report on useful lives and depreciation, we understand that the Australian Accounting Standard for Depreciation AASB 1021 requires that the depreciable amount of any addition or extension to an existing depreciable asset, which becomes an integral part of that asset, must be allocated over the remaining life of that asset.

Because there were substantial additions to Terminal B and Piers B and C MMPL have given the additions normal individual structural useful lives.

Combining the new and old structures for building "B" and building "C" for remaining lives would increase the depreciation for each of the buildings.

MMPL

MMPL have noted the Australian Accounting Standard for Depreciation (AASB 1021) requirement that the depreciable amount of any addition or extension to an existing depreciable asset which becomes an integral part of that asset must be allocated over the remaining life of that asset. Application of this would require the value of the new structures to be written off over the remaining life of the old structures, i.e. 30 years. Because there were substantial additions to Terminal B and Piers B and C, MMPL have given the additions normal individual structural useful lives.

Our view is that in reality it will not be feasible in practice to rehabilitate or replace those older structures in isolation from the newer structures. Nor does there appear superficially to be any reason to consider that the functionality or structural integrity of the older structural elements would compromise the 60 years expectation of the new structures.

We suggest that from a structural perspective the terminal can be considered as a single entity with a UL of 60 years and a RL of 60 years (effectively) given the extent of recent work and structural integration of new work with older structures.

This approach is also consistent with the accounting requirements provided the depreciation rate for the earlier part of the structure is based on its written down value at the time the building was modified and reflects the revised remaining life.

Recommendation 8.1.1	The terminal should be considered as a single entity with a UL and RL of 60 years.
Valuation Impact	ORC = $Nil ODRC = + $4.4M

The assessment of 40 years for a UL for the shell is considered to be appropriate. Notwithstanding the argument above that the UL of the structures can not be considered separately, the values for the shell are properly applied to each of the structures based on the actual construction date.

> *Whilst there is a substantial area of new shell there is just as substantial an area of old, each of which would have its own expected life, being independent of the other. The governing factor is the remaining life of the building.*
>
> *MMPL*

8.1.2 Replacement Cost

In our preliminary consideration of the valuation of the SIT structures, we have compared the effective unit costs applied by MMPL with standard industry rates. As a first approximation we have taken the unit rate for a regional shopping centre, high standard 2 storey of $1585/m² (Rawlinsons Handbook). Of this, the components for preliminaries, substructure, and superstructure total $835/m². This figure should also be adjusted by 7% to allow for a brownfields replacement, and 12% for professional fees.

Table 8 : Structure Cost Rate Comparisons

Structure	MMPL Rate $/m²	Indicative Rate (Rawlinsons handbook)	Indicative Rate Adjusted for Brownfields	Indicative Rate Adjusted for Fees and Brownfields
Terminal B	$1055/m²	$835/ m²	$893/ m²	$1000/ m²
Pier B	$950/m²	$835/ m²	$893/ m²	$1000/ m²
Terminal C	$1154/m²	$835/ m²	$893/ m²	$1000/ m²
Pier C	$1152/m²	$835/ m²	$893/ m²	$1000/ m²

We understand that several airline lounges on Pier C Level 3 are currently vacant. However we also understand that this is a temporary situation and that lease arrangements that will result in full occupation of them are currently being finalised. We are therefore of the view that the terminal building is appropriate sized and that the facilities available and standard of fitout and services is appropriate, and have taken the present gross floor area as the basis for calculating replacement valuation.

We note that the elevated road to the Departures (Level 2) forms the roof to part of the Arrivals Hall (Level 1). For the purpose of estimating the replacement valuation, we have considered the elevated road structure to be separated from the terminal structure.

The total MMPL valuation for substructure, superstructure and shell is $234M. Our calculation of ORC using as an approximation the rate of $1000/m² is $220M. We accept that some site-specific construction issues such as provision of adequate foundations on the weak soils in this location, shoring and de-watering could explain this difference. On balance we have chosen to accept the replacement costs for the substructure and superstructure adopted by the MMPL valuation.

Recommendation 8.1.2	No change from the current valuation
Valuation Impact	Nil

8.1.3 Area Use Allocations

The uses of areas in the terminal and piers were subjected to spot checks in order to verify the proper assignment of fitout and services costs. In general the area uses shown on the drawings provided to us correspond to our observations in the terminal. Exceptions are:

- Seating in the food hall (around McDonalds) Level 2, not classed as retail food seating.
- Retail food area (Level 2, opposite North end of Check-in J) on drawings but no longer present.
- New money exchange at North end of Check-in C.
- Some alterations around ends of Check-in A and B, providing access to Bar Garden
- Beer garden deck not coded as Retail Food.
- Games areas (opposite end of Check-in E) should be coded retail.
- Cell phone rental area (Terminal C, Level 1) not shown.

We do not consider any of these to be material in the context of establishing a replacement valuation (but note that some may be in the context of apportioning responsibility for costs).

With regards to spot check reconciliation of areas from drawings with valuation spreadsheet areas we are satisfied that the areas reconcile, within the limits of scaling dimensions off the drawings provided.

Possible area use allocation has changed from that shown on the drawings available and used at the time of the valuation.

We don't believe there are any unallocated areas on the mezzanine level 1 of terminal B.

The unused areas of level 4 of Pier C are awaiting lease negotiations.

Differences between the SA2000 plans used in the valuation and the November inspection

> *by Opus, reflect the plans available at the time of the valuation, the cut off date of the valuation and known differences at that time and work that has been subsequently completed.*
>
> *MMPL*

Recommendation 8.1.3	That changes in floor use be periodically updated and allocations revised for future valuations
Valuation Impact	Changes are unlikely to be materially significant.

8.1.4 Miscellaneous Items

(a) We have considered the appropriateness of the steel frame canopy over the elevated road at Terminal C (in the context of valuation) and accept the MMPL view that the functionality and similar architectural form would be embodied in a replacement development.

> *Steel Frame Canopy over elevated road at Terminal C. The International Terminal of an airport is normally considered to be a "Gateway to the City". As such you would expect that the terminal would have some treatment to distinguish it from other major building of similar use (e.g. Shopping Plazas). The canopy is one of the few architectural features that make the terminal unique and as such would not be considered to be over design. Its extent also ensures that passengers alighting from taxis, buses and cars do not need to be concerned with inclement weather.*
>
> *MMPL*

(b) We note that the elevated road to the Arrivals (Level 2) forms the roof to part of the Departure Hall (Level 1). For the purpose of estimating the valuation, we will consider the elevated road structure to be separated from the terminal structure.

> *We agree with Opus's intention of considering the elevated road as separate from the terminal structure.*
>
> *MMPL*

8.2 Fitout

We have reviewed the detailed rates build up provided by Rawlinsons to MMPL for the purpose of estimating the replacement value of the fitout in each of the spaces in the terminal building. We have also compared a sample of those with detailed rates commissioned and provided by BARA.

BARA has questioned the appropriateness of applying elemental square costs rates, and compared this with measuring vertical elements to establish replacement cost.

We have found no significant differences in those rates, and are reasonably satisfied that items have been properly accounted for.

Recommendation 8.2	No change from the current valuation
Valuation Impact	Nil

8.3 Building Services

An inspection of all areas of the terminal buildings was made to characterise the facility for services requirements according to utilisation, functionality and intensity. This was to ascertain the extent and standard of installation of services and to allow for comparison of the buildings with other similar facilities for which the elemental costs for services are published.

In the absence of specific published values for airport terminal buildings elemental costs for facilities with similar functionality have been used. For this review we have particularly drawn on the elemental costs of buildings given in the Australian Rawlinsons 2000 Handbook.

This method of valuation review is appropriate as it is representative of the cost of services for a new facility. This method is also appropriate from an optimised replacement perspective as it ignores the unnecessary complexities and inefficiencies of installation and redundant installations that result from major extensions and alterations as has occurred at the International Terminal Building.

8.3.1 Terminal Buildings Levels 1 and 2

It was noted that overall there was a strong resemblance between levels 1 and 2 of the terminal building and two level high standard regional shopping malls in terms of their services requirements.

Similarities and differences include –

- Functionally the dominant areas include a mixture of retail, eating/food court, public circulation and public assembly. On balance these would have a similar intensity of services as a major high quality shopping Mall.

- The major cost service for most areas is for mechanical services, particularly air-conditioning. These are fully air-conditioned using fully ducted systems and chilled water with evaporative air-conditioning. In this respect the terminal buildings and shopping malls have similar requirements. Most areas have high, though variable, occupancy densities this requiring air-conditioning systems that can introduce large amounts of outside air, this adding to the air-conditioning performance requirements. Retail areas have high lighting intensities that add to the air-conditioning load. The large areas of public assembly have relatively subdued though efficient lighting but this would be offset by a design requirement for higher solar gain in the terminal areas that have large outside windows used for observation. Overall there would be a similar cost for air-conditioning.

- Both types of facilities have a high reliance on backup electrical systems for such things as operation of refrigeration plant for food preservation, for security, emergency access lighting and operation of vertical transport. Electrical systems have both essential and non-essential electrical systems with generator backup of the essential circuits.

- Electrically the large areas of public assembly such as baggage reclaim and arrivals hall have relatively simple and low cost lighting systems, typically subdued low intensity discharge lighting. However this is partially offset by a greater overall electrical complexity for equipment such as flight information systems and signage, etc. On balance the Terminal buildings levels 1 and 2 would have a similar electrical cost to a high standard, two level, shopping mall.

- Both facilities have similar requirements for fire protection (detection and sprinklers, etc) and associated features such as means of escape and smoke clearance, etc.

- Both facilities have similar levels of security services. This assumes that security systems used by Government Departments such as Immigration, Customs, Agriculture & Fisheries/(Quarantine) and other commercial tenants are included in their own fit outs and not to be included in this valuation.

- Transportation has not been included under the Services but is included under plant and equipment.

A comparison of the valuations for these areas can be made using elemental costs for buildings as for a 2 level high standard shopping Mall from the Rawlinsons 2000 Handbook. The elemental costs are applied over all parts of these areas.

Table 9 : Building Services Cost Rate Comparison

Service	MMPL Valuation, taken over Terminals and Piers B&C Levels 1, 2 and 4. Total Area=146,654m^2 \$/m^2	Opus Review based on High Class 2 Level Shopping Mall for same areas. (Adjusted) Total Area=146,654m^2 \$/m^2
Mechanical	Total Value for services for this area of $80,230,163	$280.50
Electrical		$88.50
Fire		$72.50
Hydraulic		$52.00
Communications		Inclusive electrical
Security		Inclusive electrical
Subtotal		$493.50
Preliminaries 10%		$49.30
Professional Fees 12%		$59.20
TOTAL	**$547.00**	**$602.00**

Note that the Rawlinsons values include for central plant including for chiller, cooling towers, associated pumps and plant and for some backup standby power generation.

8.3.2 Notes on Mechanical Installation

Tenanted areas of the Terminal Buildings would have additional fit out costs including for installation of fan coil units and associated local plant. Food preparation areas would have air extract systems. The chilled water for tenants fan coil units and often the background air-conditioning is supplied by SACL

8.3.3 Terminal Buildings Level 3 Office Areas and other Office Areas.

Terminal Buildings B and C level 3 (all areas) and parts of the basement area have similar building services requirements as for office buildings. An alternative estimate is proposed using elemental costs for buildings as for rentable low rise fully serviced offices from Rawlinsons 2000 handbook.

Table 10 : Terminal Building Cost Rate Comparison

Service	MMPL Valuation taken for Terminals B&C – level 3 and office areas of basement. Total area=23,712m^2 \$/m^2	Opus Cost Review based on low rise fully serviced office buildings for same area. \$/m^2
Mechanical	Total cost in valuation is \$14,817,837	\$207.00
Electrical		\$104.50
Fire		\$90.00
Hydraulic		\$66.75
Communications		Included
Security		Included
Subtotal		\$468.25
Preliminaries 10%		\$46.82
Professional Fees 12%		\$56.19
TOTAL	**\$624.91**	**\$571.26**

Again the Rawlinsons values include for central plant including chillers, cooling towers, associated pumps and plant and for some backup standby power generation.

8.3.4 Building Services in lower levels

The lower areas have an essentially industrial function, particularly for baggage handling and sorting and storage. These areas are typically mechanically ventilated as for a basement garage (necessary for operation of mobile diesel plant) excepting some areas have comfort heating (assumed hot water coil), and some areas will be naturally ventilated but no areas are air-conditioned. Lighting is industrial but with task lighting for work-stations (baggage handling). The electrical system services a considerable amount of machinery. These areas are fully sprinkled.

An alternative estimate is proposed using comparative and elemental costs for buildings from Rawlinsons 2000 handbook.

Table 11 : Terminal Basement Cost Rate Comparison

Service	MMPL Valuation taken for industrial areas of Terminals and Piers B&C – basement and Ramp Levels Total area= 51009m^2 \$/m^2	Opus Review based on comparative and elemental costs from Rawlinsons 2000 Handbook \$/m^2
Mechanical	Total cost in valuation is \$12,991,429	\$51.00
Electrical		\$65.00
Fire		\$80.00
Hydraulic		\$25.00
Communications		Included
Security		Included
Subtotal		\$221.00
Preliminaries 10%		\$22.10
Professional Fees 12%		\$26.50
TOTAL	**\$254.69**	**\$287.30**

8.3.5 Services Plant in the Central Services Building

The rates proposed by Opus in this review are based on Rawlinsons rates for elemental costs of buildings for mechanical services and include the major items of mechanical plant including chillers and cooling towers, for comfort heating plant (low pressure hot water boilers, etc) and for backup generation of electricity.

The MMPL valuation separately accounts for the major building services plant in the central services building under asset group 580. We have accounted for this plant directly into the rates for the terminal buildings (Asset group 530). The chilled water plant including the chillers, evaporative cooling towers and associated pumps are totally dedicated (except the electricity generators also share the cooling towers) to the Terminal Buildings. Also the elemental rates given in the Rawlinson Handbook include for this central plant.

Therefore the rates proposed by Opus include for central plant including chillers, cooling towers, pumps and back up power generation.

The total air- conditioned area is approximately 150,000 square meters. Based on an overall design load of say 130W/m^2 the total cooling load on a design day would be approximately 19,500 kW. This is comparable to the capacity of 4 to 5 of the nominally 4,500kW chillers installed in the central services building. This analysis supports the allowance for the provision of the six chillers installed.

The chillers and associated cooling towers are large capacity items of plant. They are also of the most cost effective and best efficiency type. An examination of unit rate costs for the chillers ($/kW) and cooling towers ($/kW) show that considerable savings from scale of economy result from the use of this large plant. Additionally the plant particularly the cooling tower is more compact and has a smaller footprint, this resulting in a reduction in plant accommodation costs. These savings would compensate for costs associated with chilled water mains local to the terminal buildings.

According to the SACL Power Distribution Engineer, Mr Peter Davidson, the backup generators located at the Central Services Building currently only service ventilation (but not cooling), lifts, security, fire, about half the terminal lighting, apron lighting, half the car park lighting, about 80% of the baggage handling and some other loads, including those from tenants in the Terminal Buildings. As such these generators are provided for essential loads in the International Terminal buildings and associated facilities outside.

The MMPL valuation has provided an estimate for the replacement cost of this central services plant (minus the chilled water pipes and insulation) of $8,652,828. Spread over the total floor area of the terminal buildings of 221,000 m^2 this represents a unit rate of $39/m^2.

Considering an optimised replacement development, we would question the provision of a remote central services facility, preferring instead to locate these services in a more central location within the terminal buildings. Chillers and generators would be installed in the basement and cooling towers would be installed on the roof. This would effectively reduce the length of service tunnel and eliminate the need for a separate services building (but would incur additional terminal building costs) and reduce the cost of reticulation services in the service tunnel. Considering the ODRC then, we have deleted the value of the 900m lengths of chilled water pipes and the associated insulation from the Asset Group Valuation 580.

8.3.6 Building Cost Rate Summary

Table 12 : Building Cost Rate Comparison

Item	MMPL Valuation	Opus Comparative Valuation
Terminal Buildings Total Floor Area	221,375m^2	Accepted areas given by MMPL
Services Valuation exclusive of allowance for Central Plant	$108,039,429	
Services Valuation inclusive of central plant		$116,486,311
Allowance for Central Plant	$8,652,257	
Total Services Valuation	$116,692,257	$116,486,311
Average Rate $/m2	**$527/m^2**	**$526/m^2**

The alternative Opus estimation agrees closely with the MMPL valuation. Therefore we accept the MMPL valuation as being correct.

Recommendation 8.3.6	No change from the current valuation
Valuation Impact	Nil

8.4 Services Tunnel

Locating services in a more central location within the terminal buildings would effectively reduce the length of service tunnel. The optimised replacement value is therefore limited to the length of tunnel inside the envelope of the terminal buildings.

Recommendation 8.4	Reduce the value of the services tunnel by the length of the tunnel outside the terminal building envelope.
Valuation Impact	ORC = - $3.1M ODRC = - $1.9M

9 [540] Other Permanent Buildings

9.1 Redundant Buildings

BARA have suggested that a number of buildings could be considered redundant, and it was also our observation that several buildings appeared to be used for storage as a matter of expediency rather than design. The buildings suggested by BARA as being potentially redundant include:

#109 – Houses toilets and water booster pumps

#119 – Old control tower

#128 – Ex plumbers workshop and foreman's office

#132 – Old Fire Station

#143 – Material and equipment store

#254 – Pumping station (Cooks River)

> *Buildings 109, 119, 128 and 143 are still being used and are still an asset returning fees to SACL in one form or another except for #119.*
>
> *Building 254 is the main sewerage pumping station for the North West Sector of the Airport including the International Terminal and is definitely not redundant.*
>
> *Building 132has been valued as a store, with sectional tilt door access, and is used by the SACL for storage. Storage around the airport is at a premium and any building that becomes vacant and is usable is used for general storage. Until alternative arrangements can be provided the building will be used and hence is not redundant, even though it is a "redundant" fire station.*
>
> *MMPL*

MMPL have responded that buildings 109, 119, 128 and 143 are still being used and except for #119 returning fees to SACL in one form or another. Building 254 is the main sewerage pumping station for the North West Sector of the Airport including the International Terminal; and building #132 has been valued as a store, with sectional tilt door access, and is used by the SACL for storage. MMPL note that storage around the airport is at a premium and any building that becomes vacant and is usable is used for general storage.

Our consideration of replacement value provides for these buildings to be valued as storage, and we have used an indicative rate of \$550/ m^2 (Rawlinsons Handbook - high bay warehouse, plus 10% fees). We accept the functionality of building 254 as stated in the valuation.

Recommendation 9.1	That the replacement value for buildings used as storage be reviewed.
Valuation Impact	Unknown

9.2 Remaining Life

The Remaining life for these buildings generally fall into a sequence of 3, 8, 13, 18, 23, 28, 38 and 48 categories[1]. In the absence of a specific development plan we believe it is more appropriate to assign lives based on building construction/functionality. We would suggest generic values of 60 years for structure, 30 years for fitout and 30 years for services.

> *Fitout and services for other permanent buildings generally have a remaining life less than 20 years and account for most of those referred to by Opus. There are a few buildings whose structure has a RL less than 20 years and these are already 40 plus years old. The other buildings with a structural RL less than 20 years have been assessed at that from field observations.*
>
> *MMPL*

Recommendation 9.2	Use useful lives of 60 years for structure, 30 years for fitout and 30 years for services.
Valuation Impact	Unknown

9.3 Buildings 1, 2, 3 and 13 – Hangers

We understand these are included in a proposed development and accept the 3 year remaining life is appropriate. We believe there is only limited re-use/salvage value in these buildings and have excluded this from our consideration of value.

Recommendation 9.3	No change from the current valuation
Valuation Impact	Nil

1 Opus believe that these values were estimated in 1998 and rounded to the nearest 5 years. 2000 update has obviously changed previous estimates by 2 years.

9.4 Building 397 – Elevated Water Tank

It is our understanding that water supply to the airport site does not rely on any functionality provided by this tank. It does not provide additional head and its storage capacity is superseded by 2 large capacity reservoirs on site. On the other hand MMPL have responded that compliance to the new minimum water supply and fire storage capacity for the North West (NW) sector can only be achieved with the inclusion of this reservoir capacity. During curfew hours the whole of the NW sector is gravity fed from the reservoir utilising the elevation of the reservoir and bypassing the booster pump station (and is part of the Sydney Airport's energy management strategy). It also acts as a balancing tank and provides constant flow and pressure even when flow and pressure from Sydney Water mains vary abnormally.

We accept that the facility is used at present (and in that context is not redundant), but our view is that this facility would not be required in an optimised development. The water supply and storage capacity would be provided in ground level tanks, and it is not appropriate to capitalise the energy savings.

Recommendation 9.4	Consider the replacement value of the elevated water tank with more appropriate facilities
Valuation Impact	Reduced ORC and ODRC

10 [550] Temporary Buildings

We have no issues with this asset group.

11 [560] Main Services

11.1 Optimisation

Where buildings are classified as redundant or have had a change of, or reduction in, use, then the optimised replacement cost of utilities servicing those buildings, should reflect that lesser use.

> *Opus' general comments on charge out rates for redundant structures are noted. However, these assets are leased on a "contestable" basis and the rate would reflect the age and use of the building.*
> *MMPL*

Recommendation 11.1	Adjust ORC of services supplying redundant or under-utilised buildings.
Valuation Impact	Minor

11.2 Tariffs

Tenants are levied a composite tariff which includes both SACL and Utility Companys' charges. The basis for the SACL component of these charges is unclear (particularly the capital recovery)

Recommendation 11.2	Review the basis for the capital recovery charge for main services assets
Valuation Impact	Unknown

11.3 Sewer Mains

A sampling approach was used to verify quantities. Lengths/diameters scaled off drawings confirmed a satisfactory level of accuracy for the valuation inventory. A few anomalies were found for sewer mains in the vicinity of the old fire station.

- DA87 to DA86. Spreadsheet states as dual 525mm pipes. Drawings indicate 1x450mm and 1x650mm drawings.
- DA85 to DA25. Spreadsheet states as 750mm, whereas drawings indicate 900mm.

> *The two sections mentioned have been inspected by CCTV cameras*
>
> - *DA87 to DA86: CCTV inspection confirmed size as dual 525 mm dia.*

• *DA85 to DA25*	*CCTV inspection confirm size as 750 mm dia.*	
		MMPL

11.4 Water Mains

Sampled lengths scaled from drawings confirmed the quantity schedules used for the valuation to be representative. The valuation inventory did not appear to include feeder lines (including meters, values etc) from the mains to the buildings.

> *Most building are metered. These meters belong to Sydney Water who charges the lessee for water use. Connections for building supplies are provided by Sydney Water at the same time as installing meters. The connection to the meter is part of the building service.*
>
> *MMPL*

Recommendation 11.4	An item for mains to meter connections be included in the valuation schedule.
Valuation Impact	Minor

11.5 Gas Mains

The gas mains appear to be oversized for the apparent consumption. The pipeline was observed to be nominally 200mm diameter and according to the labelling is operating at a relatively high pressure of nominally 200kPa.g.

In our opinion, based on experience (but not on rigorous calculation), this gas pipeline has an enormous over capacity. It is our opinion that a 150NB pipeline would be ample including for extension to other areas.

Recommendation 11.5	Value on the basis of a 150mm pipeline.
Valuation Impact	ORC = **-** $0.6 M

> *Value taken from the 1998 asset register shows gas reticulation with supply date of 1966 and 1993, and Domestic Gateway Utilities gas in 1994.*
>
> *A new gas main and distribution mains were provided under the SA2000 project for heating, via three boilers, and for food preparation areas for the existing terminals and piers with additional*

capacity for extension to a fourth boiler for a future northern Pier A.

The new installation required a 200 mm diameter gas main as the next smaller main was insufficient for requirements. The 200 mm supply main has sufficient capacity for existing requirements and also provides some 40% more capacity than required. The additional capacity will allow for future expansion of a Pier A.

We believe the valuation should not be discounted as the main size was required by the existing systems.

MMPL

11.6 Fuel Mains

The MMPL valuation includes a sum of $1,325,205 for fuel lines.

There is uncertainty about the details of these fuel mains particularly as the Facilities Manager for the International Terminal, Mr Walter Rafin, stated that all fuel systems, are owned by Contractors. It is understood that all fuel systems for fuelling aircraft are owned by contractors and that SACL do not own any appreciable amount of mobile plant.

Information provided by Michael Nicholls and Dave Ralph (schedule of liquid storage tanks owned by SACL), suggests that the cost is mostly for 13 underground, and 2 above ground, fuel tanks, of which more than half service the generators in the Central Services Building and most of the rest service generators associated with lighting and visual aids.

No cost breakdown was available for equipment rooms associated with the lighting and visual aids and so a check could not be made as to whether these tanks had been double counted. Usually the diesel tanks dedicated to generators would be costed as part of the generator.

The diesel tanks associated with the Central Services Buildings generators have not been costed with the central services buildings plant. Therefore it is certainly acceptable to be costed against this asset class. Most of the value of these tanks is associated with 7 off 45,000 litre underground diesel tanks. A new fully installed 50,000 litre underground tank is valued at $26,000.

Allowing for associated pumping, pipework and day tanks the current new value of all tanks would be estimated at less than $500,000.

Value taken from the 1998 asset register that shows fuel reticulation with a supply date 1963, and during widening of Keith Smith Avenue in 1991.

MMPL

Recommendation 11.6	Check for double counting of diesel tanks associated with visual and lighting aids generators. Check basis of value of fuel installation
Valuation Impact	Minor

11.7 Electrical

11.7.1 Supply System

The electrical system was reviewed with Peter Davidson, the SACL Power Distribution and Airport Lighting Engineer. Recent power distribution drawings for Sydney airport were obtained and these were reconciled by discussion with Peter Davidson.

The Sydney Airport is supplied power from 3 Energy Australia 33kV Substations From these 8 off SACL owned transformers with 10.25kV output, provides power to the entire site. Power is distributed at 10.25kV to about 60 secondary transformers with 400V output. The International Terminal is serviced by essential and non-essential power distribution systems. Generators located in the Central Services Building back up the essential circuits.

The Sydney Airport has a total maximum demand of about 30MVA of which the International Terminal is responsible for about 16MVA. SACL uses on average about 38% of the electricity it's network transmits. The balance, 62%, is sold to tenants.

The International Terminal essential system has a maximum demand of about 4MVA. The generators are sized at 2.5, 1.3 and 1.3 MVA. If one generator fails the remaining 3 generators would be struggling to service this load. Money has been allocated in this year's budget to replace one of the existing 1.3MVA generators with a new 2.5MVA generator.

SACL has medium to long term plans to convert the high voltage system from 10.25kV to the industry standard 11kV. Long term it is planned to ring main the high voltage system by connecting from the International Terminal to the Domestic Terminal (Subs 12 to 16). There is also a development strategy to provide for a new domestic zone main substation to cater for new buildings and terminal development.

11.7.2 2000 Valuation for Electrical Services

The MMPL 2000 valuation gives a year 2000 ORC for the electrical services of $32,800,681,

The MMPL valuation is comprised of a detailed 1996/98 valuation adjusted upwards by 6.6 to 8.5% for year 2000 and values from a schedule of new equipment and cabling installed between 1998 and 2000. The valuations of the recent installations are based on actual costs.

The basis of the 1996/1998 valuation comprised of lists of plant and cable installations were discussed with Mr Davidson and sample checked for reasonableness.

Mr Davidson agreed with the list of Switchgear and transformers and their ages. The MMPL valuations for sample transformers were reconciled against listed prices for new transformers and switchgear. Allowing for design supply and installation margins and price movements the prices are in reasonable agreement.

Sample checks of high voltage cable valuations suggests that the 1998 valuations undervalued the cables by a good margin, perhaps by as much as 20% if the cable is valued as XLPE type.

Generally most high voltage distribution cable is comprised of copper conductors with paper insulation and lead sheathing excepting newer cables installed within the last 10 years is XLPE insulated. XLPE cable is almost universally used today. Paper insulated cable is only used for maintenance of existing cables. Cables are buried direct into the ground but are ducted under runways and roads, etc.

Most of the cables are old technology type, which are more difficult to handle and install, and the network layout has been routed for historical reasons. An optimised route may save as much as 10% overall. The combined impact of an underestimate of cable cost and overestimate with regards cable length will result in little overall change to the current valuation.

These cables should last in excess of 40 years and would only be replaced if they fail.

Sample checks of 1998 MMPL ORC valuations for low (415V) cables show reasonable agreement with today's values when prices are adjusted for margins and pricing movements.

In summary we have not found anything in the valuation for site electrical services to be concerned about the accuracy of the MMPL valuation.

The 2000 valuation of the electrical mains was not available as at the date of the valuation. *MMPL*

Recommendation 11.7	No change
Valuation Impact	Nil

12 [570] Aerobridges

Aerobridges and NIGS have all been valued assuming a remaining life of 30 years regardless of supply date (essentially either 1/6/00 or 1/7/92). For NIGS, a UL of 30 years is appropriate given the mechanical components etc. Aerobridges are essentially extensions on the piers and should have the same life as the fixed links ie 60 years.

As a result of the replacements and upgrades in 2000, the useful life of aerobridges and NIGS has been set at 30 years. The aerobridges are attached to the fixed links that form part of the Pier structures. However, they are mechanically operated and subject to wear not associated with fixed structures. Experience has shown that 30 years is about the maximum time you can maintain them before replacement.

The valuation has some minor errors in life due to last minute amendments to supply dates.

MMPL

Recommendation 12	No change to the valuation
Valuation Impact	Nil

13 [580] Fixed Plant and Equipment

13.1 Communications

No details to enable audit.

13.2 Miscellaneous

No details to enable audit.

13.3 Mechanical Services

Addicoat Hogarth Wilson Pty Ltd carried out a valuation of the mechanical services plant located in the Central Services Building for MMPL. We agree with the scope and quantum of the valuation apart from allowing for 900 metres of chilled water pipework in services tunnels. Refer also to other relevant comment in other sections of this report including for the international Terminal Buildings Services and for site services.

However we are uncertain how values for mechanical plant has been incorporated into the valuation for this asset class (580).

> The mechanical equipment in the Central Services Building (CSB) are not included in the rates for services in the SIT. Refer to earlier comments in regard to the SIT.
>
> *MMPL*

Recommendation 13.3	Deduct the value of services contained within the services tunnel external to the envelope of the terminal buildings.
Valuation Impact	ORC = - $6.6M.

13.4 Irrigation

No details to enable audit.

13.5 Signs

No details to enable audit.

13.6 Security

No details to enable audit.

13.7 Baggage Handling

Baggage handling is substantially all new. No costing information was available from which to confirm the valuation of this specialised equipment.

> The baggage handling equipment in Terminal C is as installed in 1992 with some minor changes to tie into the new systems in Terminal B and Pier B.
>
> *MMPL*

14 [600] Assets Under Construction

It was not possible to review this item from the information available.

15 Conclusions

The primary focus of this review has been to gauge the robustness and reliability of the 2000 valuation of Sydney Airport. The review considered the appropriateness of the methods used, the suitability of assumptions made, and the accuracy of the valuation. The work underpinning that valuation was found to be both thorough and professionally competent. The accuracy and reliability of the numbers are a function of several factors. Firstly, the sheer scale and complexity of the airport facility places practical limitations on the level of accuracy that can be achieved. Secondly, the lack of detail for some asset inventories and gaps in the information at the time the valuation was undertaken, have also impacted on accuracy.

Lack of a comprehensive asset register meant that the valuation inventories for the pre 1998 assets had to be derived from a variety of sources including accounting records, maintenance reports, drawings and anecdotal evidence. The inventory for the more recent assets (post 1998) was compiled from construction drawings. Timing of the valuation (June 2000) meant that final as-builts and CADD files were not complete.

The review has taken these limitations into account and has found through extensive cross checking of information sources, that the inventory overall provides a realistic basis for the valuation. Differences were identified in a number of areas. These included:

(a) Values assumed for some input variables

(b) Lack of information to support some of the parameters used in the analysis

(c) Uncertainty about the potential effects of assumptions

Areas where accuracy is questionable or uncertain, have been identified and where possible potential impacts have been quantified in dollar terms. *Note that the amount ($) stated represents the change in value associated with a specific change of input variable(s). Change in value associated with a composite change to a range of variables would be quite different than the summation of the individual components.*

Given the scale, complexity and long life nature of the assets involved, there is inevitably scope for variable opinion about appropriate parameters to use for the valuation, eg. forecast life cycles, optimised arrangements and costs etc. It is therefore important that all assumptions and input variables that underlie the valuation are clearly explicit, so that monitoring and refinement can provide an ongoing basis for valuation improvements. The current valuation has established a comprehensive platform for future valuations. Recommendations for changes, further review and for improvements are outlined in the following section.

16 General Recommendations

16.1 Revaluation Methodology

The methodology of updating the 1998 valuation to produce the 2000 valuation has impacted on reliability. The update relied on exception reporting to account for changes to assets and condition since 1998.

Opus recommends that the next valuation be developed from first principles by using the latest asset register. This will ensure that all assets have been identified and that the most reliable information is incorporated. The valuation should be tied to a complete and up-to-date set of CADD drawings from which quantities can be measured directly.

16.2 Information Management

The information sources researched as part of this review were sometimes disparate and difficult to locate. Information includes:

- Asset Inventory
- Basis of valuation
- Cost Rates
- Assumptions

Opus recommends that all information regarding the valuation be stored in a series of dossiers with reference to drawing plans.

16.3 Allowance for Other Cost

Allowance for other costs such as professional fees and financial charges are included in the valuation as a percentage increase applied to the construction cost. The percentage used has a significant effect on the overall value, increasing $20M for every 1% increase in the allowance. The review has identified that the current allowance is potentially underestimated. Opus recommends that a detailed review be undertaken to confirm the value of this allowance. Potential changes could increase Optimised Replacement Cost (ORC) and Optimised Depreciated Replacement Cost (ODRC) by up to $100M.

16.4 Specific Asset Groups

Recommendations relating to specific asset groups are summarised as follows:

16.4.1 Runways, Taxiways and Aprons

Revisions are recommended for some valuation parameters to better reflect expected life cycles, replacement costs and optimised assets. The recommendation with the most significant impact on the pavement valuation is the placing of a residual value on the asphalt layer to recognise its ongoing contribution to pavement strength. The impacts of these changes are as follows:

- Reduce subgrade cost. (ORC -$8.6M, ODRC -$4.6M)
- Reduce basecourse cost (ORC-$4.3M, ODRC -$2.2M *Indicative – runway only*)
- Adjust thicknesses, lives and residual values. (ORC +$1.3M, ODRC + $61.1M)
- Use minimum depreciation rate of 1% for economic write-off (ODRC + $11.2M)

16.4.2 Airfield Grass

Airfield grass has been valued on the basis of turfing. A reduction in unit cost is recommended along with a revised life cycle to reflect maintenance funding. The impacts are

- Reduce unit cost rate (ORC -$13.8M, ODRC -$7.5M)
- Increase life (increase in ODRC)

16.4.3 Runway Platform and Sea Protection

An optimised replacement of the platform for the main runway would involve a significant reduction in the quantities of fill, sea protection works and area of grass. The basis for the current valuation is unclear and appears to be overstated. Further elaboration and review of these assets is recommended. The impacts are

- Reduce the unit cost of sea protection works (decreased ORC and ODRC)
- Increase the life of the sea protection works (increase in ODRC)

16.4.4 Roads and Carparks

The asset inventory for this category lumps information together for each asset type. Verification of quantities has not been possible. It is recommended that a more detailed inventory be developed. Two specific high valued assets in this category are the elevated roads at both the Domestic and International Terminals. Both appear to have an overstated value. It is recommended that the optimised replacement cost of these two structures be recalculated.

16.4.5 Airfield Lights

The useful life for lighting equipment is overstated in the current valuation. A more realistic life of 25 years would reduce the ODRC by $3.7M.

16.4.6 Passenger Terminal Buildings

Both the old and new parts of the terminal structure should be considered to have identical remaining lives. Also, centralising the location of services within the terminal building would effectively reduce the length of the services tunnel. Impacts are:

- Use a single remaining life for the structure (ODRC + $4.4M)
- Reduce the length of the services tunnel (ORC – $3.1M and ODRC - $1.9M)

16.4.7 Other Buildings

Some buildings are no longer required for their original purpose and are now being used simply as a storage area. Replacement value should be recalculated to reflect the current lower cost use. Also, an unusual sequence of remaining lives has been specified for some buildings. A more generic specification is recommended. The services of the elevated water tank, while still used, could be provided by a less costly alternative. The impact of these recommended changes is minor.

16.4.8 Main Services

Only minor changes are recommended for the main services assets. These include

- Review basis for current charging
- Include value for lateral connections from water mains (minor increase in ORC and ODRC)
- Decrease diameter for gas main (ORC - $0.6M)
- Review fuel main assets (Potential ORC - $0.5M)

16.4.9 Fixed Plant and Equipment

Optimisation would centrally locate services for the terminal building, reducing the effective length required for the services tunnel. There would be a corresponding reduction in the amount of mechanical services corresponding to a reduction in ODRC of $6.6M.

Specific recommendations are summarised in Table 13.

Table 13 : Recommendation Summary

Asset Group	Item	Recommendation	Impact on Valuation
All Groups	Other Costs	To review the allowance for other costs.	ORC & ODRC +$100M
510 Runways, Taxiways and Aprons	Quantities	That quantities be recalculated from updated CADD files	Potential for significant change
	Unit Costs	Review the cost rate used for subgrade and basecourse.	ORC -$12.9M & ODRC - $6.8M
	Flexible Pavements	Reduce asphalt thickness to 50mm	ORC +$0.4M & ODRC + $51.0M
		Increase residual value of asphalt to 67%	
		Increase lives and residual values of basecourse & subgrade	
	Rigid Pavements	Increase thickness of basecourse to 200mm	ORC +$0.4M & ODRC + $10.1M
		Increase lives and residual values	
	Shoulders & Run-offs	Decrease basecourse thickness to 250mm	Included with pavement items above.
		Increase lives and residual values of basecourse & subgrade	
	Econ. Write-off	Minimum depreciation rate of 1% to cover economic write-off	ODRC +$11.2M
	Airfield Grass	Reduce the unit rate to reflect field seeding ($8/$m^2$)	ORC -$13.8M & ODRC - $7.5M
		Increase life and residual value	Increase in ODRC
		Adjust area to reflect opt replacement formation for runway 16R-34L	Decrease in ORC & ODRC
	Sea Walls & Runway Fill	Quantities and costs to be reviewed for optimised replacement formation for runway 16R-34L	Decrease in ORC & ODRC
515 Roads and Carparks	Quantities	More itemised inventories are required for these assets	Potentially significant change
	Elevated Roads	Review the cost of the elevated road at the Domestic Terminal	Potential ORC -$10M
		Optimise the elevated road at the International Terminal	Minor
520 Lighting	Lighting equip	Reduce the useful lives of these assets to 25 years.	ODRC -$3.7M
530 Passenger Terminal	Structure	Treat the terminal as a single entity with regards to remaining life.	ODRC +$4.4M
	Services Tunnel	Reduce the length of the services tunnel	ORC -$3.1M & ODRC - $1.9M
540 Other Permanent Buildings	Changed Use	Lesser utilised buildings to be revalued accordingly	Minor
	Lives	Revise the lives for structures, fitout and services	Minor
	Water Tank	Consider optimised replacement alternative for the elevated tank	Minor
560 Main Services	Water Main	Include value of lateral connections	Minor
	Gas Main	Decrease pipe diameter to 150mm	ORC -$0.6M
580 Fixed Plant	Mech. Services	Reduce quantity to correspond with shortened tunnel length	ORC -$6.6M

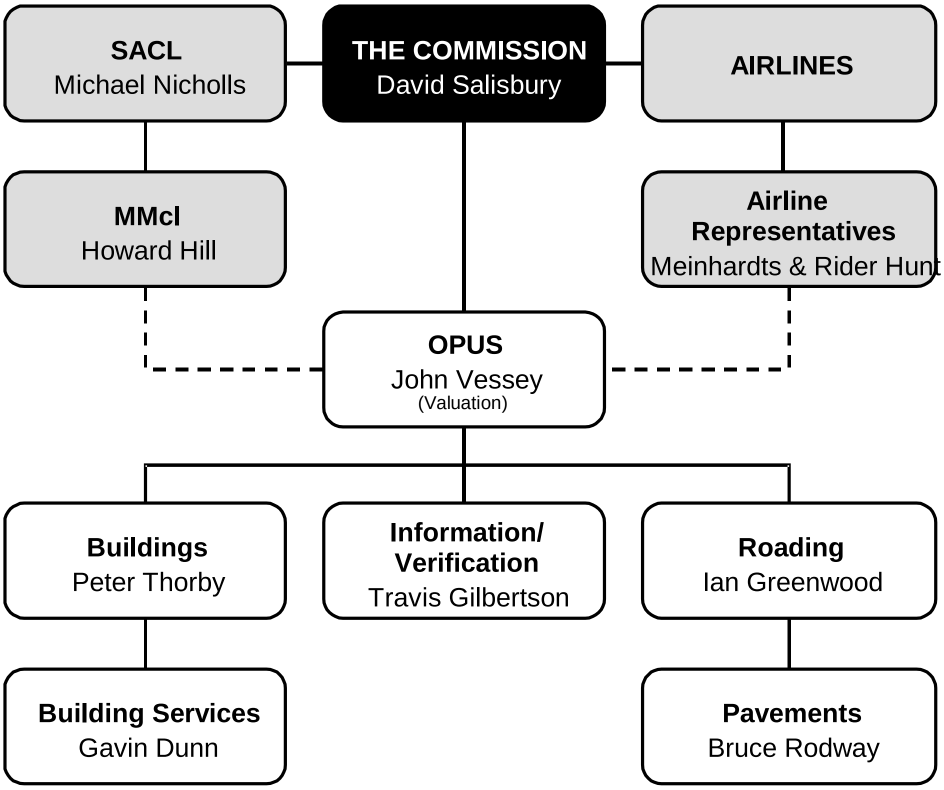
17 Acknowledgements

The Opus team acknowledges the generosity and openness of Sydney Airports Corporation Ltd (SACL) and their consultant advisor Maunsell McIntyre Pty Ltd (MMPL). Both organisations gave readily of their time and resources in providing assistance to the review team, unhesitantly responding to all requests for information and explanation. The Opus team sincerely thanks all those who participated in the review exercise. A few key people singled out for special thanks are: Michael Nicholls, Garry Wickham and Tina Kalogeras from SACL and Howard Hill, Kim Jessop and Simon Magri from MMPL.

APPENDIX A

Team Structure

The make-up of the Opus team and the communication lines within the overall project team are detailed below:



APPENDIX B

Project Contacts

Persons contacted during the course of the review are tabulated below.

Organisation		Person	Topic Area
Australian Competition and Consumer Commission (Client)		David Salisbury	
Sydney Airports Corporation Ltd		Michael Nicholls	Airport Operations
		Garry Wickham	Airport Operations
		Peter English	Pavements
		Krishan Tangri	Airfield Maintenance
		Karl Mezgailis	Planned Development
		Walter Rafin	Facilities Management
		Daniel Boyd	Drainage
		Nambi	Services
		Carol Wan	Asset Accounts
		John Peterie	Airport Lighting
		Rob Haysom	Central Services Building
		Brett Bates	Facilities Project Management
		Peter Davidson	Power Distribution
Maunsell McIntyre Pty Ltd		Kim Jessop	SACL 2000 and 1998 Valuations
		Howard Hill	
		Simon Magri	
Rawlinsons		Graham Moult	Costing Information
BARA	Ansett	Belinda Searle	Concerns with SACL 1998 valuation
	Quantas	Angelina Sarcasmo	
	Rider Hunt	Mark Quinn	
	Ansett	Ian Robinson	