

Environmental

Impact

Assessment

***PROPOSED EASTERN  
DISTRIBUTOR***

Cahill Expressway to Mill Pond Road

**VOLUME 1**

Department of Urban Affairs and Planning

625.712

ED.15



***PROPOSED EASTERN  
DISTRIBUTOR***

Cahill Expressway to Mill Pond Road

**VOLUME 1**

***Director-General's Report  
Section 115C  
of the Environmental  
Planning and Assessment Act***

*June 1997*

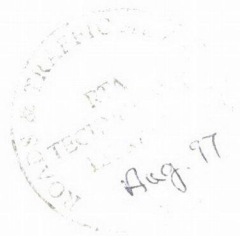


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## FOREWORD

The RTA proposes to develop the Eastern Distributor, a tolled motorway standard road between the Cahill Expressway and Mill Pond Road, Botany Bay.

The RTA has sought the approval of the Minister for Urban Affairs and Planning for the project under Section 115B of the *Environmental Planning and Assessment Act* (EP&A Act).

This report has been prepared in accordance with Section 115C of the EP&A Act which requires the Minister to obtain a report from the Director-General of the Department of Urban Affairs and Planning prior to making a decision on the project.

The purpose of this report is to review the environmental impact statement, issues raised in representations made in response to its exhibition, submissions from the RTA and other relevant matters. The report concludes that the potential environmental impacts associated with the project could be mitigated and managed by adopting stringent further measures and safeguards which are specified in the report's recommended conditions of approval.

In preparing this report there have been a number of special difficulties that I wish to emphasise and recommend that the Government needs to consider to ensure that they do not arise again.

The project has been particularly controversial and has had severe time constraints imposed on it to enable its construction to be completed prior to the Year 2000 Olympic Games. These time constraints placed great pressure on the whole assessment process. The request from the RTA for approval of the project was not received until 18 April, 1997. It should be noted that the EP&A Act provides the Director-General with 3 months to report and it needs to be understood that for a project as complex as this, this time may be absolutely necessary to enable proper independent consideration to be given to it.

The Legislative Council adopted a resolution on 17 April, 1997 to require the Auditor-General to undertake a performance audit of the Eastern Distributor. The Auditor-General reported to the Parliament on 27 May, 1997. The report was tabled whilst the Director-General's report was being prepared. For the most part the Auditor-General's report is not directly relevant to my considerations under the EP&A Act. However, I wish to make two points about the report.

Firstly, the Auditor-General notes the delay which took place in 1995 and 1996. The EIS was placed on exhibition on 15 November 1996 and closed on 24 December 1996. At this time the RTA clearly knew that if the project was to be completed by 2000 it must be started by July 1997. Notwithstanding this situation it was not until 18 April 1997 that the Director-General was in a position to start the assessment process.

Secondly, the Auditor General refers in his report to cost penalties payable by the RTA and whilst these penalties are not, in my view, relevant to my assessment of the project the fact



that they are now in the public domain has provided a further difficulty in the assessment environment. I would strongly reiterate the Auditor General's view that it would be preferable in the future for projects of this nature for the EIS to be prepared and considered before the project is put to tender rather than after the selection of the preferred tenderer. The Auditor General's report clearly outlines why this is the preferable course of action.

On 29 May, 1997 the Parliament adopted legislation to deal with the excision of land from Moore Park to enable the construction of the South Dowling Street part of the Eastern Distributor. I note that whilst the Opposition introduced certain amendments to the legislation it was passed with strong bipartisan support. Therefore I have concluded that the construction of the Eastern Distributor essentially in the form it was submitted to me for assessment and to the Minister for approval has the support of the Parliament of NSW.

I note that it is unprecedented for the Parliament to pass legislation of this nature during the assessment period and I have, therefore, concluded that it is both legitimate and imperative that I take into account this legislation when finalising my report for the Minister.

In conclusion I wish to emphasise that notwithstanding the special difficulties presented by the circumstances surrounding the assessment of the Eastern Distributor I believe that, with the conditions of approval recommended, the project could proceed.



Gabrielle Kibble  
**Director-General**



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## Glossary

AEP	Annual Exceedance Probability
CPMPT	Centennial Park and Moore Park Trust
dB(A)	decibel (A-weighted scale)
Department, The	Department of Urban Affairs and Planning
Director-General	Director-General of the Department of Urban Affairs and Planning
DLaWC	Department of Land and Water Conservation
DoT	Department of Transport
DoH	Department of Health
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
ENCM	EPA's Environmental Noise Control Manual
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
FAC	Federal Airport Corporation
LAIP	Local Area Improvement Program
landscaped cover	a cover over the Cahill Expressway extending from 10 metres west of the existing Art Gallery Road Bridge to the eastern edge of the Art Gallery building adding some .85 hectares of land to the area of the Domain. The cover is to include landscaping such as grass and shrubs.
km	kilometre
km/h	kilometre per hour
m	metre
Minister, The	Minister for Urban Affairs and Planning
NPWS	National Parks and Wildlife Service
PCA	Pollution Control Approval
RAC	Rail Access Corporation
RBGDT	Royal Botanic Gardens and Domain Trust
Regulation, The	Environmental Planning and Assessment Regulation 1994
RTA	Roads and Traffic Authority
SFS	Sydney Football Stadium
SCG	Sydney Cricket Ground
SWC	Sydney Water Corporation
TAG	Transport Action Group
UNSW	University of New South Wales
WHO	World Health Organisation



## EXECUTIVE SUMMARY

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### The Proposal and Assessment Process

The proposed Eastern Distributor by the Roads and Traffic Authority (RTA) is a major road infrastructure project of significance to the economy, environment and planning of Sydney and New South Wales. The proposed development is to be determined under the provisions of Part 5 of the *Environmental Planning and Assessment Act* (EP&A Act). This requires the preparation of an independent assessment report by the Director-General of the Department of Urban Affairs and Planning, hence the purpose of this report. The Minister for Urban Affairs and Planning must also grant his approval before the project can proceed.

### EIS Exhibition

An environmental impact statement (EIS) for the proposed development was publicly exhibited during November/December 1996. Key features of the proposal are described in section 2 of this report. The RTA received some 2,762 representations to the exhibited EIS. The Minister and Director-General also received numerous representations indicating the wide public interest in the proposal. Key issues raised in representations included: need and justification including public transport alternatives; traffic implications both regional and local; noise and vibration; air pollution; urban design; social and economic concerns; community severance and loss of parkland at Moore Park; effects on underground water, heritage and private and business properties. Section 3 of this report provides a detailed analysis of all representations received.

### Proposed Modifications

The RTA in response to various concerns expressed in representations proposed modifications to the EIS preferred scheme. These are indicated in Section 4 and include in the main: a landscaped canopy over a section of the motorway near the Art Gallery; relocation of the northern tunnel portal north of Cathedral Street; and a 'Parkway' scheme along South Dowling Street comprising a lowering of the motorway and extensive landscaping. The RTA submitted on 18 April, 1997 a Representations Report seeking approval of the Minister for Urban Affairs and Planning and addressing issues raised in representations.

### Comparative Assessment of Proposed Modifications

The RTA Representations Report provides a comparative assessment of the modifications relative to the exhibited EIS and concludes that overall the modifications would eliminate or reduce the environmental impacts of the EIS scheme. This claim is independently assessed in Section 5 of this report. The conclusion is that there would be a number of positive as well as negative impacts. Overall the modifications in the vicinity of the Art Gallery, Drivers Triangle, South Dowling Street (south of Dacey Street) and Southern Cross Drive would result in major positive impacts with relatively minor negative impacts. The proposed



modifications at Cathedral Street and along South Dowling Street would introduce a range of different impacts which have been specifically assessed in this report. These relate specifically to urban design and groundwater/property settlement potential. Strict controls of these will be essential if the impacts are to be tolerated.

## Key Issues

The Director-General's overall assessment of the proposal is provided in Section 6. The key findings and conclusions are as follows:

- The Eastern Distributor as now proposed would change the functional nature of this corridor to a major north-south emphasis relative to previous regional transport considerations. Whilst this may be in response to emerging needs and trends, the conclusion is made that a reassessment of previous strategic and related transport documents would need to be undertaken should this proposal proceed.
- The assessment at Section 6.1 indicates that the claimed objectives of the proposal could be achieved to varying degrees. This will necessitate design adjustments or complementary measures, particularly in relation to: public transport initiatives; local area improvement plans; and intersection and access improvements.
- It is accepted that the proposal would complement the overall public transport system provided major improvements and giving priority to bus services are implemented. The main benefit in this regard would be around Taylor Square. For other areas the proposal could act as a catalyst for public transport improvements. The Department is satisfied that commitments to such improvements would be implemented through the government Bus Priority Taskforce. The Department also considers the New Southern Railway and the Eastern Distributor to provide complementary transport modes (see section 6.2).
- Independent traffic modelling by the Department indicates relative benefits and disbenefits to regional and local roads (see sections 6.3 and 6.4). Main benefits would occur at several roads parallel to the proposal particularly the Woolloomooloo area north of Oxford Street and the Surry Hills area south of Fitzroy/Foveaux Streets. Relative increases in traffic to those previously predicted would particularly occur on Palmer Street, Fitzroy Street, Bourke Street and the northbound surface roads. Local area traffic management would be critical and essential to control toll avoidance routes and in managing local traffic in particular.
- A number of specific project design modifications are suggested for further investigations as the result of the assessment at section 6.6. These include: improvements to Mill Pond Road intersection; access provisions at Link Road; and maximising demand management opportunities on Southern Cross Drive by providing for transit lanes.
- The proposal would increase the number of properties affected by permanent rock anchors for the tunnel section of the proposal and hence stratum acquisition requirements beyond those already identified in relevant planning instruments. Consultation with affected property owners would be necessary to ensure minimal impacts. The proposal would



introduce requirements for temporary soil anchors particularly along the western side of South Dowling Street during the construction period. These will have to be disconnected subsequent to construction so as to ensure no long term restrictions to the affected property owners.

The proposal as modified would significantly affect the Kidman Terrace area in terms of air quality, stratum acquisition and potential for settlement from construction activities. A specified impact management regime would be essential for this area including possible acquisition.

- Section 6.8 details the urban design implications of the proposal. The conclusion is made that whilst the proposed modifications are an improvement on the EIS scheme in some areas (particularly in the Art Gallery area), there would be considerable potential impacts on the visual character along the route. These result from changes to the physical form and existing views; loss of landscaping and visual markers; the introduction of hard surfaces and features; and the severance of existing linkages and access routes. A number of key recommendations are made to minimise and manage such impacts.
- In accordance with section 15 (O) of the *Centennial Park and Moore Park Trust (Eastern Distributor) Bill, 1997*, the Director-General is required to report on the need to acquire Trust land for the purpose of the Eastern Distributor. Section 6.9 provides such an assessment. It is inevitable that should this proposal proceed, there will be a need to acquire park land. There will also be wide ranging impacts. The RTA and the Trust have agreed on comprehensive compensatory measures which would provide an opportunity to enhance and improve the Park through landscaping and rationalisation of space.

Notwithstanding, the Director-General considers it important to minimise the permanent land take from the Park in the public interest. To this end, removal of the southbound ramp (south of Fitzroy Street) and the relocation of the southbound surface road as close as possible to the motorway whilst still retaining the 'Parkway' landscaping theme are recommended.

- The proposed modification of the motorway would have a potentially significant impact on groundwater. As assessed in section 6.10 during construction dewatering, groundwater draw-down is expected to exceed historical lows which could potentially impact on properties in terms of settlement. Mitigation measures such as reinjection are available and would need to be strictly imposed if the impacts are to be satisfactorily managed.
- Noise during construction may exceed EPA criteria during day time and at places, as advised by EPA. A noise management strategy which would limit construction time is to be implemented. The EPA has indicated that it can issue the necessary licences and approvals for the construction of the project.
- Existing noise levels along the proposal's corridor already exceed EPA criteria at times in various places. The assessment indicates that there would be an overall reduction in noise levels from the modifications relative to those indicated in the EIS. Where small increases are anticipated, additional mitigation measures including noise barriers have been



proposed. The EPA has indicated that subject to these and other measures it expects to be able to grant pollution control approvals and licences.

- Air quality during construction would be affected principally by dust from the construction sites and stockpiles. A dust suppression plan would be required to be prepared to the satisfaction of the EPA. Contractors would be required to keep construction vehicle exhaust emissions within levels approved by the EPA.
- Existing concentrations of some pollutants are already high along parts of the proposed corridor and the assessment of the project indicates small increases would occur at various places. These increases would however remain within EPA goals. Further wind tunnel testing would be required for the tunnel ventilation stacks to confirm the design and compliance with air quality goals. Air quality within the tunnel would require approval by the EPA and would be monitored to ensure that adequate air quality levels are achieved. Conditions of approval have been recommended to take into account emerging future health standards. The EPA has indicated that subject to these and other measures required it expects to be able to grant the necessary pollution control approvals and licences.
- Other issues of relevance to the proposal are assessed in Section 7, including impacts on heritage buildings, flora and fauna, businesses, cyclists, flooding, soil and wastes. The conclusion is that all such impacts can be managed and would not, subject to conditions, result in long term adverse effects.

## **Conclusion**

The Director-General's conclusion of the overall assessment is that should the proposal proceed it will be essential for comprehensive and advanced conditions to be imposed so as to maximise its benefits and manage residual impacts. Section 9 of this report lists the recommended conditions of any approval, the key ones include:

- ⇒ the preparation and implementation of comprehensive environmental management plans for both the construction and operation stages.
- ⇒ the appointment of a qualified environmental manager and employing contractors with accredited environmental performance.
- ⇒ the establishment of a community liaison group and a 24 hour complaint phone system.
- ⇒ extensive monitoring and auditing requirements by independent persons, including making results publicly available.
- ⇒ instituting a bus priority network prior to the proposal becoming operational and improvements to key intersections to facilitate/strengthen public transport.
- ⇒ the development of an integrated transport strategy for the servicing of major events in the Moore Park area.
- ⇒ instituting a comprehensive Local Area Improvement Program, prior to the development becoming operational.



- ⇒ the removal of the southbound on ramp in the vicinity of Moore Park south of Fitzroy Street to minimise land take of the Park.
- ⇒ further investigation into the justification of providing major intersection improvements including at Mill Pond Road and Link Road.
- ⇒ disconnecting all temporary anchors and ensuring all affected property owners particularly in the Kidman Terrace area are consulted and compensated wherever applicable.
- ⇒ extensive landscaping and environmental management planning for Moore Park during construction and when operational.
- ⇒ extensive groundwater and settlement impact management during construction including independent monitoring of drawdown and settlement and water reinjection in affected areas.
- ⇒ compliance with noise criteria to EPA satisfaction and ensuring noise during construction is managed and limited to day time unless otherwise agreed to by the EPA.
- ⇒ compliance with air quality standards to EPA satisfaction both current and projected where applicable.
- ⇒ various conditions that are aimed at heritage conservation; water and waste management; minimising impacts on business and maximising benefits to pedestrian and cyclists.



## **1.0 INTRODUCTION**

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### **1.1 Nature of the Proposal**

The Roads and Traffic Authority (RTA) proposes to develop the Eastern Distributor, a tolled motorway standard road which would link the Cahill Expressway in the north with the General Holmes Drive in the south. (Figure 1.1).

Key features of the proposal as identified in the EIS include:

- grade separated intersection of Cahill Expressway and Sir John Young Crescent;
- two three lane tunnels from north of William Street to South Dowling Street, linking to Moore Park Road and Anzac Parade;
- grade separated interchanges along South Dowling Street to remove conflicts between motorway traffic and local traffic;
- widening of Southern Cross Drive; and
- northbound traffic would be tolled at \$2.50 (Year 2000 value).

In response to the representations received during the exhibition, the RTA is now proposing a number of modifications to the proposal. The key modifications include:

- a landscaped canopy over a section of the motorway near the Art Gallery of New South Wales;
- relocation of the northern tunnel portal to north of Cathedral Street;
- a "Parkway Scheme" along South Dowling Street comprising a lowering of the motorway and associated comprehensive landscaping works; and,
- an increase of the toll to \$3.00 (Year 2000 value).

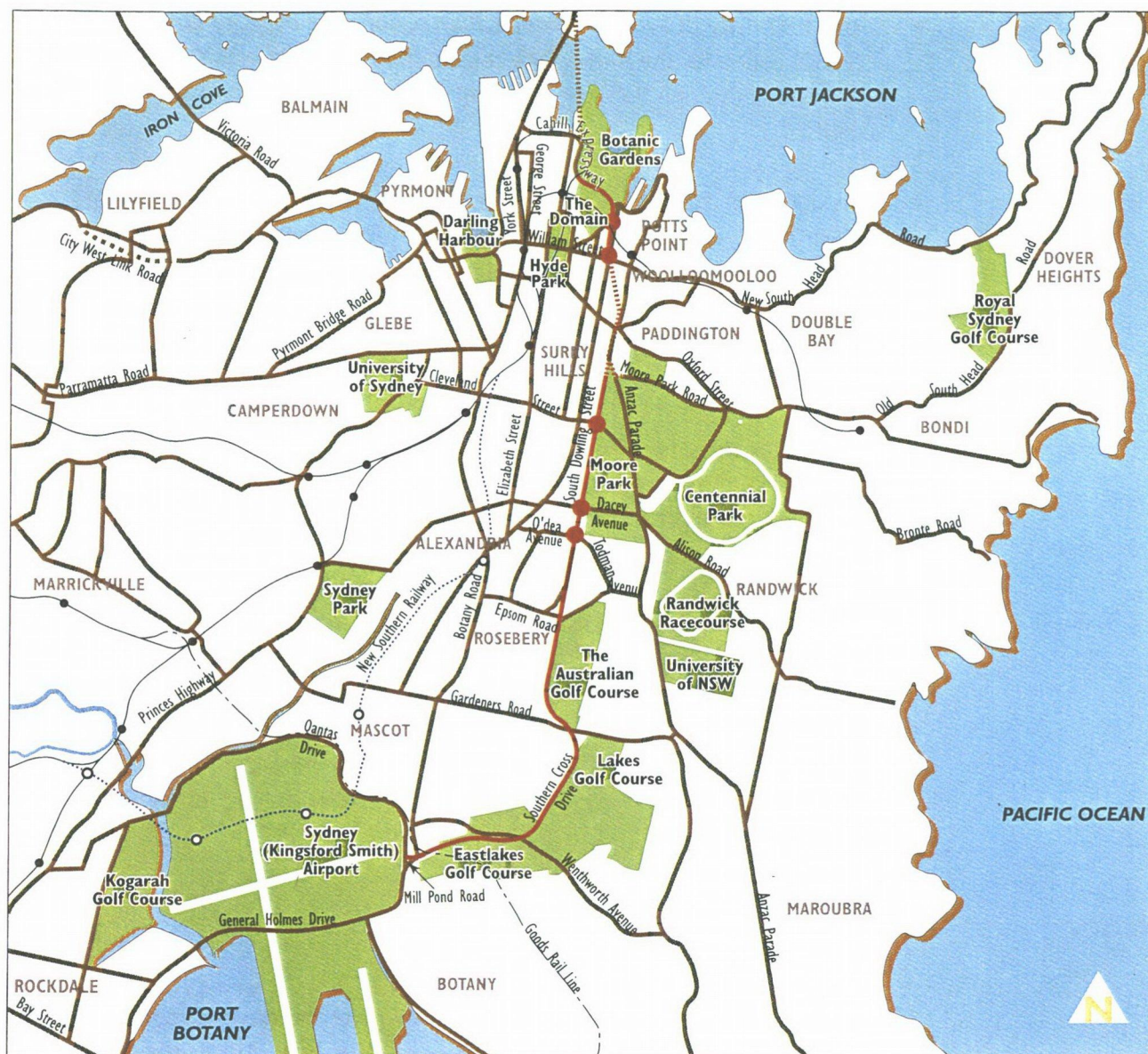
Fundamental to the proposal was a comprehensive local area traffic management plan as well as major improvements to public transport facilities. Further details on the proposed changes are provided in Section 4.

### **1.2 Background and History**

The concept of developing an eastern bypass of Central Sydney has existed at least since 1945. In 1985 a proposal for the Eastern Distributor was developed to provide an improved connection from the Cahill Expressway to Anzac Parade, South Dowling Street and Moore Park Road.

An Environmental Impact Statement (EIS) was prepared and a determination to proceed was made in November 1985. Construction of the proposal was to be undertaken in three stages. Stage 1 involved the construction of a tunnel under William Street for southbound traffic on Palmer Street. Stages 2 and 3 involved the construction of a much longer tunnel to the north and south of William Street. Stage 1 was completed in 1987. Due to funding limitations, Stages 2 and 3 were not undertaken.





- Major Intersection Improvements ●
- Road Improvements Including New Lanes —
- Tunnels —
- Roads —
- Rail —
- Proposed Rail —○—
- Landmarks ■



## Overview of Eastern Distributor

0 1 2 3  
Scale Km

Figure 1.1

Source: RTA



### **1.3 Statutory Provisions and Assessment Process**

The approval of the Minister for Urban Affairs and Planning (the Minister) is required for those projects undertaken by State agencies where an environmental impact statement (EIS) has been prepared under Part 5 of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) and where the proponent also has a determining role.

An assessment report must be prepared by the Director-General of the Department of Urban Affairs and Planning for the proposal before the Minister makes a decision. The Director-General's report together with the Minister's decision are to be made publicly available.

To enable all parts of the proposal to be assessed consistently under Part 5 of the Act, State Environmental Planning Policy No. 51 - Eastern Distributor (SEPP 51) was gazetted on 18 April 1997 to permit the carrying out of the development for the purpose of the Eastern Distributor without development consent.

### **1.4 Request for the Approval of the Minister for Urban Affairs and Planning**

The RTA publicly exhibited the EIS during November and December 1996. A report on Representations including a request for the Minister's approval was received by the Department on 18 April 1997. The request included proposed modifications to the project as described in the RTA's Representations Report and associated supporting information.

### **1.5 Purpose of the Report**

The purpose of this report is to review the EIS, issues raised in the representations made in response to the exhibition, the RTA's Representations Report including the proposed modifications to the proposal and other relevant matters pertinent to the potential environmental impact of the proposal.

This report is prepared in accordance with section 115C of the EP&A Act which requires the Director-General to assess and report to the Minister for Urban Affairs and Planning on the proposal.



## 2.0 THE PROPOSAL AS DESCRIBED IN THE EIS

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*This section provides a description of the project outlined in the EIS. The proposed modifications to the proposal are described in Section 4.*

### 2.1 Project Description

The project involves the construction and operation of a motorway standard road with limited access between the Cahill Expressway, Woolloomooloo and Mill Pond Road, and all necessary ancillary works including access points and improvements to roads in the vicinity of the Eastern Distributor.

Key features of the proposal include:

- the replacement of the existing traffic lights at the intersection of Cahill Expressway, Sir John Young Crescent and Palmer Street with a short tunnel under the Cahill Expressway linking Sir John Young Crescent with Cowper Wharf Road;
- direct access would be provided for vehicles travelling south from the Cahill Expressway to William Street via an access ramp located on the eastern side of a widened Palmer Street road corridor;
- access would be provided for vehicles travelling north from William Street to both the Cahill Expressway and Macquarie Street in the City;
- toll plazas would be located on the motorway between Sir John Young Crescent and the Art Gallery Road bridge over the Cahill Expressway. Only northbound traffic using the Eastern Distributor tunnels would be tolled.
- access ramps would be provided from the motorway to William Street to allow full access between those roads. Northbound traffic leaving the motorway to enter William Street would also be tolled;
- two three-lane tunnels would extend from just north of William Street to South Dowling Street, Moore Park Road and Anzac Parade. Each tunnel would have three traffic lanes with the northbound tunnel generally located on the top of the southbound tunnel. The tunnels would mostly be located under Bourke Street and Flinders Street;
- tunnel entries and exists would be provided for traffic on South Dowling Street, Anzac Parade and Moore Park Road;
- South Dowling and Dowling Street would be upgraded to provide four motorway lanes extended from Fitzroy Street to the Southern Cross Drive. Underpasses would be provided under Cleveland Street and from Dacey to Todman Avenues to enable unimpeded traffic flows under those intersections. On the outside of the motorway would



be four lanes, two in each direction, for local and other traffic wishing to enter and exit the motorway;

- Southern Cross Drive would be upgraded from Link Road to Mill Pond Road by the addition of one traffic lane in each direction; and
- changes would be made to the intersection of Mill Pond Road with Botany Road and General Holmes Drive to improve traffic flows.

Fundamental to the proposal is the preparation and implementation of a comprehensive local area traffic management plan as well as major improvements to public transport. The EIS committed to finalising these aspects at the time of an approval/determination of the project.

Details of the proposal are presented at Figures 2.1 a-g.

Construction of the proposal is expected to take approximately 36 months. General work hours are proposed between 7:00am and 6:00pm weekdays and 8:00am to 1:00pm Saturdays. Some Sunday work may be required. Tunnelling and haulage of excavated rock is expected to be undertaken 24 hours a day.

Establishment of four work compounds would be required, with the largest one located in Moore Park. Traffic diversion during construction for all northbound traffic from South Dowling Street into O'Dea Avenue, Bourke Street and Crescent Street is proposed and would be required for a period of 24 months. The EIS identified the possibility of other traffic diversions but provided no details.

## **2.2 Need, Benefit, Project Justification and Consequences of Not Proceeding**

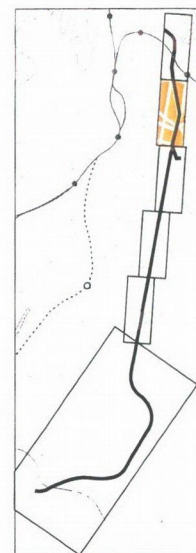
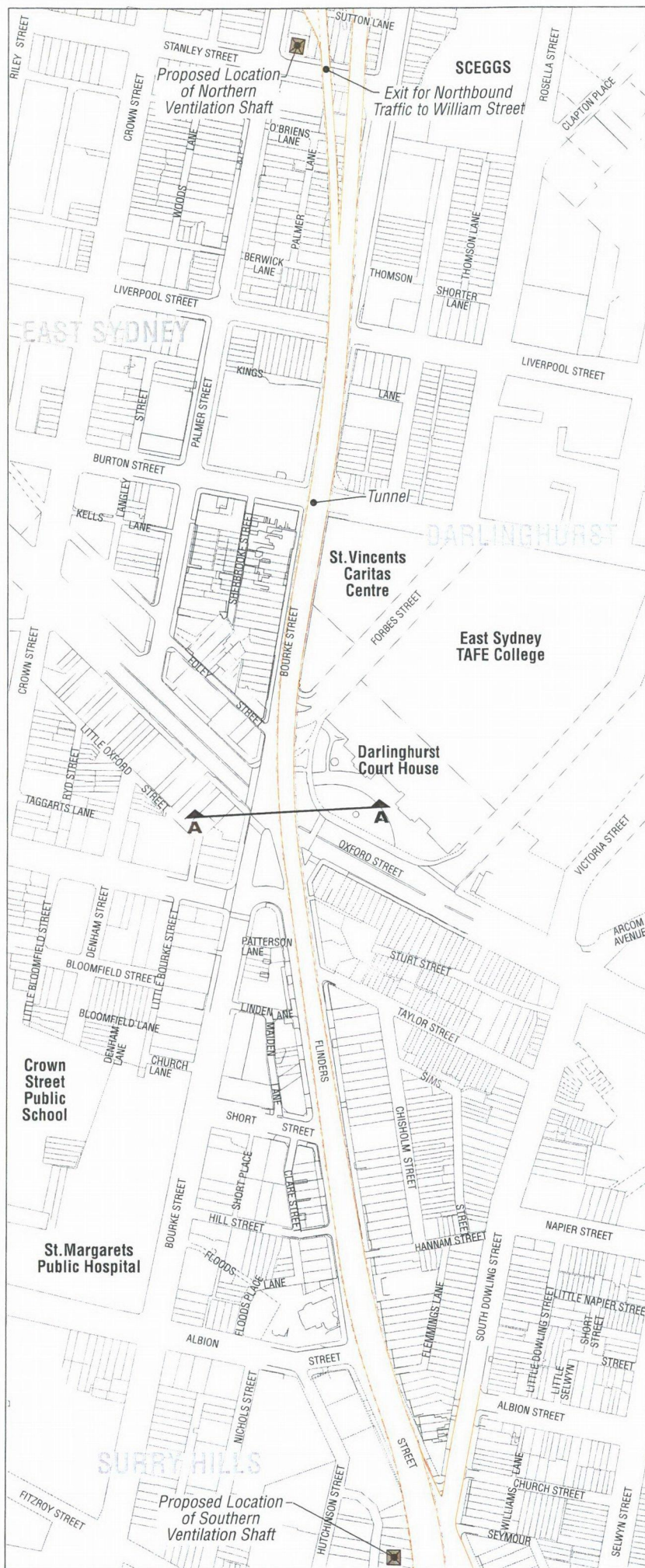
The need, benefit and justification of the proposed Eastern Distributor as stated in the EIS are:

- to complete an important link in Sydney's emerging orbital road network which would provide a greatly improved transport route for passenger, freight and commercial movements and enhance economic efficiency at a national, State and regional level;
- to remove traffic conflict in the inner eastern suburbs with improved traffic flow and safety for pedestrians, cyclists and motorists;
- to improve public transport and cyclist opportunities, while providing support for urban development and renewal initiatives and increased employment in and around the central industrial area and Sydney (Kingsford-Smith) Airport;
- to support State Government transport and landuse strategies; and
- to provide potential for improved environmental amenity of residents in the areas above the tunnel.









Cross Sections   
(see Figure 7.2c)

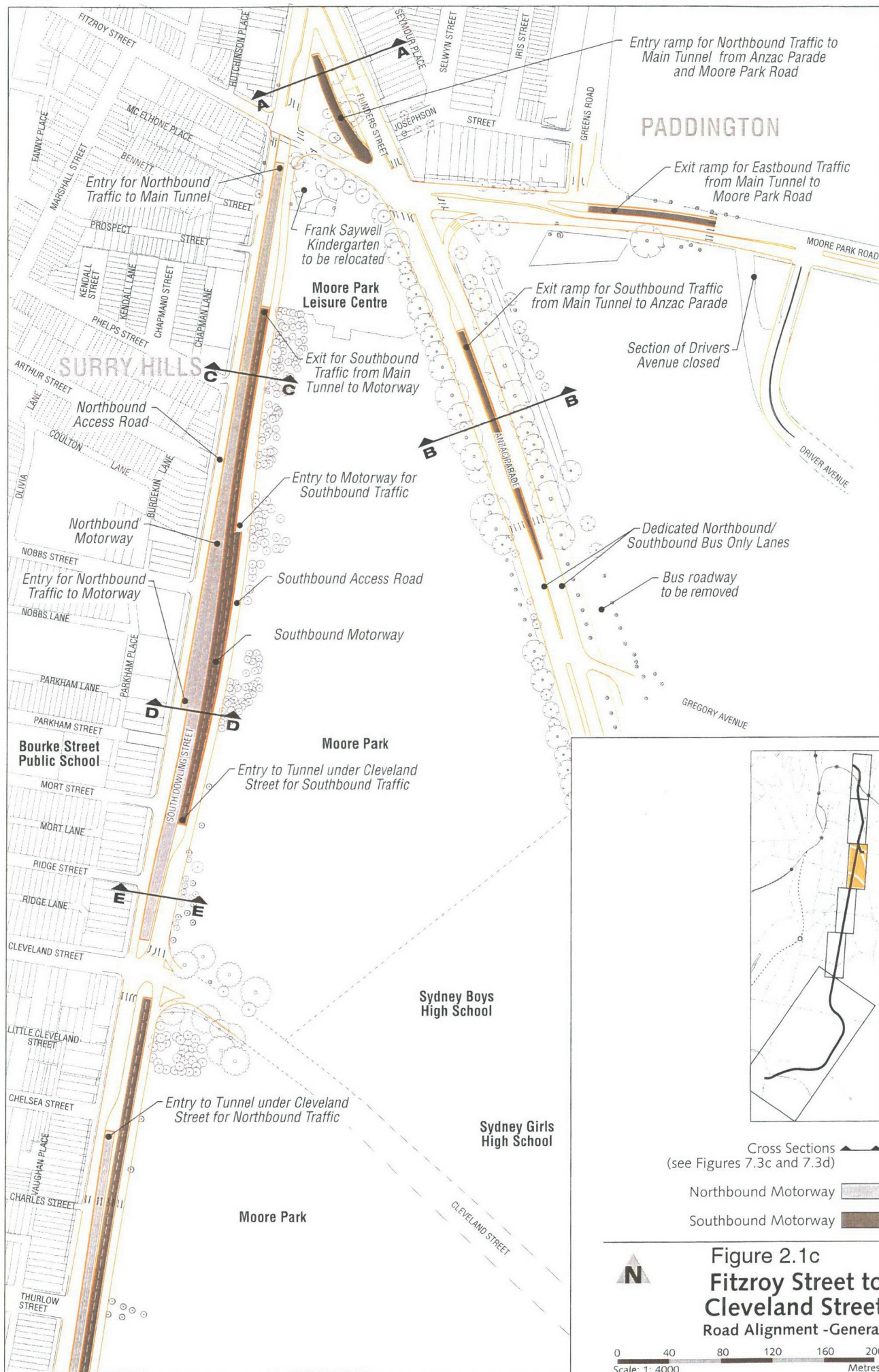
Tunnel 

**Figure 2.1b**  
**Stanley Street to**  
**South Dowling Street**  
**Road Alignment -General**

0 40 80 120 160 200  
Scale: 1: 4000 Metres

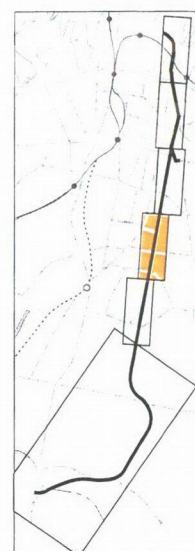
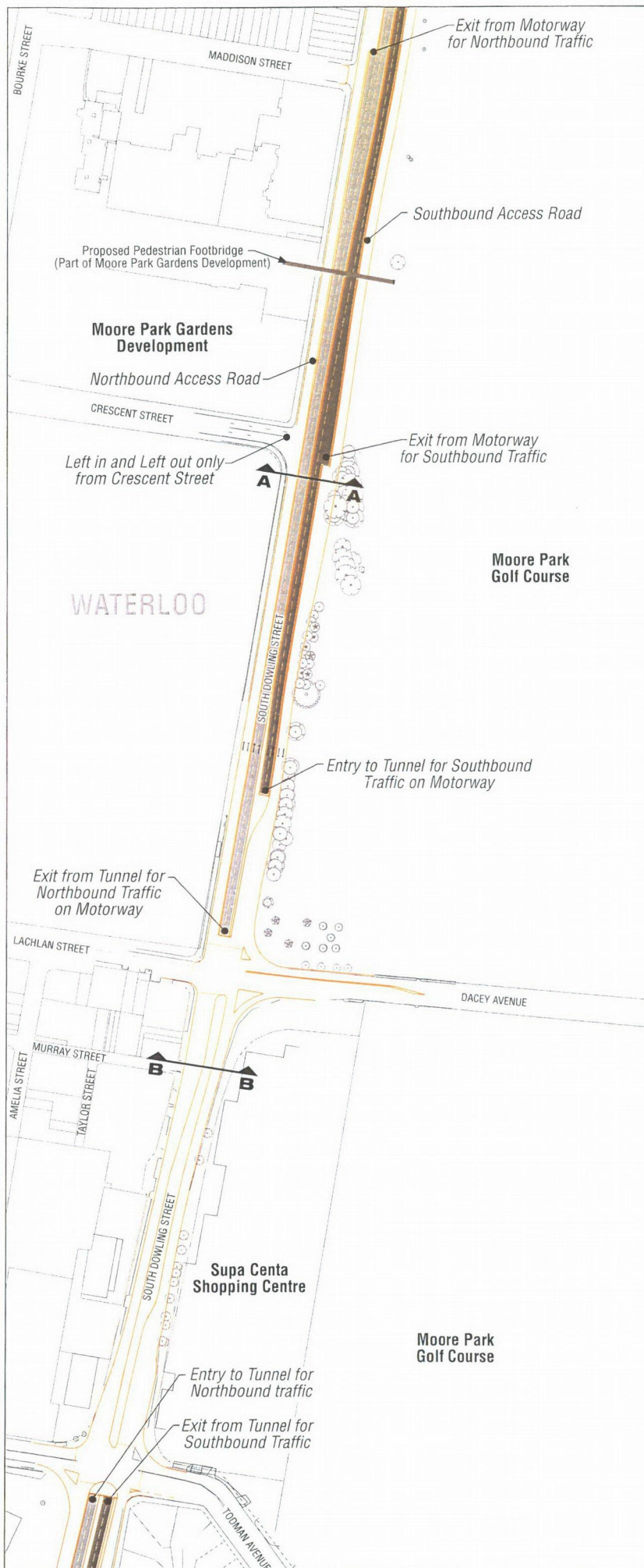
Source: RTA





**Figure 2.1c**  
**Fitzroy Street to**  
**Cleveland Street**  
 Road Alignment -General





Cross Sections  
(see Figure 7.4c)

Northbound Motorway

Southbound Motorway

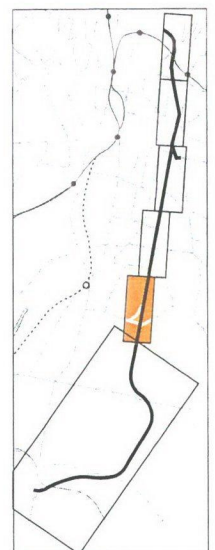
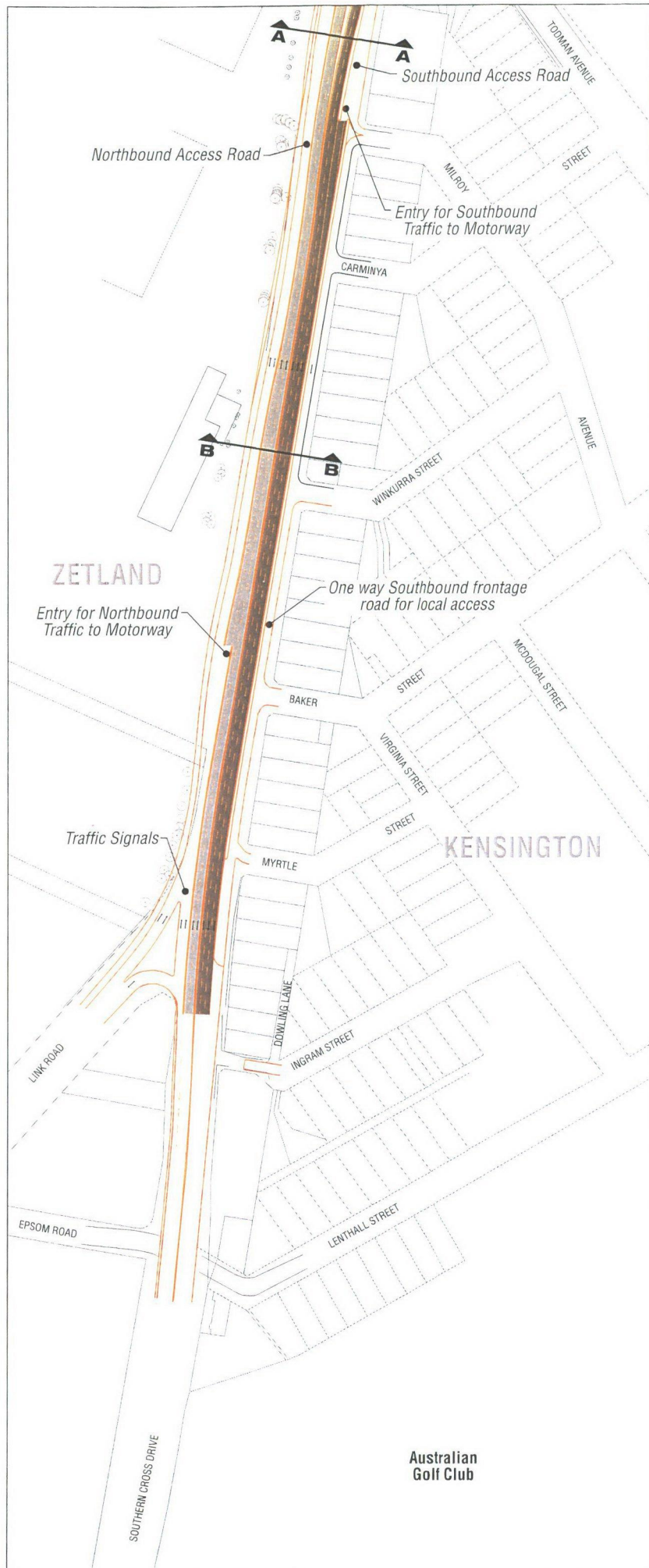


**Figure 2.1d**  
**Cleveland Street to**  
**Todman Avenue**  
**Road Alignment -General**

0 40 80 120 160 200  
Scale: 1: 4000 Metres

Source: RTA





Cross Sections (see Figure 7.5c)

Northbound Motorway  
Southbound Motorway

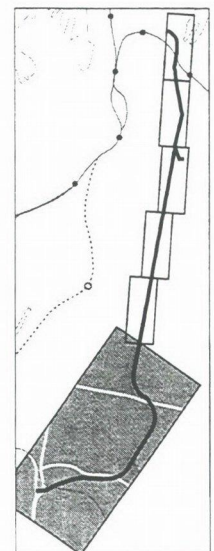
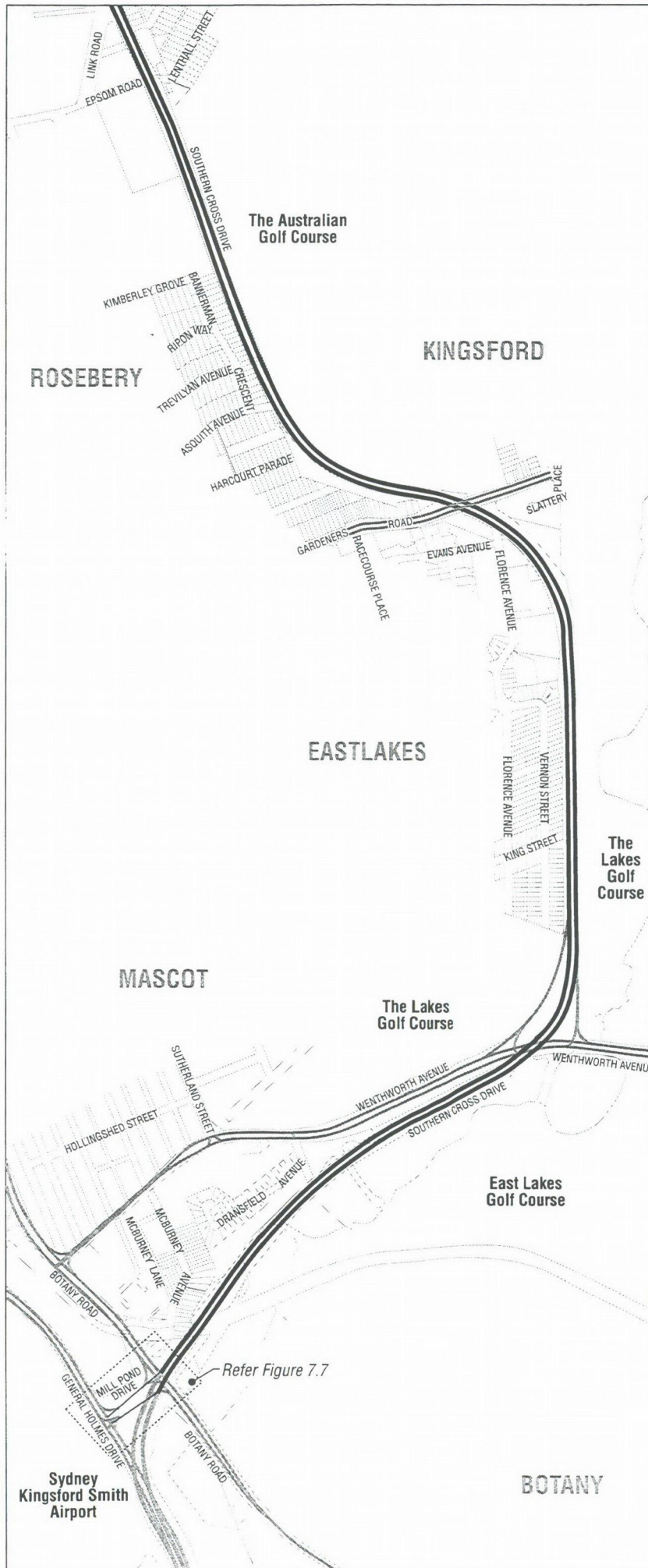


**Figure 2.1e**  
**Dowling Street**  
**Road Alignment -General**

0 40 80 120 160 200  
Scale: 1: 4000 Metres

Source: RTA





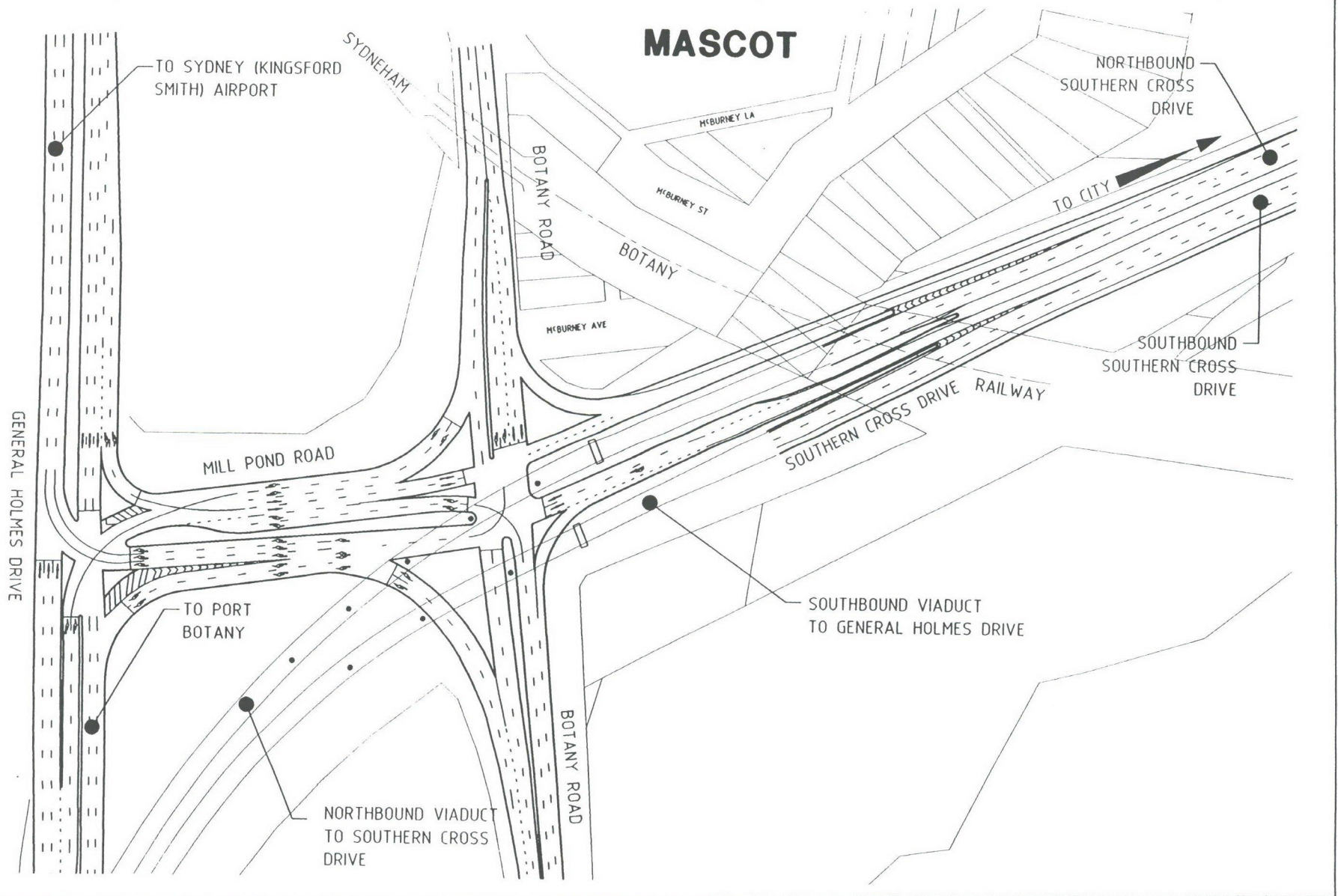
Southern Cross Drive Upgrade 

**Figure 2.1f**  
**Southern Cross Drive**  
 Road Alignment

0 150 300 450 600 750  
 Scale: 1: 15000 Metres

Source: RTA





**N** **Mill Pond Road**  
**Proposed Intersection Arrangements**

0 20 40 60 80 100  
 Scale Metres

Figure 2.1g Mill Pond Road

Source: RTA



The consequences of not proceeding as stated in the EIS are:

- loss of opportunity to significantly improve access to Sydney (Kingsford-Smith) Airport - Port Botany and the central industrial area resulting in a diminishing return to the regional, state and national economy;
- loss of opportunity to provide an integral component of the metropolitan orbital road concept resulting in potential adverse economic and road network impacts;
- loss of opportunity to provide a significant component of the transport infrastructure needed to allow continued and orderly economic development and urban redevelopment of the eastern and south-eastern region of Sydney;
- loss of opportunity to address the bio-physical and social environmental consequences of the present "interim Eastern Distributor" road system;
- traffic volume would continue to grow on the exiting road network and would result in longer travel times, spreading of peak periods into intervening business hours, deteriorating services on public transport and poor safety and amenity of residential areas as increasing volumes of traffic would be spilled to the residential areas; and
- a range of localised impacts would be avoided during construction and operation.

## **2.3 Alternatives considered**

### **2.3.1 Strategic Options**

The EIS identifies a number of strategic options to broadly achieve the objectives of the proposal. The strategic options listed are:

- relocating activities to achieve a better balance of employment and residential growth;
- traffic demand management;
- traffic calming;
- improving rail and bus systems; and
- providing additional road capacity.

The EIS preferred option is to provide additional road capacity, which would be supplemented by improving provision of public transport, implementing demand management measures and implementing local area traffic management. The EIS indicates that this option is preferred because:

- large scale re-organisation of landuses within the highly developed and intensively used urban system is unlikely to be feasible and desirable;
- demand management would only be effective if achieved by a combination of landuse and transport strategies. Full implementation would require major changes in community



attitude and behaviour. The EIS does not regard this as an effective solution to realise the objectives of the Eastern Distributor;

- local area traffic calming does not have the potential by itself to achieve the objectives of the Eastern Distributor objectives. It would be difficult to achieve corridor traffic calming when the major roads are still required to move large volumes of traffic unless additional road space was made available. City-wide traffic calming would have similar limitations as demand management;
- rail and bus alone, even given the introduction of the New Southern Railway, are not sufficient to cater for the full range of travel demand predicted for eastern and south eastern suburbs by 2011; and
- provision of additional road capacity could be achieved by using existing roads, building new links or both. Additional road space is required to cater for the likely increase in demand (a growth of at least 20% by 2011), to cater for the needs of freight traffic and to achieve the desired reduction of through traffic in residential areas.

### 2.3.2 Design and Operational Options

Various design and operational options were considered for each of the nine sections of the proposed Eastern Distributor at Woolloomooloo, Cathedral Street, William Street, the tunnel, Drivers Triangle, South Dowling Street, Southern Cross Drive and the intersection of Mill Pond Road and Botany Road.

Assessment of these options took into consideration relationship to urban design; accessibility; severance; costs; traffic efficiency; property impacts; and separation of through and local traffic. The EIS option was the preferred option at this stage on the basis that it provided the best balance between costs and impacts.

## **2.4 Major Benefits and Adverse Effects identified in the EIS**

### 2.4.1 Major Benefits identified in the EIS:

The major benefits of the proposal identified in the EIS are:

- an overall reduction in travel time in the peak period for the whole of the road network;
- assisting in realising the objectives of the Sydney orbital road concept;
- assisting economic growth because of the improvements to access to and from important markets, industrial centres, business activities and cultural and recreational activities;
- removing inappropriate traffic volumes from residential and commercial streets resulting in improved amenity and pedestrian, cyclist and vehicular safety;



- providing opportunities for improvement to public transport and also providing an improved level of service for access to Sydney (Kingsford-smith) Airport; and
- providing support for major redevelopment proposals in the area through improved accessibility and removal of uncertainty.

#### *2.4.2 Major Adverse Effects:*

Major adverse effects of the proposal identified in the EIS are:

- increased traffic delays at a number of intersections during the construction period and delays to bus services;
- significant impact of construction noise on local residents at varying times and for varying durations;
- generation of dust from earthworks during construction;
- inconvenience to pedestrians and loss of trade for local business during construction;
- increase in traffic volumes on roads that form part of the Eastern Distributor and on some adjoining roads and decline in the performance of some intersections;
- permanent acquisition of open space at Drivers Triangle and the eastern edge of Moore Park;
- community severance and inconvenience, particularly in Woolloomooloo and along South Dowling Street by the change of pedestrian access across the Eastern Distributor;
- major impact on the visual environment of the important civic and historical urban spaces, especially in the Woolloomooloo area and adjacent to Moore Park and significant change of a number of important views and vistas, particularly from the Art Gallery and the Domain;
- demolition of two buildings identified as having heritage significance and relocation of a number of heritage items;
- increase in the concentrations of air pollutants along Palmer Street between William Street and Sir John Young Crescent and along South Dowling Street and Southern Cross Drive; and
- significant increase in traffic noise in areas adjacent to Palmer Street at Woolloomooloo.



### 3.0 SUMMARY OF REPRESENTATIONS

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#### 3.1 Preparation and Exhibition of the Environmental Impact Statement

The RTA determined that the project is likely to significantly affect the environment and required the preparation of an Environmental Impact Statement (EIS) in accordance with section 112 of the EP&A Act.

In a letter dated 22 August 1996, the RTA wrote to the Director-General of the Department of Urban Affairs and Planning seeking advice on requirements as to the form and content for an EIS. The Director-General's requirements were issued to the RTA in a letter dated 10 September 1997. The EIS included a certificate signed by Rust PPK Pty Ltd (the consultant who prepared the EIS) stating that it had been prepared in accordance with the Environmental Planning and Assessment Regulation 1994.

Advertisements advising public display locations and times were published in the Sydney Morning Herald, Daily Telegraph, Sunday Telegraph and 8 local newspapers. The advertisements indicated that the EIS would be on display and representations would be received by the RTA from 15 November 1996 to 16 December 1996. The RTA later advertised the period of acceptance of representations would be extended until 24 December 1996. This was advertised in Sydney Morning Herald, Daily Telegraph and 4 local newspapers.

Copies of representations were received by the Department of Urban Affairs and Planning from the RTA during the period 15 December 1996 to 30 January 1997.

#### 3.2 Summary of Representations Received

A total of 2762 representations were received of which 475 were individual representations, 7 were petitions and 2280 were form letters.

The category types of the representations are summarised below:

Commonwealth Government	2
State Government	12
Local Government	6
Businesses	12
Community Groups	31
Private Individuals	2699

A summary of the representations from government agencies and local councils is presented in Table 3.1. A wide range of issues were raised by businesses, community groups and private individuals. The most frequently raised issues are summarised in Figure 3.1. Further discussion on the issues raised is provided in Section 3.3.



Table 3.1 Summary Table of Issues Raised by Commonwealth, State and Local Governments

	Issues	Cth		State											Local						
		Bio-Diversity Group	Federal Airport Corp.	Dept.of Transport	EPA	Dept. of Health	Dept. of Housing	DLaWC	Heritage Council	Fire Brigade	Sydney Ports	CPMPT	Royal Botanic Garden	NSW Art Gallery	Sydney Water	Botany Bay	Randwick	Liverpool	Sth Sydney City	Sydney City	Wollahara
Traffic & Transport	Strategic justification / Regional transport planning		♦		♦	♦							♦				♦	♦	♦	♦	♦
	Induced traffic and traffic growth				♦	♦							♦				♦		♦	♦	♦
	Provision of wider transport link															♦	♦	♦	♦	♦	
	Alternative dangerous goods / freight route																♦			♦	
	Relationship to airport expansion	♦														♦	♦				
	Olympic traffic demand	♦																			
	Alternative route/design										♦									♦	
	Safety and intersection design										♦					♦	♦		♦		
	Link Rd intersection																		♦		
	Public transport			♦	♦													♦	♦	♦	
	Extension of the tunnel*												♦	♦					♦	♦	
	Increase of local traffic												♦				♦		♦		
	Local area traffic management**			♦	♦								♦						♦		♦
	Loss of parking and access												♦						♦		
Noise	Noise impact & vibration				♦		♦					♦	♦	♦		♦			♦	♦	
Air	Air quality (emission from vent stack)				♦	♦						♦		♦		♦	♦		♦	♦	
Urban Design & Social Impacts	Loss of parkland, loss of access to the park				♦	♦						♦							♦	♦	
	Impact on Art Gallery & its amenity													♦							
	Visual impact and intrusiveness							♦		♦			♦	♦					♦	♦	
	Community severence							♦					♦						♦	♦	
	Pedestrian/cyclist access				♦	♦						♦	♦			♦	♦		♦	♦	
	Community fitness					♦										♦					
	Impact on heritage precinct, buildings & items							♦		♦		♦	♦		♦		♦		♦	♦	
	Visual impact of noise barrier											♦	♦				♦				
	Improved lighting and signage												♦								
Bio-physical Environmental Management	Impact on ecosystem & waterbodies	♦			♦			♦					♦		♦	♦	♦		♦		
	Flora, fauna and landscaping				♦								♦	♦			♦		♦		
	Drainage and flooding			♦	♦		♦	♦				♦			♦				♦		
	Settlement				♦			♦									♦	♦			
	Contaminated spoil management				♦			♦				♦					♦				
	Sediment & erosion control							♦											♦		
	Acid sulphate soil							♦													
	Water quality management and monitoring	♦																			
	lack of details of the construction compound												♦								
	Emergency plan												♦								
Other Issues	Business viability												♦								
	Land acquisition								♦				♦								
	Compensation												♦								
	Inadequate EIS, insufficient information			♦	♦	♦			♦								♦	♦		♦	
	Insufficient consultation								♦		♦										
	CBA, calculation of benefits/externalities				♦	♦						♦									
	Impact of toll																				
	Toll collection method		♦																	♦	
	Toll plaza location												♦								
	Hazard and risk associate with heavy vehicles																			♦	
	Depletion of oil supplies				♦												♦	♦			
	Relocation & change of access to public utility														♦						

\* extension includes roofing, up to Link Rd. and the whole route

\*\* including event traffic and Fox Studio Complex traffic management



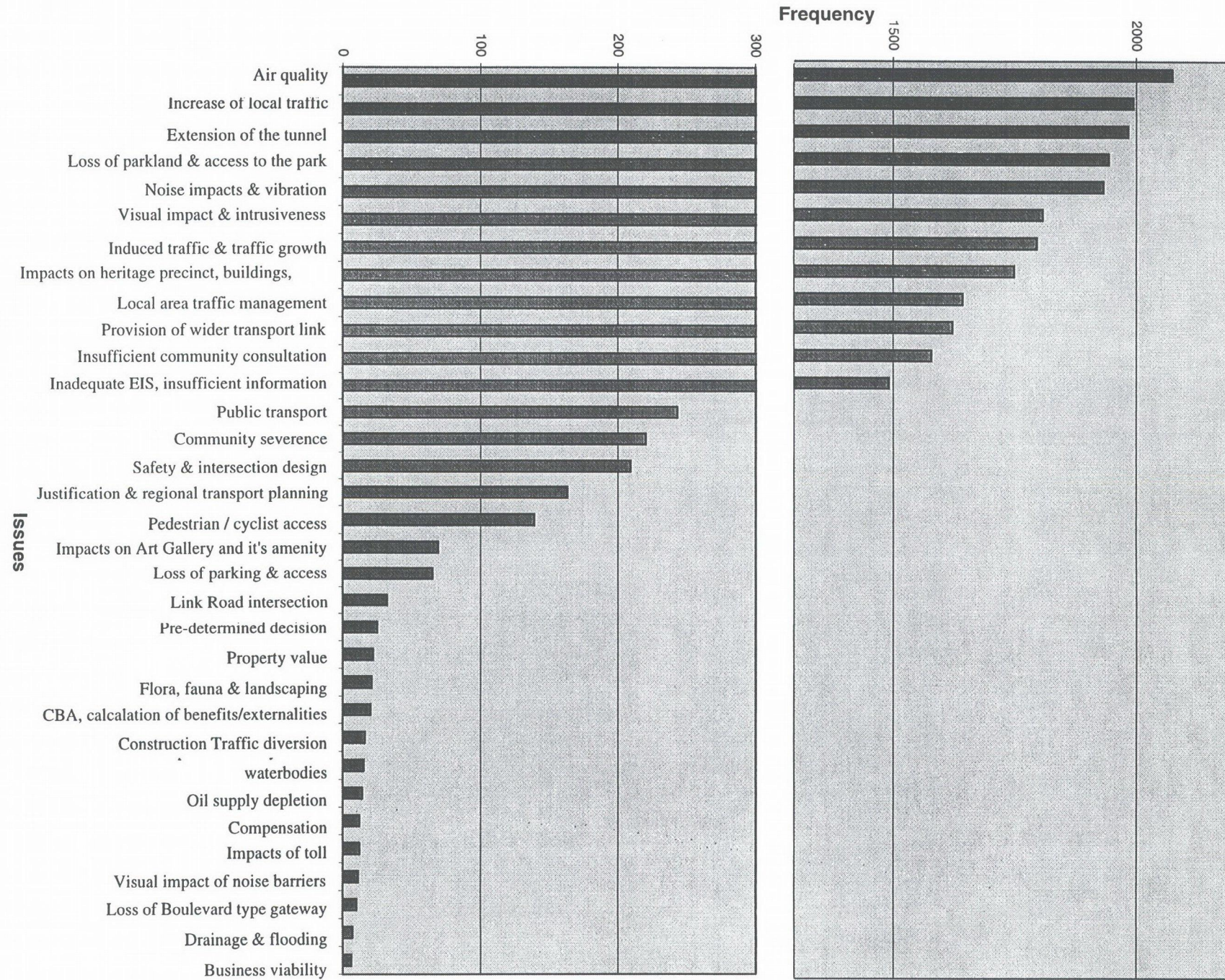


Figure 3.1 Frequency of Issues Raised in the Representations Made by Community Groups, Business and Private Individuals



### 3.3 Overview of Key Issues Raised in the Representations

This section provides an overview of the main issues raised in all representations received by the RTA. The most frequently raised issues include traffic and transport, noise impacts, air quality, urban design, information delivery and consultation.

#### 3.3.1 *Traffic and Transport*

Traffic and transport were the most frequently raised issues. Major concerns were:

##### *Strategic and Regional Transport Planning:*

- the EIS failed to demonstrate a sound regional transport planning basis for the proposal and did not provide alternative routes and design;
- the proposal conflicted with the objectives of traffic demand management; it did not give adequate consideration to discourage car use; and did not adequately provide for transit lanes;
- the proposal would induce traffic and would result in traffic congestion;
- the EIS did not give adequate consideration to the impact of the proposal on east-west traffic movements;
- traffic modelling data did not reliably correspond to existing data and predicted future conditions;
- the proposal would increase heavy and/or dangerous goods vehicle movements on the parallel roads and local streets;
- provision needed to be made for wider transport linkages, such as linkage with Domain Tunnel and the proposed east-west tunnel under the City; and
- the proposal needed to take into consideration the growth in traffic demand as a result of the linkage with the proposed M5 East, the proposed airport expansion and Olympics 2000.

##### *Road Design:*

- concerns about the location of entry and exit portals of the tunnel, the design of intersections and safety issues;
- concerns about the Link Road intersection including the dangers of left turns in and out and the need to maintain the existing right turns in and out to support commercial activities in Rosebery;
- need to extend the tunnel, particularly to Link Road in the south and to the Art Gallery area in the north;
- the proposed Mill Pond Road intersection improvement was not adequate;
- the EIS did not provide adequate detail of traffic signage for recreational facilities, businesses and community facilities; and
- problems associated with traffic diversion measures during the construction period, particularly diversion for northbound traffic on South Dowling Street using O'Dea/Bourke/Philip/Crescent Streets for 24 months.



*Local Area Traffic Management and Public Transport Services:*

- the need for a local area traffic management (LATM) plan needs to be developed before any decision is made;
- lack of programming and funding commitment to the Access Improvement Program and Local Area Improvement Program as proposed in the EIS;
- The LATM needs to take into consideration traffic generated by activities associated with Sydney Football Stadium (SFS)/Sydney Cricket Ground (SCG)/Fox Studio complex;
- the impact on access to residences, businesses and other facilities;
- impacts on the reduction of parking along the proposed route;
- huge parking demand, particularly during event periods would impose constraints upon residents and businesses;
- the proposal would compete with the patronage of the New Southern Railway and bus services, and would inhibit future construction of light rail; and
- improvement needed to be made in public transport services, particularly for the area of UNSW/Randwick Hospital/SCG/SFS/Centennial and Moore Park and roadways such as Elizabeth, Oxford and Cleveland Streets and Anzac Parade.

*3.3.2 Noise and Vibration*

Noise and vibration were the second most frequently raised issues in the representations. Major concerns included:

*Construction noise:*

- impact of construction noise would be significant given the long duration and close proximity to the residential areas and recreational facilities;
- background noise has not been determined correctly;
- inconsistencies in noise objectives: higher objective in the area to the south of Link Road compared to the north of Link Road;
- numerous noise exceedances relative to EPA's Environmental Noise Control Manual;
- need to identify the details of mitigation measures including identifying specific receiver groups and specifying the mitigation measures and their effectiveness in reducing noise levels;
- need to restrict work hours between 10:00 pm and 7:00am in sensitive residential areas; and
- vibration in relation to road construction works and tunnelling would be close to houses and would cause damage.

*Operation Noise:*

- noise generated by the tunnel ventilation shafts, plants and equipment;
- need to assess noise impact against the emerging new EPA noise criteria;
- exceedance of RTA noise standard particularly at Palmer Street and South Dowling Street;
- exceedance of World Health Organisation noise standard;
- health impacts and sleep disturbance;
- noise impact of heavy vehicles has not been properly evaluated and assessed;
- omission of analysis of peak noise level and sleep disturbance in the EIS;
- uncertainty or lack of noise abatement measures along the route;
- inadequate studies on noise impact and interference with recreational facilities;



- need for noise management plan and proper noise monitoring; and
- noise of stopping /starting of cars at the toll plazas.

### 3.3.3 Air Quality

Air quality during construction and operational stage was a general concern raised in the representations. It was the most frequently raised issue in the representations made by private individuals.

- the proposal would increase regional air pollution as it would induce more traffic;
- emission from the two tunnel ventilation stacks would concentrate pollution within a localised area, the emissions need to be treated to reduce impacts;
- proper standards (such as World Health Organisation standard), background/base data and modelling have not been used in the air study;
- the likelihood that more stringent air quality goals would be adopted by the State Government prior to the opening of the Eastern Distributor;
- need to ensure that air quality within the tunnel would meet the air quality goals and the need to continually monitor air quality;
- need to have permanent monitoring of the proposal during construction and operation;
- increase in greenhouse gas emissions as well as particulate matter; superficial treatment of climatic and greenhouse impacts in the EIS;
- dust generation and its impact on vegetation and water bodies; and
- impacts on health from air pollution.

### 3.3.4 Urban Design and Social Impact

Urban design and social impact were recurring major issues raised in the representations. The major concerns were:

- visual impact and the incompatible scale/intrusiveness of the proposed motorway and the associated structures such as the toll plaza, administration building, ventilation shafts and noise barriers;
- adverse impact on important historic civic urban spaces and heritage conservation areas;
- impacts on individual heritage buildings and items, including demolition and relocation;
- increased pollution and visual impacts on the Art Gallery and its vicinity;
- loss of the existing boulevard type gateway along South Dowling Street;
- permanent loss of parkland in Moore Park;
- reduced access to major open space and recreational facilities;
- community severance including severing Woolloomooloo from the City/Art Gallery/Domain, dividing the neighbourhood of Surry Hills from the City, and severing Moore Park from the surrounding communities;
- failure to provide adequate and safe pedestrian and cyclist access; and
- adverse impacts on community health and fitness as a result of increased air and noise pollution, reduced access to recreational space and lack of cyclist facilities.



### **3.3.5 Bio-physical Environmental Management**

Issues raised included:

- impacts on fig trees at Moore Park;
- lack of a landscape plan and the details of maintenance techniques;
- impacts of the proposal on the ecosystem and water quality;
- the capacity of storm water systems and lack of plans detailing how flooding would be dealt with;
- ground settlement as a result of dewatering of groundwater during construction;
- need for a proper environmental management plan, including sediment and erosion control measures and water quality management;
- need for an incident management/emergency plan so as to minimise the impact of emergency incidents;
- lack of proper plan of waste management and disposal;
- handling of contaminated soil; and
- handling of acid sulfate soil.

### **3.3.6 Other Major Issues**

- the information provided was insufficient and the EIS was inadequate;
- lack of thorough community consultation;
- the proposal was pre-determined and the need for a public inquiry;
- impact on property value and business viability due to increase in traffic and pollution; degraded residential amenity; and reduced accessibility to residential areas, businesses and facilities;
- demand for compensation for the potential loss and acquisition of properties by the RTA;
- the Cost Benefit Analysis and the calculation of externalities in the EIS had major deficiencies;
- impact of toll on the use of the motorway;
- the impact of ground settlement on the structural integrity of the buildings and the need of conducting pre-construction survey;
- lack of details of the construction compound and the activities to be carried out within;
- need to investigate alternative toll collection methods, such as electronic tolling; and
- oil supply depletion not properly taken into consideration.

## **3.4 Consideration of Request for a Commission of Inquiry**

Under the EP&A Act, the Minister for Urban Affairs and Planning may direct that an Inquiry be held by a Commission of Inquiry with respect to all or any of the environmental aspects of an activity (or part of such activity). In addition to a number of representations requesting a hearing or inquiry into the proposal, there have been subsequent direct requests to the Minister and the Director-General that an inquiry be held prior to the Minister's consideration of the proposal. Writers have been advised that the Minister would consider such requests.



Commissions of Inquiry may be held where one or more of the following circumstances apply:

- the activity is of state or regional significance;
  - there are significant complex technical issues;
  - there may be a potential conflict of interest between the Proponent and decision maker.
- The rationale when one or more of these factors applies is to have an independent assessment by a third party where such circumstance(s) apply.

In this case, the Director-General's assessment report which is to be made publicly available provides the independent assessment required for infrastructure projects such as the Eastern Distributor. The provisions of Division 4 Part 5 of the EP&A Act which give the Minister for Urban Affairs and Planning an approval role over the RTA proposal also ensure that there is no conflict of interest between the Proponent and the decision maker.

A Commission of Inquiry may have been warranted in the absence of this independent assessment and decision making process. However, given the assessment regime applicable little value adding would be achieved by having an Inquiry which in the circumstances is not recommended.



## 4.0 PROPOSED CHANGES TO THE EIS PROPOSAL

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*This section provides a detailed description of the proposed changes to the proposal as exhibited.*

### 4.1 Introduction

In response to issues and concerns raised in the representations the RTA has proposed a number of changes to the EIS scheme as exhibited. In general terms the modifications would be contained within the existing alignment (apart from changes around Moore Park). The proposed changes would effectively place an additional 500 metres of roadway underground and about 1.5 kms in a deep cutting.

### 4.2 Proposed Modifications near the Art Gallery

#### 4.2.1 Description of the Proposed Modifications

The proposed changes to this area are shown on Figures 4.2a to 4.2e.

The main modification to the EIS proposal is to construct a landscaped cover extending from ten metres west of the existing Art Gallery Road Bridge to the eastern edge of the Art Gallery Building. The "cover" adds about 0.85 hectares to the area of the Domain.

Other modifications include moving the tollway administration building to a site on the south side of Nicholson Street at present used by South Sydney City Council and integrating it with stairs and an elevator at the eastern end of the footbridge which crosses the toll plaza thus providing disabled access between Woolloomooloo and the Central Business District (CBD). The design of the bridge and the toll booths would be integrated.

As shown, paths across the proposed "cover" follow a number of pedestrian desire lines, most importantly providing connections between Cowper Wharf Road, the CBD, the Art Gallery of NSW, the Botanic Gardens and the Domain.

A simple grass treatment is proposed for the surface of the "cover", with areas of dense shrubbery located to conceal the parapets above the portals. On the west side of Art Gallery Road Bridge, the footpath would be widened by some 4m to align with the existing stonewall that defines the entrance court to the Botanic Gardens. This is proposed to improve pedestrian safety in this heavily used pedestrian and recreation area. To the west of this, dense shrubbery would be grown to obscure the motorway as much as possible from view from the road bridge.

Allowance has been made for high quality finishes including sandstone and precast concrete to be used on the motorway portals and retaining walls at the eastern and western entrances. The western toll plaza booths would be located under the portal over the north bound lanes of the motorway. A light weight canopy attached to the portal would provide cover to this. These would not be visible from the Art Gallery or the Domain. Lincoln Street would become a local two lane no through road. The carriageway would be narrowed and landscaped.



Three metre high noise walls would be provided on the eastern side of the Motorway to shield residential development.

#### *4.2.2 Construction Methods and Staging*

Structural support of the roof near the Art Gallery would involve the erection of retaining walls, sill beams, and pier columns. These works together with the placement of girders, fitout, and landscaping would be incorporated into the staging of the roadworks and bridgeworks on the Cahill Expressway.

The support system along the Art Gallery sandstone face would consist of a sill beam retaining wall and a cantilever reinforced concrete wall at the southern end of the Art Gallery sandstone face. Excavation would be required using rock breakers and hydraulic excavators, with excavated material being either reused on site or taken to off-site disposal. The sill beam and retaining wall would be constructed using conventional formwork systems and concrete placement methods. A protective hoarding would be erected to shield the Art Gallery from construction impacts.

The support system along the northern side of the Woolloomooloo exit ramp would consist of a headstock constructed on pier columns and a retaining wall. The construction of the pier columns and headstock, and the retaining wall in this location would require the Woolloomooloo exit ramp to be reduced to one lane of traffic. A temporary route for pedestrians to gain access to the Art Gallery Road/pedestrian bridge would be provided.

The construction access would require reshaping of the area in the Botanic Gardens immediately behind the construction zone, with a chain wire fence separating pedestrians from the works. A combination of retaining wall and pier columns with headstock would be constructed between the Woolloomooloo exit ramp and the southbound motorway, and between the Macquarie Street ramp and the Northbound motorway, as well as between the northbound and southbound motorway carriageways.

Support beams would be placed between the structural supports as they are completed, using either wheeled or tracked cranes as applicable. Deck concrete would be poured in-situ, with landscaping activities following completion of the deck structure. Mechanical and electrical fitout would generally follow girder placement.

It is envisaged that the majority of these activities would be carried out during daylight hours, although some night work for erection of girders and fitout would be required together with traffic diversions. A schematic diagram is shown in Figure 4.2f. Details of the traffic staging is provided in Appendix A. No construction compounds, site offices, stockpiling of materials, parking of trucks or trade cars would occur in the grounds of the Art Gallery, Botanic Gardens or Domain.



### **4.3 Proposed Modifications in the Woolloomooloo Area**

The proposed changes to this area are shown on Figure 4.3.

The tunnel portals are proposed to be moved to the north of Cathedral Street (southbound portal moved 55m north of Cathedral Street, northbound portal moved 20m north of Cathedral Street), enabling Cathedral Street to be fully re-opened and the intersection signal controlled.

The exit ramp is moved from the centre of the motorway removing it from the rear boundaries of Kidman Terrace. Traffic volumes require the intersection to be constructed to give priority to traffic crossing Cathedral Street and entering Palmer Street. Palmer Street becomes a two-way street and an additional development site along this block would be created.

On the site where the northbound portal meets Cathedral Street, a small building to house various service requirements for the motorway is proposed. It is intended to be in keeping with the form and height of the surrounding buildings and to provide some noise shielding. With the completion of a building on the other side of the intersection, it is intended that this would be a normal urban block intersection.

A noise wall is proposed along the eastern edge of the exit ramp, over the southbound portal and along the eastern side of the southbound motorway to Cathedral Street. Residual land would be added to the park.

Details on construction methods and staging is provided in Appendix A.

### **4.4 Proposed Modifications at Drivers Triangle and South Dowling Street to Dacey Avenue ('Parkway Scheme')**

The EIS scheme and the proposed changes to this area are shown on Figure 4.4a to 4.4j.

The Parkway scheme lowers the motorway lanes by approximately 4-5 m below the surface, bounded by a wall to the west and a sloping, landscaped eastern side. As the motorway emerges from the Fitzroy Street portals, the southbound motorway lanes would be below the northbound motorway lanes until they are level at approximately Arthur Street. The entrance and exit ramps would be contained within landscape reserves, such that both the access roads and the motorway remain relatively straight.

The western wall is intended to be a high quality finish concrete of a sandstone colour and texture detailed in such a way to create a sympathetic base to the terrace houses above. The eastern landscaped edge is intended to be landscaped with trees and low planting. The motorway would be below the ground water level and hence require certain construction solutions to prevent groundwater seepage onto the motorway. Landscaped parking bays are provided on the western edge of the northbound access road from McElhone Place to Maddison Street.



At the widest point, between Phelps and Parkham Streets, the scheme encroaches 24m into Moore Park. Between Chelsea and Thurlow Street, the scheme encroaches 19m into Moore Park. The approximate area of Moore Park affected is 2.2 hectares.

In Drivers Triangle the entry ramp portal would be located 2m south east of the South Dowling Street kerb to retain footpath and pedestrian access down the west side of Drivers Triangle park. The footpath along Flinders Street would be removed and replaced with permeable surface to improve survival chances of fig trees, except at the northern end where the relocated bus stop would be. Pedestrian signals would be provided across Flinders Street at the intersection of Flinders and South Dowling Street for people to get to the northbound bus stop.

A fence would be installed along the median strip of Flinders Street between Moore Park Road and South Dowling Street to prevent pedestrians, particularly after stadium events, making informal crossings and conflicting with ramp traffic. The southern edge of Drivers Triangle park would be landscaped to discourage pedestrian movement across the entry to the new ramp. A signalised pedestrian crossing would be provided at the end of Greens Road across Moore Park Road to link with proposed new formal pedestrian entry to Moore Park.

One-directional traffic only could be maintained on South Dowling Street during construction of the preferred "Parkway Scheme" and Cleveland Street underpass option. The construction of these works, while restricted by the above procedures would be by standard techniques and methods. The construction plant would be parked at the completion of each shift within the construction works zone or in the compound area within Moore Park. Piling construction, installation of deck units and relocation of services at the Cleveland Street intersection would be undertaken at night with the remainder of the construction work along South Dowling Street being completed during normal daytime working hours. A temporary southbound carriageway through Moore Park would be constructed in a location to be selected in consultation with the CPMPT to ensure minimum impact on existing large fig trees and disturbance to existing structures. The temporary carriageway would be removed and the park reinstated and upgraded as part of the compensation package to the Trust upon completion of the "Parkway Scheme" and Cleveland Street underpass.

In general terms the traffic management and staging would be as follows:

- northbound traffic would remain on South Dowling Street and traffic movements switched to suit construction staging;
- southbound traffic would be diverted onto the temporary carriageway; and
- installation of temporary traffic signals to control the intersection.

Details of the proposed traffic management scheme is provided in Appendix A.



#### **4.5 Proposed Modifications at South Dowling Street between Dacey Avenue and Link Road**

The EIS scheme and the proposed changes to this area are shown on Figures 4.5a to 4.5e.

The proposed modifications include an extension of the southbound carriageway of the underpass to the south of Todman Avenue and provision of a service road on the eastern side that starts from Todman Avenue and would exclusively serve the Kensington residential properties. These would be hidden from the motorists' view by a four metre noise wall designed as a climbing frame for vines and creepers within a 2.5m median strip. Trees would be planted on the eastern side of the wall. The noise wall would be located between 11m (north of Milroy Avenue) to 14m (south of Winkurra Street) from the residential properties as compared to the uniform distance of 12.5m as proposed in the EIS scheme.

#### **4.6 Proposed Modifications to Southern Cross Drive**

The EIS scheme and the proposed changes to this area are shown on Figures 4.6a and 4.6b.

The proposed changes involve increasing the width of the median strip from 1.6m to 2.8m to improve landscaping aspects between Link Road and Wentworth Avenue. This would result in a reduction of the widths of the traffic lanes. South of Wentworth Avenue to Mill Pond Road it is proposed to reduce the width of the median and to provide a 1 metre wide shoulder/bicycle lane.





Figure 4.2a **MODIFIED PROPOSAL**  
**Art Gallery, Domain and Woolloomooloo**  
Plan

Source: RTA





Figure 4.2b MODIFIED PROPOSAL  
Cahill Expressway to William Street

Artist's aerial perspective of Woolloomooloo and Domain looking south west

Source: RTA

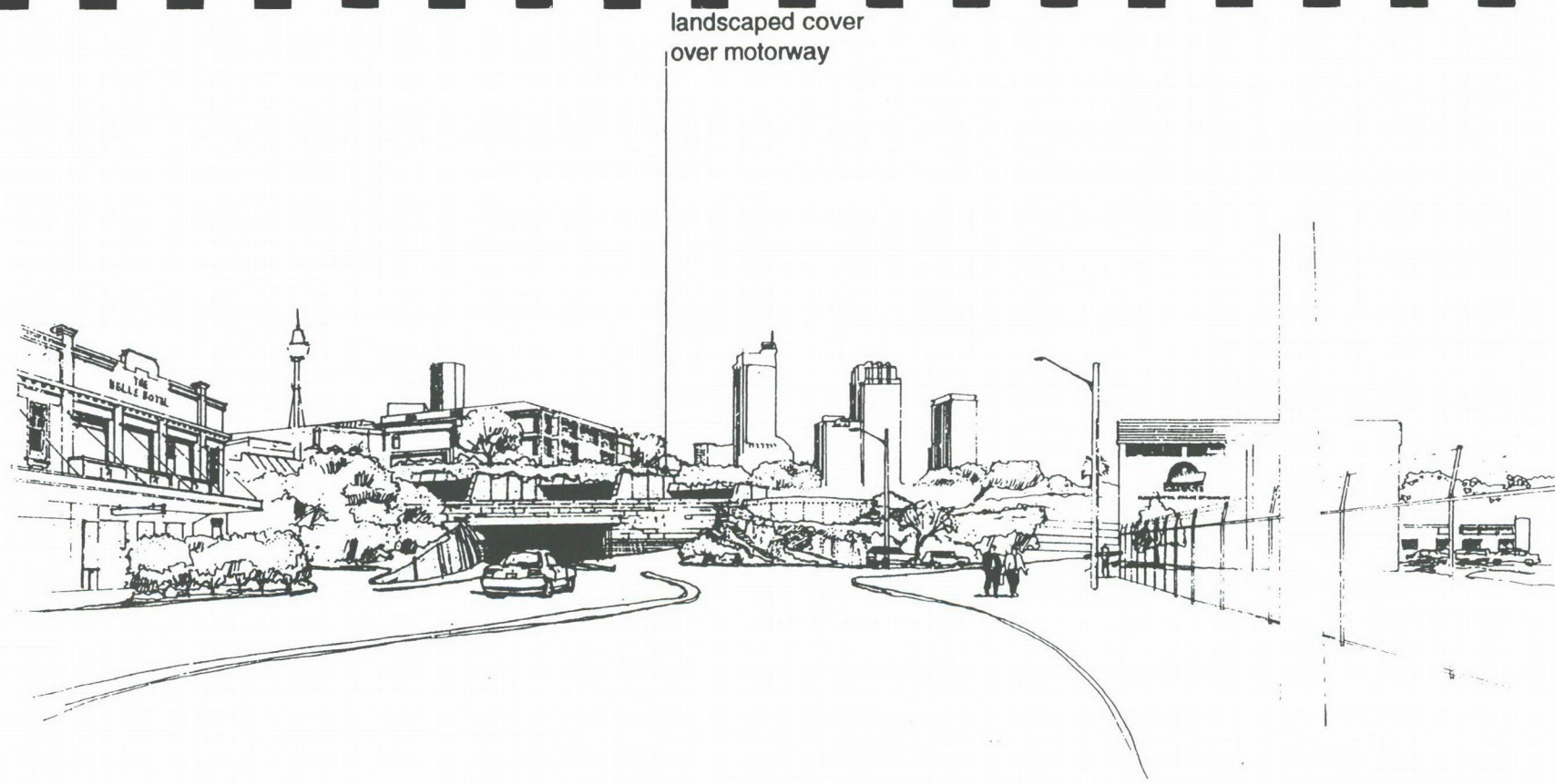




Figure 4.2c **MODIFIED PROPOSAL**  
**View from Art Gallery to Woolloomooloo**  
Artist's perspective from Art Gallery of NSW looking north east

Source: RTA





landscaped cover  
over motorway

Figure 4.2d **MODIFIED PROPOSAL**  
**Woolloomooloo - View "B"**  
Artist's perspective from Cowper Wharf Rd looking south west  
Source: RTA



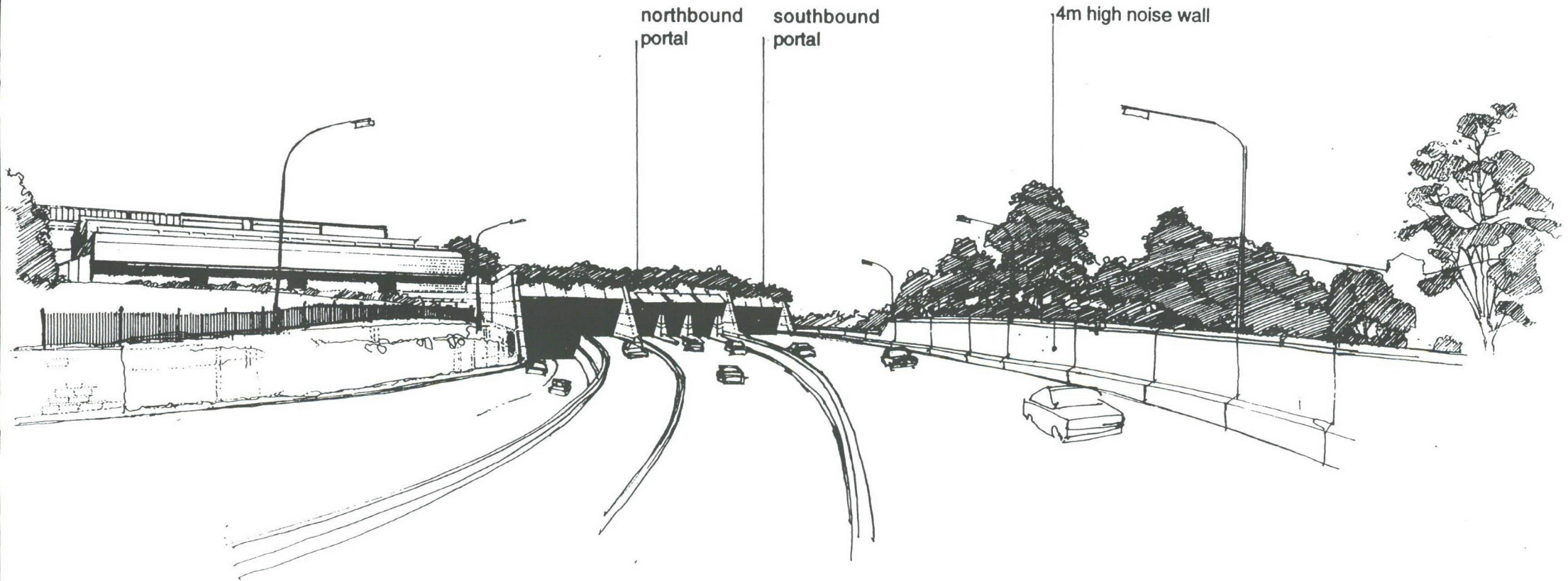


Figure 4.2e **MODIFIED PROPOSAL**  
**Woolloomooloo - View "E"**

Artist's perspective from Sir John Young Crescent looking north

Source: RTA





STAGE 1 CONSTRUCTION



STAGE 2 CONSTRUCTION



STAGE 3 CONSTRUCTION



STAGE 4 CONSTRUCTION



STAGE 5 CONSTRUCTION



FINAL STAGE OF LAND BRIDGE CONSTRUCTION

# PROPOSED EASTERN DISTRIBUTOR - ART GALLERY LAND BRIDGE

Model and photo montage by  
CONYBEARE MORRISON & PARTNERS

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Figure 4.2f Art Gallery Construction Staging

Source: RTA



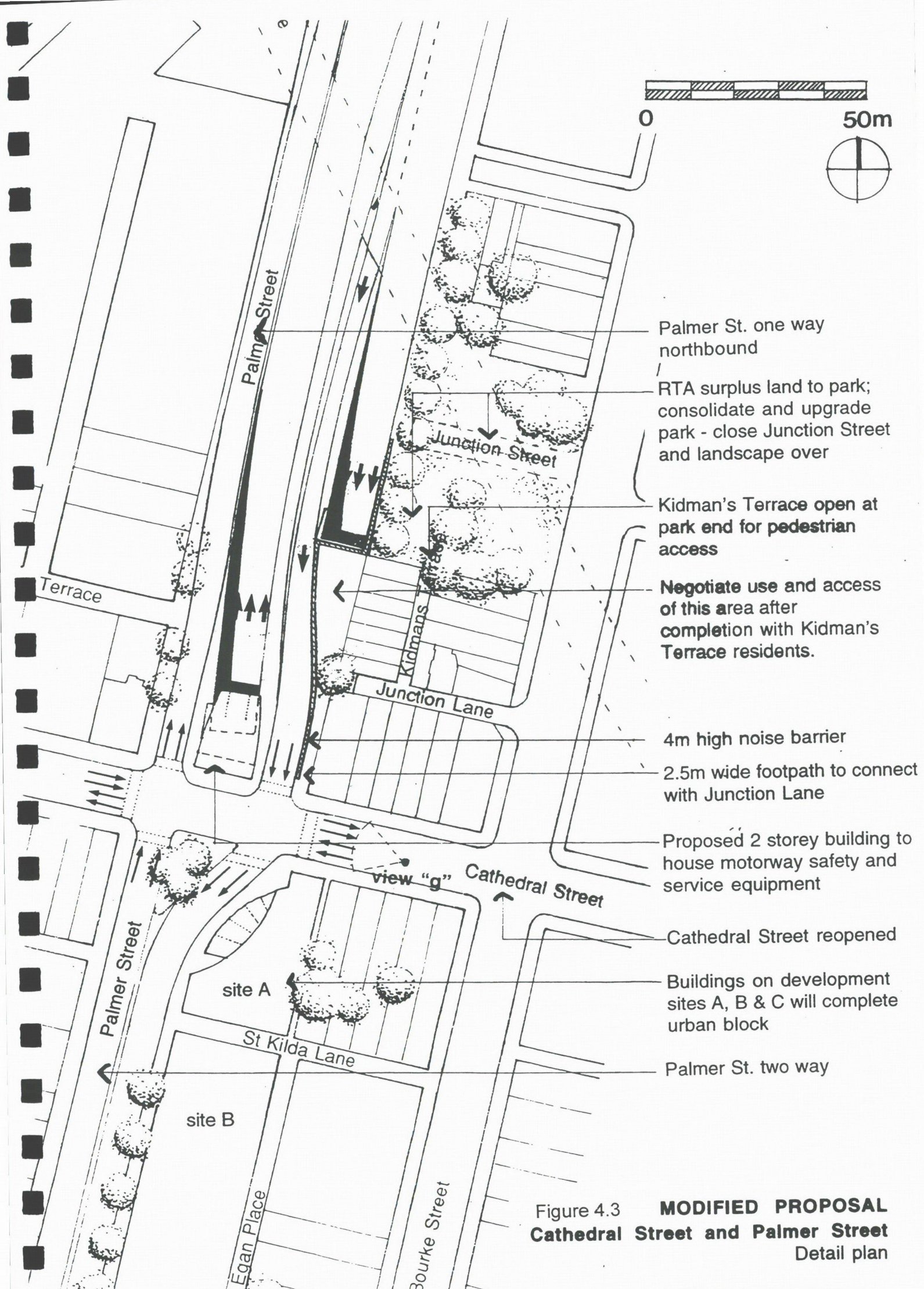


Figure 4.3 **MODIFIED PROPOSAL**  
**Cathedral Street and Palmer Street**  
 Detail plan



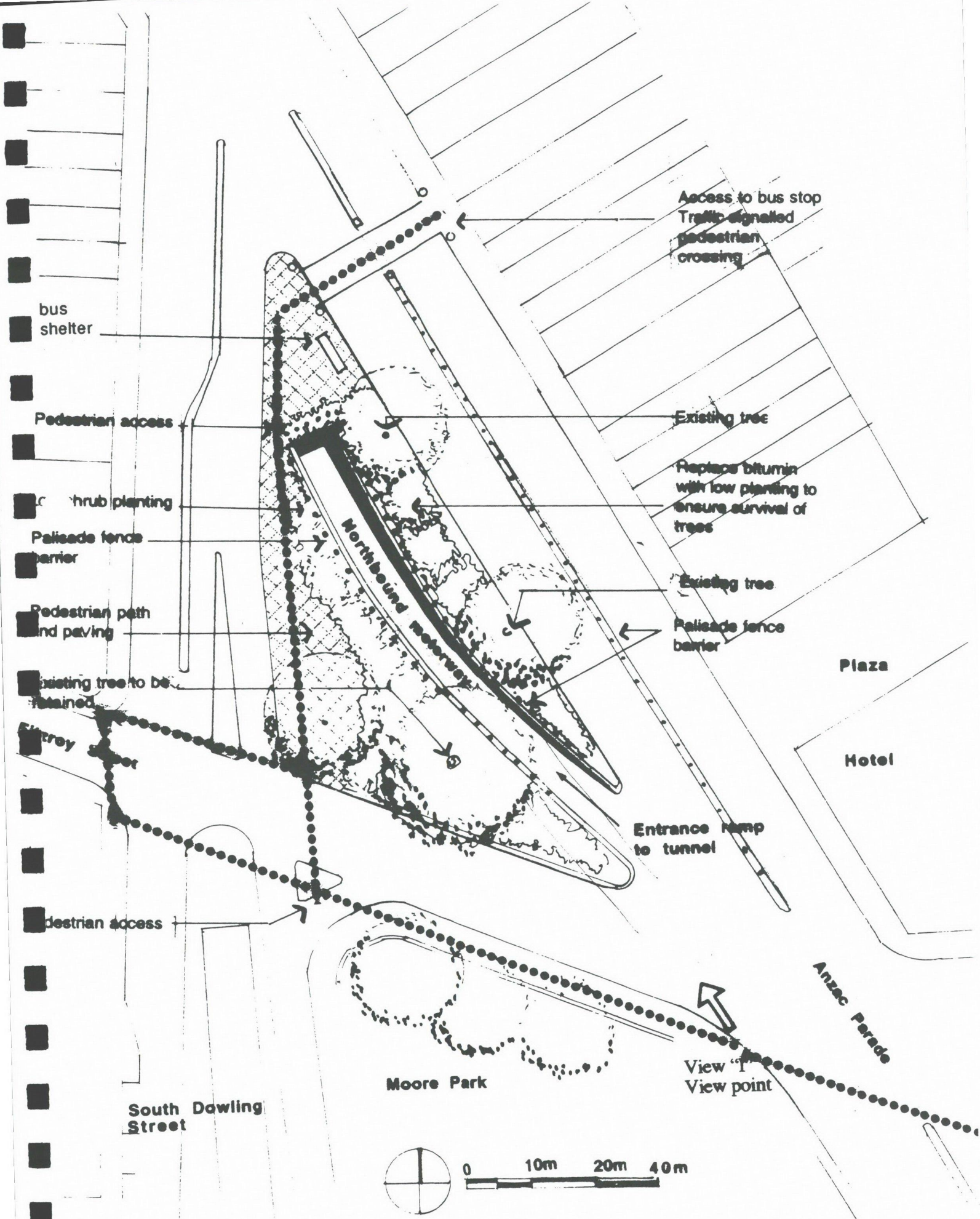


Figure 4.4a **MODIFIED PROPOSAL**  
**Drivers Triangle**  
 Detail plan

Source: RTA





Source: Airport Motorway

Figure 4.4b EXHIBITED SCHEME EIS  
Fitzroy Street to Cleveland Street

Artists' aerial perspective of South Dowling Street from Cleveland St. looking north

Note: Does not include potential noise mitigation measures  
Source: RTA



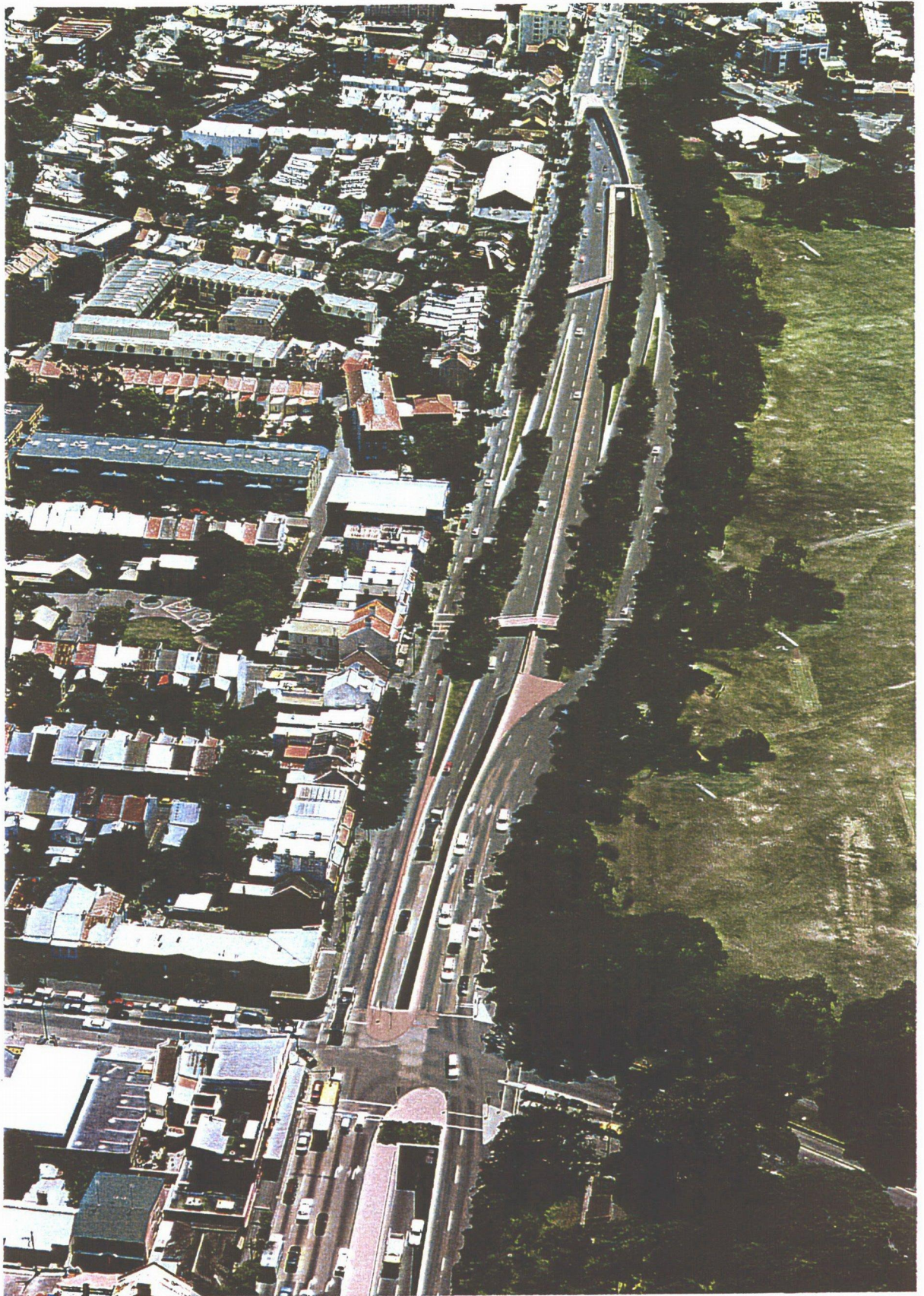


Figure 4.4c **MODIFIED PROPOSAL**  
**Fitzroy Street to Cleveland Street**

Artist's aerial perspective of South Dowling Street from Cleveland St. looking north

Source: RTA





Figure 4.4 d EXHIBITED SCHEME EIS  
South Dowling Street

Source: RTA





Figure 4.4e **MODIFIED PROPOSAL - "Parkway"**  
**South Dowling Street**

Source: RTA









Figure 4.4g MODIFIED PROPOSAL - "Parkway"  
 South Dowling Street  
 Detail Plan - Cleveland Street to Crescent Street  
 Source: RTA



Drivers Triangle  
Promenade/Exhibition  
space with strong  
relationship to Taylor  
Square.

Pedestrian link  
city to Moore Park.

Kindergarten to be  
relocated to the ES  
Marks Field.

Recreation Centre  
examine long term  
viability. Consider  
relocation of facilities to  
another site.

Maintain landscape  
buffer between  
playing fields and  
motorway.

New street planting to  
filter edge of  
motorway. Improve  
landscape amenity.

Pedestrian and cycle  
paths.

Maintain vistas and  
outlook to Moore Park  
for local residents.

Retain fig trees.

Bus interchange and  
bus queuing.

Reconfigure  
intersection  
synchronise Anzac  
Parade traffic with  
busway.

Sculptural retaining  
wall.

Emphasise  
topography of Mount  
Steele.

Pedestrian/cycle  
bridge connection to  
Moore Park Gardens  
development.

Resolve conflict  
between golf course  
and motorway with  
landscape treatments.

Earth sculpture mound  
as entrance statement  
for Moore Park.

Formalise  
pedestrian/cycle  
connection from  
Paddington to Moore  
Park.

Create pedestrian link  
from Greens Road to  
Moore Park in  
accordance with Moore  
Park plan of  
management.

Retain and restore  
heritage gates and  
obelisk to Moore Park  
and Anzac Parade.

Pedestrian and cycle  
paths.

Driver Avenue to be  
pedestrian orientated  
boulevard. Widen  
footpath.

Gregory Avenue  
closed and converted  
to parkland.

Pedestrian routes form  
major event venues to  
bus interchange.

Close Macarthur  
Avenue and revert to  
parkland.

Bus lanes to be  
relocated. Road to be  
closed and revert to  
parkland.

Playing field over  
future underground car  
park.

New access from  
Driver Avenue to  
Grand Parade.

Restore the symbolic  
formal address and  
entrance to Centennial  
Park.

Reconnect Moore Park  
and Centennial Park.

Close Robertson  
Road to through traffic.

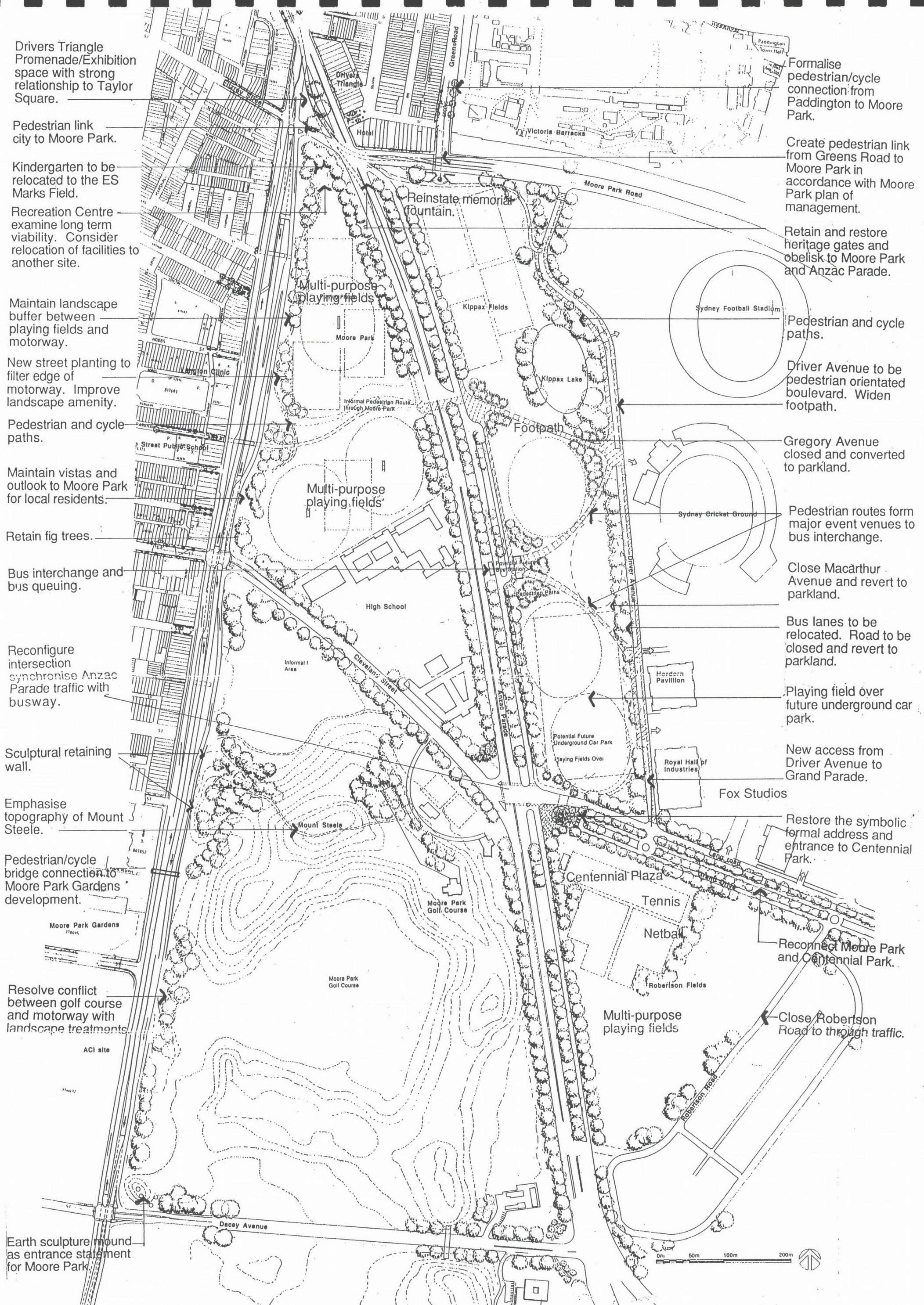


Figure 4.4; MODIFIED PROPOSAL - "PARKWAY"  
Moore Park Improvements

Source: RTA





Figure 4.4 j **MODIFIED PROPOSAL**  
**South Dowling Street**  
Elevation of proposed western wall

Source: RTA



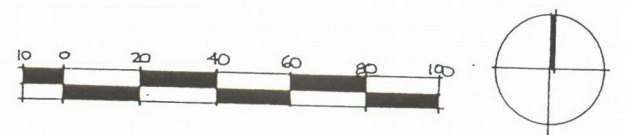
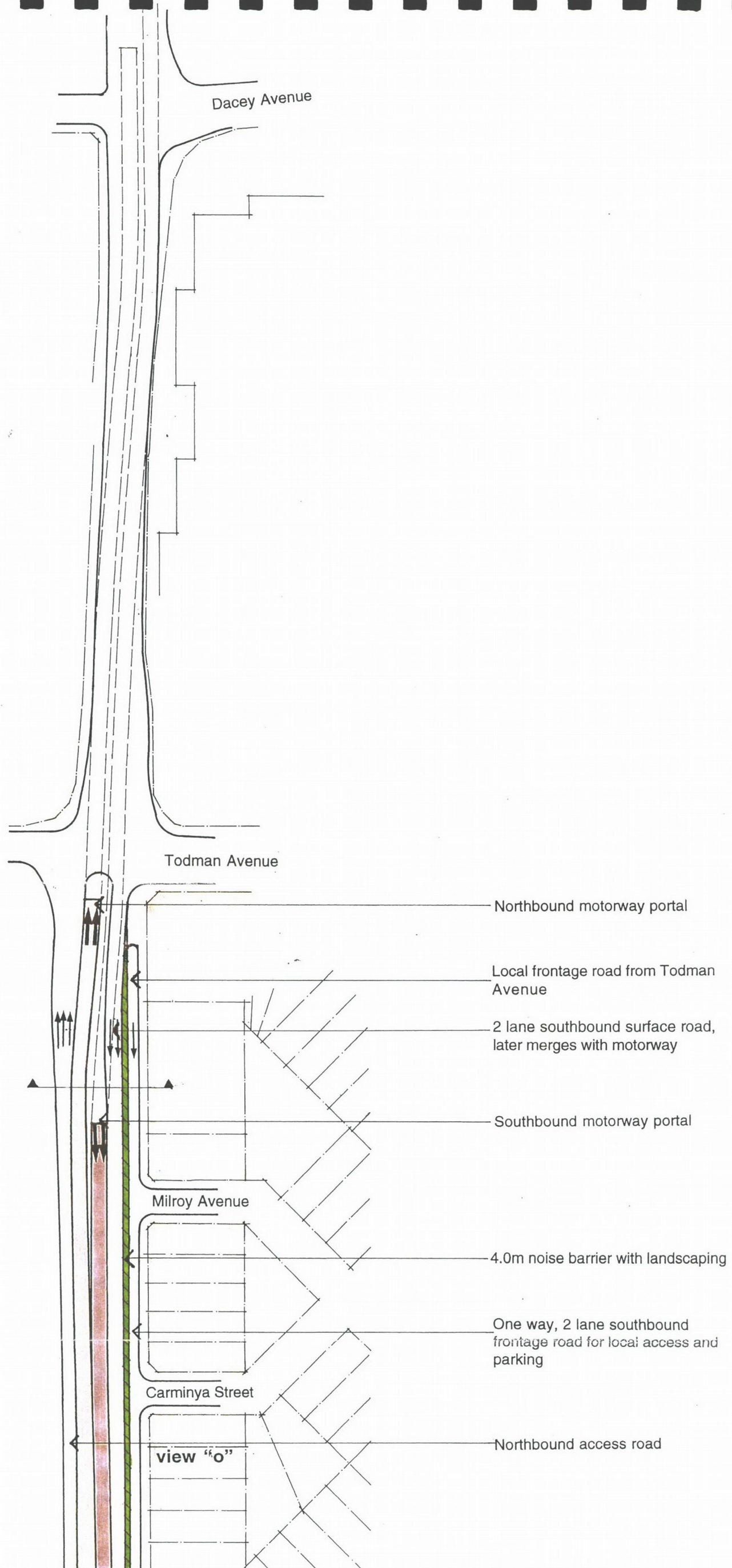


Figure 4.5a **MODIFIED PROPOSAL**  
Dowling Street  
Plan

Source: RTA



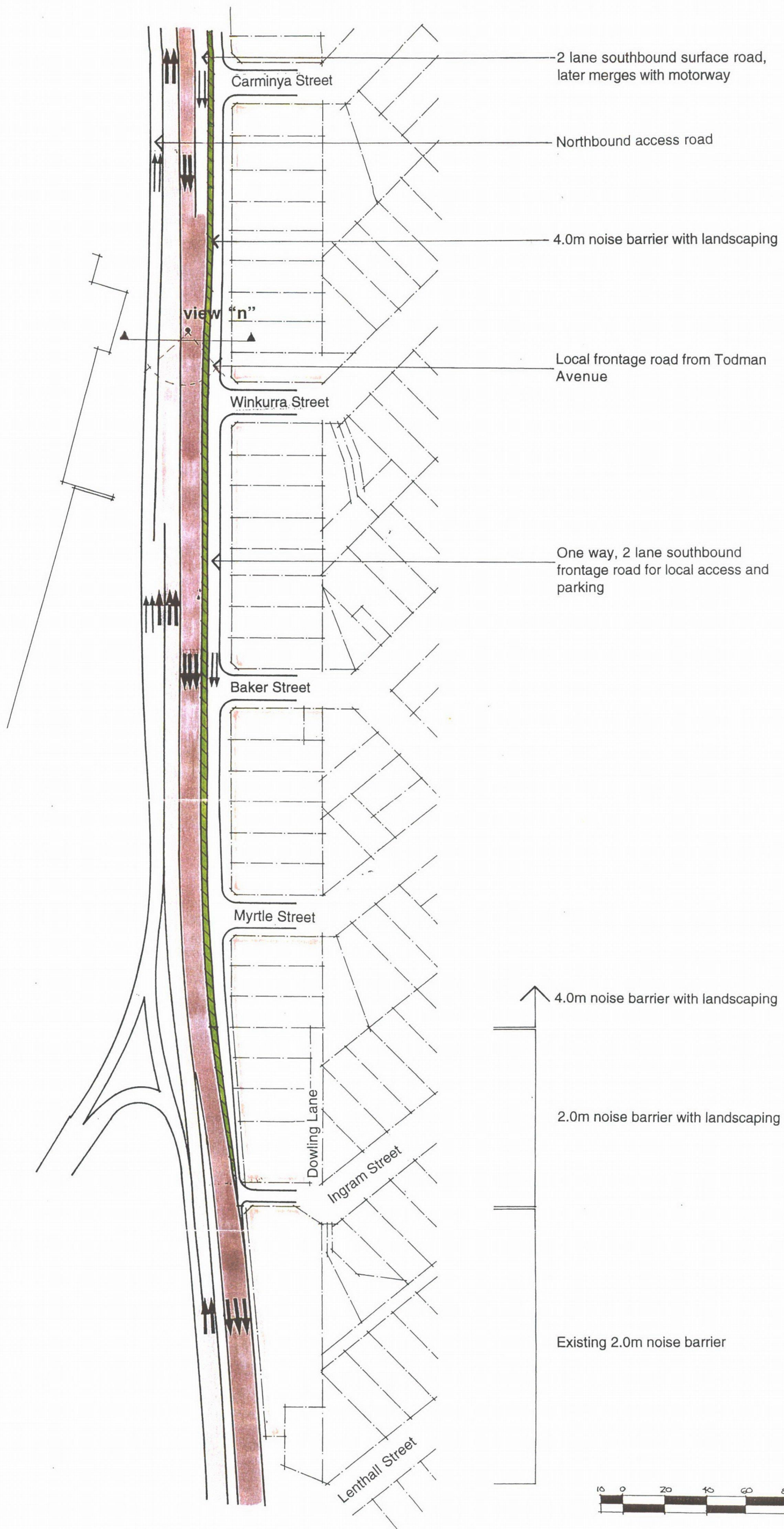


Figure 4.5b MODIFIED PROPOSAL  
Dowling Street Plan

Source: RTA



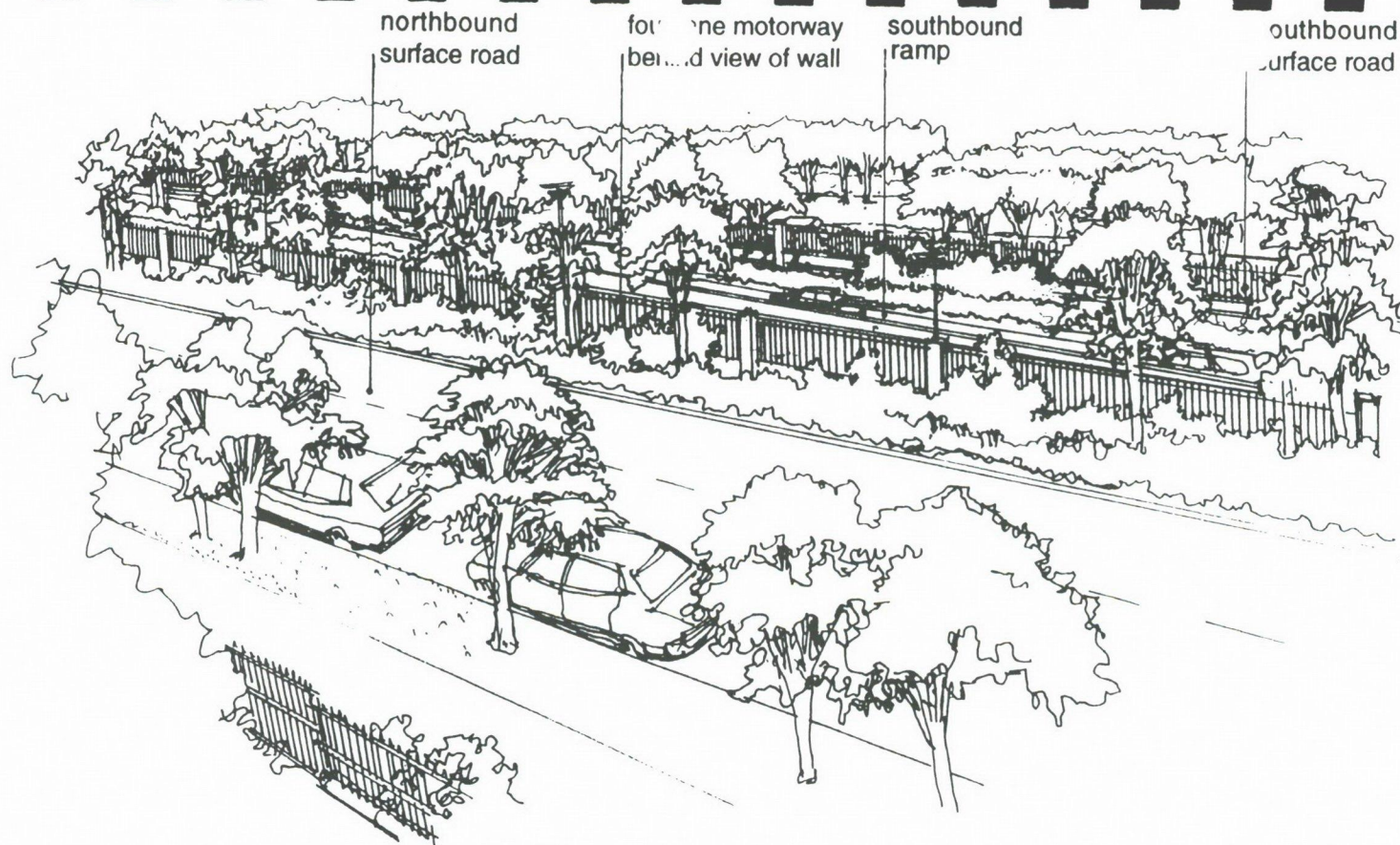
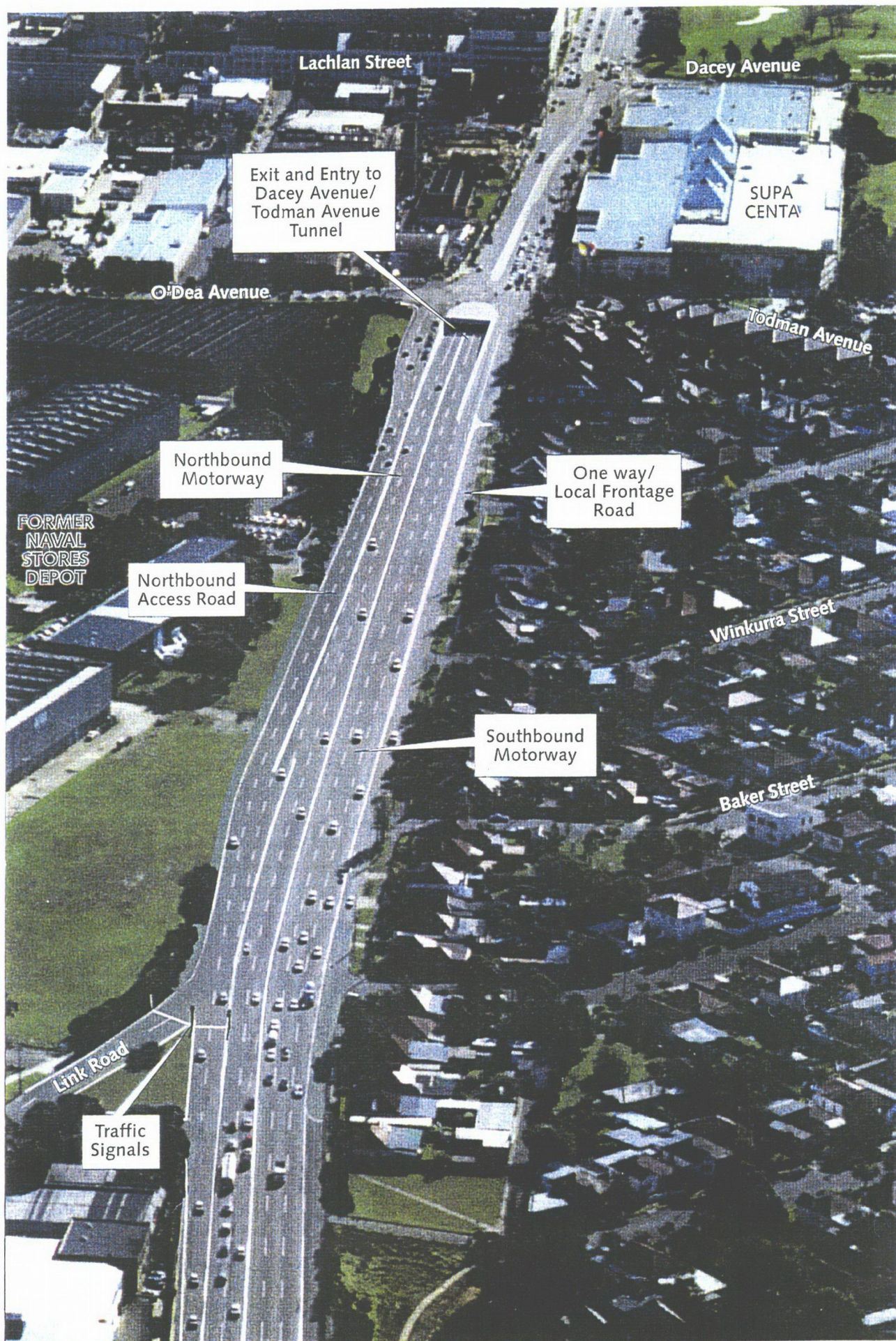


Figure 4.4h **MODIFIED PROPOSAL**  
**South Dowling Street - View "Z"**

Artist's perspective from house (1st storey) looking east

Source: RTA





Source: Airport Motorway

Figure 4.5 c EXHIBITED SCHEME EIS  
Dowling Street

Artists' aerial perspective of Dowling Street looking north

Note: Does not include potential noise mitigation measures

Source: RTA



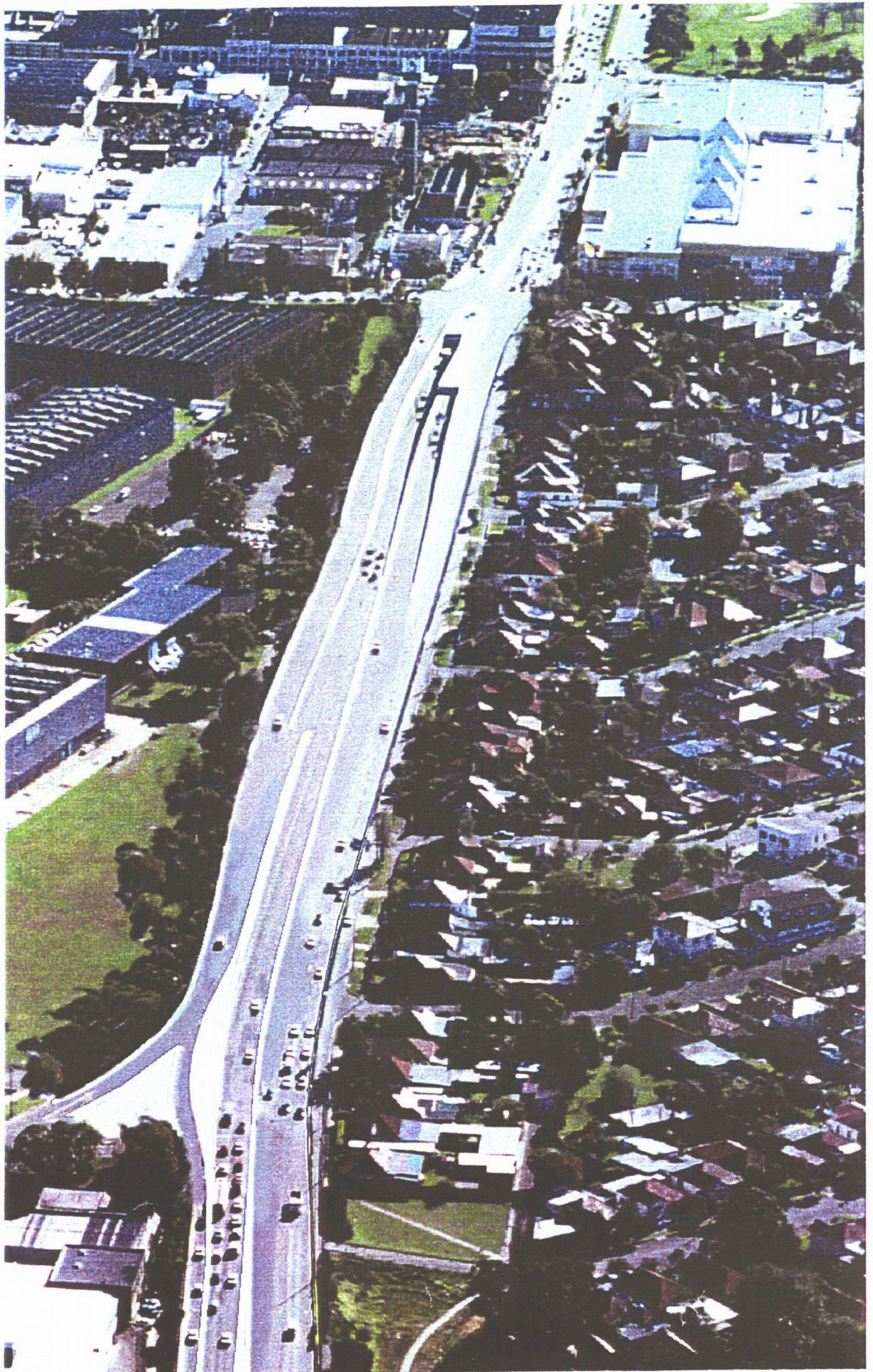


Figure 4.5d **MODIFIED PROPOSAL**  
**Dowling Street**

Artist's aerial perspective of Dowling Street looking north

Source: RTA



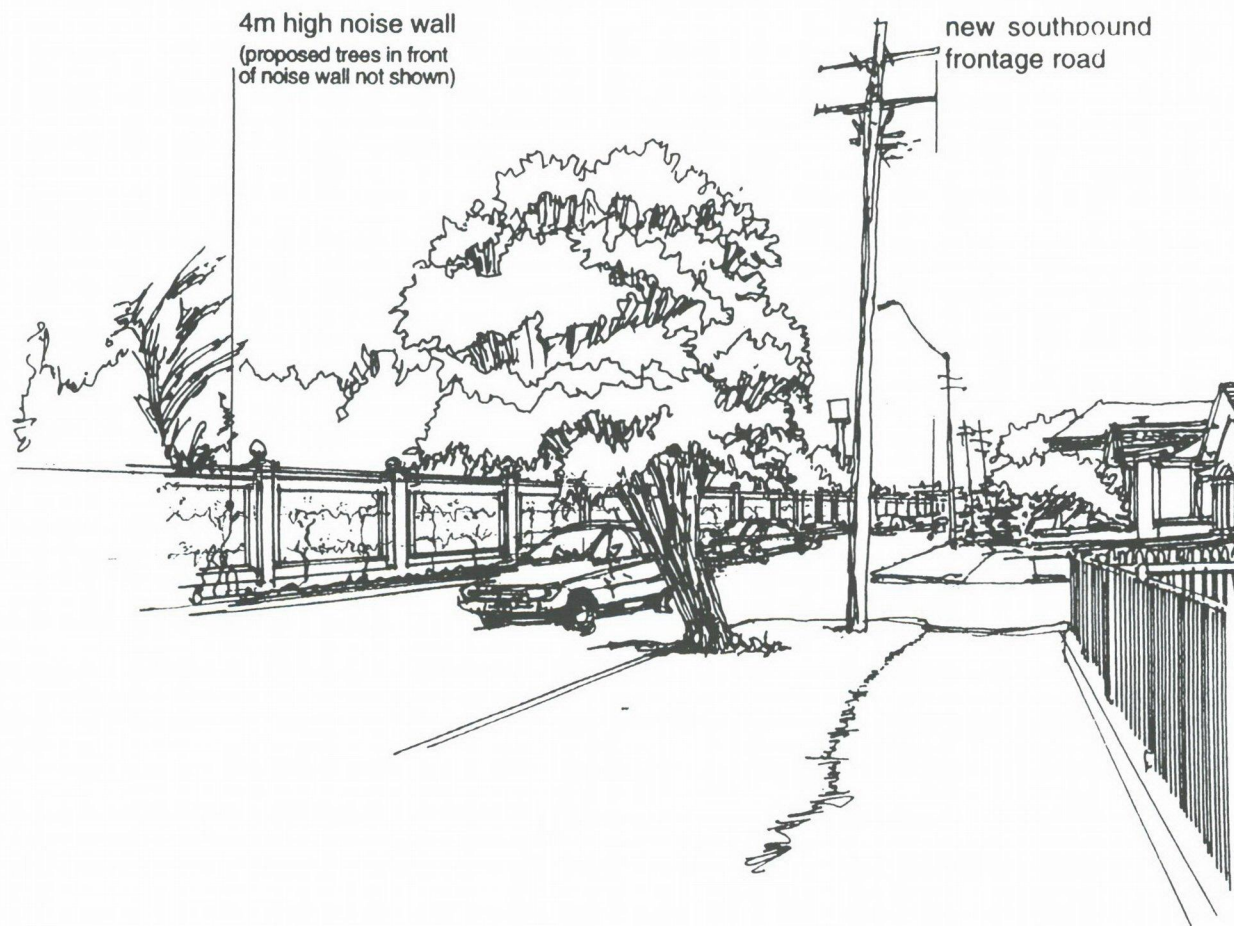
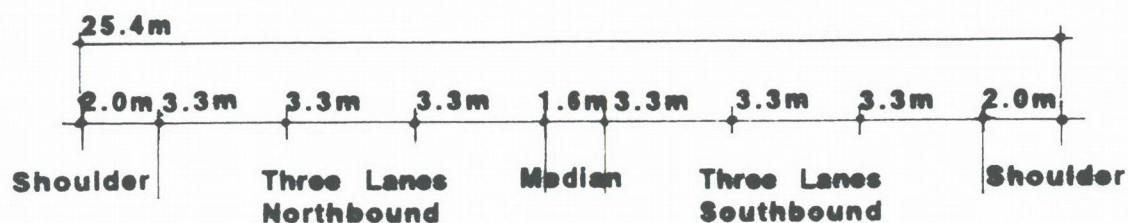
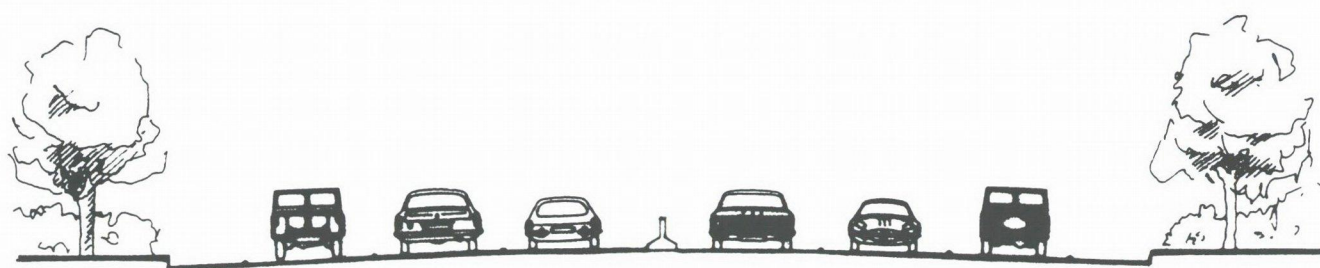
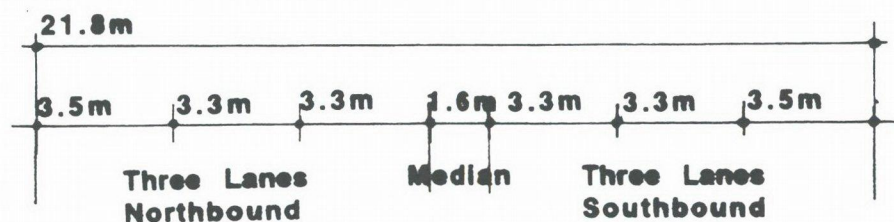
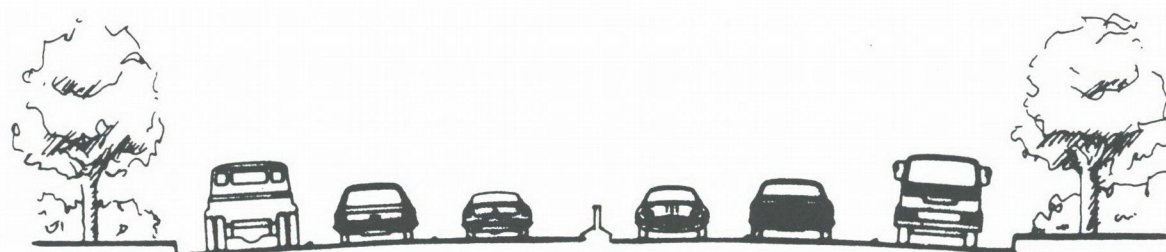


Figure 4.5e MODIFIED PROPOSAL  
Dowling Street - View "O"  
Artist's perspective from Dowling Street looking north  
Source: RTA





Typical Section - Link Road to Wentworth Avenue

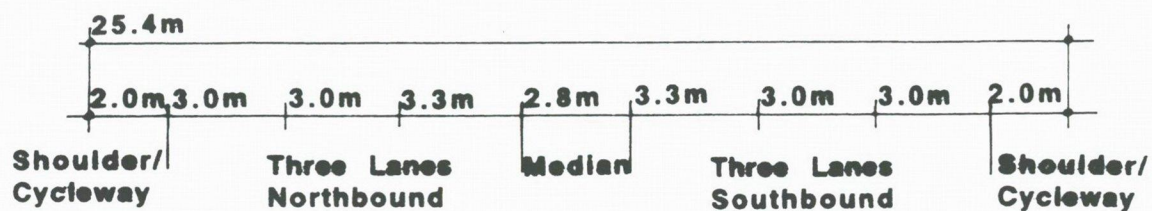
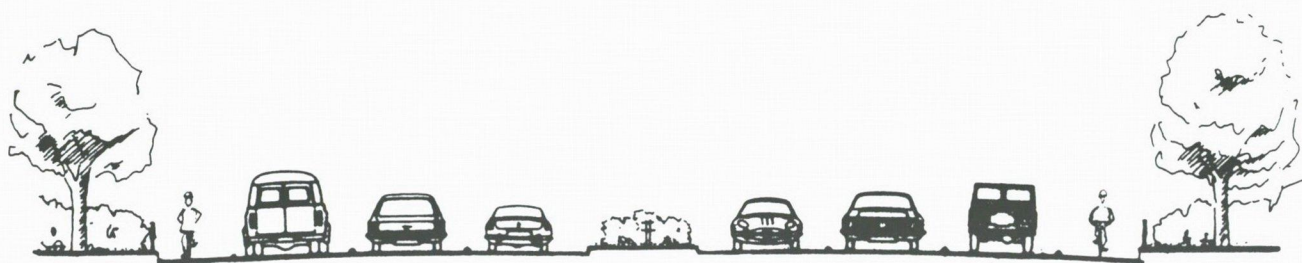


Typical Section - Wentworth Avenue to Mill Pond Road

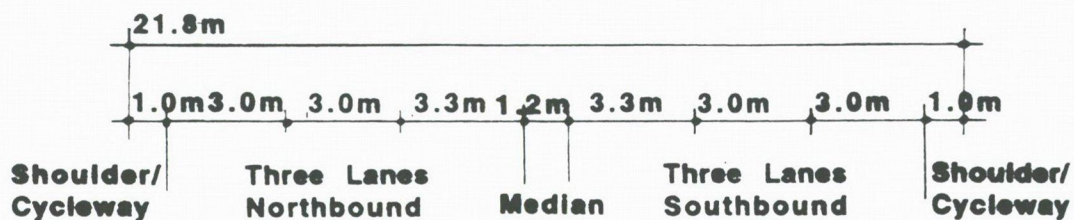
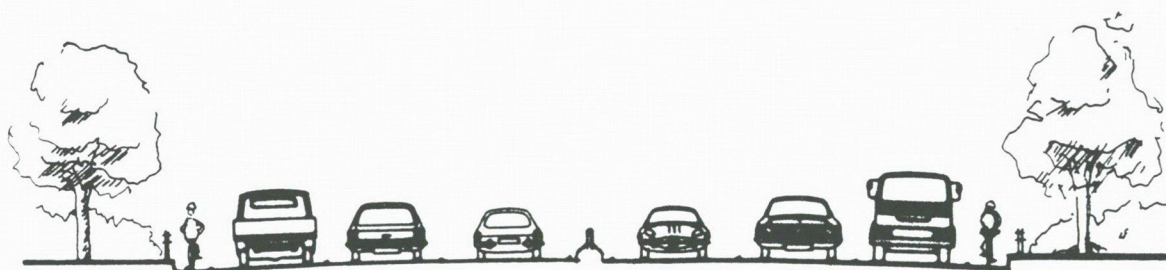
Figure 4.6a

**EXHIBITED SCHEME EIS**  
**Southern Cross Drive**  
**Typical Sections**





Typical Section - Link Road to Wentworth Avenue



Typical Section - Wentworth Avenue to Mill Pond Road

Figure 4.6b **MODIFIED PROPOSAL**  
**Southern Cross Drive**  
 Typical Sections



## 5.0 COMPARATIVE ASSESSMENT OF THE PROPOSED CHANGES

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*This section provides a comparative assessment of the proposal as exhibited against the proposed changes.*

### 5.1 Overview

The proposed modifications to the Eastern Distributor scheme as was presented in the EIS are described in Section 4 of this report. The RTA's representation report detailed the comparative environmental assessment of these proposed modifications relative to the EIS preferred scheme. This is also provided in Appendix A. The RTA's conclusion in this regard is that the modifications have been proposed in response to various issues of concern raised in submissions to the EIS and overall would eliminate or reduce the detrimental effects of the original scheme and therefore represent an overall better environmental outcome to the project.

This section presents the Department's consideration of the comparative merits or otherwise of the proposed improvements as submitted by the RTA. The detailed assessment of each of the components of the project including its proposed modifications are in Section 6 of this report and therefore information presented here should not be considered in absolute terms but for comparative purposes only.

### 5.2 Comparative Assessment

Table 5.1 presents the Department's independent consideration of the comparative impacts of the proposed modifications.

Overall this table indicates that in terms of the proposed modifications in the vicinity of the Art Gallery, Drivers Triangle, South Dowling Street (south of Dacey Street) and Southern Cross Drive, the proposed modifications would potentially result in major positive impacts with relatively minor negative impacts. Major positive impacts relate in particular to urban design; the reunification of the Domain and Botanic Gardens creating additional public land; and noise, air pollution and visual improvements. This conclusion is consistent with the main findings of the RTA in its representation report. The proposed changes at Cathedral Street and along South Dowling Street (between Drivers Triangle and Dacey Street) would introduce a range of potentially different impacts relative to the original scheme which would need specific assessments so as to ensure the overall result in net improvements to the proposal. Some of these impacts represent substantial improvements whilst others would necessitate strict control and management if they are to be tolerated.



Table 5.1 Comparative Assessment of Impacts of Proposed Changes

Location and Description of Proposed Changes	Potential Impact Issue	Estimated Positive or Negative Potential Impact	New or Changed Potential Impact
<b>Art Gallery Area</b> <ul style="list-style-type: none"> <li>• Landscaped cover (0.85 ha)</li> <li>• Moving toll offices to south of Nicholson St</li> <li>• pedestrian bridge including lift linked to Cathedral Street</li> <li>• 3m noise walls</li> </ul>	Urban Design (including visual impact, views, physical impact, community links and accessibility, streetscape, finishes and materials, advertising and safety).	+ve at Art Gallery as Domain and Botanic Gardens re-united and this significant open space and cultural area would be improved	New Major
	Property	+ve Additional public land (0.85 hectares) provided	New Major
	Air Quality	No change	
	Noise	+ve Art Gallery. Lincoln Cres and east side of Bourke Street.  -ve east side of Motorway between Griffiths and Harmer	Changed Minor  Changed Minor
	Construction impacts	-ve greater level of construction activity on the vicinity of the Art Gallery.	Changed Minor (temporary)



Table 5.1 contd

<b><i>Extension of tunnel portals to keep Cathedral intersection</i></b> <ul style="list-style-type: none"> <li>• Portals moved to the north of Cathedral Street and Cathedral Street reconnected</li> <li>• Off ramp moved to Palmer Street. Palmer St becomes 2 ways</li> <li>• New intersection created at Cathedral St</li> <li>• existing open space upgraded</li> <li>• development sites created along route</li> </ul>	Urban Design ( including visual impact and views, severance, heritage, physical impact, community links and access, streetscape and safety).	+ve impacts south of Cathedral street as the area is already degraded and the motorway proposal has the potential to upgrade existing open space and protect heritage features; retains existing community links and important vistas to St Mary's Cathedral.	Major New
	Groundwater	-ve More groundwater encountered	Changed Minor
	Air Quality	+ve at William St	Changed Minor
		-ve at Kidman Terrace near portal. Substantial reduction in air quality.	Changed Major
		-ve at vent stacks due to longer tunnel	Changed Minor
	Settlement/Heritage	-ve. Settlement of Kidman Terrace. Need for underpinning/ support or demolition.	New Major
	Noise	+ve west side of Palmer (south of William) and west side of Palmer (nth of William)	Changed Minor
	Property	-ve. east side of Motorway	Changed Minor
		-ve about 35 properties outside of the area previously affected by the tunnel.	Changed Major



Table 5.1 contd

<p><b><i>Drivers Triangle</i></b></p> <ul style="list-style-type: none"> <li>• Relocation of entry ramp portal 2m east of the South Dowling Street</li> <li>• Relocate signals at Flinders Street and South Dowling Street for access to northbound bus stop;</li> <li>• Install fence along median strip of Flinders Street;</li> <li>• landscape southern edge of Drivers Triangle to discourage pedestrian movement across entry to new ramp;</li> <li>• New signals at Greens Road/Moore Park Road to link with proposed new formal pedestrian entry to Moore Park</li> </ul>	<p>Urban Design (including visual impact, views, heritage, physical impacts, community links, vegetation and landscaping, land take, signage and streetscape.</p>	<p><b>-ve as a result of the change to an existing community link and less convenient route for some users;</b></p> <p><b>+ve as a result of the introduction of safety features</b></p>	<p><b>Changed Minor</b></p> <p><b>Changed Minor</b></p>
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Table 5.1 contd

<b>South Dowling Street (to Dacey Ave)</b> <ul style="list-style-type: none"> <li>• Motorway depressed in 4 to 5 metre trench</li> <li>• Provision of landscape parking bays on northbound access road</li> <li>• pedestrian bridges at grade over motorway lanes at Phelps St, Parkham St and Charles St.</li> <li>• parking bays on west side of South Dowling Street</li> <li>• construction of elevated viaduct associated with Telstra cable</li> <li>• Additional 1.1 ha of Moore Park. Increase from 35 m for roadway (EIS Scheme) to 55m.</li> <li>• Temporary diversion road for southbound traffic extended through the northern end of Moore Park</li> <li>• Minor changes to entrance ramp at South Dowling Street and minor changes around Drivers Triangle</li> <li>• New signals at Greens Road</li> </ul>	Urban Design (including visual impact severance, heritage, physical impact, community links, accessibility, vegetation and landscaping, streetscape, noise, finishes and materials, safety.	<p><b>-ve due to visual and physical impacts, loss of vegetation and landscaping, land take of public park land. In combination these issues result in a loss of character and urban quality</b></p> <p><b>+ve due to additional road crossings and pedestrian bridges to Moore Park. Links correspond to existing routes.</b></p> <p><b>-ve new impact may result from inclusion of elevated Telstra structure. Insufficient details provided at this stage.</b></p>	<p><b>Changed Major</b></p> <p><b>Changed Major</b></p> <p><b>New Minor</b></p>
	Moore Park	<p><b>-ve Increase loss of Moore Park. Additional 1.1 hectares required.</b></p> <p><b>-ve Section of Moore Park used for stormwater detention</b></p> <p><b>+ve Potential for Centennial and Moore Park Trust to undertake major upgrade of Park from compensation</b></p>	<p><b>Changed Major</b></p> <p><b>Changed Minor</b></p> <p><b>Changed Major</b></p>
	Private Property Affection.	<b>-ve Temporary stratum acquisitions below properties fronting South Dowling Street to protect soil anchors</b>	<b>New Major (temporary)</b>
	Groundwater/settlement	<b>- ve Rep Report recognises that modification raises <u>significant</u> groundwater issues.</b>	<b>New Major</b>
	Operation Noise	<b>+ve</b>	<b>Changed Minor</b>
	Heritage	<b>-ve Potential risk of settlement of heritage buildings increased</b>	<b>New Minor</b>
	Utilities	<b>-ve Exposure of major optical fibre cable</b>	<b>New Minor</b>
	Contaminated Spoil Disposal	<b>-ve Greater volumes of spoil to be removed and disposed.</b>	<b>Changed Minor</b>



Table 5.1 contd.

<b><i>Dowling Street (Dacey Ave to Link Road)</i></b>  <ul style="list-style-type: none"> <li>• Movement of exit portal south from Todman St</li> <li>• 4 metre noise wall on eastern side of roadway</li> </ul>	Urban Design (including visual impact, severance, physical impact, vegetation, landscaping)	<b>-ve visual impact due to extensive noise walls, loss of pedestrian crossings and physical impact of road carriageway. Severance aggravated. Loss of vegetation.</b>	<b>Changed Minor</b>
	Noise	+ve	<b>Changed Major</b>
	Property	<b>-ve Loss of public land and reduce footpath.</b>	<b>Changed Minor</b>
<b><i>Southern Cross Drive (Link Road to Mill Pond Rd)</i></b>  <ul style="list-style-type: none"> <li>• widening of roadway by 8 to 10 metres;</li> <li>• reduction of footpath width up to 2 metres.</li> </ul>	Urban Design including visual impact, community links and access, signage, materials and finishes, gateway treatment.	<b>No Change</b>	
	Cyclists	<b>+ve Increase in provision for cyclists.</b>	<b>Minor Changed</b>

An analysis of more specific impacts follows hereafter.



### 5.2.1 Cathedral Street Area

The proposed modifications to the Cathedral Street area are expected to bring a number of urban design improvements, particularly in relation to the restoration of vistas and views along Cathedral Street, pedestrian access, additional length of motorway in tunnel, and improvement to community cohesion and connectivity. However, there would potentially be an increase in the severity of impacts in the Kidman Terrace area, particularly in relation to potential deterioration in air quality and greater potential for settlement in this area. The extension of the tunnel to the north would also require additional subsurface stratum acquisition (for anchoring protection purposes) beyond the provisions currently identified in existing planning instruments.

Issues relating to settlement could be controlled through appropriate conditioning and monitoring of structures during and after the construction period. Impacts on air quality would necessitate a specialised management regime between the owners, the RTA and EPA, including compensation measures if necessary. Section 6 of this report provides more detailed assessment.

### 5.2.2 South Dowling Street

The relevant issues associated with the proposed changes relate to urban design; additional impacts on Moore Park; potential impacts on groundwater and associated potential for settlement; and the need for temporary anchors and temporary stratum easements.

The urban design issue is a complex one as it deals mainly with subjective issues. Some aspects which appear to be an improvement to one person may not be to another. There may be a loss of character and urban quality in part against environmental and visual improvements in other parts. The residential character of South Dowling Street is considered to be enhanced relative to the original scheme on some aspects but not on others. Section 6 of the report provides a detailed assessment.

The modifications would increase the land take from Moore Park by some 1.1 hectares over the original proposal of 1.1 hectare. Whilst this loss of additional park land would represent a relatively small incremental area compared to the total park area, the loss would be irretrievable. This additional impact would need to be justified and alternatives investigated to avoid or at least minimise the land take from Moore Park (see Section 6 for alternative considerations).

As recognised in the RTA's representation report, the proposed modifications "would raise significant groundwater issues compared with the EIS proposal". This is a potentially new impact which needs careful assessment. The Department is satisfied that these impacts are likely to be manageable, however it is important to recognise that if not properly managed then settlements could potentially significantly extend to areas away from the excavation. Stringent monitoring and control techniques as discussed in Section 6 of this report would therefore be essential if this impact is to be minimised. In addition, there would be a need for consultation with potentially affected land owners in terms of managing the impact and where necessary re-injection to compensate for dewatering effect.



The proposed modifications would also introduce the need for temporary stratum easements although the impact on most affected properties would be minimal. Conditions could be introduced to ensure that anchoring is only temporary and with no long term effects.



## 6.0 ASSESSMENT OF KEY ISSUES RELATING TO THE MODIFIED PROPOSAL

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*This section outlines the Department's detailed consideration of the current proposal having regard to information provided in the EIS, issues raised by DUAP, representations received in response to the EIS exhibition and from additional information provided by the RTA in addressing proposed changes.*

*The RTA has also provided the Department with an assessment of all issues raised in the representations and this is included in Volume 3 of the RTA's Representation Report. The assessment by the RTA has been reviewed by the Department and where required further assessment has been undertaken.*

### 6.1 Overall Project Justification

#### 6.1.1 Key Issues Raised

The need and justification of the proposed development was raised by a number of government agencies, local councils and private submitters. Key issues raised in this regard include the strategic context of the proposal within integrated transport planning initiatives and the proposal as part of a Sydney Orbital road network which has not been assessed.

#### 6.1.2 Consideration of Issues

An assessment of the relevant issues associated with the need and justification of the proposal and its objectives is presented in Appendix B and through various sections of this report. Overall the following conclusions are made:

#### *State and Regional Planning Context*

The EIS and RTA's representation report indicate that a key strategic justification for the proposal is that it is compatible with DUAP's "*Cities for the 21st Century*", the DOT's "*Integrated Transport Strategy*", and the RTA's "*Draft State Road Network Strategy*". A review of these documents indicates that the strategic emphasis had previously been on addressing east-west transport linkages, with a particular emphasis on the need for an underground tunnel at Taylor Square. The RTA's "*Draft State Road Network Strategy*" document in particular highlights the need for completing the link between the Gore Hill Freeway, Sydney Harbour Tunnel and the upgrading of General Holmes Drive. The document highlights the need for a privately funded underground Eastern Distributor to complete this route. It is understood that it was the RTA's intention at the time to complete this link by way of an underground tunnel beneath Taylor Square.

The RTA has indicated that since the formulation of these documents and during the development of the Eastern Distributor as a privately funded toll road, it became obvious that building a tunnel only under Taylor Square would unacceptably overload South Dowling Street and therefore it made the decision to incorporate the upgrading of South Dowling



Street and Southern Cross Drive into the current Eastern Distributor proposal. In the Department's view this would fundamentally change the functional nature of this corridor from providing for the distribution of traffic to the eastern suburbs to a significant north-south emphasis with a much broader metropolitan orbital ring road function. There would be a regional switch of traffic from the west to the east of the city. Traffic volumes are predicted to increase well above those anticipated before.

The implications of the above are that a readjustment of previous transport strategic and related documents would need to be undertaken in the light of this proposal should it proceed. It is not the purpose of the EIS nor of this assessment report to undertake such strategic re-assessment which needs to be undertaken as a whole-of-government initiative.

It has also been implied by the RTA that this proposal is part of a broader Sydney orbital. Whilst it is accepted that the concept of an orbital has been identified by the RTA since the 1980s it is apparent that this concept has not been explicitly evaluated in more recent times. Accordingly, it is important to recognise that an endorsement (or otherwise) of this Eastern Distributor proposal should not be taken as an endorsement (or otherwise) of the orbital concept. A separate strategic assessment would benefit any orbital road proposals on their own merit.

#### *Assessment of the Objectives of the Proposal*

This assessment more appropriately focuses specifically on examining the RTA's stated objectives in justifying the proposal. These objectives include: facilitation of commercial/freight movements to/from the Airport and Port Botany; supporting economic and employment growth; improving the level of service to existing and future growth areas along the corridor; improving Airport to CBD access; improvements to public transport initiatives; and removal of traffic from residential areas.

A detailed assessment of each of the above objectives based on data and information in the EIS, RTA's Representation Report and further support information indicates that these objectives would be met to varying degrees (refer Appendix B).

The objective of facilitating public transport as the result of the Eastern Distributor would be mostly achieved around Taylor Square where the highest level of traffic reduction would occur to enable opportunities for public transport and specialised bus lanes to be introduced. Apart from Flinders Street the Eastern Distributor could also be a catalyst for introduction of bus lanes in other areas such as Oxford Street, William Street, Anzac Parade and Botany Road notwithstanding that these other measures could be implemented without the Eastern Distributor. There is a commitment by the RTA for this to occur, including the establishment of a government Task Force for that purpose.

The Eastern Distributor is expected to result in varying levels of traffic reduction in surrounding areas with some areas experiencing a significant decrease while other areas would experience an increase. This would largely depend on the local area improvement program (LAIP) to which the RTA is committed.



The objective of improving Airport to CBD access including facilitation of commercial/freight movements to/from the Airport and Port Botany would depend upon the success of the improvements to the Mill Pond Road intersection with Botany Road and General Holmes Drive, which could be required as a condition of approval. Overall, it is recognised that the M5 East and proposed Southern Arterial would facilitate to a greater extent freight movements to and from Sydney Airport/Port Botany/Central Industrial Area and central Sydney notwithstanding that the Eastern Distributor could complement these routes provided necessary commitments outlined elsewhere in this report are made.

Level of service to existing and future growth areas, particularly in the South Sydney City proposed urban development area, may be constrained by access limitations to and from the motorway. Whilst the Eastern Distributor would assist access to the areas by the provision of on and off ramps to the motorway, the Department's assessment indicates that north bound ramps would provide a low level of service in peak hours but that benefits could be achieved during business and off-peak hours. In that context it is considered that the Eastern Distributor is mostly intended by the RTA to improve travel conditions for north-south traffic. However, east-west access could be enhanced by way of improving access through design modifications as considered later in this report.

A number of recommendations are made in this report relating to public transport improvements, local area traffic improvements, project design modifications and further investigations and studies to ensure the maximum achievement of the identified objectives.

## **6.2 Public Transport Issues**

Representations from the EPA, DoT, Sydney City Council, the Total Environment Centre, Bicycle NSW, TAG, Action for Public Transport, South Sydney Regional Organisation of Councils, the Eastern Distributor Taskforce and a relatively large number of private individuals raised issues and concerns related to consideration of public transport as an alternative, impacts on existing public transport services and potential impacts on the New Southern Railway. Sydney Buses and the Department of Transport raised a number of concerns about the removal of the bus lane in Moore Park.

### **6.2.1 Public Transport as an Alternative**

Consideration of public transport alternatives in response to EISs for major roads is a commonly raised strategic concern. However as indicated in the Department's *EIS Guideline for the Preparation of an EIS for Roads and Related Facilities*, it is not the role of the project EIS to undertake a strategic environmental assessment of transport plans or policies. Nonetheless it is expected that relevant strategic studies should be considered in formulating and justifying the proposal. On this aspect the EIS relies on strategic documents such as DUAP's "*Cities for the 21st Century*", the DoT's "*Integrated Transport Strategy*" and the RTA's "*Draft State Road Network Strategy*". As previously indicated it is not clear how the proposal specifically addresses the strategic principles identified in these studies. The conclusion has been previously made that a reassessment of broad transport policies are warranted in light of this proposal.



The Department accepts the conclusion in the EIS that the proposal would complement the overall public transport system provided that major improvements to bus services are implemented as an integral part of the proposal. The RTA's commitment to undertake a feasibility study into a light rail link between Central Railway and the University of New South Wales passing Sydney Football Stadium, Sydney Cricket Ground, Moore Park and Randwick Racecourse is evidence of the commitment to improving public transport to this part of the city. This is considered by the Department to be essential. Furthermore it is not expected that the anticipated growth in the city south area and movement needs from the airport could be accommodated by public transport services alone in the long term. In that context, the proposal must be seen as providing an opportunity for public transport improvements as essential complementary measures.

### *6.2.2 Public Transport Initiatives*

One of the key potential benefits of the proposal is improvement to public transport. The EIS identified a number of improvements which could be made to public transport due to opportunities for road capacity freed up by the Eastern Distributor. The EIS also made an explicit commitment (refer Figure 1.3 of the EIS) that such measures would be identified and exhibited at the same time as the determination/approval. It is now apparent that this would not be the case. This is somewhat unfortunate as this would have provided a strong basis for the Department's consideration of this key aspect of the proposal. The joint representation by the Department of Transport, Sydney Buses and State Rail Authority raised concerns that because such significant bus priority measures have not been identified as part of the proposal the implementation may prove to be difficult after the proposal is approved. As such the DoT recommended that any plans for bus priority measures be approved at the same time as the proposal.

To ensure the maximum use of public transport opportunities which would be created by the Eastern Distributor, the Government has established a Bus Priority Task Force. The Task Force is charged with investigating options for improving bus priority which would both make buses faster and more reliable and would attract more passengers over time. The Task Force is chaired by the Mayor of South Sydney City Council and members comprise representatives from South Sydney City Council, DoT, Sydney Buses, DUAP, EPA and the RTA. Terms of reference for the Task Force and a draft package of potential 'before' and 'after' works including bus priority lanes, transit lanes, clearways, intersection improvements and new bus stations are provided in Appendix C.

The next steps of the Task Force are to:

- consult with the community on the draft proposals;
- recommend a final package of achievable works for bus priority;
- develop implementation strategy for the "before" works;
- develop performance thresholds for bus priority and also for special event clearways;
- review the impact of the Eastern Distributor construction staging on bus operations;
- implement the "before" works; and,
- evaluate and review the "after" proposals.



While data available to the Department indicates that major public transport routes would not have significantly lower volumes with the Eastern Distributor (compared to the 'do-nothing' option) apart from Flinders Street, the proposed public transport initiatives are still considered to be integral to the success of the proposal and would provide an overall improvement to public transport in the area. Furthermore the RTA's commitment to undertake a feasibility study into a light rail link is also evidence of the commitment to improving public transport to this part of the city.

The Department considers that the key issue is the level of commitment to ensure the measures are implemented. At this stage there is a commitment by the RTA to the funding and implementation of bus priority measures on Oxford Street and Flinders Street. In addition none of the proposed measures (including measures proposed for Oxford and Flinders Street) have had any detailed impact assessment nor community involvement in terms of the implications for the regional bus network. It is therefore uncertain how effective they are likely to be and therefore premature to make any final recommendations about their implementation. As a consequence, any specific recommendations for bus priority measures to be included as part of this proposal (as required by the DoT/ Sydney Buses) can not yet be finalised.

Accordingly, it is **RECOMMENDED** that, in view of:

- the level of concerns raised in representations about the need to improve public transport;
- the need to avoid the potential for mode shift favouring the private vehicle and resulting in the potential for induced car travel;
- the non deliverance at this time by the RTA on the Access Improvement Program which was committed in the EIS to be completed and exhibited jointly with the approval; and
- the need to ensure that the bus priority measures are implemented prior to the project commencing operation,

**bus priority measures be substantially in place and implemented prior to the proposal becoming operational.**

It is further **RECOMMENDED** that prior to adoption or implementation of any bus priority measure (including bus priority measures in Oxford and Flinders Street) the RTA ensures that there is appropriate assessment and consultation with the community and local business groups.

Conditions to ensure maximising improvements to public transport and to minimise any impacts during construction are specified in Recommended Conditions of Approval 16 to 22.

### 6.2.3 Bus Roadway in Moore Park

The EIS proposed the removal of the bus roadway between Gregory Avenue and Moore Park Road. Instead, the bus roadway was to be replaced with a Bus Lane in each direction on Anzac Parade with buses re-entering Anzac Parade through traffic signals at Gregory Avenue. A number of deficiencies were identified with this proposal, particularly the potential



elimination of options for use of the bus roadway as a light rail corridor which is to be addressed in the recently announced feasibility study. The Department accepts the concerns of Sydney Buses and agrees that the bus roadway should remain, subject to further discussions with Sydney Buses and the Centennial Park and Moore Park Trust.

#### *6.2.4 Flinders Street/Anzac Parade/Moore Park Road*

This is a critical intersection in terms of bus efficiency, movements of pedestrians during major events in the Showground area and access to the tunnel system for Moore Park Road and Anzac Parade traffic. As a consequence it is important that it operates at a high level of service. Traffic analysis indicates that this intersection would perform poorly under the proposed Eastern Distributor.

To provide the opportunity to significantly increase the efficiency of bus operations in this area, it is RECOMMENDED that further analysis be undertaken on the benefit of further grade separation of this intersection to provide more benefits to public transport. This is specified in Recommended Condition of Approval 23.

#### *6.2.5 Impacts on the New Southern Railway*

The levels of traffic congestion on the Sydney network are expected to increase over time and time savings from the Eastern Distributor would also reduce as a consequence. The levels of congestion (peak and non-peak) on approach roads to the airport would also increase over the life of the project, increasing the attractiveness of the rail choice over time relative to the Eastern Distributor corridor.

The New Southern Railway is expected to encourage mode shift to public transport. The predicted travel time savings for vehicles travelling to the airport after the construction of the Eastern Distributor is unlikely to affect this modal shift.

The Department considers that the New Southern Railway and the Eastern Distributor would provide complementary transport modes rather than operate in direct and uneconomic competition.

### **6.3 Regional Traffic and Transport Issues**

Representations from private and government agencies contended that the traffic modelling presented in the EIS was deficient because it did not take into account traffic that would be induced through the freeing up of the road system that would result from construction of the Eastern Distributor. There were also concerns about the implications of the proposal on parallel roads and broader regional road network issues.

#### *6.3.1 Induced Traffic*

The EIS expressed a belief that any induced traffic effect would be small but provided no evidence of this. The Department considers that improvements to a road system could have



the potential to induce traffic growth. This occurs through one or more of the following mechanisms:

1. trip redistribution occurs as relative travel times to competing attractions are changed such that some trips are switched from closer to more remote destinations with a consequent increase in trip length;
2. change of mode occurs from another mode to private car because an improved road system increases the relative attractiveness of private car travel; and
3. a discretionary trip that would otherwise not have been made would be made because the trip was made more convenient.

The RTA has subsequently analysed induced traffic effects and although the Department's review indicates that further details may be warranted enough work has been undertaken to show that:

- a feedback mechanism could occur whereby induced traffic itself would increase travel times along a particular route such that some induced traffic would then revert to its original mode or destination;
- resulting volumes of induced traffic would not be high in proportion to background traffic flows; and
- if public transport priority measures on a particular route feeding along the Eastern Distributor corridor could improve bus travel times by five minutes then induced traffic effects along those routes would be nullified.

On the basis of the work undertaken to date it is concluded that traffic induction effects would not be so large as to significantly influence a decision on the Eastern Distributor. Nevertheless it is considered that the bus priority measures are of the highest importance if the RTA is to achieve its demand management objectives. Stringent conditions have been specified in relation to public transport and local area traffic management to ensure such measures are implemented.

### 6.3.2 *Traffic Modelling*

The complexities of trying to simulate motorist behaviour in a complex road system such as the Sydney CBD are acknowledged and the statements in the EIS that the models have limitations and that they need to be interpreted by experienced designers and traffic planners are accepted.

Different models were used in the EIS to represent high and low scenarios. It is evident from the representations that this use of multiple models has resulted in some confusion in the interpretation of results particularly when there are situations where the "low" volumes are higher than the "high" volumes. The EIS presents limited information on traffic impacts beyond the proposal corridor.

On the basis of the above an independent traffic consultant was commissioned to provide a peer review of the traffic modelling. Details are provided in Appendix D.



After detailed review of the 'TRACKS' model (used in the EIS as the "low" forecast for traffic impact assessment, economic analysis and prediction of road network travel time savings) a number of concerns were identified. The key concerns are:

- modelled volumes on nearby parallel routes to South Dowling Street were very different from existing (i.e actual 1996) flows. Reasonable correlation between modelled and existing volumes is normally a key and essential starting point for traffic modelling.
- the coding in the model appeared to connect the M5 East at fixed points to the Princes Highway and General Holmes Drive. This would therefore not allow traffic the option of switching to different sides of the airport for cases with and without the proposal. This forced travel behaviour is an important assumption and is not explained nor justified in the EIS.
- the coding of the model did not allow ready switching between the Harbour Bridge and the Harbour Tunnel which has a high potential of occurring (as reflected in the STM model which was used in the EIS as the "high" forecast for noise and air quality assessment and traffic impact assessment) given the improved future attractiveness of this corridor relative to travelling to the west of the CBD.
- travel times were not accurately modelled on a link by link basis therefore there can be limited confidence in the aggregate travel time measures on which the economic analysis has been founded.
- the model shows both Bourke Street (south of Fitzroy Street) and Crown Street/Baptist Street (south of Fitzroy Street) as two way in 2011. The EIS proposes only Crown Street to be made two way. The STM 2011 model had both Crown and Bourke Street one way.
- the coding in the model resulted in a high degree of sensitivity to the toll time/dollar equivalence assumption used and appeared to forecast an excessive amount of toll avoidance.

On the basis of the above concerns and on the advice from the Department's traffic consultant, the TRACKS model is no longer considered by DUAP to be sufficiently robust for the assessment of transport and economic implications for the project.

An assessment was also undertaken on the STM/EMME/2 model used as the "high" model in the EIS. This model was used for estimating noise and air quality impacts. There were also a number of concerns with this model in terms of :

- both Bourke Street (south of Fitzroy Street) and Crown Street/Baptist Street (south of Fitzroy Street) were modelled as one way in 2011 as is the present case. The EIS however proposes Crown Street to be made two way. It was also inconsistent with the TRACKS model which had Bourke St two way.
- a toll was imposed on the William Street southbound on-ramp. The EIS did not identify a toll at this location.
- the "without case" was also without the M5 East. The 2011 'with' case has the M5 East. The assessment is therefore comparing with and without the M5 East and the Eastern Distributor.



- the 2011 'without' had a slightly different trip table to the 2011 'with' case. No explanation was provided.
- the Bourke Street extension was not included.

The RTA has subsequently undertaken additional modelling (using a revised version of the EIS STM model) to verify the integrity of the various assessments undertaken for the EIS. This new modelling was also required to assess the implications of increasing the toll from \$2.50 to \$3.00 (2000 value), an increase of 20%.

Results of this model are considered to be suitable for both strategic and economic assessment of the proposal subject to two provisos. These relate to a tendency for the model to overpredict the attractiveness of the Eastern Distributor such that year 2011 forecasts for the South Dowling Street motorway are somewhat in excess of its capacity. It is thus likely that in morning peak periods the motorway would reach capacity before 2001. Thereafter any further peak period traffic growth in the peak flow directions would be taken up where allowed on routes previously relieved by the Eastern Distributor or at different times of the day. To allow for this, it would be appropriate to ignore any increase in economic benefits after 2001 for the purposes of economic assessment. Further discussion on this aspect is provided in Section 7.5.

The second proviso is that the 2011 motorway and ramp forecasts need to be scaled down to better reflect actual capacity constraints. This was done in the original STM analysis. From inspection the modified model forecasts for the motorway are broadly similar to the original forecasts. Thus the adjusted forecasts produced by STM to reflect capacity constraints are still considered to provide a suitable basis for examining operational aspects of the proposal at the level of accuracy needed for an environmental assessment. Changes to these forecasts would obviously be needed for the purposes of detailed design.

#### *Results of Additional Traffic Modelling*

The Department has subsequently undertaken a detailed review of the traffic predictions using the new modelling. Appendix E provides a comparison of the projected traffic volumes of the STM model presented in the EIS with the revised STM model.

Appendix E indicates that the revised model indicates a similarity in terms of predicted traffic volumes with the following exceptions<sup>1</sup>.

#### *Reductions in Traffic Compared to the EIS (by -20%)*

- Entry ramp to Macquarie Street
- Crown Street (north of William)
- Northbound exit ramp to William Street
- Riley Street (north of William)
- Anzac Parade (north of Gregory Ave)
- Northbound surface access road (south of Cleveland Street)

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<sup>1</sup> Defined as + or - 20% change.



- Lachlan Street
- Crown Street (south of Foveaux)
- Bourke Street (south of Foveaux)
- Lenthall Street (east of South Dowling Street).

#### *Increases in Traffic Compared to the EIS (+20%)*

Of more concern are roads which the new modelling predicts a significant increase in traffic compared to the volumes presented in the EIS.

- Palmer Street

The proposed modifications to the location of the portals near Cathedral Street have resulted in moving the southbound exit ramp to Palmer Street. Noise and air quality impacts would still be within EPA criteria. Further details are provided in Section 6.12 and 6.13.

- Flinders Street

Compared to the EIS the revised model indicates an increase in traffic on Flinders Street. Traffic volumes would still be substantially reduced relative to the do-nothing.

- Fitzroy Street/Crown Street/Bourke Street/Campbell Street

The new traffic modelling indicates that there would be a major increase in traffic turning off at Fitzroy Street probably in response to avoiding the toll. The predicted reductions in traffic for the local area between Oxford Street and Fitzroy/Foveaux would therefore be less overall than that identified in the EIS. It would still generally be better than the do-nothing scenario. Nonetheless it is apparent that the area bounded by Oxford, Wentworth, Elizabeth, Fitzroy/Foveaux and Flinders Streets is likely to be most vulnerable from intrusion of through traffic avoiding the toll.

- South Dowling Street Surface Access Roads

The new model indicates a major increase in traffic on all sections of the northbound surface access roads again probably reflecting toll avoidance. Over a 50% increase is predicted on the northbound surface road between Cleveland and Fitzroy Street. Traffic volumes on this section of South Dowling Street are predicted to be little different from the "do-nothing" scenario.

- Motorway Traffic Volumes

Northbound motorway traffic is also predicted to significantly increase along South Dowling Street from about 20% in the south (i.e around Link Road) up to 85% (around Cleveland Street). This reflects the increase in traffic volumes predicted along Southern Cross Drive.



- Southern Cross Drive

Traffic volumes on Southern Cross Drive are predicted to increase by about 30% compared to the volumes presented in the EIS. This probably reflects more realistic coding in the traffic model to better reflect travel patterns to/from the airport.

- Link Road

Traffic volumes along Link Road are projected to increase by about 50%. There would not be any major implications relative to the EIS as traffic volumes would still be relatively low.

### *Conclusions*

Traffic modelling should only be used as a guide. Its main benefits is relative analysis rather than absolute analysis. In this regard it is the changes that are most relevant rather than the actual predicted traffic volumes. The revised modelling undertaken as part of this assessment is considered to be more robust and is therefore considered likely to provide a better prediction of potential traffic impacts.

The new modelling indicates relative benefit to several roads parallel to the proposal, particularly the Woolloomooloo area north of Oxford Street and the Surry Hills area south of Fitzroy /Foveaux Streets. However the new modelling indicates relative increases in traffic volumes particularly on the northbound surface access roads and through the northern part of the Surry Hills area probably as a result of the higher toll. Traffic volumes on the northbound carriageway of South Dowling Street (north of Cleveland Street) "with the proposal" would be similar to "without the proposal". The proposal however would separate the southbound carriageway which would provide an overall benefit in separating traffic from the residents along South Dowling Street. Traffic volumes through the Surry Hills area would increase relative to the predictions made in the EIS but are still likely to be less than the "do nothing" scenario.

Local area traffic management would be critical to this area to avoid the establishment of toll avoidance routes. Further discussion on local traffic issues is provided below. A more detailed traffic model would be needed to examine the sorts of measures likely to be included in the Local Area Improvement Program.

### *6.3.3 Regional Traffic Impacts*

An assessment of the regional traffic impacts is provided in Appendix D. Traffic on the Eastern Distributor is expected to attract about 3% additional traffic to the corridor it serves across Sydney Harbour with about 15% additional traffic to the corridor south of Cleveland Street. Natural traffic growth would result in about 18% more traffic in the corridor by 2011.

Because of these redistributional effects and strong traffic growth in the corridor there are likely to be some locations at which operational capacities would be exceeded in the future. Points for which there are concerns include:



- major intersections on South Dowling Street;
- intersections of William Street with Crown and Palmer Streets; and,
- northbound ramps onto the motorway in South Dowling Street.

The Eastern Distributor itself is expected to carry up to 5000 vehicles per hour in peak flow directions. Capacity of certain elements is expected to be reached soon after the year 2001 due to the attraction of traffic off parallel routes. Thereafter traffic growth in peak periods would revert to some of the relieved roads. However measures to control traffic levels in some of the relieved roads such as Crown and Bourke Streets should ensure that environmental benefits would continue into the future.

Several detail design measures to address consequential effects on the surface road system have not been addressed in detail at this stage. This has reduced the potential for design feedback to the main motorway elements. As a result a number of supplementary design and assessment investigations are required in addition to the proposed Local Area Improvement Program to ensure that the proposed motorway does not lead to undue disadvantage to surface traffic. These include:

- overall road safety audit;
- design of intersections and ramps on South Dowling and Dowling Streets;
- design of intersections on William Street along with arrangements for north-south traffic flow through Woolloomooloo;
- design of the motorway between Dacey Avenue and Lenthall Street;
- design and consequences of an interchange between the motorway and Link Road;
- adequacy of Joynton Road and O'Dea Avenue to carry traffic diverted if right turns between South Dowling Street and Link Road are eliminated;
- design of access between Southern Cross Drive and the airport;
- design and consequences of providing an off ramp from the South Dowling Street northbound motorway to Dacey Avenue eastbound;
- design of the intersection of Flinders Street/Anzac Parade/Moore Park Road/ northbound motorway on-ramps;
- implications of public transport priority measures suggested by the Bus Priority Task Force; and
- construction period traffic arrangements such that this analysis could be fed into a comprehensive construction traffic management strategy and implementation plan.

*Further details on these aspects are discussed in this report.*

## **6.4 Local Traffic Issues**

### **6.4.1 Key Concerns Raised**

As indicated in Section 3 the most frequent concern raised in representations by private individuals related to local traffic impacts. The concerns ranged from broad based philosophical questions about new roads inducing additional traffic (which would then use local streets either due to congestion on the motorway or toll avoidance), through to very specific issues relating to the impacts and access to individual streets. There was an overall



concern that building the motorway would make access more difficult for local residents or would generate more traffic onto local streets thereby reducing any long term potential benefits the motorway may have.

#### *6.4.2 Specific Access Issues Relating to Affected Communities*

Along its length the proposal once operational would have different access and amenity implications for different communities. These are discussed in broad terms below.

##### *Kensington*

The proposed service road and noise wall along Dowling Street would lead to a considerable amenity improvement for residents with frontage to Dowling Street. However other residents of the suburb have expressed considerable concern that there would be a tendency for drivers travelling to suburbs to the east and north east of Kensington to short cut through Kensington using Link Road/Lenthall Street. This could be well founded as the route through Kensington could to be both shorter and quicker than an alternative route along the Dowling/South Dowling surface system and then Dacey Avenue.

Residents of the area have made representations requesting a tunnel link connection for northbound motorists between the South Dowling Street motorway and Dacey Avenue to provide a quicker, more direct route. The RTA has indicated this is not feasible and certainly it would be very difficult and costly to achieve. Lenthall and other streets in the area would need heavy traffic calming to minimise unwanted through traffic. This would need to be implemented as part of the LAIP with input from the affected community.

##### *Rosebery*

The removal of right turns between Link Road and Dowling Street would result in inconvenience to residents and employees of Rosebery. Adverse consequences likely to arise include increased use of Joynton Avenue which may need to be upgraded to sub-arterial status and possible southbound short cut movements between Epsom Road and Gardeners Road through the old residential parts of Rosebery by drivers who would otherwise have used Southern Cross Drive for southbound travel e.g. to East Gardens shopping centre. This would be avoided if ramps were provided for right turn movements to or from Lenthall Street. An interchange at this location has been costed by the RTA at around \$16 million but no benefit cost analysis has been conducted. It is considered that such an analysis should be conducted. If a full or partial interchange does show benefits then even if not provided now, the design of the motorway should be changed to allow its inclusion at a future time. This issue is further discussed in Section 6.6.

##### *Surry Hills*

Surry Hills would experience considerable amenity benefits through the removal of through traffic. These benefits would be on account of reduced quality of access to and from the north. This is because southbound access from the Domain tunnel via Bourke Street would be closed. In addition, access to William Street and the Domain tunnel would be constrained



through the downgrading of Crown Street in order to minimise avoidance of the Eastern Distributor toll.

The Department considers that the reduced accessibility of Surry Hills should be made up through considerably improved amenity. The correct balance between improved amenity and reduced accessibility would be addressed through the LAIP as is proposed and recommended.

#### *Moore Park Road*

Residents from the Paddington and Bondi Junction area and suburbs to the east who wish to use the Eastern Distributor would need to do so via Moore Park Road. The traffic forecasts indicate a substantial traffic increase on Moore Park Road. Understandably residents living on Moore Park Road have strong objections to the prospective traffic increase.

On the one hand Moore Park Road is a relatively wide road with a direct connection to Oxford Street and thence the Bondi Junction Bypass. It thus has the physical characteristics appropriate for a major traffic thoroughfare. Also it has substantial lengths of non residential frontage. On the other hand residents living on it are already exposed to the adverse effects of events at the major Moore Park venues which front it.

If Moore Park Road is not connected then not only would access to the eastern suburbs be diminished but there would be enhanced traffic pressures on other roads such as Oxford Street and Ocean Street which are less tolerant of traffic. However while Moore Park Road would carry more traffic, this could be managed to minimise adverse impacts on residents, and on pedestrians crossing to and from the major venues. Traffic calming as part of the LAIP would be essential as part of the management in this area.

#### *Oxford Street*

At present there is very good access to Oxford Street from the Cahill Expressway via Bourke Street. Access from Oxford Street to the Cahill Expressway is relatively poor. There is no signposted route but alternative options include College Street, a G-turn via Crown Street involving left into Bourke Street and then right into Campbell Street and Crown Street, or Darlinghurst Road to either Burton Street, Crown Street or William Street.

Routes from Oxford Street would be largely unchanged except for the elimination of the G-turn to Bourke Street and the downgrading of Crown Street. However the direct route to Oxford Street would be eliminated through the downgrading/ closure of Bourke Street. It is a matter of some concern that a road such as Oxford Street would have such diminished connectivity to the north.

Ideally there should be north facing ramps between Oxford Street and the Eastern Distributor tunnels. However it is accepted that the depth of the tunnels beneath Oxford Street and weaving movements between portals at the southern end and ramps to and from William Street mean that these cannot be provided. Nonetheless well defined routes should be provided between Oxford Street and Cowper Wharf Road and these should be appropriately



signposted. The most appropriate streets for these would best be assessed as part of the LAIP.

It is noted that there would be some amenity benefits due to reduced traffic flows on Oxford Street arising from its reduced accessibility from the north. This would advantage both kerbside pedestrian activity and bus movements. These benefits should be maximised as part of the LAIP process.

### *Paddington*

The traffic modelling conducted for the EIS is too coarse to indicate traffic changes in Paddington arising from the Eastern Distributor. The main effects are likely to be similar to those for Oxford Street i.e. reduced accessibility from the Domain tunnel due to the downgrading of Bourke Street and reduced accessibility to Woolloomooloo due to the downgrading of Crown Street. This may cause some Paddington traffic to switch from Liverpool Street and Burton Street to New South Head Road.

These and other effects would need to be quantified in the LAIP. At this stage the impacts would not appear to be unmanageable.

### *Woolloomooloo*

The amenity of a number of streets in Woolloomooloo would be improved by focusing most north-south traffic on Palmer Street. By keeping Cathedral Street open to traffic crossing Palmer Street in the amended scheme, satisfactory access would be provided to Woolloomooloo. As discussed above, traffic travelling between Surry Hills, Oxford Street and parts of Paddington would necessarily traverse Woolloomooloo. Thus one or more north-south roads would need to be kept available as a through route for this traffic. In addition there are concerns about the ability of Palmer Street to adequately serve traffic travelling to and from William Street east. The need for north-south capacity to serve these demands would need to be properly understood at the commencement of the LAIP so that residential expectations of traffic relief are clearly understood.

### *6.4.3 Conclusions*

Local traffic issues are highly complex in a city environment. Given the complexity of demands there would always be a trade off between accessibility and traffic volumes. Access to individual streets therefore cannot be viewed in isolation from the complexities of the complete local road network. The RTA has addressed a number of the specific issues raised in representations. This assessment further exposes key issues which need to be addressed.

It would be inappropriate and impractical for the Department to examine access needs to each and every road/lane way without a full appreciation of the inter-relationship of the entire local and regional road network. Nonetheless the Department recognises that resolving local traffic issues is fundamental and integral to the success of the Eastern Distributor proposal and supports the commitment in the EIS to undertake a Local Area Improvement Program concurrent with the planning of the Eastern Distributor. The primary objective of the LAIP is



to take advantage of the opportunities presented by the reduction in traffic volume to improve the local environment by introducing measures which restrict through traffic and to ensure that alternative routes for those motorists wishing to avoid the toll is discouraged.

It is anticipated that the outcomes of the program would include various measures to calm traffic in presently busy local roads, possible street closures and various measures to improve the appearance of local streets, including landscaping and widening of footpaths. Funding for the LAIP would be provided by the proponent and where appropriate, the local Council. The program is expected to be developed during 1997 and would be implemented during the Eastern Distributor construction period.

The EIS indicates that the LAIP would be identified and exhibited at the same time as the determination approval. It is now apparent that this would not be the case. This is somewhat unfortunate as this would have provided a strong basis for the Department's consideration of this key aspect of the proposal. At this stage the RTA has provided details on the proposed process for the LAIP including the proposed structure of the LAIP and the methodology. This draft scoping report is provided in Appendix F.

Accordingly it is **RECOMMENDED** that:

- due to the level of concerns raised in representations about the potential impacts on local streets;
- to avoid the potential for toll avoidance routes to be established;
- to realise one of the key benefits of the proposal through reduction of traffic in local streets;
- due to the non deliverance at this time of the RTA on the Local Area Improvement Program which was committed in the EIS to be completed and exhibited jointly with the approval; and,
- to ensure that the LAIP is implemented in a timely manner,

**LAIP measures be substantially in place and implemented prior to the proposal being implemented.**

This recommendation together with other conditions relating to the Local Area Improvement Program are specified in Recommended Conditions of Approval 24 to 27.

## 6.5 Alternatives

### 6.5.1 Overview

Representations identified a number of potential alternatives to the proposal. The alternatives ranged from 'do-nothing', improve public transport, corridor alignment options, modifications at particular locations and alternative toll locations. The most frequently raised alternative (which was expressed in most of the form letters and raised by South Sydney City Council) was to extend the tunnel to Link Road. Sydney City Council identified an alternative for the motorway to be built in a tunnel between William Street and the Domain Tunnel.



The RTA's Representations Report assessed many of the alternatives identified and details are provided in Appendix G. The assessment resulted in the proposed modifications to the EIS concept as has been described in Section 4.0. The RTA considers that the proposed modifications address the critical concerns raised about visual quality, social and environmental amenity. The RTA has not adopted Sydney City Council's option due to additional costs of \$142 million. Similarly the option of extending the tunnel to Link Road was not preferred by the RTA because of an estimated additional cost of \$274 million which would necessitate an unacceptable toll level.

The following is an assessment of alternatives within the framework of the proposed development corridor.

#### *6.5.2 Extending the Tunnel to the South*

The RTA's assessment of the full tunnel option has been reviewed and it is accepted that the additional expenditure of \$274 million may not be economically justified or is likely to require a toll that would be either unacceptable and/or result in a major diversion of traffic away from the motorway.

A sub-option of extending the tunnel to Maddison Street has been identified which may balance costs and benefits given that the major existing residential frontage to South Dowling Street ends around this location. It also corresponds to the southern extent of the 'Parkway' concept. The cost of this scheme has been estimated by the RTA at some \$98 million as against \$61 million for the "Parkway".

A significant potential advantage of this option is that it could be constructed by cut and cover in Moore Park (leaving the existing road and Moore Park relatively unaffected in the long term) except for the fact that a southbound on-ramp is required south of Fitzroy Street. (When the justification of the on-ramp is taken into consideration it is apparent that its main purpose would be for access from the Showground area after major events, however most of this traffic is expected to use Driver Avenue and Lang Road and join the South Dowling Street at Dacey Avenue. Further discussion on this aspect is provided in Section 6.9 and the conclusion indicates that the deletion of this ramp would be justified.)

The additional cost of \$37 million is not insubstantial and would have to be considered against a number of potential advantages over the 'parkway' scheme. These include no additional permanent land take of Moore Park, improvements in noise and air quality, numerous urban design advantages (i.e no major visual or physical severance, more efficient pedestrian access with no need for bridges), minimal disruption to South Dowling Street during construction and less potential groundwater impacts given the greater distance from the houses on the western side of South Dowling Street. Apart from cost the major disadvantage would be greater construction stage impacts on Moore Park, and additional air quality impacts at the vent stack in Taylor Square.

The Department is unable to reach any final conclusions on the merits or otherwise of this alternative as it needs to be subject to more detailed investigations particularly as there are additional costs involved relative to incremental benefits.



### 6.5.3 Construct the Tunnel Only and Do-Nothing Along South-Dowling Street

The RTA's Representations Report provides an assessment of the "tunnel only" option.

Overall the RTA does not support this option as it would limit the capacity of the road system. In addition the RTA identifies a number of major adverse impacts. These are discussed below together with the Department's consideration thereof.

- 1. It would funnel significantly more traffic onto South Dowling Street, Anzac Parade and Moore Park Road than the existing situation, increasing delays and queue lengths, without the benefits of grade separation to assist traffic flow;*

The Department accepts that this option would result in increasing delays and queue lengths. However it is noted that travel times in 2011 with the "tunnel only" would be equivalent to those today (i.e 38km/hr in the peak) and would be equivalent to the average travel speed across the whole state road network (refer Appendix B). In peak periods the relative travel time savings to capital cost outlay would be similar for the "tunnel only" and full Eastern Distributor, whilst in off peak periods the "tunnel only" concept would provide relatively higher travel time savings relative to the cost of the full Eastern Distributor. The main benefits therefore appear to be for off-peak.

- 2. Less traffic would be attracted off parallel streets reducing the benefit to the surrounding area;*

For a proper understanding of the traffic implications of constructing the "tunnel only" option the RTA was requested by the Department to undertake further computer modelling of the "tunnel only" concept. The results of the additional traffic modelling in terms of the equivalent information provided in the EIS is also presented in Appendix E.

In general terms Appendix E indicates that while the construction of the "tunnel only" would provide similar benefits to some parallel streets as the full Eastern Distributor proposal, there would be some overall relative advantages and disadvantages.

- Relative Traffic Advantages of the "tunnel only" Concept to Full Eastern Distributor

There would be a significant reduction in traffic volumes on Bourke Street (south of Albion Street) and on Crescent Street. Southern Cross Drive would also benefit significantly and would not require widening.

- Relative Traffic Disadvantages of the Tunnel Only Concept

The major disadvantage with the "tunnel only" concept is the retention of high traffic volumes along South Dowling Street. With the full Eastern Distributor, the South Dowling Street corridor would carry up to 130 000 vehicles however some 80 000 would be in the motorway leaving up to 40 to 50 000 on the surface roads. With the "tunnel only" traffic volumes would increase on South Dowling Street to between



70 000 to 80 000 per day, about 10 000 more than if no other improvements were undertaken.

The modelling also indicates that the improvements to Crown Street, Link Road, Lenthall Street and Elizabeth Street would be greater with the full Eastern Distributor. Nonetheless the absolute traffic volumes on these roads would still be at an acceptable level. It is also noted that the model coded Crown Street two way under the full Eastern Distributor proposal but one-way under the "tunnel only" concept. It is therefore difficult to assess whether it is the influence of the traffic changes rather than the influence of "tunnel only" or full Eastern Distributor.

3. *It would be much more localised in its beneficial effects. It would reduce north/south travel times through Woolloomooloo and East Sydney but such benefits would be eroded at Cleveland Street and other critical intersections;*

This issue relates to travel times along the corridor and is addressed under the first point.

4. *It would not serve the Moore Park sporting, recreational, and entertainment facilities as well as the full scheme;*

It is not clear why it would not serve the Moore Park area as well as the full proposal as it would provide the same entry and exit portals to Moore Park Road and Anzac Parade. Access from the south would continue to be mainly via Dacey Avenue. As indicated in Section 6.1 the performance of the Dacey Avenue intersection is not expected to be significantly improved by the construction of the full proposal.

5. *It would not provide a high level of return to road users as it is estimated that the benefits of travel time savings would be reduced by 40%;*

It is accepted that the level of return to road users would be less than the full proposal however the benefit cost ratio would be above 2.0.

6. *Public transport improvements such as bus priority lanes in Flinders Street and Oxford Street were not proposed;*

As indicated in the DoT's representation to the EIS and as discussed in Section 6.2 above, the bus priority measures could be implemented with or without the proposed changes along South Dowling Street, with the probable exception of the Taylor Square area.

7. *It would reduce the potential for amenity improvements along South Dowling Street offered by the "Parkway" modification;*

The "parkway" modification is in response to mitigation of the impacts of the original EIS proposal. A more detailed analysis is required to validate this conclusion.



8. *Travel times would be approximately 5 minutes longer than with the modified proposal.*

This issue is the same as issues 1 and 3 and relates to the overall performance of the corridor.

#### 6.5.4 Conclusion

A number of alternatives have been assessed in the EIS, the RTA's Representations Report and further in this assessment report. The Department is also aware of other alternative proposals privately and publicly advanced subsequent to the RTA's decision to seek approval. Obviously each alternative may have relative advantages and disadvantages including in particular, cost implications to the community overall. A detailed assessment of each and every alternative is not feasible within the ambit of this EIS decision.

The Department's assessment has focused on those alternatives presented in the EIS and the RTA's Representations Report including possible variations related thereto. The conclusion is that the options such as extending the tunnel to Maddison Street or the tunnel only option (i.e no works along South Dowling Street) would necessitate extensive additional assessment beyond the statutory capability of this determination. Even if such a detailed assessment was undertaken at this point in time, a determination on only part of the proposal as submitted is statutorily highly questionable if at all valid. The assessment must therefore focus on the merits of the Eastern Distributor proposal as submitted for approval by the RTA.

### 6.6 Project Design Issues

Notwithstanding the alternatives discussed above, the Department identified a number of design issues regarding the RTA's proposal. In general terms, the overall design philosophy of the proposal in terms of location of ramps, motorway configuration, intersection treatments, connections to the regional road network etc. to ensure that satisfactory local access was retained was notably missing from the EIS and subsequent documentation. It is concluded that further investigations into this aspect would be needed prior to final acceptance of the Eastern Distributor design. These relate to minimising the impact on Moore Park, the intersection of Mill Pond Road/Botany Road, the intersection of Link Road, Southern Cross Drive and the intersection of Flinders Street/Anzac Parade/Moore Park Road.

#### 6.6.1 Minimising the Impact on Moore Park

In accordance with Section 150 of the *Centennial Park and Moore Park Trust (Eastern Distributor) Bill, 1997* the Director-General's report must contain advice as to the need to acquire Trust land for the purposes of the Eastern Distributor.

The Department has undertaken a review of the design concept to establish what changes could be feasibly made to minimise the land take of Moore Park and details are provided in Section 6.9. It has been concluded that to reduce the impact on Moore Park, the only feasible option available is to remove the southbound ramp (south of Fitzroy Street) and relocate the southbound surface road as close to the motorway as possible without compromising the "Parkway" landscaping theme.



Accordingly it is RECOMMENDED that the proposal be modified by the removal of the southbound on-ramp south of Fitzroy Street. This is specified in Recommended Condition of Approval 28.

#### 6.6.2 Mill Pond Road Intersection

As indicated in Section 6.1, provision of an improved service to the airport is cited as one of the major justifications for the project. The proposed final connection between Southern Cross Drive and the airport via Mill Pond Road would however be poor and hence constrain the achievement of this objective. This is reflected in the traffic modelling for the project which indicates minimal future traffic growth on Mill Pond Road despite relatively strong growth in airport passenger numbers. It appears from the modelling that capacity constraints on Mill Pond Road would encourage airport traffic travelling to the north and north east to use O'Riordan Street and Bourke Street and then filter between Bourke Street and South Dowling Street before or after using the Eastern Distributor tunnels. While some short term improvements to the Mill Pond Road connection between General Holmes Drive and Southern Cross Drive are proposed as part of the project, it is clear that these would not suffice for the long term.

The FAC has also raised specific concerns about the Mill Pond Road/General Holmes Drive intersection, indicating that it would be a key constraint of the proposal in its ability to function as a major access link to the airport.

At this stage it is not possible to assess the implications or impacts of providing a grade separated interchange at this location. Issues such as the relationship to flight paths, drainage and structural requirements have not been assessed. Nonetheless the performance of this intersection is critical in meeting one of the key objectives of the proposal and it is proposed that a detailed investigation be undertaken in consultation with the FAC, local Councils, Port users and local business and community groups. The investigation should include the direct and indirect (i.e reduced traffic on less appropriate alternative routes such as Botany Road) environmental, traffic and economic benefits of providing a grade separated intersection at this location.

Accordingly, subject to more detailed investigations, the Department RECOMMENDS that a grade-separated intersection be provided at the Mill Pond Road intersection with Botany Road and General Holmes Drive. This is specified in Recommended Condition of Approval 29.

#### 6.6.3 Link Road

Major concerns were raised in representations particularly by business groups about the elimination of the right turn in and out of Link Road as it provides an important access point to the Central Industrial Area and to nearby business.



As discussed in Section 6.4.2 there appears to be justification for further consideration of the opportunity for a ramp to be provided for right turn movements to/from Link Road. This is specified in Recommended Condition of Approval 30.

It is also noted that the EIS scheme proposed traffic lights to allow north bound traffic exiting Link Road at Rosebery to merge or cross northbound traffic continuing on the Dowling Street surface system after leaving Southern Cross Drive. In the RTA's modified scheme these traffic signals have been deleted. No discussion of this is provided in the supplementary documentation.

It is therefore RECOMMENDED that, unless the safety and capacity of the revised arrangement can be demonstrated to be satisfactory, traffic signals to allow northbound traffic exiting Link Road should remain as originally proposed. This is specified in Recommended Condition of Approval 31.

#### 6.6.4 *Southern Cross Drive*

The Representations Report indicates that the proposal embraces demand management as it replaces existing roads rather than supplementing them. However, this approach does not appear to have been adopted for Southern Cross Drive which is to be widened from 4 to 6 lanes.

It is RECOMMENDED that to maximise the demand management opportunities provided by the relative additional capacity in widening Southern Cross Drive to 6 lanes, transit lanes should be imposed on the 6 lane section. This would establish demand management opportunities and encourage more appropriate travel patterns. The Department also RECOMMENDS that the transit lanes be available to truck traffic so as not to impede the transport efficiency of freight movement. This requirement is specified in Recommended Condition of Approval 32.

#### 6.6.5 *William Street East-West Tunnel*

A number of representations including one from Sydney City Council, raised concerns about the regional implications of the proposal and its relationship to other strategic road network opportunities including implications on the possible east-west tunnel below William Street. An east-west tunnel was also critical in an alternative proposal forwarded by a private representation from Chris Stapleton and Zorica Vujanac.

At this stage the justification and feasibility of an east-west tunnel has not been assessed in detail. Nevertheless there appears to be some merit in such a proposal in principle.

To ensure that the proposal does not limit future opportunity for the provision of an east-west tunnel to improve city traffic integration it is RECOMMENDED that the proposal be designed so as not to impose any significant cost constraints on this proposal. This requirement is specified in Recommended Condition of Approval 33.



## 6.7 Property Impacts

### 6.7.1 Key Issues

The EIS indicates that all properties directly required for the motorway are owned by government agencies including the RTA, SRA, Department of Education, Crown Land and Department of Defence and that no additional private land acquisitions would be required. The EIS also identifies the need to acquire strata titles affecting 18 private properties located above the tunnel as protection from potential structural damage to the tunnel. The EIS indicates that no compensation would be payable unless damage resulting from construction or operation of the motorway occurs.

In general terms, direct impact on property was not a major issue raised in representations. However there were major concerns about indirect impacts on property value from noise, vibration, air quality, severance and settlement. These issues are addressed in other sections of this report.

### 6.7.2 Subsurface Easements

The number of subsurface easements to be acquired was underestimated in the EIS as it did not take into account the need for permanent protection of the rock anchors. To some extent there would be an expectation on these owners that there is the potential for restrictions to development due to the tunnel. It is therefore not expected that stratum acquisitions would result in a significant impact.

However there are two areas which have now been identified as requiring permanent stratum acquisitions and two areas requiring temporary stratum easements which are neither inside the affected area identified in the EIS nor covered by South Sydney's LEP designated area for the tunnel. These are shown on Figures 6.7a to 6.7c and described below:

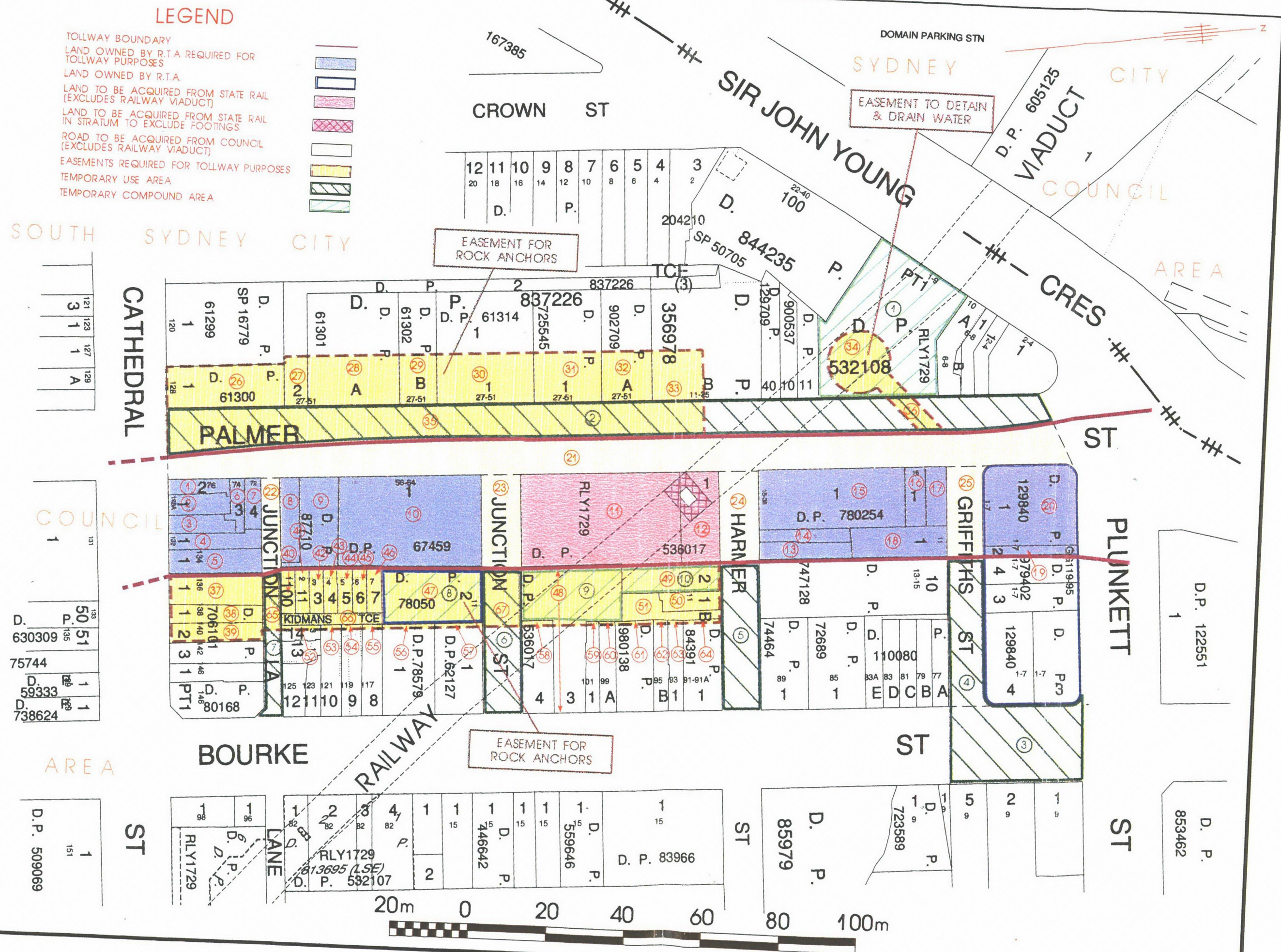
- *Permanent Stratum Acquisitions*

The areas affected by permanent rock anchors located outside South Sydney City Council's LEP designated area for the tunnel are:

- a strip of about 30-35 properties between the northern extent of the South Sydney's LEP designated area for the tunnel and Plunkett Street; and
- a strip of about 25 properties located on the western side of the tunnel alignment between Barnett Lane and Berwick Lane.

Under the existing South Sydney City LEP the area which would be affected by the permanent rock anchors is zoned residential, mixed commercial and light industrial uses. The floor space controls for this area are between 1.75 to 1 to 3.0 to 1. The height control for the area is generally about 12 metres. The objective of the zoning is to retain residential character but to allow a mix of residential, commercial and light industrial. The Draft South Sydney City LEP 1996 which is currently being considered by South Sydney City Council is performance based and there are no height or floor space ratio requirements. Each development would therefore be assessed on its own merits.















For these property owners there may be a potential concern that the placement of the rock anchors could limit the development potential of the land which up until this stage had not been previously affected. Impacts on the acquisition of these subsurface strata is not known at this stage as it would depend upon the development potential of each property in relation to the exact location of the rock anchors.

- *Temporary Easements*

The areas affected by temporary soil anchors which were not identified in the EIS are:

- a strip of about 15 properties located between Hutchinson Place and Hutchinson Street north of Fitzroy Street located directly behind the ventilation building; and,
- a strip of about 80 to 100 properties on the western side of South Dowling Street.

Temporary soil anchors would be placed at sufficient depth to ensure no direct physical disturbance nor any impacts from vibration or potential settlement. The anchors would remain in place after construction but would be detensioned and become effectively obsolete. Conditions are recommended to ensure this happens. In the long term the anchors could be removed if required without any affect on the structural integrity of the motorway vertical wall. No long term impacts or restrictions on land would occur. Each owner would be notified prior to the instalment of the temporary soil anchors.

While there would be no long term impacts of temporary soil anchors below property there are 3 larger sites where this impact would need special consideration. This includes the Moore Park Gardens Development, the ACI site and the Department of Defence site.

In relation to the Moore Park Gardens site, the construction of an 18 storey building has already been approved. The proposal is to be built on a concrete slab. As such the temporary anchors along this section should not have any adverse consequences.

The ACI site is currently zoned for mixed industrial use and is part of a master planning exercise being undertaken by South Sydney City Council. As a result no major redevelopment is anticipated at least in the next 12 months. Special provisions may need to be accounted for in the design phase of the Eastern Distributor so as not to cause any adverse consequences for any new development.

The Department of Defence site is currently the subject of negotiations between the Commonwealth and the State Governments. This area would also be subject to the preparation of a master plan and redevelopment of part of the site for mixed residential and commercial uses is possible before the year 2000. Implications of temporary soil anchors would also need to be taken into account by the road proposal.



### 6.7.3 Conclusions

To ensure that there are no restrictions placed on properties affected by the rock anchors located outside South Sydney Council's LEP designated area for the tunnel or by the temporary soil anchors, it is RECOMMENDED that prior to construction the RTA institute special arrangements. The Proponent should provide sufficient detail to each affected owner to enable the precise location of such anchors relative to existing buildings to be determined; if required the Proponent should instigate any necessary adjustments to construction methods at no cost to the property owner; and the Proponent should ensure that the anchors do not impose any restrictions on potential development of the affected property unless otherwise agreed to by the landowner. These requirements and others relating to property are specified in Recommended Conditions of Approval 34 to 41.

#### *Kidmans Terrace Area*

The Kidmans Terrace area would be affected by poor air quality, stratum acquisitions and potential for settlement. Details on these aspects are provided in the relevant sections of this report.

On this basis it is RECOMMENDED that there is strong justification for a special management regime for these properties including where necessary, acquisition should the impacts be unacceptable to the owners. However, this should not give the Proponent the option of demolishing the properties without the approval of the Director-General given their heritage and urban design value in this part of Woolloomooloo. These requirements are specified in Recommended Conditions of Approval 42 and 43.

## 6.8 Urban Design

The route of the proposal would run through an intensively developed urban environment, which includes significant urban space, prominent visual markers, cultural and heritage precincts and areas of well established local character. Given the scale and the extent of roadworks proposed in a well established urban setting, a wide range of urban design issues need to be addressed.

Urban design impacts embrace a wide range of issues such as impacts on streetscape, landscape, local character, visual relationship, community links, severance and the configuration and quality of open space. A detailed assessment of urban design aspects is provided in Appendix H.

### 6.8.1 Visual Impacts

The visual impact and the intrusiveness of the proposal was one of the most frequently raised concerns in the representations. Areas of special concerns are the Art Gallery, Woolloomooloo, Drivers Triangle, Moore Park and South Dowling Street. The major impacts of the exhibited proposal are change of visual character and views of the Art Gallery and Woolloomooloo precincts, alteration of visual environment, landscaping and heritage streetscape at Drivers Triangle, Moore Park and South Dowling Street.



Representations raised concerns about the intrusiveness of the toll plaza outside the Art Gallery, the control tower/administration building, adverse impacts on the heritage buildings and the devastation of the cultural and heritage precincts of the Art Gallery and Woolloomooloo. The visual impact of noise barriers was also raised. For Drivers Triangle/Moore Park area and South Dowling Street, the main issues raised in the representations were the need to complement the heritage architecture of surrounding areas, the loss of green median and plantings between the carriageways on South Dowling Street, the impacts on fig trees and landscaping of Drivers Triangle and Moore Park and relocation or removal of heritage items.

#### *Art Gallery/Woolloomooloo*

The modified proposal at the Art Gallery section is an improvement relative to the exhibited proposal. The proposed 'landscaped cover' would reduce the visual impact of the motorway. It would visually and physically re-establish a link between the Domain and the Botanical Gardens. The proposed landscaped cover would be able to mitigate the visual impacts, noise and air pollution associated with the toll booths and the motorway. The modified proposal also redresses some of the physical and visual impacts of the existing Cahill Expressway. However, the section of motorway which emerges from the landscaped cover and enters Palmer Street would still have adverse impacts on the view from Woolloomooloo as would the view into the portals and underside of the landscaped cover.

Toll plazas would be integrated with either the landscaped cover or pedestrian bridge, therefore reducing the overall visual impact. The location of the administration building (details of which have not yet been provided) at a position integrated with the existing urban fabric would reduce potential visual intrusiveness of the building.

For the Woolloomooloo area, the relocation of the Palmer Street tunnel entry portals to the north of Cathedral Street would provide opportunities for the improvement of the visual amenity of Palmer Street between Cathedral Street and William Street.

The proposed demolition of terraces in Bourke and Palmer Streets which are of streetscape significance would have adverse impacts on the visual environment and heritage character. The 4 metres high noise barriers proposed along the eastern side of Palmer Street could be visually prominent but as they back most private properties they would have only a limited impact on these properties.

#### *Drivers Triangle, Moore Park & South Dowling Street*

Built form, landscaping and buildings/items of heritage significance are important elements in this precinct. The modified proposal would have significant visual impacts by changing the physical form of Moore Park, Drivers Triangle and the roadway. The entrance portal would have a major visual impact on Drivers Triangle by bisecting the existing open space. Exit portals in Moore Park Road and Anzac Parade would also intrude visually within the existing roadway.



The Parkway scheme, involving depression of the motorway to 4 or 5 metres below ground level and alteration of the straight road alignment, would totally alter the existing boulevard character of South Dowling Street. Moore Park would be encroached up to 24 metres along its western edge. The proposed changes are shown in Figures 6.8a to 6.8c. The Parkway scheme would significantly change the physical form of the Park and the road.

The change in physical form would result in significant alteration of the visual environment. The visual relationship of the terraces on the western side of South Dowling Street, the form of the road and Moore Park would also be changed to a considerable extent. The character of this precinct would be significantly altered.

The Department notes that the proposed elevated Telstra cable duct over the depressed motorway would cause adverse visual impacts. However, the details of the cable duct are not available in the RTA's Representations Report. The visual environment for this section would further be altered by the proposal because a considerable number of important visual elements such as landscaping, significant trees, heritage items and visual markers would be changed, removed and relocated.

A number of significant fig trees in Moore Park would be removed. The current scheme proposes to supplement the retained street tree planting with landscaping in Moore Park and to increase landscaping along the route. The proposed landscaping could mitigate visual impacts in an aesthetic sense, but would not mitigate the adverse impacts on the historic and cultural landscape.

A number of items of heritage significance would be relocated. These items include the Moore Park Gate Post, Anzac Parade Obelisk and Rennee Fountain. These items serve as important visual markers. Appropriate sites need to be identified for relocation (if required) of these items so as to mitigate the adverse impacts on heritage streetscape.

### *Dowling Street*

Four metre high noise barriers would become the predominant visual element along Dowling Street. Current views from houses facing Dowling Street would be lost as noise walls are located as close as eleven metres from the front property boundary. Removal of mature planting on the western side of Dowling Street and the four metre high noise barriers would significantly change the existing local character. Streetscape would be dominated by hard elements such as laneway barriers and noise walls rather than the existing soft elements such as landscaping.

### *Other visual impacts*

The following elements need to be designed in accordance with appropriate urban design and landscape principles.

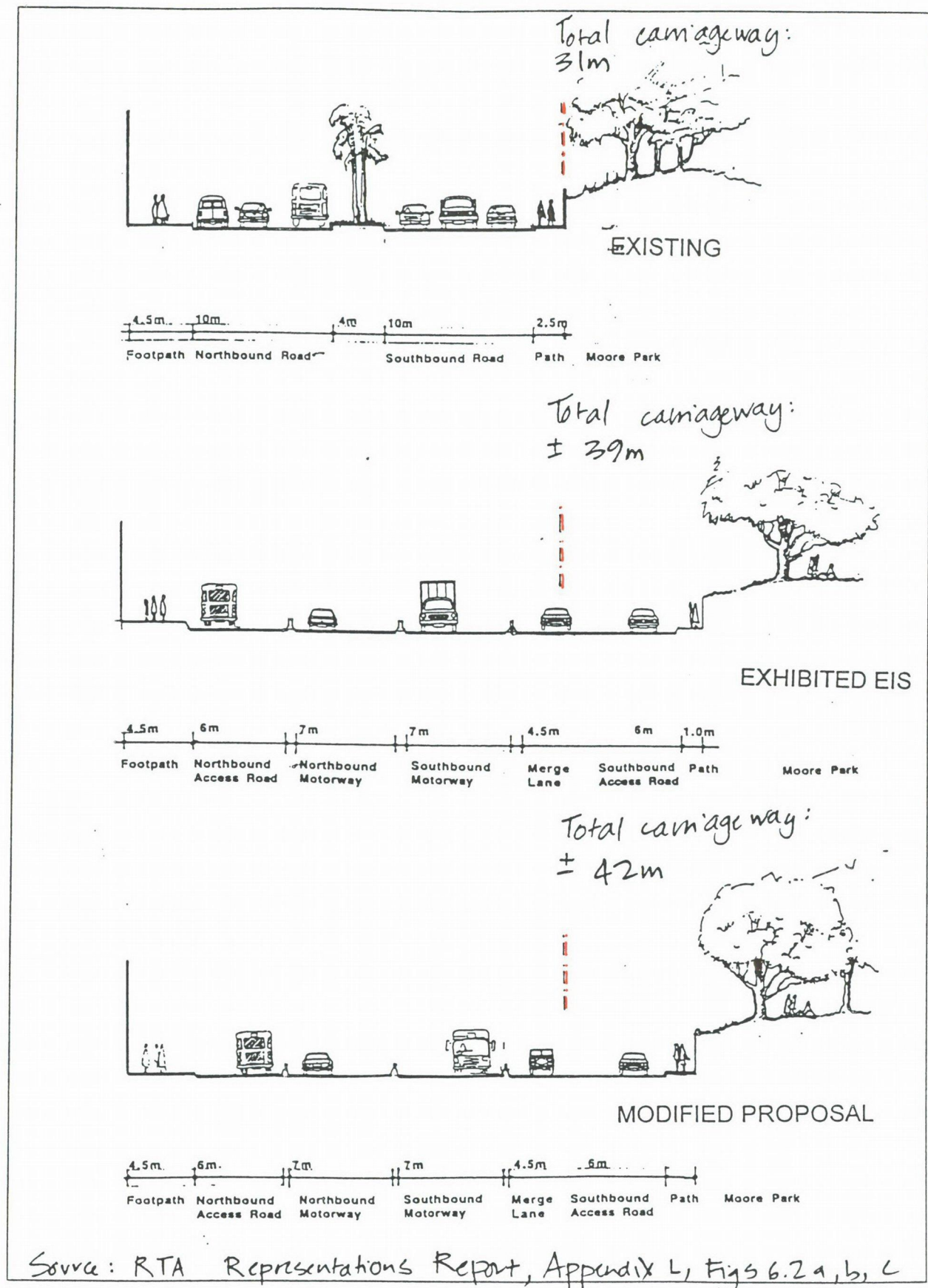
- **Tunnel vent stacks:**

The proposed height of the ventilation stacks is 26 metres, equivalent to a 7-8 storey building. The height of the northern ventilation stack would be prominent in an area that is









Eastern Distributor

COMPARISON OF PROPOSALS

## SOUTH DOWLING STREET

(Cross section of South Dowling St near Crescent St)

Not to scale

U R B A N D E S I G N A D V I S O R Y S E R V I C E

--- current  
Park  
boundary

Figure 6.8b



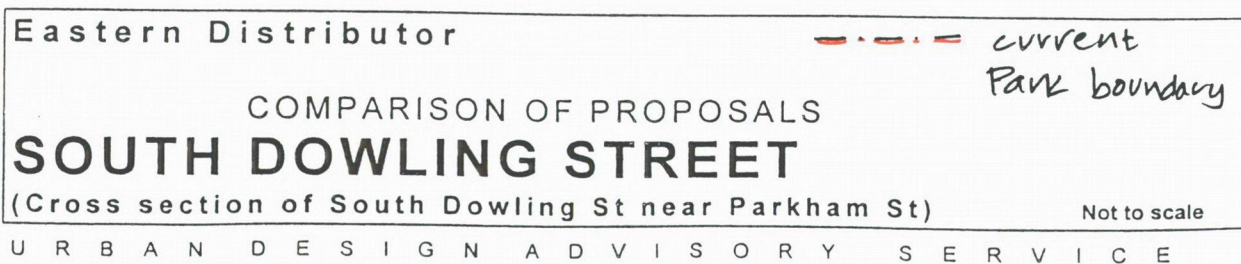
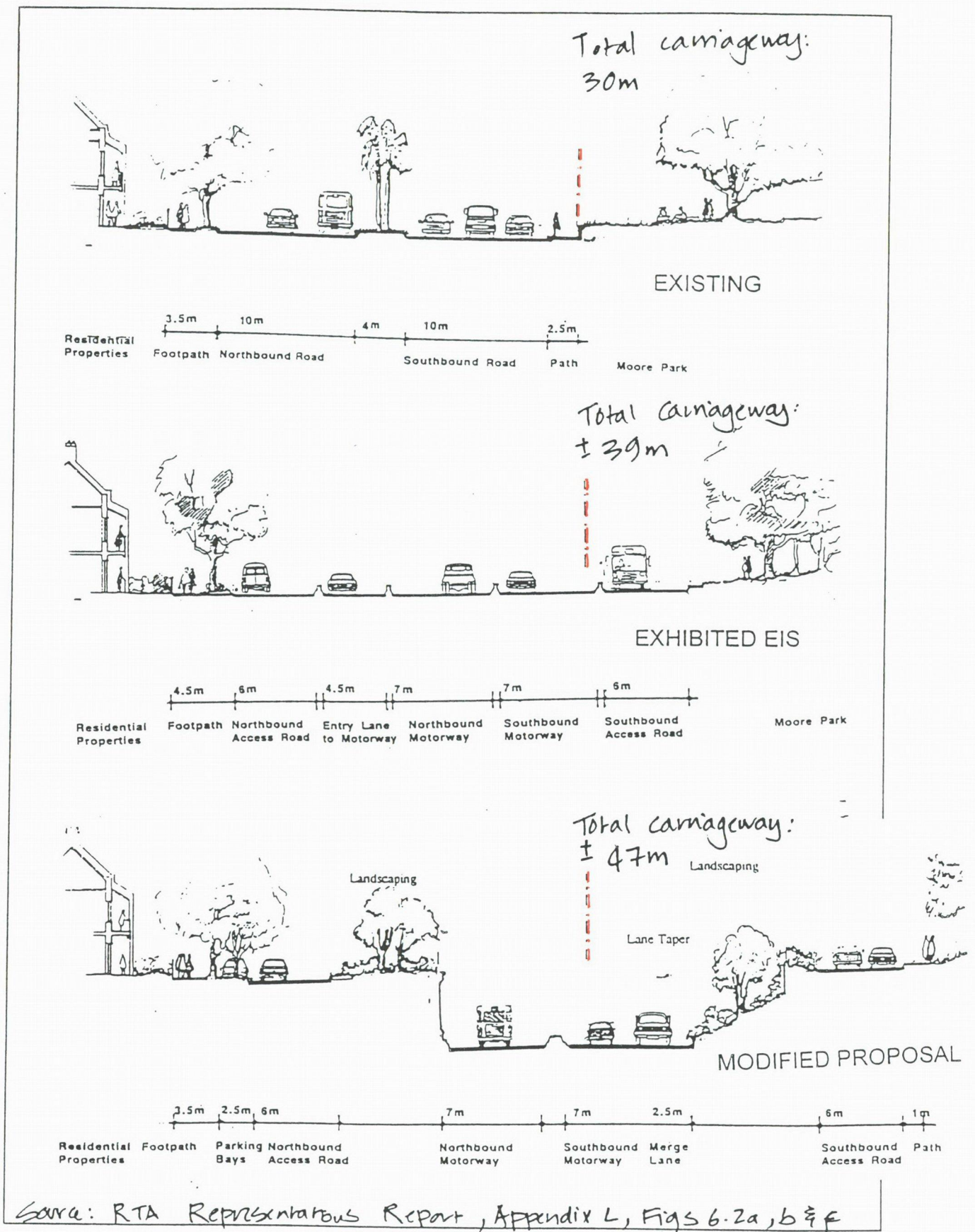


Figure 6.8c



predominantly 2-3 storeys. Visual impacts would be aggravated if this structure is not effectively incorporated into redevelopment of the site. For the southern stack, the visual impact would be less prominent on the streetscape as the adjacent buildings are 4-9 storeys high. The visual impacts could nevertheless be further mitigated if incorporated as part of the redevelopment of the site.

- Landscaping along Southern Cross Drive:

Southern Cross Drive is considered an important entry point and 'gateway' leading into central Sydney. The proposal would narrow the landscaped median. Loss of landscaping, installation of concrete barriers and increased number of lanes in the existing carriageway would reduce the existing high quality of the gateway entry.

### 6.8.2 Community Linkages, Accessibility and Severance

The proposal would change pedestrian and bicycle routes, affect access to facilities and recreational space and aggravate severance of neighbourhoods and precincts.

A number of representations called for an improvement in the quantity and quality of pedestrian and bicycle access along the route, particularly access to recreational facilities and at South Dowling Street and linkages between Woolloomooloo and Domain/Botanic Gardens. It was raised that the lack of pedestrian routes and access made the crossing of the Eastern Distributor far more dangerous and difficult. Representations also expressed the view that the proposal would result in severance of Woolloomooloo from the Art Gallery/Domain/City, severance of Moore Park from the surrounding inner city areas and dividing of neighbourhoods such as Surry Hills from the rest of Sydney.

#### *Art Gallery/Woolloomooloo*

The Department considers that the current proposal is an improvement relative to the exhibited proposal at this section of the route. The proposed landscaped cover would improve community and pedestrian links between Cowper Wharf Road, the Domain, Art Gallery and the City. This would offset the existing alienation caused by the Cahill Expressway. The proposed pedestrian bridge would improve pedestrian safety.

For Woolloomooloo, the current proposal would relocate the northern tunnel portal to the north of Cathedral Street. The principal community link through Woolloomooloo would be improved by re-establishing the Cathedral Street link which would provide grade access across Palmer Street at Cathedral Street for pedestrians, cyclists and vehicles.

The Department considers that the current proposal would improve the existing community links and accessibility for the Art Gallery and Woolloomooloo area. The existing severance would also be reduced by improving physical links.

#### *Drivers Triangle, Moore Park & South Dowling Street*

Drivers Triangle is heavily used by pedestrians, particularly during events at Sydney Cricket Ground and Sydney Football Stadium. The portal entrance in Drivers Triangle would disrupt



existing routes and links, although pedestrian access on the southern side of Moore Park Road to Fitzroy Street is maintained. Pedestrians from Anzac Parade to Flinders Street would have to divert to the new crossing 100m east of the intersection. Pedestrian safety would be enhanced by relocation of bus stop, pedestrian crossing and median fencing.

Three pedestrian overbridges are proposed in the current scheme along South Dowling Street. Pedestrian and cyclist access to Moore Park would be retained by these grade overbridges which correspond to existing pedestrian links. However, these overbridges do not provide as convenient access as presently exists as each of them would require crossing the northbound surface lanes and the southbound ramps/surface lanes. Furthermore, walking distance to the park would be lengthened by approximately 20 metres to 55 metres.

The "Parkway" scheme is considered an improvement to the exhibited proposal. However the depression and increased width of the motorway in the Parkway scheme, together with the inconvenience and distance required to walk to reach the park, would increase the severance between Moore Park and the residential neighbourhood on the western side of South Dowling Street.

### *Dowling Street*

The existing formal pedestrian crossing at Link Road would be lost in addition to the loss of the existing pedestrian path along the western side of Dowling Street. This loss of pedestrian access and community links would result in inconvenience and severance. The introduction of a four metre high noise wall together with the widening of the roadway would further aggravate the severance between the east and west sides of Dowling Street.

Cycling is presently possible and permitted in Dowling Street but does not appear possible in the proposal as there is no indication of cycling links. The treatment of Link Road intersection is discussed in section 6.4. This could allow improvement of pedestrian and cyclist access.

### *6.8.3 Public Open Space*

The current proposal would have implications for the configuration, quality and size of public open space in the inner city.

### *Art Gallery*

The proposed landscaped cover near the Art Gallery would create 0.85 hectares of public open space. The newly created open space would provide an important link between the public open space adjacent to Lincoln Crescent, Woolloomooloo and Domain/Royal Botanic Gardens/City. Part of the created open space is proposed for an outdoor sculpture exhibition area of the Art Gallery. The proposal would increase the amount of inner city open space and would improve linkages between existing public open spaces.



The Department notes that the topography and the shallow soil would impose constraints on landscaping and the created open space would not have the capacity to accommodate active recreational activities.

### *Woolloomooloo*

In Woolloomooloo the proposal would provide an opportunity to consolidate and upgrade the existing open space near Junction Street. Surplus land at this location would provide an open space area of up to 2,400m<sup>2</sup>. With appropriate landscaping and park furniture, this open space would be enhanced and could provide for passive recreation needs of the neighbourhood. This would also improve the amenity and visual environment of the area.

### *Moore Park*

The current proposal would cause a total loss of 2.2 hectare of public land at the western edge of Moore Park, compared to the loss of 1.1 hectare as in the exhibited proposal. The RTA indicated that the proposal would offer an opportunity to enhance the park by improved landscaping.

Moore Park is a major inner city open space, serving both regional and local needs. The low ratio of open space per person in the inner eastern suburbs makes Moore Park an important recreation resource. The park also has high historical and cultural value. As park land loss is unlikely to be recoverable, it is very undesirable to have permanent loss of part of Moore Park. Therefore this land take should be minimised. The issues of land take from Moore Park and the design option to minimise the land take are discussed in section 6.9.1 - Land take from Moore Park.

### *6.8.3 Conclusions and Recommendations*

While the modified proposal is an improvement in some areas compared to the EIS scheme, particularly the Art Gallery area and around Woolloomooloo, the proposal would have considerable impacts on the visual character along the route. Negative visual impact would be most obvious along South Dowling Street. Such impact would result from changes to the physical form and existing views, the loss of landscaping and visual markers, the introduction of hard surfaces and features and the severance of existing linkages and access routes. To minimise these impacts a number of mitigation strategies and conditions are proposed.

**It is RECOMMENDED that:**

- a detailed Urban Design and Landscape Plan(s) be prepared to provide details on proposed urban design and landscape treatments including structures and built elements.
- information be provided on the design of the northern ventilation stack.
- the noise barriers, landscaping treatments and pedestrian bridges be designed carefully to mitigate the visual impacts.
- the open space affected by the proposal at Woolloomooloo be upgraded.
- a specific design plan relating to the Telstra cable duct be prepared.
- the sites and procedures of relocation of heritage items be carried out in accordance with a Conservation Management Plan.



These requirements are specified in Recommended Conditions of Approval 44 to 56. Related conditions on impact issues such as noise, air quality, flooding etc are identified in other sections of this report.

## 6.9 Moore Park

Moore Park is an important inner city recreational space of regional significance. Its high cultural, historical and recreational value are commonly recognised. Part of the park land would be required for construction of the motorway and the whole length of the western boundary of the Park would immediately adjoin the motorway along South Dowling Street. This makes the Park the largest single property to be affected by the proposal.

'Moore Park' in this chapter also refers to Drivers Triangle, which is part of the "original land" identified in the *Centennial and Moore Park Trust Act, 1983*.

Significant concerns were raised about the permanent loss of park land, reduced accessibility to Moore Park, degraded amenity of the Park, impacts on the significant trees and removal of the bus roadway.

The Centennial Park and Moore Park Trust (CPMPT), raised a number of concerns, including the compensation and acquisition of the parkland, the lack of construction compound details and construction impacts, the construction impacts on parking, and the impacts on the trees, vegetation and heritage items.

### 6.9.1 Landtake from Moore Park

#### *Impacts of Landtake*

Compared to the exhibited proposal, the Parkway scheme would involve further encroachment into the Park of an additional 1.1 hectares. A total of 2.2 hectares would be required for the current scheme, approximately one hectare for motorway carriageway and 1.2 hectares for the landscape areas and access lanes to the east of the motorway carriageway. The loss of open space in Moore Park was one of the most frequently raised concern in the representations.

Moore Park is a major inner city open space, serving both regional and local needs. The inner eastern suburbs have a low ratio of open space per person, making Moore Park an important recreational resource. The Park also has high historical and cultural value.

The RTA stated in its Representations Report that the eastern and western edge of Moore Park along Anzac Parade has been identified as part of a county road reservation since 1971 and that the proposal would result in removal of a road reservation on seven hectares of the Park. The present road reservation, however would not reflect the best use of the land nor the expectation of the community.

RTA claimed that the compensation for the loss of parkland would provide an opportunity to improve and enhance the landscaping and facilities of the Park. However, funding for park



enhancement could possibly be derived from sources other than the compensation for land take. Compensation would not justify the irrecoverable loss of inner city public open space.

According to the representation made by CPMPT, further encroachment into the Park would necessitate the relocation of the playing fields to passive recreation areas and hence would have long term impacts on the recreational values of both Centennial Park and Moore Park.

*Centennial Park and Moore Park Trust (Eastern Distributor) Amendment Bill, 1997*

- Purpose:

The lands proposed to be acquired for the road are part of the original land as identified in the *Centennial Park and Moore Park Trust Act, 1983* (CPMPT Act). The proposed acquisition of "original land" is inconsistent with the objects and provisions of that Act and is therefore prohibited.

An Act of Parliament is required to amend the CPMPT Act to allow release of the original land. The *Centennial Park and Moore Park Trust (Eastern Distributor) Amendment Bill, 1997* was moved in the Legislative Assembly on 29 May 1997 for this purpose. The Amendment Bill would also provide the CPMPT with the power to licence for the use of parkland for the purpose of construction of the road.

- Requirements of the Director-General to Report on the Need to Acquire Trust Land.

Section 15 (O) of the *Centennial Park and Moore Park Trust (Eastern Distributor) Bill, 1997* requires the Director-General's report to contain advice about the need to acquire Trust land for the purposes of the Eastern Distributor.

As indicated above, the proposed modifications would result in a significant additional encroachment and impact on Moore Park. The Department has undertaken a review of the design concept to establish what changes could be feasibly made to minimise the land take of Moore Park.

In broad terms the impact on Moore Park could be reduced by reverting to the EIS proposal or by reducing the extent of landscaping. Some of the alternatives discussed in section 6.5 (eg. full tunnelling) could also reduce the land take from Moore Park. However, there are practical difficulties in adopting any of these alternatives as indicated in section 6.5. The Department has therefore focused on the feasibility of removing the southbound on-ramp south of Flinders Street as a possible measure to reduce land take of the Park.

In terms of the justification of the southbound on-ramp (south of Fitzroy Street), the traffic modelling undertaken in the EIS predicts traffic volumes on the ramp to be relatively low, in the order of 9000 vehicles per day. Similarly traffic volumes on the southbound access roads would also be relatively low (order of 7000 per day).

Discussions with the RTA indicate that the main purpose for providing the on-ramp at this location would be for access from the Centennial Park/ Moore Park/Showground/Fox Studio



area after major events. However traffic studies undertaken for the Moore Park and Centennial Park Area and for Fox Studio<sup>2</sup> indicate that this ramp would not be a key exit route. Most of the southbound exiting traffic is expected to use Driver Avenue and Lang Road and join South Dowling Street via Dacey Avenue. In addition traffic from the Centennial Park/ Moore Park/Showground/Fox Studio area wishing to use this ramp would still have to pass through the at-grade intersections of Moore Park Road/Anzac Parade and Fitzroy Street/South Dowling Street which are likely to be heavily congested with pedestrians and buses after special events. There is a logic in keeping conflicts between vehicular and pedestrian/public transport traffic separate.

On balancing the potential benefits of providing an entry ramp for south bound traffic to the motorway at this location with the impacts on land take from Moore Park there does not appear to be strong justification for provision of an on ramp at this location. Subject to a detailed design review it has been estimated that the removal of the ramp could return up to an additional 0.2 to 0.3 hectares of Moore Park depending upon the final design and location of the surface road and landscaping requirements. This return is not insubstantial and would be compatible with the "Parkway" design philosophy adopted at the northern end of South Dowling Street. It would also reduce the width of the pedestrian bridge and enable the continuity of landscaping that would be broken by the on-ramp. In traffic terms it would reduce a merge conflict with southbound motorway traffic. It would have no impact on the toll revenue.

The main potential negative impact of deleting the ramp would be that traffic wishing to use this ramp would have to continue on the service road to Todman Avenue. Given the relatively low volumes which were predicted to use the ramp and the low volumes on the southbound surface road in this section, this relatively minor increase in traffic is not expected to have a significant effect on the traffic operational efficiency of the proposal. It would operate at a performance level equivalent to other locations along the motorway and surface roads.

On this basis, it is RECOMMENDED that to reduce the impact on Moore Park, the only feasible option available is to remove the southbound ramp (south of Fitzroy Street) and relocate the southbound surface road as close to the motorway as possible without compromising the "Parkway" landscaping theme. This recommendation has already been made in relation to other project design changes as discussed in Section 6.6.

#### 6.9.2 The Use of Moore Park for Construction Compound and Temporary Bypass Road

A further 8.65 hectares of parkland is required during construction for a major work compound and construction of a temporary bypass road. The EIS did not provide adequate information to enable proper assessment of the impacts of activities to be carried out in the compound. The RTA in its Representations Report has briefly outlined that the compound would be used for office, information centre, storage of equipment and materials, vehicle parking and workers facilities. The RTA proposed that upon the completion of construction,

<sup>2</sup> Various reports to the Department of Urban Affairs and Planning including *Moore Park and Centennial Park Traffic and Transport Report* and *Assessment of Fox Studio's Development Application - Traffic and Transport*.



the compound would be dismantled and the site reinstated. The RTA also committed that compensation for the use of Moore Park during construction activities would be negotiated with CPMPT.

A temporary bypass road in the Park is required to divert southbound traffic from South Dowling Street during the construction stage. The two lane bypass road would be eleven metres wide. The Representations Report indicated that the route would be designed to minimise the disturbance of trees and the impacts on the park.

A special Construction Management Plan would need to be prepared to address a wide range of construction issues, including further details of the compound site, roadway and disturbance of trees. A detailed Landscape/Rehabilitation Plan would also be needed to include procedures to reinstate the Park.

#### 6.9.3 Impacts of Noise

Representations raised concerns that construction work and the compound site would deliver a high level of noise pollution to the Park. Concerns were expressed that there has been no assessment of noise interference with recreational activities, and noise impact studies have not taken into account the cumulative background noise levels.

The Department notes that the construction of the modified proposal differs from the EIS and anticipates that there would be changes in construction noise. When operational, noise levels of the proposed Parkway scheme are predicted to be lower than the EIS proposal. The issue of construction noise is discussed in section 6.12 Noise and Vibration.

#### 6.9.4 Air Pollution

Dust generation and its impacts on the park were raised as an issue of concern. The RTA in its Representations Report responded that air quality impacts were assessed in the EIS and mitigation measures like regular watering and revegetation of disturbed areas were identified.

#### 6.9.5 Traffic and Parking during Construction

The EIS and the Representations Report provided limited analysis of the impacts on traffic and parking during construction. It would therefore be important for a construction traffic management plan to be developed and implemented. Separate bus lanes and any necessary bus priority measures would also need to be provided in Drivers Triangle to minimise impacts on the public transport system during construction. Issues relating to construction stage traffic is provided in Section 7.7.

#### 6.9.6 Loss of Business of the Leisure Centre and Relocation of Frank Saywell Kindergarten

The RTA indicated that it would enter into negotiations with CPMPT to compensate for the loss of business at the Leisure Centre. Agreement has been reached that the Frank Saywell Kindergarten would be relocated to E S Marks Athletics Field.



#### 6.9.7 Impacts on Significant Trees, Landscaping and Vegetation

The RTA Representations Report stated that most of the fig trees in the Park would not be affected by the proposal, and that an arborist would be engaged to ensure that the adverse impacts are minimised. The Representations Report indicated that six significant fig trees would be removed. It is important to require a management plan detailing tree protection measures.

The significant trees contribute to both the heritage and aesthetic value of the Park, and the loss of these significant trees is considered highly undesirable. The trees should be replanted in the Park as far as practical. Appropriate landscaping is necessary to reinstate the Park.

#### 6.9.8 Bus Roadway in the Park

RTA now proposes to retain the bus roadway. This would maintain the bus service to the area.

#### 6.9.9 Impacts Associated with Pump Station and Detention Basins

The EIS has indicated a tunnel pump station would be constructed at the south of Cleveland Street, however, no details about the pump station were provided by the RTA in spite of repeated requests made by the Department. The Department was lately advised that the proposed pump station would be approximately 25m x 25m of 12m deep underground, while the above ground structure would be 10m x 12m and one storey high. The pump station is proposed to pump the runoff from the motorway and the underpasses during major rainfall events.

The Department is also advised that the two existing detention basins are proposed to be enlarged to a significant extent. The existing earthmounds are proposed to be enlarged to approximately one metre high. While part of the capacity of the detention basin to the south of Cleveland Street would be used also for detention of runoff from the motorway, the detention basin to the north of Cleveland Street would be used for runoff from the Park. As the storage of water in the basins would be short term and is not expected to have any significant impact on the availability of the use of parklands for recreational purpose.

#### 6.9.10 Heritage Items in the Park

Further assessment of heritage impacts would be required as part of the Conservation Management Strategy (refer Section 7.6) including the details of the proposed relocation of items, including Comrie Fountain; Moore Park Gate Post; Anzac Parade Ceremonial Columns; Anzac Memorial Obelisk; three stone boundary piers at the Frank Saywell Kindergarten; and the Rennee Fountain.

#### 6.9.11 Severing Moore Park From the Surrounding Residential Neighbourhood

The exhibited proposal would reduce the accessibility of the Park from residential neighbourhoods by removing a signalised pedestrian crossing and removing the opportunity



for mid-block crossing. The modified scheme proposed to add three more pedestrian/cyclist overbridges to provide level crossing over the motorway with an extended width. This would provide relative benefits compared to the EIS scheme. However the modified scheme would still aggravate the severance of Moore Park from the surrounding neighbourhoods of Surry Hills and Redfern as a result of its physical and visual impact. The issue is discussed in section 6.8.2.

#### 6.9.12 Alteration of Visual Environment of Moore Park

Moore Park and its plantings form a major element in the visual environment and surrounding streetscapes of the precinct. The significant fig trees which would be removed form part of the cultural landscape, which contributes to the visual qualities of the heritage precinct. They also have a strong landmark value. The landscaping on the edge of the Parkway and in the Park would mitigate the visual impacts to differing degrees depending on the viewpoint. However, this would not mitigate the adverse impacts on the historic and cultural landscape.

Drivers Triangle, which is commonly regarded as the gateway to the historic and recreational Moore Park precinct, would be altered significantly by the tunnel portals and the removal of significant trees. The current proposal would involve the relocation of a number of important historic visual markers, such as Comrie Fountain Moore Park Gate Posts, Moore Park perimeter gate posts and sandstone base, avenue trees and Anzac Memorial Obelisk.

The visual environment of Moore Park would be altered significantly by the removal of cultural plantings, relocation of historic visual markers and changes of visual character of the precinct. To mitigate the impacts, the relocation of visual markers and landscaping needs to be designed to ensure that the historic visual character is protected as far as possible.

#### 6.9.13 Conclusions and Recommendations

The impacts on Moore Park are wide ranging. During the construction stage there would be a temporary loss of a large area of the park including playing fields as well as tree disturbance, construction noise, dust, relocation of heritage items, movement of plant and equipment. This would result in a major inconvenience to park users.

Once completed the proposal would result in the permanent loss of 2.2 hectares of public open space from an area which is presently well used. This loss cannot be recovered. The Department has identified the potential to reduce the amount of land take by eliminating the southbound on ramp.

The RTA has undertaken to compensate for the land take of Moore Park. This would provide an opportunity to enhance and improve the Park through rationalisation of the Park space.



It is RECOMMENDED that:

- a detailed management plan be prepared to address the construction stage impacts including:
  - detailed information on the compound site, the bypass road and any disturbance to the trees in the Park and the need for an aborist to advise on the protection of trees;
  - detailed information on the reinstatement and rehabilitation of the Park;
  - disposal and collection of water;
  - provision of further information on dust impacts and detailed measures of dust suppression and mitigation.
  - other details as required.
- a detailed landscape plan be prepared including landscaping and rehabilitation as well as operational aspects relating to the operation of detention basins and the tunnel pump station.

These requirements are specified in Recommended Condition of Approval 45 to 48. Related conditions with respect to noise, flooding, urban design aspects etc are detailed in other sections of this report.

## 6.10 Groundwater

### 6.10.1 *Key Issues Raised*

The EIS recognises that the route of the Eastern Distributor south of Drivers Triangle would be in the Botany Sands aquifer and that dewatering would be required where structures are to be located below the main groundwater table. The EIS estimated the following draw-down profiles:

Distance From Tunnel Wall (m)	Draw down below Static Water Table (m)
20	2
40	1.1
60	<0.1

The EIS also indicated that historic records have been as much as one metre lower than measured and therefore the anticipated draw down would be within historic records beyond 40 metres from the excavation. However, within 40 metres the EIS indicates that the draw down could be greater than historic records which could cause an increase in the risk of settlement. The EIS indicates that a detailed site investigation would be undertaken as part of the detailed design phase. The EIS also commits to a number of safeguards including pre-construction building surveys, implementing stabilisation methods (if required), and monitoring structure for movements.

The EIS also recognises groundwater issues relating to the tunnel section, however the tunnel would be located below the groundwater table for most of its length. The tunnel would cross the groundwater table but the EIS indicates that infiltration/seepage would be localised and is unlikely to lead to impacts on the surface.



The Department of Land and Water Conservation (DLWC) raised a number of issues relating to groundwater. The main concern was protection of the groundwater as an important resource as it is currently used for a range of industrial and irrigation uses in the area. In general terms however, the DLWC indicated that the EIS has adequately addressed groundwater impacts.

#### *6.10.2 Consideration of Issues*

As indicated in Section 5, the proposed modifications would have significant potential implications for groundwater along South Dowling Street. These changes relate to groundwater related settlement issues, its value as a resource and potential contamination. To assess the changes to groundwater resulting from the modifications the RTA has undertaken a supplementary groundwater study entitled *Report No. AJ9707.27 Groundwater Related Impacts of the Proposed Eastern Distributor* prepared by CM Jewell & Associates. A summary and assessment of this follows.

#### *Existing Hydrogeological Conditions*

The "Parkway" section of the motorway would cross the northern part of the Botany sands aquifer which comprises approximately 15 metres of aeolian sands (i.e wind deposited) overlying a further 5 to 10 metres of estuarine sands. The aquifer has provided a high yielding water source for Sydney since the completion of Busby's Bore in 1837. There are currently some 67 industrial and irrigation abstractions from the aquifer with a total abstraction of about 30ML/day.

The groundwater generally flows from north-east to south-west towards Botany Bay at a gradient of about 1 in 120 with discharge to the Alexandra Canal. The northern part of the aquifer particularly Moore Park area is a significant source of recharge.

The water table in the area is presently about 5 metres below the surface. Historical records available from long-term bore hydrographs dating back to 1972 indicate that the depths to the water table fluctuates over a range of about 2 metres and that existing levels are close to the average levels. Analysis of historical rainfall data and modelling work indicates that the historical minimum groundwater levels probably occurred during the early 1940's and that at this time groundwater levels were probably about 1.5 metres below average levels.

#### *Potential Impacts*

The proposed motorway would be in a deep cut and would extend below the water table. Primary issues of concern would therefore relate to short term potential impacts of construction dewatering, and longer term potential impacts of the motorway presenting an impermeable barrier to groundwater movements.



*Short Term Impacts of Dewatering During Construction*

- Groundwater Induced Settlement

The response of the groundwater system to the changes introduced by construction dewatering were assessed using three different techniques including a local and regional scale model and an analytical method. The models indicated that there is a reasonable likelihood that draw down from construction dewatering would exceed historical lows with a predicted range being between 1.2 to 2 metres below average groundwater levels.

The report indicates that specific geotechnical, structural and heritage surveys should be conducted to identify buildings or areas of high value or risk and that reinjection of groundwater should be implemented in these areas.

- Groundwater as a Resource

The report predicts that construction may result in slightly reduced yields from boreholes within 400 metres of the excavation however none of the large diameter bores would be likely to lose supply. Shallow spears could be more seriously impacted and replacement bores may need to be provided at these locations.

- Mitigation Measures

As indicated in the report the only option available to protect sensitive structures and groundwater resources which are located in areas where draw down potentially in excess of safe limits is unavoidable is to replace the water (i.e recharge). Several recharge options are available and the report indicates that recharge has been successfully employed in many parts of the world to protect sensitive structures during dewatering operations. A sketch showing a schematic of a typical re-injection system is shown on Figure 6.10a. Nevertheless the report recognises that reinjection is not without potential limitations particularly potential for problems arising from particulate clogging and precipitation of iron oxyhydroxides. Use of mains water is one option to minimise this risk. A reinjection trial was recently completed at Zetland to demonstrate the feasibility of reinjecting groundwater pumped during dewatering. The trial was highly successful with very little blockage apparent during the week of the trial.

- Settlement Analysis

A separate preliminary settlement analysis has been undertaken by the RTA and the results are provided in Appendix I. The results indicate the following:

- Australian Standard AS2870.2-1990 :Residential Slabs and Footings : Part 2 Guide to Design by Engineering Principles indicates a criteria for allowable differential settlement across any one domestic structure as 10mm;
- Without re-injection total settlement could exceed 70mm close to the excavation and differential settlement could exceed 10mm close to the excavation;
- With re-injection, criteria for differential settlement is not likely to be exceeded however



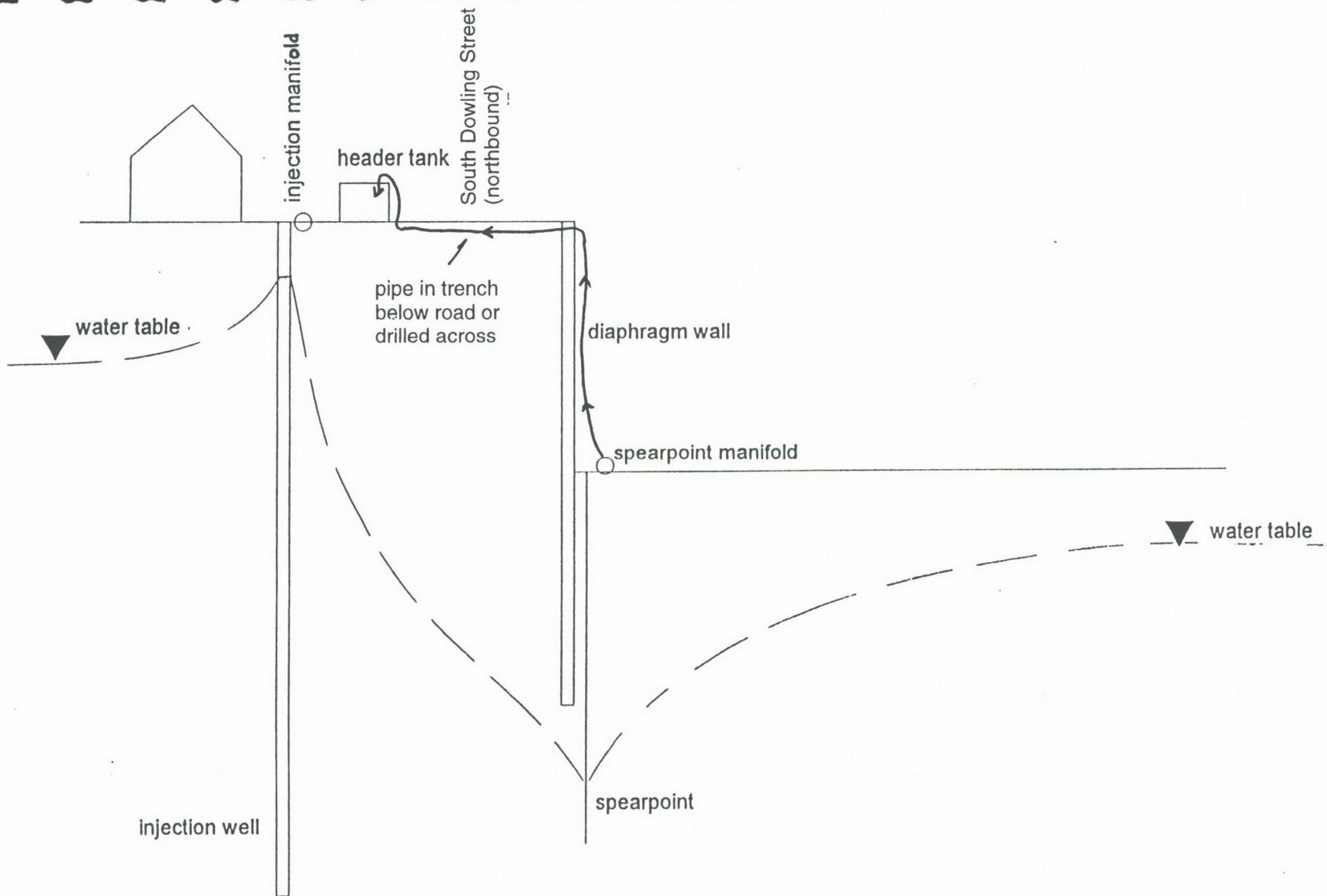


Figure 6.10a  
 Sketch showing schematic of re-injection system  
 Source: RTA



total settlement could exceed 30mm within about 200-300 metres of the excavation.

At this stage the extent of building surveys has not been established but given the potential extent of affectation a precautionary approach would be to extend the building surveys covering the area where total settlement (with reinjection) could exceed 30mm. This area is shown on Figure 6.10b.

#### *Long Term Impacts of Permanent Structure*

Numerical modelling has been used to assess the regional impacts of the permanent structure considering three construction alternatives. The analysis indicates that all design options would create measurable effects on groundwater levels, however the preferred fully tanked option would not generate water level changes that are significantly outside the range that occurs due to natural variations. The proposal is therefore not expected to have any long term effect on settlement or groundwater users

#### *6.10.3 Conclusions and Recommendations*

The proposed modification to the motorway would have a potentially significant impact on groundwater. During construction dewatering draw downs are expected to exceed historical lows which could potentially impact on properties in terms of settlement up to 100 to 200 metres either side of the excavation. Mitigation measures such as reinjection are available and would need to be imposed to minimise the potential risks of settlement occurring over a wide area. It is recognised that reinjection is not without potential problems and monitoring and management of such would be critical to its success.

At this stage the extent of settlement is likely to be acceptable provided that adequate mitigation measures such as reinjection could be applied successfully. Given the potential consequences, the Department strongly recommends very stringent mitigation and monitoring conditions to ensure that any risks on settlement are minimised to the greatest practical extent.

Groundwater users in the Botany Bay sand aquifer area are also likely to be affected during the construction stage and there is a likely chance that shallow spears may need to be replaced or deepened. In the longer term provided that a fully tanked option is constructed the long term impacts of the permanent structure on settlement and on groundwater users would be minimal.

Impacts on groundwater in the vicinity of the tunnel would be minimal.



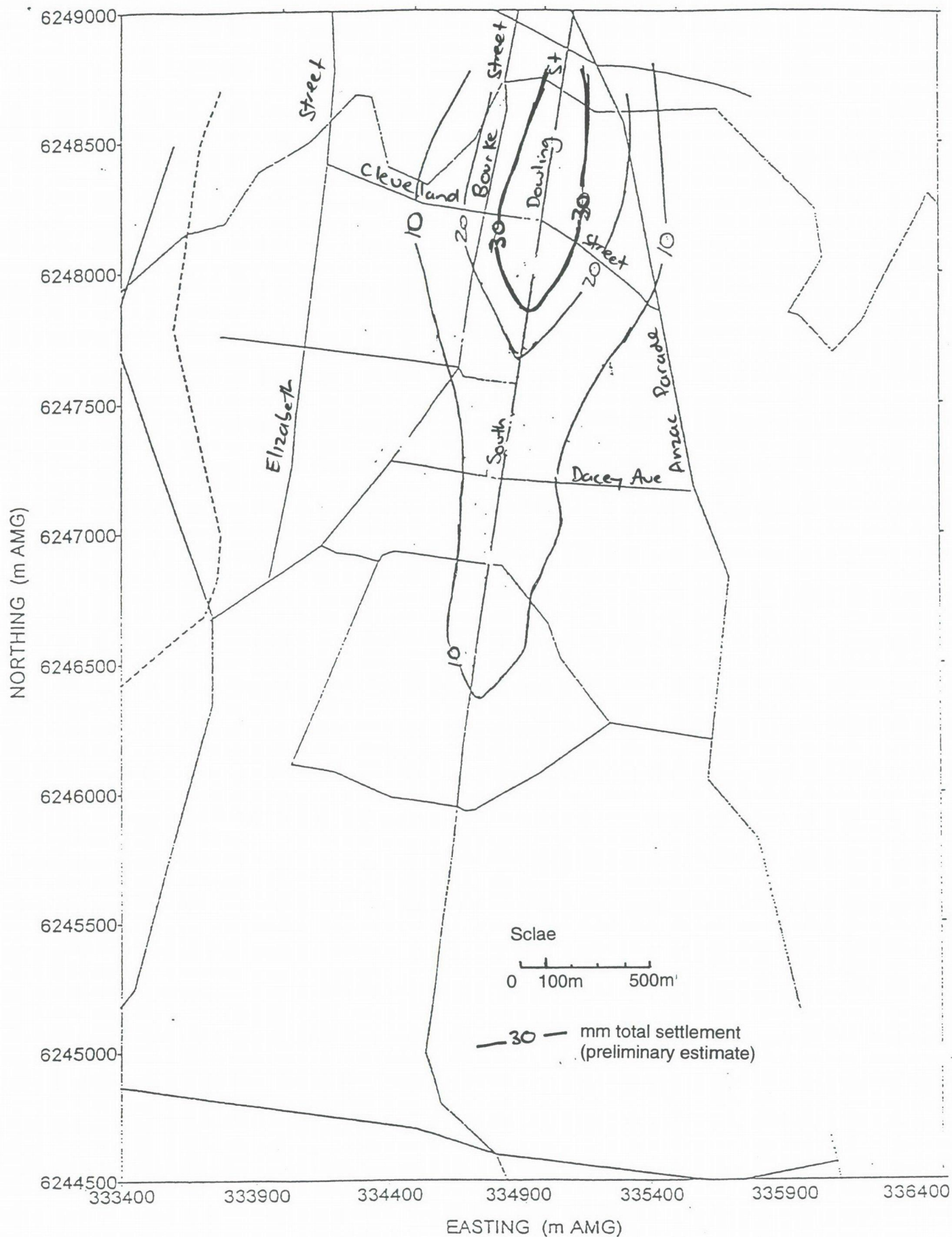


Figure 6.10b

Preliminary sketch showing total settlement from construction dewatering (with re-injection)



In view of the above assessment it is RECOMMENDED that:

- the fully tanked option be adopted;
- a detailed settlement study be conducted to determine the potential extent of settlement and the structures that would need to be protected through reinjection;
- a detailed groundwater management procedure be prepared by a suitably qualified hydrogeologist requiring approval from the Department of Land and Water Conservation covering all areas of the proposal;
- building surveys be conducted covering the zone where differential settlement could exceed 10mm and extended if required should potential impacts resulting from the settlement study indicate it to be more extensive;
- a bore hole reinjection system be selectively implemented to reinject dewatering discharge to sensitive structures;
- a detailed monitoring plan identifying piezometers locations, construction details, monitoring frequency and analysis requirements be prepared;
- an area groundwater monitoring system comprising a mix of slim standpipe piezometers installed by direct push techniques and 50mm piezometers installed by conventional drilling be established. Slim piezometers should also be used to monitor groundwater levels at identified vulnerable structures and a selection of the 50mm piezometers be fitted with transducers and data loggers for continuous groundwater level monitoring;
- pre-construction groundwater quality samples be collected from the 50mm network and fortnightly monitoring take place during construction;
- the use of only skilled operators to manually control dewatering pumping to the minimum necessary to maintain a safe and effective system and maintain settlement to acceptable levels;
- a conventional spear point system be used with airlift considered for areas of the excavation where risks to structures is high and where it is desirable to install the system before excavation begins or desirable to locate the system outside the excavation for other reasons;
- a reinjection system in terms of borehole spacing, borehole design, injection pipework, monitoring pipework and general system design and redevelopment in accordance with the system design identified in the report; and,
- regular monitoring of all existing registered bores within 400 metres of the excavation (or greater if required) including any necessary measures to ensure minimal impact on the bores.

These requirements are specified in Recommended Conditions of Approval 57 to 68.

### 6.11 Settlement Issues (Non-Groundwater Related)

A number of components of the project have the potential to cause ground settlement as a result of construction and associated activities. Particular concerns have been raised in relation to Busby's Bore, the Bondi Ocean Outfall Sewer (BOOS) and general concerns by



residents living above the tunnel. The Heritage Office also raised concerns with respect to the sensitivity of heritage buildings.

The EIS anticipates the range of ground settlement above the main tunnel (from excavation activities) of up to 10mm which is not expected to cause structural failure in buildings that are currently in a fair condition. The predicted settlements are also expected to be within the maximum tolerable limits in Australian Standard AS2870.2 - 1990 for masonry veneer, articulated masonry and full masonry structures. The EIS indicates that structures which are in a poor condition or heritage buildings which are extremely sensitive to small movements may be affected by settlement.

Whilst accepting the approach to settlement control proposed in the EIS, it is **RECOMMENDED** that appropriate ground settlement criteria be specified and that failure to meet specified settlement criteria would require the RTA to provide either structural support or modify the construction techniques. This is specified in Recommended Condition of Approval 69.

Nevertheless the imposition of the settlement criteria would not remove the responsibility of the RTA for the protection of existing structures and services. If damage occurs but at settlements less than the criteria allows, compensation would still be required.

As a further precaution it is **RECOMMENDED** that pre-construction surveys be undertaken for all buildings located within 50 metres of the works associated with the construction of the tunnel (i.e including rock/soil anchors) and within 100 metres for all sensitive heritage buildings. This requirement and others relating to settlement are specified in Recommended Condition of Approval 70 to 72.

Issues relating to Busby's Bore and the BOOS are addressed under heritage and the noise/vibration assessment sections of this report.

## **6.12 Noise and Vibration**

### **6.12.1 Introduction**

The route of the proposed motorway is already a significant traffic corridor and has been classified for noise control purposes as a "new use for an existing road". Construction of the road would require licensing by the EPA.

An initial noise assessment was made in 1995, to establish whether any adverse noise impact may occur and what mitigative measure may be required. This assessment covered the route of the proposed motorway from Cahill Expressway to Link Road and in 1996 this was extended to include south of Link Road. The results were in the exhibited EIS and incorporated as *Working Paper No. 4 - Noise*.

The EIS concluded that traffic noise levels would remain higher than EPA targets levels and that mitigative measures would be required to prevent significant daytime and night-time noise impacts.



### 6.12.2 Representations to the RTA

Noise and vibration impacts were a frequently raised issue in representations to the exhibited EIS and were divided between construction and operation of the project. A number of government and other agencies have made submissions, including the EPA, the Councils of Botany Bay City, South Sydney City and Sydney City, the Royal Botanic Gardens, the Art Gallery and the Centennial Park and Moore Park Trust, with nearly 2,000 individual submissions made by community groups, schools and private individuals. Issues raised include existing high noise levels, noise exceedances, EPA's noise criteria and nighttime noise, provision for sleep disturbances, the requirement for a noise management plan, noise monitoring and the visual impact of noise barriers. Vibration related issues included the effect on utilities and services.

The EPA had a number of concerns with the information provided in the EIS, including the methodology used to determine background levels and would require further information to be provided prior to any approvals being issued. In general terms however, the EPA has advised that it would be able to issue the pollution control approval and any pollution control licence for construction of the proposal. A copy of the EPA's submission to the EIS is provided in Appendix J.

### 6.12.3 Additional Supplementary Information

Although an assessment of the operational noise and vibration of the modified proposal was provided with the Representations Report, a construction noise and vibration assessment has now been undertaken in a report entitled *Eastern Distributor Cahill Expressway to Southern Cross Drive Construction Noise Assessment May 1997*, prepared by Wilkinson Murray P/L. This has been provided to the Department and the EPA and provides an assessment based on the likely impact of construction along the proposed route based on equipment to be used, the overall staging sequence and details of any mitigative measures. The EPA's submission on the RTA's Representation Report is also provided in Appendix J.

### 6.12.4 Key Issues/Assessment of Impacts

Key issues in the construction and operation of the project are assessed below.

#### *Construction Noise*

The supplementary construction noise report shows that construction would have a differential effect on the community and some residences may be subject to intense noise for a period of some days to weeks. For example, the requirement for the construction of a "cover" over the motorway in the vicinity of the Art Gallery would require rock breakers and rock drilling to be carried out as close as 7 metres from the Art Gallery for a period of approximately 12 days. Other construction in the area of Sir John Young Crescent may be subject to construction for periods up to 2 years.



Structure and audible internal noise would be generated by the tunnel construction although it is not likely to have a significant impact on the surrounding residences except near sensitive buildings.

The EPA has suggested that construction hours for the project be 7am to 6 pm Monday to Friday and 7am to 1pm Saturday, with no work on Sundays or public holidays. However the EIS and the RTA's Representation Report assumes a 24 hour construction time for the tunnel. The EPA has indicated that its hours could be varied if the proponent could demonstrate that noise could be managed to EPA satisfaction. This has not yet been done. Further assessment also needs to be made from the noise generated by construction trucks.

### *Construction Vibration*

The EIS has adopted EPA guidelines for assessing vibration which are based on the Australian Standard AS2670.2. Those activities exceeding the acceptable limit for continuous vibration would be restricted to normal construction hours only. Additional safeguards are required to limit vibration within residences during the evening and at night. Potential vibration impacts were identified during construction from the use of vibratory rollers, vibration from the road header required for tunnelling activities and from rockbreaking and blasting. Levels in excess of EPA criteria for continuous vibration were predicted.

### *Proposed Road Deviations During Construction*

Road deviations have been proposed during construction of the project and although traffic noise has been included in the additional supplementary information provided, other environmental impacts of the proposed road deviations have not been discussed and would require further investigation. See section 7.7 of the report.

#### *6.12.5 Conclusions - Construction Noise*

The impact on noise levels from daytime construction is likely to cause disturbance to nearby residents however it would be consistent with other road construction where residences are close to the works. The noise assessment concluded that it was not possible to reduce noise levels so that no impact would occur during the construction nor could noise levels from construction comply with EPA criteria. A noise management strategy is proposed to be put into place which would form part of the Environmental Management Plan.

Noise is expected to cause disturbances to residents from time to time. However, despite the best practical means of noise control it would not be possible to comply with the EPA criteria at all times. A specific noise impact statement for each stage of the construction is to be prepared which is consistent with the Environmental Management Plan. The EPA has advised that it could issue the necessary licences and approvals for the construction of the proposal.



### *Operational noise*

In general terms the modified proposal compared with the EIS options would benefit a number of residents although this benefit would not be evenly spread. The "landscaped cover" would reduce the level of traffic noise levels at the Art Gallery, although there would be an increase in noise levels as vehicles exit the tunnel. Barriers along the eastern edge of the motorway would reduce noise spillover to the east. The proposal to extend the tunnel northwards would benefit a number of residences on Palmer and Bourke Streets between Cathedral and William Streets by removing motorway traffic at this point, however this would increase the noise levels in the vicinity of Kidmans Terrace.

The "Parkway" would result in marginally improved conditions, with the differences more evident at night with noise barriers along Dowling Street expected to improve the noise environment along that street.

### *Fixed plant - Noise*

Noise impacts from fixed plant would come from a number of sources such as the ventilation plant associated with the main tunnels including the emergency generators, the ventilation fan building, the tunnel vent stack and from the pumping station in Moore Park. Further wind tunnel testing associated with emissions from the vent stack may require the relocation of the stacks and hence the impact of predicted noise.

#### *6.12.6 Conclusions - Operational Noise*

Overall there would be a decrease in the number of residences within the locality affected by noise largely due to the removal of predicted through traffic from a number of streets away from the proposed motorway. Existing traffic noise levels are expected to remain high along the motorway corridor. It is predicted that without the motorway and with the natural increase in traffic, the noise level would increase by 3dB(A) by the year 2011.

With the modified proposal the introduction of noise barriers for most properties that front the motorway would result in a reduction of noise. Daytime levels along Todman Avenue would be increased because of the natural increase in traffic volumes, while those along Dowling Street would benefit by the introduction of noise barriers. The modified proposal assumes that the noise barriers would be in place and would reduce noise levels. Without the noise barriers the noise levels from the modified proposal would be similar to the exhibited EIS.

The EPA has advised that prior to the installation of permanent noise control measures the RTA should be required to conduct further investigations into the feasibility and cost effectiveness of additional noise control measures.

#### *6.12.7 Revised Traffic Modelling*

Noise assessment for the operation of the proposal was based on traffic volumes which have subsequently been revised and would need to be reviewed prior to finalising noise control



measures. A doubling of traffic would however mean an increase of 3dB(A) in noise levels and would only occur on the southbound ramp to the motorway from Bourke Street and it is expected that additional mitigative measures would be required. However it was predicted that the expected noise level would remain within EPA guidelines.

A 1dB(A) increase is expected along the surface route at South Dowling Street and Flinders Street, which means that the reduction in noise predicted with the modified proposal would not be as significant as expected at this location. Noise would be expected to increase along Dowling Street, although the proposed 4 metre noise barrier would mitigate against any significant increase.

#### 6.12.8 Consideration

The EPA has indicated that although there is the potential for significant differences in the noise impacts arising from the project modification, the assessment has shown that there is no significant new impacts in the revised proposal for the Eastern Distributor. The assessment has shown that there is an overall reduction from noise levels in the EIS proposal, with a few sites subject to an increase in noise levels. The reductions in noise levels have been achieved amongst other reasons by the "cover" over the Cahill Expressway at the Art Gallery, 3-4 metre high noise barriers along the motorway at Woolloomooloo, the lowering of the road surface 4 to 5 metres below that proposed in the EIS and the introduction of noise barriers along Dowling Street.

Where small increases in noise levels over that existing have been predicted, additional mitigation measures have been suggested for consideration at the pollution control approval stage.

Noise levels are currently high along the length of the Eastern Distributor route and it is unlikely that the EPA goals for noise could be reached. However, the EPA has advised that it expects to be able to grant pollution control approval and any licences necessary to construct the Eastern Distributor.

It is **RECOMMENDED** that the following conditions apply:

- a project specific noise and vibration management procedure be prepared.
- that the hours of construction for the project be limited to 7 am to 6 pm, Monday to Friday and 7 am to 1 pm Saturday unless otherwise approved by the EPA. Works outside these hours may include any works which do not cause noise emissions to be audible at any residential property boundary or emergency work. Public notification is also required.
- construction noise for the project must comply with Chapter 171 of the EPA's ENCM except where sufficient justification and reasonable mitigation measures have been undertaken.
- construction noise levels and exceedances be specified.
- detailed monitoring of construction noise.
- blasting shall be carried out in accordance with Chapter 154 of the EPA's Environmental Noise Control Manual and to the satisfaction of the EPA.



- the RTA to ensure that vibration and structural borne noise shall meet the requirements of Chapter 154 of the EPA's Environmental Noise Control Manual. Particular requirements are specified for Busby's Bore.
- prior to the installation of permanent noise control measures, the RTA is to consult with the EPA about the feasibility and cost effectiveness of additional noise measures using EPA criteria as the target.
- noise and vibration from fixed plant is to comply with EPA criteria outlined in Chapters 19-21 of the Environmental Noise Control Manual.

These requirements are specified in Recommended Conditions of Approval 73 to 87.

## 6.13 Air Quality

### 6.13.1 Introduction

Existing air quality was measured at four sites along the proposed route, in terms of carbon monoxide, nitrogen oxides, ozone, nitrogen dioxide and particulate matter. Additional data has come from the Sydney Kingsford-Smith Airport. Air quality is detailed in the EIS and the accompanying *Working Paper No. 5 Air Quality*. All measured pollutant levels were said to be within recommended health goals, although the sites at Fitzroy Street and Stanley and Palmer Streets were the highest measured.

During the construction of the proposal it is expected that impacts on air quality would come from dust generated from construction activity including the removal and stockpiling of materials and spoil and from construction vehicle exhaust emissions.

The operation of the proposed motorway may impact on air quality from the predicted increase in traffic using this corridor and from emissions from the vent stacks associated with the tunnels and from the tunnel portals. Two 26 metre high ventilation stacks are proposed, with a building required to house the ventilation plant and other equipment at ground level. This height would ensure acceptable air quality levels.

In general terms the exhibited EIS stated that local air quality would be expected to improve along Flinders, Crown, Baptist and Bourke Streets, along Southern Cross Drive and on Palmer Street between William Street and Sir John Young Crescent.

### 6.13.2 Representations

Air quality was one of the major issues raised in representations. Representations were made by government and local agencies including the EPA, the Department of Health, the Centennial Park and Moore Park Trust, the Art Gallery, the councils of Botany Bay City, Randwick City, South Sydney City and Sydney City and by individuals and community groups. Issues raised about air quality include monitoring requirements, adopted and future air quality goals, the general increase in air pollutants, levels of pollutants emitted from the ventilation stacks and air quality in the tunnels. Concerns were also expressed about the levels of dust and air pollution generated during construction. The submission by the EPA is provided in Appendix J.



### *6.13.3 RTA Responses*

An assessment was made of air quality of the modified proposals, which concluded that the Parkway scheme would marginally improve the air quality around South Dowling Street and Dowling Streets compared with the original EIS. The "cover" option for the northern section of the motorway would not substantially affect the air quality around Woolloomooloo. Although air quality would be improved in the William Street area as a result of moving the tunnel portal to the north, the impact would also be moved north to Kidmans Terrace. The modified proposals were stated to comply with EPA air quality guidelines.

### *6.13.4 Assessment of Key Impacts*

#### *Air Quality Goals and Modelling*

Air quality goals for urban air pollutants have not been defined in NSW although the EPA has a list which relate to motor vehicle emission. This includes particulate matter, carbon monoxide, nitrogen dioxide and ozone which are based on criteria determined by the World Health Organisation (WHO), the National Health and Medical Research Council (NHMRC) and the US EPA. The goals that the Health Department recommend foreshadow the more stringent goals worldwide as a result of advances in medical research and the effect that exhaust emissions would have on human health. Ambient air quality goals are currently being reviewed through a national process under the umbrella of the National Environment Protection Council (NEPC).

The EPA has stated in a submission to the Department (refer Appendix J), that in view of the health-goal trend reflected in the NSW Health submission and that the Health Department has expertise on all human health related issues, it would be prudent for the RTA to design the tunnel ventilation system and management of all pollution impacts caused by the Eastern Distributor to reflect the goals that may be adopted in the national process.

The air quality inside the tunnel would have immediate and direct impacts on motorists. The EPA in its submission has asked that an air quality goal be adopted in the tunnel. The World Health Organisation (WHO) goal requires that the WHO 15 minute ambient air quality goal for carbon monoxide (CO) must be met inside a tunnel at all times. Further, the tunnel ventilation should be capable of ensuring that the WHO CO goal would be met under both normal and congested traffic conditions.

The tunnel ventilation system as proposed in the EIS and the modified proposal uses air that is directly taken from the tunnel portals. This intake air is polluted by vehicle emission and it is considered that the ventilation capacity should be much larger than a design which assumes the intake air is free of traffic emissions.

#### Wind tunnel testing

The EPA was concerned that the air quality modelling presented in the EIS was limited by the input data and methodologies used.



The topography is complex in the vicinity of the proposed stacks and the air quality modelling used makes it difficult to account for the actual airflow patterns and the pollutant dispersion in the proposed motorway corridor. The EPA has requested that further wind tunnel testing be carried out in the early design stages so that any potential adverse impacts could be rectified and to confirm the suitability of the design. This may raise urban design issues as the height of the stacks is required to be 26 metres. Conditions are recommended that would require wind tunnel testing in the early stages of the detailed tunnel design.

The movement of the tunnel portals to the north would not require an increase in the number of vent stacks. The air intakes themselves do not have air quality impacts, however pollutant levels in the intake air would in part determine the ventilation rate required to keep carbon monoxide levels within the tunnel at an acceptable level for the health and safety of those using the tunnel. The level of the pollutants emitted from the vent stack would be a reflection of what is in the tunnel. Frequent monitoring would be required to ensure that this level is achieved.

#### *Revised traffic modelling*

Revised traffic modelling would have some implications for air quality. The southbound entry onto the motorway from Bourke Street is now expected to have a doubling of traffic volumes. This however would have little impact on the air quality in this vicinity but would mean that there would be a decrease in air quality near the relocated tunnel portals in the vicinity of Kidmans Terrace.

Air quality concentrations would be expected to increase slightly over the levels predicted in the EIS at Flinders and South Dowling Streets, although air quality would still remain within EPA air quality guidelines.

#### *6.13.5 Conclusion*

During the construction of the project the major source of pollutants to the air would be from dust generated by construction vehicles, by windborne dust generated from the construction site and from construction vehicle exhausts. The Department is satisfied that air quality could be managed during the construction period by suitable conditions of consent.

The predictions made about air quality for the exhibited EIS and the modified proposal are similar and even with the minor changes predicted with revised traffic modelling would be within EPA guidelines.

EPA has advised that all necessary approvals and licenses could be issued for the construction of the project.

During operation, the air quality control measures in relation to tunnel vent and tunnel portals should have regard to the current and emerging health based regional ambient air quality goals.



It is RECOMMENDED that the following conditions should apply:

- the RTA is to prepare a Dust Management Procedure.
- an Air Quality Management Procedure is to be prepared and is to reference health based regional ambient air quality goals.
- the tunnel vent and tunnel portals should have regard to the current health based regional ambient air quality goals of NO<sub>2</sub> - one hour average of 320 µg/m<sup>3</sup> (0.16ppm) and PM<sub>10</sub> - 24 hour average of 150 µg/m<sup>3</sup> and the emerging health based ambient air quality goals of NO<sub>2</sub> one hour average of 256µg/m<sup>3</sup> (0.125ppm) and PM<sub>10</sub> - 24 hour average of 50µg/m<sup>3</sup>.
- the tunnel ventilation system shall be designed and operated so that the World Health Organisation (WHO) 15 minute ambient air quality goal for carbon monoxide of 87 ppm is not exceeded.
- wind tunnel testing should be carried out to the satisfaction of the EPA.
- no open burning or incineration permitted.
- the ventilation shafts shall be as specified in the modified proposal and the top of the stack shall not exceed 26 metres from the ground unless otherwise agreed by the EPA. These are specified in Recommended Conditions of Approval 88 to 96.



## 7.0 ASSESSMENT OF OTHER IMPACTS RELATING TO THE PROPOSAL

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### 7.1 Flora and Fauna

The proposed Eastern Distributor would be located in a intensively built urban environment. The majority of the landform is urbanised, altered and disturbed. The EIS indicated that no areas of natural habitat or original vegetation communities survive along the route of the proposal. Habitats existing in the area are mainly in the Domain & Royal Botanic Gardens, Moore Park, Botany Wetlands and the open country between East Lakes and the Airport. No threatened plant or fauna species are recorded in the area directly affected by the proposal.

Three threatened species, two bird species and one amphibian species have been recorded in the areas adjoining the proposal. They are: Bush Stone-Curlew, Regent Honeyeater and Green and Golden Bell Frog. The first two bird species are rare in Sydney and the Green and Golden Bell Frog has been recorded at the Botany Wetland and at Rosebery.

The EIS recognised the existence of a large number of trees along the length of the route. These trees are mostly native and exotic species of fig trees and palms lining the outer edge of Moore Park. They are considered to be significant in terms of their contribution to the streetscape or heritage value.

#### 7.1.1 Impacts on Flora:

The EIS acknowledges there are a large number of mature and significant trees along the route of the proposed Eastern Distributor. The construction of the proposal would have impacts on some of the significant trees. Impacts range from root disturbance to total removal.

#### *The Art Gallery Area*

The Eastern Distributor Conservation Management Strategy prepared by Godden Mackay indicated that the current scheme would involve removal of four trees near the eastern edge of the proposed cover next to the Art Gallery. The information on the impacts of the modified proposal on vegetation at the Art Gallery and Royal Botanic Gardens is not available in the RTA's Representations Report. Issues and conditions of approval relating to impacts on trees are discussed in Section 6.8.

#### *Anzac Parade and South Dowling Street*

Representations raised the concerns about the removal of poplars on Anzac Parade, the removal of Cabbage Tree Palms in the central median of South Dowling Street, the impacts on trees when construction is in close proximity to the drip line, and the impacts on vegetation in Moore Park, especially the removal of significant fig trees.



The current proposal would retain the bus roadway and therefore reduce the impact on the poplars. The Representations Report indicated that the Cabbage Tree Palms in the central median of South Dowling Street would be transplanted and the final location would be determined in consultation with local Councils and CPMPT.

#### *Moore Park and Drivers Triangle*

A number of significant trees, including fig trees in Drivers Triangle and Moore Park would be removed. The proposal would encroach on the urban forest in the Park but the plantings are not considered by the RTA as significant.

The RTA's Representations Report indicated that six significant fig trees would be removed, consistent with the "approximately five" trees as identified in the EIS. However, the Eastern Distributor Conservation Management Strategy (Draft) prepared by Godden Mackay indicated that 26 significant trees would be removed and four would be subject to significant root loss. The Department was also advised by CPMPT that more trees along the western edge of Moore Park Golf Course are anticipated to be affected. The Department notes the discrepancy of the information.

The significant trees contribute to both the heritage and aesthetic value of the Park, and the loss of these significant trees is considered highly undesirable. The proponent should also be required to engage an arborist to ensure that impacts on the trees are minimised. The plan detailing tree protection measures needs to be prepared to the satisfaction of CPMPT. Conditions of approval have been imposed in relation to Moore Park which addresses these issues (refer Section 6.9).

#### *Dowling Street*

The current scheme which involves widening of Dowling Street would result in removal of mature trees along the western edge of the street. Appropriate landscaping would be necessary.

#### *7.1.2 Impacts on Fauna Habitats*

Concerns were also raised about the protection of fauna and the fauna habitats, particularly the Botany Wetlands, a potential habitat for the Green and Golden Bell Frog and certain species of migratory birds. The existing drainage system would be amplified and take the runoff of the motorway to Mill Pond Creek. Detailed plans and specification of water pollution controls would be prepared in consultation with EPA and be provided prior to commencement of work.

Mitigation of indirect impacts such as water quality has been addressed elsewhere in this report. The Department notes that information on impacts of the modified proposal on fauna and habitats at the Art Gallery, Domain and Royal Botanic Gardens is not available. RTA responded that none of the threatened fauna species is recorded in the areas directly affected by the proposal. Nesting animals would be monitored and protected during construction



## Conclusions and Recommendations

The Department considers that the impacts on fauna and habitats could be managed by proper preparation and implementation of construction management plans, which include management of drainage and run-off and landscape plans. However it is **RECOMMENDED** that should any endangered flora or fauna species be identified then the appropriate action be undertaken. This is specified in Recommended Condition of Approval 97.

## **7.2 Spoil Disposal and Waste Management**

### **7.2.1 Introduction**

The EIS indicates that excavations would generate approximately 180,000 cubic metres of sandstone and 70,000 cubic metres of sand over a two year period. The RTA has made a commitment to the recycling and reuse of quantities of surplus spoil within the site and has indicated that significant quantities are expected to be recycled for use on other developments. Sites for the disposal of surplus material would however vary according to the rate of development activity generally and the volume of material available elsewhere. One of the sites identified is in the Port Botany area. Surplus material may need to be stockpiled.

Spoil not able to be recycled would be transported to approved landfill sites or off-site recycling depots. Ocean disposal was given as another option although it was noted that this would need to be the subject of a separate development application and the appropriate environmental approvals. Some preliminary investigations have indicated that the existing fill material along the western boundary of the Moore Park Golf Course near the Dacey Avenue intersection is likely to contain heavy metals. Contaminated fill would need to be treated when necessary and disposed at a landfill site licensed by the EPA to receive such material.

### **7.2.2 Representations**

Spoil disposal was an issue raised by the local councils in the area, by the EPA and the Centennial Park and Moore Park Trust. Concerns were expressed in terms of likely traffic impacts from construction vehicles entering and exiting the site, the route/s of construction vehicles, the identification of landfill sites, alternatives for disposal including ocean dumping and the disposal of contaminated materials. The EPA did not favour the ocean dumping of any spoil. The Department of Land and Water Conservation made a submission about the management of acid sulfate soils.

### **7.2.3 Modified Proposal**

A number of issues were raised by the modified proposal which include the disposal of the increased amount of spoil from the lengthening of the tunnel at the northern end and the increased excavation required by the "Parkway" proposal, the management of construction traffic, disposal sites for the spoil and the likelihood of increased amounts of contaminated spoil and disposal options.



#### 7.2.4 Consideration

Since the location of landfill sites for disposal of spoil cannot be finalised at this early stage, the impacts of trucks transporting spoil from the site cannot be properly assessed. The construction traffic management plan is discussed in further detail in Section 7.7.

Further testing for contamination is required. The excavation and disposal of contaminated material must be treated in consultation with the EPA and disposed of to an approved landfill site. The identification and treatment of acid sulfate soils should also be carried out in consultation with the Department of Land and Water Conservation.

The RTA has advised that as part of their Environmental Management Plan, a Solid Waste Management Plan and a Reuse Strategy would be prepared. The EPA has asked that this plan incorporate waste minimisation hierarchy principles and this is fully supported.

Overall, the Department considers that the impacts of spoil disposal and waste management could be managed by suitable conditions of consent attached to any approval.

The Department fully supports maximising recycling opportunities instead of ocean dumping and a condition prohibiting ocean dumping is recommended. (Condition 101).

It is **RECOMMENDED** that the following conditions apply:-

- the RTA is required to prepare as part of a Spoil Management plan, details of the proposed disposal sites for the handling, stockpiling and disposal of all spoil.
- the truck routes to be used are to be detailed as part of an environmental management plan for the construction of the project.
- no spoil is to be disposed of in the ocean.
- the RTA is to prepare a Solid Waste Management and Reuse Strategy, to incorporate waste minimisation principles.

These requirements and others relating to spoil disposal and waste management are specified in Recommended Conditions of Approval 98 to 110.

### 7.3 Flooding and Water Quality

#### 7.3.1 Introduction

Historic groundwater levels indicate that the tunnel under William Street would be located some eight metres below the static water table. The tunnels would be provided with a comprehensive drainage system to collect stormwater, seepage and contaminated water. Along the tunnel route, the effect of seepage would be localised and occur primarily along joints in the sandstone.

During significant storm events parts of Woolloomooloo and South Dowling Street flood and it is likely that runoff would increase as a result of more paved surfaces. The increase in flow could be reduced by underground detention systems or by general trunk systems upgrading. A dual system is proposed for the motorway and would be designed to cater up to the 20 year



Average Recurrence Interval standard. The drainage system is to be designed to prevent flooding of the tunnels.

Construction of the proposal has the potential to have an adverse impact on water quality, through erosion caused by construction works and runoff during operation. The EPA has indicated that a Pollution Control Approval would be required to minimise the pollution of receiving waters. Water management plans would be required to be prepared and submitted as part of the approval process. During the operation of the motorway a range of water quality control measures would be put in place to prevent debris from the roads being discharged into receiving waters. These include detention systems to contain spills from accidents, trashracks and trap gullies.

### *7.3.2 Representations*

Representations were made on issues of drainage and flooding, water quality and management by the EPA, the DoH, DLaWC, CPMPT, SWC, South Sydney City Council and a number of individuals. The Commonwealth Biodiversity Group made a representation on the impact of water quality management and monitoring on species management.

### *7.3.3 Modified proposal*

Proposed changes to the northern section of the motorway would not alter the hydrology and flooding impacts as described in the EIS. The modified "Parkway" proposal would affect groundwater levels and reinjection of ground water would be required. (See details in section 6.10).

### *7.3.4 Conclusions*

Construction and operation impacts of the proposal on flooding and water quality could be managed by the Department of Land and Water Conservation and EPA licensing and by suitable conditions of approval.

As part of the construction process a detailed erosion and sediment control plan and a site rehabilitation plan is to be prepared. These plans are to be to the satisfaction of the DLaWC and the EPA. Conditions are recommended to manage these impacts.

Flooding and stormwater would be managed in consultation with EPA, DLaWC, the Centennial Park and Moore Park Trust, Sydney Water and relevant councils. Stormwater shall be detained through appropriate measures to ensure that there is no exacerbation of any existing flooding.

As part of the pollution control approval process, the EPA would require the proponent to install, maintain and operate such wastewater collection or containment treatment and disposal systems as are necessary to prevent pollution of waters from the construction sites

The Department concurs with the proposed safeguards.



It is RECOMMENDED that the following conditions apply:-

- the RTA to prepare plans to ensure that flooding and stormwater impacts are prepared and implemented.
- the RTA is to prepare a detailed erosion and sediment control plan and site rehabilitation plan to ensure that the impacts of the construction and operation on water quality are minimised.
- acid sulfate soils are to be managed to the satisfaction of DLaWC and the EPA.

These requirements and others relating to flooding and water quality control are specified in Recommended Conditions of Approval 111 to 122.

#### 7.4 Business Impacts

A number of concerns were raised by businesses located along the route of the proposed motorway, ranging from direct impacts from noise, loss of trade due to changes to exposure to passing motorists, access and parking, concerns about signage and construction stage concerns due to access changes, parking, dust, noise and general amenity.

The EIS provides very limited specific information on business impacts dealing with the issues more generally under specific impact areas (i.e noise, air, access, amenity etc). The RTA's Representations Report indicates that impacts on businesses would be minimised by maintaining access during construction. In the longer term the RTA indicates that many areas, and in particular Taylor Square would experience improved conditions for local businesses.

The Department considers that in general terms the impact of the proposed tunnel section would result in minimal impact on businesses and agrees that after construction, conditions for businesses would be improved in many cases.

However issues relating to the southern section would be mixed. Some businesses such as the Shell Garage and the Supa Centa would be affected during construction and when operational due to changes to access. Similarly businesses located along South Dowling Street north of Crescent Street such as the Sydney Antique Centre would be affected through the removal of parking on the eastern side South Dowling Street during construction.

It is RECOMMENDED that to ensure there is minimal impact on businesses during construction and when operational a detailed signage plan be prepared in consultation with the affected businesses. To minimise impacts from changes during construction particularly those businesses located on the western side of South Dowling Street north of Crescent Street it is also RECOMMENDED that on-street parking on the northbound lane of South Dowling Street be maintained wherever practicable and to the fullest extent possible throughout the construction stage consistent with the existing parking provisions and restrictions on South Dowling Street. These recommendations are specified in Recommended Conditions of Approval 123 and 124.



## 7.5 Economics

### 7.5.1 Issues Raised

Several representations raised concerns about the methodology for economic assessment. Issues were raised about assumptions and parameters used in the analysis (particularly the annualisation factor and the value of travel time) and non inclusion of social and environmental costs such as noise and air quality impacts and costs of loss of parkland.

The EPA raised concerns about the analysis not including costs associated with the construction stage diversion and that it was inconsistent to include costs due to travel time savings once the proposal is operational but ignore travel time costs due to traffic diversions.

Whilst not forming a representation to the EIS, the State Chamber of Commerce provided a detailed report to the Department entitled "*Driving Ambition - The Economic Case for the Eastern Distributor*". The Report indicates that the net economic benefits to the community from the Eastern Distributor are likely to be extremely large and at least \$3 billion over the life of the project (i.e 30 years) and that the overall impact is positive for the business community of Sydney and the state economy.

### 7.5.2 Consideration of Issues Raised

The Department acknowledges the complexities of incorporating environmental values in quantitative economic assessment and recognises the ongoing debate in terms of the practicalities and advantages/disadvantages of such methods. Overall the Department accepts that the modifications proposed would assist in the reduction of environmental impacts and therefore the additional costs involved could be considered to indirectly reflect environmental and social values. The RTA indicates that the economic evaluation is but part of the assessment which includes both quantitative and qualitative assessments and that environmental goods have been included indirectly by responding to community issues.

Nevertheless the Department identified a number of limitations in the quantitative analysis undertaken in the EIS. These concerns included:

- *the efficacy of the TRACKS model*
- *costs of diversion of northbound traffic on South Dowling Street not included in analysis*
- *costs to Sydney Buses not included*
- *the annualisation factor and value of travel time were not based on conservative estimates*
- *no consideration for an increase in the toll to \$3.*

Whilst acknowledging a number of these issues, the RTA's Representations Report did not incorporate them in any revised economic analysis, rather it considered the issues in terms of a sensitivity analysis. The RTA's Representations Report indicates that the validity of the EIS economic analysis has also been verified from both the STM and a NETANAL model output with benefit-cost ratios (BCRs) of 8.3 and 7.4 respectively. These models were the ones referred to by the State Chamber of Commerce in its report "*Driving Ambition - The Economic Case for the Eastern Distributor*" in estimating net economic benefits of over \$3



billion. As indicated above the EIS STM model was not appropriate for economic assessment due to fundamental problems with the base case. The Department has been unable to independently review this assessment using NETANAL.

The Department subsequently requested the RTA to undertake a completely revised economic analysis using the most recent (and robust) traffic modelling, incorporating the concerns identified.

The revised BCRs and nett present values (NPVs) for the proposal and the "tunnel only" option are shown in Table 7.1

Table 7.1 Results of Updated Economic Analysis

	NPV (\$ Million)	BCR
Eastern Distributor only <sup>(1)</sup>	992	3.8
Proposed Eastern Distributor	1970	4.5

(1) No significant upgrading south of South Dowling Street

While it is considered that the economic assessment has now been satisfactorily performed the following issues should also be considered:

- The use of the revised STM model covers a much broader road network and as such extremely small travel time savings (i.e terms of seconds or less) are included as a travel time saving directly resulting from the Eastern Distributor project.
- The cover over the Cahill Expressway would have some value as open space in addition to its aesthetic value. This could reasonably have been costed at the value of acquiring a similar amount of open space nearby.
- The analysis does not account for the reduction in stops through the provision of a free flowing motorway. Elimination of stops represents a major benefit of a motorway through reductions in fuel use and in wear and tear on vehicles.
- The analysis assumes that travel time savings estimated for the project would increase to those predicted by the EMME 2 model until 2011 and then level out. As discussed previously the EMME 2 model assigns traffic to the motorway in excess of its capacity in peak periods in 2011. Therefore it would be more conservative to have conducted the economic analysis assuming no growth in benefits after 2001.

With the benefits held to 2001 levels the economic performance of the two alternatives would change as shown in Table 7.2:



Table 7.2 Adjusted Economic Analysis

	NPV (\$ Million)	BCR
Eastern Distributor Only	1146	3.0
Proposed Eastern Distributor	715	3.0

The amended analysis indicates that with travel benefits held constant after 2001 both options would still be very well justified. The benefit cost ratio is likely to exceed 2.0 with a Net Present Value of at least \$1 billion.

In conclusion the Department considers that the benefits of either the full proposal or the "tunnel only" option would be sufficiently high to significantly outweigh any intangible adverse impacts that are not amenable to costing.

## 7.6 Heritage

### 7.6.1 Introduction

The EIS and accompanying *Working Paper No. 6 - Heritage*, details the impact that the proposal would have on heritage within the Eastern Distributor corridor in terms of the demolition and relocation of heritage items, the visual and physical intrusion on heritage conservation areas and the removal of archaeological features.

Two heritage items (identified in the South Sydney City Heritage Study) are proposed to be demolished. These are the BMW building at 2-12 Palmer Street, which would be partially demolished and reconstructed and three terraces at 179-183 Bourke Street. The Moore Park gate posts, perimeter fence and ANZAC Memorial Obelisk and a number of other items proposed to be relocated are dealt with in Section 6.9.

A number of other buildings of potential heritage value are also to be demolished, particularly in the northern section of the route. The EIS and accompanying working paper did not clearly identify these buildings nor consider their streetscape values although some 13 buildings in the Palmer to William Streets section would appear to be affected.

### 7.6.2 Representations

Key issues raised in submissions include potential impacts on heritage precincts, streetscapes, buildings and other heritage items. Representations on these issues were received from the Department of Housing, the Heritage Office, Sydney Water, Centennial Park and Moore Park Trust, the Royal Botanic Gardens and the Councils of Randwick City, Sydney City, South Sydney City, the National Trust, Art Gallery and many individuals and community groups.

Many individuals also expressed concerns about the potential for settlement of heritage buildings caused by the works and compensation for affected buildings.



### *7.6.3 Modified Proposal*

The northern section of the tunnel portals in the vicinity of Cathedral Street would impact on the buildings in Kidmans Terrace. The Parkway proposal has the potential to impact on groundwater and hence the settlement of buildings, as the roadway is some 4 to 6 metres below that in the EIS. Further groundwater testing was carried out which included an analysis of the potential for settlement. These issues are discussed in Sections 6.10 and 6.11.

### *7.6.4 Additional Information*

It was not clear from the EIS nor from the RTA's Representations Report about the number of items to be demolished, the heritage status of such items nor any plan for the relocation of items from Moore Park. A draft Conservation Management Strategy has now been prepared, by Godden Mackay and submitted to the Department. This strategy provides for the recording of heritage items prior to any demolition, requires management plans to be prepared for items to be relocated, contributes to urban design and landscape strategies and reviews the actions and strategies in the EIS.

Detailed archaeological assessments have also been undertaken for the entire length of the proposed corridor.

### *7.6.5 Consideration*

The EIS and Working Paper recognise that there is potential for significant archaeological remains to be found along the route of the road. The Department considers that measures should be applied which ensure that significant archaeological remains and relics are identified prior to adverse impacts occurring and that appropriate action is taken to protect or record these. The Department understands that excavation permits would be sought from the Heritage Council prior to substantial commencement of any such work.

The Department considers that the adoption of an appropriate Conservation Management Strategy and the completion of an archaeological assessment prior to work commencing, together with compliance with conditions of any excavation permits that may be granted, should provide sufficient protection for archaeological relics and deposits. The strategy would also deal with the demolition of heritage buildings and the relocation of heritage items and is to be prepared to the satisfaction of the Director-General and the relevant local councils.

Other than for those buildings identified as heritage items, preliminary assessment indicates that buildings identified for demolition do not have significant heritage value but contribute to streetscape. This is considered in as an urban design issue in Section 6.8.

The impact of noise and vibration from tunnelling on Busby's Bore has been assessed. The EPA does not specify vibration criteria to protect against structural damage of buildings as their criteria relate to human comfort. However, based on the British, US and Swiss practices the recommended maximum vibration level of 3mm/s peak particle velocity would give the



bore the necessary protection. Recommendations relating to vibration and need for building surveys due to settlement are discussed in other sections of this report.

#### 7.6.6 Conclusion

The Department is satisfied that with the appropriate monitoring and conditions as outlined, impacts on heritage buildings and items and archaeological remains along the route of the Eastern Distributor Corridor could be satisfactorily managed.

It is RECOMMENDED that the following conditions apply:-

- a Conservation Management Strategy be prepared in consultation with the relevant local councils and to the satisfaction of the Director-General. Heritage items to be relocated or resited within Moore Park are to be in consultation with the Centennial Park and Moore Park Trust.
- a building settlement analysis be undertaken prior to the commencement of construction for all identified heritage buildings within the impact zone to establish procedures for control of potential settlement.
- archival recording is to be made of any heritage item likely to be destroyed.
- specific vibration levels from tunnelling are to be specified in the vicinity of Busby's Bore.
- if during construction any items of aboriginal archaeology are uncovered work is to cease immediately and the relevant Aboriginal Land Council and the National Parks and Wildlife Service shall be consulted.

These requirements are specified in Recommended Condition of Approval 125 to 131.

### 7.7 Construction Stage Traffic Impacts and Diversion Requirements

A number of concerns were raised by local Councils and businesses such as the Supa Centa and the Shell Garage about the construction stage diversion in South Dowling Street. A further issue relating to construction stage diversion which has only recently been identified in any detail is the need to divert southbound traffic onto Plunkett and Bourke Street to enable construction works in Sir John Young Crescent.

#### 7.7.1 General Construction Stage Traffic Impacts

There is the potential to cause considerable delay and inconvenience to traffic using the corridor during construction and in fact the viability of some businesses may be affected. A comprehensive traffic management plan needs to be developed in consultation with local interests to address detailed matters such as traffic management principles; timing of road disturbance; measures so as not to discourage public transport; modifications to existing roads and intersections; truck manoeuvring and access to construction sites; spoil and material disposal routes; implications and arrangements for bus and taxi stops; pedestrian/cyclist management; temporary or permanent loss of parking and requirements for adequate signage; co-ordination of construction activities proposed by other major developments; impacts on existing operating conditions and need for temporary



improvements; notification to residents affected by proposed road changes; signposting and markings; lighting; speed limiting devices and any other relevant matters.

The requirement for a detailed construction stage traffic management plan is specified in Recommended Condition of Approval 132. Other requirements to protect local streets from construction traffic and physical damage are specified in Recommended Condition of Approval 136 to 138.

#### *7.7.2 Northbound Traffic on South Dowling Street*

A major impact of the proposal during construction is the need to close all northbound lanes on South Dowling Street and divert northbound traffic to O'Dea Ave, Bourke Street and Crescent Street. This would apply for a period of up to two years. The direction of Bourke Street between the Crescent and Campbell Street is also proposed to be reversed for the construction duration. The EIS justifies the need for this diversion so as "to keep construction activities inside the existing road reserve".

The RTA's Representations Report has provided additional information on the physical works required to facilitate the diversion in terms of proposed intersection changes however at this stage the traffic impact analysis is still insufficient to demonstrate the acceptability or otherwise of the proposed diversion design and thus the traffic impacts of the construction stage diversion.

It is RECOMMENDED that no traffic be diverted from South Dowling Street until the impacts are assessed in more detail including further consultation with the local Council. Monitoring of traffic volumes on the diversion is also recommended. These requirements are specified in Recommended Condition of Approval 133 and 134.

#### *7.7.3 Plunkett Street/ Bourke Street Diversion*

Supplementary information provided by the RTA refers to the diversion of traffic along Bourke and Plunkett Streets to allow space for the construction of the Sir John Young Crescent Overpass. This was not included nor assessed in the EIS. Based on information provided to DUAP it is now understood that the proposed deviation would take:

- southbound traffic coming off the Cahill Expressway which turns right into Sir John Young Crescent; and
- traffic from Lincoln Crescent, including traffic travelling from Potts Point which turns right to enter the Cahill Expressway.

The deviation is expected to increase the number of vehicles on Bourke and Plunkett Streets from 400 per hour to 1800 per hour during the morning peak. The increase in noise levels is predicted as  $L_{Aeq}$  of 7.5 dBA, which the noise consultant concludes is significant.

Overall the analysis presented to date is not sufficient at this stage to demonstrate the acceptability or otherwise of the construction stage diversion.



It is RECOMMENDED that no traffic be diverted to Plunkett or Bourke Streets until the impacts are properly assessed including further consultation with the local Councils. This requirement is specified in Recommended Condition of Approval 135.

## 7.8 Cyclist Facilities

### 7.8.1 Introduction

Existing and proposed cyclist facilities are detailed in the EIS. Currently facilities for cyclists are not distributed equally along the Eastern Distributor corridor, with limited cycle routes on through routes such as Crown and Palmer Streets because of existing traffic and a larger number of cyclist facilities associated with Moore Park. Cyclists would not be able to be accommodated safely in the tunnels nor on the motorway of the Eastern Distributor. Shared cycle and vehicle lanes would be available in South Dowling Street, south of Crescent Street.

In general terms, construction was not seen as having a great impact on cyclists because of the small amount of land required for cyclist facilities. Nevertheless, the severance of east-west routes is important, particularly south of Drivers Triangle where the majority of recreational facilities along the route are located. This brings with it increased safety risk.

During the construction phase, temporary facilities are proposed at the existing cyclist crossings of the Eastern Distributor corridor and uncontrolled access would not be encouraged.

A number of bicycle links are to be made across the proposed Parkway. These are to be a shared facility for use by pedestrians and cyclists. Opportunities for cyclists using local space and local streets is to be investigated with the local councils in a Local Area Improvement Program.

### 7.8.2 Representations

Representations were made by the Councils of Sydney City, Randwick City, Botany Bay City, South Sydney City, Department of Defence, Centennial Park and Moore Park Trust, the Royal Botanic Gardens, Bicycle New South Wales Inc and Marrickville - South Sydney Bicycle Group. Individuals and community groups also made representations to the EIS. Key issues raised were the severance of the east-west bicycle movements, provision of improved bicycle facilities and safety aspects.

### 7.8.3 RTA Response

Responses by the RTA indicated that improved bicycle access would result from the reduction of traffic on surface roads adjacent to the Eastern Distributor corridor.

### 7.8.4 Modified Proposal

Construction impacts on cyclist facilities would remain the same as those detailed in the exhibited EIS. However, the modified proposal would provide increased opportunities for



bicycle access in the vicinity of the Art Gallery and with the proposed reopening of Cathedral Street. The reduction of through traffic in some of the streets may also provide increased opportunities.

Connections with Moore Park by means of a bridge over the lowered roadway would be provided at Phelps Street, near the Bourke Street Public School and at Charles Street. A bridge is to be provided at the Moore Park Gardens development, however this would be subject to a separate development application. Opportunities exist for shared bicycle lanes or the use of the road shoulder along Southern Cross Drive and South Dowling Street. These are proposed to be between 1 metre and 2 metres wide.

The RTA's Representation Report indicates that 4 metre wide shared vehicle/cyclist lanes would be provided on the surface access roads along South Dowling Street. However the cross-sections are unclear as they only specify the width of the northbound carriageway. To clarify this aspect and to ensure the RTA's commitment to the 4 metre wide kerbside lane, this requirement has been conditioned.

#### 7.8.5 Consideration

There is the potential for increased opportunity for the provision of cyclist facilities within the modified proposal, however there is the potential to disrupt cyclist access during the construction of the Parkway. There is also some discrepancy between the RTA's proposal and the bicycle plan prepared for South Sydney City Council, particularly the existing designated cycle routes and east-west access points and this should be addressed at the detailed design stage. Generally the Department is satisfied that the impacts of the construction and operation of the motorway on cyclist facilities could be managed by suitable conditions of consent.

It is RECOMMENDED that the following conditions apply:

- to require the RTA to assess the impacts and management of any temporary road closures, detours or other major disruptions to cyclist access during construction and at major events in the Moore Park precinct.
- cyclist facilities are to be provided to at least the level currently provided.
- a 4 metre wide shared vehicle/cyclist lane be provided along the surface access roads.
- bicycle facilities are to be provided during the detailed design stage in consultation with local councils and Bicycle NSW.

These requirements are specified in Recommended Conditions of Approval 139 to 142.

## 7.9 Hazards, Risk and Safety

### 7.9.1 Introduction

The principal issues of hazards, risk and safety are associated with accidents arising out of heavy and dangerous goods vehicle movements and vehicle accidents in the tunnel section.



The EIS indicates that the proposal has the potential to eliminate about 50 reported accidents per year. Safety will be further enhanced by the removal of heavy goods from local streets through a Local Area Improvement Program. Hazardous or dangerous goods form a minor proportion of the total traffic flow, estimated as being between 0.1% and 0.14% of all traffic. A preferred heavy vehicles route is shown in Figure 5.8 of the EIS.

It is assumed in the EIS that dangerous goods not permitted in the tunnel will generally continue to use current routes and there will be no significant increase in risk exposure along any individual route as a result of the proposal. However, the impacts have not been quantified, in particular, those involving changes in the movement of dangerous goods to and from the Woolloomooloo Bay and Garden Island areas.

A range of possible hazardous events are identified in the EIS, which discusses the design and operational measures proposed to minimise risk and to protect the public. These include fire resistant tunnel design, a traffic incident management system and emergency response systems.

#### 7.9.2 Representations

Representations were made by Botany Bay City, Randwick City, South Sydney City and Sydney City Councils, Sydney Ports Corporation and by private individuals, and community and business groups such as Bizwatch and the Dowling Street Residents' Action Group. The main issue raised was the lack of planning for dangerous goods routes. Particular concerns were raised that it is unclear how the intent to keep dangerous goods away from the City centre and from local roads will be implemented.

Other issues included hazards and risks due to increases in heavy vehicle and dangerous goods traffic, suitability of intersections for heavy vehicle and dangerous goods traffic, construction risks and traffic incident management.

#### 7.9.3 Considerations

The EIS indicates that changes in dangerous goods route patterns are minor, and thus safety impacts will not be significant. However, the Department considers that a traffic management plan should be developed to minimise or avoid movements of dangerous goods through local streets in the Woolloomooloo/Garden Island area and surrounds.

In general the Department is satisfied that hazards and risks can be managed through appropriate conditions of consent attached to any approval. These would include: provision of emergency infrastructure and emergency plans and procedures; enforcement of the prohibition of dangerous goods from the tunnel sections; a traffic management plan; installation of tunnel design safety features; and a traffic incident management system.



It is RECOMMENDED that the following conditions apply:-

- to ensure that 6 months prior to the commissioning of the project an Emergency Response Plan is prepared to the satisfaction of the NSW Fire Brigade, the police and State Emergency Services. Testing shall be carried out two months prior to commissioning.
  - to ensure that traffic management plans are prepared for the movement of dangerous goods.
  - that appropriate design measures are incorporated into the tunnel design and operation.
- These requirements are specified in Recommended Conditions of Approval 143 to 148.

## 7.10 Utilities and Services

The construction of any roadway through a heavily populated area would have a potentially significant impact on the public utilities and services already established in the road corridor itself and where these utilities and services cross the proposed route. Impacts are likely to be caused because of disruption to services during the initial tunnelling and construction works, potential damage to some of the service providers' infrastructure and by the need to relocate such services either within the road corridor itself or at some other location.

All relevant public authorities with utilities and services within the corridor were contacted by the RTA and their requirements were identified as part of the concept design services.

The EIS identified that services in the Dacey Avenue to Todman Avenue tunnel in South Dowling Street would be the most affected, as these utilities would be the most difficult to relocate or incorporate in the tunnel structure. However it was likely that these services could be accommodated within the tunnel roof without the need for relocation. In the northern section of the exhibited proposal, a major water main would have to be relocated in Palmer Street in the vicinity of Plunkett and Cathedral Streets.

### 7.10.1 Representations

Representations were made by Australian Gas Limited and Sydney Water who were concerned about disruptions to services, their relocation and the proposed staging of the construction. A number of submissions from individuals raised the possibility of damage to utilities and services from vibration from the tunnel construction.

Sydney Water was also concerned about tunnelling in the vicinity of the Bondi Ocean Outfall Sewer which runs near Busby's Bore in Oxford Street.

### 7.10.2 Modified Proposal

It is likely that the construction required to complete the Parkway proposal would have some additional impacts on the utilities and services in the vicinity because of the requirement to excavate to a greater depth.



### 7.10.3 Consideration

Generally, suitable design and operational conditions could be imposed to ensure that any impacts could be managed, that the continuity of supply is maintained and that the relocation of utilities and services could be carried out in a manner acceptable to the relevant service authorities and users.

It is therefore **RECOMMENDED** that the following conditions apply:

- to require the RTA to identify those services potentially affected by construction activities and that any alteration is determined in consultation with the relevant authority and that any costs incurred shall be paid for by the RTA.
- to ensure that the RTA is responsible for minimising any disruption to services and advising the local community of any disruptions to supply.
- to require special measures for tunnelling in the vicinity of Busby's Bore and the Bondi Ocean Outfall Sewer to ensure that there is no damage caused from vibration.

These requirements are specified in Recommended Conditions of Approval 149 and 150.



## **8.0 CONCLUSIONS AND RECOMMENDATIONS**

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### **Conclusions**

The proposed Eastern Distributor would have significant implications to the economy, environment and planning of Sydney and New South Wales. The proposal, if it proceeds, would change the functional transportation nature of its corridor to a major north-south emphasis.

The Director-General's assessment of the proposal's claimed objectives concludes that such objectives could be achieved to varying degrees but that this is highly dependent on complementary measures and specific design modifications. The attainment of the claimed objectives will particularly require substantive implementation of public transport initiatives, local area improvement plans to manage the effect of local traffic and improvements to major intersections and access.

The assessment also indicates that alternatives to the current proposal would necessitate detailed assessment beyond the scope of the current one. However, a number of specific project design modifications are suggested including: improvements to the Mill Pond Road intersection; access provisions at Link Road; and maximising demand management opportunities on Southern Cross Drive by providing for transit lanes.

The assessment concludes that there will be important urban design implications which will necessitate comprehensive landscaping and environmental management. In order to minimise the land take from Moore Park, the Director-General recommends that the south bound ramp (south of Fitzroy Street) be deleted.

The assessment also concludes that groundwater drawdown and the potential for settlement will need to be strictly controlled and managed. Whilst this is considered feasible, strict monitoring and re-injection practices will need to be strictly implemented.

Advice from the EPA indicates that impacts of noise and air pollution could be controlled within established standards and that licensing could be granted subject to detailed pollution control and management matters.

Overall, as with any major infrastructure projects of this nature, it is expected that there will be benefits as well as disbenefits. The extent of disbenefits could be substantially reduced and mitigated by way of conditions. If the proposal is to proceed it should be the subject of stringent conditions which would ensure that any residual impact is kept to a minimum and within tolerable levels relative to the overall project benefits.

### **Recommendations**

The Director-General's recommendation of the overall assessment is that should the proposal proceed it will be essential for comprehensive and advanced conditions to be imposed so as to maximise its benefits and manage residual impacts. These conditions are specified in the following section and are based on the extent of issues raised in representations and by the Department to ensure that environmental impacts associated with the proposal can be managed and mitigated to an acceptable level.



## 9.0 RECOMMENDED CONDITIONS OF APPROVAL

*This section provides the Director-General's recommended conditions of approval. The recommended conditions have been based on the Director-General's assessment of the EIS, the representations made to the EIS and further supplementary investigations, studies and advice.*

*It is also noted that the EIS and supplementary documentation contains extensive information on procedures and mitigation strategies that would be implemented as part of the proposal to ameliorate the impacts. The recommended conditions should therefore be implemented in addition to those procedures and mitigation measures proposed in the EIS and the supporting documents. Where there is an inconsistency between the EIS and other documents with these recommendations, these recommendations apply.*

The following acronyms and abbreviations are used:

CPMPT	Centennial Park and Moore Park Trust
Department, The	Department of Urban Affairs and Planning
Director-General, The	Director-General of the Department of Urban Affairs and Planning (or nominee)
DLaWC	Department of Land and Water Conservation
DoT	Department of Transport
ENCM	EPA's Environmental Noise Control Manual
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
FAC	Federal Airports Corporation
LAIP	Local Area Improvement Program
Minister, The	Minister for Urban Affairs and Planning
NPWS	National Parks and Wildlife Service
RAC	Rail Access Corporation
RBGDT	Royal Botanic Gardens and Domain Trust
Relevant Councils	Any one or more of the following Councils as applicable: Botany Bay City, Randwick City, South Sydney City or Sydney City
RTA	Roads and Traffic Authority
SWC	Sydney Water Corporation
The Proponent	The Roads and Traffic Authority

### General

1. The proposal shall be carried out in accordance with:
  - the proposal contained in the environmental impact statement (EIS) *Proposed Eastern Distributor- From the Cahill Expressway, Woolloomooloo to Mill Pond Road, Botany* (hereafter referred to as 'the EIS') prepared for the RTA by Rust



PPK Pty Ltd, dated October 1996, subject to modifications to the proposal as described in Section 4.0 of the *Proposed Eastern Distributor- Cahill Expressway to Mill Pond Road. Director-General's Report* dated June 1997 hereafter referred to as 'the Director-General's Report'.

- all identified procedures, safeguards and mitigation measures identified in the EIS;
- the conditions of approval granted by the Minister; and,

despite the above, in the event of any inconsistency with the EIS, the conditions of approval granted by the Minister shall prevail.

These conditions do not relieve the Proponent of its obligation to obtain all other approvals and licences from all relevant authorities required under any other Act. Without affecting the generality of the foregoing, the Proponent shall comply with the terms and conditions of such approvals and licences.

It shall be the ultimate responsibility of the Roads and Traffic Authority (RTA) to ensure compliance with all conditions of approval granted by the Minister.

### **Compliance**

2. The Proponent shall comply or ensure compliance with all requirements of the Director-General in respect of the implementation of any measures arising from the conditions of this approval. The Proponent shall bring to the attention of the Director-General any matter that may require further investigation and the issuing of instructions from the Director-General. The Proponent shall ensure that these instructions are implemented to the satisfaction of the Director-General within such time that the Director-General may specify.

For the purposes of this approval the date of commencement shall be from the date that the RTA determines to proceed with the proposal. The Director-General shall be provided with the date of commencement.

### **Dispute Resolution**

3. The Proponent shall endeavour as far as possible to resolve any dispute with relevant public authorities arising out of the implementation of the conditions of this approval. Should this not be possible the matter shall be referred to the Minister for resolution. The Minister's determination of the disagreement shall be final and binding on all parties.

### **Complaints Telephone Number**

4. Prior to commencement of construction, the Proponent shall institute and publicise a 24 hour complaints contact telephone number which will enable any member of the general public to reach a person who can arrange appropriate response action to the complaint.



### **Complaints Register**

5. A Complaints Register shall be maintained and used to record details of all complaints received and actions taken during the construction stage. The complaints register shall be available to all relevant government agencies and relevant Councils upon request.

### **Advertisement of Activities**

6. The Proponent shall ensure at three-monthly intervals from commencement of construction, the advertisement in relevant local newspapers of the nature of works proposed for the forthcoming three months, the areas in which these works are proposed to occur, the hours of operation and the contact telephone number. The Proponent shall ensure that the local community is kept informed (by way of local newsletters, leaflets, newspaper advertisements and community notice boards etc.) of the progress of the project including any traffic disruptions and controls, construction of temporary detours and work required outside of the nominated working hours prior to such works being undertaken.

### **Environmental Management Representative**

7. A suitably qualified Environmental Management Representative (EMR) shall be employed throughout the construction stage. The EMR shall be responsible for considering and advising on matters specified in the conditions of this approval and compliance with such, and shall facilitate an induction and training program for all persons involved with the construction activities. The EMR shall have the independence and the authority to stop work immediately if an unacceptable impact on the environment is likely to occur or to require other reasonable steps to be taken to avoid or minimise the impacts.

### **Environmental Management System**

8. The Proponent shall ensure the appointment of contractors that have a demonstrated capability and experience in the implementation of an Environmental Management System (EMS) prepared in accordance with the AS/NZS ISO 14000 series or BS7750-1994 certified by an accredited certifier and/or have a proven environmental management performance record.

### **Environmental Management Plan(s) (Construction Stage)**

9. Prior to commencement of substantial construction at various sites or within such time as agreed by the Director-General, Environmental Management Plan(s) (Construction Stage) shall be progressively prepared for various sites and locations. The EMP(s) shall be prepared to the satisfaction of the Director-General following consultation with relevant government agencies and relevant local councils. The EMP(s) shall be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted best practice management plans.



The EMP(s) shall:

- a) address construction activities associated with all key constructions sites;
- b) cover specific environmental management objectives and strategies for the main environmental system elements and include, but not be limited to: noise and vibration; water; air; erosion and sedimentation; access and traffic; property acquisition and/or adjustments; heritage and archaeology; groundwater; contaminated spoil and material (including acid sulfate soils), spoil disposal; waste/resource management; flora and fauna; flooding and stormwater control; geotechnical issues; recreational facilities; visual screening, landscaping and rehabilitation; hazards and risks; energy use, resource use and recycling; and utilities.
- c) address, but not be limited to:
  - i. identification of the statutory and other obligations which the Proponent is required to fulfil during project construction including all approvals and consultations/agreements required from authorities and other stakeholders, and key legislation and policies which control the Proponent's construction of the project;
  - ii. definition of the role, responsibility, authority, accountability and reporting of personnel relevant to the EMP;
  - iii. measures to avoid and/or control the occurrence of environmental impacts;
  - iv. measures (where possible and cost effective) to provide positive environmental offsets to unavoidable environmental impacts;
  - v. the role of the EMR;
  - vi. environmental management procedures for all construction processes which are important for the quality of the environment in respect of permanent and/or temporary works;
  - vii. monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental management of the project including performance criteria, specific tests, protocols (e.g. frequency and location) and procedures to follow;
  - viii. environmental management instructions for all complex environmental control processes which do not follow common practice or where the absence of such instructions could be potentially detrimental to the environment;
  - ix. steps the Proponent intends to take to ensure that all plans and procedures are being complied with;
  - x. consultation requirements with relevant government agencies; and
  - xi. community consultation and notification strategy (including local community, relevant government agencies and relevant Councils), and complaint handling procedures.



Specific requirements for some of the main environmental system elements referred to in (b) shall be as required under the conditions of this approval and/or as required under any licence or approval.

The EMP (Construction Stage) shall be made publicly available.

### **Environmental Monitoring - Construction**

10. The Proponent shall obtain and make public a report(s) in respect of the environmental performance of the construction works and compliance with the Environmental Management Plan (Construction Stage) and any other relevant conditions of this approval. The report(s) shall be prepared at six monthly intervals or at other such periods as requested by the Director-General to ensure adequate environmental performance over the duration of the construction works. The report(s) shall include, but not be limited to, information on:
- a) applications for consents, licences and approvals, and responses from relevant authorities;
  - b) implementation and effectiveness of environmental controls and conditions relating to the work undertaken;
  - c) identification of construction impact predictions made in the EIS and any supplementary studies and details of the extent to which actual impacts reflected the predictions;
  - d) details and analysis of results of environmental monitoring;
  - e) number and details of any complaints, including summary of main areas of complaint, action taken, response given and intended strategies to reduce complaints of a similar nature; and
  - f) any other matter relating to the compliance by the Proponent with the conditions of this approval or as requested by the Director-General.

The report(s) shall also be submitted to the EPA, DLaWC, CPMPT, relevant Councils and any other relevant government agency nominated by the Director-General. The report(s) shall also be made publicly available.

11. All sampling strategies and protocols undertaken as part of any monitoring program shall include a quality assurance/quality control plan and shall require approval from the relevant regulatory agencies to ensure the effectiveness and quality of the monitoring program. Only accredited laboratories shall be used for laboratory analysis.

### **Environmental Management Plan (Operation Stage)**

12. An Environmental Management Plan shall be prepared for the operation of the proposal. The Plan shall be prepared to the satisfaction of the Director-General and in consultation with the EPA, DLaWC, CPMPT, relevant Councils and any other relevant government agency nominated by the Director-General. The Plan shall be prepared in accordance with the conditions of this approval, all relevant Acts and



Regulations and accepted best practice management procedures.

The EMP shall address at least the following issues:

- a) identification of the statutory and other obligations which the Proponent is required to fulfil including all licences/approvals and consultations/agreements required from authorities and other stakeholders, and key legislation and policies which control the Proponent's operation of the project;
- b) requirements of and compliance with relevant approval and licences;
- c) sampling strategies and protocol to ensure the quality of the monitoring program including specific requirements of the EPA, DLaWC and CPMPT;
- d) monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental performance of the project during its operation including description of potential site impacts, performance criteria, specific tests and monitoring requirements, protocols (e.g. frequency and location) and procedures to follow;
- e) steps the Proponent intends to take to ensure that all plans and procedures are being complied with;
- f) consultation requirements including relevant government agencies, the local community and relevant Councils and complaint handling procedures; and
- g) strategies for the main environmental system elements and include, but not be limited to: noise and vibration; water; air; erosion and sedimentation; access and traffic; property acquisition and/or adjustments; heritage and archaeology; groundwater; settlement; contaminated spoil; waste/resource management/removal/ disposal; flora and fauna; hydrology and flooding; recreational facilities; visual screening, landscaping and rehabilitation; hazards and risks; energy use, resource use and recycling; and utilities.

Specific requirements for some of the main environmental system elements referred to in (g) shall be as detailed under the conditions of this approval and/or as required under any licence or approval.

The EMP (Operation Stage) shall be made publicly available.

- 13. All sampling strategies and protocols undertaken as part of the EMP (Operation Stage) shall include a quality assurance/quality control plan and shall require approval from the relevant regulatory agencies to ensure the effectiveness and quality of the monitoring program. Only accredited laboratories shall be used for laboratory analysis.

### **Environmental Impact Audit Report**

- 14. An environmental impact audit report shall be submitted to the Director-General, the EPA and upon request by the Director-General to any other relevant government agency 12 months after commissioning of the project and at any additional periods thereafter as the Director-General may require. The Report shall be prepared by an



independent person to be appointed by the Director-General and at the Proponent's expense. The report shall assess the key impact predictions made in the EIS and any supplementary studies and detail the extent to which actual impacts reflect the predictions. In particular the report shall provide details on actual versus predicted traffic volumes on local roads, toll avoidance, groundwater changes, settlement, noise and air emissions, water quality and flooding and all other key impact issues identified in the EIS. Suitability of implemented mitigation measures and safeguards shall also be assessed. It shall also assess compliance with the Environmental Management Plan (Operation stage).

The report shall also discuss results of consultation with the local community in terms of feedback/complaints on the construction and operation phases of the project and any issues of concern raised. The Proponent shall comply with all reasonable requirements of the Director-General, the EPA, DLaWC, RBGDT, CPMPT and any other relevant determining authority with respect to any reasonable measure arising from, or recommendations in the report.

The Report shall be made publicly available.

### **Community Liaison Group(s)**

15. A Community Liaison Group or Groups including representatives from the RTA, the contractor, relevant local community and business groups and relevant Councils shall be formed prior to the commencement of substantial construction to discuss detailed design issues and methods for minimising the impact on the local community and businesses, including but not limited to: local vehicle, pedestrian and cyclist access requirements; construction stage traffic diversions; groundwater control; settlement; noise barriers; air quality; water quality; flooding; landscaping requirements (including design of noise barriers); and any other issues as considered relevant by the Group. Appropriate facilities and information shall be provided by the Proponent to assist the Group in carrying out its functions. The Group may make comments and recommendations about the design and implementation of the proposal which shall be considered by the Proponent.

### **Public Transport**

#### *Construction Stage*

16. Prior to the commencement of substantial construction at the sites which would affect public transport, management plan(s) shall be prepared to deal with the impact of construction activities on public transport. The management plan(s) shall ensure that buses and high occupancy vehicles are able to operate at pre-construction levels of use at all times and shall be to the satisfaction of the Bus Priority Task Force.
17. The Proponent shall provide separate bus lanes or other alternatives to the satisfaction of the DoT during the work in the Drivers Triangle to maintain bus services at least to pre-construction stage levels. Where bus services are disadvantaged/affected by traffic diversions, priority measures shall also be implemented to the satisfaction of



## Sydney Buses.

*Operation Stage*

18. Bus priority measures as identified in Appendix C of the Director-General's report or as otherwise agreed by Bus Priority Task Force shall be developed in consultation with the relevant councils and community groups nominated by the Bus Priority Task Force and shall include a general public exhibition process to the satisfaction of the Bus Priority Task Force. Prior to adoption of these measures the Proponent shall ensure that there is appropriate environmental impact assessment of any such measures to be implemented.
19. Prior to the operator collecting any toll the Proponent shall have all necessary bus priority measures referred to in Conditions 18 formulated and agreed upon to the satisfaction of the Bus Priority Task Force. The implementation of such measures including any associated construction works shall be within 3 months of commencement of toll collection. Any extension of time beyond the 3 month period shall be specifically approved by the Minister following consultation with the Bus Priority Taskforce.
20. The proposal shall be designed to the satisfaction of the Director-General following consultation with the DoT, so as not to prevent or impose greater cost implications for future provision of a light rail and/or bus system between Central Station and the University of New South Wales via Moore Park subject to the feasibility studies in relation to such a project.
21. All government buses shall be exempt from all tolls and shall be provided with a nominated lane through the toll booths unless otherwise agreed to by the DoT.
22. The Proponent shall in consultation with the RAC, Sydney Buses, local Councils Sydney Cricket Ground Trust and CPMPT develop to the satisfaction of the DoT an integrated transport strategy for the servicing of major events in the Moore Park area.
23. The Proponent shall prepare in consultation with the DoT and CPMPT a detailed feasibility report to the Director-General on the costs and impacts of providing a northbound entry ramp to the tunnel from Anzac Parade or an equivalent modification to improve the operation of the Anzac Parade/Moore Park Road/Flinders Street intersection for bus operations. The report shall be prepared within 2 years of operation of the project. The Proponent shall comply with all requirements of the Director-General which may arise from the report.

**Local Traffic**

24. Prior to commencement of substantial construction at sites/locations that would affect local traffic, a Technical Advisory Committee shall be established to oversee the preparation of the Local Area Improvement Program (LAIP). The Committee shall include representatives from the RTA, NSW Police, South Sydney City Council, Sydney City Council, Randwick City Council, Botany Bay City Council, Woollahra Municipal Council, Department of Transport and Sydney Buses.



25. The LAIP shall include a comprehensive consultation process, including the agencies represented in Condition 24 as well as community, business and bicycle groups and shall be in accordance with the process identified in Appendix F of the Director-General's report. The consultative process shall also include affected communities.

The key objectives of the LAIP shall be to improve the amenity and safety of local roads and public spaces by restricting through traffic and ensuring that alternative routes for traffic wishing to avoid the toll is relatively unattractive. Any measures arising from the LAIP shall require the approval of the relevant local council traffic management committees. The Proponent shall meet the full costs of works which are required to regulate and guard against intrusive traffic directly attributable to the construction and operation of the proposal including consideration of toll avoidance, diversions, construction traffic or as otherwise agreed to by the relevant local council traffic management committees.

26. Prior to the implementation of the LAIP, the Proponent shall ensure that there is appropriate environmental impact assessment of any measures to be implemented and adequate involvement of the local council(s), community and local business groups.
27. Prior to the operator collecting any toll, the Proponent shall have in place to the greatest extent practicable and have agreed on all funding requirements for the necessary LAIP measures referred to in Conditions 24 and 25 to the satisfaction of the Technical Advisory Committee. Despite the above, the implementation of such measures including any associated construction works shall be fully completed within 6 months of commencement of toll collection. Any extension of time for the full implementation of the LAIP measures shall be specifically approved by the Minister following consultation with the relevant local councils.

## **Project Design**

### Moore Park

28. The south-bound on ramp in the vicinity of Moore Park shall be removed and the southbound surface roads shall be moved as far west as possible (to minimise the extent of land take of Moore Park) but retain the 'Parkway' landscape theme.

### Mill Pond Road

29. The Proponent shall provide a report to the satisfaction of the Director-General and within 12 months of this approval, on the provision of a full or partial interchange at Mill Pond Road. The report shall be prepared in consultation with the FAC, relevant local Council(s), Port industry, business and community groups and shall include traffic impact assessment, concept design options, cost estimates, environmental assessment and economics. The proposal shall be modified in accordance with any recommendation by the Director General resulting from this report.

### Link Road

30. The Proponent shall provide a report to the satisfaction of the Director-General and



within 12 months of this approval, on the provision of a full or partial interchange between the motorway and Link Road. The report shall be prepared in consultation with the relevant local Council(s), business and community groups and shall include traffic impact assessment, concept design options, cost estimates, environmental assessment and economic assessment. The proposal shall be modified in accordance with any recommendation by the Director-General resulting from this report.

31. Traffic signals shall be installed at the intersection of Link Road with the northbound surface road leaving Southern Cross Drive as per the original EIS concept unless it can be demonstrated to the satisfaction of the Director-General that not providing traffic signals would not introduce safety impacts due to conflicting weaving and merging.

#### Southern Cross Drive

32. The Proponent shall investigate and report to the Director-General within 6 months of the date of this approval the practicality and feasibility of providing peak period transit (i.e T2) lanes on both sides of Southern Cross Drive giving preference for high occupancy vehicles and heavy vehicles consistent with the principles of demand management. The Proponent shall implement any such measures in relation to transit lanes as directed by the Director-General.

#### William Street East-West Tunnel

33. The proposal shall be designed so that it does not prevent the construction of an east-west cross city road tunnel in the William Street area.

### **Property Matters**

#### General

34. Prior to the placement of permanent rock anchors, the Proponent shall notify the owners of all affected properties outside the existing boundary identified in South Sydney City LEP requiring developments to be referred to the RTA (as of the date of the EIS exhibition), of the need for placement of permanent rock anchors. The Proponent shall provide sufficient detail to each owner to enable the precise location of such anchors relative to existing buildings to be determined. The Proponent shall ensure if necessary, adjustments to construction methods, at no cost to the property owner, to ensure that the placement of any rock anchors or other such construction stage measure does not impose any restrictions on potential development of the affected property unless otherwise agreed by the landowner.
35. Prior to the placement of temporary soil anchors the Proponent shall notify all affected property owners of the need for placement of temporary soil anchors and shall provide sufficient detail to determine the precise location of such anchors relative to existing buildings. The Proponent shall instigate, if necessary, adjustments to construction methods at no cost to the property owner, to ensure that the placement of any temporary soil anchors or other such construction stage measure does not impose any



- restrictions on development (existing or proposed) along South Dowling Street unless otherwise agreed to by the landowner.
36. Once construction is complete all soil anchors shall be disconnected and made obsolete and no restrictions shall be placed on the use of the land.
  37. Structural surveys shall be undertaken for all buildings and major structures located within 50 metres of the tunnel works (100 metres for sensitive buildings) and for all heritage buildings as identified in the Conservation Management Strategy referred to in Condition 125 prior to commencement of construction works or other major vibration inducing construction activities in the vicinity of such buildings/structures. A copy of the survey shall be given to each affected property owner together with information on how to pursue a claim for damage. The Proponent shall ensure that any damages occurring as a result of the construction are fully rectified at no cost to the owner(s).
  38. The Proponent shall notify the owner of any property that is to be adjusted, acquired or for which an easement is to be obtained. This notice shall contain sufficient details to identify the land of interest being adjusted/acquired and is to include dimensions, location with respect to boundaries and any other information necessary to enable the identification of the land in relation to the development. This notification shall be given prior to access for construction purposes.
  39. The acquisition of any land shall be in a responsive and sensitive manner and in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*.
  40. Alternative access arrangements shall be provided to the reasonable satisfaction of the relevant council to any property or public area which would otherwise be denied access as a result of the construction or operation of the proposal. Such alternative access shall be provided at an appropriate standard to the reasonable satisfaction of the relevant council. Any temporary access road(s) shall be removed and any affected areas reinstated to the reasonable satisfaction of the relevant council when no longer required.
  41. All affected property (including any affected buildings, structures, lawns, trees, sheds, gardens etc.) shall be fully restored to at least the condition it was in prior to disturbance at no cost to the owner(s). Construction activities undertaken within private property shall be sympathetic to the specific needs of individual property owners particularly in terms of requirements for temporary facilities such as fencing, access to footpaths/ driveways/garages etc.

#### Special Property Acquisition - Kidmans Terrace Area

42. The Proponent shall ensure that an independent assessment of the impact of the detailed design on air quality, settlement, and sub-surface stratum acquisition requirements at 1-7 Kidman Terrace and 138-142 Cathedral Street is undertaken in consultation with the owners, the EPA and relevant government agencies. The Proponent shall ensure that such measures are in place in consultation with the affected owners to manage the effects



of the impact within acceptable levels to the satisfaction of the Director-General. Any impact management measures shall also include consideration where appropriate of property acquisition as determined by the independent assessment by a person approved by the Director-General but paid for by the Proponent.

43. The operation of this special acquisition condition where applicable shall not give the Proponent the option of demolition of the existing buildings unless otherwise approved by the Director-General.

## **Urban Design/Landscaping**

### General

44. A detailed Urban Design and Landscape Plan(s) for the entire proposal shall be prepared in consultation with the Royal Botanic Gardens and Domain Trust (RBGDT), Art Gallery of NSW, relevant local Councils, Centennial Park and Moore Park Trust (CPMPT) and to the satisfaction of the Director-General. The Plan(s) shall be prepared by a suitably qualified urban designer. The Plan(s) shall include but not be limited to:

#### *Urban Design Issues*

- proposed structures or fixtures including retaining walls, tunnel portals, ventilation shafts, tunnel walls, pedestrian bridges, noise walls, paving materials and lane barriers;
- emergency phone locations;
- street furniture and fixtures including planter boxes, lighting, fencing, signage;
- built elements including the proposed tunnel pump station in Moore Park, ventilation stacks and toll booths;
- footpaths and pedestrian crossings;
- proposed treatments, finishes and materials of exposed surfaces. Colours, specifications and samples should be detailed;
- proposals if any for community art or interpretation in public spaces along the proposal;
- measures proposed to ameliorate visual impact along the route should be highlighted; and,
- the location and design of road and pedestrian/cycle signage.

#### *Specific Landscape Issues*

- the location and type of new and existing plants and details of hard and soft landscaping features including mounds, terraces and retaining walls, road medians and roadside planting; and,
- timing and staging of works; methodology; monitoring and maintenance.



Moore Park

45. A Management Plan (Construction Stage) shall be prepared for the Moore Park/Drivers Triangle in consultation with the Centennial and Moore Park Trust (CPMPT), South Sydney City Council and key user groups. The Plan shall be prepared to the satisfaction of the Director-General and shall address all aspects of construction stage impacts on Moore Park/Drivers Triangle, including but not limited to:

- relocation of kindergarten;
- details of hours of operation, activities undertaken, contacts for information or to lodge complaints, construction site area, temporary work boundaries, access, truck routes in the vicinity of the Park, site layout, location of spoil stockpiles, means to ensure Park user safety, location of security fencing, protection and monitoring the health of trees, erosion and sedimentation controls, dust and noise mitigation proposals;
- protection of the amenity of the leisure centre;
- temporary roads within the park including liability issues, access arrangements;
- limitations on provision for parking for construction employees to reduce impact on Moore Park;
- provisions for the storage and disposal of waste material;
- impacts on bore water supply;
- stormwater and flood management;
- design and details relating to the construction of the tunnel pump station, detention basins and enlargement of earth mounds;
- erosion and sedimentation control and other water pollution issues;
- provision of permanent landscaping to obviate the need for temporary landscaping;
- temporary loss of playing field facilities and proposed compensation strategies;
- vehicle and pedestrian access particularly during major events including event management strategy;
- concrete batching plant (if required) including environmental impact assessment and approvals;
- impacts, monitoring and protection of heritage items particularly Comrie Fountain, Anzac Parade Ceremonial Columns and Obelisk; 3 stone boundary piers at the Frank Saywell Kindergarten and the Rennee Fountain;
- schedule of any trees to be lost/relocated, monitoring of trees (existing and newly planted), impacts on native fauna;
- collection and disposal of groundwater;
- potential settlement issues due to groundwater changes;
- noise and air quality monitoring and mitigation;
- flooding and potential works to existing flood regime, discharges to Park's drainage system, erosion and sedimentation control, detention capacity;
- contaminated material, excavation, management and disposal; and,
- services including provision for service maintenance, and access.

46. A detailed Landscape Plan shall be prepared in consultation with CPMPT and relevant Councils and to the satisfaction of the Director-General for the landscaping/



rehabilitation and maintenance of Moore Park and Drivers Triangle and shall include aspects relating to motorway stormwater management and control. The Plan shall include but not be limited to:

- surfacing treatment, remediation of construction compound;
- location and types of new and existing plants and details of landscaping features including mounds, terraces and retaining walls;
- proposed gateway treatments and measures to enhance the setting of heritage items;
- reinstatement of areas through landscaping, land forming, plantings, replantings and park boundary definition, security fencing and landscaping;
- details on quantity, collection, storage and disposal of water collected from the motorway, including use for irrigation, methods to ensure public safety, procedures adopted in case of pump failure and monitoring requirements;
- appearance, architectural form, material and finish of tunnel portal facade, tunnel pumping station and any associated above ground facilities within Moore Park;
- protection/public safety issues relating to open slot through Drivers Triangle;
- urban design, public art and landscape vistas and acknowledgement of the gateway function of South Dowling Street particularly during the Olympic games;
- location, size, and styles of signing;
- monitoring of trees until total recovery achieved, and
- rehabilitation and embellishment proposals upon completion of construction activities.

Particular attention shall be given to design and landscaping proposals for Moore Park at the eastern edge of the road proposal including but not limited to soil types, depth of soil for landscaping purposes, types of plants proposed and their location, footpaths and lighting.

Costs for all works associated with the reorganisation and rehabilitation of Moore Park shall be in agreement with CPMPT.

47. A suitably qualified tree surgeon or arborist shall be present during any excavation within the vicinity of the any significant trees as identified by the CPMPT that are not to be removed or relocated and to undertake any root pruning if required. The Proponent shall ensure that the condition of any trees affected are monitored throughout and for 12 months after construction. Any measures necessary to ensure the survival of the trees shall be undertaken (e.g. fencing, watering fertilising) to the satisfaction of CPMPT.
48. Maintenance of all landscaping (including the health of the trees) shall be provided outside of all property boundaries affected by the proposal for at least one year from the date of commissioning of the motorway or as otherwise agreed to by CPMPT.

#### Royal Botanic Gardens/Domain/Art Gallery

49. A specific Management Plan (Construction Stage) for the Royal Botanic Gardens/Domain/Art Gallery area shall be prepared to the satisfaction of the Director-General



and in consultation with the Royal Botanic Gardens and Domain Trust (RBGDT), Art Gallery, Sydney City Council and key user groups. The Plan shall address all aspects of construction and operation stage impacts on the Royal Botanic Gardens/Domain /Art Gallery, including but not limited to:

- details on hours of operation, activities undertaken, contacts for information or to lodge complaints, means to ensure public safety, location of security fencing, protection and monitoring the health of trees and noise mitigation proposals;
  - protection of the amenity of the Art Gallery;
  - provision of permanent landscaping to obviate the need for temporary landscaping;
  - temporary loss of recreation areas and proposed mitigation strategies;
  - impacts, monitoring and protection of heritage items including requirements for a Conservation Management Plan;
  - schedule of trees to be lost, monitoring of trees (existing and newly planted) and impacts on native fauna;
  - collection and disposal of groundwater, potential settlement issues due to groundwater changes;
  - noise and air quality monitoring and mitigation; and
  - services including provision for service maintenance, and access.
50. No construction compounds, site offices, storage or stockpiling of materials, parking of trucks or trade vehicles, access roads, temporary or permanent pollution controls shall be permitted in the grounds of the Art Gallery, Botanic Gardens or the Domain without the approval of the RBGDT and the Art Gallery.
51. Prior to commencement of substantial construction of the cover near the Art Gallery, an Urban Design and Landscape Plan(s) shall be prepared in consultation with Sydney City Council and Art Gallery and to the satisfaction of RBGDT addressing all aspects of the design detailing and landscaping of the cover and associated toll plaza including but not limited to:
- surfacing treatment, remediation of construction compound(s)/work sites;
  - reinstatement of areas through landscaping, land forming, plantings and boundary definition, security fencing and landscaping;
  - protection/public safety issues relating to tunnel portals;
  - the location and type of new and existing plants and details of hard and soft landscaping features including mounds, terraces and retaining walls;
  - proposed structures or fixtures including retaining wall; portals; ventilation shafts, tunnel walls; pedestrian bridges; noise walls; paving materials; lane barriers and the toll plaza;
  - furniture and fixtures in the public domain including planter boxes, lighting, fencing, signage;
  - footpaths and pedestrian crossings;
  - proposed treatments, finishes and materials of exposed surfaces. Colours, specifications and samples should be detailed;
  - design of noise mitigation;
  - proposals (if any) for community art or interpretation in public spaces;



- measures proposed to ameliorate visual impacts along the route;
- the location and design of road and pedestrian/cycle signage; and
- monitoring and maintenance of landscaping works.

Costs for all works shall be as agreed with RBGDT.

#### Other Specific Urban Design Aspects

52. Prior to the commencement of substantial construction of footpaths, parking and associated facilities in areas on the western side of South Dowling Street (between Fitzroy and Maddison Streets) or within such time as agreed by the Director-General, an Urban Design and Landscape Plan shall be prepared in consultation with South Sydney City Council, local residents and CPMPT, for the specific treatments and landscaping proposals for the western side of South Dowling Street between Fitzroy Street and Maddison Street to the satisfaction of the Director-General. The Plan should clearly communicate details for footpaths, parking, traffic calming measures (if any), landscaping, furniture and fixtures in the public domain.
53. Urban design plans and details relating to the elevated structure to support the Telstra optical fibre cable shall be prepared and submitted in consultation with CPMPT and South Sydney City Council and for the approval of the Director-General. The details shall include:
  - justification of elevated support structure and consideration of alternative methods including relocation and/or burying beneath the roadway;
  - exact location and urban design aspects of the elevated structure including finishes and materials.
54. Prior to the commencement of substantial construction in the Woolloomooloo area or within such time as agreed by the Director-General, urban design aspects of the pedestrian bridges, toll plaza and toll control building in Woolloomooloo and the service building at Cathedral Street shall be submitted for the approval of the Director-General. Details should include the exact locations, designs, finishes and materials proposed for the structures.
55. A specific Urban Design and Landscape Plan for the upgrading of any affected existing open space and any new public spaces created by surplus land resulting from the proposal at Woolloomooloo shall be prepared in consultation with the relevant Councils, the Department of Housing and relevant community groups as nominated to the satisfaction of the Director-General.
56. Urban design guidelines shall be prepared in consultation with the relevant Councils, describing but not restricted to: building height, bulk, external materials and setbacks for redevelopment sites at:
  - Palmer Street, Woolloomooloo bounded by William Street, Egan Place and Cathedral Street;
  - Palmer Street, East Sydney bounded by Stanley Street, Wisdom Lane and Barnett



- Lane; and,
- the RTA owned land at Drivers Triangle between South Dowling Street and Hutchinson Place.

## Groundwater

### Groundwater Management Procedure

57. A detailed Groundwater Management Procedure shall be prepared to meet the requirements of DLaWC and the EPA. The Procedure shall cover the complete proposal and shall provide details of groundwater control measures to be undertaken during both the construction and operation stages and include but not limited to: impacts on nearby structures from potential settlement; impacts on existing authorised groundwater users; groundwater inflow control; handling; treatment and disposal of contaminated groundwater; monitoring; auditing; measures for dealing with exceedances; and response actions. Approval from DLaWC shall be obtained prior to the commencement of any dewatering work.

### Construction Stage Dewatering in Botany Bay Sand Aquifer

58. The design of the motorway shall be a fully tanked water tight structure in accordance with the report AJ9707.27 *Groundwater Related Impacts of the Eastern Distributor* prepared by C.M. Jewell & Associates P/L unless otherwise agreed by DLaWC.
59. A detailed settlement study specific to construction stage dewatering within the Botany Bay sands aquifer shall be conducted to the satisfaction of DLaWC to determine the potential extent of settlement and the structures that will need to be protected through reinjection.
60. Building surveys shall be conducted where differential settlement due to dewatering is predicted to exceed 10 mm, unless otherwise agreed to by the DLaWC;
61. A Groundwater ReInjection Procedure shall be prepared and implemented to the satisfaction of DLaWC and shall include:-
- details on affected community consultation procedures;
  - identification of sensitive structures requiring reinjection;
  - identification of borehole spacing, borehole design, injection pipework, monitoring pipework and general system design and redevelopment; and,
  - a detailed monitoring plan identifying piezometers locations, construction details, monitoring frequency and analysis requirements.
62. The groundwater monitoring system shall comprise a mix of standpipe piezometers installed by direct push techniques and 50mm piezometers installed by conventional drilling. Slim piezometers shall also be used to monitor groundwater levels at identified vulnerable structures and a selection of the 50mm piezometers shall be



fitted with transducers and data loggers for continuous groundwater level monitoring to the satisfaction of DLaWC.

63. Preconstruction groundwater quality samples shall be collected from the 50mm piezometer network referred to in Condition 62 and fortnightly monitoring shall take place during construction.
64. Licensable groundwater works shall only be undertaken by drilling contractors who hold a current Drillers Licence issued by DLaWC with appropriate endorsement for the nature of the work required.
65. A conventional spear point system shall be used to the satisfaction of DLaWC for areas of the excavation where risks to structures are high and where it is desirable to install the system before excavation begins or desirable to locate the system outside the excavation for other reasons.

#### Groundwater Users

66. All existing registered bores within 400 metres of the excavation shall be monitored to the satisfaction of DLaWC. The 400 metre zone shall be extended at the request of DLaWC if required. The Proponent shall ensure minimum impact on the supply of water at these bores and undertake any necessary measures to provide alternative supplies to the satisfaction of DLaWC to minimise any impact.

#### Tunnel Section

67. Groundwater inflow into the tunnel shall be controlled during the construction and operational stage so as not to exceed 25 litres per second per kilometre or as otherwise approved by the DLaWC.
68. Piezometers shall be installed at locations and to standards as specified by the DLaWC prior to tunnel construction commencement.

#### **Settlement**

69. Detailed settlement analysis of representative geological conditions shall be undertaken prior to construction commencement adjacent to buildings to ensure that underground services, infrastructure and adjacent buildings will not experience settlements exceeding the criteria in Table 1. The analysis shall be made publicly available.



**Table 1 Settlement Criteria for Specific Structures**

Beneath Structure/Facility	Maximum Settlement	Maximum Angular Distortion
Buildings		
- Low or non sensitive buildings (i.e. $\leq 2$ levels and car parks).	30 mm	1 in 350
- High or sensitive buildings (i.e. $\geq 3$ levels and heritage buildings <sup>3</sup> ).	20 mm	1 in 500
Roads and Parking areas	40 mm	1 in 250
Parks	50 mm	1 in 250
Critical utilities (including Busby's Bore)	to be determined by the relevant authorities	to be determined by the relevant authorities

70. The settlement criteria shall not remove any responsibility from the Proponent for the protection of existing structures or for rectifying any damages.
71. Settlement criteria for individual sensitive utility structures including Busby's Bore, SWC services (i.e. brick sewers, BOOS) and telecommunication services, shall be determined in consultation with the relevant authorities prior to construction commencement.
72. Settlement shall be monitored throughout the construction period and for a period of not less than 12 months after construction to the satisfaction of the Director-General and paid for by the Proponent. The monitoring system shall be able to provide adequate forewarning of any significant subsidence of the ground surface. The monitoring shall also continue at appropriate intervals and frequency during the operation stage. If monitoring during construction indicates exceedance of the criteria then all work shall cease immediately and work shall not resume until fully rectified.

<sup>3</sup> As identified in the report by Godden Mackay 1997, *Eastern Distributor Conservation Management Strategy*



## Noise and Vibration

### Noise and Vibration Management Procedure

73. A detailed Noise and Vibration Management Procedure shall be prepared as part of the EMP(s) referred to in Conditions 9 and 12 to the satisfaction of the EPA. The Procedure shall provide details of noise and vibration control measures to be undertaken during both the construction and operation stages sufficient to address the technical requirements for any EPA approvals/licences.

The Procedure shall include, but not be limited to, tests for ascertaining acoustic parameters; anticipated airborne noise and vibration for all major noise and vibration generating activities and locations and durations of these activities; impacts from site compounds/construction depots; location, type and timing of erection of temporary and permanent noise barriers; specific physical and managerial measures for controlling noise and vibration; noise and vibration control equipment to be fitted to machinery; predicted noise and vibration levels at sensitive receivers; noise and vibration monitoring and reporting procedures; measures for dealing with exceedances; arrangements to inform residents of construction activities likely to affect their noise amenity; contact point for residents; complaints handling systems; reporting of complaints and response actions.

The Procedure shall be prepared prior to the construction and operation (as appropriate) of the noise or vibration generating activities and shall be made publicly available.

### Construction Noise and Vibration

#### *Construction Hours*

74. All construction activities including entry and departure of heavy vehicles shall be restricted to the hours 7.00 am to 6.00 pm (Monday to Friday); 7.00 am to 1.00 pm (Saturday) and at no time on Sundays and public holidays.

Works outside these hours which may be permitted include:

- any works which do not cause noise emissions to be audible at any nearby residential property;
- the delivery of materials which is required outside these hours as requested by police or other authorities for safety reasons;
- emergency work to avoid the loss of lives, property and/or to prevent environmental harm; and
- any other work as approved by the EPA.

Any work outside the hours specified shall be subject to approval from the EPA. Public notification shall be in a manner to the satisfaction of the EPA.



*Construction Noise Impact Assessments*

75. A specific noise impact statement shall be prepared for each stage of construction consistent with the noise management procedure identified above. The statement shall include:
- description of proposed processes and activities;
  - examination of alternative methods that would potentially reduce noise impact;
  - assessment of potential noise from proposed construction methods;
  - description and commitment to work practices which limit noise;
  - description of specific noise mitigation treatments and time restrictions;
  - justification for any activities outside the normal hours specified by the EPA;
  - consideration of construction vehicle movements;
  - noise impacts of traffic diversions;
  - extent of noise monitoring of construction activities; and,
  - community consultation and notification.

Each noise impact statement shall be prepared in consultation with the relevant Council(s) and be subject to the approval of the EPA as part of the information required to obtain a Pollution Control Approval.

*Noise Level Monitoring/Criteria*

76. Construction noise levels shall be monitored to verify compliance with the requirements specified in the Noise and Vibration Management Procedure. Should monitoring indicate exceedance, the Proponent shall ensure consultation with the EPA and shall ensure the implementation of any additional mitigation measures as required. In any event construction noise shall be within the following criteria unless otherwise agreed with the EPA:
- For a construction period of four weeks and under, the  $L_{10}$  level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 20dB(A).
  - For a construction period of greater than four weeks and not exceeding 26 weeks, the  $L_{10}$  level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 10dB(A).
  - For a construction period greater than 26 weeks, the  $L_{10}$  level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background noise level by more than 5 dB(A).
77. Construction noise for the project shall comply with the EPA's Environmental Noise Control Manual (ENCM) Chapter 171 standard noise control conditions for construction, except where there is sufficient justification and all reasonable



mitigation measures have been undertaken to the satisfaction of the EPA.

### *Blasting*

78. Prior to any blasting being undertaken a "Blasting Management Strategy" shall be prepared in accordance with Chapter 154 of the EPA's ENCM to the satisfaction of the EPA.
79. For any section of the tunnel construction where blasting is proposed, a series of initial trials at reduced scale shall be conducted prior to production blasting to determine site-specific blast response characteristics and to define allowable blast sizes to meet ANZECC guidelines presented in 'Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (1990)'.
80. If necessary air blast control doors shall be erected at tunnel portals to reduce air blast emissions from blasting in the tunnels, until tunnel construction has advanced to a stage where emission levels without the doors comply with ANZECC limits.
81. Blasting shall only be undertaken between the hours of 9am and 5pm (Monday to Friday) and 9am to 1pm on Saturdays and at no time on Sundays or Public Holidays, unless otherwise approved by the EPA.

### *Vibration/Structural Borne Noise*

82. The vibration level due to construction activities including both above ground and underground work shall meet the requirements of the EPA as specified in its pollution control approval and/or licence. In general the EPA's noise control manual dealing with Vibration in Buildings in Chapter 174 of the ENCM (1994) shall be applied for all buildings potentially affected unless otherwise agreed to by the EPA.
83. Consultation with the Director-General shall be undertaken in terms of appropriate vibration criteria due to tunnelling or any other construction activities as to their impacts on heritage buildings or structures. Unless otherwise specified by the Director-General, vibration levels shall not exceed 3mm/s within 20 metres of Busby's Bore.
84. No on-site concrete batching plant shall be allowed unless otherwise approved by the EPA.

### Operational Noise

85. Monitoring of the operational traffic noise shall be undertaken as part of the Noise and Vibration Management Procedure. The Proponent shall, in consultation with the EPA, assess the adequacy of the traffic noise mitigation measures. Should the assessment indicate a clear trend in traffic noise levels which are not consistent with the general predictions made in the Appendix N of the RTA's Representation Report, the Proponent shall ensure the implementation of further noise mitigation measures if practicable and cost effective to the satisfaction of the EPA.



86. Prior to installation of permanent noise control measures the Proponent shall, in consultation with the EPA, ensure that further investigations are conducted into the feasibility and cost effectiveness of additional noise mitigation measures using the EPA's noise criteria as the target.
87. Fixed plant associated with the proposal including ventilation stacks, equipment, fans, water pumping stations etc, shall be designed to comply with EPA criteria for stationary sources as outlined in Chapter 19-21 of the ENCM.

## Air Quality

### Construction Stage

88. A specific Dust Management Procedure (DMP) shall be prepared to the satisfaction of the EPA. The Procedure shall provide details of all dust control measures to be implemented during the construction stage sufficient to address the technical requirements for any EPA approvals/licences. The DMP shall include measures to reduce dust from stockpiles and cleared areas or other exposed surfaces. The measures such as temporary planting of stockpiles and progressive rehabilitation of any exposed areas should be designed to achieve EPA local air quality protection goals.
89. All construction vehicles shall be maintained and covered to prevent any loss of load whether in the form of dust, liquid, solids or otherwise and shall be maintained in such a manner that they will not track mud, dirt or other material onto any street which is opened and accessible to the public. Without limiting the generality of this requirement, the Proponent shall install and maintain a wheel wash facility for effective wheel cleaning of construction equipment prior to it leaving construction areas and/or other such devices to ensure that material from construction vehicle tyres are not deposited on nearby streets.
90. No open burning or incineration shall be permitted on site.

### Operation Stage

91. As part of the EMP referred to in Condition 12, a detailed Air Quality Management Procedure shall be prepared to the satisfaction of the EPA.  
  
The Procedure shall provide details of air quality control measures to be undertaken during the operation stage and shall reference health-based regional ambient air quality goals as specified in condition 92.
92. Unless otherwise approved by the EPA, the Air Quality Management Procedure, referred to in Condition 91 shall in relation to the tunnel vents and tunnel portals have regard for both the current health-based regional ambient air quality goals:
  - NO<sub>2</sub> - One hour average of 320 µg/m<sup>3</sup> (0.16 ppm);
  - PM<sub>10</sub> - 24 hour average of 150 µg/m<sup>3</sup> and,



and the following emerging health-based ambient air quality goals:

- NO<sub>2</sub> - One hour average of 256 µg/m<sup>3</sup> (0.125 ppm)
- PM<sub>10</sub> - 24 hour average of 50 µg/m<sup>3</sup>

In the Procedure, there shall also be regard for both short-term and long-term strategies, including source control, especially of diesel vehicle emissions, that might be necessary if the emerging health-based regional ambient air quality goals are to be met.

93. Wind tunnel testing shall be undertaken of the tunnel ventilation stacks and of the northern and southern tunnel portals in a manner approved by the EPA.
94. The tunnel ventilation system(s) shall be designed and operated so that the World Health Organisation (WHO) 15-min carbon monoxide (CO) goal of 87 ppm is not exceeded under any conditions.
95. The ventilation stacks shall be located as specified in the modified proposal and the top of the stack shall not exceed 26 metres from ground level unless otherwise agreed by the EPA.
96. The ventilation stacks(s) shall be designed in consultation with South Sydney City Council and shall be architecturally sympathetic with other development in the vicinity.

### **Flora and Fauna**

97. If, during the course of construction any threatened flora or fauna species are encountered, the Director-General of the NPWS shall be advised immediately. No activity which places any of these species at risk shall be undertaken until advice has been received from the NPWS. All recommendations by the NPWS shall be complied with prior to any works likely to affect any threatened species.

### **Spoil Disposal and Waste Management**

#### Spoil Disposal

98. The Proponent shall ensure the preparation and submission of a Spoil Management Plan. This Plan shall identify requirements for handling, stockpiling and disposal of all spoil. The Plan shall be prepared in consultation with the EPA and relevant Councils before the commencement of substantial construction at relevant sites.
99. Prior to commencement of construction at various relevant sites where spoil is to be generated the Proponent shall ensure that the EPA and any other relevant authority is provided with details of the locations where spoil will be disposed.



100. All clean and/or treated spoil shall be reused or recycled wherever it is possible and cost effective to do so. The Proponent shall ensure that spoil generated from construction activities is maximised in preference to any import of fill.
101. No spoil, material or item of equipment shall be disposed of in the ocean.
102. The Proponent shall arrange for the relevant Councils to obtain detailed plans for the routes and access points to be used by construction traffic. These shall not be varied unless otherwise agreed to by the relevant local council traffic management committees.
103. Truck access shall only be via state and regional roads unless otherwise agreed to by the relevant local council traffic management committees.

#### Contaminated Spoil

104. Tests shall be carried out during the site investigation stage of the project to assess the type, extent and concentration of soil contamination. Measures for handling, treatment and disposal of the contaminated material shall be approved by the EPA before any likely disturbance.
105. Disposal of any contaminated material shall only be to a landfill approved by the EPA.
106. Dilution of contaminated spoil with clean spoil shall not be undertaken, unless otherwise approved by the EPA.
107. The Proponent shall ensure that the cost of treatment of any contaminated spoil on-site and for reuse is investigated and if cost effective implemented to the satisfaction of the EPA prior to commencement of spoil disposal.

#### Waste Management and/or Recycling

108. As part of the EMP referred to in Conditions 9 and 12, a detailed Waste Management and Reuse Procedure shall be prepared to address the management of wastes during both the construction and operation stages. The Procedure shall be prepared prior to construction and operation as appropriate and shall identify requirements for waste avoidance, reduction, reuse and recycling. It shall also detail requirements for handling, stockpiling and disposal of wastes specifically spoil, concrete, contaminated soil or water, demolition material, cleared vegetation, oils, greases, lubricants, sanitary wastes, timber, glass, metal etc. It shall also identify any site for final disposal of any material and any remedial works required at the disposal site before accepting the material. Any waste material which is unable to be reused, reprocessed or recycled shall be disposed at a landfill licensed by the EPA to receive that type of waste. The Procedure shall be framed using the waste minimisation hierarchy principles of avoid-reuse-recycle-disposal.
109. The demand for water for construction purposes shall be kept to a minimum. The project shall incorporate water use reduction initiatives including reuse of water and



recycling to the maximum extent practicably possible.

110. An Action Plan shall be prepared to the satisfaction of the Director-General to promote the use of recycled materials including construction and landscape materials. The Plan shall detail how the proposal gives consideration and support to the Government's *Waste Reduction and Purchasing Policy*. The Plan shall also include details on measures to implement energy conservation best practice.

## **Flooding and Water Quality**

### Flooding and Stormwater Management

111. A detailed Stormwater Management Procedure shall be prepared in consultation with EPA, DLaWC, CPMPT, SWC and the relevant Councils. The Procedure shall provide details on catchment analysis (including localised flooding as recognised by the relevant local Councils), existing drainage systems and capacity, drainage changes resulting from the proposal and implications for the system, detention requirements and environmental impacts of such. Agreement shall be reached with the relevant Council(s) on appropriate and specific measures to be implemented at various locations.
112. All stormwater flows from the motorway shall be detained through appropriate measures to ensure that there is no exacerbation of existing flooding to the satisfaction of DLaWC. Agreement shall be reached with the relevant Councils on appropriate and specific measures to be implemented at various locations.
113. Drainage from the tunnel shall be designed to take into account the 100 year Average Recurrence Interval rainfall event or portal catchment zone, seepage inflow, fire fighting contaminated water and spillage.
114. Seepage, spillages, contaminated water, tunnel washing, fire fighting or other water in the tunnel which is likely to contain pollutant levels above the background concentrations of natural discharge points shall be directed into separate sumps with pump out facilities. This water shall not be discharged to the stormwater system unless otherwise agreed by the EPA.

### Soil and Water Management Procedure

115. As part of the EMP(s) referred to in Conditions 9 and 12, a detailed Soil and Water Quality Management Procedure shall be prepared to the satisfaction of EPA and in consultation with DLaWC, Sydney Water and the relevant Councils. The Procedure shall provide details of pollution control measures to be undertaken during both the construction and operation stages sufficient to address the technical requirements for obtaining relevant EPA approvals/licences.

The Soil and Water Quality Management Procedure shall include, but not be limited to:- identification of baseline stream water quality monitoring; environmental limits/criteria; performance objectives; measures to handle and dispose of stormwater; effluent and contaminated water and soil; the capacity of the proposed on-site



detention systems to contain all runoff; procedures for analysing the degree of contamination of potentially contaminated water; sedimentation and control measures to prevent erosion and pollution; measures of dealing with overland flow; measures for the use of water reclaimed or recycled on-site; and a monitoring program including monitoring of baseline stream water quality at locations potentially affected by the construction and operation of the proposal.

The Procedure shall have regard to the criteria and principles detailed in the draft reports on *Managing Urban Stormwater* prepared by the EPA for the State Stormwater Co-ordinating Committee and the Department of Housing's *Soil and Water Management for Urban Development*.

#### Construction Stage Water Pollution Control Measures

116. The Soil and Water Management Procedure shall incorporate a detailed Erosion and Sedimentation Control Plan and Site Rehabilitation Plan which shall be prepared and submitted to the satisfaction of DLaWC and EPA to satisfy the technical information requirements for issuing of all relevant pollution control approvals and licences. The Plan shall include details of the location and design criteria for erosion and sediment control measures and shall specifically address measures for treatment of stormwater before disposal including performance objectives as required in the EPA Pollution Control Approval. The measures shall follow the RTA's *Guidelines for the Control of Erosion and Sedimentation in Roadworks* and DLaWC's *Urban Erosion and Sediment Control*.
117. The Proponent shall ensure that all soil and erosion and sediment control works are completed and in place prior to the commencement of any works that may have the potential to generate soil erosion or sediment. Erosion and sediment protection measures shall also be in place before the commencement of any stockpiling activities.
118. The Proponent shall ensure that tests are carried out in advance of excavation to test for the presence of acid sulfate soil in all areas to be disturbed by the proposal. Areas requiring particular detailed attention shall include the area between Art Gallery Road to Cathedral Street. Should acid sulfate soils be found then a detailed Acid Sulfate Soil Management Plan shall be prepared to the satisfaction of the EPA and DLaWC prior to any additional construction activity taking place in the area affected. The Plan shall be prepared in accordance with the EPA's guideline *Assessing and Managing Acid Sulfate Soils*.
119. All water collected during construction, including water drained from the tunnel (portal entry, seepage, groundwater influx) and from dewatering of major cuttings, which is likely to be contaminated shall be tested, treated, handled and disposed of to the satisfaction of the EPA.

#### Operational Stage Water Pollution Control Measures

120. All stormwater and wastewater systems of the proposal shall be designed, constructed,



operated and maintained to meet the requirements of the relevant authorities including EPA, SWC and relevant Councils.

121. In addition to trap gullies and trashracks the Proponent shall ensure the investigation into the cost effectiveness of incorporating detention systems for containing spills and materials arising from accidents and install appropriate detention systems to the satisfaction of the EPA. The Proponent shall also ensure the investigation into the cost of removal of sediment, oil and grease.
122. Provision shall be made for retention and treatment of fire water (to the equivalent retained volume of 30 minutes of fire containment operations) so that it is not directly discharged to stormwater drains.

### **Businesses**

123. A detailed Signage Plan shall be prepared in consultation with the relevant local traffic committee and all potentially affected businesses with an objective of minimising impact on local businesses during both the construction and operation stage. The Plan shall be prepared to the satisfaction of the relevant local council traffic management committee(s).
124. Adequate access and on-street parking shall be maintained as far as practicable on the northbound lane of South Dowling Street for all properties fronting South Dowling Street during the construction stage consistent with the existing parking provisions and restrictions on South Dowling Street.

### **Heritage and Archaeology**

#### Heritage

125. A Conservation Management Strategy shall be prepared in consultation with the relevant Councils and CPMPT and to the satisfaction of the Director-General to identify and manage heritage items and archaeological resources located within the impact zone of the proposal. The Strategy shall include but not be limited to assessing effects on heritage items including demolition, relocation, physical intrusion in conservation areas and removal of heritage items. The Strategy shall include the need to provide Conservation Management Plans for any item to be relocated or resited, assessment and archival recording of items to be demolished and procedures for carrying out detailed assessment. Any heritage item in Moore Park to be removed or relocated shall only be undertaken following consultation with CPMPT.
126. A detailed settlement analysis shall be undertaken by a suitably qualified geotechnical engineer prior to excavation works in the vicinity of any heritage items identified in the Conservation Management Strategy to establish requirements for control of potential settlement.
127. Prior to commencement of substantial construction activities in areas where heritage buildings may be affected, building surveys shall be undertaken for any heritage items identified in the Conservation Management Strategy. The Proponent shall ensure that



all damages occurring as a result of the construction are fully rectified at no cost to the owner.

128. Any heritage item likely to be destroyed due to construction activities shall be fully documented and recorded for archival purposes prior to the commencement of construction in accordance with Guidelines prepared by the Department of Urban Affairs and Planning and the Heritage Council entitled *How to Prepare Archival Records of Heritage Items* and *Guidelines for Photographic Recording of Heritage Sites, Buildings and Structures*.
129. Complete documentation and recordings shall be lodged with the NSW State Archives Authority and the Mitchell Library. A copy of the black and white interior and exterior negatives shall also be provided to relevant Councils.
130. Conservation Plans shall be prepared and shall identify suitable adaptive reuses for any affected heritage buildings, and include recommendations on how the new uses are to be accommodated in the structures.

#### Archaeology

131. If, during the course of construction, the Proponent becomes aware of any heritage or archaeological material, all work likely to affect the site(s) shall cease immediately and the relevant authorities including NPWS, Heritage Council and the relevant Local Aboriginal Land Council(s) shall be consulted in terms of an appropriate course of action prior to recommencement of work. Any required permits/consents shall be obtained and shall be accompanied by appropriate supporting documentation.

#### **Construction Stage Traffic and Roadworks**

132. As part of the EMP defined in Condition 9, a detailed Construction Traffic Management Procedure shall be prepared prior to the commencement of substantial construction of various affected sites to assess the impacts and management of any temporary road closures, detours or other major disruptions to traffic flows and pedestrian/cyclist access during the construction of the scheme. The Procedure shall be prepared in consultation with the relevant local council traffic management committees and the FAC. The Procedure shall provide details on but not limited to: traffic management principles; timing of road disturbance; measures so as not to discourage public transport; modifications to existing roads and intersections; truck manoeuvring and access to construction sites; spoil and material disposal routes; implications and arrangements for bus and taxi stops; pedestrian/cyclist management; temporary or permanent loss of parking and requirements for adequate signage; co-ordination of construction activities proposed by other major developments; impacts on existing operating conditions and need for temporary improvements; notification to residents affected by proposed road changes; signposting and markings; lighting; speed limiting devices and any other relevant matters. The report shall also address impacts on businesses. No traffic changes including lane and road closures, detours, intersection changes or the like shall occur without prior consultation with the relevant local council traffic management committee(s), DoT and Sydney Buses. In



the case of substantial disagreement as the result of consultations the matter shall be referred to the Director-General for resolution.

133. Prior to the commencement of any substantial construction activities associated with the tunnel section between O'Dea Avenue and Dacey Avenue an investigation shall be undertaken in consultation with the relevant local council traffic management committee(s) and a report prepared on the impact and traffic implications of any diversion of traffic. The report shall also detail construction works to ensure the operational efficiency of any diversion and to minimise impacts on local roads. The report shall also address issues relating to access to properties along South Dowling Street. In the case of substantial disagreement as the result of consultations with the relevant local council traffic management committee(s), the matter shall be referred to the Director-General for resolution.
134. Subject to Condition 133 the Proponent shall ensure the monitoring and provision of a 3 monthly report to the relevant Councils on traffic volumes on the diversion for northbound traffic on South Dowling Street between O'Dea and Crescent Street and shall ensure that all measures are in place to minimise any diversion avoidance in consultation with the relevant Councils.
135. Prior to the commencement of any substantial construction activities resulting in the Bourke Street and Plunkett Street diversion, an investigation shall be undertaken in consultation with the relevant local council traffic management committee(s) and a report prepared into the impact and traffic implications of any diversion of traffic. The report shall also detail construction works to ensure the operational efficiency of any diversion and to minimise impacts on local roads. In the case of substantial disagreement as the result of consultations with the relevant local council traffic management committee(s), the matter shall be referred to the Director-General for resolution.
136. No local roads shall be used by construction traffic unless otherwise agreed by the relevant local council.
137. A road dilapidation report shall be prepared for all non-State roads likely to be used by construction traffic prior to their use by construction traffic and then after construction is complete. Copies of the report shall be provided to all relevant councils. Any road/footpath damage, aside from that resulting from normal wear and tear, shall be repaired to a standard at least equivalent to that existing prior to any disturbance at the cost of the Proponent or as otherwise agreed with the relevant local council(s).
138. Monitoring of any local roads affected by the proposal to be used by heavy vehicle traffic shall be undertaken in consultation with the relevant council(s) to develop measures to minimise and/or restrict use of local roads by heavy vehicle traffic. Details on the intervals and duration for monitoring shall be developed in consultation with the relevant local council(s).



## **Pedestrian/Cyclists**

### Construction Stage

139. Pedestrian and cyclist access shall be provided, without undue inconvenience to pedestrians and cyclists at all times during the construction stage unless otherwise agreed to by the relevant local council(s).
140. The Proponent shall ensure to the satisfaction of CPMPT and the relevant councils that a specific traffic management plan is prepared to deal with major events in the Moore Park precinct including maintenance of high quality and capacity pedestrian/cyclist linkages between Central Station and the Moore Park precinct and identifying situations/ criteria when certain construction activities may need to cease.

### Operation Stage

141. A 4m wide shared vehicle/cyclist lane or alternatives as approved by the Director-General shall be provided on the surface access roads along South Dowling Street, a 2m shoulder on Southern Cross Drive (from Link Road to Wentworth Avenue) and a 1 m shoulder on Southern Cross Drive south of Wentworth Avenue and shall be marked with the appropriate bicycle stencils and signposting in consultation with Bicycle NSW. The shoulders shall be appropriately marked to indicate that no parking is permitted.
142. The Proponent shall ensure consultation with the RTA's Bicycle Co-ordinator and Bicycle NSW and any other relevant cycling group as identified by Bicycle NSW during the detailed design of the proposal in terms of the design of specific cyclist facilities including, provision of on-road facilities, intersection treatments, linemarking, signposting and stencils, drainage grates, and kerb and gutter treatments.

## **Hazards, Risks and Safety**

### Emergency Planning

143. At least 6 months prior to commissioning the proposal an Emergency Response Plan shall be prepared to the satisfaction of the NSW Fire Brigades, the Police and the State Emergency Services. Two months prior to commissioning of the proposal there shall be a thorough testing of emergency procedures and evacuation systems to the satisfaction of the Police and NSW Fire Brigades. Testing thereafter shall be at least annually, or as requested by the relevant authorities.

### Dangerous Goods

144. Dangerous goods as defined in the Motor Traffic Regulation 119A shall not be allowed access to the tunnels of the proposal.



145. A traffic management plan to minimise/avoid movements of dangerous goods through local streets in the Woolloomooloo/Garden Island area and surrounds shall be prepared prior to commissioning of the proposal.

#### Tunnel Design and Operation

146. The tunnel shall incorporate design and operational measures to minimise the likelihood and impact of accidents within the tunnel. These measures shall include fire resistant materials of construction, fire control centres, emergency access doors and stairways, deluge or sprinklers, hydrants and ventilation systems. Fire systems shall be to the satisfaction of the NSW Fire Brigades.
147. A 'traffic incident management system' consistent with the concepts described in the EIS shall be installed prior to the opening of the tunnel to enable control room staff to control traffic and aid drivers during breakdown and accidents.
148. In case of power failure, the tunnel shall have adequate back-up generators to ensure lighting, signs, CCTV and voice control continue to operate until restored.

#### **Utilities and Services**

149. The Proponent shall ensure the identification of services potentially affected by construction activities to determine requirements for diversion, protection and/or support. This shall be undertaken in consultation with the relevant service authority. Any alterations to utilities and services shall be carried out to the satisfaction of the relevant authority(s), and unless otherwise agreed to, at no cost to the service/utility authority.
150. The Proponent shall be responsible for minimising any disruption to services resulting from such work and shall be responsible for advising local residents and businesses prior to disruption to services.

#### **Cumulative Impacts with Construction of New Southern Railway**

151. To minimise the cumulative impacts on the environment which the construction of both projects at the same time may have (i.e. subject to the approval and timing of the M5 East project) the Proponent shall liaise closely with the SRA and incorporate where appropriate a co-ordinated management strategy.
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