

***Cross City Tunnel
Proposed Modifications to
Approved Project***

***Director-General's Report Prepared under
Section 115C of the Environmental Planning and
Assessment Act 1979***

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FORWARD

The Minister for Planning approved the Roads and Traffic Authority's (RTA) proposal to construct the Cross-City tunnel in October 2001, subject to 240 Conditions.

The RTA has sought to modify the approved project so as to increase the benefits of the project, primarily with respect to significantly reduced construction stage impacts and to achieve a better financial return. The key modifications include, among other things, an increase in tunnel length from 1.8 kilometres to 2.1 kilometres, increased tunnel depth, and elimination of cut and cover construction in William and Riley Streets. The RTA has determined that the modifications would be inconsistent with the Minister's Approval.

The proposed modifications are subject to Division 4, Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The RTA has sought the approval of the Minister under Section 115BA of the EP&A Act. This Report has been prepared in accordance with Section 115C of the EP&A Act which requires that the Minister obtain a report from the Director-General of the Department of Planning prior to making a decision.

This Report reviews the Supplementary Environmental Impact Statement (SEIS), issues raised in representations to the SEIS, the RTA's response to the representations and other relevant matters pertaining to the potential environmental impacts of the proposal.

Based on the representations to the SEIS and further technical studies, the RTA has also sought the Minister for Planning to consider a number of revisions to the requested modification, the major ones including re-establishment of a direct connection from Cowper Wharf Road to the Domain Tunnel, provision of a new ventilation duct tunnel and provision of a landscaped bridge over the Eastern portal.

The Department's assessment concludes that the modification to the approval would not alter, in any substantial way, the ability of the project to meet the key strategic objectives as assessed for the approved project. The Department's assessment of the proposed revisions to the requested modification concludes that, individually and cumulatively, the revisions would reduce the overall environmental impact of the modified proposal subject to recommendations detailed in this Report.

I recommend that the Minister modify the approval, subject to the recommended revisions to the requested modification and further conditions.

Sue Holliday
Director-General

EXECUTIVE SUMMARY

The Proposal

The Minister for Planning approved the RTA's proposal to construct the Cross-City tunnel in October 2001. The project included two road tunnels (approximately 1.8km in length) under the Central CBD between Darling Harbour and Kings Cross. The approved project also includes new connections to the Eastern Distributor and at Sir John Young Crescent. The cost of the project was at the time of the approval estimated to be around \$400 million however the cost of the approved project has since been revised to around \$620 million following more detailed cost evaluations.

Following a comprehensive tendering process, the RTA has sought to modify the approved project so as to increase the benefits of the project, primarily with respect to construction stage impacts and to achieve a better financial return (in consideration of the higher construction costs which would have also applied to the approved activity).

The key modifications include:

- ◆ increase in tunnel length from 1.8 km to 2.1 km;
- ◆ increased tunnel depth;
- ◆ changes to the horizontal and vertical alignment;
- ◆ increase in the height of the ventilation stack in response to more traffic in the tunnel and a greater length of tunnel;
- ◆ incorporation of differential tolling rather than fixed tolling of \$2.50;
- ◆ changes to the connection to the Market Street viaduct;
- ◆ changes to the connection to the Eastern Distributor and associated access changes to William and Palmer Streets;
- ◆ new ramp connection from Ward Avenue providing access to Nield Avenue;
- ◆ increase in the stack height from 49 metres (AHD) to 65 metres (AHD);
- ◆ reduction of the Kings Cross lid from 30 metres to 6 metres; and,
- ◆ changes to traffic connections in Woolloomooloo including loss of direct access from Cowper Wharf Road to the Domain Tunnel.

The proposed modified project is estimated to cost around \$640 million.

Supplementary EIS Exhibition and Modification Approval Process

The RTA as Proponent determined that the modifications have the potential to result in significant environmental impacts and accordingly prepared a Supplementary Environmental Impact Statement (SEIS). The SEIS was exhibited between 1 August 2002 and 31 August 2002.

The modification is subject to assessment under Division 4, Part 5 of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) and the approval of the Minister for Planning is required before the RTA can proceed with the modification to the approved activity.

In accordance with Section 115BA, the RTA sought the approval of the Minister for Planning for the modification on the 4 November 2002. In the letter seeking approval for the modification of the project (as defined in the SEIS), the RTA also sought the Minister to consider further alterations to the project in response to concerns raised in submissions and to reduce the impact of the proposed modification.

This Report has been prepared in accordance with Section 115C (1A) of the EP&A Act which requires the Director-General of the Department of Planning to assess and report to the Minister on the proposed modification. This Report considers the issues raised in all representations received, including those after the exhibition period and in particular considers the additional revisions identified by the RTA.

It is important to note that this Report does not assess issues relating to the modified proposal which are fundamental and integral to the project as a whole (and would not change with the modification) as approval to the project has already been granted. On a statutory basis, the purpose of this assessment is only to assess the approved project to the extent that it is proposed to be modified.

Response by the Public and Proposed Revisions to the Modified Proposal

The Proponent received 1012 representations to the Supplementary EIS. Whilst more than 50% of the representations supported the proposal in principle, many objected to specific elements such as stack emissions, traffic impacts, noise and the eastern portal locations. A primary concern was impacts on local neighbourhoods due to increased traffic and noise and air pollution.

Based on the representations to the Supplementary EIS and further technical studies, the Proponent has sought the Minister for Planning to consider a number of revisions to the proposed modification. The key revisions include:

- ◆ alteration to traffic arrangements in Woolloomooloo;
- ◆ re-establishment of a direct connection from Cowper Wharf Road to the Domain Tunnel;
- ◆ revisions to the Sir John Young Crescent Tunnel exit ramp;
- ◆ provision of a ventilation duct tunnel;
- ◆ replacement of car parking spaces in Rushcutters Bay;
- ◆ provision of a landscaped bridge over the Eastern portal; and,
- ◆ a number of detailed construction issues relating to the above changes and refinements to other associated works.

These revisions have been presented to the public through a Preferred Activity Report (PAR) which was publicly released in late November 2002. The Department received 3 representations on the PAR. Key concerns raised in relation to the revised modified proposal included amenity impacts on the Domain, the impacts of revisions to traffic management in Woolloomooloo and the potential for further relocation of the eastern portal.

The Department assessment of the proposed revisions to the modified proposal concludes that, individually and cumulatively, the revisions would reduce the overall environmental impact of the proposal as described in the Supplementary EIS and have been recommended for consideration by the Minister for Planning as part of the modified proposal.

Need and Justification

The primary objectives of the approved project were:

- ◆ to improve the environmental quality of public space within Central Sydney;
- ◆ to improve ease of access and reliability of travel within Central Sydney; and,
- ◆ to improve the reliability and efficiency of travel between areas east and west of Central Sydney.

The Department concluded that these could be achieved subject to significant enhancement of public transport initiatives and additional offset measures.

The RTA's stated key objectives of the proposed modifications are to:

- ◆ enhance the environmental and transport related benefits of the of the approved activity
- ◆ reduce the construction impacts of the approved activity; and,
- ◆ to maintain acceptable economic and financial outcomes.

The proposed modifications (with revisions) would not substantially alter the overall nature of the approved project nor would it substantially alter the key strategic objectives of the approved project. The Department also considers that the specific objectives of the proposed modifications are appropriate and that these would be achieved with the revised modified proposal subject to the recommendations in this Report.

Environmental Impact Assessment

Air Quality

External

The proposed increase in stack height would to a large extent offset the increase in pollutants due to the predicted increase in cars and from a longer tunnel. In this regard the impacts of the revised modified proposal would be virtually the same if not slightly better than the approved activity.

The only exception would be elevated receivers at Darling Park at around the roof top level (all pollutants assessed) and residents at ground level locations in William Street, Glebe Point Road/Bridge Road and Albion Street/Elizabeth Street (for CO and NO₂ only). However the increases would be very minor and would still be well within the specified goals.

Internal

Based on experience with the operation of the M5 East and in the review and assessment of the Lane Cove Tunnel project, the Department has recommended considerable strengthening of the controls on in-tunnel air quality.

One of the major revisions to the modified proposal is a recommendation for a new ventilation tunnel which would run below the proposed tunnels. This would be used primarily during peak congestion times and would allow more stringent World Health Organisation goals (i.e. 50 ppm-30 minute) to be met during periods of significant congestion. Notification and reporting requirements have also been considerably strengthened.

Similar to the approved project, in-stack limits have been specified to control "polluting-up" to the specified goals.

Regional Traffic

The revised modified proposal would increase traffic levels in the tunnels above the approved project by around 12000 vehicles per day by 2016 with an associated reduction in surface traffic in the CBD of

around 3%. With respect to the potential to significantly increase induce traffic beyond that which would have occurred with the approved activity, independent specialist advice has indicated that the existing Conditions of Approval would be adequate.

Compared to the approved project, there would be reductions of traffic on many east-west streets particularly to the south of William and Park Street, and reductions in Woolloomooloo and Darlinghurst (west of Forbes Street). However, major increases would occur primarily on New South Head Road and on Macquarie Street. Both of these roads are major arterial roads and arguably (on relative terms) most appropriate to take the burden of the impact. Other roads expected to have increases as a result of the modification include Park, Liverpool, Cleveland, Regent Hunter, Goulburn, Bond and Harbour Street. These increases would be addressed through existing Conditions of Approval subject to enhancement of the approved monitoring requirements.

One of the major concerns raised by the community relating to regional traffic changes was the loss of access from Cowper Wharf Road to the Domain tunnel. Proposed revisions to the modified proposal which reinstates this access would address this concern.

Similar concerns were raised with respect to access to the Eastern Distributor due to the elimination of the right turn from William Street to Bourke Street. The Department considers that this requires further investigation and that the final decision be subject to further approval by the Director-General.

Local Traffic and Access

Local traffic precincts subject to greater risk from traffic intrusion due to the proposed modifications include, Bellevue Hill, Double Bay, Edgecliff, Rushcutters Bay, Woollahra, Chinatown and parts of the CBD. The existing Conditions of Approval have been enhanced to address these issues.

Risk of increased infiltration is also expected on some streets in Paddington. The existing Conditions of Approval would ensure that impacts are appropriately managed.

Parts of Kings Cross including Darlinghurst Road, Kings Cross Road and Roslyn Street would experience traffic reductions. There are no expected changes to the Pyrmont/Ultimo and Glebe local areas as a result of the modification.

Predicted increases on Ocean Street, associated with the exhibited modified proposal would be contained to levels almost the same as those predicted for the approved activity and would be enforced through the existing Conditions of Approval.

Public Transport and Pedestrians

The elimination of the need to cut and cover through William Street during construction would reduce the disruption to bus services along this route, however there would still be some additional disruptions to services associated with the lane closures in the Kings Cross Tunnel.

During the operation stage, travel times for road based public transport would generally be improved with the possible exception of some key services along New South Head Road. Transit lanes on this road would have the ability to protect these services however greater monitoring and policing may be required with higher congestion levels experienced by the general motorist. The Department notes that the proposed extension of the T2 transit lane on William Street (from Forbes Street to the Kings Cross

Tunnel) under the revised modified proposal would further enhance public transport initiatives identified in the existing Conditions of Approval.

The Sydney Harbour Foreshore Authority (SHFA) raised concerns with respect to changes to the pedestrian environment around the proposed footbridge connecting to Day Street. The Department has recommended further consultation with the SHFA before the design of this connection is finalised.

Noise and Vibration

Construction

The approved project would result in significant construction noise impacts. The extent of the daytime construction noise impacts for the revised modified proposal would be very similar to that from the approved project. Notwithstanding, an intensification of some night time works would be required to minimise construction stage traffic impacts. The night time works would require separate approval by the EPA when more detailed information is available. All construction works would require all reasonable and feasible noise mitigation. The Department is satisfied the proposed construction is manageable and that the existing Conditions of Approval (subject to recommended amendments) would be sufficient to manage the issue.

Operational Road Noise

The extent of the operation noise impacts for the revised modified proposal would be very similar to that from the approved project. The Department is satisfied that operational noise impacts are manageable and that current operational noise conditions are sufficient to manage the issue.

Spoil Removal

The increase in the length of the tunnel and the provision of an additional ventilation tunnel would increase the volume of spoil generated by over 50%. The Department considers that proposed changes to spoil management including the removal of the majority of spoil directly via the Eastern Distributor and maximising the size of the trucks, would ensure that the impacts of spoil removal would not be dissimilar to the approved activity.

Rushcutters Bay Precinct

Arguably the local precinct most significantly affected by the proposed modifications is Rushcutters Bay.

A suggestion identified by a majority of the representations to address the concerns was to extend the tunnel some 400 metres further east. However, this option would not be feasible for the following key reasons:

- ◆ the additional cost of around \$150 million. However a reduction in traffic in the tunnel would seriously affect the projects financial viability;
- ◆ conflict with the Eastern Suburbs railway;
- ◆ additional geotechnical limitations due to soft ground conditions;
- ◆ additional land required from Rushcutters Bay Park;
- ◆ loss of easy access from the Paddington and Kings Cross area with the access south of Nield Ave; and,
- ◆ possible need for a second ventilation stack.

The Department also notes the adverse impacts identified above have not been assessed in detail and have not been exposed to any degree of public scrutiny. Notably, this additional extension would be longer than the extension that is proposed as part of this modification. To this end, the Department does not consider that extension of the tunnel as is suggested could be recommended as part of the proposed modification. Notwithstanding, it is recommended that the modified proposal could be revised to include a land bridge over the eastern portals. This would provide significant urban design improvements and amenity to the area, with minimal adverse impacts.

Other key concerns raised relating to this Precinct includes loss of parking, construction noise, portal emissions, structural /settlement issues and impacts of street prostitution. These issues are addressed in the Report.

Fire and Life Safety

In general, the frequency of fire risk is likely to increase with an increase in the length of the tunnel and the increase in the number of vehicles using it.

The Department considers that the fire safety assessment is generally adequate for the revised modified proposal however recommends that the existing Conditions of Approval be strengthened in line with International Best Practice.

Other Issues

Other issues of relevance to the proposal are assessed in Sections 6 and 7 of this Report. The key ones include construction traffic management, urban design changes, heritage, hazards and risks. The assessment concludes that all such impacts can be managed and, subject to the existing Conditions of Approval (with amendments and additions in some cases), would not result in long term impacts or irreversible effects.

Conclusions

The need and justification for the project as a whole was established when the Minister for Planning approved the project in October 2001, subject to 240 conditions.

This Report does not assess issues relating to the modified proposal which are fundamental and integral to the project as a whole (and would not change with the modification), as approval to the project has already been granted. On a statutory basis, the purpose of this assessment is only to assess the approved project to the extent that it is proposed to be modified.

The Department's assessment indicates that the proposed modifications (with revisions) would not substantially alter the overall nature of the approved project and therefore concludes that the revised modified proposal would not alter, in any substantial way, the ability of the revised modified proposal to meet the key strategic objectives as assessed for the approved project.

The Department assessment of the proposed revisions to the modified proposal concludes that, individually and cumulatively, the revisions would reduce the overall environmental impact of the proposal as described in the Supplementary EIS and have been recommended for consideration by the Minister for Planning as part of the modified proposal.

The Department also concludes that the specific objectives of the proposed modifications are appropriate and that these would be achieved with the revised modified proposal, subject to the recommended changes to the Conditions of Approval as detailed in this Report.

Recommendations

It is recommended that the Minister for Planning adopt the proposed revisions to the modified project as detailed in Section 5 of this Report

It is also recommended that should the modification proceed, it would be essential for amendments and additions to be made to the existing Conditions of Approval. These are detailed in Sections 6 and 7 of this Report and Appendix F of the RTA's Supplementary Representations Report.

The key recommendations include:

Revisions to the Requested Modification

- ◆ provision of a ventilation duct tunnel;
- ◆ provision of a landscaped bridge over the Eastern portal;
- ◆ re-establishment of a direct connection from Cowper Wharf Road to the Domain Tunnel;
- ◆ revisions to traffic arrangements in Woolloomooloo;
- ◆ revisions to the Sir John Young Crescent tunnel exit;
- ◆ replacement of car parking spaces in Rushcutters Bay; and,
- ◆ relocation of variable message signs.

Changes to the Existing Conditions of Approval

- ◆ significant strengthening of the air quality conditions, particularly relating to in-tunnel conditions, including adoption of more stringent health criteria;
- ◆ inclusion of penalties for exceedances of in-tunnel goals, with any generated funds to be spent on improvements to in-tunnel and external air quality;
- ◆ enhancement of fire/life safety management and incident response plan requirements;
- ◆ additional monitoring of traffic intrusion in key sensitive areas including Bellevue Hill, Double Bay, Edgecliff, Rushcutters Bay, Woollahra (Ocean Street), Haymarket and other parts of the CBD;
- ◆ further consideration of reinstating the right turn from William Street to Bourke Street;
- ◆ review of access to Darling Harbour;
- ◆ minimising disruption to traffic using the Kings Cross tunnel during construction;
- ◆ further geotechnical analysis of additional buildings including Altair, Elan, Millennium, Maestri, MBF Building, Lobana and other properties along Elizabeth Street;
- ◆ confining transport of spoil largely to the Eastern Distributor rather than through streets in east Sydney/Woolloomooloo; and,
- ◆ preparation of Tree Replacement and Environmental Enhancement Plan as an offset for the loss of Fig trees in the median of the Cahill Expressway.

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GLOSSARY/ABBREVIATIONS

Approved Project	The Cross City Tunnel Project Approved by the Minister for Planning on 3 October 2001
dB(A)	decibel (A-weighted scale)
CBD	Central Business District
CCS	Council of the City of Sydney
CCT	Cross City Tunnel
CO	Carbon Monoxide
Department, The	Department of Planning
Director-General	Director-General of the Department of Planning
DLWC	Department of Land and Water Conservation
DoT	Department of Transport/TransportNSW
DoH	Department of Health/NSW Health
EMP	Environmental Management Plan
EMR	Environmental Management Representative
ENCM	EPA's Environmental Noise Control Manual
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
ESPs	electro-static precipitators
LATM	Local Area Traffic Management
km	kilometre
km/h	kilometre per hour
m	metre

Minister, The	Minister for Planning
Modified Proposal	The Cross City Tunnel Project as modified in the Supplementary EIS
NPWS	National Parks and Wildlife Service
NEPM	National Environment Protection Measure
NO _x	nitrous oxides
Original EIS	The Cross City Tunnel Environmental Impact Statement prepared by PPK Environment and Infrastructure Pty Ltd on behalf of the RTA, dated July 2000
Original Representations Report	The Cross City Tunnel Representations Report prepared by RTA Environmental Technology, dated 23 April 2001
PCA	Pollution Control Approval
PM ₁₀	particulate matter with equivalent aerodynamic diameter less than 10µm
PTC	Public Transport Committee
Regulation, The	Environmental Planning and Assessment Regulation 2000
Revised Modified Proposal	The Cross City Tunnel Project as modified by the Supplementary EIS and recommended revisions detailed in the Supplementary Representations Report
RTA	Roads and Traffic Authority
SHFA	Sydney Harbour Foreshore Authority
SSCC	South Sydney City Council
SRA	State Rail Authority
Supplementary EIS	The Cross City Tunnel Supplementary Environmental Impact Statement prepared by PPK Environment and Infrastructure Pty Ltd on behalf of the RTA, dated July 2002
Supplementary PAR	The Cross City Tunnel Supplementary Preferred Activity Report, dated November 2002
Supplementary Representations Report	The Cross City Tunnel Representations Report for Supplementary Environmental Impact Statement prepared by RTA Environmental Technology, dated November 2002
STA	State Transit Authority
SWC	Sydney Water Corporation
TAG	Transport Action Group
WHO	World Health Organisation

1. INTRODUCTION

1.1 The Approved Cross City Tunnel

The Roads and Traffic Authority's (RTA's) Cross City Tunnel involves the construction and operation of two road tunnels (two traffic lanes in each direction) for traffic traveling east–west through Central Sydney between Darling Harbour and Kings Cross, approximately two kilometres in length. A number of surface improvements primarily relating to the reduction of traffic capacity along William, Park and Druiitt Streets would also be undertaken as part of the project.

The Minister for Planning approved the project on 3 October 2001. Details of the approved project are given in Section 2.

1.2 The Proposed Modifications

The RTA has now sought modifications to elements of the approved project. Key modifications proposed in the Supplementary EIS include:

- ◆ increasing the total length of the tunnel from 1.8 kilometres to 2.1 kilometres, extending the tunnels 30 metres to the east of the existing Kings Cross Tunnel;
- ◆ deepening the tunnel at the eastern end by up to 30 metres, allowing the project to pass under instead of over the Eastern Distributor tunnels;
- ◆ minor realignment of the eastbound tunnel to the north under Hyde Park;
- ◆ increasing the speed limit from 70 km/h to 80 km/h;
- ◆ differential tolling (previously \$2.50 for the main tunnel and \$1.10 for traffic exiting to Sir John Young Crescent);
- ◆ increasing the height of the ventilation stack by 16 metres to 65 metres AHD and provision of a ventilation duct tunnel;
- ◆ provision of an additional lane on the Western Distributor viaduct over Darling Harbour to improve traffic flow;
- ◆ sub-surface tunnel construction in place of cut and cover construction along William Street between the Kings Cross Tunnel and Bourke Street; and,
- ◆ changes to traffic arrangements in Woolloomooloo including loss of direct access to the Domain Tunnel and Sydney Harbour Tunnel from Cowper Wharf Road, Palmer Street and Sir John Young Crescent. Access to these points would be from the Cross City Tunnel, the Eastern Distributor and Cowper Wharf Road only.

Details of the proposed modifications are given in the Supplementary EIS (which was publicly exhibited) and outlined in Section 3 of this Report.

The RTA has now sought that the Minister for Planning consider further revisions to the modified proposal in accordance with Section 115BA (6) of the Environmental Planning and Assessment Act, 1979 (EP&A Act). Key revisions proposed in the Supplementary Representations Report include:

- ◆ alterations to traffic arrangements in Woolloomooloo;
- ◆ direct connection to the Domain Tunnel from Cowper Wharf Road;
- ◆ alterations to the Sir John Young Crescent tunnel exit;
- ◆ provision of a ventilation duct tunnel;
- ◆ replacement of car parking spaces in Rushcutters Bay;

- ◆ relocation of variable message signs; and,
- ◆ provision of a land bridge over the eastern portal.

The proposed revisions to the modified proposal are detailed in the Supplementary Representations Report and a publicly available Preferred Activity Report prepared by the RTA. An outline of the proposed revisions is given in Section 5 of this Report.

1.3 Statutory Provisions and Assessment Process

1.3.1 Background

State Environmental Planning Policy No. 63 was gazetted on 2 February 2001. This enables the project to be assessed entirely under Part 5 of the *Environmental Planning and Assessment Act, 1979* (EP&A Act). As the RTA is both the Proponent and determining authority for the proposal, and an EIS was prepared, Division 4 of Part 5 of the EP&A Act applies. An Environmental Impact Statement (EIS) on the project was exhibited between 2 August 2000 and 6 October 2000. Under Section 115C of the EP&A Act, the Department completed an independent environmental impact assessment of the project and reported the findings of this Assessment in a Director-General's Report, dated September 2001. The Minister for Planning (the Minister) approved the Cross City Tunnel on 3 October 2001 under Section 115B of the EP&A Act, subject to the 240 Conditions of Approval recommended in the Director-General's Report.

Section 115BA of the EP&A Act provides that a Proponent may request the Minister to modify an approval granted under Section 115B of that Act if the modification of the approved activity would be inconsistent with the approval. In requesting a modification, the Proponent is also required under Section 115BA(4) of the EP&A Act to determine whether the proposed modified activity would be likely to significantly affect the environment. The RTA has determined that the proposed modifications may significantly affect the environment and accordingly a Supplementary EIS has been prepared.

In accordance with Section 115BA(5)(a), the RTA publicly exhibited the Supplementary EIS between 1 August 2002 and 31 August 2002. Copies of the original EIS and Representations Report were also put on public display. One thousand and twelve representations were received by the RTA in response to the Supplementary EIS exhibition and forwarded to the Department as required by the EP&A Act.

1.3.2 Request for the Approval of the Minister for Planning

In accordance with Section 115BA(2), the RTA sought the approval of the Minister for the modification in a letter dated 4 November 2002. The request for approval was accompanied by a Supplementary Representations Report which presented the RTA's response to the issues raised in representations to the public exhibition of the Supplementary EIS and included detailed proposed revisions to the proposed modifications.

1.3.3 Release of the Preferred Activity Report

The Proponent has prepared a Preferred Activity Report (PAR) detailing proposed additional modifications to the Supplementary EIS proposal. The PAR was released to the public in late November 2002. A brochure detailing the proposed additional modifications was sent to surrounding residences and locations where the PAR could be viewed was advertised in local newspapers.

1.4 Purpose of this Report

The purpose of this Report is to review the Supplementary EIS for the proposed modifications, the issues raised in representations to the public exhibition, submissions made by the Proponent and other matters pertinent to the potential environmental impacts of the proposed modification. It should be noted that in accordance with the EP&A Act this assessment is contained only to the extent that the approved activity has been modified. That is, there is no statutory ability to assess the project beyond the extent of the modifications.

This Report has been prepared in accordance with Section 115C of the EP&A Act which requires the Director-General to assess and report to the Minister on the proposal. This Report documents the outcome of an independent environmental impact assessment by the Department accounting for the key issues raised in representations to the Supplementary EIS.

This Report does not assess issues relating to the modified proposal which are fundamental and integral to the project as a whole (and would not change with the modification), as approval to the project has already been granted. On a statutory basis, the purpose of this assessment is only to assess the project to the extent that it is proposed to be modified.

2. THE APPROVED PROJECT

This section of the Report outlines the project as approved by the Minister for Planning on 3 October 2000, here in referred to as the approved project. It provides a summary of the project including mitigation measures detailed in the original EIS and Representations Report and in the Recommended Conditions of Approval. For more details of the approved project see the original EIS, the original Representations Report and the Director-General's Report on the Proposed Cross City Tunnel.

2.1 Introduction

The project involves the construction and operation of two road tunnels (with two traffic lanes each way) for traffic travelling east-west through Central Sydney between Darling Harbour and Kings Cross, approximately 2 kilometres in length. The project also includes a number of surface improvements primarily relating to the reduction of traffic capacity along William, Park and Druitt Streets. A plan of the approved project is given in Figures 1 a - b.

2.1 Key Conditions of Approval

The requirements of the key Conditions of Approval include:

- ◆ the establishment of a Public Transport Committee to carry the project through the construction and at least early operation stages to ensure that there is a strong and pro-active approach in integrating public transport provisions as part of the project;
- ◆ creation of around 5 kilometres of bus lanes with the potential for a further 15 kilometres of additional bus or transit lanes;
- ◆ a contingency fund of \$5 million for the purposes of implementing additional mitigation measures not explicitly identified in the Conditions, relating to public transport, cyclist provisions, local area traffic management, air quality and other environmental improvements;
- ◆ a comprehensive package of over 30 public transport enhancement measures including: improved co-ordination with existing CBD traffic controls (SCATS), performance indicators, investigation of electronic based passenger information systems, digital cameras for bus lanes, intersection improvements, bus facilities such as bus shelters and street furniture and protection of bus routes during construction;
- ◆ minor relocation of the stack approximately 50 metres to the west, with a small increase in height of 5 metres;
- ◆ compliance with stack limits to ensure no "polluting-up" and compliance with ambient air quality goals to ensure no net worsening of air quality. Real-time public access to monitoring results via the Internet is also recommended;
- ◆ deferral of any portal emissions until a comprehensive assessment has been undertaken including the development of a Protocol which would include extensive community consultation;
- ◆ requirement for a Community Based Air Quality Monitoring Station operated independently from the RTA;
- ◆ provision for retro-fitting of pollution control systems subject to air quality impacts and technological improvements for treatment of gases;
- ◆ preparation and implementation of comprehensive environmental management plans for both the construction and operation stages;
- ◆ preparation of a Community Involvement Plan and an independent Community Liaison Representative with the ability to address community concerns regarding construction impacts within no greater than 2 hours of a complaint;

- ◆ the establishment of community liaison groups and a 24 hour complaint phone system during construction;
- ◆ extensive monitoring and auditing requirements during construction by independent persons, including making results publicly available;
- ◆ comprehensive Local Area Traffic Management Measures for Paddington. Also monitoring of other areas including Glebe, Ultimo/Pymont, Darlinghurst, East Sydney and Woolloomooloo for potential LATM Measures;
- ◆ enhancements to the cycle network including improved connections to Pymont Bridge and King Street Cycleway and an investigation into a new link from Oxford Street to Darling Drive (Darling Harbour);
- ◆ extensive building surveys and settlement monitoring to overcome the types of major concerns raised during the construction of the Eastern Distributor;
- ◆ establishment of an Independent Property Impact Assessment Panel to resolve disputes arising from potential and/or actual property impacts;
- ◆ improved access provisions to Darling Harbour including new grade separated pedestrian links from Harris Street and from Bathurst Street; and,
- ◆ various conditions that are aimed at heritage conservation; water and waste management; minimising impacts on business and maximising benefits to pedestrian and cyclists.

2.2 Alignment and Access

The location and horizontal and vertical alignment of the tunnel has been determined by a number of significant underground constraints. One tunnel would be for vehicles travelling from west to east, starting near the intersection of Bathurst and Harbour Streets at Darling Harbour and extending beneath the alignment of Bathurst and William Streets to the Kings Cross Tunnel beneath Darlinghurst Road. This tunnel would cross diagonally from Bathurst to William Street beneath Hyde Park. The second tunnel would provide for vehicles travelling from east to west, commencing at the Kings Cross Tunnel beneath Darlinghurst Road and extending beneath the alignment of William, Park and Druitt streets. The eastbound tunnel would be up to 50 metres beneath surface streets and the depth of the westbound tunnel would be up to 32 metres.

Access to the tunnels would be provided via the following arrangements:

East Bound

- ◆ entry via the existing Bathurst Street viaduct over Darling Harbour; or
- ◆ via a single lane entry ramp in the centre of Harbour Street, south of Day Street; and,
- ◆ exit via a direct connection to the Kings Cross Tunnel; or
- ◆ to the Eastern Distributor (southbound).

West Bound

- ◆ entry via a direct connection from the Kings Cross Tunnel; or,
- ◆ from the Eastern Distributor (northbound) and,
- ◆ exit via a ramp to Sir John Young Crescent and continue onto the Cahill Expressway; or
- ◆ into the Western Distributor.

2.3 Tunnel Ventilation

The tunnels would be ventilated by a longitudinal system with a single 44 metre high discharge stack located in Darling Harbour as shown in Figure 2. The ventilation design makes provision for the retrofitting of pollution control systems should the need arise and in the case of treatment of gases, if technological developments make such systems available, necessary and cost effective.

Portal emissions (emissions from tunnel entrances and exits) and would only be allowed following the Director-General's approval of a detailed and comprehensive analysis of the associated impacts and a Procedure for portal emissions.

2.4 Surface Works

In addition to the construction and operation of the tunnel, a number of surface works would be undertaken to either take advantage of opportunities created by the approved project or to address access issues arising from its development. The major works include:

- ◆ widening and upgrading of footpaths in William and Park Streets;
- ◆ construction of a "lid" over the eastern portal of the Kings Cross Tunnel;
- ◆ some 5 kilometres of additional bus lanes, on the Western Distributor between the Druitt Street Ramp and Anzac Bridge, on sections of Chalmers and Elizabeth Streets, Bridge Street and Liverpool Street and potentially a further 15 kilometres of new bus or transit lanes including sections on Pitt Street, Park Street, Ocean Street, New South Head Road, Anzac Bridge and Victoria Road between Anzac Bridge and Gladesville;
- ◆ improved access provisions to Darling Harbour including new grade separated pedestrian links from Harris Street and from Bathurst Street; and,
- ◆ enhancements to the cycle network including dedicated cycle lanes along the William/Park/Druitt Street corridor, improved connections to Pyrmont Bridge and King Street Cycleway and an investigation into a new link from Oxford Street to Darling Drive (Darling Harbour).

2.5 Tunnel Features

Tunnel features include:

- ◆ an overall design speed of 70 kilometres per hour. Design speeds would range from 40 to 60 kilometres per hour at the entry and exit ramps;
- ◆ a width of 7 metres between barriers for the two lane tunnels and 5.5 metres between barriers for single lane tunnels;
- ◆ tunnel traffic would be tolled in each direction by using electronic facilities (\$2.50 for the main tunnel and \$1.10 for traffic exiting to Sir John Young Crescent);
- ◆ a central supervisory control and monitoring system;
- ◆ a traffic management and control system;
- ◆ various systems to allow communication within the tunnel;
- ◆ an electrical supply system to provide power;
- ◆ a lighting system in compliance with the guidelines for road tunnels;
- ◆ directional signposting, variable message signs, lane usage signs, intersection direction signs and regulatory signposting;
- ◆ speed cameras in the eastbound, westbound and northbound tunnels; and,
- ◆ refurbishment of the Kings Cross Tunnel to match the Cross City Tunnel.

2.6 Property Acquisition

The project would necessitate the acquisition of 16 private properties and the creation of easements for rock anchors over 13 private properties. A number of government owned properties would also be affected.

2.7 Construction

Tunnelling works would include the construction of the main tunnels, caverns at tunnel divergence and merging areas, fan niches, cross-over ventilation tunnels, ventilation shaft, underground substations and emergency egress cross-passages. Two construction methods for the tunnel would be employed, being cut-and-cover and driven tunnels (using road headers and rock breakers). Tunnelling at Druitt Street, Bathurst Street, Harbour Street, William Street, Palmer Street, Bourke Street, Riley Street and Sir John Young Crescent would be completed using cut and cover techniques (representing 400 metres of mainline tunnel and 450 metres of entry/exit ramps).

Construction of the approved project is expected to take approximately three years. General work hours are proposed between 7:00 am and 6:00 pm weekdays and 7:00 am to 1:00 pm Saturdays. Underground works including tunnel excavation would operate 24 hours a day.

The construction of the approved project would involve three key phases, pre-construction, construction and commissioning. It is estimated that each work compound would generate an average of 100 vehicle movements per day up to a peak of 120. These traffic movements would occur throughout the construction period. It is estimated that a further 111 laden trucks per day (222 total truck movements) would operate between the hours of 7.00 am and 6.00 pm on weekdays and 7.00am and 1.00 pm on Saturdays, over a period of approximately 13 months to transport spoil from the site.

Worksites would be established at the following locations:

- ◆ Harbour Street between Blackwattle Place and Day Street;
- ◆ Druitt Street between Sussex and Kent Streets;
- ◆ Bathurst Street between Harbour and Day Streets;
- ◆ the intersection of William and Bourke Streets;
- ◆ Palmer Street, north and south of William Street;
- ◆ Riley Street and Sir John Young Crescent outside the Domain Car Park;
- ◆ William Street between Bourke and Forbes Streets; and,
- ◆ William Street west of the existing Kings Cross Tunnel.

Site compounds, to provide support to these worksites would be established in the following locations:

- ◆ Northern side of Druitt Street (No. 1) with ancillary facilities on open space bounded by Day, Harbour and Bathurst Streets;
- ◆ corner of Spence Lane and Egan Place (No. 2) with ancillary facilities on the block between Palmer and Bourke Streets;
- ◆ an area on the northern side of the Kings Cross Tunnel (No. 3) following realignment of the off-loading ramp to Darlinghurst Road; and,
- ◆ on existing open space outside the Domain Carpark (No. 4).

3. DESCRIPTION OF PROPOSED MODIFICATIONS AS DESCRIBED IN THE SUPPLEMENTARY EIS

This Section of the Report provides a description of the modifications to the approved project as the as described in the Supplementary EIS (herein referred to as the modified proposal). Its purpose is to provide an overview of the information presented in the Supplementary EIS. Information presented in this Section does not necessarily represent the views of the Department. Section 5.2 of this Report provides details of additional modifications proposed following exhibition of the Supplementary EIS. The Department's consideration of the proposed modifications is provided in Sections 6 and 7.

3.1 Introduction

The following Sub-sections outline proposed modifications to the approved project. Plans of the Modified proposal are given in Figures 3 a - j. The RTA's proposed changes to the Minister's Conditions of Approval are given in Appendix B marked in red.

3.2 Tunnel Alignment

Changes to the horizontal and vertical alignment of the tunnels is proposed to reduce grades to 6%, with a maximum of 8% and increase the radius of curves. It is proposed to extend the tunnel 300 metres to the east (increasing the length from 1.8 km to 2.1 km) and relocate the eastern entry to the Cross City Tunnel 30 metres east of the existing Kings Cross Tunnel. The tunnel would be up to 30 metres deeper at the eastern end and pass under rather than over the Eastern Distributor. The horizontal alignment of the east bound tunnel would shift slightly to the north between Pitt Street and College Street. The horizontal alignment of the west bound tunnel would shift very slightly to the north in the vicinity of Kent and George Streets. The exit ramp to Sir John Young Crescent would also be slightly realigned and deeper than the approved project. These modifications are illustrated in Figures 3 a-c.

3.3 Traffic and Tolling

Changes to connections to existing roads and the alignment of the tunnels would facilitate an increase in the speed limit from 70 km/hr to 80 km/hr, with lower speeds from 40 to 80 km/hr on entry/exit ramps and on surface connections. Traffic forecasts indicate that the modified proposal would attract traffic volumes 18% higher than for the approved activity (an increase from 86,500 to 102,000 vehicles per day).

Differential tolling (different tolls for different classes of vehicles) is now proposed in place of standard tolls amounts for all vehicles. Charges for heavy vehicles may be double that of cars, which would be \$2.50 (in 1999 dollars).

3.4 Connections to the Approved Road Network

Proposed changes to road network connections of the approved project are outlined in Table 1.

Table 1 – Modifications to the Exits and the Surrounding Road Network

Road	Proposed Modification
Market Street Viaduct	widening of the three lane Market Street viaduct to provide for an additional traffic lane over a distance of 360 metres
Druit Street Viaduct	relocation of a supporting pier

Road	Proposed Modification
Domain Tunnel/Cahill Expressway	<ul style="list-style-type: none"> ◆ loss of access from Cowper Wharf Road and Palmer Street to Domain Tunnel and Macquarie Street; ◆ access to the Domain Tunnel would only be available from the Cross City Tunnel and the Eastern Distributor; and, ◆ traffic signals at Cowper Wharf Road would be removed.
Sir John Young Crescent	<ul style="list-style-type: none"> ◆ relocation of the exit portal from the intersection with Palmer Street to the south west, in the vicinity of Crown Street; ◆ provision of a southbound parking lane between Palmer and Crown Streets.
Eastern Distributor connection	<ul style="list-style-type: none"> ◆ provision of the loop ramp connecting the Eastern Distributor (northbound) to William Street and the Cross City Tunnel on the outside rather than on the inside of the Bourke Street entry ramp; ◆ relocation of the ramp connecting eastbound Cross City Tunnel traffic to the Eastern Distributor (southbound) 660 metres further west; and, ◆ widening of the Eastern Distributor Tunnel over a length of 40 metres to accommodate Cross City Tunnel access.
William Street	<ul style="list-style-type: none"> ◆ loss of right turn into Palmer Street; ◆ potential for loss of right turn into Bourke Street; ◆ introduction of right turns into Riley and Crown Streets; ◆ extension of the existing westbound T2 lane from Forbes Street to the Kings Cross Tunnel.
Palmer Street	<ul style="list-style-type: none"> ◆ introduction of one way traffic flow (southbound) between Sir John Young Crescent and Cathedral Street; ◆ removal of traffic signals at the intersection with Sir John Young Crescent; and, ◆ provision of an additional northbound 25 metre right turn lane on the approach to William Street.
Crown Street	reconfiguring for northbound traffic
Access to Rail Yards and Domain Carpark	retain existing separate access to these facilities in place of the approved combined access way including dismantling and reassembly or removal of a section of heritage listed stone wall.
Kings Cross Tunnel	<ul style="list-style-type: none"> ◆ traffic to enter and exit the Cross City Tunnel east of the Kings Cross Tunnel instead of within the Kings Cross Tunnel, requiring a reduction from three to two lanes in each direction within the Kings Cross Tunnel; and, ◆ provision of a daytime T2 Transit Lane in the Kings Cross Tunnel and along William to Forbes Street.
Kings Cross Road	altered kerblines and road width east of Darlinghurst Road
Craigend Street	<ul style="list-style-type: none"> ◆ altered kerblines and road width east of Darlinghurst Road; and, ◆ changes to pedestrian arrangements (westbound) at the intersection with McLachlan Avenue.
Bayswater Road	altered kerblines and road width west of Neild Avenue
New Ward Avenue Ramp	new single lane eastbound ramp from Ward Avenue providing access to Neild Avenue

Key changes to the road network are illustrated in Figures 3a and d – g.

3.5 Tunnel Design Features

The following changes to the tunnel design of the approved project are proposed:

- ◆ an increase in the number of traffic lanes in the Sir John Young Crescent exit ramp between Palmer and Young Streets from one to two; and,
- ◆ provision of two continuous traffic lanes in the westbound tunnel throughout its length.

3.6 Tunnel Ventilation

A 16 metre increase in the height of the ventilation stack from 44 metres (49 AHD) to 60 metres (65 AHD) is proposed. Portal emissions, which were permitted only following the Director-General's approval of a detailed and comprehensive analysis of the associated impacts and a Procedure for portal emissions, are now proposed during congested traffic conditions.

To keep the ventilation systems of the Cross City Tunnel separate from the Eastern Distributor, a section of the connecting tunnel, between Bourke and Palmer Streets would be open to air but covered by louvres. This modification is illustrated in Figure 3 g.

3.7 Surface Works

The following modifications to surface works are proposed:

- ◆ the Kings Cross "lid", approved to extend approximately 30 metres to the west of the Kings Cross Tunnel for open space and /or complementary commercial activity would be reduced to extend 6 metres;
- ◆ the walls of the Kings Cross Tunnel would be cleaned rather than refurbished and the wingwalls at the western end would be refinished;
- ◆ use of full black granite paving in place of black granite flagstones around asphalt panels and tree wells along William Street;
- ◆ re-landscaping of the eastern portal generally between Ward Avenue and the pedestrian bridge east of the Kings Cross Tunnel, including removal of a large fig tree north of Bayswater Road (eastbound) at Rushcutters Bay; and,
- ◆ retention of a number of mature plane trees on the western side of Riley Street.

Some of these modifications are illustrated in Figures 3 h – i.

3.8 Parking

The proposed changes to traffic arrangements and surface works would result in a net loss of 22 parking spaces on tunnel opening. The following changes are proposed:

- ◆ on Kings Cross Road (north side):
 - creation of three new parking spaces between Ward Avenue and Bayswater Road;
 - creation of three new parking spaces immediately east of Roslyn Street; and,
 - removal of 11 one hour parking spaces between Roslyn and Waratah Streets.
- ◆ loss of 10 two hour parking spaces on Kings Cross Road (south side) between Ward Avenue and Bayswater Road; and,
- ◆ loss of 7 one hour parking spaces on Bayswater Road (south side) between McLachlan and Neild Avenues.

There is the potential for up to 10 parking spaces on the southern side of Bayswater Road, west of McLachlan Avenue, to be lost in the future due to traffic growth. These modifications to parking arrangements are illustrated in Figure 3j.

3.9 Property Acquisition

The modified proposal would necessitate the acquisition of 51 private properties (an increase of 35 over that required for the approved project) and the creation of easements for rock anchors over 70 private properties (an increase of 57 over that required for the approved project). The number of government owned properties to be directly impacted would also increase.

3.10 Construction Changes

The modified proposal is estimated to commence in late 2002 and would take approximately 40 months to complete (four months longer than the approved project), with tunnel opening expected after 34 months.

Proposed areas of cut and cover tunnel construction have been reduced from 1150 metres to approximately 750 metres. Cut and cover construction, estimated to take approximately 12 months, would no longer be required along William Street between Bourke Street and the Kings Cross Tunnel. Increases in the depth of the tunnels would also reduce the extent of utility relocations required, particularly in William and Palmer Streets. The extent of cut and cover required in Riley Street would be reduced by approximately 55 metres.

Proposed modifications to construction site compounds are outlined in Table 2. The modified site compounds and work areas are illustrated in Figures 4 a-b.

Table 2 – Modifications to Site Compounds

	Location/Description	Proposed Changes to the Approved Project
A	Northern side of Druitt Street	Extension of compound length by approximately 300 metres
B	Between Day, Bathurst and Market Streets	New compound (previously identified as a work area)
D	Under Market Street Viaduct immediately west of Harbour Street (south)	New compound and work area required to construct the ventilation stack in the approved location
E	Between Day and Harbour Street	New compound
G	Between Sir John Young Crescent and Palmer Street	New compound to ensure adequate space for storage of equipment, materials, facilities and workforce
H	Corner of Palmer and Cathedral Streets	Use as a daytime workshop (previously identified for ancillary facilities)
I	North of William Street between Palmer and Bourke Streets	Dual use as a compound and work area for spoil extraction over a period of 18 months (previously identified as an ancillary compound)

No changes are proposed to the Bathurst Street Compound (Compound A), the compound in the north-east corner of the Domain Car park off Sir John Young Crescent (Compound F) and the compound south of William Street between Palmer and Bourke Streets (Compound J). The site compound near Darlinghurst Road (identified as Compound No. 3 in the original EIS) would no longer be required.

The following additional road and/or lane closures would be required in the following streets:

- ◆ closure of Market Street Viaduct lanes (over 25 nights);
- ◆ closure of all traffic lanes and pedestrian access under the Market Street Viaduct to deliver materials to this worksite;
- ◆ closure of Bathurst Street viaduct (over five nights);
- ◆ night time closure of one lane in each direction in Harbour Street and provision of left in – left out access to the ventilation stack work area;
- ◆ closure of Riley Street to all but local traffic (over six months). A right turn into Crown Street would be provided for the duration of the closure of Riley Street;
- ◆ maintenance of at least one traffic lane in each direction on Crown Street between Sir John Young Crescent and William Street;
- ◆ single lane closures on the Cahill Expressway at night;
- ◆ extended closure of the Bourke Street entry Ramp to the Eastern Distributor (from the approved nine months to approximately 24 months);
- ◆ closure of Bourke Street between William Street and the Eastern Distributor on-ramp (six months);
- ◆ closure of the William Street exit from the Eastern Distributor (over four months);
- ◆ loss of right and left turns from William Street to Bourke Street (over 30 months);
- ◆ closure of lanes in the Kings Cross Tunnel outside peak periods (over eight nights);
- ◆ closure of lanes outside peak periods on eastern ramps from the Kings Cross Tunnel to Waratah Street, Bayswater Road and Craigend Street and subject to RTA approval;
- ◆ maintain one lane at the Craigend Street off ramp to Oswald Lane; and,
- ◆ maintain a minimum of two northbound lanes and one southbound lane on Sir John Young Crescent with closure of the southbound lanes from Cowper Wharf Road to Palmer Street in order to provide two northbound lanes during portal construction.

Approximately 500,000 m³ of spoil (compared to the approved 350,000 m³) would need to be transported from the approved removal sites at Druitt Street, Bathurst Street, Bourke Street and Sir John Young Crescent. A relatively small volume of spoil would also need to be transported from Bayswater Road. Given the proposed increase in driven tunnel excavation it is now proposed to use five 300 kilowatt roadheaders in place of the approved four 300 kilowatt and two 100 kilowatt roadheaders. The capacity of trucks has been reduced from 15 m³ to 7 m³ as a result of site restrictions. The maximum number of truck loads per day would increase from the approved 111 to 470 truck loads per day, with a maximum of 55 truck loads per hour.

It is proposed that the majority of spoil would be transported from the Bourke Street Compound directly into the Eastern Distributor on a 24 hour basis. To do this, it is proposed to construct a new ramp from Bourke Street connecting to an underground cavern with direct access to the Eastern Distributor (southbound). On return journeys trucks would exit the Eastern Distributor via the William Street off-ramp, travel across William Street and turn into Bourke Street to re-enter the underground cavern. Spoil from the other sites would be removed during standard hours.

The estimated cost of the approved project was \$400 million (1999 dollars). Based on the information received by the RTA as part of the tendering process, it was determined that the capital investment required to finance and construct the approved project would be \$620 million. Construction of the modified proposal would cost \$640 million.

4. SUMMARY OF REPRESENTATIONS TO THE SUPPLEMENTARY EIS

4.1 Identification of Key Issues

The RTA received 1012 representations to the Supplementary EIS from the following parties:

State Government	8
Local Government	4
Business Groups	10
Interest Groups	17
Individual	284
form letters	689
Total	1012

In the Supplementary Representations Report, the Proponent included a summary of the issues raised in representations to the Supplementary EIS, which categorised issues into over 70 categories. The Department has undertaken an independent assessment of the issues raised in representations. The key issues raised in these representations include:

- ◆ general support for the modified proposal;
- ◆ need to relocate the eastern portal further to the east;
- ◆ loss of amenity in existing local streets and pedestrian spaces;
- ◆ need for a grassed canopy over the eastern portal;
- ◆ traffic congestion in the Rushcutters Bay precinct following completion of the modified proposal;
- ◆ need for appropriate urban design and surface landscaping;
- ◆ local air quality impacts; and,
- ◆ operational noise.

Table 3 provides the Department's summary of the frequency of issues raised in representations. Issues raised by Government agencies are summarised in Table 4. A graph showing the frequency key issues were raised is given in Figure 5.

More than half (636) of the representations supported the modified proposal generally, however objected to a number of elements of the approved project such as stack emissions, traffic implications, operational noise and the proposed relocation of the eastern portal. Twenty-one percent of representations (213) objected outright to the modified proposal. Eight representations expressed unconditional support for the modified proposal.

A primary concern raised in representations was the impact of the modified proposal on the amenity of local streets and pedestrian spaces. Six hundred and sixty-one representations considered that the modified proposal would have a negative effect on local neighbourhoods due to increased traffic and associated noise, pollution and visual impacts. A number of representations suggested actions that could mitigate impacts on local amenity and lifestyle. Six hundred and thirty representations suggested that the modified proposal would affect fewer people if the eastern portal of the tunnel was moved further east and located in Rushcutters Bay Park. A further 462 representations raised concern over the adequacy of urban design and surface landscaping to be provided as part of the modified proposal.

Operational traffic issues were a major concern. In particular, 51% of representations (518) considered that traffic congestion and problems would occur in the Rushcutters Bay Precinct. Additionally, operational air quality and traffic noise impacts were raised in 368 and 321 representations respectively.

A more detailed outline of the issues identified in the Department's review of representations is given in Section 4.3 of this Report. The Department has compared the findings of its analysis to the RTA's analysis included in Section 3 of the Supplementary Representations Report. Generally, the issues discussed in the Supplementary Representations Report under each category were similar to those identified by the Department in its independent review of representations. Some issues were categorised differently resulting in varying numbers of representations cited for different issues, however, there are some discrepancies between the Department's findings and those outlined in the Supplementary Representations Report that cannot be attributed to differences in categorisation.

The Supplementary Representations Report noted only sixteen representations that offered general support for the modified proposal, but objected to elements and 680 representations that objected to the entire modified proposal. However, the Department took a broader view of general support suggesting that 636 representations offered general support (but objecting to elements), and only 213 representations objected to the entire modified proposal.

The Supplementary Representations Report failed to cite two form letters (472 representations) that raised the issue of local traffic in the Rushcutters Bay Precinct. This resulted in the Supplementary Representations Report citing only 26 representations concerned about this issue, while the Department noted 518.

The Department took a broader view of air quality impacts, noting 368 representations raising concern about local air quality and 126 representations raising concern about regional air quality. The Supplementary Representations Report noted only 48 and 18 representations respectively. Additionally, the Supplementary Representations Report cited only 48 representations raising health concerns, while the Department noted 184.

Notwithstanding the differences in frequencies recorded, the Department notes that responses to these issues have been provided in the Supplementary Representations Report.

4.2 Request for a Commission of Inquiry

A number of representations requested that a Commission of Inquiry be held on the proposed modifications, including South Sydney City Council's which requested this on the basis of claimed deficiencies with the modified proposal and the 'brief' public exhibition period. The Department does not consider that a Commission of Inquiry will add value to the assessment or decision making process given that:

- ◆ the proposed modifications relate to aspects of an approved project which has previously been independently assessed;
- ◆ the proposed modifications are already the subject of independent review by the Director-General of Planning; and,
- ◆ all issues of concern to the public have been reasonably identified and are known to the decision makers through representations both to the exhibited EIS directly, and submissions outside the formal exhibition process.

A Commission of Inquiry is not therefore recommended in this instance.

Table 3: Issues Raised in Representations to the EIS

	Individual/ Agency	A	B	C	D	E	F	G	H	I	Total	%
No. of Representations	323	400	29	19	39	72	112	6	4	8	1012	
Need and Justification												
General support but object to element(s)	52	T				T	T				636	63
Object	108		T	T	T			T	T	T	213	21
Support	8										8	1
Amenity												
Local lifestyle & streetscape	52	T		T		T	T	T			661	65
Displacement of street prostitution	3										3	<1
Project Design												
Move eastern portal	32	T				T	T	T		T	630	62
Tunnel design	18						T	T			136	13
Urban Design & Landscaping												
Grass canopy at eastern portal	10	T				T	T	T			600	59
Surface landscaping	37	T		T				T			462	46
Mature trees	15							T			21	2
Design of ventilation stack	19										19	2
Local Traffic and Access												
Rushcutters Bay Precinct	32	T				T		T		T	518	51
Loss of right turn Cowper Wharf Road	149		T						T		182	18
Parking	37				T	T		T		T	162	16
Eastern Precinct	60		T						T		93	9
Darling Harbour Precinct	16										16	2
Pedestrian/cyclist access	16										16	2
Central Precinct	8										8	1
Hyde Park Precinct	0										0	-
Air Quality - Operation												
Local Impacts	102		T		T	T	T	T		T	368	36
Health Impacts	67				T	T		T			184	18
Emission Treatments	72					T		T			150	15
Regional Impacts	15				T	T					126	13
Assessment/Modelling	21										21	2
Odour	4										4	<1
Operational Noise												
General	55		T		T	T	T	T		T	321	32
Mitigation	21				T						60	6
Construction Impacts												
Noise and Vibration	39				T	T	T	T			268	27
Working hours	29				T	T	T	T			258	26

	Individual/ Agency	A	B	C	D	E	F	G	H	I	Total	%
Access/Parking	27				T			T			72	7
Air and Dust	16				T			T			61	6
Compound sites	11				T						50	5
Traffic Management	27							T			33	3
Pedestrian/cyclist access	7										7	1
EIA Process												
Consultation	44		T				T	T			191	19
EIS Content	30		T	T				T			84	8
Planning Process	17							T			23	2
Regional Traffic												
Regional Impacts	49			T		T		T		T	154	15
Woollahra (Ocean Street)	27			T						T	54	5
Access issues to/from Eastern Distributor	34			T							53	5
Assessment/Modelling	17			T							36	4
Tolling												
General	62		T	T					T		114	11
Transport Policy												
General	36			T				T			61	6
Public transport	32										32	3
Cycle/pedestrian network	11										11	1
Property Impacts												
Compensation	7				T						46	5
Settlement	20							T			26	3
Property Value	15							T			21	2
Operational vibration	13							T			19	2
Business Impacts												
Local businesses	25							T		T	39	4
Heritage												
General	17			T							36	4
Safety												
Pedestrians	25									T	33	3
Road users	23									T	31	3
Emergency response	11										11	1
Other	6										6	1

Notes:

- No. of Representations is the total number received;
- 'A' thru 'I' are Form letters received.
- Issues are listed by category, then number of representations. The total representations for each issue are the number of representations that raised that issue.
- Where one representation covered more than one issue these issues have been counted in both areas. For example, if a representations raised concerns about regional traffic and the impact of operational noise from such traffic, these concerns were tallied under 'regional traffic' as well as under 'operational noise'.

Table 4: Issues Raised in Representations from Government Agencies

	EPA	DLWC	Heritage Office	Dept. of Health	Transport NSW	State Transit	SHFA	Dept. Housing	Woollahra Council	South Sydney Council	Leichhardt Council	City of Sydney Council
General support but object to element(s)						T	T	T				T
Support			T		T				T	T		
Local lifestyle & streetscape							T			T		
Surface landscaping				T			T				T	T
Design of ventilation stack							T			T		
Loss of right turn Cowper Wharf Road					T			T	T			T
Parking				T					T	T		T
Traffic: Darling Harbour Precinct							T			T		
Pedestrian/cyclist access				T			T					T
Regional Traffic Impacts					T	T				T		T
Local Air Quality Impacts	T			T			T	T	T		T	T
Health Impacts	T			T				T	T	T		
Regional Air Quality Impacts	T									T		T
Air Quality Assessment/Modelling				T							T	
Odour				T								
Operational Noise	T						T	T				
Noise Mitigation								T		T		

	EPA	DLWC	Heritage Office	Dept. of Health	Transport NSW	State Transit	SHFA	Dept. Housing	Woollahra Council	South Sydney Council	Leichhardt Council	City of Sydney Council
Construction Noise and Vibration	T						T	T		T		T
Construction Working hours	T							T		T		T
Construction Access/Parking							T	T		T		T
Construction Air and Dust								T		T		
Construction Compound sites	T						T	T				
Construction Traffic Management							T	T		T		T
Construction Pedestrian/cyclist access							T			T		T
Transport policy						T				T		
Public transport	T				T	T		T		T	T	
Cycle/pedestrian network									T	T	T	
Settlement		T					T			T		
Operational Vibration										T		
Heritage			T					T		T		
Pedestrian safety				T							T	
Road user safety		T									T	
Emergency response		T						T		T	T	

4.3 Meetings with Community Representatives

The Department was invited to attend two community meetings held to discuss issues in relation to the modified proposal and recommended revisions.

On the 24th October 2002, the Department met with the Member for Bligh, MsClover Moore, to discuss the modified proposal. Representatives from the Paddington Society, Centennial Park Residents Association, Woolloomooloo Neighbourhood Advisory Board, Woolloomooloo Today Resident's Group, and Ocean Street Not Ocean Freeway Group also participated in the meeting. Key issues of concern were:

- ◆ that the Supplementary EIS failed to assess the impacts associated with the revised modified proposal and does not identify mitigation measures;
- ◆ tunnelling impacts in the vicinity of several high-rise buildings in Central Sydney;
- ◆ the need for additional traffic management in surrounding suburbs (LATMs);
- ◆ the visual and amenity impacts of the eastern portal;
- ◆ lack of underground interconnectivity;
- ◆ lack of health and air quality assessment, particularly in Woolloomooloo;
- ◆ the impact of portal emissions;
- ◆ lack of in-tunnel filtration;
- ◆ no access from Cowper Wharf Road to the Domain Tunnel;
- ◆ removal of direct access from William Street to the Eastern Distributor (no right turn onto Bourke Street);
- ◆ increased through traffic in Woolloomooloo; and,
- ◆ increased traffic volumes on New South Head Road and Ocean Street.

These issues are discussed in Sections 6 and 7 of this Report.

The Department met with the Cross City Tunnel Action Group (CCTAG) on the 3rd December 2002, representing a large number of residents and interest groups in Rushcutters Bay Precinct to discuss the revised modified proposal. The CCTAG raised a number of issues that it considered have not been properly studied and assessed. Specific issues included:

- ◆ tunnelling impacts in the vicinity of several high-rise buildings in Central Sydney;
- ◆ the need for an Environmental Impact Statement to be prepared and exhibited for the whole project (as opposed to just for the proposed modifications);
- ◆ lack of 'to scale' longitudinal or cross sections for affected areas;
- ◆ lack of structural and vibration assessment;
- ◆ lack of local air quality impacts and human health impacts assessment;
- ◆ lack of identification of mitigation measures identified to overcome construction noise;
- ◆ lack of assessment of the impacts on development potential;
- ◆ lack of consultation with affected communities at the eastern portal location;
- ◆ inadequate justification for each modification to the approved project;
- ◆ inadequate traffic and transport impact assessment; and,
- ◆ failure to address the Director-General's requirements.

4.4 Issues Summary

Amenity

A core concern was the impact of the modified proposal on the amenity of local streets and pedestrian spaces. Sixty-five percent of representations (661) considered that the modified proposal would have a negative effect on local neighbourhoods due to increased traffic and associated noise, pollution and visual impacts. Such representations cited existing streetscapes and lifestyles that may be significantly changed as a result of the modified proposal.

Displacement of street prostitution was raised in three representations. However, each of these three representations, from South Sydney Council, the Member for Bligh, and the East Sydney Neighbourhood Association, considered the issue in detail.

Project Design

A majority (62%) of representations (630), including the submission from South Sydney Council, suggested that the modified proposal would affect fewer people if the eastern portal of the tunnel was moved around 400 metres further east to Rushcutters Bay Park. Many of these representations supported the modified proposal in principal, however considered the negative impacts of the eastern portal on local residents too great.

One hundred and thirty-six representations raised concerns over the design of the tunnel itself. Design concerns included tunnel depth, the need for more traffic lanes and engineering constraints.

Urban Design, Visual and Landscaping

Six hundred representations recommended the incorporation of a grassed canopy at or over the eastern portal to improve amenity in this area. These representations commonly cited the reductions in the size of the Kings Cross "lid" as a reason for requiring such a canopy.

A further 462 representations raised issues of adequate urban design and surface landscaping as part of the modified proposal. Twenty-one representations suggested that mature trees should be retained as part of the modified proposal as the survival of new trees would be severely limited by ecological conditions and interference by pedestrians.

Nineteen representations were not satisfied with the design of the ventilation stack, suggesting that the location and height of the stack would have a visual impact that could not be mitigated.

Local Traffic

Local traffic concerns were raised in relation to the Rushcutters Bay Precinct (518 representations), Eastern Precinct (93 representations), Darling Harbour Precinct (16 representations), the Central Precinct (eight representations) and Paddington (54 representations). The issues in relation to these precincts, and other issues raised are outlined below.

Rushcutters Bay Precinct

Operational traffic issues were a major concern, raised in 51% of representations (518 representations, 486 of which were form letters). These representations considered that traffic congestion would increase in the Rushcutters Bay Precinct due to the modified proposal.

Concerns included increased (and induced) traffic using the proposed tunnel and the associated traffic around the tunnel portals. However, the main concern related to traffic using local roads to either avoid the proposed tunnel itself or to enter the proposed tunnel. Representations considered that traffic avoiding the tunnel would adversely affect local traffic conditions in this precinct causing congestion and delay. The magnitude of this impact was considered to be significantly higher than predicted.

One hundred and sixty-two representations considered that the proposed parking arrangements would be inadequate to cater for local residents in the Precinct. Loss of residential parking around the eastern portal was a particular concern, as well as short-stay parking for taxis and delivery used by older residents.

Eastern Precinct

Nine percent of representations (93) raised concerns regarding the potential traffic increases in the Eastern Precinct and the resulting congestion and noise. Particular concern was noted over loss of accessibility. The Council of the City of Sydney (CCS) noted particular concern in relation to predicted increases in traffic volumes on St Marys Road and Yurong Parkway.

Darling Harbour Precinct

Representations suggested that congestion in the Darling Harbour Precinct was linked to regional traffic concerns regarding the Anzac Bridge and traffic in the inner-west. Representations noted concern over a perceived increase in traffic congestion on local roads and around the western tunnel portal as a direct result of the modified proposal.

Paddington

Of particular concern regionally, was the impact of the modified proposal on streets in Woollahra, particularly Ocean Street. Fifty-four representations (including the "Ocean Street Not Ocean Freeway" community group) identified severe traffic impacts on Ocean Street that would lead to congestion and associated noise, pollution and loss of amenity.

Air Quality – Operation

The impacts of the modified proposal on local air quality were a major concern. Thirty-six percent of representations (368) considered local air quality would be reduced significantly as a direct result of the modified proposal. The source of air pollution was considered to be the increased traffic on surface streets, as well as emissions from the ventilation stack. Of these, 184 representations noted concern about the health impacts of the air pollution resulting from the modified proposal. Health concerns ranged from short term asthma through to potential long-term impacts such as cancer and respiratory disease. Four representations also mentioned odour problems associated with stack emissions.

Emission treatment was strongly supported in 15% of representations (150). The need for filtration of tunnel emissions was seen as critical to ensuring that air quality and health impacts were effectively mitigated. Forty-one representations specifically cited the ventilation stack as inadequate to treat emissions. The need for portal emissions was also of concern. Representations were concerned about when it was proposed to emit from portals and the impacts of this.

The air quality impacts of the modified proposal on the Sydney region were raised in 126 representations. Concerns regarding regional pollution and greenhouse emissions were raised in relation to increased (and induced) traffic volumes.

Twenty-one representations considered air quality assessment and modelling to be inadequate or incomplete.

The EPA and Department of Transport had specific concerns regarding operational air quality. The EPA makes a number of recommendations to monitor and report on air quality during operation of the modified proposal, including:

- ◆ a more thorough analysis of traffic levels in the tunnel to establish more rigorous emission estimates;
- ◆ integration of traffic management and ventilation systems;
- ◆ minimising portal release for controlling in-tunnel air quality;
- ◆ a revised health risk assessment using emission data that takes into account the real reductions in emissions that will occur over time;
- ◆ a detailed modelling study that demonstrates the feasibility of portal emissions;
- ◆ an agreement between relevant agencies (including NSW Health) on the appropriate ambient criteria for pollutants during portal emissions; and,
- ◆ a trial of portal emissions.

Operational Noise

Thirty-two percent of representations (321) were concerned with operational noise. Sixty representations suggested more comprehensive noise mitigation measures than those described by the modified proposal such as noise walls.

Construction Impacts

The main concerns regarding construction of the modified proposal were noise and vibration (268 representations) and working hours (258 representations). Residents were very concerned that construction noise would be excessive and prolonged.

The proposal to allow 24 hour construction and heavy vehicle movements was considered unacceptable by 356 representations (26%), including the EPA, Department of Housing and South Sydney Council. It was suggested that construction working hours be limited and that heavy vehicle movements be restricted. The EPA objected to 24 hour spoil transport.

Lack of information on the length and staging of construction was identified in 74 representations (72 from one form).

Concern over access arrangements, loss of parking and traffic management was identified in 27 representations. Seven representations also noted concerns over pedestrian access during construction.

Concerns regarding air quality, particularly dust during construction were raised in 61 representations. The location of compound sites was raised in 50 representations. These representations recommended that compound sites be located away from multi-storey residential buildings, out of sight and have minimum impacts on access and traffic.

The EPA noted that surface and near surface construction stages would require particularly sensitive management and appropriate noise mitigation measures to be in place before substantive construction begins at the eastern portal.

EIA Process

Nineteen percent of representations (191) were of the opinion that public consultation for the modified proposal was inadequate. Complaints ranged from lack of notification, the limited exhibition period, and misleading information and assessment. Eighty four representations considered the EIS to contain major errors.

Twenty three representations suggested that the EIA planning process itself was flawed due to a lack of community consultation and inconsistency with strategic planning.

Regional Traffic

Regional traffic implications were identified in 154 representations. The main concern was increased congestion as a direct result of the modified proposal in suburbs to the east of the modified proposal (eg. Woollahra, Paddington) and the inner west (eg. Glebe, Leichhardt). Many representations considered that such regional impacts would be significantly higher than predicted.

Access to the Eastern Distributor was of particular concern to 53 respondents, including South Sydney City Council (SSCC) who noted concern of loss of access under the modified proposal.

Thirty-six representations considered the traffic assessment and/or modelling to be flawed. Representations raised broad concerns that predicted increases and redistribution of traffic was counter-intuitive to local experience. Other representations cited specific modelling figures that were considered incorrect or misleading.

Concern over the access implications of losing the right turn from Cowper Wharf Road was raised in 182 representations (18%). In particular, Transport NSW, SSCC, and the Royal Australian Navy (a significant employer in the area) were concerned that the modified proposal had not provided effective access to northern Sydney. The Council of the City of Sydney, SSCC and the Member for Bligh, Ms Clover Moore MP objected to this proposed modification noting the adverse impacts on local access and undesirable detours which would result. The Department noted significant concern over this proposed modification and requested the RTA to investigate options which allowed right turns from Cowper Wharf Road to the Domain Tunnel to remain.

SSCC also objected to the following proposed changes:

- ◆ the introduction of right turns from William Street into Crown and Riley Streets, as the proposal is contrary to the objectives of the Eastern Distributor Local Area Improvement Plan;
- ◆ the loss of right turns from William Street into Bourke Street; and,
- ◆ the traffic diversions required as a result of the proposed changes.

Tolling

General concern over tolling arrangements was raised in 114 representations. The majority of these were concerned about toll avoidance and resultant traffic increases on local roads. A small number of

representations suggested that a toll was unjustified in fulfilling the strategic benefit of the modified proposal.

Transport Policy

Six percent of representations (61) discussed transport policy in general, usually with a strong view that the modified proposal would not contribute to transport strategies for the Sydney region. Thirty-two representations were concerned with a lack of planning and/or commitment to public transport as part of the modified proposal. A further eleven representations had similar concerns for the local cycle/pedestrian network, including submissions from three local bicycle groups. Sixteen representations noted that the modified proposal would have negative impacts on pedestrians once completed.

In their representations, Woollahra, South Sydney and Leichhardt Councils all suggested that public transport enhancements into the modified proposal required more consideration. The Department of Housing, Department of Transport, State Transit and the EPA also raised concerns about the level of commitment to public transport.

Property Impacts

Twenty-six representations noted concern over the potential for settlement related property damage impacts. Forty-six representations suggested compensation for potential property damage and/or loss of value. Property damage due to operational vibration was raised in 19 representations.

Business Impacts

Potential negative impacts on local businesses around the proposed tunnel portals (particularly Kings Cross and Darling Harbour) was raised in 39 representations. Lengthy submissions were received from a number of local business groups, particularly those operating in Darling Harbour. Business groups including the Darling Harbour Business Association were concerned about potential impacts on patronage and tourism due to increased traffic, visual impacts and air pollution.

Heritage

Thirty-six representations noted the need to manage potential impacts on heritage buildings during construction and following operation of the modified proposal. The Heritage Office noted a number of specific requirements for the modified proposal to consider. Specific sites with heritage value included the 'Woolloomooloo Drain', the 'Bourke Street Branch of the Bondi Ocean Outfall Sewer', the site of 'Palmer's Farm', the Domain, and a number of State listed heritage buildings. The Heritage Office noted that permits would be required for excavations that may affect heritage sites and recommended a number of specific management measures.

Safety

Safety concerns for road users and pedestrians were raised in 31 and 33 representations respectively. Eleven representations were concerned about emergency response in the event of an accident in the tunnel. Representations were concerned about the ability of emergency vehicles to access the tunnel or local streets due to congestion problems.

The Department of Housing considered that tunnel events including major fire, explosion or toxic release events may have impacts on properties and residents near tunnel portals. The Department of Housing suggested that emission and blast impacts in an emergency event need to be modelled and mitigation measures implemented.

The Department of Land and Water Conservation was concerned that flood protection and gravitational drainage needed more consideration. More detailed use of the Government's Flood Policy was recommended to ensure the safety of construction personnel and tunnel users.

5. ADDITIONAL REVISIONS TO THE PROPOSED MODIFICATIONS

This Section of the Report provides a description of the additional alterations as described in the Supplementary Representations Report. It also includes the Department's comparative evaluation of the alterations proposed by the RTA. The Department's detailed consideration of the revised modified proposal (i.e. the modified proposal as exhibited plus revisions as described in this Section) is provided in Sections 6 and 7.

5.1 Additional Revisions Outlined in the Supplementary Representations Report

5.1.1 Introduction

The Supplementary Representations Report details proposed revisions to the modifications presented in the Supplementary EIS following consideration of representations, additional correspondence from Government agencies and other bodies, additional studies undertaken and further development of the concept design. Key revisions include:

- ◆ alterations to traffic arrangements in Woolloomooloo;
- ◆ direct connection to the Domain Tunnel from Cowper Wharf Road;
- ◆ alterations to the Sir John Young Crescent tunnel exit;
- ◆ provision of a ventilation duct tunnel;
- ◆ replacement of car parking spaces in Rushcutters Bay;
- ◆ relocation of variable message signs; and,
- ◆ provision of a land bridge over the eastern portal.

Plans of these revisions are given in Figures 6 a – g. An outline of these revisions is given below. Proposed additional changes to the Conditions of Approval are given in Appendix B marked in blue.

The RTA has sought that the Minister for Planning consider these further revisions to the proposed modification in accordance with Section 115BA (6) of the EP&A Act.

5.1.2 Revisions to Traffic Arrangements in Woolloomooloo

The Supplementary EIS proposed modifications to traffic arrangements in this area including:

- ◆ loss of right turns from William Street to Palmer and Bourke Streets;
- ◆ new right turn movement from William Street to Crown Street (to be introduced prior to construction) and to Riley Street;
- ◆ southbound one way movement in Palmer Street to Cathedral Street from Sir John Young Crescent; and,
- ◆ removal of the traffic signals at the intersection with Sir John Young Crescent.

The Supplementary Representations Report proposes the following revisions:

- ◆ re-introduction of right turns from William Street into Palmer Street northbound;
- ◆ provision of a single lane roundabout at Crown Street intersection with Sir John Young Crescent and the Domain Car Park;

- ◆ two way traffic movement in Palmer Street between Cathedral Street and Sir John Young Crescent;
- ◆ left turn only from Yurong Parkway into St Marys Road at Sylvia Chase Square; and,
- ◆ introduction of a permanent right turn ban into Bourke Street from William Street for northbound road users.

These revisions are illustrated in Figures 6 a - b.

5.1.3 Direct Connection to the Domain Tunnel from Cowper Wharf Road

The Supplementary EIS prohibited access from Cowper Wharf Road and Palmer Street to the Domain Tunnel and Macquarie Street. The Supplementary Representations Report proposes to reinstate right turns from Cowper Wharf Road and retain the existing traffic signals. Access from Palmer Street to Macquarie Street and the Domain Tunnel would continue to be prohibited as per the Supplementary EIS proposal. This revision is illustrated in Figure 6 b.

5.1.4 Proposed Revisions to the Sir John Young Crescent Tunnel Exit Ramp

The Supplementary EIS relocated the Sir John Young Crescent portal six metres to the south west, from the intersection with Palmer Street to near the intersection with Crown Street, and slight realignment and deepening of the exit tunnel. This would reduce the extent of cut and cover construction in Riley Street by 55 metres.

The Supplementary Representations Report proposes further deepening of the tunnel alignment and relocation of the portal 20 metres southward from the position outlined in the Supplementary EIS. Cut and cover excavation would be limited to Sir John Young Crescent and accordingly, Riley Street, which would have been closed to through traffic for six months, would remain open. Louvres would also be added over a length of approximately 20 metres, extending northward from the portal position. Tunnel excavation activities, including haulage of spoil would now be undertaken in Sir John Young Crescent as part of the proposal for the new ventilation duct tunnel (see Section 5.1.5 of this Report). These revisions are illustrated in Figure 6 c.

5.1.5 Provision of a Ventilation Tunnel

The Supplementary EIS proposed:

- ◆ a 16 metre increase in the height of the ventilation stack from 44 metres (49 AHD) to 60 metres (65 AHD); and,
- ◆ portal emissions during congested traffic conditions.

The Supplementary Representations Report proposes to effectively eliminate portal emissions (except in extreme circumstances by providing:

- ◆ a separate ventilation tunnel beneath the proposed road tunnels to improve in-tunnel air quality;
- ◆ provision of stub tunnel connection from the ventilation tunnel in Darling Harbour to facilitate possible future connection of a ventilation stack at an alternative location as part of the future development at Darling Walk; and,
- ◆ portal emissions would only occur during an emergency unless otherwise agreed by the Director-General under the Conditions of Approval.

These revisions are illustrated in Figures 6 d.

5.1.6 Replacement of Car Parking Spaces in Rushcutters Bay

The modifications proposed in the Supplementary EIS would result in the net loss of 20 parking spaces and the potential for a further 5 to 10 to be lost due to traffic increases. The Supplementary Representations Report proposes the provision of 15 additional car parking spaces around the eastern portal, in the Rushcutters Bay area, reducing the net loss to 5 parking spaces. This revision is illustrated in Figure 6 e.

5.1.7 Relocation of Variable Message Signs

The following changes to variable message signs are proposed:

- ◆ relocation of a sign at the eastern portal to the westbound tunnel east of the Barcom Avenue junction; and,
- ◆ provision of three new Variable Message Signs on Crown Street, Sir John Young Crescent and Cowper Wharf Roadway in Woolloomooloo.

The location of all variable message signs, including the four revisions, are illustrated in Figure 6 f.

5.1.8 Provision of a Landscaped Land Bridge Over the Eastern Portal

The Supplementary Representations Report proposes the provision of a 40 metre land bridge over the eastern Kings Cross Tunnel and Cross City Tunnel portals in Rushcutters Bay. A concept design for the land bridge is illustrated in Figure 6 g.

5.1.9 Construction Issues

The proposed revisions would result in a number of changes to construction arrangements including:

- ◆ an intensification of lane closures surrounding the eastern portal, in Sir John Young Crescent and the Domain Tunnel;
- ◆ a new worksite between Cowper Wharf Road/ the Eastern Distributor / the Domain Tunnel / Macquarie Street;
- ◆ the elimination of cut and cover construction in Riley Street; and,
- ◆ the removal of spoil from the Sir John Young Crescent site;
- ◆ a 69 000 m³ increase in tunnel spoil, resulting largely from the construction of the ventilation duct tunnel; and,
- ◆ no truck movements on surface streets between 10 pm and 7 am, in place of 24 hour haulage from the Bourke Street site proposed in the Supplementary EIS.

5.2 Summary of Representations to the PAR

The RTA proposed changes to the modified proposal following consideration of the representations received to the Supplementary EIS. A summary of these modifications is given in Section 5.1 of this Report. The RTA prepared a Preferred Activity Report (PAR) that detailed proposed revisions to the modified proposal. The PAR was publicly released in late November 2002.

The Department has received three representations in relation to the PAR. Representations were received from one individual, Woollahra Council and the Royal Botanic Gardens and Domain Trust. Key concerns include:

- ◆ object to community suggestions about relocating the eastern portal 400 metres east to Rushcutters Bay Park;
- ◆ the loss of fig trees on the median strip of the Cahill Expressway;
- ◆ an increase the intrusiveness of road noise and visual pollution from the Cahill Expressway;
- ◆ the permanent ban of the right hand turn on William Street onto Bourke Street, preventing access to the Eastern Distributor southbound; and,
- ◆ the adequacy of a one lane roundabout at Crown Street and Sir John Young Crescent; and,
- ◆ the impacts of the proposed right-turn ban from William to Bourke Street.

These concerns are discussed in Sections 6 and 7 of this Report.

5.3 Consideration of Proposed Additional Modifications

The Department's assessment of the key issues relating to the revisions to the proposed modifications outlined in Section 5.1 of this Report is provided in Table 5.

Overall, Table 5 indicates that the alterations proposed by the RTA would result in a net positive effect over a range of environmental and planning issues when compared to the modified proposal exhibited in the Supplementary EIS. Key positive impacts would include:

- ◆ maintenance of access to the Domain Tunnel from Cowper Wharf Road;
- ◆ provision of more direct access to the north-eastern CBD from Woolloomooloo;
- ◆ significant improvements to in-tunnel air quality associated with provision of the ventilation tunnel; and,
- ◆ the provision of landscaped open space on the eastern land bridge.

The key negative impacts would be the significant increase in spoil generation and the associated construction traffic impacts resulting from construction of the ventilation duct tunnel and the loss of the fig trees from the median of the Cahill Expressway associated with the maintenance of access to the Domain Tunnel. The Department notes that the RTA's proposal to haul the majority of tunnel spoil directly into the Eastern Distributor from the Bourke Street Compound would significantly reduce the noise and traffic congestion issues associated with spoil haulage. The Department concludes that the considerable in-tunnel air quality improvements made possible by the provision of the ventilation duct tunnel would also provide a significant long-term environmental benefit and would more than off-set the short-term construction impacts. These issues are discussed further in Sections 6.2, 6.7 and 7.2 of this Report.

With regard to the loss of fig trees from the median of the Cahill Expressway, the Department notes that the revisions to access to the Domain Tunnel would significantly improve accessibility for Woolloomooloo residents compared to the modified proposal presented in the Supplementary EIS. The Department notes that these trees would be replaced with specimens of similar maturity under existing Condition of Approval No. 237. To further enhance the amenity of this area the Department has also recommended that the Proponent a Tree Replacement and Environmental Enhancement Plan to manage construction impacts at this location in consultation with the Royal Botanic Gardens and the Domain Trust. The Department notes that the enhancement to accessibility resulting from the

maintenance of access to the Domain Tunnel from Cowper Wharf Road would more than off-set the loss of the fig trees and concludes that the existing and recommended Conditions of Approval discussed above would manage the associated amenity impacts. This issue is discussed further in Section 6.10 of this Report.

5.4 Conclusion

The Proponent has sought that the Minister for Planning consider proposed alterations to the modifications presented in the Supplementary EIS to reduce the detrimental effect of the Supplementary EIS proposal on the environment. This has been as a result of:

- ◆ consideration of representations made on the Supplementary EIS;
- ◆ consideration of additional correspondence from Government agencies and other bodies;
- ◆ additional studies undertaken; and,
- ◆ further development of concept design details

The Department's assessment of the proposed alterations has concluded that, individually and cumulatively, they would overall reduce the impacts compared with the Supplementary EIS proposal. While it is noted that the additional spoil generated would require careful management, the additional modifications would result in significant benefits above and beyond those associated with the Supplementary EIS proposal. In particular, it is noted that the additional modifications would provide better accessibility for Woolloomooloo residents and significant improvements to in-tunnel air quality.

The Department therefore recommends that the proposed alterations outlined in this Section be adopted and that the Minister revise the requested modification in accordance with Section 115BA (6) of the EP&A Act.

Table 5 - Comparative Assessment of the Impacts of the Proposed Additional Modifications

Description of Additional Modification	Justification	Potential Impacts	Estimated Positive or Negative Impact Compared to the Modifications Proposed in the Supplementary EIS	Nature of Impact
Revisions to Traffic Arrangements in Woolloomooloo For an outline of proposed revisions see Section 5.1.2 of this Report and Figures 6 a - b	The Supplementary Representations Report indicates that this revision would improve access for local residents and provide efficient traffic circulation in the Woolloomooloo area	Regional Traffic (See Section 6.5 for details)	-ve due to loss of relatively direct access to the Eastern Distributor (southbound) from William Street.	New Minor Change
		Local Traffic and Access (see Section 6.6 for details)	+ve due to provision of more direct access to the north-east of the CBD +ve due to reductions in impacts on Cathedral Street and St Marys Road -ve to traffic increases on Riley Street	Major Change Minor Change Minor Change
		Construction Issues (see Section 6.10)	-ve due to construction stage traffic impacts associated with roundabout construction	Minor Change
Direct Connection to the Domain Tunnel from Cowper Wharf Road For an outline of this proposed revision see Section 5.1.3 of this Report and Figure 6 c	The Supplementary Representations Report indicates that this revision would allow for direct access to Harbour Crossing for northbound road users from Woolloomooloo	Regional Traffic (See Section 6.5 for details)	+ve due to maintenance of access to the Domain Tunnel from Cowper Wharf Road +ve due to maintenance of access from the Domain Tunnel to Macquarie Street via Cowper Wharf Road	New Major Change Minor Change
		Physical Property Impacts (See Section 7.3 for details)	-ve due to need to excavate rock from under the Domain land bridge and potential for stability issues	Minor Change

Description of Additional Modification	Justification	Potential Impacts	Estimated Positive or Negative Impact Compared to the Modifications Proposed in the Supplementary EIS	Nature of Impact
		Landscaping (See Section 6.10)	-ve due to loss of fig trees in the median of the Cahill Expressway	Major Change
		Construction Issues (See Sections 7.1 and 6.10)	-ve due to need for additional road closures and additional worksite	Minor Change
Revisions to Sir John Young Crescent Exit Ramp For an outline of these revisions see Section 5.1.4 of this Report and Figure 6 c	The Supplementary Representations Report indicates that this change would allow for more efficient tunnel alignment generally with flatter grades while reducing impacts on utilities, trees, the Woolloomooloo Drain,	Local Traffic (See Section 6.6)	+ve due to improved tunnel grades	Minor Change
			+ve due to improved weaving and merging	Minor Change
		Landscaping (See Section 6.10)	+ve due to retention of Plane Trees	Major Change
		Physical Property Impacts (See Section 7.3)	+ve due to slightly reduced risk of settlement	Minor Change
		Construction Issues (see Sections 6.10 and 7.1)	+ve due to elimination of need to close Riley Street during construction +ve due to reduced impacts on utilities	Minor Change Minor Change

Description of Additional Modification	Justification	Potential Impacts	Estimated Positive or Negative Impact Compared to the Modifications Proposed in the Supplementary EIS	Nature of Impact
		Heritage (See Section 7.5)	+ve due to reduction in impact on the Woolloomooloo Drain	Minor Change
Provision of a Ventilation Duct Tunnel and Spur Tunnel Connection For an outline of this proposed revision see Section 5.1.5 of this Report and Figure 6 d	The Supplementary Representations Report indicates that the ventilation duct tunnel would ensure that in the event of a sustained period of congestion or blockage, the in-tunnel air quality criteria would continue to be met without the need for portal emissions The stub connection would allow for the possibility of a future ventilation stack to be included as part of the Darling Walk Complex	Air Quality (See Section 6.2)	+ve due to improvements in in-tunnel air quality +ve due to reductions to circumstances where portal emissions would occur	Major Change Minor Change
		Spoil Management (See Section 7.2)	-ve due to 69 000 m ³ increase in spoil generation and associated traffic	Major Change
		Urban Design (See Section 6.11)	+ve due to potential for ventilation stack to be incorporated into a building	Minor Change
Replacement of Car Parking Spaces in Rushcutters Bay For an outline of the proposed revision to parking arrangements see Section 5.1.6 of this Report and Figure 6 e	The Supplementary Representations Report indicates that the additional spaces to be provided would improve the impact on amenity and local businesses	Impacts on Businesses (See Section 6.8)	+ve due to reduction in net loss of parking from 20 to 5 spaces	Minor Change
		Residential Amenity (See Section 6.9)	+ve due to reduction in net loss of parking from 20 to 5 spaces	Minor Change

Description of Additional Modification	Justification	Potential Impacts	Estimated Positive or Negative Impact Compared to the Modifications Proposed in the Supplementary EIS	Nature of Impact
Relocation of Variable Message Signs For an outline of the proposed revision see Section 5.1.7 of this Report and Figure 6 f	The Supplementary Representations Report indicates that relocated VMS would provide road users with sufficient prior warning that they are entering a tolled tunnel and an opportunity to choose an alternate route The three additional signs are required for better regional and local traffic management of incidents on surface streets	Traffic and Access (See Section 6.9)	+ve for identifying alternative toll-free routes	Minor change
		Emergency Management (See Section 6.10)	+ve due to better emergency management capabilities	Minor Change
		Urban Design (See Sections 6.9 and 6.10)	-ve due to introduction of visual impact at new location	Minor Change
			+ve due to elimination of visual impact at old location	Minor Change
Provision of a Land Bridge over the Eastern Portal For an outline of this proposed revision see Section 5.1.8 of this Report and Figure 6 g	The Representations Report indicates that this revision would reduce the impacts of the new eastern portal on the residents of Rushcutters Bay Precinct and improve social amenity	Urban Design (See Section 6.9)	+ve due to provision of landscaped open space	Major Change
		Noise (See Section 6.7)	+ve due to reductions in road noise emissions at residences near the land bridge	Minor Change
		Construction Issues (See Section 7.1)	-ve due to intensification of road closures	Minor change

6. ASSESSMENT OF KEY ISSUES

This Section of the Report provides an assessment of the key environmental impacts of the revised modified proposal (i.e. modification as proposed in the Supplementary EIS plus the revisions as identified in Section 5) based on an examination of the Supplementary EIS, issues raised in representations and the RTA's response to those issues provided in its Supplementary Representations Report and during further consultation with the Department. In accordance with Section 115BA(7) of the EP&A Act, the environmental impacts of the revised modified proposal is assessed only to the extent that the approved project is to be modified.

The RTA has also provided the Department with an assessment of all the issues raised in representations in the Supplementary Representations Report. The assessment has been reviewed by the Department and where required further assessment has been undertaken and discussed. It is therefore important that this Section be read in conjunction with the RTA's Supplementary Representations Report.

6.1 Need, Benefit and Justification

6.1.1 Background

The primary objectives of the approved project as stated in the original EIS are:

- ◆ to improve the environmental quality of public space with in Central Sydney;
- ◆ to improve ease of access and reliability of travel within Central Sydney; and,
- ◆ to improve the reliability and efficiency of travel between areas east and west of Central Sydney.

The Supplementary EIS states that the objectives of the proposed modifications are to:

- ◆ enhance the environment and transport related benefits of the approved project;
- ◆ to reduce the construction impacts of the approved project; and,
- ◆ to maintain acceptable economic and financial outcomes.

The Supplementary Representations Report indicates that the revised modified proposal would result in a 3 % reduction in 2016 daily surface traffic across the CBD screen lines with resultant traffic noise reductions and improvements in air quality and urban amenity. The Supplementary Representations Report concludes that this, together with the public transport enhancements required under the existing Conditions of Approval would ensure that the revised modified proposal would result in similar strategic and environmental and transport benefits when compared to the approved project.

6.1.2 Key Issues Raised in Representations to the Supplementary EIS

More than half (636) of the representations supported the modified proposal generally, however objected to a number of elements of the approved project such as stack emissions, traffic implications, operational noise and the proposed relocation of the eastern portal. Twenty-one percent of representations (213) objected outright to the modified proposal. Eight representations expressed unconditional support for the modified proposal.

A primary concern raised in representations was the impact of the modified proposal on the amenity of local streets and pedestrian spaces. Six hundred and sixty-one representations considered that the

modified proposal would have a negative effect on local neighbourhoods due to increased traffic and associated noise, pollution and visual impacts.

6.1.3 Consideration of Key Issues

The Department notes that the need and justification for the project as a whole was established when the Minister for Planning approved the project, subject to 240 Conditions of Approval. The Department's assessment of the revised modified proposal has found that its strategic benefits would be similar to the approved project.

The Department notes that the Supplementary EIS and Supplementary Representations Report have concluded the strategic benefits of the revised modified activity would be similar to the approved project. While the Department notes that the modifications would result in slight overall reductions to traffic volumes of CBD surface streets, some streets would experience significant increases. As with the approved project, long-term traffic congestion would require careful management, if the benefits of the project are to be achieved. With regard to public transport impacts, the Department's assessment has concluded that the requirements of the existing Conditions of Approval would ensure that benefits are enhanced to the greatest extent practicable.

In relation to the Harbour Street Exit, the Department notes that traffic volumes using this exit are predicted to increase by around 20% by 2016. The Department concludes that the monitoring and, if necessary, implementation of further traffic management measures and/or a congestion toll required under existing Condition of Approval No. 24 would ensure that unacceptable infiltration of traffic from this exit back into the CBD is effectively managed. Impacts on the operation of the Bathurst/Harbour Street are addressed in Section 6.5 of this Report.

The Department notes that the modifications to access arrangements within Woolloomooloo detailed in the Supplementary EIS, in particular the loss of access to the Domain Tunnel and Macquarie Street from Cowper Wharf Road, resulted in unnecessarily forcing more vehicles into the CCT tunnels than managing surface traffic impacts. The Department notes that the revisions to arrangements in this precinct detailed in the Supplementary Representations Report would provide better accessibility, including the maintenance of access to the Domain Tunnel and Macquarie Street from Cowper Wharf Road while also protecting against through traffic intrusion. Notwithstanding, the loss of direct access to the Eastern Distributor (southbound) associated with the loss of right turns from William Street and the potential for congestion associated with the proposed Sir John Young Crescent roundabout require further consideration. These issues are addressed in Sections 6.5 and 6.6 of this Report.

With regard to construction stage impacts, the Department notes that the proposed lengthening and deepening of the tunnels under William Street and the deepening of Sir John Young Crescent ramp would eliminate the need for both William Street and Riley Street to be closed. The proposal to haul spoil directly into the Eastern Distributor from the Bourke Street Compound and the proposed truck turning facility at Shakespeare Place would also significantly reduce construction traffic impacts. Notwithstanding, the increase in spoil generated by the modified proposal and the traffic impacts around the eastern portal, on the Domain Tunnel and the Eastern Distributor would require careful management. The management of these issues is discussed in Sections 7.1 and 7.2 of this Report. The potential for settlement impacts would also require detailed assessment, diligent monitoring and, in some cases, proactive protection. This issue is discussed further in Section 7.3 of this Report.

6.1.4 Conclusion

In its assessment of the approved project, Department concluded that the project objectives could be achieved subject to significant enhancement of public transport initiatives and additional offset measures. The proposed modifications (with revisions) would not substantially alter the overall nature of the project nor would it substantially alter the key strategic objectives of the approved project. The Department also considers that the specific objectives of the proposed modifications are appropriate and that these would be achieved with the revised modified proposal subject to the recommendations in this Report.

6.2 Operational Air Quality

6.2.1 Background

The approved project comprises two road tunnels for east and west traffic through Central Sydney between Darling Harbour and Kings Cross ventilated longitudinally with a single 49 metre high discharge stack located in Darling Harbour as shown in Figure 2.

The Conditions of Approval currently ensure that the:

- ◆ ventilation design makes provision for the retrofitting of pollution control systems should the need arise and technological developments make such systems available and cost effective;
- ◆ portal emissions would only be allowed following the Director-General's approval of a detailed and comprehensive analysis of the associated impacts and a procedure for portal emissions;
- ◆ in-tunnel air requirements are met through stringent monitoring and auditing; and
- ◆ external air quality requirements are met through stringent monitoring and auditing.

The Supplementary EIS proposed the following changes to the approved project which have air quality implications, namely:

- ◆ increased traffic movements through the tunnel. Daily traffic flows in 2006 for the approved project would be 68900, while the modified proposal is predicted to have daily traffic flows in 2006 of 77 100. As more cars are expected to use the tunnel more emissions would be emitted through the stack, thus necessitating a change to Condition of Approval No. 93;
- ◆ to provide additional air dispersion of pollutants and to offset the increase in tunnel emissions it is proposed to increase height of the ventilation stack from 49 metres AHD to 65 metres AHD. This would necessitate a change to Condition of Approval No. 80; and,
- ◆ incorporation of a new in-tunnel air quality limit of 50ppm 30 minute exposure time which would necessitate portal emissions to control in-tunnel air quality under congested traffic conditions. This would require a new Condition.

6.2.2 Issues Raised in Representations to the Supplementary EIS

Air quality impacts from the proposal were one of the most significant issues raised by the community.

Thirty-six percent of representations (368) considered local air quality would be reduced significantly as a direct result of the modified proposal. Concerns were particularly raised about portal emissions (eastern portal), emissions from the ventilation stack and increased traffic on surface streets. Of these, 184 representations noted concern about the health impacts of the air pollution resulting from the modified proposal. Treatment of tunnel emissions was suggested in a total of 150 representations. The

representations discussed additional treatment of emissions suggesting consideration of the inclusion of electrostatic precipitators in the tunnel to reduce the impact of tunnel emissions on surrounding residents. It was queried why electrostatic precipitators cannot be implemented in Cross City Tunnel when they are used in Norway and Japan.

EPA and Department of Planning raised concerns with regard to the air quality assessment in the Supplementary EIS. The EPA's and Department's concerns specifically related to:

- ◆ the NO₂ impact assessment;
- ◆ air toxics and health risk assessment;
- ◆ congested traffic conditions and portal emissions – have congested traffic conditions been considered in developing emission concentrations and load limits?
- ◆ cold starts; and
- ◆ greenhouse gas emissions.

6.2.3 Additional Investigations

Subsequent to the exhibition of the Supplementary EIS the proponent has proposed changes to the modified proposal which have air quality implications. The changes proposed result in:

- ◆ decreased traffic movements through the tunnel. (Daily traffic flows in 2006 for the modified proposal were 68300 while the revised modified proposal has daily traffic flows in 2006 of 66900); and,
- ◆ the construction of a new ventilation tunnel to meet new in-tunnel air quality limit of 50ppm 30 minute exposure time for congested traffic conditions. The construction of the ventilation tunnel reduces the need for portal emissions under congested conditions, as such, portal emissions are not proposed.

It should be noted that the revised modified proposal still proposes to increase the height of the ventilation stack from 49 metres AHD to 65 metres AHD.

The Supplementary Representations Report provides additional investigations into air quality impacts of the revised modified proposal, namely:

- ◆ alterations to the modified proposal as outlined in the Supplementary Environmental Impact Statement for the Cross City Tunnel – 31 October 2002 (Holmes Air Sciences); and,
- ◆ Cross City Tunnel Altered Tunnel Ventilation Concept Design Report – 30 October 2002 (ABB Australia).

6.2.4 Consideration of Key Issues

Overview

When the Department conducted its assessment of impacts for the approved project, in-tunnel air quality under congested traffic conditions was considered and Condition of Approval Nos. 89 and 90 were incorporated in the Approval. Post approval, concerns have been raised about long term (greater than 15 minutes) exposure of motorist's to carbon monoxide while driving through the tunnel. The RTA has tried to address this concern by seeking the inclusion of a new condition incorporating a 50 ppm 30 minute rolling average carbon monoxide limit. As there is a complex inter-relationship between Approval conditions for in-tunnel air quality, external air quality, air quality monitoring and regulation, the

Department considers that rather than modifying the existing air quality conditions individually a more integrated approach that looks at the air quality conditions holistically should be adopted. This was done by deleting all the of the existing 26 air quality Conditions (Condition of Approval Nos. 80 to 106) and replacing them with 34 new integrated Recommended Conditions of Approval (Nos. 247 to 280) based on conditions developed for the Lane Cove Tunnel project. The Department considers the Lane Cove tunnel air quality conditions are currently the most up to date Condition of Approval that deal with air quality impacts from road tunnels.

Regional Air Quality Impacts

A primary objective of the approved project is "to improve ease of access and reliability of travel within Central Sydney" (reduce traffic congestion on city streets) and improve traffic flow efficiency between east and west of Central Sydney. As a secondary objective it is to improve air quality and reduce greenhouse gas emissions.

As stated in the Director General's Report (September 2001), the Department was concerned that the approved project would lead to an increase in vehicle kilometres travelled (vkt) due to the attraction to travel further on less congested network which is in direct conflict to Action for Air. The revised modified proposal does not address this issue any further; however, the overall conclusion from the Director General's Report (September 2001), would still appear to be valid – that the efficiency improvements (vehicle hours travelled) offset the reductions to air quality due to increases in vehicle kilometres travelled compared to not having the Cross City Tunnel.

It is predicted that, for the revised modified proposal, emissions from Central Sydney would decrease relative to the approved project in 2006, however emissions would increase relatively to the approved project apart from CO₂ in 2016. In all cases it would appear that the revised modified proposal is marginally better than the modified proposal.

The stringent air quality monitoring against ambient air quality goals which were included in the Ministers Approval Conditions for the approved project are still particularly relevant for the revised modified proposal. To ensure that any "net improvement" to residents relative to the situation without the CCT and not be eroded to unacceptable levels in the future the Department has therefore recommended new Conditions of Approval Nos. 262, 265 and 270.

In-Tunnel Air Quality

There is a possibility that individuals/motorists (not associated with tunnel management) to be inside the tunnel for periods greater than 15 minutes. This would mainly be due to possible congestion within the tunnel. As there is no conclusive evidence that traffic congestion will not occur within the proposed Cross City Tunnel and can be controlled through traffic management, the Department, NSW Health and EPA recommended a precautionary approach to try and avoid longer term exposure and assume that motorists may be inside the tunnel for longer periods. On this basis the RTA has reviewed the ventilation design to meet a more stringent internal CO goal of 50ppm 30 minutes.

To be able to meet the new in-tunnel air quality limit of 50ppm 30 minute exposure time under congested traffic conditions, the modified proposal proposed portal emissions to control in-tunnel air quality. In response to representations about portal emissions the Proponent proposed the construction of a ventilation tunnel which would allow the in-tunnel air quality limit of 50ppm 30 minute exposure time for congested traffic conditions to be met without portal emissions. The Department therefore supports the proposed ventilation tunnel and recommends the inclusion of a Condition of Approval with a 50ppm

30 minute exposure time air quality limit (new Recommended Condition of Approval No. 258) in addition to the existing 87ppm 15 minute exposure time air quality limit.

NSW Health has indicated that an absolute limit for in-tunnel CO would also be appropriate. The Department and NSW Health are not aware of any specific public health guidelines for short term CO impacts. Using the WHO methodology for establishing CO concentration levels to ensure “no-observed” health effect with a significant margin of safety, a short term 200ppm 3 minute average limit for a single point is considered appropriate (new Recommended Condition of Approval No. 259).

The Department also considers that the Proponent should not solely rely on the ventilation system design to limit CO exposure in-tunnel and should have effective management systems in place to limit individual exposure of CO particularly during congested traffic conditions. To ensure that this occurs, the Department has recommended new Condition of Approval No. 255.

Impact of Stack Discharge

Since the bulk emission loads from the tunnel ventilation stack have increased compared to the approved project the Proponent has proposed to increase the stack height based on an air quality study.

Air quality impacts from stacks are typically considered separately for ground level receptors and elevated receptors as air quality impacts at elevated levels can be higher due to less opportunity for pollution dispersal.

The Proponent concluded from the air quality and risk assessment that for an increase in stack height of sixteen metres above the approved stack height of 49 metres AHD (ie. 65 metres AHD) the revised modified proposal would have the following consequences:

- ◆ a reduction in pollutant levels at the Millennium Towers, the closest elevated receptor;
- ◆ a marginal increase in pollutant levels at Darling Park. The impacts at Darling Park would still be less than those at Millennium Towers;
- ◆ generally a reduction in ground level concentrations close to the stack;
- ◆ marginal ground level concentration increases away from the stack at the corner of William Street and Crown Street, Corner of Bridge Road and Glebe Point Road, and Albion and Elizabeth Streets;
- ◆ a reduction in aggregated risk at the Millennium Towers; and,
- ◆ a marginal increase in aggregated risk at Darling Park. The risks at Darling Park would still be less than those at Millennium Towers.

The air quality impact predictions are presented in Table 6 for elevated receptors and Table 8 for ground level receptors. Table 7 presents the calculated aggregate risk for the closest elevated receptors. The situations where the predicted levels are greater for the revised modified proposal compared to the approved project are shaded.

Table 6 - Predicted Concentrations at Elevated Receptors Due to Stack Emissions for Approved Project and the Revised Modified Proposal Using the HAS Emissions

Pollutant	CO mg/m ³ (% of goal)		NO ₂ µg/m ³ (% of goal)		PM ₁₀ µg/m ³ (% of goal)		Benzene µg/m ³ (% of goal)
	1 hour	8-hour	1-hour	Annual	24-hour	Annual	Annual
Goal	31 mg/m ³	10 mg/m ³	245 µg/m ³	60 µg/m ³	50 µg/m ³	30 µg/m ³	16 µg/m ³
Approved Activity – stack 49 metres (AHD) HAS emissions							
Location							
IMAX 15	0.04 (0.1)	0.02 (0.2)	1.7 (0.7)	0.1 (0.2)	0.10 (0.2)	0.005 (0.02)	0.003 (0.02)
IMAX 30	0.27 (0.9)	0.04 (0.4)	12.7 (5.2)	0.2 (0.3)	0.14 (0.28)	0.008 (0.03)	0.0045 (0.028)
Mill 40	0.64 (2.1)	0.26 (2.6)	30.5 (12.4)	4.9 (8.2)	0.99 (1.98)	0.195 (0.65)	0.114 (0.72)
Mill 50	1.11 (3.6)	0.37 (3.7)	52.0 (21.2)	6.5 (10)	1.41 (2.82)	0.265 (0.88)	0.157 (0.98)
Mill 60	1.63 (5.3)	0.56 (5.6)	76.5 (31.2)	8.0 (13.3)	2.15 (4.3)	0.35 (1.2)	0.207 (1.29)
Mill 70	2.77 (9.0)	0.76 (7.6)	101.6 (41.5)	8.8 (14.7)	2.87 (5.74)	0.433 (1.44)	0.247 (1.54)
DP 145	1.27 (4.1)	0.17 (1.7)	30.6 (12.5)	1.2 (2.0)	0.70 (1.4)	0.07 (0.23)	0.034 (0.21)
Revised Modified Proposal (congested)– stack 65 metres (AHD) HAS emissions							
IMAX 15	9.5 x 10 ⁻⁵ (3.0 x 10 ⁻⁴)	2.2 x 10 ⁻⁵ (2.2 x 10 ⁻⁴)	4.2 x 10 ⁻³ (0.002)	7.0 x 10 ⁻⁵ (1.2 x 10 ⁻⁴)	6.6 x 10 ⁻⁵ (1.3 x 10 ⁻⁴)	2.8 x 10 ⁻⁶ (9.3 x 10 ⁻⁶)	1.6 x 10 ⁻⁶ (9.8 x 10 ⁻⁶)
IMAX 30	9.5 x 10 ⁻⁵ (3.0 x 10 ⁻⁴)	2.2 x 10 ⁻⁵ (2.2 x 10 ⁻⁴)	4.2 x 10 ⁻³ (0.002)	7.2 x 10 ⁻⁵ (1.2 x 10 ⁻⁴)	6.6 x 10 ⁻⁵ (1.3 x 10 ⁻⁴)	2.9 x 10 ⁻⁶ (9.6 x 10 ⁻⁵)	1.6 x 10 ⁻⁶ (1.0 x 10 ⁻⁵)
Mill 40	0.21 (0.69)	0.09 (0.88)	10 (4.08)	1.83 (3.05)	0.39 (0.78)	0.07 (0.25)	0.04 (0.26)
Mill 50	0.65 (2.1)	0.24 (2.37)	30.4 (12.4)	5.27 (8.8)	1.01 (2.01)	0.21 (0.71)	0.12 (0.76)
Mill 60	1.16 (3.75)	0.40 (4.01)	54.3 (22.2)	7.5 (12.5)	1.73 (3.5)	0.31 (1.02)	0.18 (1.11)
Mill 70	1.68 (5.4)	0.48 (4.8)	69.3 (28.3)	7.66 (12.8)	2.07 (4.15)	0.33 (1.09)	0.19 (1.2)
DP 145	1.30 (4.2)	0.23 (2.3)	31.6 (12.9)	1.4 (2.3)	1.25 (2.5)	0.09 (0.29)	0.04 (0.27)

Note: values are shaded when Alteration to Modified Proposal predictions are higher than Approved Project predictions. Using HAS emissions

Table7 - Predicted Aggregate Risk Due to Stack Emissions for Approved Project and the Revised Modified Proposal Using HAS Emissions

	Aggregate Risk						
	IMAX 15	IMAX 30	Mill 40	Mill 50	Mill 60	Mill 70	DP145
Revised Modified Proposal (congested)– stack 65 metres (AHD) HAS emissions	7.3 x 10 ⁻⁸	1.03x10 ⁻⁷	2.64x10 ⁻⁶	3.63x10 ⁻⁶	4.79x10 ⁻⁶	5.7x10 ⁻⁶	7.76x10 ⁻⁷
Revised Modified Proposal (congested)– stack 65 metres (AHD) HAS emissions	3.6x10 ⁻¹¹	3.75x10 ⁻¹¹	9.64x10 ⁻⁷	2.80x10 ⁻⁶	4.09x10 ⁻⁶	4.44x 10 ⁻⁶	9.85x10 ⁻⁷

Table 8 - Predicted Concentrations at Ground Level due to Stack Emissions for Approved Project and the Revised Modified Proposal Using HAS Emissions

Pollutant	CO mg/m ³ (% of goal)		NO ₂ µg/m ³ (% of goal)		PM ₁₀ µg/m ³ (% of goal)		Benzene µg/m ³ (% of goal)
	1 hour	8-hour	1-hour	Annual	24-hour	Annual	Annual
Goal	31 mg/m ³	10 mg/m ³	245 µg/m ³	60 µg/m ³	50 µg/m ³	30 µg/m ³	16 µg/m ³
Approved Activity – stack 49 metres (AHD) HAS emissions							
Location							
Day Street Darling Harbour	0.023 (0.07)	0.006 (0.06)	1.04 (0.40)	0.03 (0.05)	0.02 (0.04)	0.001 (0.003)	0.001 (0.006)
Paddys Market	0.246 (0.79)	0.08 (0.8)	10.4 (4.2)	0.60 (1.0)	0.49 (0.98)	0.03 (0.1)	0.016 (0.1)
William Street, Woolloomooloo (east of Crown Street)	0.149 (0.48)	0.031 (0.31)	4.3 (1.76)	0.66 (1.1)	0.16 (0.32)	0.037 (0.12)	0.019 (0.12)
Cnr of Bridge & Glebe Point Roads	0.074 (0.24)	0.033 (0.33)	2.1 (0.86)	0.54 (0.9)	0.16 (0.32)	0.028 (0.09)	0.016 (0.1)
Cnr Harris and William Henry Drv	0.221 (0.71)	0.127 (1.3)	9.9 (4.04)	0.6 (1.0)	0.39 (0.78)	0.030 (0.1)	0.018 (0.11)
Cnr Harris Street and Fig Street Ultimo	0.076 (0.25)	0.030 (0.3)	2.7 (1.1)	0.63 (1.05)	0.17 (0.34)	0.029 (0.1)	0.017 (0.11)
King Street Wharf	0.171 (0.55)	0.094 (0.94)	5.8 (2.37)	0.89 (1.51)	0.59 (1.18)	0.045 (0.15)	0.0256 (0.16)
Cnr of Albion & Elizabeth Streets Surry Hills	0.176 (0.57)	0.059 (0.59)	6.4 (2.6)	0.52 (0.86)	0.31 (0.62)	0.028 (0.09)	0.015 (0.09)
Alterations to the Modified Activity – stack 65 metres (AHD) HAS emissions							
Location							
Day Street Darling Harbour	0.018 (0.06)	0.004 (0.04)	0.8 (0.34)	0.01 (0.02)	0.01 (0.02)	0.000 (0.00)	0.000 (0.00)
Paddys Market	0.235 (0.76)	0.054 (0.54)	6.5 (2.66)	0.36 (0.60)	0.29 (0.59)	0.018 (0.06)	0.009 (0.06)
William Street, Woolloomooloo (east of Crown Street)	0.167 (0.54)	0.028 (0.28)	4.6 (1.88)	0.54 (0.89)	0.14 (0.28)	0.030 (0.10)	0.015 (0.10)

Pollutant	CO mg/m ³ (% of goal)		NO ₂ µg/m ³ (% of goal)		PM ₁₀ µg/m ³ (% of goal)		Benzene µg/m ³ (% of goal)
	1 hour	8-hour	1-hour	Annual	24-hour	Annual	Annual
Goal	31 mg/m ³	10 mg/m ³	245 µg/m ³	60 µg/m ³	50 µg/m ³	30 µg/m ³	16 µg/m ³
Cnr of Bridge & Glebe Point Roads	0.082 (0.27)	0.017 (0.17)	2.3 (0.93)	0.41 (0.69)	0.12 (0.25)	0.022 (0.07)	0.012 (0.08)
Cnr Harris and William Henry Drv	0.102 (0.33)	0.049 (0.49)	3.8 (1.53)	0.34 (0.57)	0.19 (0.38)	0.016 (0.05)	0.009 (0.06)
Cnr Harris Street and Fig Street Ultimo	0.063 (0.20)	0.022 (0.22)	1.7 (0.71)	0.42 (0.70)	0.11 (0.22)	0.018 (0.06)	0.011 (0.07)
King Street Wharf	0.078 (0.25)	0.051 (0.51)	3.2 (1.32)	0.49 (0.82)	0.32 (0.64)	0.024 (0.08)	0.014 (0.08)
Cnr of Albion & Elizabeth Streets Surry Hills	0.199 (0.64)	0.030 (0.30)	5.5 (2.25)	0.37 (0.62)	0.20 (0.39)	0.020 (0.07)	0.010 (0.07)

In general the Department considers that it would be difficult to find any location to accommodate a stack that would be entirely acceptable to the community. Based on the sites' ability to meet air quality goals for stack discharge and general lessening of the air quality impacts over the approved project and the potential to effectively manage the visual and urban design impacts, the Department supports the proposed stack height change to 65 metres AHD (new Condition of Approval No. 247). As the revised modified proposal has reduced the impacts at the IMAX to relatively low levels and increased the pollutant levels at Darling Park, the Department recommends the monitoring conditions be changed to have two elevated monitoring locations rather than monitoring at the IMAX and one elevated monitoring location (new Conditions of Approval Nos. 262 and 264).

In general, moving the stack within Darling Harbour is constrained by a number of important factors, particularly; air quality; land availability; ability to connect the vent stack to the main tunnel and urban design issues. Overall this would restrict any relocation principally to the east of the EIS location. Any location further east would generally have greater impact on the nearby high-rise apartments unless the stack was significantly higher.

The Sydney Harbour Foreshore Authority (SHFA) in their response to the Supplementary EIS suggested that the allowable relocation distance for the stack provided in Condition of Approval No. 81 of 100 metres was inadequate to provide a realistic height. In response to SHFA's concerns, the RTA investigated the potential to relocate the stack further away. The RTA report on this issue is presented in Appendix F. The report concludes it is possible to have a stack further to the eastern side of the current stack. However, to off-set the encroachment of the stack on residential buildings, it would be require a substantial increase in height in the order of 80 to 150 metres.

In this regard the Department supports the recommendation by SHFA provided that the air quality impacts are no worse that the revised modified proposal and recommends an amendment to existing Condition of Approval No. 81 allowing a greater degree of flexibility in the stack location in line with the additional information on alternative stack locations in Appendix F of this Report (See new

Recommended Condition of Approval No. 248). It should be noted any potential for alternative solutions would require the separate approval of the Director-General following consultation with the EPA and the Department of Health. This requirement is specified in new Recommended Condition of Approval No. 249.

Stack Filtration

Treatment of tunnel emissions was proposed in a total of 150 representations to the Supplementary EIS. The Department considers that this issue has not changed since the approved project, nor the modifications and was sufficiently dealt with in the original EIS assessment process. Notwithstanding, new Recommended Condition of Approval No. 251 ensures that the tunnel is designed and constructed so as to make provision for future installation of an appropriate pollution control system to treat air emissions from the tunnel if the technology becomes available.

PM_{2.5} Air Quality Goals

In the Supplementary EIS, the Proponent proposed the deletion of "PM_{2.5} (if approved following current NEPC review)". Department has adopted this change in new Recommended Condition of Approval No. 267, following advice from the EPA that the PM_{2.5} NEPM would not be appropriate to apply as a compliance goal since the NEPM is being established for reporting purposes only.

Notwithstanding, the PM_{2.5} has been retained for monitoring and reporting purposes. Requirements for monitoring and reporting on PM_{2.5} levels are specified in new Recommended Condition of Approval Nos. 262 to 265 inclusive and 270.

Air Quality Management

Regulation of Impacts

The EPA's preferred approach to regulate emissions from point sources is to develop site-specific emission limits using the air quality assessment conducted for the EIS, taking into account ambient standards and existing background conditions. The EPA's reasoning for adopting this approach is that a pollutant present in ambient air would be emitted from a variety of sources and making one (1) premise or activity alone responsible for meeting an ambient air quality standard is unreasonable. It is also extremely difficult to determine compliance.

In this regard the EPA's preferred approach is to set stack limits for all key pollutants. This would provide more stringent control of emissions from the stack, for which the RTA would be accountable, than applying ambient standards alone, as it would incorporate the worst-case background levels of pollutants. This would also prevent the Proponent from "polluting up" often cited as a significant community concern. This approach was adopted by the Victorian EPA for the operation of the Burnley and Domain tunnels as part of the City Link tunnel in Melbourne and for the Approved project. New recommended stack limits based on the revised modified proposal for NO₂, PM₁₀, CO and VOCs are incorporated in new Recommended Condition of Approval No. 271.

The Department considers that whilst the establishment of stack limits places a more direct control on operations, it may not ensure that the RTA (as a provider of public infrastructure) is accountable to its broader public commitments to improving the regional air shed through predicted improvements to travel efficiency resulting from the CCT. For example, the original EIS clearly indicates that the construction of the tunnel would reduce the total vehicle emissions across the Sydney road network due to the

reduction in overall traffic congestion. If this is the case then this should be reflected in ambient air quality improvements.

The Department considers that the RTA's public statements and commitments to a net improvement to air quality (or at least no worsening) as a result of the construction of the CCT is fundamental and integral to the strategic justification of the Proposal. On this basis, the Department recommends that the NEPM goals should be retained for the revised modified proposal as a way of ensuring accountability to such strategic air quality commitments. Used in conjunction with the stack limits, this would address the ability to "pollute up" but also given the community an assurance that net improvements to the regional air shed would be achieved.

As part of strategic air quality management, the Department considers it appropriate for the RTA to install an ambient air quality monitoring network and for monitoring results to be made publicly available. Should results indicate exceedance of the regional NEPM goals the RTA must provide a detailed written report outlining the circumstances of the exceedance and options available to prevent recurrence including improvements to traffic management or ventilation systems or installation of pollution control systems. Any recommendation to discontinue monitoring would require the approval of the Director-General. The requirement to meet NEPM ambient air quality goals is specified in new Recommended Condition of Approval No.267.

Portal Emissions

The revised modified proposal effectively eliminates the need for portal emissions, except in extreme circumstances because of the ventilation tunnel, as such, portal emissions are not proposed. This change reduces the need to change existing Condition of Approval No. 89, in fact it makes it possible to delete the condition, as such portal emission could only be allowed through a formal modification of the project. New Recommended Condition of Approval No. 273 presents the circumstance where portal emissions can occur, these circumstances are for emergency situations only, such as accidents.

6.2.5 Conclusion

The proposed increase in stack height would to a large extent offset the increase in pollutants due to the predicted increase in cars and from a longer tunnel. In this regard the impacts of the revised modified proposal would be virtually the same if not slightly better than the approved activity.

The only exception would be elevated receivers at Darling Park at around the roof top level (all pollutants assessed) and residents at ground level locations in William Street, Glebe Point Road/Bridge Road and Albion Street/Elizabeth Street (for CO and NO₂ only). However the increases would be very minor and would still be well within the specified goals.

Based on experience with the operation of the M5 East and in the review and assessment of the Lane Cove Tunnel project, the Department has recommended considerable strengthening of the controls on in-tunnel air quality.

One of the major revisions to the modified proposal is a recommendation for a new ventilation tunnel which would run below the proposed tunnels. This would be used primarily during peak congestion times and would allow more stringent World Health Organisation goals (i.e. 50 ppm-30 minute) to be met during periods of significant congestion. Notification and reporting requirements have also been considerably strengthened.

Similar to the approved project, in-stack limits have been specified to control “polluting-up” to the specified goals.

6.3 Fire and Life Safety

6.3.1 Background

The original EIS identified that the potential for vehicle accidents in the tunnel may result in structural damage to the Cross City Tunnel and/or a fire (through the combustion of petrol and diesel). A fire could potentially affect the CCT structure and smoke released could impact on surrounding land uses in the vicinity of the portals and stack.

Fire control would be managed by a manually operated deluge system to suppress the size and spread of fire. In the event of a fire, the longitudinal ventilation system could be used to push smoke along the tunnel in the direction of traffic and thereby prevent back layering of smoke on vehicles trapped behind the incident. These systems would be supported by emergency facilities including fire fighting equipment, communications systems to inform and protect tunnel users and emergency egresses spaced at regular intervals through the tunnel.

The original EIS noted that the movement of dangerous goods would be prohibited, as with all tunnels in NSW. Emergency Response Plans would also be developed to address impacts in the event of an accident within the tunnel.

The Department was satisfied that adequate facilities and measures were provided in the approved design to minimise the likelihood and impact of fire in the tunnel. Conditions 208 and 212 restrict the handling of dangerous goods and transportation of such in the tunnel. Condition 214 requires that design and operational measures that minimise the likelihood of vehicular accidents be installed. Condition 213 required that an Emergency Response Plan be developed in consultation with the NSW Fire Brigades, Police Service and SES. This must be submitted to the Director General for approval prior to operation. A rehearsed incident response must be undertaken prior to opening. Condition 215 requires that an annual hazard review be implemented.

The Supplementary EIS does not propose to alter the fire safety services and facilities in the tunnel. The primary fire control tools are the deluge system and the longitudinal ventilation system. The supplementary proposal, however, involves an increase tunnel length to 2.1km and an increase in the level of traffic by 18 percent. The capacity of the fire system to cater for the potential increase in traffic congestion must therefore be addressed.

6.3.2 Issues Raised in Representations to the Supplementary EIS

Safety concerns for roads users were raised in 31 representations, though none dealt specifically with fire concerns. Eleven representations were concerned with emergency response in the event of an accident in the tunnel. Issues of concern included traffic management.

The Department of Housing raised concern that a disaster incident in the tunnel such as a fire, relies on exhausting air from all opening including portals. The Department of Health was concerned about the impact on their residences in proximity to the portals.

6.3.4 Consideration of Key Issues

The revised modified proposal would result in the increased tunnel length from 1.8 kilometres to 2.1 kilometres. Additionally, the daily level of traffic is estimated to increase by approximately 18 percent. Generally, the frequency of fire risk in a tunnel is likely to increase in relation to the length of the tunnel and number of vehicles travelling through it. The Department therefore considers that it must be demonstrated that the fire safety system proposed, namely the deluge system and the longitudinal ventilation system, can be adequately coordinated to control the spread of a fire and protect tunnel users. In order to maximise fire safety in tunnels and ensure that best practice, fire safety systems utilised overseas are used as a benchmark. The RTA refers to the PIARC Committee of Road Tunnels (C5) document *'Fire and Smoke Control in Road Tunnels 05.05.B 1999'* as the international benchmark for fire safety.

Holmes Fire and Safety undertook a Fire Protection Feasibility Study for the approved Cross City Tunnel (Holmes Fire and Safety *'Draft Fire Safety Design Report Cross City Tunnel Fire Protection – Feasibility Study'*, 23 June 2002 & Holmes Fire and Safety, *'Supplementary Report Fire Safety Design'*, 26 July 2002). The Supplementary Report included an assessment of life safety in the tunnel. It was assumed that 8 percent of traffic levels would be congested and 1 percent of traffic levels would be stationary. The study noted that in the event of congested conditions in the tunnel, traffic control measures would be implemented to overcome this. The study stated that under these scenarios, the fire system would provide a higher level of life safety than a tunnel designed in accordance with PIARC recommendations.

The RTA has indicated that this fire safety assessment is adequate for the revised modified proposal. The Sydney Harbour Tunnel was used by the RTA as a benchmark to predict incident frequency in the CCT. As the Sydney Harbour Tunnel has similar traffic levels as those predicted for the CCT, it is considered that this would provide a comparative guide to congestion levels. The RTA estimated that congestion as a result of incidents within the tunnel would occur on 3.2 percent of occasions between 7am and 7pm. The initial estimates for congestion were therefore conservative and remain valid.

It should be noted that incidents occurring in the surrounding road network have not been factored into the congestion levels. As the CCT will be feeding into the established inner city road network, the broad impacts of external incidents can not be ignored. The Department requires further assurance that the deluge system and longitudinal ventilation system can adequately protect life safety in the event of a fire occurring in dense and congested traffic levels. It is considered, however, that these issues may be adequately dealt with through with the existing and recommended new Conditions of Approval.

Existing Condition of Approval No. 214 required that the Proponent provide the Director-General with details of design and operational measures to be incorporated into the CCT to minimise the likelihood and impact of vehicular accidents within the tunnel. New Condition of Approval No. 241 has been recommended to ensure that the fire safety systems adequately cater for the increased length and traffic through the tunnel in a holistic manner. The Proponent would also be required to develop a specific *'Fire and Smoke Management Plan'* under new Condition of Approval No. 246 to address fire safety in the tunnel during congested conditions. The Plan shall outline the fire protection systems, equipment and operational protocol required. This plan is to be to the satisfaction of the Fire Brigade. A full audit of this fire safety system is to be undertaken prior to operation. Similarly, fire simulation and smoke testing shall also be undertaken prior to operation.

The Department considers that these systems (including the deluge and ventilation systems) should be reviewed in the future, to ensure their ongoing adequacy. It is important that relevant stakeholders

including the Department and emergency services have a role within this. New Condition of Approval No. 245 is therefore recommended to establish an Evaluation Committee with representatives from the RTA, PlanningNSW, NSW Fire Brigade, Police and State Emergency Services, who would review the adequacy of these fire systems annually and in the event of an incident. The Evaluation Committee would consider national and international fire safety standards. A similar review committee has been established in France during the last two years. It is also recommended that a maintenance testing program be undertaken annually to ensure the operation adequacy of the fire safety systems. This requirement is specified in new Condition of Approval No. 243.

To ensure that tunnels users are adequately advised on appropriate behaviour in the event of a fire or incident, the Department recommends the implementation of a community awareness program, outlining actions to be undertaken in the tunnel in the event of a fire. This requirement is specified in new Condition of Approval No. 280.

6.4 Public Transport

6.4.1 Background

Impacts on public transport was a very significant issue raised in representations to the original EIS.

The original EIS describes public transport initiatives which form part of the approved project, including:

- ◆ the provision of eastbound and westbound 24 hour bus lanes in Park Street between College and Elizabeth Streets, in Druitt Street between Sussex and George Streets and on the Druitt Street viaduct between Harris and Sussex Streets;
- ◆ the conversion of the peak hour T2 transit lanes on William Street to 6 am to 7 pm T2 lanes between Forbes and College Streets westbound and between College and Palmer Streets eastbound;
- ◆ extension of the southbound bus lane on Elizabeth Street from Park Street to Liverpool Street by removing one right turn lane from Elizabeth Street northbound into Park Street eastbound; and,
- ◆ provision of bus priority signals at the Park Street mid-block signals in Hyde Park for westbound buses.

Notwithstanding these initiatives, the Director-General's report noted that the project, on its own merit when considered in isolation, would not appear to result in substantive improvements to the operating performance of major bus routes and concluded that supplementary measures would be essential, as an integral part of the project implementation to achieve more substantive improvements. The Director-General's Report recommended the implementation of over 30 public transport enhancement initiatives which were imposed as Conditions of Approval by the Minister, including:

- ◆ some 5 km of additional bus lanes;
- ◆ investigation into a further 15 km of new bus lanes or transit lanes;
- ◆ investigation of electronic based passenger information systems;
- ◆ improved co-ordination of buses with the RTA's traffic systems;
- ◆ real time congestion monitoring;
- ◆ provision of bus facilities such as bus shelters and street furniture;
- ◆ improvements to digital cameras for policing bus lanes; and,
- ◆ a contingency fund of \$5 million for additional works required following the investigations required.

Neither the modified proposal nor the proposed revisions propose any additional initiatives specifically directed at public transport enhancement, however, it is noted that it is proposed to extend the existing T2 transit lane in William Street from Forbes Street to the Kings Cross Tunnel. Both documents conclude that the predicted decreases in traffic on surface streets within the CBD would result in marginally improved conditions for road based public transport. With regard to construction impacts, the Supplementary Representations Report concludes while traffic would increase on some streets, there would be reductions in traffic volumes on other streets and the network would operate satisfactorily. The RTA recommends updating the Condition of Approval relating to public transport to refer to the additional assessment work completed in the Supplementary Representations Report.

6.4.2 Key Issues Raised in Representations to the Supplementary EIS

Public Transport was raised in 33 representations. In their representations, Woollahra, South Sydney and Leichhardt Councils all suggested that public transport enhancements to be undertaken as part of the approved project required more consideration. The Department of Housing, Department of Transport, State Transit and the EPA also raised concerns about the level of commitment to public transport.

6.4.3 Consideration of Key Issues

Peer Review of Assessment

The Department commissioned Stepfair Pty Ltd to review the traffic assessment in the Supplementary Representations Report, which compares the impacts of the revised modified proposal to the approved project. The Traffic Review is given in Appendix E.

Key conclusions of the Stepfair Traffic Review in relation to public transport are as follows:

- ◆ the signal priority change from east-west to north-south is critical to improving predominately north-south bus routes through the CBD;
- ◆ impacts identified for the approved activity remain valid for the revised modified proposal; and,
- ◆ the existing Conditions of Approval are considered adequate in addressing operational concerns with the revised modified proposal.

Construction Impacts

The Department notes the elimination of the need to close lanes on William Street would reduce construction stage traffic impacts along this road corridor. Notwithstanding, the relocation of the eastern portal to the east of the Kings Cross Tunnel and the construction of the eastern land bridge would require lane closures during daytime hours and total road closures at night. Requirements to ensure that the impacts of these closures are satisfactorily managed are discussed in Section 7.1 of this Report. The Department concludes that existing Conditions of Approval, which require the preparation of Construction Stage Public Transport Management Plans in consultation with key stakeholders and resolution of the need to re-route bus services during the closure of Bourke Street, would ensure that construction stage impacts on public transport associated with the revised modified proposal are appropriately managed. No further changes are therefore recommended.

Operational Impacts

The Department's assessment has found that whilst travel times for road based public transport would marginally improve under the revised modified proposal, services on New South Head Road may be impacted by predicted increases in traffic volumes. Existing transit lanes on New South Head Road are expected to protect bus services. The Department notes that Conditions of Approval Nos. 28 and 36 require the development of bus performance indicators and reviews of bus operations 1 and 3 years after tunnel opening. Condition 38 requires the Proponent to implement measures required by the Public Transport Committee to achieve the bus performance indicators to the greatest extent practicable. The impacts on New South Head Road would need to be monitored in accordance with these Conditions of Approval to ensure that no operational problems arise. The Department concludes that the existing Conditions of Approval would ensure that the public transport impacts associated with the proposed modifications would be satisfactorily addressed.

6.5 Regional Traffic Issues

6.5.1 Background

Regional traffic impacts were a key concern raised in representations to the original EIS. Particular concerns were raised over the potential for the increased capacity in the road network to encourage induced traffic and increased congestion beyond the CBD on major feeder routes to tunnel entrances and exits.

Overall, the Department's assessment of the approved project concluded that reductions in congestion levels on surfaces streets within the CBD appeared to be largely confined to the William/Park/Druitt Street corridor, with marginal reductions on streets beyond this corridor which are unlikely to be noticeable to drivers or pedestrians. It noted that induced demand has the potential to erode the predicted traffic volume reductions on CBD surface roads and, as a consequence, existing Condition of Approval No. 58 requires the Proponent to develop measures to reduce the roadway capacity where practicable in Albion, Bathurst, Castlereagh, Foveaux, Liverpool, Palmer and Pitt Streets. The Department also concluded that intersection performance improvements resulting from the approved project would be more limited than predicted by the RTA. Conditions of Approval Nos. 56 and 57 therefore require the Proponent to work with the relevant local Councils to ensure that traffic impacts within the regional areas adjacent to the project are monitored and appropriately managed.

The proposed modifications include a number of changes which would impact on the regional road network. Key changes include loss of access to the Domain Tunnel from Cowper Wharf Road and Sir John Young Crescent (with the exception of traffic exiting from the CCT via the Sir John Young Crescent ramp), right turn bans from William Street into Bourke and Palmer Streets and capacity reductions within the Kings Cross Tunnel. The modifications proposed in the Supplementary EIS are outlined in Section 3 of this Report.

The Supplementary Representations Report proposes a number of revisions to road network connections including:

- ◆ maintenance of direct access from Cowper Wharf Road to the Domain Tunnel;
- ◆ re-introduction of right turns from William Street into Palmer Street northbound;
- ◆ provision of a single lane roundabout at the intersection of Crown Street with Sir John Young Crescent and the Domain Carpark;
- ◆ two way traffic movement in Palmer Street between Cathedral Street and Sir John Young Crescent;

- ◆ left turn only from Yurong Parkway into St Marys Road at Sylvia Chase Square; and,
- ◆ a minor relocation of the Sir John Young Crescent portal.

These revisions to the modified proposal are discussed in Section 5 of this Report.

The Supplementary Representations Report indicates that the revised modified proposal would attract around 12,000 more vehicles into the tunnel per day in 2016 (a total of 91, 700 vehicles per day). This increase is predominately attributable to a predicted increase in usage of the Sir John Young Crescent Exit and proposed changes to access to the Domain Tunnel. Traffic volumes on CBD streets under the revised modified proposal would remain largely similar to those predicted for the approved project, with the exception of the following key changes:

- ◆ wide spread reductions in traffic volumes on east-west streets, particularly to the south of the William Street/Park Street corridor;
- ◆ large traffic reductions in Woolloomooloo and Darlinghurst (west of Forbes Street);
- ◆ increases in traffic volumes on Cleveland Street, the Harbour Bridge, Regent Street, Macquarie Street, the Eastern Distributor, Anzac Bridge and New South Head Road;
- ◆ slight reductions in traffic on Moore Park Road and Oxford Street

Details are provided in Appendix I of the RTA's Supplementary Representations Report

Travel efficiency and the potential for mode shift remain largely similar to that predicted for the approved project. However, a regional switch from the Harbour Tunnel to the Harbour Bridge of around 8 000 vehicles per day) is predicted. Of note, Macquarie Street would experience an increase from 19 800 vehicles per day to 26 800, which equates to an increase of 35% above the levels predicted for the approved project. The Supplementary Representations Report concludes that this increase is similar to those forecast in Elizabeth and George Streets and is not considered inappropriate for a principal CBD street.

6.5.2 Key Issues Raised in Representations to the Supplementary EIS

Regional traffic implications were identified in 154 representations. The main concern was increased congestion as a direct result of the modified proposal in suburbs to the east of the modified proposal (eg. Woollahra, Paddington) and the inner west (eg. Glebe, Leichhardt). Many representations considered that such regional impacts would be significantly higher than predicted.

Access to the Eastern Distributor was of particular concern to 53 respondents, including South Sydney City Council (SSCC) who noted concern regarding loss of access under the modified proposal.

Thirty-six representations considered the traffic assessment and/or modelling to be flawed. Representations had broad concerns that predicted increases and redistribution of traffic was counter-intuitive to local experience. Other representations cited specific modelling figures that were considered incorrect or misleading.

Concern over the access implications of losing the right turn from Cowper Wharf Road was raised in 182 representations (18%). In particular, Transport NSW, SSCC, and the Royal Australian Navy (a significant employer in the area) were concerned that the modified proposal had not provided effective access to northern Sydney. The Council of the City of Sydney, SSCC and the Member for Bligh, Ms Clover Moore MP objected to this proposed modification noting the adverse impacts on local access and undesirable detours which would result. The Department noted significant concern over this

proposed modification and requested the RTA to investigate options which allowed right turns from Cowper Wharf Road to the Domain Tunnel to remain.

SSCC also objected to the following proposed changes:

- ◆ the introduction of right turns from William Street into Crown and Riley Streets, as the proposal is contrary to the objectives of the Eastern Distributor Local Area Improvement Plan;
- ◆ the loss of right turns from William Street into Bourke Street; and,
- ◆ the traffic diversions required as a result of the proposed changes.

6.5.3 Issues Raised in Representations on the PAR

One representation on the PAR noted concern over the impacts associated with the proposed right-turn ban from William Street to Bourke Street.

6.5.4 Consideration of Key Issues

Peer Review of Regional Traffic Impacts

The Department commissioned Stepfair Pty Ltd to review the regional traffic assessment in the Supplementary Representations Report. This Review is given in Appendix E.

Key conclusions and recommendations of the Traffic Review which compares the impacts of the revised modified proposal to the approved project are as follows:

- ◆ the modelling undertaken is acceptable and existing Conditions of Approval would address any induced traffic issues;
- ◆ the revised modified proposal would result in the following key positive impacts:
 - a 4 500 vehicle per day increase in tunnel traffic in 2016 associated with access restrictions to the Domain Tunnel;
 - minor reductions in travel times between the Ocean Street/Oxford Street intersection and the Western Distributor viaduct;
 - traffic reductions on east-west streets, particularly the William/Park Street corridor; and,
 - elimination of weaving issues in Sir John Young Crescent;
- ◆ the revised modified proposal would result in the following key negative impacts:
 - the shift of approximately 8 000 vehicles per day from the Harbour Tunnel to the Harbour Bridge which is in part caused by the increase in traffic exiting the tunnel via the Sir John Young Crescent ramp;
 - increased traffic on New South Head Road and significantly less pronounced increases on Ocean Street beyond that predicted in the Supplementary Representations Report;
 - potentially greater increases on Anzac Bridge than predicted which may pose capacity implications;
 - increases on Park, Liverpool, Cleveland, Hunter, Goulburn, Bond and Harbour Streets; and,
 - significant increases in traffic volumes on Macquarie Street.
- ◆ concludes that the above negative impacts would be addressed through existing Conditions of Approval Nos. 59 and 61 (provided that references to China Town and Macquarie and Hunter Streets are added to this Condition);
- ◆ notes the level of service at the intersection of the exit with Harbour Street may deteriorate to an unsatisfactory level due to increases in traffic using this exit under the revised modified proposal

- and recommends that the operation of this intersection be monitored and, if necessary, rectification works carried out; and,
- ◆ notes that the proposed right turn ban from William to Bourke Street limits access to the Eastern Distributor (southbound) and poses an unnecessary constraint, particularly outside peak hours and recommends that the Proponent investigate the feasibility of allowing right hand turns.

Induced Traffic and Capacity Reductions

The economic and traffic analysis included in the Supplementary Representations Report (in keeping with the findings of the original EIS) suggests that there would only be a small amount of induced traffic in the CBD and adjacent road network when the Cross City Tunnel is operational. The Director-General's Report and the Stepfair Traffic Review indicates that induced traffic has the potential to significantly erode the reductions in traffic volumes on surface streets in the CBD which would be a key benefit of the project. To protect against this, existing Condition of Approval No. 58 requires that the Proponent develop measures to reduce the roadway capacity where practicable in Albion, Bathurst, Castlereagh, Foveaux, Liverpool, Palmer and Pitt Streets. The Department notes that similar reductions are predicted on these streets under the revised modified proposal and concludes that the existing Condition would appropriately manage the issue.

It is also noted that Condition of Approval No. 61 requires the Proponent to monitor traffic volumes on regional and local roads within suburbs surrounding the project and, if traffic intrusion is found to be reasonably beyond that predicted, prepare and implement traffic management measures to mitigate the impacts of intrusive traffic following consultation with relevant Councils and the affected communities. This Condition of Approval would also work to manage the impacts of induced traffic and is discussed further in Section 6.6 of this Report. No further Conditions of Approval are recommended.

Net Intersection Performance Improvements

The Department notes that the predicted overall reductions in traffic on CBD surface streets (though marginal) under the revised modified proposal would result in similar intersection performance as that predicted for the approved project. Notwithstanding, the Department notes the Supplementary Representations Report indicates that the Harbour Street/Bathurst Street intersection would operate at capacity (level of service F) in the AM peak and at level of service B at other times in 2016 and concludes that this intersection would operate satisfactorily. The Stepfair Traffic Review indicates that this assessment is conservative and concludes that this intersection may operate at capacity. Existing Condition of Approval No. 62 requires the Proponent to monitor the operation of this intersection to ensure an appropriate balance between intersection performance and pedestrian green times. The Department also notes that the Proponent would be required to monitor congestion on Harbour and Bathurst Streets under existing Condition of Approval No. 61 and concludes that this issue would be satisfactorily addressed by the existing Conditions of Approval.

Access to the Domain Tunnel

The Department supports and endorses the RTA's proposed revision to maintain access to the Domain Tunnel from Cowper Wharf Road. This would provide efficient travel times from the Woolloomooloo and Darlinghurst areas and reduce Vehicle Kilometres Travelled for trips to and from this area. Notwithstanding, the Department notes that there are still impacts posed by the more circuitous route that drivers wishing to travel from this area to the north-east of the CBD would need to take. This issue is discussed further in Section 6.6 of this Report.

Access to the Eastern Distributor

The approved project provides a connection to the Eastern Distributor (southbound) from the Cross City Tunnel (eastbound) and a connection to the Eastern Distributor (northbound) from the Cross City Tunnel (westbound). Access to the Eastern Distributor was an issue raised in 53 representations to the Supplementary EIS. The key concern was the loss of right turns from William Street to Bourke Street which allows for convenient access from William Street (westbound) to the Eastern Distributor (southbound).

The Supplementary Representations Report notes that this right turn ban would result in significant increases in traffic on Victoria Street as drivers attempt to gain access to the Eastern Distributor further south but concludes that congestion in William Street and the potential for toll avoiders to “rat-run” down Bourke Street and enter the Domain Tunnel via Cowper Wharf Road warrants the ban. The Stepfair Traffic Review notes that since there is no direct access from the Cross City Tunnel (westbound) to the Eastern Distributor (southbound) the proposed ban places an unnecessary restraint on traffic, particularly during off-peak periods, and have recommended that the Proponent investigate the feasibility of providing for right turns. The Department therefore recommends new Recommended Condition of Approval No. 288 requiring the Proponent to investigate the feasibility of providing for right turns from William Street to Bourke Street and report back to the Director-General. The report would identify ways to limit rat-runs using Bourke Street and investigate the feasibility of limiting right turns only during peak periods.

6.6 Local Traffic and Access Issues

6.6.1 Background

The impact of the project on local streets was a key concern raised in representations to the original EIS. Particular concern was noted in relation to impacts on local streets in Paddington, East Sydney, Glebe, Woolloomooloo and Pyrmont Ultimo.

The Director-General's Report on the approved project noted that the likely impacts on local streets around Paddington warranted specific intervention in order to limit traffic intrusion, and existing Condition of Approval No. 59 requires that Local Area Traffic Management (LATM) measures are implemented. With regard to the likely impacts on local streets in Ultimo, Pyrmont, Glebe, Darlinghurst, East Sydney and Woolloomooloo, the Department found that the implementation of LATM measures could not be justified at this stage. Notwithstanding, existing Condition of Approval No. 61 requires the Proponent to monitor traffic changes on roads in these areas resulting from the project over a period of 12 months after tunnel opening and, if necessary, implement traffic management measures to mitigate the impacts of intrusive traffic following consultation with relevant Councils and the affected community.

Existing Condition of Approval No. 71 requires the Proponent to complete a road safety audit of the project including reassessment of the length of the slip lane in the Bourke Street entry ramp to the Eastern Distributor and a review of the safety implications of horizontal curves on the western approach to the tunnel.

The proposed modifications detailed in the Supplementary EIS and the revisions to these modifications detailed in the Supplementary Representations Report would result in a number of changes to the local road network, particularly in the Woolloomooloo/East Sydney area. Proposed modifications detailed in the Supplementary EIS are outlined in Section 3 of this Report. Proposed revisions to the modified proposal are discussed in Section 5 of this Report. Issues in relation to access to the Domain Tunnel are discussed in Section 6.5 of this Report.

As discussed in the previous Section, the Supplementary Representations Report indicates that traffic volumes on streets in the CBD would experience marginal reductions as a result of the proposed modifications. The following is a summary of the impacts of the revised modified proposal in surrounding suburbs. Impacts on CBD streets are outlined in Section 6.5 of this Report.

Eastern Precinct

The Representations Report indicates that the revised modified proposal would have the following redistribution effects in this precinct:

- ◆ through traffic currently using Cowper Wharf Roadway originating east of Kings Cross would be required to use either the CCT or William Street;
- ◆ southbound traffic in the Sydney Harbour Tunnel/Domain Tunnel which currently uses the Cowper Wharf Roadway exit to U-turn back via the Eastern Distributor on-ramp into Macquarie Street would be required to undertake the U-turn at the proposed roundabout at Crown Street and Sir John Young Crescent;
- ◆ northbound traffic on Bourke Street destined for Macquarie Street would need to re-route to Riley or Crown Streets or remain on William Street westbound to College Street;
- ◆ northbound traffic on either Crown Street or Palmer Street destined for the Domain Tunnel would need to re-route to Cowper Wharf Road via Cathedral Street/Bourke or use the CCT; and,
- ◆ access to the Eastern Distributor southbound entry portal off Bourke Street from William Street would be via Palmer Street northbound to Cathedral Street eastbound to Bourke Street southbound;

The Supplementary Representations Report indicates that the revised modified proposal would result in marked reductions to traffic volumes on streets within Woolloomooloo, with the exception of Riley Street. Riley Street would experience increases of more than double that predicted for the approved project as a result of traffic redistribution rather than infiltration. The Supplementary Representations Report concludes that the traffic impacts within this precinct would be managed by existing Conditions of Approval.

Paddington

With regard to this suburb, the Supplementary Representations Report notes that the implementation of LATM measures is required by the Conditions of Approval and indicates that the revised modified proposal would result in increases in traffic in this precinct would be slightly less than the volumes associated with the no CCT case. The Supplementary Representations Report concludes that the required LATM measures would effectively manage the impacts of the modified proposal.

With regard to Ocean Street the Supplementary Representations Report notes that the additional modifications would result in traffic increases similar to the approved project and, in keeping with the Supplementary EIS, concludes that traffic flows on Ocean Street would revert back to pre-Eastern Distributor conditions.

Eastern Portal/Rushcutters Bay

The Supplementary Representations Report notes that in this area, Ward Avenue, Neild Avenue, McLachlan Avenue, portions of Liverpool Street and MacDonald Street are expected to experience

increased traffic volumes under the revised modified proposal but concludes that these impacts would be off-set by reductions on other streets including Cowper Wharf Road, Macleay Street, Darlinghurst Road, Burton Street and portions of Liverpool Street. The Supplementary Representations Report also concludes that the proposed new Ward Avenue Ramp would have the effect of reducing traffic on Kings Cross Road and Roslyn Street (east of Ward Avenue) by about 50% compared to the no – tunnel case.

Edgecliff/Double Bay/Bellevue Hill

While the Supplementary Representations Report concurs with the findings of Supplementary EIS in concluding that the revised modified proposal would not result in substantial variations in traffic volumes within this area, it is noted that traffic volumes on Manning Road and Bellevue Road would increase in the order of 2 700 and 3 500 respectively when compared to the approved activity. With regard to these predicted increases, the Supplementary Representations Report recommends close monitoring on opening of the CCT.

Darling Harbour

The Supplementary Representations Report indicates that traffic volumes exiting from the Harbour Street exit would increase by 20% under the revised modified proposal and concludes that this increase is counterbalanced by a reduction in traffic levels on the Bathurst Street eastbound ramp (which does not pass through the Harbour Street intersection). The Supplementary Representations therefore concludes that traffic volumes at the intersection of Bathurst and Harbour Streets would experience only a small increase under the revised modified proposal and concludes that this intersection would operate satisfactorily.

Pyrmont/Ultimo/Glebe

The Supplementary Representations Report notes that traffic volumes on local streets within these suburbs would remain largely unaffected by the proposed modifications and concludes that traffic volumes should be monitored in accordance with the existing Conditions of Approval.

RTA's Proposed Changes to Conditions of Approval

The Supplementary EIS proposes to include references to Bellevue Hill, Double Bay, Edgecliff and St Marys Road in the CBD in existing Condition of Approval No. 61. No additional changes or conditions are proposed. The Supplementary Representations Report proposes to update Condition 61 to reflect the additional assessment completed.

6.6.2 Key Issues Raised in Representations to the Supplementary EIS

Local traffic concerns were raised in relation to the Eastern Precinct (93 representations), Paddington (54 representations), Rushcutters Bay Precinct (518 representations), Darling Harbour Precinct (16 representations), and the Central Precinct (eight representations). The issues in relation to these precincts, and other issues raised are outlined below.

Eastern Precinct

Nine percent of representations (93) raised concerns regarding the potential traffic increases in the Eastern Precinct and the resulting congestion and noise. Particular concern was noted over loss of

accessibility. The Council of the City of Sydney (CCS) noted particular concern in relation to predicted increases in traffic volumes on St Marys Road and Yurong Parkway.

Paddington

Of particular concern regionally, was the impact of the modified proposal on streets in Woollahra, particularly Ocean Street. Fifty-four representations (including the "Ocean Street Not Ocean Freeway" community group) identified severe traffic impacts on Ocean Street that would lead to congestion and associated noise, pollution and loss of amenity.

Rushcutters Bay Precinct

Operational traffic issues were a major concern, raised in 51% of representations (518 representations, 486 of which were form letters). These representations considered that traffic congestion would increase in the Rushcutters Bay Precinct due to the modified proposal.

Concerns included increased (and induced) traffic using the proposed tunnel and the associated traffic around the tunnel portals. However, the main concern related to traffic using local roads to either avoid the proposed tunnel itself or to enter the proposed tunnel. Representations considered that traffic avoiding the tunnel would adversely affect local traffic conditions in this precinct causing congestion and delay. The magnitude of this impact was considered to be significantly higher than predicted.

One hundred and sixty-two representations considered that the proposed parking arrangements would be inadequate to cater for local residents in the Precinct. Loss of residential parking around the eastern portal was a particular concern, as well as short-stay parking for taxis and delivery used by older residents.

Darling Harbour Precinct

Representations suggested that congestion in the Darling Harbour Precinct was linked to regional traffic concerns regarding the Anzac Bridge and traffic in the inner-west. Representations noted concern over a perceived increase in traffic congestion on local roads and around the western tunnel portal as a direct result of the modified proposal.

6.6.3 Issues Raised in Representations to the PAR

One representation in relation to the PAR noted concern over the potential for congestion associated with the proposed new roundabout in Sir John Young Crescent.

6.6.4 Consideration of Key Issues

Peer Review of Local Traffic Impacts

The Department commissioned Stepfair Pty Ltd to review the regional traffic assessment in the Supplementary Representations Report. The Traffic Review is given in Appendix E.

Key conclusions and recommendations of the Traffic Review are as follows:

- ◆ the modelling undertaken is acceptable and existing Conditions of Approval would address any induced traffic issues;

- ◆ the revised modified proposal would result in the following positive impacts:
 - minor reductions in travel times between the Ocean Street/Oxford Street intersection and the Western Distributor viaduct; and,
 - elimination of weaving issues in Sir John Young Crescent;
- ◆ the revised modified proposal would result in the following negative impacts:
 - increased traffic on New South Head Road and significantly less pronounced increases on Ocean Street beyond that predicted in the Supplementary Representations Report; and,
 - potentially greater increases on Anzac Bridge than predicted which may pose capacity implications;
- ◆ concludes that the above negative impacts would be addressed through existing Conditions of Approval Nos. 59 and 61 (provided that references to China Town and Macquarie and Hunter Streets are added to this Condition);
- ◆ the retention of access from Cowper Wharf Road would have the following impacts which would be managed under existing Condition of Approval No. 61:
 - elimination of existing weaving issues resulting in congestion and loss of capacity between the Domain Tunnel and the Eastern Distributor toll plaza;
 - reductions in traffic volumes on Sir John Young Crescent, resulting largely from northbound movements from the Domain Car Park;
 - northbound traffic on Sir John Young Crescent would either divert to Macquarie Street or use an alternative route through Bourke Street and Cowper Wharf Road;
 - significant increases in traffic volumes on Macquarie Street;
- ◆ the revised modified proposal would result in an increase in “rat-runs” through Paddington compared to the approved activity but concludes that overall traffic infiltration is already an existing problem and that increases would be expected to be 2.3% above the no - tunnel scenario. These increases would be effectively managed under existing Condition of Approval No. 59;
- ◆ the increases on Ocean Street predicted in the Supplementary Representations Report are likely to be conservative as the predicted increases in volumes on Manning and Bellevue Road may in reality divert to Ocean Street. However this could be managed by existing Conditions of Approval Nos. 59 and 61;
- ◆ proposed changes in parking arrangements around the Kings Cross Tunnel would improve the U-turn movement from Bayswater Road at Neild Avenue for traffic from the CCT (eastbound) wishing to enter Kings Cross but still warrant a road safety audit under existing Condition of Approval No. 71; and,
- ◆ the proposed roundabout in Sir John Young Crescent may experience increases in traffic beyond that predicted as vehicles from Crown Street (northbound) and the Domain Car Park divert to Cowper Wharf Road via Cathedral and Bourke Streets instead of using Macquarie Street to access the Cahill Expressway and requires additional assessment to ensure that the design would adequately cater for future traffic volumes on Sir John Young Crescent;

Additional Traffic Monitoring

The Department notes that while the Supplementary EIS and Supplementary Representations Report indicate that the predicted traffic impacts of the revised modified proposal would warrant further monitoring under Condition of Approval No. 61, it concludes that no additional LATM measures would be required at this stage. The Supplementary EIS recommends that references to Bellevue Hill, Double Bay, Edgecliff and St Marys Road in the CBD be added to this Condition. The Department notes that the Supplementary Representations Report also recommends that traffic volumes on streets within Rushcutters Bay, Woollahra and East Sydney are monitored and considers that references to these

areas should also be added to this Condition. Stepfair's peer review concurs with this finding of the Proponent and has recommended that references to Chinatown and Macquarie and Hunter Streets in the CBD also be added. The Department therefore recommends that existing Condition of Approval No. 61 be amended to include references to the above suburbs and streets.

With regard to the monitoring methodology required under Condition of Approval No. 61, the Department notes that the Condition states that monitoring shall be undertaken for a period of no less than twelve months after opening. Stepfair have recommended that this requirement be extended in light of the time it would take for traffic conditions to stabilise after tunnel opening. The Department have therefore recommended that monitoring under this Condition be undertaken for representative periods at 1 and 3 years after opening.

Woolloomooloo/East Sydney

The Department notes that the revisions to the modifications proposed in the Supplementary EIS would substantially improve predicted traffic impacts in this precinct. In particular, the Department notes that maintenance of access to the Domain Tunnel from Cowper Wharf Road would significantly improve accessibility. Issues with regard to access to the Eastern Distributor and the Domain Tunnel are discussed in Section 6.5 of this Report.

With regard to the Sir John Young Crescent roundabout, the Department notes that Stepfair's Peer Review (see Appendix E) has noted concern over the potential for congestion as the traffic volumes predicted for Sir John Young Crescent may increase due to the increased attractiveness of routes to Cowper Wharf Road. To ensure that the design of the roundabout adequately caters for future traffic volumes on Sir John Young Crescent, the Department has therefore recommended that the Proponent undertake additional traffic assessment in consultation with the relevant Council and consider the need for two approach lanes to the roundabout in Sir John Young Crescent (southbound and northbound). This requirement is specified in new Recommended Condition of Approval No. 287.

Paddington

The Department notes that the revised modified proposal would intensify impacts within this area and concludes that the LATM measures required by existing Condition of Approval No. 59 should effectively manage the predicted traffic infiltration impacts. Notwithstanding, the Department notes that traffic volumes within Paddington would be monitored under Condition of Approval No. 61 and, if necessary, LATM measures may need to be extended to better mitigate against traffic impacts.

Ocean Street

The Department notes that the original Representations Report predicted that traffic volumes on Ocean Street would increase by about 10 to 15 % by 2016. The Director-General's Report noted that this increase would match the reductions obtained with the opening of the Eastern Distributor and concluded that the cumulative impacts of both projects should at least result in no net worsening. The Director-General's Report also concluded that the feasibility of providing a bus lane or at least a T3 lane along Ocean Street should be investigated. This requirement is specified in existing Condition of Approval No. 38.

The revised modified proposal on traffic volumes in Ocean Street is given in Table 9 below.

Table 9 - Predicted traffic impacts on Ocean Street

Location	North Bound			South Bound			Two-way Flow		
	No CCT	Approved	Altered Modified	No CCT	Approved	Altered Modified	No CCT	Approved	Altered Modified
South of New South Head Road	13,960	15,900	16,060	9,230	9,230	9,430	22,190	25,130	25,490
North of Oxford Street	12,320	13,920	14,130	7,100	7,920	8,140	19,420	21,840	22,270

(Source: RTA's Supplementary Representations Report, Appendix I, p. 33)

While it is noted that the Supplementary Representations Report indicates that the impacts of the revised modified proposal would be similar to the approved project, the Stepfair Peer Review has indicated that traffic on Manning and Bellevue Roads (predicted to increase south of New South Head Road under the revised modified proposal) may actually divert to Ocean Street. The Stepfair Peer Review concludes that diversion of traffic from these roads to Ocean Street is possible, given that Manning Road is narrow and winding and the capacity constraints of these roads.

The Stepfair Peer Review concludes that the potential for traffic increases on Ocean Street warrants additional monitoring and recommends that the Proponent develop and implement management measures to encourage through traffic to use alternate route(s), if this monitoring shows unacceptable traffic intrusion. Given the predicted traffic reductions on Moore Park Road, Stepfair have indicated that there is potential for some through traffic to be diverted to this Road. The Department notes that the management approach recommended by Stepfair is in accordance with the requirements of existing Condition of Approval No. 61 and have therefore recommended that a reference to Ocean Street be inserted into this Condition. The Department notes that the requirements of Condition 61 would ensure that traffic impacts do not result in net worsening of impacts when compared to pre-Eastern Distributor levels, in keeping with the findings of the Director-General's Report on the approved project.

Eastern Portal

The Department notes that the Stepfair Traffic review has noted specified concern over the safety implications of the proposed U-turn arrangement for CCT (eastbound) traffic exiting at the eastern portal and wishing to travel to Kings Cross. To ensure that any safety implications of the proposed design are addressed the Department has recommended that a specific reference to this arrangement be inserted into existing Condition of Approval No. 71, which requires the Proponent to undertake a road safety audit of the project.

6.7 Noise and Vibration

6.7.1 Background

The approved project has approximately 30 existing Conditions of Approval that relate to noise and vibration (Condition Nos. 121 to 152). These Conditions include requirements covering:

- ◆ construction hours;
- ◆ construction noise criteria;
- ◆ construction noise management plans and construction noise impact statements;
- ◆ regenerated noise criteria;
- ◆ vibration criteria;
- ◆ blasting criteria;
- ◆ operational noise management plans; and
- ◆ noise criteria for the ventilation stack.

The Supplementary EIS proposed the following changes to the approved project which have noise implications, namely:

- ◆ Darling Harbour Precinct:
 - construction of an additional westbound traffic lane on the Market Street viaduct of the Western Distributor.
 - construction works to a pier supporting the Druitt Street viaduct of the Cross City Tunnel; and,
 - increased construction due to the increased height of the ventilation stack from 49 metres AHD to 65 metres AHD.
- ◆ Eastern Precinct/Central Precinct:
 - no cut-and-cover construction within William Street and Reilly Street;
 - increased activity in the construction area located north of William Street and bounded by William, Bourke and Palmer Streets. This would necessitate a change to existing Condition of Approval No. 134;
 - the Proponent proposed to have night time spoil removal from the Bourke Street site. Approximately 70 percent of the spoil would be removed from this area, mostly southbound via the Eastern Distributor. This would necessitate a change to existing Conditions of Approval Nos. 122 and 138;
 - vibration on buildings and other structures and regenerated noise would be reduced because of the increased depth of the tunnel.
- ◆ Rushcutters Bay Precinct:
 - the relocation of the eastern portals to the eastern side of the Kings Cross Tunnel; and,
 - construction of the modified proposal would require substantial works in the area between Ward Avenue and Waratah Street/Barcom Avenue. Particularly night construction works associated with the Ward Avenue ramp

6.7.2 Issues Raised in Representations to the Supplementary EIS

Thirty-two percent of representations (321) were concerned with operational noise. Sixty representations suggested more comprehensive noise mitigation measures than those described by the modified proposal such as noise walls.

Residents were very concerned that construction noise would be excessive and prolonged. The main concerns regarding construction of the modified proposal were noise and vibration impacts (268 representations) and working hours (258 representations).

The proposal to allow 24 hour construction and heavy vehicle movements was considered unacceptable by 356 representations (26%), including the EPA, Department of Housing and South Sydney Council. It was suggested that construction working hours be limited and that heavy vehicle movements be restricted. The EPA objected to 24 hour spoil transport.

6.7.3 Additional Investigations

The Proponent has proposed revisions to the modified proposal which have the following noise and implications:

- ◆ no 24-hour spoil removal from the Bourke Street site is proposed. It is proposed to have evening movements of spoil between the hours of 6pm and 10pm Monday to Sunday. This would necessitate changing Condition 122 and 138.
- ◆ a proposed new condition to ensure to the greatest extent practical that the largest capacity trucks are utilised for spoil removal.

The Supplementary Representations Report includes additional investigations into noise and vibration impacts of the revised modified proposal.

6.7.4 Issues Raised in Representations to the Supplementary PAR

The Royal Botanic Gardens and Domain Trust noted concern over the increase road noise on the Cahill expressway associated with revised modified proposal in its representations on the PAR.

6.7.5 Consideration of Key Issues

Regenerated Noise

The existing Approval Condition No. 125 limits regenerated noise in the evening (10pm to 7am) to 40 dB(A) and at night (10pm to 7am) to 35 dB(A). The Department has reviewed the condition and believes it requires some modification to clarify the intent. The Department proposes to modify the Condition by incorporating a noise descriptor ($L_{eq, 15minutes}$) and by clarifying the applicability of the limits to residential sleeping areas. These changes are directed towards reducing the potential for sleep disturbance.

Rushcutters Bay Precinct

Regenerated Noise

The supplementary EIS states that the Modified proposal could result in substantial regenerated noise impacts in the Rushcutters Bay precinct. These impacts are a result of move the portals to the western side of the Kings Cross Tunnel. The Department considers that regenerated noise in this area has the potential for serious impacts, however, can be dealt with through the existing Approval Conditions. The existing Approval Condition No 125 limits regenerated noise in the evening (10pm to 7am) to 40 dB(A) and at night (10pm to 7am) to 35 dB(A). The Department understands that prediction and monitoring of regenerated noise is difficult therefore it believes that community consultation and provision of information to the community will be vitally important for this project, particularly, provision of immediate (i.e. 2 hours) response to any complaints would deliver a responsive outcome.

Construction Noise

The Modified proposal relocated the eastern portals to the eastern side of the Kings Cross Tunnel. The relocation of the portals has the potential to intensify construction noise impacts in the area of Ward Avenue, Waratah Street and Barcom Avenue. Particularly night construction works associated with the Ward Avenue ramp. These construction works have been assessed in the Supplementary EIS the conclusion was the construction noise impacts at the new portal would likely be lesser in magnitude than for the comparable works previously required for the Approved proposal for the cut and cover works in William Street. The Department is satisfied that construction noise impacts are manageable and that existing construction noise conditions are sufficient to manage the issue.

Operational Noise

The extent of the operation noise impacts for the Modified proposal would be very similar to that from the Approved project. The revised modification of the Kings Cross "lid", to extend approximately 30 metres to the west of the Kings Cross Tunnel has reduced the operational traffic noise levels. The Department is satisfied that operational traffic noise impacts are manageable and that current operational traffic noise conditions are sufficient to manage the issue.

Eastern Precinct and Central Precinct

Regenerated Noise

The supplementary EIS states that the Modified activity would result in no change or a beneficial change with the Modified proposal apart from the Bourke Street area where there is an increase in construction related vibration and regenerated noise. The majority of the noise increases are in the order of 5 dB. The Department considers that regenerated noise in this area has the potential for serious impacts. The Department understands that prediction of regenerated noise is difficult therefore it believes that community consultation and provision of information to the community would be vitally important for this project, particularly, provision of immediate (i.e. two hours) response to any complaints in order to effectively manage impacts.

Construction Noise

For the modified proposal the Proponent proposed 24-hour spoil removal from the Bourke Street site. It was proposed that trucks entering the Bourke Street site would use the William Street out ramp from the Eastern Distributor, cross William Street turn into Bourke Street and enter the site and that all trucks are to be loaded underground during this period. In response to representations the Proponent has revised the modified proposal to allow for evening spoil removal between 6pm and 10pm. The Department has supported this revision to existing Conditions of Approval No. 122 and 134 on the provision that night time noise criteria can be met. The Department, however, considers that there should be at least one respite day for the community and therefore has only allowed for evening spoil stockpiling (using a gantry crane) and removal six days a week excluding Sunday night. To control noise levels from the spoil removal operations at the surface the proponent proposed the construction of an acoustic shed over the gantry crane and spoil storage area (refer to Appendix D of this Report). The Department supports this revision to Approval Condition No. 122, provided that the night-time noise criteria and the requirements of new Recommended Approval Condition No. 286 can be met.

The Supplementary EIS proposed the increased of activity in the construction area located north of William Street and bounded by William, Bourke and Palmer Streets. This requires an amendment to the existing conditions of Approval. The Department has supported this modification by the amendment of the existing Approval Condition 134 on the basis that sites H and J shall only be used for light activities (including administration/office purposes etc) with minimal night time activities and sites I and J should only be used as a workshop for maintenance if the maintenance is carried out within the confines of the building and only within the hours of 7.00 am to 6.00 pm (Monday to Friday); 8.00 am to 1.00 pm (Saturday).

Operational Noise

The extent of the operation noise impacts for the Modified proposal would be very similar to that from the Approved project. The Department is satisfied that operational noise impacts are manageable and that current operational noise conditions are sufficient to manage the issue.

As per the Approved proposal, the final mix of noise mitigation for affected residential receivers would take account community preferences, local Councils concerns and the cost effectiveness of the mitigation.

With regard to road noise impacts around the Domain Tunnel, the Department has reviewed the traffic numbers on the Cahill Expressway. Noise levels as a result of traffic would be similar for the revised modified proposal and the Approved project. Notwithstanding a new condition has been recommended for the Proponent to develop in consultation with the Royal Botanic Gardens and Domain Trust prepare a Tree Replacement and Environmental Enhancement Plan which would include investigating mitigation of noise and visual impacts from the Cahill Expressway utilising built or landscaped noise walls with appropriate plantings as required under new Recommended Condition of Approval No. 292.

Darling Harbour Precinct

Regenerated Noise

The supplementary EIS states that there is no alignment change to the tunnel in this area and therefore the regenerated noise and vibration impacts for this area remain the same compared to the Approved project.

Construction Noise

The original EIS indicated that there could be significant construction noise impacts from the western portals. The extent of the daytime construction noise impacts for the Modified proposal would be very similar to that from the Approved project.

A large amount of the construction works for the additional westbound traffic lane on the Market Street viaduct are required to occur at night because of traffic management issues. These works have potential to cause significant noise impact. These night time works would require separate Approval by the EPA when more detailed information is available. The Department is satisfied the proposed works are manageable and that current construction noise conditions are sufficient to manage the issue.

The Department notes that reactive actions may be required to ensure that noise levels are effectively managed at all times. The existing Approval Condition 13 enables an Independent Community Liaison Representative appointed by the Director General to consult with the Environmental Management Representative (EMR) who can place a hold on noisy construction works resulting in complaints from affected residents which in the opinion of the EMR do not comply the Recommended Conditions of Approval.

Operational Noise

The extent of the operation noise impacts for the Modified proposal would be very similar to that from the Approved project. The Department is satisfied that operational noise impacts are manageable and that current operational noise conditions are sufficient to manage the issue.

The ventilation stack is not proposed to be relocated for the Modified proposal. The Department is satisfied that operational noise impacts from the ventilation stack are manageable with the current operational noise condition (Condition of Approval 151).

6.7.6 Conclusion

The approved project would result in significant construction noise impacts. The extent of the daytime construction noise impacts for the revised modified proposal would be very similar to that from the approved project. Notwithstanding, an intensification of some night time works would be required to minimise construction stage traffic impacts. The night time works would require separate approval by the EPA when more detailed information is available. All construction works would require all reasonable and feasible noise mitigation. The Department is satisfied the proposed construction is manageable and that the existing Conditions of Approval (subject to recommended amendments) would be sufficient to manage the issue.

The extent of the operation noise impacts for the revised modified proposal would be very similar to that from the approved project. The Department is satisfied that operational noise impacts are manageable and that current operational noise conditions are sufficient to manage the issue

6.8 Economic and Social Impacts

6.8.1 Background

Economic and Business Impacts

The Supplementary EIS for the modified proposal included a revised cost benefit analysis. Despite an increase in the estimated capital cost of the modified proposal to \$640 million the benefit to cost ratio (BCR) of the modified proposal increased at a 7% discount rate from 3.3 for the approved activity to 3.4 for the modified proposal (excluding externalities). The higher BCR was largely the result of higher forecasted traffic flows in the tunnel with resultant increased road user savings, particularly travel time savings (approximately 90% of benefits) to the road network.

The modified proposal would not require cut and cover tunnel construction along parts of William Street reducing the potential impacts on William Street businesses during this period.

The modified proposal includes an increase in the toll for heavy vehicles to double the estimated approved activity \$2.50 toll (1999 dollars) for light vehicles i.e. heavy vehicles would be charged an estimated \$5.00. The Supplementary EIS stated that the increase in toll for heavy vehicles was consistent with the higher differential toll charged to heavy vehicles on a number of other toll roads and was not forecast to have any significant impact on the numbers of heavy vehicles forecast to use the modified proposal.

Social

During the assessment of the approved activity, social impacts during both construction and operation were identified. The construction related impacts included those associated with construction activities such as noise, access and dust. During operation the main concerns were about the potential impacts on low income housing in the area and the potential to displace street prostitution and drug related activities from William Street.

To address the social impact concerns raised, a number of Conditions of Approval were imposed to minimise construction impacts such as noise, dust, access including the appointment of an Independent Community Liaison Representative to liaise with the community during construction. Existing Condition of Approval No. 238 required that the Proponent liaise with local Steering Group on Street Prostitution and other relevant groups to develop mitigation measures for potential displaced prostitution from William Street to local streets.

The Supplementary EIS stated that the long term social impacts in the region of the modified proposal would be similar to those assessed as part of the approved activity. It was identified that the main modifications that could result in beneficial and negative social impacts were related to construction activities. The deletion of the need for a cut and cover tunnel on William Street would reduce construction related impacts in this area. Increased tunnelling works and spoil removal from the Bourke Street construction area, new construction compounds east of the Kings Cross tunnel eastern portal and on the south-eastern side of Sir John Young Crescent opposite the Domain Carpark were recognised as increasing potential impacts.

6.8.2 Issues Raised in Representations to the Supplementary EIS

A number of representations received from businesses raised concerns about the impacts of the modified proposal on businesses both at the western and eastern portals. Business groups including the Darling Harbour Business Association (DHBA) raised concerns about the impacts of the proposed ventilation stack and other associated impacts on business and tourism in Darling Harbour. Concerns were also raised by businesses primarily with regard to construction related impacts in Kings Cross.

A number of representations to the Supplementary EIS raised concerns about the proposed tolling of the modified proposal including its equity. The Department requested further details from the Proponent justifying the statements that a higher toll for heavy vehicles would not substantially affect the numbers of heavy vehicles using the modified proposal and therefore using surface streets.

Loss of parking within the Rushcutters Bay Precinct and associated amenity and business impacts were also raised in 162 representations.

The Department also requested further clarification on the level of predicted travel time savings as part of the economic analysis and the need to test for sensitivity purposes, the removal of 'inframarginal' travel time savings (i.e. those less than 5 minutes).

6.8.3 Additional Investigations

The modifications proposed in the Supplementary EIS would result in the net loss of 20 parking spaces in the Rushcutters Bay Precinct compared to the existing situation. The Supplementary Representations Report proposes the provision of 15 additional car parking spaces around the eastern portal in the Rushcutters Bay Precinct, resulting in a net loss of 5 parking spaces compared to the existing situation. Figure 6 e shows the locations of the additional parking spaces.

6.8.4 Consideration of Key Issues

Economic and Business Impacts

The DHBA representation and other Darling Harbour businesses raised concerns about the impacts of the proposed ventilation stack, both in terms of air quality and visibility, on businesses and tourism. It

was stated that the proposed stack location would affect development potential in the vicinity of the IMAX theatre.

A detailed assessment of the air quality impacts of the modified proposal is given in Section 6.2 of the Report. This assessment indicates that the air quality impacts of the proposed stack are manageable. There are a number of conditions targeted at reducing the visual impacts of the proposed stack including requirements to investigate the stack being placed within a new building. These measures should ensure that business impacts resulting from the proposed stack in Darling Harbour would be minimised.

Some representations raised concerns about parking and access impacts during construction of the modified proposal including works proposed at the two new work compounds. The Department notes that the Supplementary Representations Report identifies 15 new parking spaces to be provided under the revised modified proposal and concludes that this modification would significantly reduce the long-term impacts on businesses in the Rushcutters Bay area. This issue is discussed further in Section 6.9 of this Report. Condition of Approval No. 46 requires the preparation of Traffic Management Plans for each construction compound to reduce any potential business impacts. This issue is discussed further in Section 7.1.

On the whole, the revised modified proposal is likely to have reduced business impacts compared to the approved activity due to the elimination of construction impacts from the cut and cover section in William Street.

In response to the equity of imposing a toll, the RTA stated that relying on Government funding for such large infrastructure projects would utilise limited public funds and could delay their construction. The RTA stated that alternative routes would be available for motorists who did not wish to pay the toll.

In response to the concerns raised by the Department about higher tolls for heavy vehicles, the RTA stated that research on other toll roads (where heavy vehicles are tolled at higher rates than light vehicles) indicates that heavy vehicle traffic proportions of total traffic on these roads are similar to proportions on nearby arterial roads. The RTA claimed that this indicates that it is unlikely that the increase in tolls for heavy vehicles as part of the modified proposal would not lead to any substantive changes in traffic numbers on surface roads i.e. avoiding the toll.

As noted in the Department's assessment of the approved activity, the inclusion of 'infra-marginal' travel time savings can have the potential to overstate project benefits. The Department requested that the RTA consider the elimination of these 'infra-marginal' travel time savings as part of the economic assessment of the modified proposal. In response, the RTA stated that the elimination of these savings in 2006 would effectively halve the overall proposal benefits in that year. In the year 2016, however, the elimination of such savings would virtually leave the benefits of the modified proposal unchanged.

Although the estimated road user benefits of the modified proposal are reliant on the assumption that there would not be significant induced traffic, the Department is generally satisfied that the modified proposal is likely to result in a positive BCR.

Social Impacts

The Department is satisfied that Conditions of Approval and the new Recommended Conditions of Approval including those related to construction noise, dust, traffic and access are appropriate to reduce, wherever possible, the impacts of the modified proposal. The elimination of the cut and cover

tunnel works in William Street would result in significant improvements to construction related impacts in this area.

Construction related impacts in relation to noise, air quality and traffic and access are discussed in Sections 6 and 7.

6.9 Rushcutters Bay/Eastern Portal

6.9.1 Background

The Rushcutters Bay Precinct is shown in Figure 7. The Supplementary EIS proposes an extension of the CCT by approximately 300 metres to the east. The eastern portal of the CCT would be relocated to 30 metres east of the Kings Cross Tunnel and into the Rushcutters Bay Precinct. The modified proposal would involve the reduction of traffic lanes in the Kings Cross Tunnel from three to two lanes in each direction.

Construction of the revised modified proposal would require substantial works in the area between Ward Avenue and Waratah Street/Barcom Avenue. Other areas of the precinct would require minor roadwork and remarking of road lines.

The major long-term impact in the Rushcutters Bay Precinct would be due to the increased traffic volumes on surface streets under the revised modified proposal.

6.9.2 Issues Raised in Representations to the Supplementary EIS

A majority (62%) of representations (630), including the representation from South Sydney City Council, suggested that the proposal would affect fewer people if the eastern portal of the tunnel was moved around 400 metres further east to Rushcutters Bay Park. Many of these representations supported the proposal in principal, however considered the negative impacts of the eastern portal on local residents to be too great.

Six hundred representations recommended the incorporation of a grassed canopy or land bridge at or over the eastern portals of the CCT and Kings Cross Tunnel to improve amenity in the Rushcutters Bay Precinct. These representations commonly cited the reductions in the size of the Kings Cross "lid" as a reason for requiring such a land bridge.

Operational traffic issues were a major concern, raised in 51% of representations (518 representations, 486 of which were form letters). Traffic impacts are discussed in Sections 6.5 and 6.6 of this Report.

One hundred and sixty-two representations considered that the proposed parking arrangements would be inadequate to cater for local residents in the Precinct. Loss of residential parking around the eastern portal was a particular concern, as well as short-stay parking for taxis and delivery used by older residents.

A core concern was the impact of the modified proposal on the amenity of local streets and pedestrian spaces in the Rushcutters Bay Precinct. Representations considered that the modified proposal would have a negative effect on local neighbourhoods due to increased traffic and associated noise, pollution and visual impacts. Such representations cited existing streetscapes and lifestyles that may be significantly changed as a result of the modified proposal.

Displacement of street prostitution was raised in representations from South Sydney City Council, the Member for Bligh, and the East Sydney Neighbourhood Association.

The need for portal emissions was also of concern for the Rushcutters Bay Precinct. Representations were concerned about the frequency and circumstances requiring portal emissions and the impacts of this. Portal emissions are discussed in Section 6.2.

The Cross City Tunnel Action Group (CCTAG), representing a large number of residents and interest groups in Eastern Precinct, raised a number of specific issues with the modified proposal and the Supplementary EIS. The CCTAG were concerned that the modified proposal had not been properly studied and assessed. Specific issues included:

- ◆ the impacts of tunnelling in the vicinity of several high-rise buildings in Central Sydney;
- ◆ the need for an Environmental Impact Statement to be prepared and exhibited for the whole project (as opposed to just for the proposed modifications);
- ◆ lack of to scale longitudinal or cross sections as required by the Director-General for affected areas;
- ◆ lack of structural and vibration assessment;
- ◆ lack of local air quality impacts and human health impacts assessment;
- ◆ lack of identification of mitigation measures identified to overcome construction noise;
- ◆ lack of assessment of the impacts on development potential;
- ◆ lack of consultation with affected communities at the eastern portal location;
- ◆ inadequate justification for each modification to the approved project;
- ◆ inadequate traffic and transport impact assessment; and,
- ◆ failure to address the Director-General's requirements in relation to community consultation.

6.9.3 Additional Investigations

Following a review of representations received, the RTA developed a design for a land bridge to cover the eastern portals of the proposed CCT and Kings Cross Tunnel and is shown in Figure 6 g. The covered areas would be appropriately landscaped, restore street frontage to Ward Avenue, reduce the visual impact of the proposed eastern portal, and potentially reduce operational noise impacts.

The modifications proposed in the Supplementary EIS would result in the net loss of 20 parking spaces in the Rushcutters Bay Precinct compared to the existing situation. The Supplementary Representations Report proposes the provision of 15 additional car parking spaces around the eastern portal in the Rushcutters Bay Precinct, resulting in a net loss of 5 parking spaces under the revised modified proposal compared to the existing situation. Figures 3 j and 6 e illustrate the modified and revised parking arrangements.

The relocation of one existing VMS at the eastern portal to the westbound tunnel east to the Barcom Avenue intersection is also proposed in the Supplementary Representations Report. This change is illustrated in Figure 6 f.

6.9.4 Issues Raised in Representations to the PAR

Woollahra Council provided a representation to the PAR expressing objection to any suggestion that the eastern portal be moved 400 metres east to Rushcutters Bay Park. The revised modified proposal does not propose moving the eastern portal to Rushcutters Bay Park for the reasons described below.

6.9.5 Consideration of Key Issues

Construction Impacts

As a result of the revised modified proposal, significant construction impacts would be experienced in the Rushcutters Bay Precinct, between Ward Avenue and Waratah Street/Barcom Avenue, which would not have occurred under the approved project. Construction work in this area would be required for approximately 14 months. The Department considers that the required road closures and construction traffic impacts would also be managed appropriately under the Framework Traffic Management Plan and individual Traffic Management Plan required by Conditions of Approval Nos. 45 and 46 and new Recommended Condition of Approval No. 285, which sets out the following minimum requirements for road closures in this area:

- (a) a minimum of four lanes (two in each direction) to remain open in the Kings Cross Tunnel and one lane on Bayswater Road, Kings Cross Road and Craigend Street during peak periods (6 am to 10 am and 3 pm to 7 pm) and a minimum two lanes (one in each direction) during off peak periods, with the exception of the situations outlined in (b) and (c);
- (b) if required, full closure of Kings Cross Tunnel shall only occur between 10 pm and 5 am provided that all lanes on Craigend Street, Bayswater Road and Kings Cross Road shall remain open for the duration of the closure; and,
- (c) if required, Craigend Street and Bayswater Road may be closed to traffic between the hours of 10 pm and 5 am provided that the Kings Cross Tunnel remains open in accordance with the requirements of (a).

This issue is discussed in more detail in Section 7.1 of this Report.

The potential displacement of street prostitution would not be greater for the revised modified proposal compared to the approved project. Condition of Approval No. 238 requires co-operation with the local Steering Group on Street Prostitution and other relevant groups and would still be relevant to the revised modified proposal.

Construction noise and potential property impacts are discussed in Sections 6.7 and 7.3 of this Report.

Relocation of VMS

With regard to the relocation of the Variable Message Sign, the Department notes that the location of the sign at the eastern portal under the approved project would not have allowed drivers to choose not to enter the tunnel in favour of an alternative, toll-free route.

Loss of Parking

The Department notes that loss of parking within the Precinct was a concern raised in representations to the Supplementary EIS. In response, the RTA has now identified 15 new parking spaces to be provided as part of the revised modified proposal. As a result of the revised modifications, there would be a net loss of five parking spaces compared to the approved project. Notwithstanding, the Department notes that a further ten parking spaces on the southern side of Bayswater Road, west of McLachlan Avenue could potentially be lost due to growth in traffic volumes and that there is potential for additional parking to be incorporated into the urban design concept for William Street. The potential for parking on William Street is discussed in Section 6.10 of this Report. The Department considers that the additional parking

identified by the RTA in the Supplementary Representations Report would largely offset the impacts of the revised modified proposal.

Relocation of the Eastern Portal

In a submission to the Department, the RTA has cited a number of specific reasons why the eastern portals could not be moved further eastward to Rushcutters Bay Park, including:

- ◆ the tunnel would conflict with the Eastern Suburbs Railway and require special provision to support the Eastern Suburbs Railway and its viaduct;
- ◆ geotechnical limitations of soft ground tunnelling conditions that would be encountered;
- ◆ land for an additional lane would need to be acquired in the Rushcutters Bay Park area to cater for the predicted traffic volumes and safe merging of traffic;
- ◆ the modified proposal has been designed to cater for easy and safe access to the Cross City Tunnel system from Kings Cross as well as the Paddington area. If the portal is moved beyond the Neild Avenue / McLachlan Street Junctions, an additional tunnel exit and entrance access would still be required to meet the reasonable expectations of the local road users. Loss of this access would adversely impact on revenue and the project would not remain viable;
- ◆ a second ventilation stack would be required in the eastern end; and,
- ◆ there would be a significant additional cost to relocate the portal in the order of at least \$150 Million and an unacceptable drop in tunnel patronage resulting in a project that could not be supported from a benefit cost viewpoint.

The Department also notes the adverse impacts identified above have not been assessed in detail and have not been exposed to any degree of public scrutiny. To this end, the Department does not consider that extension of the tunnel as is suggested could be recommended as part of the proposed modification. Notwithstanding, it is recommended that the modified proposal be revised to include a land bridge over the eastern portals. This would provide significant urban design improvements and amenity to the area, with minimal adverse impacts.

Land Bridge over the Eastern Portal

The addition of a land bridge over the eastern portals of the CCT and Kings Cross Tunnel represents a significant improvement to urban design and amenity for the area. The Department commends the RTA's pro-active response to representations from residents and local Councils. Notwithstanding, the Department recommends that urban design and landscaping for the proposed land bridge is considered carefully and in consultation with relevant Councils, Agencies and community. To this end, changes to Condition of Approval No. 166 are recommended to require consideration of landscaping that would discourage street prostitution, vandalism, drug use; and encourage safety and crime prevention through environmental design. Use of the NSW Police Service and Department's "Crime and Safety Management Strategy" is recommended to prepare a "Safer by Design" evaluation.

Visual Impacts of the relocated VMS

The Department notes that while the relocated VMS would result in better traffic management outcomes, the visual and urban design implications of this relocation would need to be satisfactorily resolved. The Department has therefore recommended consideration of VMS be included in existing Condition of Approval No. 166.

Loss of Trees

During construction of the proposed eastern tunnel portals and ramps, trees would be removed on the north side of Craigend Street between Barcom Avenue and Ward Avenue. These would be replaced with new plantings following construction as described in the Supplementary Representations Report. This would be in keeping with the requirements of existing Condition of Approval No. 236. The Department notes that the existing Condition of Approval No. 233 requires the preparation of a Tree Protection Plan and concludes that the impacted trees on Craigend Street would be covered by this Plan.

Issues raised by the CCTAG

The Cross City Tunnel Action Group (CCTAG) represent a significant number of residents and interest groups in the Eastern Precinct. The groups has raised a number of concerns both in formal representations, direct submissions to the Minister and the Department and a meeting held with officers of the Department on 3rd of December 2002. With regard to key issues raised by the CCTAG, the Department notes that:

- ◆ cross sections for the modified proposal were provided by the RTA in various sections of the Supplementary EIS;
- ◆ the structural and vibration impacts of tunnelling on high-rise buildings in Central Sydney are assessed in Appendix S of the Supplementary EIS. Geotechnical and groundwater impacts are discussed in Appendix T of the Supplementary EIS. The Department's assessment of potential physical impacts associated with the modifications is given in Section 7.3 of this Report;
- ◆ Appendix U of the Supplementary EIS addresses possible air quality impacts. Air quality is discussed further in Section 6.2 of this Report;
- ◆ construction noise impacts are addressed in Appendix S of the Supplementary EIS, while construction noise mitigation is discussed in Appendices M and S of the Supplementary EIS. This is discussed further in Section 6.7 of this Report;
- ◆ the impact of the modified proposal on development potential is discussed for each Precinct in the Supplementary EIS.
- ◆ community consultation processes are discussed further in Section 6.12 of this Report;
- ◆ Section 2.2 of the Supplementary EIS provides an analysis of the reasons for and advantages of the modified proposal over the approved project. The Department's assessment of the need and justification for the modifications to the approved project is discussed in Section 6.1 of this Report; and,
- ◆ an assessment of both regional and local traffic and transport issues is provided in Appendix M of the Supplementary EIS and discussed throughout Volume 1 of the Supplementary EIS. Traffic and transport issues are discussed further in Sections 6.5 and 6.6 of this Report.

6.10 Eastern Precinct

6.10.1 Background

The Eastern Precinct is shown in Figure 7. Major construction works in the Eastern Precinct would be tunnel excavation, including connections between the CCT and the Eastern Distributor and an exit to the Cahill Expressway (on Sir John Young Crescent).

A Number of existing Conditions of Approval would ensure impacts are minimised and benefits maximised, including:

- ◆ mitigation of construction noise impacts including vibration and regenerated noise;
- ◆ traffic management during construction, including property access;
- ◆ monitoring of settlement at sensitive structures;
- ◆ management of archaeological resources in the precinct;
- ◆ urban design and landscaping requirements;
- ◆ monitoring of local traffic and implementation of traffic management measures if required; and,
- ◆ provision of bus and cycle lanes.

The Supplementary EIS proposed a number of changes that would affect the Eastern Precinct, including modifications to the location and design of the exit portal at Sir John Young Crescent and alterations to the Cahill Expressway to prohibit access from Cowper Wharf Road and Palmer Street to the Macquarie Street ramp of the Cahill Expressway. Access to the Domain Tunnel would then only be available from the CCT and Eastern Distributor.

The modified proposal includes an extension of the tunnel by approximately 300 metres to the east. The eastern portal of the CCT would then be located 30 metres east of the Kings Cross Tunnel. The major implications of this re-location for the Eastern Precinct would be that, due to changed road heights, the Kings Cross Tunnel "lid" proposed in the original EIS would be reduced from approximately 30 metres to approximately six metres.

As a result of proposed modifications to the alignment and depth of the approved project, cut-and-cover construction would not be required within William Street, however surface improvements would still be required. During construction the modified proposal would involve increased activity in the construction area located north of William Street, specifically 70 percent of the spoil would be removed from this area, mostly southbound via the Eastern Distributor. An additional site compound would also be required on the south-eastern side of Sir John Young Crescent for storage. The Supplementary EIS also proposes additional workshop uses for construction compounds. The Supplementary EIS proposes changes to existing Condition of Approval No. 134 to allow workshop activities within standard construction hours.

Compared to the approved project, the modified proposal would result in decreases in daily traffic flows on east-west streets and some increases in traffic on north-south streets.

The modified proposal would result in changes to urban design in the Eastern Precinct including:

- ◆ full granite paving of William Street instead of granite flagstones and asphalt panels;
- ◆ provision of louvres over the open area of ramp between the CCT (eastbound) and the Eastern Distributor (southbound);
- ◆ relocation of the ramp between the Eastern Distributor (northbound) and the CCT (westbound) from the western to the eastern side of the exit ramp from the Eastern Distributor to Palmer Street;
- ◆ reduction in the size of the "lid" structure over the Kings Cross Tunnel western portal;
- ◆ no refurbishment of the Kings Cross Tunnel walls near William Street; and,
- ◆ modifications to works in the area adjoining the Domain, including:
 - relocation of the exit portal to Sir John Young Crescent approximately six metres south-east of its location in the approved project;
 - retention of access to the Domain Carpark and maintenance yard of the Eastern Suburbs Railway;

- modifications to the stone wall located adjacent to Sir John young Crescent and under the Eastern Suburbs Railway; and,
- modifications to the lane arrangements on the Cahill Expressway.

6.10.2 Issues Raised in Representations to the Supplementary EIS

Six hundred representations (59%) recommended the incorporation of a grassed canopy or land bridge at or over the eastern portals of the CCT and Kings Cross Tunnel to improve amenity in the Rushcutters Bay Precinct. Many of these representations were concerned with the reductions in the size of the Kings Cross "lid" in the Eastern Precinct.

Four hundred and sixty-two representations (46%) raised issues of adequate urban design and surface landscaping as part of the modified proposal. Twenty-one representations suggested that mature trees should be retained as part of the modified proposal as the survival of new trees would be severely limited by ecological conditions and interference by pedestrians.

Nine percent of representations (93) raised concerns regarding the potential traffic increases in the Eastern Precinct and the resulting congestion and noise. Concern over the access implications of losing the right turn from Cowper Wharf Road was raised in 182 representations (18%). In particular, Transport NSW, South Sydney Council, and the Royal Australian Navy (a significant employer in the area) were concerned that the modified proposal had not provided effective access to northern Sydney.

The Department raised additional concerns about what landscaping treatments would be applied to the reduced Kings Cross "lid" and the louvres on Sir John Young Crescent.

6.10.3 Additional Investigations

In response to representations, the proposed revisions to the modified proposal would re-instate the right turn from Cowper Wharf Road to provide a new northbound connection on the Cahill Expressway to the Domain Tunnel. Changes to traffic arrangements in this precinct under the revised modified proposal would significantly reduce traffic volumes within Woolloomooloo, thereby reducing traffic noise and improving local air quality and pedestrian safety on surface streets.

Revisions to the Sir John Young Crescent exit tunnel proposed in the Supplementary Representations Report would substantially reduce construction impacts. The proposed change to the vertical alignment would also mean that potential impacts on the heritage listed Woolloomooloo Drain would be reduced compared to the modified proposal. These issues are discussed in Sections 7.3 and 7.5 of this Report.

The following revisions to the Supplementary EIS proposal, as described in the Supplementary Representations Report, would have urban design / landscaping impacts on the Eastern Precinct:

- ◆ minor relocation of the tunnel exit portal in Sir John Young Crescent and the addition of louvres over the ramp to reduce visibility into it from nearby buildings;
- ◆ a new roundabout in Sir John Young Crescent;
- ◆ a proposed extra traffic lane on the Cahill Expressway in the Domain, the consequent narrowing of the median and loss and replacement of the existing fig trees within it;
- ◆ provision of three new Variable Message Signs (VMS) in Woolloomooloo; and,
- ◆ consideration of potential parking on William Street and possible associated removal of the median and adjustments to footpath widths.

6.10.4 Issues Raised in Representations to the PAR

The Royal Botanic Gardens and Domain Trust raised concerns about the loss of fig trees on the median strip of the Cahill Expressway. The Trust considers the loss of the fig trees would create both a literal and symbolic impact in the Phillip Precinct of the Domain and the Botanic Gardens and that the revised modified proposal would increase the intrusiveness of road noise and visual pollution from the Cahill Expressway.

6.10.5 Consideration of Key Issues

Construction Impacts

The revised modified proposal eliminates the need for cut-and-cover construction on William and Palmer Streets and would therefore reduce construction impacts significantly, including a reduction in regenerated noise due to the deeper tunnel. However, some surface works would still be required, and accordingly, the Department expects that traffic would be managed appropriately and incorporated into the Framework Traffic Management Plan and individual Traffic Management Plans as described in Conditions of Approval Nos. 45 and 46 of the approved project.

The Department also notes that the increase in spoil generation under the revised modified proposal would result in increases in the number of truck movements for spoil transport which would require careful monitoring and management. Spoil management is discussed further in Section 7.2.

The Supplementary Representations Report notes that an additional site compound of approximately 1035 square metres will be required on the south-eastern side of Sir John Young Crescent. An additional work area is also required between Cowper Wharf Roadway/ the Domain Tunnel/Eastern Distributor and Macquarie Street. The Department expects this site to be managed appropriately and incorporated into the Framework Traffic Management Plan and individual Traffic Management Plans as described in Conditions of Approval Nos. 45 and 46 of the approved project. The site would also require a Construction Method Statement as described in Condition of Approval No. 18 of the approved project.

Proposed activities within new sites and compounds would include administration, storage, surface construction and workshop activities. The construction noise impacts are discussed in Section 6.7 of this Report.

The Department also notes that the revised modifications the Sir John Young Crescent exit would allow for 15 Plane trees in Riley Street to be retained, thereby reducing the impacts on this streetscape.

Urban Design and Landscaping

Amenity Impacts on the Domain

In response to concerns raised by the Royal Botanic Gardens and Domain Trust, the Department notes the impacts of the revised modified proposal on the Phillip Precinct of the Domain and the Botanic Gardens adjacent to the Cahill Expressway. Notwithstanding, the Department considers that there are opportunities for enhancing this area that are within the scope of the revised modified proposal. To this end, the Department recommends that the Proponent prepare a Tree Replacement and Environmental Enhancement Plan consultation with the Trust. The Plan, required under new Recommended Condition of Approval No. 296 would incorporate elements of the Master Plan for the Domain and include:

- ◆ replacement of the 14 mature fig trees on the Cahill Expressway median strip in accordance with existing Condition of Approval No. 236;
- ◆ a tree replacement program for the Phillip Precinct of the Domain;
- ◆ built or landscaped noise walls with appropriate plantings;
- ◆ investigation into the potential for new pedestrian links between the Phillip Precinct of the Domain and the Botanic Gardens;
- ◆ measures to control runoff from the Cahill Expressway;
- ◆ improvements to the legibility of the edges to the Domain along the Cahill Expressway; and,
- ◆ recovery of historical elements of the Domain if appropriate;

The Department considers that the successful implementation of the Tree Protection Plan, and Construction Method Statements as appropriate, would ensure that mature trees are retained where possible. In addition, urban design and landscaping as part of the revised modified proposal would ensure that appropriate new plantings occur following construction.

William Street Urban Design Concept

The Department supports the proposal to repave the footpath in William Street using a high standard of full granite paving.

The Department notes that, in response to representations, additional parking on William Street would also be considered under the revised modified proposal. The Department believes that the pedestrian zones along William Street are a critical component of the CCT in making the environment of Central Sydney streets and adjoining public spaces more pleasant for pedestrians, residents and business. Any proposal to reduce pedestrian zones in William Street would require planning and consultation with the relevant Council(s) and community. The consideration for parking on William Street is reflected in proposed changes to Condition of Approval No. 166.

The Supplementary EIS notes that as a result of the proposed movement of the eastern CCT portal, construction in William Street at the eastern portal of the Kings Cross Tunnel would be avoided and there would be little impact on the walls of the Kings Cross Tunnel. The Department therefore supports cleaning of the external faces at the western end rather than refurbishment.

Other Issues

The revised modified proposal introduces a number of urban design and landscaping issues in the Eastern Precinct including the new Variable Message Signs (VMSs), a reduction in the size of the Kings Cross Tunnel "lid" and the Sir John Young Crescent Roundabout.

Landscaping concepts proposed by the revised modified proposal would continue to be refined in collaboration with relevant councils and community as required by existing Conditions of Approval Nos. 166 to 174. The Department notes that consideration of the urban design implications of the Kings Cross "lid" is already required under these Conditions. To ensure that the impacts of the revised modified proposal are satisfactorily addressed the Department has recommended that references to Sir John Young Crescent and the VMS are included in Condition 166.

6.11 Darling Harbour

6.11.1 Background

The Darling Harbour Precinct is shown in Figure 7. The approved project would involve changes and impacts resulting from construction and operation of the CCT that would be experienced in the Darling Harbour Precinct. The major surface works in the Darling Harbour Precinct would include construction of the western portal, the ventilation stack, and result in changes to pedestrian access during the construction period.

The approved project would potentially exacerbate current difficulties with pedestrian access to Darling Harbour, particularly during construction. The Harbour Street exit would create significant problems for existing at-grade pedestrian crossings on Harbour Street which are already under utilised. To address this issue, a number of pedestrian options were developed by the RTA in consultation with the Council of the City of Sydney and the SHFA. The Department provided a number of Conditions that ensured access to Darling Harbour would be maintained, including:

- ◆ consultation with SHFA on final design of pedestrian access (Condition 73);
- ◆ high quality design of pedestrian bridges (Condition 73);
- ◆ Harbour Street pedestrian access is maintained during construction and operation (Conditions 74 and 75);
- ◆ consultation with SHFA during construction to minimise disruption to traffic, pedestrians, cyclists and tenants in Darling Harbour (Condition 76);
- ◆ provision of a new footpath from Druitt Street to Bathurst Street (Condition 77); and,
- ◆ safe pedestrian access and clear signposting (Condition 78).

The Supplementary EIS proposed changes to the physical form of the project, including:

- ◆ an additional westbound traffic lane on the Market Street viaduct of the Western Distributor;
- ◆ adjustments to a pier supporting the Druitt Street viaduct of the CCT; and,
- ◆ increasing the height of the ventilation stack from 49 metres AHD to 65 metres AHD.

6.11.2 Issues Raised in Representations to the Supplementary EIS

Potential negative impacts on local businesses around the proposed tunnel portals (including Darling Harbour) were raised in 39 representations. Lengthy submissions were received from a number of local business groups, particularly those operating in Darling Harbour. Business groups including the Darling Harbour Business Association were concerned about potential impacts on patronage and tourism due to increased traffic, visual impacts and air pollution.

Nineteen representations were not satisfied with the design of the ventilation stack, suggesting that the location and height of the stack would have a visual impact that could not be mitigated.

Concerns in relation to traffic focused on congestion on the Anzac Bridge in the inner-west. Sixteen representations were concerned with increased traffic congestion on local roads and around the western tunnel portal as a direct result of the modified proposal. Traffic impacts are discussed in Sections 6.5 and 6.6.

Seven representations noted concern with pedestrian access during construction. The Department was concerned about the management of pedestrians accessing Darling Harbour during construction given the significant increase in surface works described in the Supplementary EIS.

6.11.3 Additional Investigations

The Supplementary Representations Report notes that changes to pedestrian access to Darling Harbour during construction would be made to cater for the construction of the ventilation duct and relocation of the stack, resulting in the delay of a permanent pedestrian bridge. However, a temporary pedestrian bridge would be built, with the permanent footbridge constructed as soon as practicable before operation of the revised modified proposal. This is noted in changes to Condition of Approval No. 75 recommended by the RTA.

The Supplementary Representations Report also recommends removing the timing component in Condition of Approval No. 73 because the approved timeframe would not be able to be met.

6.11.4 Consideration of Key Issues

Construction Impacts

The Department notes that the revised modified proposal would require the establishment five construction sites in the Darling Harbour Precinct including the two proposed as part of the approved activity. There would also be an increase in the size of major work areas. Activities within new sites and compounds would include administration, storage and surface construction. Changes to construction sites and compounds would not substantially increase the construction impacts of the revised modified proposal compared to the approved project. Cut-and-cover construction on Druitt Street would be reduced under the revised modified proposal, thereby reducing construction traffic impacts. Notwithstanding, the Department notes that each construction site and compound would be required to be managed appropriately under the Framework Traffic Management Plan and individual Traffic Management Plans required by existing Conditions of Approval Nos. 45 and 46. Construction traffic management is discussed in Sections 7.1 and 7.2 of this Report.

The management of pedestrians accessing Darling Harbour between the Darling Walk building and the Kiosk during construction would require a temporary pedestrian bridge to be constructed. Due to safety and technical requirements a permanent pedestrian bridge could only be constructed after construction of the ventilation duct and relocation of the stack. This is recognised in proposed amendments to existing Condition of Approval No. 75.

Access to Darling Harbour

The Sydney Harbour Foreshore Authority indicated significant concerns that the proposed modifications at the western end of the project would reduce the size of the island bounded by Day Street/Harbour Street and Bathurst Street. Under the approved access arrangements, this island would be expected to accommodate a significant number of people accessing Darling Harbour.

The Department notes that the original configuration shown on the approved access (refer Figure 5.2 of the Director-General's Report dated September 2002) may no longer be entirely adequate. In addition, the grade of the access would not meet current requirements for disabled access. The Department therefore recommends that further design review be undertaken regarding this access including the

need to meet a grade requirement of 1 in 14, and consideration of extending the new elevated footway over Harbour Street to the eastern side of Day Street.

It is therefore recommended that existing Condition of Approval Nos. 74 be modified to allow further consideration of improvements to the pedestrian access to Darling Harbour.

With regard to the RTA's concern over the timing of existing Condition of No. 73, the Department notes that the specified timeframe would not allow for the further design review discussed above to be completed and has therefore recommended that this Condition be amended to allow the design details of access arrangements be finalised within 6 months of substantial construction.

Visual and Urban Design Impacts of the Modified Ventilation Stack

The approved project included a 49 metre ventilation stack to be located to the south-east of the IMAX Theatre. The Department's Condition of Approval No. 167 required that the Director-General approve the final stack design.

The Department notes that proposed increases to the height of the stack would have significant air quality benefits. Air quality is discussed in Section 6.2. The additional visual and shadowing impacts are not considered significantly different to the approved project and concludes that the visual and urban design impacts the ventilation stack as altered under the revised modified proposal can be managed in accordance with the requirements of existing Condition of Approval No. 167.

Other Issues

The Department notes that representations to the Supplementary EIS noted concern over a perceived intensification of construction stage impacts in this precinct. Impacts on businesses are discussed in Section 6.8 of this Report. Construction noise management in this area is discussed in Section 6.7.

6.12 Communication and Consultation Strategies

6.12.1 Background

In preparing the original EIS, the Proponent consulted the affected residences, businesses, government agencies and individuals through:

- ◆ the release and public display of a preliminary design in a booklet entitled "The Cross City Tunnel: Improving the Heart of Sydney" (RTA 1998);
- ◆ stakeholder discussions and surveys;
- ◆ establishing a 24 hour freecall telephone information line;
- ◆ placing advertisements in local and metropolitan newspapers advising commencement of EIS preparation and contact details;
- ◆ distribution of a brochure outlining the CCT proposal;
- ◆ a public display;
- ◆ providing information on the RTA website and toll-free telephone information line;
- ◆ conducting focus group, discussion and information-sharing sessions;
- ◆ conducting briefings for potentially affected property owners; and,
- ◆ a Planning Focus Meeting and various sessions attended by key government stakeholders.

The Supplementary EIS indicates that the community and stakeholders would remain informed throughout construction of the CCT via:

- ◆ development of a communications plan;
- ◆ a 24 hour free-call telephone information hotline;
- ◆ a 24 hour telephone complaints line;
- ◆ procedures for complaint handling and investigation;
- ◆ establishment of community and government liaison groups;
- ◆ resident notification of construction activities;
- ◆ newsletters or project updates;
- ◆ information displays for residents;
- ◆ a website with at least monthly updates; and,
- ◆ local advertising of planned construction works.

The existing Conditions of Approval require, among other things:

- ◆ a complaints register (Condition 8);
- ◆ advertising of construction activities and the creation of a project internet site (Conditions 9 and 10);
- ◆ establishment of Community Consultation Groups and a Community Involvement Plan (Conditions 11 and 12);
- ◆ establishment of an independent Community Liaison Representative (Condition 13).
- ◆ the establishment of two display centres at or near the Harbour Street and William Street construction site (Condition 14);
- ◆ the preparation of Construction Management Statements, Construction Stage Public Transport Plans, Traffic Management Plans and Construction Noise Impact Statements (Conditions 18, 31, 46 and 124 respectively) that include community consultation and notification;
- ◆ establishment of a CCT Public Transport Group, which would, among other things, develop education programs for the public and businesses affected by changes to public transport (Condition 27);
- ◆ consultation with local businesses through a Business Management Strategy (Condition 70) and notification of all businesses affected by altered traffic arrangements during construction at least 10 days prior to any affection and the requirement to maintain critical access at all times where reasonable and feasible (Condition 53);
- ◆ establishment of an Air Quality Community Consultative Committee (Condition 85);
- ◆ consultation with affected property owners regarding any practicable and cost-effective measures to minimise the impacts associated with construction (Condition 107);
- ◆ building condition surveys for relevant properties (Condition 108); and,
- ◆ community consultation and notification as part of Noise Impact Statements (Condition 124).

The Supplementary EIS concludes that no additional communication and consultation strategies are required as part of the modified proposal and does not propose any additional changes to the Conditions of Approval outlined above.

6.12.2 Issues Raised in the Supplementary EIS

Nineteen percent of representations (191) were of the opinion that public consultation for the modified proposal was inadequate. Complaints ranged from lack of notification, the limited exhibition period, and

misleading information and assessment. Eighty four representations considered the Supplementary EIS to contain major errors.

The Department was concerned that community consultation during construction needed more attention, particularly with the increase in construction sites and compounds.

The Cross City Tunnel Action Group also noted concern over a perceived lack of consultation during preparation of the Supplementary EIS.

6.12.3 Additional Investigations

The Supplementary Representations Report proposes that display centres are established only before substantial construction, rather than any construction.

The Supplementary Representations Report recommends a new Condition of Approval that would implement an awareness program for motorists prior to opening of the CCT and educate the general public about:

- ◆ use of the tunnel;
- ◆ tunnel features;
- ◆ fire safety;
- ◆ engineering facilities; and,
- ◆ electronic tolling.

6.12.4 Issues Raised in Representations to the PAR

Woollahra Council provided a representation to the PAR requesting that a Community Consultation Group be established for the Woollahra community.

6.12.5 Consideration of Key Issues

Consultation During Preparation of the Supplementary EIS

In a submission to the Department, the RTA states that the following consultation took place during the preparation of the Supplementary EIS:

- ◆ the Minister for Transport issued a media release in February 2002 which included advice that the tunnel proposal was being extended. This was widely reported in the media;
- ◆ a display centre was open in William St during the preparation of the Supplementary EIS on Tuesdays and Thursdays with an average of 20 persons per day attending;
- ◆ consulted with a number of key stakeholders listed in Appendix H of the Supplementary EIS; and,
- ◆ RTA officers met with residents of the Altair apartments to discuss options for extension of the tunnel further east as well as options for covering the portal area to reduce impacts.

Communication and Consultation

The Department generally commends the consultation and communication strategy set out under the approved project. In order to ensure that community information and consultation is conducted in a manner which takes into consideration the extended duration and linear nature of impacts, the

Department recommends that the administration of notification of activities, the project website and Community Liaison Groups is detailed in a Community Involvement Plan overseen by an Independent Community Liaison Representative. These requirements are reflected in existing Conditions of Approval Nos. 9 to 14.

The Department considers that the establishment of Community Liaison Groups would not only help to provide information on construction activities, but create a forum through which the community can provide pro-active feedback on how the proposal could be better managed to alleviate community concerns. The appointment of an Independent Community Liaison Representative to oversee the implementation of the Community Involvement Plan would ensure that the full communication and consultation obligations within the existing Conditions of Approval are met in a transparent environment conducive to the timely resolution of arising issues.

The primary role of Community Liaison Groups would be liaising over construction and traffic impacts during the construction of the CCT. The revised modified proposal would have no direct construction impacts in the Woollahra Local Government Area, therefore establishment of a specific Community Consultation Group for this area is not recommended. Residents that may be affected during construction would be able to apply to join the proposed Community Liaison Groups and have access to a number of communication resources including the display centres and the website and the complaints telephone number.

The Department recommends that the Proponent erects an appropriate sign on each construction compound and work area advertising the toll-free complaints contact number required by Condition of Approval No. 7 and the address of the internet site required by Condition of Approval No. 10. This requirement is specified in new Recommended Condition of Approval No. 281.

The Department commends the RTA's suggestion of an awareness program for motorists prior to opening of the CCT. New Condition of Approval No. 280 is recommended accordingly.

Complaints Procedures

The Department recommends that the Proponent continue to advertise and operate a toll free complaints telephone number in accordance with existing Conditions of Approval No. 8. The complaint resolution process recommended by the Department is given in Figure 8. This process would provide for the timely resolution of complaints and is strengthened by provisions for independent dispute resolution.

7. OTHER ISSUES

This Section of the Report provides an assessment of the other environmental impacts of the revised modified proposal (i.e. the modifications proposed in the Supplementary EIS plus the revisions as identified in Section 5) based on an examination of the Supplementary EIS, issues raised in representations and the RTA's response to those issues provided in its Supplementary Representations Report and during further consultation with the Department. In accordance with Section 115BA (7) of the EP&A Act, the environmental impacts of the revised modified proposal is assessed only to the extent that the approved project is to be modified.

The RTA has also provided the Department with an assessment of all the issues raised in representations in the Supplementary Representations Report. The assessment has been reviewed by the Department and where required further assessment has been undertaken and discussed. It is therefore important that this Section be read in conjunction with the RTA's Supplementary Representations Report.

7.1 Construction Traffic Management

7.1.1 Background

The approved project would have resulted in a number of changes to the existing road network during the three year construction period. Five main areas would be disrupted:

- ◆ streets surrounding the western portal works including Druitt, Day, Bathurst, and Harbour Streets;
- ◆ at the connection to the Eastern Distributor including Palmer and Bourke Streets;
- ◆ at the exit onto Sir John Young Crescent, including works along Riley Street and Sir John Young Crescent;
- ◆ William Street between Dowling and Bourke Street; and
- ◆ streets surrounding the eastern portal works including William Street and Darlinghurst Road.

The original EIS proposed a number of specific management measures required to ensure that disruption to traffic flows is minimised including:

- ◆ decommissioning the Bourke/William Street traffic signals and limiting turns at this intersection to 'left in and left out';
- ◆ minimum of four lanes on William Street to remain open to traffic;
- ◆ provision of two left turn lanes from Kent Street to Market Street to accommodate traffic diverted from Druitt Street;
- ◆ access from construction sites to be limited to "left in and left out" or signalised where possible; and,
- ◆ close monitoring of bus operations to ensure disruptions are minimised.

The need for advanced notification of changed access arrangements, traffic delays and loss of parking were key issues raised in representations to the original EIS.

The Director-General's Report noted that even minor road closures and detours can have significant impacts across the network and potentially significant traffic congestion consequences. The original Representations Report included a schedule of minimum traffic conditions required during

construction. The Department concluded that it was inevitable that construction traffic management would be a dynamic process and that the tender process could lead to innovations that would reduce construction impacts. For these reasons Conditions of Approval relating to construction traffic management set in place management planning, monitoring and notification frameworks.

The Supplementary EIS indicates that a number of the proposed modifications would result in changed traffic conditions, including:

- ◆ changes to work areas and construction compounds;
- ◆ relocation of the eastern portals to the east of the Kings Cross Tunnel;
- ◆ deepening of tunnels, resulting in no traffic disruptions on William Street and reduced scope for surface works;
- ◆ reduction of cut and cover works in Riley Street by 50%;
- ◆ increases in the spoil volumes from 350 000 m³ to 500 000 m³ and the use of 7 m³ spoil trucks in place of 15 m³ spoil trucks, resulting in an increase from 111 truck movements per day and 20 truck movements per hour to 470 truck movements per day and 25 (and up to 60) truck movements per hour; and,
- ◆ haulage of 69% of spoil from the Bourke Street site via the underground Eastern Distributor connection 24 hours a day. Trucks would return to the site via the William Street exit ramp, cross William Street and turn down Bourke Street.

As a result, the following new or changed road and lane closures would be required:

- ◆ closure of Market Street viaduct lanes (over 25 nights);
- ◆ closure of all traffic lanes and pedestrian access under the Market Street viaduct to deliver materials to this worksite;
- ◆ closure of Bathurst Street viaduct (over five nights);
- ◆ night time closure of one lane in each direction in Harbour Street and provision of left in – left out access to the ventilation stack work area;
- ◆ closure of Riley Street to all but local traffic (over six months). A right turn into Crown Street would be provided for the duration of the closure of Riley Street;
- ◆ maintenance of at least one traffic lane in each direction on Crown Street between Sir John Young Crescent and William Street;
- ◆ single lane closures on the Cahill Expressway at night;
- ◆ extended closure of the Bourke Street entry ramp to the Eastern Distributor (from the approved nine months to approximately 24 months);
- ◆ closure of Bourke Street (northbound) between William Street and the Eastern Distributor on-ramp (six months);
- ◆ closure of the William Street exit from the Eastern Distributor (over four months). Closure of this ramp would not coincide with any closures of the Market Street off-ramp from the Cahill Expressway;
- ◆ loss of right and left turns from William Street to Bourke Street (over 30 months);
- ◆ closure of lanes in the Kings Cross Tunnel outside peak periods (over eight nights);
- ◆ closure of lanes outside peak periods on eastern ramps from the Kings Cross Tunnel to Waratah Street, Bayswater Road and Craigend Street and subject to RTA approval;
- ◆ maintain one lane at the Craigend Street off ramp to Oswald Lane; and,
- ◆ maintain a minimum of two northbound lanes and one southbound lane on Sir John Young Crescent with closure of the southbound lanes from Cowper Wharf Road to Palmer Street in order to provide two northbound lanes during portal construction.

The Supplementary EIS indicates that traffic changes to other streets may be introduced if necessary, following community consultation. The Supplementary EIS indicates that some streets would experience increased traffic pressures while others would experience relief and concludes that the modified traffic arrangements, which would result in fewer traffic restrictions than those imposed by the approved project, would have less impact on the road system. Notwithstanding, the Supplementary EIS emphasises the need to closely monitor access arrangements to the Bourke Street site, and if required, limit spoil removal or undertake remedial works to maintain a satisfactory traffic flow during peak hours. The need to closely monitor bus operations to ensure disruptions to schedules are minimised is also noted. The Supplementary EIS proposes updating the Conditions of Approval to refer to the Supplementary EIS in place of references to the original EIS and Representations Report.

7.1.2 Key Issues Raised in Representations to the Supplementary EIS

The proposal to allow 24 hour construction and heavy vehicle movements was considered unacceptable by 356 representations (26%), including the EPA, Department of Housing and South Sydney Council. It was suggested that construction working hours be limited and that heavy vehicle movements be restricted. The EPA objected to 24 hour spoil transport.

South Sydney Council noted concern over the use of local streets by spoil trucks, however commended the removal of traffic disruption on William Street.

The Department noted concern over the use of smaller spoil trucks and construction stage implications in Woolloomooloo.

Concern over access arrangements, loss of parking and traffic management were identified in 27 representations.

Seven representations noted concerns over pedestrian access during construction. Issues with regard to pedestrian access during construction are discussed in Section 7.4.

The Council of the City of Sydney noted concern over the loss of parking during construction.

7.1.3 Additional Information

The Supplementary Representations Report proposes a number of changes which have implications for construction traffic management, particularly in and around Woolloomooloo, including:

- ◆ a new worksite between Cowper Wharf Road/ the Eastern Distributor/ the Domain Tunnel / Macquarie Street;
- ◆ the elimination of cut and cover construction in Riley Street;
- ◆ the removal of spoil from the Sir John Young Crescent site. A truck turning facility would be provided at Shakespeare Place to allow construction traffic to exit the site via the Cahill Expressway; and,
- ◆ use of trucks with a capacity to carry 15 m³ were possible; and,
- ◆ no truck movements on surface streets between 10 pm and 7 am.

Issues in regard to spoil haulage outside standard construction hours are discussed in the noise assessment contained in Section 6.7 of this Report.

While Riley Street would now remain open, the following additional impacts would result:

- ◆ additional lane closures on the Cahill Expressway and full closures between the Domain and Sir John Young Crescent on Sunday and Monday nights over a four month period and for 72 hours over a public holiday long weekend. Lane closures would not coincide with closures of the northbound Eastern Distributor off-ramp to William Street;
- ◆ single lane closures of the Eastern Distributor to the Domain Tunnel over a four month period. Lane closures would not coincide with closures of the northbound Eastern Distributor off-ramp to William Street;
- ◆ closure of the Eastern Distributor to Macquarie Street over a 72 hour period and closures of the Macquarie Street ramp provided alternative access is provided via the main Eastern Distributor carriageway to Macquarie Street; and,
- ◆ maintenance of at least two trafficable lanes on Sir John Young Crescent between Riley Street and Cowper Wharf Road instead of three.

The Supplementary Representations Report proposes updating the Conditions of Approval to refer to the Supplementary Representations Report in place of references to the original EIS and Representations Report. The imposition of an additional condition requiring the Proponent to utilise the largest possible capacity trucks for removing tunnel spoil to the greatest extent reasonably practicable is also recommended.

The Supplementary Representations Report indicates that the proposed revisions to the modified proposal would provide an acceptable level of service, with worst case impacts limited to a four month period. The Supplementary Representations Report concludes that the revised modified proposal, which would result in fewer construction stage traffic restrictions than those imposed by the approved project, would have less impact on the road system.

7.1.4 Consideration of Issues

Peer Review of Construction Traffic Assessment

The Department commissioned Stepfair Pty Ltd to review the construction stage traffic assessment in the Supplementary Representations Report. The Traffic Review is given in Appendix E.

Key conclusions and recommendations of the Traffic Review are as follows:

- ◆ concluded that the use of smaller capacity trucks (7 m³) rather than larger trucks (15 m³) would effectively double the traffic generated during construction and recommended the use of larger trucks;
- ◆ concluded that the proposed additional road closures would result in traffic recirculation in the Woolloomooloo and East Sydney area;
- ◆ concluded that the closure of the Bourke Street ramp over 24 months and closures of the Cahill Expressway would need to be assessed and managed in the relevant Traffic Management Plan under existing Condition of Approval No. 46;
- ◆ concurred with the findings in the Supplementary Representations Report in relation to traffic generation surrounding the Bourke Street site, closure of the Kings Cross Tunnel and the Kent Street / Market Street intersection; and,
- ◆ concluded that safety audits should be conducted on the required Traffic Management Plans

General

The Department notes that the reductions in cut and cover works in Riley Street and the elimination of cut and cover construction along William Street would significantly reduce the construction stage traffic impacts in these areas. Notwithstanding, there are a number of additional and changed construction traffic impacts associated with the revised modified proposal which would require careful management and monitoring. The impacts associated with spoil haulage are discussed in Section 7.2 of this Report.

The Department notes that existing Conditions of Approval Nos. 45 and 46, which require the preparation of a Framework Traffic Management Plan and Traffic Management Plans (TMPs) for each individual site, set in place processes for identifying specific traffic management measures to be implemented during the construction stage. Each TMP would be certified by an experienced transport planner to be engaged throughout the construction period to advise on implementation issues and amendments and liaise with relevant Councils. In addition Condition of Approval No. 47 requires the Proponent to monitor traffic changes during construction on regional and local streets in suburbs surrounding the project and if necessary prepare and implement Local Area Traffic Management Measures for these areas following consultation with the relevant Council(s). The Department concludes that these existing Conditions of Approval would set in place a traffic management process to ensure that construction stage traffic impacts are managed to acceptable levels.

With regard to potential traffic safety implications resulting from road and lane closures and traffic diversions highlighted by Stepfair, the Department has recommended that safety audits be carried out on the TMPs. This requirement is specified in new Recommended Condition of Approval No. 283. Under this Condition an audit of the road safety implications of the traffic management measures within TMPs would need to be completed prior to certification by the experienced transport planner.

The Department supports the RTA's proposal to update the construction traffic Conditions of Approval to reflect the additional assessment work and management requirements detailed in the Supplementary EIS and Supplementary Representations Report. Accordingly, amendments recommended to exiting Conditions 50, 51 and 52 are recommended.

Impacts on Woolloomooloo/East Sydney/Eastern Distributor

The extended closure of the Bourke Street ramp to the Eastern Distributor would result in a redistribution of movements in surrounding streets and cause drivers to seek alternative routes to access the Eastern Distributor. The Stepfair Traffic Review Report indicates that traffic would most likely seek to access the Eastern Distributor further south, via South Dowling Street. The impact of this redistribution is not assessed in detail and it is concluded that this issue would need to be addressed as part of the TMP to be prepared for the Bourke Street Compound under Condition of Approval No. 46 and impacts monitored in accordance with Condition of Approval No. 47.

Construction of the revised modified proposal would also require a number of additional lane and/or total closures of a number of roads, including the Cahill Expressway, the William Street exit ramp from the Eastern Distributor, the Macquarie Street exit from the Eastern Distributor, main Eastern Distributor lanes, Sir John Young Crescent and the section of Bourke Street between William Street and the Eastern Distributor ramp. The Supplementary Representations Report indicates that the following restrictions would be applied to road and lane closures to minimise impacts in this area:

- ◆ closure of the Macquarie Street exit from the Eastern Distributor shall be minimised to the greatest extent possible; and,
- ◆ neither the northbound nor the southbound tunnel of the Eastern Distributor main tunnel may be closed in its entirety on any given day. Lane closures within the main tunnel will be permitted during the period 11pm and 6am on any weekday. This does not preclude the Eastern Distributor operator and the emergency services from responding to incidents within the Eastern Distributor.

These requirements are reflected in new Recommended Condition of Approval No. 285.

Impacts on Eastern Portal Area

In order to construct the relocated eastern portals and the eastern land bridge, a number of additional road and/or lane closures would be required surrounding the Eastern Portal. The Supplementary Representations Report concludes that the impacts of these closures would be acceptable if they were completed outside peak periods, with a minimum number of lanes open to traffic, excepting in circumstances requiring total road closures. These requirements are reflected in new Recommended Condition of Approval No. 285.

Notwithstanding, the Department notes that specific lane traffic lane requirements are not specified for surrounding streets during total road closures. In particular, the Department is concerned that congestion may result even in off-peak periods during total closure of the Kings Cross Tunnel. To this end, new Condition of Approval No. 285 also requires that all lanes on Craigend Street, Bayswater Road and Kings Cross Road remain open for the duration of closure of the Kings Cross Tunnel.

7.2 Spoil Management

7.2.4 Background

The approved project would generate approximately 350 000 m³ of bulked spoil from tunnel excavations. Spoil would be removed from construction compounds as outlined in Table 10.

Table 10 – Spoil Volumes and Removal Sites for the Approved Project.

	Bulk Excavated Volume (m³)	Activity Duration (months)	Approximate Maximum No. of Truckloads per day	Hours of Spoil Removal	Approximate average hourly truck movements
Druitt Street	65, 000	8	23	11	4
Bathurst Street	98, 000	11	23	11	4
William Street	162, 000	13	47	11	8
Sir John Young Crescent	25,000	3	18	11	3
Total	350 000		111		19

Note: based on trucks with a capacity of 15 m³

Disposal routes were not finalised at the time of the approval. In its assessment, the Department noted that the transportation, disposal and re-use of spoil represented a significant management challenge, given the limited stockpiling areas and time limits on spoil transportation. Any

contaminated spoil would also require careful management. A number of existing Conditions of Approval relate to spoil management, including:

- ◆ the preparation of a Spoil Management Sub Plan;
- ◆ detailed geotechnical/soil analysis to ascertain spoil re-use potential;
- ◆ assessment of any impacts associated with spoil disposal sites;
- ◆ preparation of a Contamination Investigation Report and, if necessary the preparation of a Remedial Action Plan;
- ◆ maximisation of spoil re-use including the investigation of the potential for treating and re-using any contaminated spoil; and,
- ◆ limiting spoil haulage to standard daytime construction hours.

The Supplementary EIS indicates that the proposed modifications would increase spoil volumes by 150 000 m³. While spoil removal from William Street is no longer required, the Supplementary EIS proposes to remove the majority of spoil from the Bourke Street site directly into the Eastern Distributor. Trucks would return to the site via the William Street exit ramp, cross William Street and turn down Bourke Street to enter the site. Spoil haulage via surface streets would also be required during establishment of the Bourke Street site and from the new Bayswater Road construction compound. Modifications to spoil haulage routes through the CBD are illustrated in Figure 4 c.

The Supplementary EIS proposes to amend Condition of Approval Nos. 122 and 138 to allow for spoil transportation on a 24 hour basis from the Bourke Street Compound.

7.2.2 Key Issues Raised in Representations to the Supplementary EIS

The proposal to allow 24 hour construction and heavy vehicle movements was considered unacceptable by 356 representations (26%), including the EPA, Department of Housing and South Sydney Council. It was suggested that construction working hours be limited and that heavy vehicle movements be restricted. The EPA objected to 24 hour spoil transport.

South Sydney Council noted concern over the use of local streets by spoil truck. The Department noted concern over the use of smaller spoil trucks and construction stage implications in Woolloomooloo.

7.2.3 Additional Information

The Supplementary Representations Report indicates that the revised modified proposal would generate an additional 219 000 m³ of spoil. This additional spoil would be removed from the Bathurst/Harbour Street site and the Sir John Young Crescent site. A truck turning facility would be provided at Shakespeare Place to allow construction traffic to exit the site via the Cahill Expressway. Spoil volumes and removal sites for the revised modified proposal are outlined in Table 11.

Table 11 – Spoil Volumes and Removal Sites for the Revised Modified Proposal

	Bulk Excavated Volume (m ³)	Activity Duration (months)	Approximate Maximum No. of Truckloads per day	Hours of Spoil Removal	Approximate average hourly truck movements	Approximate maximum hourly truck movements
Druitt Street	57,000	4	40	11	2	6
Bathurst / Harbour Street *	118,000	16	22	11	4	6
Bourke Street (Initial	15,000	3	30	11	4	6

	Bulk Excavated Volume (m ³)	Activity Duration (months)	Approximate Maximum No. of Truckloads per day	Hours of Spoil Removal	Approximate average hourly truck movements	Approximate maximum hourly truck movements
works)						
Bourke Street (Main tunnelling works)	335,000	19	60	15	4	16
Sir John Young Crescent *	30,000	14	37	11	3	8
Bayswater Road	14,000	4	30	11	3	6
Total	569,000		219		20	

Notes:

based on trucks with a capacity of 15 m³

*increased due to ventilation duct tunnel

In response to the concerns raised by the Department with regard to the increased construction noise and traffic impacts associated with the use of smaller trucks, the Supplementary Representations Report recommends the imposition of the following new condition requiring the Proponent to utilise the largest possible capacity trucks for removing tunnel spoil to the greatest extent reasonably practicable.

In response to concerns raised in relation to the proposal to haul spoil from the Bourke Street site on a 24 hour basis, the Supplementary Representations Report has recommended changes to existing Conditions of Approval Nos. 122 and 138 to allow for the haulage for spoil from this site between the hours of 7 am and 10 pm, provided that all trucks are loaded underground and that no more than 10 truck movements to and from the site are completed per hour. The noise impacts associated with the proposed night time spoil haulage are discussed in Section 6.7 of this Report.

7.2.4 Consideration of Issues

Spoil Management

The Department notes that construction of the revised modified proposal would result in a 219 000 m³ (63%) increase in spoil generation. It is considered that these additional volumes could be managed by the frameworks set in place by the Spoil Management Sub Plan required under existing Condition of Approval No. 196. In particular, the Department notes that this Sub Plan would be prepared in Consultation with the EPA, the Sydney Harbour Foreshore Authority and relevant Councils and would be fully integrated with the Traffic Management Plans required under existing Condition of Approval No. 46 and discussed in Section 7.1 of this Report.

While the increased spoil volume would result in increases in heavy vehicle movements, the proposal to haul spoil from the Bourke Street site directly into the Eastern Distributor and via the Cahill Expressway from the Sir John Young Crescent site would work to minimise impacts, provided the recommended monitoring and management requirements discussed below are implemented.

Truck Capacity

The Supplementary Representations Report proposes an additional condition which aims to ensure that spoil transportation is completed using larger capacity trucks. The Department notes that the use of larger trucks (with 15 m³ capacity instead of 7 m³ capacity) would be in keeping with the approved project and would work to minimise the traffic and noise impacts associated with spoil transportation. To this end, the Department recommends that the Proponent utilise trucks with a

capacity to carry nominally 15 m³ or more for removing spoil from sites unless the use of smaller trucks is certified by the Environmental Management Representative through the Construction Method Statement verification process. This requirement is specified in new Recommended Condition of Approval No. 282.

Bourke Street Site Traffic Management

While the Supplementary Representations Report notes that spoil haulage traffic from the Bourke Street Compound would represent one truck per traffic signal cycle, it recommends close monitoring of construction traffic access arrangements surrounding this Compound and, in particular, the William Street/Palmer Street intersection. If construction traffic results in unacceptable congestion in this area, remedial works would be implemented and/or the removal of spoil during peak hour periods limited. These requirements are specified in new Recommended Condition of Approval No. 284. In addition, this Condition would require the traffic monitoring to be completed to the satisfaction of the experienced transport planner required under existing Condition of Approval No. 46.

7.3 Settlement and Potential Physical Property Impacts

7.3.1 Background

The potential for damage to properties resulting from tunnel construction was an issue raised in representations to the original EIS. In its assessment of the approved project, the Department noted that the project has the potential to cause ground settlement as a result of tunnel excavation, particularly excavation works resulting in significant vibration and dewatering of surrounding aquifers. Prior to approval, the Department commissioned Pell Sullivan Meynink (PSM) to peer review the adequacy of the geotechnical assessment and provide advice on settlement impacts. A copy of their report was included in Appendix L of the Director-General's Report. The Department's assessment of settlement impacts concurred with the findings of PSM and a number of Conditions of Approval were imposed by the Minister in order to manage potential physical property impacts. These requirements include:

- ◆ consultation with property owners regarding measures to minimise impacts;
- ◆ extensive dilapidation surveys;
- ◆ comprehensive geotechnical and settlement studies to further assess potential settlement impacts and determine whether pro-active protection of specific structures is required;
- ◆ notification of placement of temporary and permanent rock anchors;
- ◆ preparation of a Groundwater Management Sub Plan;
- ◆ settlement criteria for specific structures;
- ◆ monitoring of settlement for at least six months after settlement has stabilised and provisions to stop work affecting settlement if the settlement criteria are exceeded;
- ◆ rectification of any damage to buildings and structures resulting from construction of the project;
- ◆ establishment of an independent Property Impact Assessment Panel to resolve any disputes in relation to property damage; and,
- ◆ operational groundwater inflow limits.

The Supplementary EIS includes a geotechnical review for the proposed modifications to the approved project which indicates that changes to the horizontal and vertical tunnel alignments and

tunnelling methods would alter the likely risks associated with tunnel excavation works. For details of the modifications proposed in the Supplementary EIS refer to Section 3 of this Report.

Cut and cover tunnel construction would be reduced from 1150 linear metres to approximately 750 linear metres under the proposed modifications. The Supplementary EIS indicates that the proposed deepening of the tunnels would reduce settlement risks as the distances from basements to the crown of the tunnels would increase. With regard to changes to the horizontal alignment (between Pitt and College Streets and between Kent and George Streets), the Supplementary EIS notes that the tunnels would be closer to the plan positions of building basements. While changes to excavation works within Darling Harbour would be minor, it is noted that potential stress changes and ground movements induced by cut and cover ramp construction and driven tunnelling would need to be carefully assessed.

With regard to excavation works in the vicinity of the Eastern Distributor the Supplementary EIS (in keeping with the findings of the original EIS) notes that the shale (lamine) interbed within the Hawkesbury Sandstone and laminate rock (the Woolloomooloo fault zone) would require more support and possibly a more arched roof profile. The Supplementary EIS notes that the implications of changes to alignments in this area would need to be assessed but concludes that the modified proposal poses the same level of risk for groundwater inflows and surface settlement as the approved project.

The Supplementary EIS notes the proposed modification to the Sir John Young Crescent Exit (which includes extension of driven tunnel excavation) would present a potentially greater risk of dewatering and surface settlement than that posed by the approved project and concludes that pre-tunnel grouting may be necessary. In keeping with the findings of the original EIS, the potential for groundwater inflows beneath Riley Street is also highlighted.

With regard to the proposed modifications to the eastern portal, the Supplementary EIS notes that the Elan, Altair and the Millennium Hotel buildings are located above the Kings Cross Tunnel and share some footings with the Kings Cross Tunnel. The Supplementary EIS notes that a preliminary assessment indicates that tunnelling induced impacts to these structures would be in the order of 10 mm (which is well within the settlement limits) and concludes that careful monitoring would be required during construction.

In relation to the magnitude of likely groundwater inflows, the Supplementary EIS indicates that local high inflows of a few litres/second may occur. The supplementary EIS notes that seepage from alluvial sediment areas, bedding seams and other defects would require detailed groundwater drawdown analysis to determine maximum allowable groundwater inflows, with particular focus on the Cockle Bay area, Riley Street, the Woolloomooloo fault zone and known joint swarm locations.

The Supplementary EIS recommends the following changes to the existing Conditions of Approval:

- ◆ inserting references to the need for landowner permission in Conditions 108 and 109;
- ◆ updating the lists of buildings requiring specific geotechnical and vibration analysis in Condition 109;
- ◆ updating the references to areas requiring settlement studies in Condition 158; and,
- ◆ deletion of Condition 164 which specifies an operational inflow goal of 1 litre/second/kilometre.

7.3.2 Key Issues Raised in Representations to the Supplementary EIS

Twenty-six representations noted concern over the potential for settlement related property damage impacts. Forty-six representations suggested that compensation was needed for potential property damage and/or loss of value. Property damage due to operational vibration was raised in 19 representations.

The Sydney Harbour Foreshore Authority noted concern over a perceived increase in excavation in the Darling Harbour area and the potential for increased settlement risk and requested that a reference to the excavations required to construct the ventilation stack be incorporated into Condition 153.

The Heritage Office requested that the list of heritage items in Condition 109, requiring geotechnical and vibration analysis where there is the potential for damage, be expanded to include items identified in various environmental planning instruments and a number of specific items.

The Department noted concern over the proposal to delete Condition 164 given that this Condition reflected the assessment included in the original EIS.

7.3.3 Additional Information

The Supplementary Representations Report proposes a number of revisions to the modified proposal outlined in the Supplementary EIS which alter the extent of excavations, including:

- ◆ the ventilation duct tunnel;
- ◆ a longer driven tunnel for the Sir John Young Crescent exit; and,
- ◆ the construction of an additional northbound lane to provide access to the Cahill Expressway from Cowper Wharf Road.

The ventilation duct tunnel is located in sandstone generally within the footprint of the main tunnels and would intercept two known joint swarms near Sussex and Pitt Streets and the Woolloomooloo fault zone near Bourke Street. A small section of the duct is located along Druitt Street at a depth where settlement impacts are predicted to be negligible. The Supplementary Representations Report concludes that construction of the ventilation duct would not impact on surface settlements predicted for primary tunnel construction.

The extent of cut and cover excavation to be used in constructing the Sir John Young Crescent exit would be reduced in favour of driven tunnelling. The Supplementary Representations Report notes that location of the portal has been chosen to manage the geotechnical constraints posed by the paleochannel in this area. The Supplementary Representations Report notes that groundwater inflows of between 1 and 2 litres/second/kilometre would be likely along the length of the exit tunnel and that excavation in the vicinity of the portal would need to be carefully managed to minimise inflows during construction and operation and associated surface settlement.

To provide the proposed new lane on the Cahill Expressway, the rock face along the Domain and the Art Gallery, under the land bridge, would need to be cut back. The Supplementary Representations Report notes that this excavation would require careful management, given that the land bridge is supported by the rock but concludes that no significant changes in the existing hydrological conditions are likely.

In relation to the likely groundwater inflows throughout the project, the Supplementary Representations Report notes that flows are likely to vary, depending on the severity of the rock discontinuities. The Supplementary Representations Report concludes that the operational inflow rate is more likely to be in the order of 2 to 2.5 litres/second/kilometre and notes that this higher rate would not necessarily increase surface settlement risk.

The Supplementary Representations Report proposes to add the following sentence and note to existing Condition of Approval No. 164, instead of removing this requirement:

“or other such limit, or limits, established by the Proponent, and agreed to by the Director-General, based on detailed geotechnical investigations, groundwater modelling and settlement analyses.”

Note: The limit specified in Condition 164 is aimed at limiting settlement related damage.

7.3.4 Consideration of Issues

Settlement and Dewatering Studies

Existing Condition of Approval No. 158 requires that detailed settlement studies specific to construction stage dewatering within alluvium and fill areas and all areas identified in Section 6.1.1 of Table 8.1 of the original Representations Report are carried out in order to determine the potential extent of settlement and the need for protection through reinjection. The Department notes that the section of the table referred to contains a list of buildings also referenced in existing Condition of Approval No. 109 and an extensive list of heritage items which are noted to be potentially more sensitive to damage from surface settlement. While the Proponent has recommended that existing Condition 158 refer to an updated table provided in the Supplementary EIS, the Department notes that this new table does not include the list of heritage items. Accordingly, the Department recommends that the wording of Condition 158 be amended so as refer to the buildings listed in Section 6.1.1 of Table 8.1 of the original Representations Report and the buildings listed in Condition 109. The Department concludes that these amendments would ensure that the intent of the Condition is maintained and that references are appropriately updated.

The Department also notes that the Sydney Harbour Foreshore Authority noted concern over the potential for surface settlement associated with construction of the ventilation stack and have requested that a reference to the excavations required to construct the ventilation stack be incorporated into Condition 153. This Condition requires the Proponent to prepare a detailed geotechnical model of representative geological conditions to identify and include significant geological structures with particular reference to excavations near the western portal. The Department notes that the particular reference to excavations near the Western portal would include excavation associated with construction of the ventilation shaft and therefore concludes that there is no need to amend this Condition.

Geotechnical and Vibration Analysis

Existing Condition of Approval No. 109 requires the Proponent to undertake geotechnical and vibration analysis on a number of buildings listed in the original Representations Report where there is a potential for damage. The Proponent has recommended that references to the following buildings be deleted from the Condition:

- ◆ Olivetti (140 William Street); and,
- ◆ Columbus Line (150-162 William Street).

In addition, the Proponent has recommended that the following buildings are added to Condition 109:

- ◆ Altair (3 Kings Cross Road);
- ◆ Elan (1 Kings Cross Road);
- ◆ Millennium Hotel (2 Kings Cross Road);
- ◆ Maestrin Towers;
- ◆ MBF Building;
- ◆ Lobana, 70 William Street; and,
- ◆ 52-58 William Street.

While the Department notes that the two buildings proposed for deletion are located in the vicinity of the Eastern Distributor where the depth of the tunnels would increase under the proposed modifications, a specific assessment of the impacts on these buildings is not included in the Supplementary EIS or Supplementary Representations Report. The Department therefore concludes that adequate justification for deleting these two buildings has not been provided and recommends that reference to these buildings remain in this Condition. With regard to the buildings recommended for incorporation into this Condition, the Department notes that these buildings are in close proximity to and, in the case of the Elan and Altair buildings share some footings with the Kings Cross Tunnel. The Department notes that the revised modified proposal would extend excavation works to the east of the Kings Cross Tunnel and concludes that additional study into the potential for impacts to these buildings is warranted. The Department has therefore recommended including these items in existing Condition of Approval No. 109.

The Heritage Office has recommended that existing Condition of Approval No. 109 apply to all listed heritage items where there is a potential for damage to occur, all heritage buildings within 15 metres of the tunnel route and, in particular, the following items:

- ◆ former Police Station (281 Clarence Street);
- ◆ Sewerage Pumping Station 12 (Washington Street);
- ◆ Man O'War Steps (Farm Cove);
- ◆ Bank of NSW (107-109 Bathurst Street);
- ◆ Cypress Hellene Club (150-152 Elizabeth Street);
- ◆ Metters Building (154-158 Elizabeth Street);
- ◆ Crown Hotel (160-162 Elizabeth Street);
- ◆ Sydney Central Local Court House (98 Liverpool Street);
- ◆ Pitt Street Uniting Church (264A Pitt Street);
- ◆ Sydney School of Arts (former, 275-277A Pitt Street);
- ◆ Gresham Hotel or Hong Kong House (147-149 York Street);
- ◆ Obelisk (Elizabeth Street);
- ◆ St Peters Anglican Church (former, 150-152 Bourke Street);
- ◆ St Johns Anglican Church and Rectory (Darlinghurst Road); and,
- ◆ Oakleigh (18 Ward Avenue).

The Supplementary Representations Report indicates that none of the heritage items are within the potential impact zone of the revised modified proposal. Given this finding, and noting the

requirements of the existing Conditions of Approval specifically directed at managing the potential for damage to heritage items, the Department concludes that the inclusion of the above references to heritage items is not warranted.

Where the vibration and geotechnical analysis required by Condition of Approval No. 109 indicates that impacts may occur to the listed buildings, building surveys would be undertaken. Notwithstanding, the Department notes that a number of the listed buildings would automatically meet the criteria for building surveys established in Condition 108. To clarify this inconsistency, the Department recommends amendments to Condition 109:

Dilapidation Surveys

The Proponent has recommended that existing Conditions of Approval Nos. 108 and 109, which require building condition surveys to be undertaken, be amended to so as to be subject to the receipt of permission of the landowner and occupier. The Department notes that the proposed amendments recognise the rights of landowners and occupiers to refuse entry to their property and therefore supports these amendments. Notwithstanding, it is noted that the completion of building condition surveys enables the extent of damage resulting from construction of the project to be accurately determined and the Department therefore recommends that owners and occupiers have their properties surveyed.

Groundwater Inflows

Following discussions with the Department, the Proponent has recommended changes to Condition 164, which was initially recommended for deletion in the Supplementary EIS. Condition 164 requires the Proponent to take all practicable measures to limit operational groundwater inflows to 1 litre/second/kilometre. The goal of 1 litre/second /kilometre was drawn from the original EIS which indicated that inflows would be similar to those experienced on the Eastern Distributor project. Based on an assessment of the likely inflow rates along each section of the modified proposal, the Supplementary Representations Report indicates that operational inflow rates are likely to be in the order of 2 to 2.5 litres/second/kilometre, but notes that inflows above 1 litre/second/kilometre would not necessarily result in greater settlement risk. The Proponent has therefore recommended that this Condition be amended to allow for other limit(s) to be specified following detailed geotechnical investigations, groundwater modelling and settlement analysis and be subject to the agreement of the Director-General. The addition of a note indicating that the limit is aimed at reducing settlement related damage is also recommended by the Proponent.

The Supplementary EIS and Supplementary Representations Report indicate that the revised modified proposal would not significantly increase likely inflows and concludes that the risk of settlement is reduced by some of the proposed modifications, particularly the proposed increases in the depth of excavation works. In order to manage groundwater drawdown impacts, these documents outline a number of mitigation measures to be applied to areas where inflows are likely, including the use of watertight cutoff walls and pre-tunnel grouting.

Condition of Approval No. 164 does not require the Proponent to limit inflows to 1 litre/second/kilometre, but rather establishes 1 litre/second/kilometre as the operational groundwater inflow goal. The Department notes that the RTA's recommended amendments to this Condition do not alter the intent of the Condition, but allow for greater flexibility, subject to technical assessment, and therefore supports this alteration. Notwithstanding, it is noted that the Proponent would need to

demonstrate that any increase(s) in the goal specified in Condition 164 would not increase the risk of settlement related property damage.

Operational Vibration

The Department notes that concern in relation to the potential for property damage resulting from operational vibration was raised in 19 representations. The Department notes that operational vibration impacts would be well within the precautionary vibration limits for sensitive receptors and therefore concludes that property damage is unlikely to result from operational vibration.

7.3.5 Conclusion

The Department notes that the approved project has the potential to cause some surface settlement and for this reason the existing Conditions of Approval require proactive-protection of structures in areas likely to experience significant inflows and monitoring and management of settlement along the entire project. The existing Conditions of Approval, as modified by the recommended amendments would ensure that settlement related property damage associated with the revised modified proposal is appropriately managed.

7.4 Pedestrians and Cyclists

7.4.1 Background

The approved project incorporated a number of pedestrian facilities, including:

- ◆ a footpath on the western side of the realigned Harbour Street between Day Street and Wheat Road;
- ◆ a new footway along the Market Street viaduct to replace the existing footway which would be converted to an additional traffic lane;
- ◆ a new footbridge to Darling Walk over Harbour Street adjacent to Bathurst Street to replace the existing bridge which would be demolished;
- ◆ widening of footpaths in Park Street between College and Elizabeth Streets and in William Street; and,
- ◆ connection of the Blackwattle Place pedestrian bridge to the northern Western Distributor footway.

In addition, existing Conditions of Approval require:

- ◆ new cycle routes along Park Street and William Street;
- ◆ enhancements to the cycle network from Druitt Street to Pymont Bridge and Kent Street Cycleway;
- ◆ an investigation into a new cycle link from Oxford Street to Darling Drive; and,
- ◆ appropriate pedestrian access to Darling Harbour.

The Supplementary EIS proposes changes to pedestrian access to Darling Harbour during construction. These changes are discussed in Section 6.11.

The Supplementary EIS proposes no major changes to pedestrian or cyclists facilities during operation compared to the approved project. However, as a result of the relocation of the eastern

portal, it would no longer be possible for pedestrians to cross between Kings Cross Road and Craigend Street without using either the existing pedestrian bridge or Ward Street.

7.4.2 Key Issues Raised in Representations to the Supplementary EIS

Key issues raised in representations to the Supplementary EIS include:

- ◆ pedestrian safety (33 representations) and access (16 representations) during operation;
- ◆ lack of commitment to pedestrian and cyclist networks and strategies (11 representations); and,
- ◆ pedestrian access during construction (7 representations).

Additionally, a primary concern raised in representations was the impact of the proposal on the amenity of local streets including pedestrian spaces.

The Department noted concern regarding the management of pedestrians accessing Darling Harbour during construction given the significant increase in surface works described in the Supplementary EIS.

Representations from three local bicycle groups noted concern that the Supplementary EIS failed to adequately address cycling needs, particularly the provision of east-west cycle routes that fully connect to the existing network. These groups recommended that the following two missing links be provided as part of the revised modified proposal:

- ◆ east bound on Kings Cross Road ends approximately 20 metres east of the Roslyn Street/Hickey Lane footbridge; and,
- ◆ west bound on Craigend Street begins approximately 10 metres west of the Womerah/Barcom Avenue intersection.

The use of the Kings Cross Tunnel by cyclists was also recommended.

7.4.3 Additional Information

The Supplementary Representations Report notes changes to pedestrian access to Darling Harbour during construction.

The Supplementary Representations Report proposes one change to cycle lanes as described in the approved project. The Supplementary Representations Report indicates that there is insufficient space for a cycle lane on Druitt Street between George and York Streets, hence it is proposed to replace "Clarence Street" with "George Street" in existing Condition of Approval No. 69.

7.4.4 Consideration of Key Issues

Construction Stage Impacts

A number of representations noted concern over loss of pedestrian and cyclist access during construction. Generally, the revised modified proposal would not affect pedestrian safety and access during construction to a greater extent than the approved project.

The management of pedestrians accessing Darling Harbour during construction would require a temporary pedestrian bridge to be constructed. This is discussed further in Section 6.11.

Cycle Network Development

As indicated in Section 1 of this Report, this assessment is confined only to the extent that the approved project has been modified. That is, there must be a nexus between the modifications and the impact on cyclists for the Department to consider any further changes to the cycle network.

The Department supports the view of bike user groups that this project provides potential further opportunities to develop the City cycle network. The RTA has made substantial improvements for cyclists as part of the approved project that would remain as part of the revised modified proposal.

The Department notes that proposed changes to existing Condition of Approval No. 69 would result in no cycle lanes on any part of Druitt Street. The Supplementary Representations Report states that cyclists could use the bus lanes and bus only zone on Druitt Street, which would allow continuous on-road cyclist access along Druitt Street. The Department acknowledges the physical limitations on Druitt Street and therefore supports this change.

The Department also recommends that existing Condition of Approval No. 69 is further updated to include the cycle lanes to be constructed on Craigend Street and Kings Cross Road. In response to representations, the Supplementary Representations Report notes that the new bicycle lanes on Kings Cross Road and Craigend Street would serve as links with bicycle routes along Victoria Avenue, Woomerah Avenue and Bayswater Road. A review of the South Sydney Bike Plan indicates that the east bound cycle lane on Kings Cross Road should extend at least to the Roslyn Street/Hickey Lane footbridge. The cycle lane on Craigend Street should link to the Womerah/Barcom Avenue intersection, which is identified in the South Sydney Bike Plan. The Department recommends that Condition of Approval No. 69 requires that, at a minimum, Craigend Street shall include a west bound link as shown in Figure 2.12 of the Supplementary EIS.

Use of the Kings Cross Tunnel by cyclists is not supported by the RTA or the Department due to safety concerns. As part of the revised modified proposal, east-west cycle routes would be provided on Kings Cross Road and Craigend Street as an alternative to using the Kings Cross Tunnel.

7.5 Heritage Impacts

7.5.1 Background

The Original EIS found that no known Aboriginal sites occur within the study area and no Aboriginal archaeological deposits would be affected. The approved project has the potential to disturb European archaeological deposits of research potential associated with more than 150 years of Sydney's history.

In its assessment of the approved project, the Department concluded that, with the appropriate monitoring and conditions, impacts on heritage buildings and items along the route of the approved project would be satisfactorily managed. To this end, Conditions of Approval Nos. 175 to 180 of the approved project require a Heritage and Archaeology Sub Plan, management of specific heritage items, and procedures for unexpected discovery of heritage items.

The Supplementary EIS proposes modifications to Sir John Young Crescent to maintain access to the Eastern Suburbs Railway maintenance yard and to preserve the development potential of the

Domain Carpark site. This would require the widening of existing access of about 3.5 metres and consequent dismantling, removal and reassembly of some sections of the sandstone wall on the boundary of the Domain. Condition of Approval No. 177 of the approved project requires that the sandstone wall be retained. The RTA has proposed that Condition of Approval No. 177 be deleted.

The modified proposal would also directly affect the archaeological remains of the Bondi Ocean Outfall Sewer (BOOS), a brick ovoid conduit of local significance. However Appendix P of the Supplementary EIS states that the removal of a small section of original fabric would not seriously affect the heritage value of the structure and that this impact would be mitigated by the photographic recording made possible during construction.

The modified proposal also has a greater potential to impact on the Woolloomooloo Drain, a brick ovoid drain, during construction. Excavation works for the cut and cover tunnel and ramp at the Riley Street/Sir John Young Crescent site are likely to reveal the archaeological remains, but would not physically interfere with the drain structure itself. The drain would spend a period of time suspended above a void, supported by structural framing, with the earth encasing the drain stiffed by the insertion of grout. After completion of the cut and cover section of the Sir John Young Crescent exit/entry ramp, the drain would be reburied.

The modified proposal would involve additional works in the Domain, which is listed on the NSW State Heritage Register. The Supplementary EIS states that heritage impacts could be mitigated by usual management practices:

- ◆ liaising with all relevant authorities including the NSW Heritage Office;
- ◆ preparing a detailed research design;
- ◆ applying for an excavation permit under Section 140 of the *NSW Heritage Act*;
- ◆ including clauses in contracts to highlight the contractor's and all subcontractors' obligations; and,
- ◆ informing the relevant statutory body and commissioning an archaeologist to assess the significance of any unexpected items discovered.

The Supplementary EIS proposes changes to existing Condition of Approval No. 175 that will update the list of heritage items, and include in the Heritage and Archaeology Sub Plan details of works and construction management methods required to widen the existing entrance to the railway maintenance yard at Sir John Young Crescent and other works impacting on the Domain. The Supplementary EIS also proposes additions to existing Condition of Approval No. 109 to update the list of buildings requiring specific geotechnical and vibration analysis arising from the modification to the alignment of the tunnels.

7.5.2 Issues Raised in Representations to the Supplementary EIS

Thirty-six representations noted the need to manage potential impacts on heritage buildings during construction and following operation of the proposal. The Heritage Office noted specific sites with heritage value, including the Woolloomooloo Drain, the Bourke Street Branch of the BOOS, the site of Palmer's Farm, the Domain, and a number of other State listed heritage buildings. The Heritage Office recommended a number of specific requirements to ensure heritage impacts would be minimised.

7.5.3 Additional Investigations

The Supplementary Representations Report proposes further alterations to the Sir John Young Crescent exit tunnel, which would reduce construction impacts on heritage buildings in Riley Street. The proposed change to the vertical alignment would also mean that potential impacts on the heritage listed Woolloomooloo Drain would be reduced compared to the modified proposal. Notwithstanding, the alterations would still require the dismantling, removal and reassembly of some sections of the sandstone wall on the boundary of the Domain.

The Supplementary Representations Report proposes further changes to existing Condition of Approval No. 175 that will update the list of heritage items.

7.5.4 Consideration of Issues

In its assessment of the construction-related impacts of the modified proposal, the NSW Heritage Council considered that a number of conditions be imposed and/or re-imposed to ensure that all heritage issues are satisfactorily addressed, including:

- ◆ protection of the sandstone wall on the boundary of the Domain (Boundary Fence) including limiting removal to a maximum of 5 metres in total;
- ◆ the archaeological research design and methodology must be approved by the Director of the Heritage Office;
- ◆ adequate resources for detailed archaeological investigation, supervision and recording;
- ◆ all relevant personnel are appropriately briefed on heritage issues;
- ◆ protection, recording, storage, reporting and notice of any relics and/or artefacts uncovered; and,
- ◆ procedures in the event of Aboriginal relic discovery.

The 24 Conditions attached to the application under Section 60 of the NSW *Heritage Act* 1977 are provided in Appendix A.

The Department is satisfied that the revised modified proposal would have a similar impact on heritage sites as the approved project. Notwithstanding, careful management of the sandstone wall on the boundary of the Domain and the Woolloomooloo Drain would be required. The Department considers that the proposal to delete Condition of Approval No. 177 is unnecessary, however recommends that a reference to the works permitted under the Heritage Council Section 60 Approval be added to existing Condition of Approval No. 177.

The Department also notes that creation of a truck turning facility on Shakespeare Place has the potential to impact on the heritage significance of the Shakespeare Monument. These proposed works would require temporary protection of the Shakespeare Monument by the placement of heavy barriers around the monument as described in Appendix V of the Supplementary Representations Report. The Department expects this heritage item to be included in the Heritage and Archaeology Sub Plan as required under existing Condition of Approval No. 175.

7.6 Hazards and Risk

7.6.1 Background

The original EIS and Representations Report indicated that the movement of dangerous goods through the approved project would be prohibited. This measure was aimed at preventing an explosion, fire or release of toxic material that could affect the integrity of the tunnel and users of it.

The Department agreed that the presence of dangerous goods in the approved project could lead to hazardous situations which could impact the structure and the safety of the population densities in the city. The carrying of dangerous goods through tunnels is currently prohibited in New South Wales. Condition 208 of the approval stated that the Proponent would not allow the storage or handling of goods defined as dangerous under the Australian Dangerous Goods Code, at any location associated with the CCT, whether during construction or operation of the CCT.

The RTA has advised the Department that existing Condition of Approval No. 208 can not be met, as a number substances classified as dangerous goods would be used in the tunnel storm water treatment processes. Sodium hydroxide (caustic soda) and poly aluminium chloride (PAC) are chemicals needed for the water treatment process of effluent inflow for discharge into the Sydney Water stormwater system. Both substances are classified as Dangerous Goods Class 8 under the Australian Dangerous Goods Act.

The Proponent proposes to locate the required water treatment plant within the low point of the westbound tunnel. The Proponent therefore seeks a modification to existing Condition of Approval No. 208 to include sodium hydroxide and poly aluminium chloride as exempted substances.

7.6.2 Additional Investigations

The Proponent investigated the use of alternative substances to sodium hydroxide and poly aluminium chloride in the water treatment process. No viable alternatives were identified.

The Proponent investigated a number of alternative options to the approved onsite treatment of water. Sydney Water does not favour inflow directly into the sewerage system due to capacity constraints. Sydney Water prefers that inflow be directly discharged to the stormwater system once water quality goals are achieved.

An alternative option involving the pumping of inflow for the low point sump to a holding tank on the surface was investigated. The inflow would be removed by a tanker and transported to a processing location. It was considered that the unpredictability of the inflow from several sources would render this process unmanageable as tanker movements would need to complement the collection rate at the sump regardless of the impact on the surface road network. Overflowing of the surface holding tank could result when inflows exceed the capacity of the removal process.

7.6.3 Consideration of Issues

The Proponent has demonstrated that the use of sodium hydroxide and poly aluminium chloride is an integral and essential component of the water treatment process. The Department is however concerned about the risks involved in storing and using these hazardous substances within the tunnel structure. In particular the Department notes that in the event of fire, toxic gases could be produced and thereby adversely impact people in the tunnel and surrounds.

The substances used in water treatment are classified as polyelectrolyte ULTRION 7157 by the chemical manufacturer. A Material Data Sheet (MSDS) provided by the manufacturer stated that in the event of a fire, oxides of carbon and oxides of nitrogen may evolve from these hazardous goods. The MSDS also warns about contact of ULTRION with bases (eg sodium hydroxide proposed) as excessive heat may be generated.

The chemical supplier has stated that 90 percent of polyelectrolyte ULTRION 7157 is water. In the event of a fire, the water component will first have to be boiled off before the oxides are formed. Carbon monoxide, nitrous oxide and nitrogen dioxide could then be generated. The Department notes that a fire near the polyelectrolyte ULTRION 7157 storage area may potentially produce toxic gases. The Department therefore request the RTA to justify why water treatment should underground rather than on the surface. In a submission to the Department, the RTA indicates that the above ground option was not favoured due to the difficulty in acquiring private property and/or a section of Hyde Park or Cook and Phillip Park. It also noted that an above ground treatment plant would be at greater risk of break-in and vandalism than a below ground treatment plant.

An initial comparison of these two options indicates that an above ground water treatment plant may provide a safer and more convenient option. Deliveries and transfer of the hazardous substances to the below ground facility could only occur during a planned tunnel closure. Planned closures are expected to be every three months, thus requiring a three month stock of chemicals, 10 tonnes of each, in the tunnel. Deliveries and transfer to an above ground facility, however, could occur with almost no disruption to the tunnel traffic. Therefore, the on-site storage quantities and hence the risks would be minimised. For instance, the process could involve storage of one tonne each at weekly deliveries. Major maintenance works of the below ground treatment plant would require a tunnel closure. It should be noted, however, that no formal risk analysis has been undertaken thus far. The Department considers that such investigations must occur prior to finalising the location of the water treatment plant.

In order to overcome safety and amenity concerns, the Department, therefore, recommends further investigation of all locational options. This requirement is specified in new Recommended Condition of Approval No. 289. The Proponent would also be required to undertake a risk analysis associated with the transportation and storage of sodium hydroxide and poly aluminium chloride in the tunnel. The analysis is to provide justification detailing the choice of location for the water treatment plant and amelioration measures to mitigate risk. If the risk of storing these substances below ground is found to be above acceptable levels, the Proponent would be required to relocate the treatment plant to an above ground or near surface site.

As the use of sodium hydroxide and poly aluminium chloride is vital for the water treatment process, the Department recommends an alteration to existing Condition of Approval No. 208, which prohibits the storage of dangerous good. Use of these substances would be permitted in the tunnel or its associated facilities as approved under new Recommended Condition of Approval No. 291, provided that it meets adequate assessment criteria. Any storage or handling of sodium hydroxide and poly aluminium chloride, however, must occur under strictly controlled circumstances in accordance with new Recommended Conditions of Approval Nos. 290 and 291.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

The need and justification for the project as a whole was established when the Minister for Planning approved the project in October 2001, subject to 240 conditions.

The Department's assessment indicates that the proposed modifications (with revisions) would not substantially alter the overall nature of the project and therefore concludes that the revised modified proposal would not alter, in any substantial way, the ability of the project to meet the key strategic objectives as assessed for the approved project.

The Department assessment of the proposed revisions to the modified proposal concludes that, individually and cumulatively, the revisions would reduce the overall environmental impact of the proposal as described in the Supplementary EIS and have been recommended for consideration by the Minister for Planning as part of the modified proposal.

The Department also concludes that the specific objectives of the proposed modifications are appropriate and that these would be achieved with the revised modified proposal, subject to the recommended changes to the conditions of approval as detailed in this Report.

8.2 Recommendations

It is recommended that the Minister for Planning adopt the proposed revisions to the modified project as detailed in Section 5 of this Report. These are detailed in Sections 6 and 7 of this Report and Appendix F of the RTA's Supplementary Representations Report.

It is also recommended that should the modification proceed, it would be essential for amendments and additions to be made to the Conditions of Approval.

The key recommendations include:

Revisions to the Requested Modification

- ◆ provision of a ventilation duct tunnel;
- ◆ provision of a landscaped bridge over the Eastern portal;
- ◆ re-establishment of a direct connection from Cowper Wharf Road to the Domain Tunnel;
- ◆ revisions to traffic arrangements in Woolloomooloo;
- ◆ revisions to the Sir John Young Crescent tunnel exit;
- ◆ replacement of car parking spaces in Rushcutters Bay; and,
- ◆ relocation of variable message signs.

Changes to the Existing Conditions of Approval

- ◆ significant strengthening of the air quality conditions, particularly relating to in-tunnel conditions, including adoption of more stringent health criteria;
- ◆ inclusion of penalties for exceedances of in-tunnel goals, with any generated funds to be spent on improvements to in-tunnel and external air quality;
- ◆ enhancement of fire/life safety management and incident response plan requirements;

- ◆ additional monitoring of traffic intrusion in key sensitive areas including Bellevue Hill, Double Bay, Edgecliff, Rushcutters Bay, Woollahra (Ocean Street), Haymarket and other parts of the CBD;
- ◆ further consideration of reinstating the right turn from William Street to Bourke Street;
- ◆ review of access to Darling Harbour;
- ◆ minimising disruption to traffic using the Kings Cross tunnel during construction;
- ◆ further geotechnical analysis of additional buildings including Altair, Elan, Millennium, Maestri, MBF Building, Lobana and other properties along Elizabeth Street;
- ◆ confining transport of spoil largely to the Eastern Distributor rather than through streets in east Sydney/Woolloomooloo; and,
- ◆ preparation of a Tree Replacement and Environmental Enhancement Plan as an offset for the loss of Fig trees in the median of the Cahill Expressway.

9. RECOMMENDED CONDITIONS OF MODIFICATION
