PROPOSED WESTERN SYDNEY ORBITAL

VOLUME 1

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

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FOREWORD

The Roads and Traffic Authority of NSW (RTA) proposes to develop the Western Sydney Orbital. The proposal involves the a 40 km dual carriageway motorway linking the M5/F5 at Camden Valley Way in the south and the M2 in the north. Once completed, and in conjunction with the proposed Lane Cove Tunnel, the Western Sydney Orbital would complete the Sydney Orbital freeway/motorway network. The proposal is estimated to cost $1.25 billion and as part of the National Highway route is being funded partially funded by the Commonwealth Government ($350 million). The remaining funds would come from private sources and likely be recouped by the successful consortium through the imposition of a toll.

The proposal is subject to assessment under Division 4, Part 5 of the *Environmental Planning and Assessment Act 1979* (the Act). As such, the approval of the Minister for Planning is required for the works. The RTA has sought the approval of the Minister under Section 115B of the Act. This report has been prepared in accordance with Section 115C of the Act which requires that the Minister obtain a report from the Director-General of the Department of Planning prior to making a decision.

The purpose of this report is to review; the Environmental Impact Statement (EIS), the issues raised in representations made in response to the public exhibition of the EIS, the additional information provided by the proponent and other relevant matters pertaining to the potential environmental impacts of the proposed works.

The large scale of the Western Sydney Orbital has led to a range of complex environmental impact issues to resolve and the RTA has proposed a number of modifications to reduce impacts and maximise benefits. In particular the proposed modifications to the alignment near Cecil Hills, the reduced scale of the M4/WSO interchange, the commitment towards a fully grade-separated cycleway/pedestrian path and the construction of facilities to enable bus services on the proposal between Richmond Road and the M2 at opening would all maximise the long term benefits.

In accordance with the 1996 'Whole of Government Integrated Action Package' , the justification and long term success of the Western Sydney Orbital is linked to it being a 'transport corridor' catering for public transport, freight and private vehicles. Early provision of public transport services on the Western Sydney Orbital integrated with the proposed bus transitway network, would improve accessibility and modal choice for residents of Western Sydney. High levels of use on the Western Sydney Orbital, particularly by freight transport, would result in significant travel time and accessibility improvements to Western Sydney with flow on benefits to the regional and State economy. The Western Sydney Orbital would also result in reductions to traffic levels on the surrounding road network and improvements to Sydney wide air quality.

This report concludes that the potential environmental impacts associated with the proposal could be mitigated to an acceptable level by adopting management measures referred to in this report and reflected in the Recommended Conditions of Approval in Section 9 of this report. On that basis, I recommend that the proposal be approved subject to the recommended conditions.

Sue Holliday
Director-General

EXECUTIVE SUMMARY

The Proposal

The RTA's proposed Western Sydney Orbital (WSO) is a major $1.25 billion infrastructure project recognised in *Action for Transport 2010*. The proposed motorway is approximately 40 kilometres long linking the Hume Highway/M5 Motorway at Prestons in the south to the M2 Motorway at West Baulkham Hills in the north. Key features of the proposal include construction of a new, four (4) lane dual carriageway with a median dedicated to public transport use. Traffic would be tolled electronically in each direction from either collector gantries mounted on overbridges or purpose built structures between each intersection or at each on and off ramp. The WSO is proposed to replace the interim National Highway route along the Cumberland Highway. A unique feature of the proposal is the first motorway to motorway interchange in Sydney at the M4. Figure 1.1 shows the location of the proposal.

Assessment and Approval Process

The proposed development is to be determined under the provisions of Division 4, Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This requires the Director-General of the Department of Planning to prepare an independent assessment report to the Minister for Planning, including recommended conditions to be imposed if the proposal were approved. The Minister for Planning must grant approval to the project before it can proceed. In determining the proposal, the RTA's determination must be consistent and in accordance with the approval of the Minister for Planning.

An environmental impact statement (EIS) for the proposed development was publicly exhibited from 8 January 2001 to 5 March 2001. The RTA received 267 representations to the exhibited EIS. Key issues raised in representations included: need and justification, including public transport initiatives; the alignment near Cecil Hills; concept design considerations; regional traffic and transport including freight; staging; and toll. Section 3 of this Report provides a summary of all representations received.

Proposal Objectives

The primary objectives of the proposed Western Sydney Orbital are:

- to provide a high standard National Highway link through Sydney;
- support the NSW Government's metropolitan strategies for land use, transport and the environment;
- support the developing integrated transport strategy by creating one part of the emerging strategic transport network for Sydney;
- improve the efficiency of freight movement and commercial travel;
- improve access to employment and other opportunities (by private and public transport);
- support economic development in western Sydney; and
- achieve the above-mentioned development in an environmentally and socially sensitive manner.

The proposal has been justified in the EIS on the basis that it meets these objectives, which in turn are expected to have the following key benefits:

- completing a high standard National Highway link through the Sydney metropolitan area, providing a greatly improved transport route and inter-conductivity (sic) to order metropolitan motorways for freight and commerce movements and contributing to economic efficiency at a national, state and regional level;
- significantly enhancing opportunities for efficient freight movement to, from and within the Greater Metropolitan region of Sydney and improve local amenity by reducing heavy vehicle usage on local roads, including relief of the Cumberland Highway from freight movements from the north west sector, Penrith, Fairfield, Campbelltown and Camden in the long term ;
- creation of opportunities for increased job growth in western Sydney due to improved access to markets and ports, improved opportunities for business, cultural, recreational and tourism activities and inter-urban movements for western Sydney residents;
- improvement to public transport and cyclist opportunities;
- support for other potential development in the area through improved accessibility, in line with the State Government's metropolitan strategy; and
- reduction of road congestion with improved traffic flow and safety for pedestrians, cyclists and drivers.

Proposed Modifications

Based on the representations to the EIS exhibition and from other additional information, the RTA proposes a number of modifications to the original proposal as described in the EIS. The modifications include:

- minor alterations to the route alignment including around Cecil Hills;
- provision of new ramps, access arrangements, contractors compound and a bridge;
- relocation of carriageways, ramps, overpass and access arrangements;
- re-configuration of interchanges or intersection improvements including the M4 interchange;
- upgrading of roads;
- improving access;
- provision of truck stop areas; and
- maintaining the status quo.

Subsequent to the Representations Report, the Minister for Roads publicly announced on the 14 November 2001 the provision of a fully grade separated off motorway cycleway as part of the proposal. The cycleway was proposed to be within the proposal road reserve for its whole length and be constructed as a shared cycleway/pedestrian path for both experienced, inexperienced and recreational cyclists.

The modified proposal was described, together with the rationale for such changes, in a Preferred Activity Report which was made publicly available. Overall, the Department is satisfied that the modifications, both individually and cumulatively would reduce the detrimental effect of the activity on the environment and broadly supports the modifications on this basis. The Department's view is that there is no justification for further environmental impact assessment (by way of an EIS) as a result of the modifications.

The Department considers that all statutory obligations concerning public notification and assessment have been complied with; and that no additional public assessment is warranted as the result of modifications.

Key Issues

Justification

The proposal has been justified on the basis that it meets the objectives outlined previously.

Additional investigations by the Proponent have indicated that the proposal would be an attractive route particularly for heavy vehicles and result in reductions of traffic on a number of surrounding roads. The proposal is also estimated to make large improvements to travel times and average travels speeds across the entire Sydney road network resulting in regional air quality improvements. The high use of the proposal by freight vehicles would assist in the added stimulation to economic and employment opportunities in Western Sydney.

Notwithstanding, to strengthen the commitments contained in the Whole of Government Integrated Action Agreement particularly with regard to public transport, freight and other transport opportunities key recommendations of the Department include:

- maintenance of a 15 metre wide median dedicated to future public transport use along the length of the WSO;
- provision of a dedicated bus way from Richmond Road to the M2 should congestion levels and patronage forecasts require it;
- exempting buses, cyclists and emergency service vehicles from the toll;
- freight enhancement strategies should monitoring indicate that heavy vehicle usage on the WSO is below that forecast; and
- cyclist and pedestrian access strategies to ensure maximum accessibility.
-

The Department is confident that with these recommendations the proposal could achieve its specified objectives and therefore could be justified.

Public Transport Issues

In accordance with the "Whole of Government Action Package", the Department considers that the justification for the WSO is fundamentally linked to it being considered as a "transport corridor" catering for private vehicle, freight and public transport services. Whilst, the Department is cognisant of the low forecast demand for public transport services on most sections of the WSO at time of opening, it also recognises that non-provision of such services would only potentially exacerbate the situation. Early provision of public transport could particularly encourage new public transport usage which may be potentially lost in future years when travel patterns/behaviour have been established and are harder to change.

The Department has recommended a number of supplementary and integral public transport facilities, and post-operational monitoring and review strategies. In particular, dedicated bus lanes along the section of the WSO between Richmond Road and the M2 are recommended to be constructed at an appropriate time following consideration of a number of factors such as predicted level of service/delay and stated demand. The Department of Transport has indicated support for these conditions.

Regional Traffic and Transport Including Freight

The Department believes that the Proponent has sufficiently demonstrated that the proposal would be an important regional transport link in Western Sydney. The assessment predicts a well patronised route for both heavy and light vehicles and suggests benefits to local, regional and intra-state trip making. The assessment predicts that the WSO has the potential to improve the efficiency of freight movements with significant positive flow-on benefits for businesses in Western Sydney.

The Department has proposed a number of monitoring conditions specifically directed at heavy vehicle numbers and traffic volumes on the surrounding road network after the opening of the WSO. Should this monitoring indicate significant changes in volumes from those estimated by modelling, the Department has recommended that the RTA identify ways of increasing freight usage on the WSO and decreasing the impacts of traffic on local and regional roads through local traffic management measures.

The assessment also predicts that the WSO would generally have benefits in terms of traffic volumes on the surrounding road network. Where increases in traffic volumes are predicted on the surrounding road network as a result of the WSO, the changes would be generally minor. In conjunction with the WSO, the RTA is proposing to upgrade a number of connecting roads to ensure there is sufficient capacity to cope with the predicted traffic flows.

There were also a number of specific concerns about the absence of a link between the WSO/M2 and the F3. The impacts of the WSO are expected to be minor as only a small proportion of traffic would travel along the entire route. Notwithstanding, the Department believes that with the monitoring of roads and the commitments by the RTA to investigate route options for this link, residual impacts would be addressed.

General Design Considerations

Modifications to the design, as described in the Representations Report, have reduced the scale and impacts of the proposal. The proposed modifications to the M4 interchange, Wallgrove Road and Elizabeth Drive are considered appropriate, providing improved safety and reduced environmental impacts.

The Department's independent engineering peer review of the proposal found that there were no fundamental flaws with the concept design based on recognised guidelines, policy, best practice, constructability and operational considerations, although safety improvements and environmental benefits could be gained through further refinement during the detailed design process.

Notwithstanding, the Department considers that the issues of flood mitigation, impacts on riparian and other vegetation and fill importation in the Maxwells/Cabramatta/Hinchinbrook Creeks floodplain require further evaluation at the detailed design stage and appropriate recommendations have been made in this regard.

Alignment Near Cecil Hills

Concerns relating to the proximity of the WSO alignment past the residential area of Cecil Hills included issues of visual impact, noise and air pollution and decreases in property values as well as impacts on indigenous heritage and ecological attributes.

In response to concerns raised, the Proponent modified the proposed alignment in the Representations Report so that the route would be up to 400m further west of the route proposed in the EIS. A number of representations were subsequently received from residents of Cecil Hills still concerned about the impacts of the modified proposal.

The Department, whilst mindful of the concerns of the residents of Cecil Hills in relation to the modified alignment, recognises that an alignment further to the west would lead to significantly higher construction costs and significantly higher road user costs and associated regional air quality impacts. An alternative outer western alignment also needs to be considered in the context of the function of the proposal as providing discrete local road links and not necessarily in the context of the full 40 km proposal. In this regard, the additional costs and length are considered far more significant on a local and regional basis.

The Department however, has residual concerns that the proposal could have significant impacts to the open space corridor west of Cecil Hills and remaining visual impacts to residents. Stringent landscape design in the area would be required to minimise impacts. The Department recommends that the Proponent prepare a detailed landscape and urban design strategy in consultation with the community including the consideration of visual impacts, access as well as consideration of potential community or recreational offsets.

The Department concludes that, with the inclusion of the recommended conditions, the modified alignment past Cecil Hills would provide an acceptable outcome in terms of minimising the impacts on residential areas as well as meeting the broader based strategic objectives for the proposal.

Staging

The RTA's Representations Report is based on the premise that a staged opening of the proposal is not the favoured approach. Any proposed staging of opening has been deferred as a matter for the successful contractor to resolve. The Department believes the scale and nature of potential impacts of any operational staged opening would be significant and could potentially involve a fundamental transformation of the proposal. The Department therefore recommends the Proponent open the whole of the WSO as a complete project and consequently any staged opening scenario require a modification including a public impact assessment and consultation phase.

Toll

A number of representations including local Councils and community groups objected to the proposed imposition of the toll. As the Commonwealth Government would only partially fund the proposal, private sector finances would be required. Without private sector involvement, the proposal is unlikely to be deliverable into the foreseeable future.

To maximise the benefits of the proposal and to ensure that the toll is equitable to users, the Department has recommended several conditions requiring that buses and cyclists be exempt from the toll and a requirement to monitor heavy vehicle usage of the proposal. It has also recommended that the RTA prepare and implement freight enhancement strategy which considers innovative tolling scenarios should heavy vehicle usage rates be below those estimated by the RTA.

Other Issues

Other issues of relevance to the proposal are assessed in Sections 5 and 6, the key ones include flora and fauna; noise and vibration; flooding and hydrology; indigenous heritage; pedestrians and cyclists; strategic planning and land use impacts and SREP No. 31 – Regional Parklands. The assessment concludes that all such impacts can be managed and would not, subject to conditions, result in long term adverse or irreversible effects.

Conclusion

The need and justification of the WSO has been primarily based on the desire to provide an efficient National Highway link between the F5 and F3, providing wider transport choices and to facilitate freight movement to, from and within Western Sydney and thereby enhancing the economic development of Western Sydney.

It has been demonstrated that the WSO would be an attractive route for private vehicles and heavy vehicles carrying freight by providing a motorway standard, integrated transport corridor. The proposal is predicted to result in reductions in traffic on surrounding roads and improvements in regional air quality.

To ensure that a sustainable outcome is achieved in the long term, a precautionary and integrated Whole of Government approach is required. Therefore, the benefits of the proposal need to be considered as more than short-term traffic relief of the Cumberland Highway and other north-south arterial routes through western Sydney. Provided that public transport facilities are provided early and integrated into the WSO, the broad-based concerns about lack of a dedicated public transport options would be addressed.

In order to achieve the desired long term and strategic outcomes, the Department has placed significant emphasis on the provision of public transport opportunities within the WSO corridor and the need to promote the proposal as the primary freight corridor through western Sydney. The Department's assessment has concluded that the proposal, if supplemented by the recommended public transport and freight enhancement conditions, would be of benefit to the community and that all residual impacts could be appropriately managed.

Recommendations

It is recommended that, should the proposal proceed, it would be essential for extensive and comprehensive conditions to be imposed so as to minimise adverse impacts and to ensure, to the greatest extent practicable, its long-term benefits. Section 9 of this Report lists all the recommended conditions of any approval, the key ones include:

- the investigation of infrastructure required for the establishment of any regular bus services;
- design of the project to accommodate the future provision of public transport facilities;
- monitoring of public transport demand, bus usage and level of service to determine the need for dedicated bus lanes and facilities in the future for at least a 12 km section of the WSO between Richmond Road and the M2;
- the investigation of bus priority measures on surrounding roads impacted by the WSO;
- the monitoring of heavy vehicle numbers and the preparation of a freight enhancement strategy to encourage higher freight usage of the WSO if heavy vehicle levels are below those predicted;
- opening of the WSO as a complete project between the M5 and M2;

- the investigation of alternative design treatments to address potential flooding issues between Camden Valley Way and Cowpasture Road;
- construction to accommodate a maximum of 4 traffic lanes;
- review of the concept design to minimise the proposal footprint, particularly at interchanges, and impacts on environmentally sensitive locations;
- preparation of a Community Involvement Plan and an independent Community Liaison Representative with the ability to address community concerns regarding construction impacts;
- the establishment of community liaison groups and a 24 hour complaint phone system during construction;
- the preparation of strategies for cyclists and pedestrians to ensure maximum accessibility along and across the proposal;
- preparation of detailed urban design and landscaping plans for the proposal including specific plans for the SREP 31 – Regional Parklands areas;
- monitoring of the local and regional road network to provide a base line for measuring significant change as a result of the proposal; and
- a number of construction related environmental management measures to minimise impacts.

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GLOSSARY AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
AIIA	Ancillary Infrastructure Impact Assessment
ARI	Average Recurrence Interval
CAMWEST	Cyclist Action Movement West
CASA	Civil Aviation Safety Authority
CO	Carbon monoxide
CO_2	Carbon dioxide
dB(A)	Decibel (A-weighted scale)
Department, the	Department of Planning
Director-General	Director-General of the Department of Planning
DLWC	Department of Land and Water Conservation
DoP	Department of Planning
DoT	Department of Transport
DUAP	Department of Urban Affairs and Planning (now DoP)
ECRTN	Environmental Criteria for Road Traffic Noise
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EPA	Environment Protection Authority (NSW)
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
EPI	Environmental Planning Instrument
EPIP Act	Environment Protection (Impact of Proposals) Act 1974
ESD	Ecologically Sustainable Development
g/m^2/month	Grams per metres squared per month
HC	Hydrocarbons
kg	Kilogram
km	kilometre
km/h	kilometres/hour
L_{Aeq}	The equivalent continuous noise level taking into account the level and frequency of noise events
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LPT	Liverpool to Parramatta Bus Transitway
m	metre
MDP	Metropolitan Development Program
m^3	cubic metres
NO_x	Nitrogen Oxides
NPWS	National Parks and Wildlife Service
OCA	Olympic Coordination Authority
OLS	Obstacle Limitation Surface
PAD	Potential Archaeological Deposit
PAR	Preferred Activity Report
PM_{10}	Particulate matter with equivalent aerodynamic diameter less than 10 microns
PMF	Probable Maximum Flood

Proponent, the	Roads and Traffic Authority
RAAF	Royal Australian Air Force
RIC	Rail Infrastructure Corporation
RTA	Roads and Traffic Authority
SEDA	Sustainable Energy Development Authority
SEPP4	State Environmental Planning Policy 4 – Development Without Consent
SIEC	Sydney International Equestrian Centre
SIS	Species Impact Statement
SREP 31	Sydney Regional Environmental Plan 31 – Regional Parklands
TSC Act	Threatened Species Conservation Act 1995
WSO	Western Sydney Orbital
WSROC	Western Sydney Regional Organisation of Councils
WSRP	Western Sydney Regional Park

1. INTRODUCTION

1.1 Nature of the Proposal

The Roads and Traffic Authority (RTA) proposes to construct the Western Sydney Orbital (WSO), a National Highway standard, tolled motorway approximately 40 kilometres long from the F5/M5 Motorway at Prestons in the south to the M2 Motorway at West Baulkham Hills in the north. The proposal would traverse Liverpool City Council, Fairfield City Council, Blacktown City Council and Baulkham Hills Shire Council. The WSO would replace much of the existing interim National Highway which follows the Cumberland Highway and Pennant Hills Road to the F3 at Wahroonga.

The WSO consists of:

- the development of a new road corridor/reserve through mostly open space from the intersection of the M5 Motorway and Camden Valley Way Prestons to just north of Elizabeth Drive at Cecil Park, adjacent to Wallgrove Road (approximately 10.5kms);
- a new road corridor/reserve parallel to and east of Wallgrove Road, crossing the M4 Motorway to the Great Western Highway (approximately 10kms);
- generally use of the existing Phillip Parkway Corridor from the Great Western Highway to Richmond Road (approximately 7kms);
- use of the existing Castlereagh Freeway Corridor from Richmond Road and linking with the existing M2 Motorway at Abbot Road, West Baulkham Hills (approximately 12.5kms);
- a road corridor varying between 65 and 150 m;
- a 15 metre wide median from Prestons to West Baulkham Hills;
- electronic tolling facilities estimated at 25c/km with a toll cap of $5 for the whole route; and
- major grade-separated intersections at 15 locations.

The proposal location is shown in Figure 1.1.

The WSO would cost approximately $1.25 billion to construct. The Commonwealth Government would partially fund the WSO with the balance of funding to be financed through a toll on road users.

1.2 Background and History

The Commonwealth Government announced the extension of the National Highway in 1994, identifying the Cumberland Highway and Pennant Hills Road as the interim National Highway between the F5 and F3 until a superior route is made available. The National Highway system is funded by the Commonwealth Government's National Highway Program. The RTA would be the Commonwealth's agent in respect of design, construction and maintenance of the WSO.

The WSO has been identified as a vital transport link in *Action for Transport 2010* and is part of a larger program of transport improvements for the Sydney region. It has two (2) main functions which are to link the sections of the National Highway to the north and south of Sydney as well as being an important component of the road network providing a high standard orbital road linking major employment and residential areas. It would connect all existing motorways in Sydney, thereby completing the NSW Government's Sydney Orbital Strategy allowing high standard access to all of Sydney.

It is recognised that Western Sydney will play an important role in the future development of Sydney in terms of providing land for accommodating population growth as well as industrial development. The Proponent has stated that the proposal would facilitate travel to, from and within Western Sydney and would be expected to attract new activities, services and facilities to the region. The proposal has been partly justified on its support of national economic development and improvement to local environments in western Sydney.

Western Sydney is also a major manufacturing region in NSW accounting for over 20% of NSW gross domestic product. Demand for freight-generating land uses in Sydney is forecast to grow and the outer local government areas of Sydney contain more than 80% of the land available for new industrial and commercial activities. The Proponent has stated that the proposal would significantly enhance opportunities for the efficient movement of freight to, from and within the metropolitan region. It would also assist in improving the amenity and safety of western Sydney suburbs by reducing heavy vehicle usage of some local roads. The proposal would contribute to more equitable distribution of employment and other activities in Western Sydney and provide more equitable access to these opportunities.

1.3 Preparation and Exhibition of the Environmental Impact Statement

The RTA initially sought the requirements of the Director-General for an EIS for the proposal on 4 July 1994 which were issued on 11 August 1994. The Director-General was further consulted on 7 June 1995 for a revised scope of works, with additional requirements issued on 4 July 1995. As an EIS had not been exhibited within two (2) years of the date of the Director-General's requirements being issued, additional requirements were again sought for the proposal as required by the Environmental Planning and Assessment Regulation 1994. The requirements were issued on 8 April 1998. Separate requirements were provided for the southern and northern sections of the proposal.

Further, a request was made to the Department on 14 January 1999 that the two sections of the proposal be assessed as one activity. This was approved by the Director-General on 15 January 1999, stating that the separate Director-General's requirements that had been issued were to be regarded as specifying a comprehensive set of obligations that apply in total to all actions covered by the new comprehensive EIS. Final consultation occurred on 29 November 1999 in regards to requirements for the provision of a toll. These requirements were issued on 3 December 1999.

An Environmental Impact Statement (EIS) for the proposal was subsequently prepared by the RTA (RTA, 2000) and publicly exhibited at 19 locations in metropolitan Sydney between 8 January 2001 and 5 March 2001. A Species Impact Statement (SIS) was also prepared and exhibited with the EIS.

Two hundred and sixty-seven (267) representations were received by the RTA in response to the EIS. Copies of all representations were forwarded to the Department as required by the *Environmental Planning and Assessment Act 1979 (EP&A Act)*.

1.4 Statutory Provisions and Assessment Process

The proposal is subject to Part 5 of the *EP&A Act 1979*. 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. As such, the approval of the Minister for Planning is required for the proposal to proceed.

Application of Section 5A of the *EP&A Act* concluded that the proposal could potentially have a significant effect on threatened species, populations or ecological communities. Consequently, an

SIS was prepared in accordance with Division 2, Part 6 of the *Threatened Species Conservation Act 1995* (*TSC Act*). The concurrence of the Director-General of National Parks and Wildlife Service was granted on 14 September 2001 in accordance with Section 112C(1) of the *EP&A Act*, subject to a number of conditions. A copy of the concurrence report including the conditions of concurrence is contained in Appendix A. The RTA also received approval from the Heritage Council on 17 August 2001 in relation to the disturbance of an item on the State Heritage Register.

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) was enacted on the 16 July 2000 and repealed a number of Commonwealth Acts including the *Environment Protection (Impact of Proposals) Act 1974* (EPIP Act). The EPBC Act is administered by Environment Australia and introduces a number of new environmental requirements and processes. However, as the RTA was designated as the proponent of the WSO under the *EPIP Act* and the assessment and determination of the proposal will be undertaken within two years of the commencement of the new Act on 16 July 2000, the transitional arrangements set out in the *Commonwealth Environmental Reform (Consequential Provisions) Act 1999* would apply. Therefore the assessment of the WSO may continue under the *EPIP Act* and the *EPBC Act* would not apply, except where the proposal affects Commonwealth land, in which case the *EPBC Act* would still apply.

1.5 Request for the Approval of the Minister for Planning

The RTA sought the approval of the Minister for Urban Affairs and Planning (now the Minister of Planning) by way of letter dated 17 September 2001, in accordance with Section 115B of the EP&A Act. The request for approval was accompanied by a Representations Report which presented the RTA's response to the issues raised in representations received during public exhibition of the EIS and SIS.

1.6 Purpose of this Report

The purpose of this report is to review the EIS for the proposal, the issues raised in representations during the public exhibition of the EIS and SIS, submissions made by the Proponent and other matters pertinent to the potential environmental impact of the proposal.

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

2 PROPOSAL AS DESCRIBED IN THE EIS

This section of the Report provides a description of the proposal as described in the EIS. The purpose is to provide an overview of the information presented in the EIS and does not necessarily represent the views of the Department. Section 4 provides a discussion of the proposed modifications to the proposal following exhibition of the EIS. The Department's consideration of the modified proposal is provided in Sections 5 and 6.

2.1 Project Description

2.1.1 Introduction

The Western Sydney Orbital (WSO) is a proposed motorway approximately 39 kilometres long from the F5/M5 Motorway at Prestons in the south to the M2 Motorway at West Baulkham Hills in the north as shown in Figure 1.1. Initially, the motorway would have four (4) traffic lanes and a 15 m wide central median which could be used to provide additional traffic lanes or public transport facilities in the future. The location and alignment of the WSO was determined by a number of strategic studies and constraining features. The proposed alignment of the WSO is shown in Figure 2.1.

2.1.2 Key Features

Key features of the proposal include:

- a new road (approximately 12km in length) from the M5 Motorway and Camden Valley Way intersection at Prestons through largely open space to Elizabeth Drive, Cecil Hills;
- an alignment immediately adjacent to Wallgrove Road from Elizabeth Drive, crossing the M4 and Great Western Highway.
- Use of the Phillip Parkway corridor between Eastern Road and Richmond Road, including upgrade of the section between Eastern Road to Woodstock Avenue;
- following the Castlereagh Freeway road reserve from Eastern Road to the M2, at West Baulkham Hills
- a dual carriageway motorway with high standard interchanges along its length providing connections with the arterial road network;
- four (4) 3.5 m traffic lanes (two in each direction) with sealed inner shoulders of 1 m;
- a median of at least 15 m wide;
- a 2.5 m combined paved shoulder/breakdown lane and on-motorway cycle lane;
- major grade-separated intersections at 15 locations; and
- electronic tolling infrastructure to toll road users. An indicative toll levied at 25c per km to a maximum charge of $5.00 excluding GST was identified in the EIS.

2.1.3 Other Design Features

Other design features of the proposal include:

- cross-over points for pedestrians and cyclists;
- a pedestrian and recreation cycle path either within the proposed corridor of the WSO or outside and parallel to the road corridor;
- cyclist crossovers at interchange ramps marked to provide safe crossing points;
- road design to 100 Year ARI flood event;

- flyovers where the motorway crosses or intersects with a local street and it is proposed to retain the street across the motorway;
- a 110km/h design speed between the M5 interchange and Richmond Road and 100km/h from Richmond Road to the M2 motorway;
- a corridor width ranging from 65 m to 150 m (with interchanges up to 400 m in width);
- fencing of the corridor with a 1.8m high chain wire fence; and
- lighting provided at interchanges and road crossings.

2.1.4 Property Acquisition

The proposal would require full or partial acquisition of 191 properties including privately owned properties and government/institutional or publicly owned properties. Property acquisition would be greater between Prestons and Cecil Hills as the alignment between Cecil Hills and West Baulkham Hills follows lands reserved for the purposes of a road. Following construction, some property adjustments may be required to minimise areas sterilised and to improve the viability of adjoining properties. This would be a matter for negotiation between property owners and the RTA.

All property acquisitions identified at the final design stage would be undertaken in accordance with the provisions of the *Land Acquisition (Just Terms Compensation) Act 1991*. The procedures followed for the acquisition of land are set out in the *Roads and Traffic Authority's Land Acquisition Policy Statement*.

2.1.5 Construction Issues

Construction of the WSO would be put out to tender on the basis of a design, construct and operate contract. The road construction work is likely to be awarded to a head contractor with several sub-contractors to carry out work simultaneously on various sections of the road.

Construction of the proposal is expected to take approximately four (4) years. General work hours are proposed between 7:00 am and 6:00 pm weekdays and 7:00 am to 1:00 pm Saturdays or 8:00am to 1:00pm if work is audible at residences. No work would be undertaken on Sundays or public holidays.

Construction facilities required are the main RTA site office and other construction management facilities including offices, amenities, material stores and stockpiles, plant compounds and car parks. These would be established adjacent to operational work sites within the road corridor.

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

The need and justification for the WSO is to extend the National Highway through western Sydney and thus provide a motorway standard road to link the existing National Highway network to the north and south of Sydney. It would also provide opportunities for bus services and cyclists along the motorway route and reduce traffic flows on key regional roads. The WSO would encompass the objectives of the National Highway program and the principles and the framework of the current metropolitan strategy *Shaping Our Cities*. The objectives of the Proposal are to:

- provide a high standard National Highway link through Sydney;
- support the NSW Government's metropolitan strategies for land use, transport and the environment;

- support the developing integrated strategy by creating one part of the emerging strategic transport network for Sydney;
- improve the efficiency of freight movement and commercial travel;
- improve access to employment and other opportunities (by private and public transport);
- support economic development in western Sydney;
- improve local environments in western Sydney; and
- achieve the above-mentioned development in an environmentally and socially sensitive manner.

The proposal has been justified by the RTA on the basis that it meets these objectives which are in turn are expected to have the following benefits:

- completing a high standard National Highway link through the Sydney metropolitan area, providing a greatly improved transport route and inter-conductivity (sic) to order metropolitan motorways for freight and commerce movements and contributing to economic efficiency at a national, state and regional level;
- significantly enhancing opportunities for efficient freight movement to, from and within the Greater Metropolitan region of Sydney and improve local amenity by reducing heavy vehicle usage on local roads, including relief of the Cumberland Highway from freight movements from the north west sector, Penrith, Fairfield, Campbelltown and Camden in the long term ;
- creation of opportunities for increased job growth in western Sydney due to improved access to markets and ports, improved opportunities for business, cultural, recreational and tourism activities and inter-urban movements for western Sydney residents;
- improvement to public transport and cyclist opportunities;
- support for other potential development in the area through improved accessibility, in line with the State Government's metropolitan strategy; and
- reduction of road congestion with improved traffic flow and safety for pedestrians, cyclists and drivers.

The consequences of not proceeding with the proposed WSO would include:

- the loss of the opportunity to provide a high standard National Highway link through Sydney, which would compound the existing dis-benefits of the absence of such a link;
- the loss of the opportunity to provide an integral component of the Sydney Regional Orbital Network, resulting in potential adverse economic and road network efficiency impacts;
- the loss of the opportunity to provide a significant component of the transport infrastructure needed to allow the orderly development of urban residential, employment and industrial areas in Western Sydney;
- significant increases in regional traffic congestion, including delays and associated environmental and social impacts as a result of future traffic volume increases;
- as a result of the forecast increased traffic volumes, a broad reduction in roadway and intersection road user levels of service, resulting in the need for significant additional road upgrading works in the region over and above those required as identified with the WSO; and
- increased road network congestion, which would also act as an impediment to the implementation of public transport initiatives as identified in the *Action for Transport 2010*.

2.3 Alternatives Considered

In 1993, the *Liverpool to Hornsby Highway Strategy Study* (Maunsell-DJA 1993a and 1993b) was undertaken. It examined the adopting or upgrading of an existing route, a new route in an existing road reservation and the development of a completely new road corridor between Liverpool and

Hornsby. The outcome was to endorse a road-based option with public transport capabilities. Three (3) existing corridors were analysed being the Cumberland Highway corridor, the Prospect Arterial corridor and the Wallgrove Road Corridor. The study recommended the preferred corridor of the Wallgrove Road option, with an opportunity to link to the M2 Motorway. Further examination of the corridor following completion of the Strategy Study defined the corridor now described as the proposed WSO.

A selection of possible alignments within the corridor was narrowed to two – direct and indirect alignments. The direct route was found to have the most advantages. An initial design proposal was prepared for the commencement of the environmental assessment, which was further refined during this process.

The southern section of the proposed route was assessed in sub-sections from the M5/F5 interchange to Bernera Road, Bernera Road to Cowpasture Road and Cowpasture Road to Elizabeth Drive. A number of sub-options were assessed within each sub-section. A comparative assessment addressed regional and local accessibility, biological and ecological diversity, visual quality, public spaces, noise environment, air quality, land use, indigenous and non-indigenous cultural heritage, road function and cost effectiveness.

Alignment options for the northern section of the proposal were comparatively well defined due to existing road corridors such as the Phillip Parkway and the Castlereagh Freeway. The proposed alignment was based on identifying that which would have the least environmental impact within these corridors. Factors considered included existing road reserve corridors, the nature of adjoining development and future land use, threatened or endangered species, geotechnical constraints, drainage and flooding constraints, access to the existing road network and existing development, existing utilities and services, location of railway lines, construction costs and value for money.

2.4 Major Benefits and Adverse Impacts Identified in the EIS

2.4.1 Major Benefits

The major benefits of the WSO as stated by the RTA are discussed previous in Section 2.2.

The WSO represents an integrated package of transport infrastructure, which would contribute to the realisation of Commonwealth and State objectives by providing a missing link of the National Highway and linking the north and south western regions of Sydney.

Positive operational impacts of the proposal include the diversion of traffic from the surrounding local road system onto the proposed road thereby resulting in a safer and less congested local and arterial road network and the impact on regional air quality.

2.4.2 Adverse Impacts

Construction

During construction of the proposal, major potential adverse impacts would relate to flora and fauna, local amenity and access, noise, air quality, water quality, traffic and visual quality. The construction is expected to directly impact on seven threatened plant species, one (1) threatened fauna species and five (5) endangered ecological communities. Other construction impacts include:

- disruptions to traffic on local roads;
- changes to access for properties adjoining the road corridor;
- disruptions to pedestrian and bicycle movements;
- local air quality could potentially deteriorate during construction;
- erosion impacts could be very high in some areas, particularly at sites adjacent to creeks and other waterways;
- impact on indigenous heritage sites including open sites, scarred trees, areas of potential archaeological deposit, open camp sites and archaeologically sensitive areas;
- impact on a section of the Sydney Water Supply Tunnel;
- impact on non-indigenous heritage including foundations of a World War II RAAF base, possible burial site, timber barns and sheds and, cisterns and dairy; and
- impact on a "contact" site which contains evidence of both indigenous and non-indigenous heritage and is considered of high significance.

Operation

Adverse impacts include the potential to affect existing hydrological characteristics within the surrounding area, visual impacts from toll gantries at certain sections along the route and impacts on the surrounding noise environment and visual quality. Many of these environmental impacts would only occur at certain localities along the route.

3 SUMMARY OF REPRESENTATIONS

3.1 Representations Made in Relation to the EIS

The EIS was exhibited between 8 January 2001 and 5 March 2001. A total of 267 representations were received of which 184 were from individuals.

The category types of the representations are summarised below:

Commonwealth Government	4
State Government	22
Members of Parliament	6
Local Government	16
Businesses/Institutions	20
Community Groups	15
Private Individuals	184
Total	**267**

Of the representations received, 45 stated clear support for the proposal and 36 objected to the proposal.

3.2 Identification of Key Issues from EIS Representations

In its Representations Report, the RTA included a summary of key issues raised which categorised issues into 14 major categories. The Department has examined the specific concerns raised in each of these categories and has further divided some of the main categories including 'Public Transport, Pedestrians and Cyclists' into 'Public Transport', and 'Pedestrians and Cyclists' and 'Water and Flooding' into 'Water Quality' and 'Flooding and Hydrology'. Accordingly, the Department has undertaken a supplementary assessment of representations in order to better understand the nature of concerns raised.

This assessment indicated that the eastern alignment near Cecil Hills was the most frequent and significant concern. The issues of public transport and design considerations for the project were also frequently raised concerns. The Department's summary of issues raised in representations is given at Appendix B.

3.3 Key Issues Raised

A summary of key issues raised in all representations to the EIS and then by Commonwealth, State and Local Government agencies only is given in Figure 3.1 and Figure 3.2 respectively. A summary of the representations from Commonwealth, State and Local Government agencies is given in Table 3.1. The following points provide an overview of the main issues raised, using the actual wording in representations.

<u>Object to Eastern Alignment near Cecil Hills</u>

- support the Western Sydney Orbital in the western alignment only;
- proposed alignment through Cecil Hills causes harm to our community;
- concerned about the environmental impact it's going to cause and the devaluation of property;

- out of the western alignment, the central alignment and the eastern alignment, the eastern alignment is the worst option of the three;
- detrimental effects on our natural environment that currently exists, it will also cause a huge change to the rural lifestyle;
- the Eastern Alignment has over the other two Alignments:
- highest visual impact
  - hills will be cut by up to 25 metres and raised in some areas by only 14 metres.
  - the landscape will be transformed to fit the road.
  - landform and drainage will be disturbed.
- highest noise impact
- highest air quality impact on Cecil Hills
- highest impact on Endangered Ecological Communities and threatened species
  - clearance of acres of the Cumberland Plan Woodland.
  - removal of colonies of large Land Snails.
  - direct impact to wetlands, aquatic fauna.
  - habitat and water quality within the farm dam.
- the eastern alignment has by far the most environmental impacts of the three proposed routes.

Public Transport

- public transport should be built instead of the Orbital;
- introduction of adequate public transport facilities;
- ideal opportunity to provide an efficient public transport link;
- issue of public transport needs to be given greater attention;
- agree strongly with future rail/busway provision;
- issue of carparking is raised as a matter of concern;
- one lane being dedicated exclusively for buses, or at a minimum, as a Transit Lane;
- lack of provision for rail access to use the corridor;
- EIS fails to adequately address the potential environmental benefits of providing public transport; and
- efforts should be made to increase public transport usage.

Design Considerations

- possibility of more lanes in each direction should be allowed for in the current design;
- the placement and design of on and off ramps;
- the placement and design of major interchanges;
- crossing of Motorway over the Blacktown to Richmond Railway line be re-evaluated;
- preferable if the route of the road between Eastern Creek & the M2 was more direct;
- many of the access and egress roads could be designed to use less land;
- too many half interchanges;
- all watercourse crossings be carried out through the construction of bridges;
- concern over complete lack of parking areas;
- all shoulders should provide a full three (3) metre traversable width; and
- reject the concept of the Norwest Boulevard interchange.

Table 3.1 Summary of Representations from Commonwealth, State and Local Government Agencies

Issues/Agencies	Department of Land and Water Conservation	Environment Protection Authority	New South Wales National Parks and Wildlife Service	New South Wales Heritage	New South Wales Health	Department of Defence	New South Wales Fisheries	NSW Agriculture	NSW Department of Education	Department of Urban Affairs and Planning	Roads and Traffic Advisory Council	Upper Parramatta River Catchment Trust	Hawkesbury Nepean Catchment Management Trust	Sydney Catchment Authority	Environment Australia	Rail Infrastructure Corporation	Sydney Water	Olympic Co-ordination Authority	Property Council of Australia	Western Sydney Regional Organisation of Councils Limited	Transport Workers Union of Australia	Sydney West Orbital Taskforce	Baulkham Hills Shire Council	Hornsby Shire Council	Fairfield City Council	Holroyd City Council	Camden Council	Blacktown City Council	Parramatta City Council	Campbelltown City Council	Penrith City Council	Ryde City Council	Liverpool City Council	Robert Watkins Mayor of Fairfield	Janice Crosio MP	Andrew Tink MP	Michael Richardson MP	Paul Lynch MP	Richard Jones MP	Kevin Rozzoli MP	**Total**
Flora and Fauna	✔		✔				✔	✔		✔			✔		✔			✔		✔		✔			✔			✔	✔	✔		✔	✔					✔		17
Public Transport		✔			✔					✔						✔				✔		✔	✔		✔	✔	✔	✔	✔	✔		✔	✔					✔		15
Toll										✔									✔	✔		✔		✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔						15
Traffic		✔			✔					✔	✔											✔		✔	✔	✔		✔			✔			✔	✔						12
Design Considerations	✔		✔				✔			✔			✔							✔	✔	✔	✔					✔		✔											11
Noise and Vibration		✔			✔				✔	✔								✔				✔			✔	✔		✔						✔			✔				11
Heritage			✔	✔						✔			✔		✔		✔								✔			✔						✔			✔				10
Air Quality		✔			✔					✔								✔		✔		✔			✔			✔					✔	✔							10
Link to F3/Pennant Hills Road			✔		✔																		✔	✔				✔		✔		✔				✔				✔	9
Planning and Land Use										✔									✔						✔			✔	✔					✔					✔		7
Cycleway/Cyclists					✔					✔				✔									✔					✔					✔								6
Access						✔				✔								✔				✔			✔			✔													6
Flooding and Hydrology	✔									✔		✔													✔								✔	✔							6
Geology and Soils	✔	✔					✔			✔		✔	✔																												6
Pedestrians					✔					✔				✔											✔			✔					✔								6
Staging		✔								✔												✔					✔	✔					✔								6
Western Sydney Regional Parkland			✔							✔										✔		✔			✔																5
Surrounding Road Network																										✔	✔	✔		✔	✔										5
Stormwater	✔	✔					✔					✔	✔																												5
Consider Alternative Alignment/Option										✔					✔			✔															✔								4
Urban Development						✔											✔			✔													✔								4
Badgerys Creek Airport										✔										✔					✔										✔						4
Landscaping													✔												✔			✔							✔						4
Salinity	✔																			✔		✔						✔													4
Upgrade Roads																						✔						✔					✔								3
Visual and Urban Design										✔															✔										✔						3

Issues/Agencies	Department of Land and Water Conservation	Environment Protection Authority	New South Wales National Parks and Wildlife Service	New South Wales Heritage	New South Wales Health	Department of Defence	New South Wales Fisheries	NSW Agriculture	NSW Department of Education	Department of Urban Affairs and Planning	Roads and Traffic Advisory Council	Upper Parramatta River Catchment Trust	Hawkesbury Nepean Catchment Management Trust	Sydney Catchment Authority	Environment Australia	Rail Infrastructure Corporation	Sydney Water	Olympic Co-ordination Authority	Property Council of Australia	Western Sydney Regional Organisation of Councils Limited	Transport Workers Union of Australia	Sydney West Orbital Taskforce	Baulkham Hills Shire Council	Hornsby Shire Council	Fairfield City Council	Holroyd City Council	Camden Council	Blacktown City Council	Parramatta City Council	Campbelltown City Council	Penrith City Council	Ryde City Council	Liverpool City Council	Robert Watkins Mayor of Fairfield	Janice Crosio MP	Andrew Tink MP	Michael Richardson MP	Paul Lynch MP	Richard Jones MP	Kevin Rozzoli MP	**Total**
Services/Utilities			✔											✔			✔																								3
Economic		✔								✔												✔																			3
Currency of Documents				✔						✔																						✔									3
Social					✔																	✔					✔														3
Groundwater	✔	✔																									✔														3
Road Closure																									✔									✔								2
Land Acquisition			✔															✔																								2
Compensation																									✔								✔									2
Open Space			✔							✔																															2
Consultation					✔																											✔									2
More lanes required on WSO																														✔											1
Commencement of Project																						✔																				1
Objects to Eastern Alignment near Cecil Hills																																							✔			1
Employment																			✔																							1
Overshadowing Impact																		✔																								1
Water Quality																												✔													1
Waste																						✔																				1
Safety																												✔													1
Contamination		✔																																							1

Toll

- the road should be toll free;
- does not support the imposition of a toll;
- no toll should be charged for cyclists;
- unfair that local users of a National Highway should be subject to tolls;
- any public transport operated along the motorway should be excluded from the toll;
- this will be the only National Highway that is proposed to attract a toll;
- this National Highway link should be fully funded – all others have been in the past – by Federal Government revenues; and
- the decision to impose tolls on the new highway is supported.

Flora and Fauna

- potential impacts have not been adequately identified and addressed;
- will segregate ecological communities;
- concern over impacts on threatened flora species and Cumberland Plain Woodland;
- objects to the proposed removal of remnant bushland;
- opposes the use of non-indigenous species;
- detrimental effect on the health, integrity and biodiversity of threatened species and communities;
- of particular concern is the impact on the Large Land Snail (*Meridolum corneovirens*);and
- would result in the destruction of 70 hectares of endangered species' habitat.

Link to F3/Pennant Hills Road

- little information is provided for the extension to the orbital;
- concern over connection to the F3;
- ludicrous that this orbital is being considered without a direct link to the F3;
- endorsement of the Western Sydney Orbital to complete the Sydney orbital network, provided there is an investigation of an alternative to Pennant Hills Road as the National Highway link; and
- Western Sydney Orbital/F3 Freeway Link be fast tracked such that this link is in place before the proposed Orbital becomes fully operational.

Noise and Vibration

- concern over lack of noise barriers and noise walls;
- consideration should be given to possible noise impact on schools;
- concerned at the likely noise impact on the existing residential areas at Cecil Hills;
- noise assessment needs to more accurately identify the areas of high noise impact construction works;
- concern over loss of land and buffer zone to minimise noise; and
- vibration impacts may arise from road and bridge works.

Traffic

- concerns in relation to traffic and transport impacts;
- assessment does not have any regard to the impact of this road system on side streets or impacts on surrounding roads;
- main impacts on traffic and transport will occur after the construction period;
- traffic noise issues;

- marginal impact on traffic flow on the arterial road network; and
- construction of motorways encourages extra traffic.

Air Quality

- concerns regarding the impacts from benzene;
- does not adequately solve the problem of poor air quality;
- regional air quality is predicted to deteriorate through the increase of vehicle emissions;
- concerns in relation to the construction phase are dust;
- increased number of vehicles on the road will result in further air pollution; and
- the air quality assessment be redone with data collected over a significantly greater timeframe at more stations.

Consider Alternative Alignment/Options

- other options and routes have to be considered;
- public transport should be built instead of the orbital;
- have a truly integrated and expanded public transport system;
- preferred options remain with the western and central alignments; and
- potential tunnel or alternative alignments should be considered.

4 MODIFICATIONS TO THE PROPOSAL FOLLOWING EIS EXHIBITION

This Section describes the current proposal for which the RTA has sought approval from the Minister for Planning as described in the Representations Report and Preferred Activity Report (PAR). The modifications to the proposal described in this Section have been made by the RTA following exhibition of the Environmental Impact Statement and in response to the issues raised in Representations.

4.1 Representations Made Subsequent to the Preferred Activity Report

The RTA modified the proposal following consideration of the representations received in relation to the EIS. The RTA prepared a Preferred Activity Report (PAR) which detailed these modifications to the proposal. The PAR was put on public exhibition on the 21 December 2001, and remains on exhibition as at the date of this report at all locations where the EIS was exhibited.

The Department has received a further 67 letters and numerous phone calls from Cecil Hills residents remaining opposed to the modified alignment. Concerns raised include that the modification should be still further to the west and that the RTA has not adequately addressed previously raised issues such as visual, noise and air pollution impacts. Some representations indicated that the modified alignment was still as close as 100m to some residences in Cecil Hills.

The Minister for Planning, the Hon. Andrew Refshauge MP, met with the Local member for Liverpool, the Hon. Paul Lynch MO, and representatives of the Cecil Hills community on 24 January 2002. Key issues raised by the residents included expectations that the alignment of the Orbital was always going to be much further to the west, that residents of Cecil Hills bought their properties on that assumption as well as the impacts on noise and property values. The Department undertook further discussions with the RTA following the meeting to assess whether there were any further opportunities to reduce the impacts on Cecil Hills. This is further discussed in Section 5.3 of this Report.

4.2 Overall Project

The general locations of proposed modifications are shown on Figure 4.1. Details of modifications are shown in Figures 4.2 (a)–(x). Modifications to the overall project are detailed in the Representations Report and Preferred Activity Report (PAR) and are summarised as:

- alterations to the route or alignment;
- provision of new ramps, access arrangements, contractors compound and a bridge;
- relocation of carriageways, ramps, overpass and access arrangements;
- re-configuration of interchanges or intersection improvements;
- upgrading of roads;
- improving pedestrian access; and
- provision of truck stop areas.

The proposed modifications have resulted in increasing the WSO length from 39 km to 40 km.

4.3 Design Modifications

The RTA has identified 23 modifications to the WSO concept design assessed in the EIS, categorised as described above. The modifications are summarised in Table 4.1 below.

Table 4.1 Summary of Design Modifications

Type of Modification	Description
Route or alignment alterations	▪ relocation of WSO over Cowpasture Road
	▪ relocation of WSO westwards at Cecil Hills
	▪ raising and relocation of WSO westwards at water supply pipelines and provide new access to nearby properties
	▪ relocation of WSO north of Great Western Highway westwards
	▪ maintaining status quo with WSO over Railway Road
New ramps, access arrangements, contractors' compounds and bridges	▪ construction of bridge over Angus Creek
	▪ provision of northbound on-ramp from Wallgrove Road to WSO
	▪ provision of access from Saxony Road to Western Sydney Regional Park (WSRP)and Sydney International Equestrian Centre (SIEC)
	▪ retention of the ramps between Wallgrove Road and the M4
	▪ raising of WSO over Woodstock Avenue and provide south-facing ramps at Woodstock Avenue instead of at Power Street
Carriageways ramp, and overpass relocations and access arrangements	▪ separation of carriageways of WSO at various locations along the WSO
	▪ relocation of WSO southbound off-ramp to Camden Valley Way
	▪ relocation of access to Hoxton Park Airport
	▪ relocation of WSO ramps at Elizabeth Drive
	▪ realignment of Symonds Road overpass
Interchange re-configuration or intersection improvements	▪ relocation of WSO / Old Wallgrove Road interchange southwards
	▪ raising of WSO at The Horsley Drive
	▪ re-configuration of WSO and M4 interchange at Eastern Creek
	▪ improvement of intersection at WSO off-ramp to Old Windsor Road
Road upgrades	▪ upgrade of McIver Avenue at West Hoxton
Pedestrian access improvements	▪ provision of pedestrian crossing at Redmayne Road
	▪ provision of pedestrian overpass at Eastern Road
Provision of truck stop areas	▪ provision of truck stops at various locations along the length of WSO

Descriptions, justifications and environmental impacts of each of the design modifications are provided in Table 4.2. Detailed assessment of the project components including the proposed modifications is provided in Sections 5 and 6 of this report and therefore information presented here should not be considered but for comparative purposes only.

4.3.1 Major Modifications

Of the 23 design modifications proposed by the RTA, three (3) major modifications were proposed. These, which are described briefly below, were the realignment of the proposal up to 400 m further west of Cecil Hills; redesign of the WSO/M4 interchange; and raising of WSO over Woodstock Avenue and provide south-facing ramps at Woodstock Avenue instead of Power Street.

Cecil Hills Realignment

The proposed modification would be relocated up to 400 m further west from that alignment considered in the EIS and the overall length increased by 350 metres. The realignment would be in the form of an arc extending generally from Hoxton Park Airport to Elizabeth Drive. Four (4) pedestrian crossing points would be incorporated in this section.

The modified route would be partially located behind spurs radiating from the main ridge, would avoid a large farm dam and minimise impacts on several stands of open woodland. In addition, reduced environmental impacts including noise, air and visual impacts would be anticipated. Negative environmental impacts resulting from the modification would include a further impact on four (4) PADs, a scarred tree, impact on one non-indigenous heritage site, removal of some small areas of vegetation and fragmentation of land identified in SREP No. 31. Hazards and risk of accident would also increase with the increased length of road though this could be negated by the decrease in risk to residential properties due to the increased "buffer area".

The RTA justified the modification based on increased distance from residential areas, noise reduction, reduced impacts on air quality and visual impacts on residents.

WSO/M4 Interchange Design

The modification from the large roundabout to a multi level interchange would incorporate the M4 Motorway at ground level, the WSO through lanes over the M4 Motorway and one level of interchange ramps over the WSO, approximately 16 metres from ground level. The remaining interchange ramps would pass under the M4 Motorway within several short tunnel sections. The proposed design ramps speeds would be 80 km/h for all movements. The RTA expects that this modification would improve traffic capacity, safety, and performance and provide more logical directional movements for road users.

Woodstock Avenue and Power Street Modifications

This modification would include realignment of the WSO over Woodstock Avenue incorporating retaining walls and embankments up to seven (7) metres high along the alignment. The previously proposed south-facing ramps were deleted to be replaced by a northbound off-ramp from the WSO to Woodstock Avenue and a southbound on-ramp from Woodstock Avenue to the WSO. Easier construction and reduced impacts on private properties in Woodstock Avenue and Station Street would be expected from this modification.

Modifications with Major Positive Environmental Changes

Relocation of WSO over Cowpasture Road

The WSO at Cowpasture Road has been modified to an overpass as twin bridges rather than an underpass, due to Obstacle Limitation Surface (OLS) at Hoxton Park Airport. This modification would result in reduced hazards and risks, as height limits for the OSL would be met where Cowpasture Road runs across the southern end of the runway. The modification would result in a minor negative visual impact compared with the proposal as stated in the EIS. Although the bulk and scale of the interchange would be similar, the WSO would be elevated in this location, though with a different configuration.

Construction of Bridge over Angus Creek

Construction of a bridge rather than a culvert over Angus Creek would be expected to provide a better outcome for aquatic and terrestrial fauna as well as minimising impacts on hydrological regimes. The existing Philip Parkway alignment would be regraded at a higher level for the WSO and the existing bridge at Angus Creek would be raised by 3.2 m at the northern abutment and 4.2 m at the southern abutment, with fill embankments to allow for regrading of the WSO. This is expected to result in marginal improvement in water quality, less likelihood of localised flooding and would be the most 'ecologically friendly' approach.

Separation of Carriageways of WSO at Various Locations along the WSO

This modification involves the separation of the WSO at a number of locations to allow for the provision of future bus stations and intersections with transitways between Richmond Road and the M2 Motorway. The future bus stations would serve surrounding residential areas. This modification allows for future bus station and transitway station connections and the associated public transport benefits. Adverse impacts would include an increase in the built form of the WSO and increased risk associated with transport interchanges.

Relocation of WSO/Old Wallgrove Road Interchange Southwards

The WSO/Old Wallgrove Road Interchange would be relocated approximately 50 m southwards, so that safety and the Old Wallgrove Road to the M4 Motorway merge distance would be increased. A two-lane ramp on the eastern side of the WSO would be eliminated reducing land acquisition and impacts on native vegetation. The modification would allow for increased traffic safety, reduced impacts to both Cumberland Plain Woodland and Sydney Coastal River-Flat Forest and reduced land acquisition, visual impacts and hazards and risks.

Provision of Pedestrian Crossing at Redmayne Road

This design modification would improve local access by providing pedestrian and cyclist access under the WSO via a combined underpass and drainage culvert. It would improve local access and reduce travel distances for pedestrians and cyclists, improve access to schools and reduce risks for pedestrians and cyclists.

Provision of Pedestrian Overpass at Eastern Road

The modification would be expected to improve local access by providing pedestrian and cyclist access over the WSO via a combined pedestrian and cyclist overbridge. It would cater for able-bodied pedestrians with bridge ramps aligned to match existing footways and ground levels to encourage use. This would improve local accessibility, reduce travel distances, improve access to schools and reduce hazards and risks. A minor negative visual impact would be expected due to the increase in built form and its elevation.

Provision of Truck Stops at Various Locations

The WSO would be a major freight route in metropolitan Sydney. Truck stops at regular intervals would improve road safety by the provision of safe areas clear of the WSO traffic for drivers to stop, check and secure their loads. Eight (8) truck stops would be provided, four (4) in each direction. This modification is expected to have positive environmental benefits based on increased efficiency and

safety, and decreased hazards and risks. Adverse impacts would include an increase in localised noise due to truck braking, a decrease in localised air quality and an additional 0.7 ha of land requirement within the road corridor.

4.4 Conclusion

The Department has reviewed the modifications to the Proposal and considers them appropriate, providing improved road safety and generally reducing adverse environmental impacts. The Department is satisfied that residual adverse environmental impacts could be satisfactorily managed by the inclusion of appropriate mitigation measures. Overall, the modifications are considered to reduce the detrimental effect of the activity on the environment. The Department's view is that there is no justification for further environmental impact assessment (by way of an EIS) as a result of the modifications.

Table 4.2 Design Modifications: Descriptions, Justifications and Environmental Impacts

Design Modification	Description	Justification	Environmental Impacts Compared to EIS		Beneficial or Adverse Potential Impact	Net Potential Impact[1]
			Beneficial	Adverse		
Alterations to the Route or Alignment						
Relocate WSO Over Cowpasture Road	The WSO would cross over Cowpasture Road as twin bridges.	Road design requirements for the WSO and height limits within the obstacle limitation surface at Hoxton Park Airport require the WSO to go over Cowpasture Road.	social and economic hazards and risks	planning and land use visual quality and landscape	+ve due to reduced congestion, reduced travel times and operating costs, improved access and reduced hazards and risks (height limits would be met). -ve due to visual amenity (bulk and scale the same but different configuration).	Positive Major Change
Relocate WSO Westwards At Cecil Hills	Relocation of horizontal alignment by up to 400 m westward and additional large scale cut and fill earthworks. Increases route length by approximately 350 m, severs proposed regional open space, delete land bridge, provision of two underpasses.	Reduce noise, air and visual impacts on Cecil Hills residents.	noise flora and fauna social and economic visual quality and landscape	traffic and transport heritage flora and fauna economic hazards and risks	+ve due to improved visual amenity, less flora/fauna impact, less social impacts, less traffic noise and improved air quality -ve due to impact on heritage (impact on 4 PADs and non-indigenous relics) and minor impact on flora (removal of some vegetation and fragmentation of land), traverses a longer stretch of roadway, increased hazards and risks due to increased road length.	Positive Major Change

Design Modification	Description	Justification	Environmental Impacts Compared to EIS		Beneficial or Adverse Potential Impact	Net Potential Impact[1]
			Beneficial	Adverse		
Raise and relocate WSO westwards at Water Supply Pipelines and provide new access to nearby properties	Horizontal alignment relocated approximately 34 m to the west and vertical alignment regraded with an overall increase in height of approximately 2 m. Underpass deleted, new access road to Austral Brick Company, retaining walls along the west side and near the poultry farm.	Land acquisition would be reduced. Impact on bushland would be avoided, need for a local bridge over the water supply pipelines would be eliminated and new improved access would be provided from the WSO to the pipelines, Austral Bricks and a nearby chicken farm.	traffic and transport social and economic hazards and risks	heritage visual quality and landscape	+ve due to reduced social impacts, improved access, hazards and risks reduced. -ve due to slight reduction in visual amenity, minor acquisition required, archaeological assessment required for non-indigenous heritage.	Positive Minor Change
Relocate WSO north Of Great Western Highway westwards	Relocate the WSO approximately 20 m westwards for 1.2 km between Beggs Road and Eastern Road.	A major gas supply line would be less affected. Construction costs would be reduced.	social and economic hazards and risks	heritage flora and fauna	+ve due to less social impacts, reduced costs, less property acquisition, reduced hazards and risks. -ve due to slight reduction in visual amenity, impact upon flora (loss of habitat), non-indigenous archaeological assessment required.	Positive Minor Change
Maintain status quo with WSO over Railway Road	Upgrade of Railway Road would not be undertaken.	Not a feeder road to the WSO so the upgrade would not be required. Provide some saving in construction costs and reduce potential impacts on local residents.	social and economic hazards and risks		+ve due to cost savings and reduced impact on local residents, hazards and risks reduced due to non-construction.	Positive Minor Change

Design Modification	Description	Justification	Environmental Impacts Compared to EIS		Beneficial or Adverse Potential Impact	Net Potential Impact[1]
			Beneficial	Adverse		
Provision of New Ramps, Access Arrangements, Contractors Compound and a Bridge						
Construct bridge over Angus Creek	Bridge would be built to cross Angus Creek. The existing Phillip Parkway alignment would be regraded at a higher level for the WSO. At Angus Creek, the existing bridge would be raised 3.2 m at the northern abutment and 4.2 m at the southern abutment with fill embankments to allow for the regrading of the WSO.	Construction of a bridge rather than a culvert would provide a better environment for fauna and minimise impacts on the aquatic ecology of Angus Creek.	water quality and flooding flora and fauna		+ve due to marginal improvement in water quality, less likelihood of localised flooding, improvement to the ecology of the area.	Positive Major Change
Provide Northbound On-Ramp From Wallgrove Road To WSO	Provide an additional northbound ramp. Widening of the eastern side of Wallgrove Road within the road reserve would provide a right turn bay onto the WSO.	Improve northbound access and use of the WSO.	traffic and transport social and economic	noise air quality visual quality and landscape hazards and risks	+ve due to improved northbound access, improved visual amenity, less impact on flora and fauna and less social impacts, reduced travel costs, increased accessibility. -ve due to slight increase in noise over a larger area, reduced visual quality and landscape character, increased hazards and risks due to additional ramp.	Positive Minor Change

Design Modification	Description	Justification	Environmental Impacts Compared to EIS		Beneficial or Adverse Potential Impact	Net Potential Impact[1]
			Beneficial	Adverse		
Provide access from Saxony Road to Western Sydney Regional Park (WSRP) and Sydney International Equestrian Centre (SIEC)	Provide a new roundabout on Saxony Road for access to a new road within Western Sydney Regional Park and parallel to the WSO alignment. Would connect to the SIEC existing internal access road.	Increase access along newly formed roads.	planning and land use traffic and transport social and economic hazards and risks	flora and fauna visual quality and landscape	+ve due to improved access, enhance the values, accessibility and use of the WSRP and SIEC, reduce hazards and risks with access to the WSRP and SIEC. -ve due to impact on flora (loss of Cumberland Plain Woodland), reduce visual quality due to increased roadspace.	Positive Minor Change
Retain the ramps between Wallgrove Road and the M4	Retention of current movement with slight modifications to the ramps between Wallgrove Road and the M4.	Retain current movement between the Great Western Highway and the M4.	traffic and transport social and economic	heritage	+ve due to improved access. -ve due to non-indigenous archaeological assessment required.	Positive Minor Change
Raise WSO Over Woodstock Avenue And Provide South-Facing Ramps at Woodstock Avenue Instead Of At Power Street	The WSO would go over Woodstock Avenue with up to 7 m high retaining walls and embankments, 3 m high noise walls placed at the WSO roadside, south facing ramps at Power Street deleted and a northbound off-ramp from the WSO and southbound on-ramp from Woodstock Ave would be provided. High voltage transmission lines and towers would be adjusted if required.	Easier to construct, would reduce impacts on access to private properties in Woodstock Avenue and Station Street and would reduce traffic volumes along Power Street.	Traffic and Transport Social and Economic	Noise Visual Quality and Landscape Hazards and Risks	+ve due to less social impacts -ve due to reduction in visual amenity, minor land acquisition, increased noise, increased footprint, increased hazards and risks during operation	Positive Minor Change

Design Modification	Description	Justification	Environmental Impacts Compared to EIS		Beneficial or Adverse Potential Impact	Net Potential Impact[1]
			Beneficial	Adverse		
Relocation of Carriageways, Ramps, Overpass and Access Arrangements						
Separate carriageways of WSO at various locations along the WSO	Carriageways of the WSO under Quakers Road, under Sunnyholt Road and over Old Windsor Road would be further separated. Carriageways separated between Richmond Road and the M2 Motorway.	Allow for future Transitway or bus stations at five locations along the WSO.	planning and land use traffic and transport social and economic	visual quality and landscape hazards and risks	+ve due to catering for future public transport facilities and the associated environmental benefits. -ve due to increased built form, increased risks with transport interchanges.	Positive Major Change
Relocate WSO southbound off-ramp To Camden Valley Way	Relocate off-ramp approximately 25 m to the west. Maxwell Creek culverts extended. Embankment along the off-ramp constructed.	Reduce adverse environmental impacts on 4 private residential properties. Footprint of the WSO would be reduced.	planning and land use social and economic	visual quality and landscape	+ve due to fewer properties required and reduced footprint (0.45 ha). -ve due to slight reduction in visual amenity, WSO would appear closer to four properties.	Positive Minor Change
Relocate access To Hoxton Park Airport	A two (2) lane sealed road off Cowpasture Road approximately 100 m north of the WSO. A new two (2) lane, 700 m long access road to the commercial area within the airport would also be provided.	Better and more efficient configuration to allow future access for light and heavy vehicles to the Airport directly from Cowpasture Road.	traffic and transport social and economic hazards and risks	planning and land use heritage visual quality and landscape	+ve due to reduced congestion, reduced travel times and operating costs, improved access (reduce hazards and risks). -ve due to minor visual impact, land acquisition (750 m^2), non-indigenous heritage (Hoxton Park Airport access)	Positive Minor Change

Design Modification	Description	Justification	Environmental Impacts Compared to EIS		Beneficial or Adverse Potential Impact	Net Potential Impact[1]
			Beneficial	Adverse		
Relocate WSO ramps at Elizabeth Drive	Relocate off-ramp and on-ramp approximately 30 m westwards, require embankments to support the ramps, northbound off-ramp also deviated slightly closer to the WSO and Wallgrove Road near Elizabeth Drive would not be deviated slightly to the west.	Reduce the footprint of the WSO and reduce impact on an area of bushland within the Western Sydney Regional Park. Minor re-alignment of Wallgrove Road would also not be required.	flora and fauna social and economic visual quality and landscape	heritage	+ve due to improved visual amenity, less impact on flora/fauna, less social impacts, less traffic noise, improved air quality, less land take. -ve due to impact on Cecil Hills Tunnel.	Positive Minor Change
Realign Symonds Road overpass	Realignment of the approximately 450 m long overpass on larger embankments located up to 60 m east of the WSO. Provide two new local roads near the northern end of the overpass on both sides to provide access to nearby properties. Two (2) way unsealed roads approximately 25 m and 100 m long.	Reduce environmental impacts on 2 nearby private properties and provide better local access.	traffic and transport social and economic visual quality and landscape		+ve due to reduced impacts on nearby private properties. -ve slight reduction in visual amenity.	Positive Minor Change
Re-Configuration of Interchanges or Intersection Improvements						
Relocate WSO / Old Wallgrove Road interchange southwards	Relocate overpass southwards approximately 50m, replace roundabout by a southbound on and off ramp, remove the 2-way 1 km long on-load ramp and add an additional roundabout.	Merge distance and safety increased to the M4. Two (2) lane on-ramp on east side would be eliminated reducing land acquisition and impacts on bushland.	planning and land use traffic and transport flora and fauna social and economic visual quality and landscape hazards and risks		+ve due to less social impacts, less impact on flora/fauna (reduction in area affected), improved access, less land acquisition, improved visual amenity, allows for better planning, traffic safety increased, hazards and risks reduced.	Positive Major Change

Design Modification	Description	Justification	Environmental Impacts Compared to EIS		Beneficial or Adverse Potential Impact	Net Potential Impact[1]
			Beneficial	Adverse		
Raise WSO At The Horsley Drive	WSO would be raised by about 4.6 m at The Horsley Drive. The southbound off-ramp would not be required.	Allow easier construction of the WSO and less disruption to traffic along The Horsley Drive.	social and economic hazards and risks	visual quality and landscape	+ve due to less social impacts and improved access, hazards and risks reduced during construction. -ve due to slight reduction in visual amenity.	Positive Minor Change
Reconfigure WSO and M4 interchange at Eastern Creek	An additional level of one lane interchange ramps within a four level structure and grade separated one lane on ramps and off ramps to cater for all directions of traffic.	Improve traffic capacity, safety performance and provide a more logical directional movement for road users.	traffic and transport social and economic	noise air quality flora and fauna visual quality and landscape	+ve due to less social impacts, improved safety and access, reduced hazards and risks. -ve due to slight reduction in visual amenity, slight increase in air quality, alight increase in traffic noise (impact on additional 10 dwellings).	Positive Minor Change
Improve intersection at WSO off-ramp to Old Windsor Road	A left turn would be permitted and a break would be provided in the Old Windsor Road median to allow a right turn movement when exiting from the WSO off-ramp.	EIS incorrectly showed a continuous median in Old Windsor Road when exiting from the WSO off-ramp.	traffic and transport social and economic	visual quality and landscape	+ve due to increased access to the WSO and surrounding road network. -ve due to increased built form.	Positive Minor Change

Design Modification	Description	Justification	Environmental Impacts Compared to EIS		Beneficial or Adverse Potential Impact	Net Potential Impact[1]
			Beneficial	Adverse		
Upgrading of Roads						
Upgrade McIver Avenue at West Hoxton	Reconstruction and widening for 500 m from a 2 lane unformed road to a 2 lane sealed road and the provision for one dense grade asphalt 2.5 m wide travel lane in each direction with one metre wide sealed shoulders and a table drain.	Would be upgraded to provide better access for nearby residents.	traffic and transport social and economic visual quality and landscape hazards and risks	flora and fauna	+ve due to reduced congestion, reduced travel times and vehicle operating costs, reduced hazards and risks, improved visual amenity. -ve due to flora impact, reduced local access.	Positive Minor Change
Improving Pedestrian Access						
Provide pedestrian crossing at Redmayne Road	Combined underpass and drainage culvert would run under the WSO from the east side of the closed section of Redmayne Road to the south-west and exit adjacent to nearby church grounds. A short pedestrian and bicycle path would be provided from the west side of the underpass to the closed section of Redmayne Road to the north.	Allow pedestrian access between the two closed ends of Redmayne Road	traffic and transport social and economic hazards and risks	visual quality and landscape	+ve due to provision of greater pedestrian and cyclist access across the WSO, provides access to nearby schools, reduces community severance, hazards and risks for pedestrians and cyclists reduced -ve due to minor visual impact	Positive Major Change
Provide pedestrian overpass at Eastern Road	Overbridge from the north side of the closed section of Eastern Road and land on the opposite closed section of Eastern Road near Warrimoo Drive.	Improve local access by providing access for cyclists and pedestrians over the WSO via an overbridge.	traffic and transport social and economic hazards and risks	visual quality and landscape	+ve due to improved local accessibility, provision of greater pedestrian and cyclist access across the WSO, provision of access to nearby schools and reduces community severance, hazards and risks reduced for	Positive Major Change

Design Modification	Description	Justification	Environmental Impacts Compared to EIS		Beneficial or Adverse Potential Impact	Net Potential Impact[1]
			Beneficial	Adverse		
					pedestrians and cyclists	
Provision of Truck Stop Areas						
Provide truck stops at various locations along the length of WSO	These would be approximately 150 m in length consisting of a 30 m long entry lane, a bay length of 60m and a 60 m long exit lane. Bays would be minimum of 9 m wide. Eight sites have been recommended for truck stop areas, providing four sites in each direction.	Truck stops to improve road safety for drivers to stop, check and secure their loads.	traffic and transport economic hazards and risks	noise air quality social visual quality and landscape	+ve due to reduction in hazards and risks and provision of facilities for freight -ve due to increased noise impacts, reduced local air quality, impacts on nearby residents, visual impacts of the truck stops	Positive Major Change

Notes: 1. Indicates the Department of Planning's independent comparative assessment of the initial proposal and the proposed modifications.

5 ASSESSMENT OF KEY ISSUES RELATING TO THE MODIFIED PROPOSAL

This section outlines the Department's detailed consideration of the key issues relating to the current proposal having regard to information provided in the EIS, issues raised by the Department, representations received in response to the EIS Exhibition and from additional information provided by the Proponent and obtained by the Department.

The Proponent has also provided the Department with an assessment of all issues raised in the representations and this is included in Section 3 of the Proponent's Representations Report. The assessment by the Proponent has been reviewed by the Department and where required further assessment has been undertaken. It is important that this section be read in conjunction with the Proponent's Representations Report to understand how all issues raised in representations were addressed.

5.1 Introduction

Identification of the key issues has been based on the nature and extent of impacts and representations from government agencies and the community. Given the nature, the objectives and the justification for the modified proposal, it is considered that the assessment of issues would best be served by delineation based on impact type. The sections in this chapter deal primarily with design and alignment issues, traffic and public transport issues and the key environmental impacts that are expected to occur. It should be noted that there is some level of cross-referencing between Sections 5 and 6 in regard to the assessment of impact types.

5.2 Strategic Justification

5.2.1 Background

The primary objectives of the proposed Western Sydney Orbital as stated in the EIS are generally related to providing a high standard National Highway link and an integrated transport corridor that facilitates improved access to employment and facilitates economic growth in Western Sydney. Further discussion of these objectives is in Section 2.2.

The EIS stated that the benefits of the proposal would be realised in the form of road user benefits, local environmental benefits and regional economic development benefits. The proposal would contribute to achieving the efficiency benefits of a completed Sydney Orbital Road network and would therefore assist the orderly development and use of land within Sydney. Justification for the road derives from economic and social considerations and the requirement to provide efficient and safe travel options for the people of Sydney and the movement of goods.

5.2.2 Key Issues

A number of representations raised issues related to the justification and objectives of the proposal. These were:

- concern that the proposal is inconsistent with or does not relate to any planning strategies for Greater Metropolitan Sydney such as *Action for Air*, *Action for Transport 2010* and the Whole of Government Integrated Action Agreement for the WSO;

- concern that the EIS does not provide an adequate justification and is based on outdated population and land use assumptions, including economic justification and the assumptions used;
- the need for improved public transport should be considered further, that priority and greater use of public transport encouraged;
- concern that the EIS does not assess the benefits of providing public transport;
- concern that there is no commitment to the provision of public transport which should be integral to the proposal; and
- that freight should be the primary users of the WSO and that the proposal cannot be justified as a freight route until the NSW Freight Strategy is released;
- that the justification of freight movement as a result of the WSO is not substantiated by the traffic assessments; and
- that further consideration should be given to the missing M2 to F3 link.

5.2.3 Additional Investigations

Justification for the Proposed Western Sydney Orbital (RTA, 2002)

Following the submission of the Representations Report, the RTA provided a further justification report to the Department. The report outlined the need for the proposal and means of satisfying the need and benefits of the proposal. These included the development, transport, and safety and amenity needs as well as transport, and development benefits.

The benefits as defined in the report are as follows:

- *Road user benefits* – the provision of a high standard road connection and cycleway would result in savings to road users in terms of travel time and vehicle operating costs and reduction in accident potential as a result of vehicles travelling on higher standard facilities;
- *Local environmental benefits* – by providing a higher standard road connection, local communities would benefit from the removal of through traffic, particularly freight and commercial traffic from local roads. Benefits are realised in terms of reductions in accidents on local roads, as well as changes in noise, air and intrusion within the local environment;
- *Regional environmental benefits* – greenhouse gas emissions across the road network and the whole Sydney air basin would generally be beneficial. Transport is responsible for more than an eighth of total greenhouse gas emissions, with CO_2 as the most important factor;
- *Regional economic development benefits* – the proposal would improve the accessibility of important economic centres such as Prestons, Wetherill Park, Huntingwood, Glendenning and Blacktown which are the result of significant decentralisation of industrial and other economic activities over the last 25 years; and
- *Equity* – the proposal would create both direct and indirect jobs for western Sydney. Broader economic benefits would include reduced costs of production for industry, greater commercial and industrial activity and a higher investment, which would flow on to other sections of the economy beyond the area that the road directly traverses. The establishment of new enterprises would be stimulated with associated employment creation.

Economic Assessment of Externalities - Revised Final Report (November 2001)

As a result of representations regarding the economic justification of the proposal, the RTA commissioned PPM Consultants Pty Ltd (2001) to prepare an additional economic assessment of externality impacts of the proposed Western Sydney Orbital.

The main findings of the assessment stated that the beneficial externality impacts would be expected with the exception of additional greenhouse gas emissions during the construction phase and the effect of the higher nitrogen oxide emissions. The report states that these impacts would be outweighed by larger beneficial changes in other categories of operational greenhouse gas and air pollution impacts. The overall impact of the anticipated changes in traffic noise, air pollution and greenhouse gas emissions is expected to increase the total benefit generated by the proposal by approximately 10% which is considered to broadly indicate the order of magnitude of benefit that could flow from the proposal.

Additional Traffic Report

Masson Wilson Twiney (MWT) was engaged by the RTA to critically review Working Paper 2 - Transportation, Traffic and Access and to undertake investigations to address concerns raised in the Representations Report. MWT (2002) focused on movements of heavy vehicles and re-modelling of the road system.

The report stated that the transport role of the proposed WSO would be to support access movements of freight and people into, through and within Sydney. Key findings and recommendations of the investigations were:

- the need for the Prospect Arterial to provide a through route from Cowpasture Road, across the M4, along Prospect Highway to Abbott Road may be diminished with the WSO ;
- the proposed WSO is projected to carry substantial traffic volumes to varying degrees along its alignments with sections between Great Western Highway and Woodstock Avenue, and Between Norwest Boulevard and Sunnyholt Road expected to carry high volumes with heavy use of interchanges; and
- that the WSO would provide an efficient link for longer distance movement of freight through Sydney as well as reducing conflicts between access requirements of heavy vehicles currently using the Cumberland Highway and longer distance movements.

Modelling results provided by the RTA showed substantially higher traffic volumes, including freight, would use the WSO when compared with the EIS forecasts due to use of contemporary data, land use forecasts, network assumptions and a model which better reflects the heavy vehicle effects on road network and distance-based tolling.

The study concluded that the effect of the WSO would be to provide traffic relief for roads along the corridor and to attract a substantial number of longer distance heavy vehicle trips and provide numerous transport functions. It would provide a far superior link through Sydney than the alternative provided by the Cumberland Highway and would support movements within Sydney in a more efficient and safe manner. It would also complete a number of missing links in the western Sydney road network.

5.2.4 Consideration of Key Issues

Strategic Policy Objectives

The NSW Government's Action for Transport 2010 and Action for Air policies outline a number of objectives with regard to integrated transport planning and infrastructure initiatives, including the need to:

- achieve more effective use of existing and proposed transport infrastructure;
- improve air quality;
- reduce car dependency;
- meet the needs of future urban transport services and usage;
- ensure new urban developments are provided with equitable access to economic and social opportunities;
- improve facilities for cyclists and pedestrians;
- reduce road accidents;
- make movement of freight more efficient; and
- provide value for money.

Overall, it must be appreciated that the strategic transport objectives would, by necessity, apply to a program of projects rather than to individual projects such as the Western Sydney Orbital. In this regard, it is not expected that each project in isolation would necessarily address all the objectives, but rather cumulatively, all projects should address or support a majority of the objectives. Notwithstanding, there would be an expectation that no individual project should result in a significant detrimental impact on any of the strategic objectives.

The ability of the proposed Western Sydney Orbital to meet these broader strategic policy objectives is considered in the context of the specific proposal objectives below.

Strategic Proposal Objectives

To Provide a High Standard National Highway Link through Sydney

The EIS states that the proposal would replace the existing interim National Highway, currently the Cumberland Highway and Pennant Hills Road to the F3, with a motorway standard, fully grade-separated link from the M5/F5 junction at Prestons to the junction with the M2 at Abbott Road. The proposal would replace more than 50 sets of traffic lights, thereby providing a more environmentally efficient, safer and faster north-south trip than that existing across Sydney. The concept design for the proposed WSO is to National Highway standard, which states a minimum design speed of 100 km/h or 110 km/h where additional cost or environmental consequences of the increase are not significant.

Notwithstanding, the proposal as described would not link the National Highway sections north (F3) and south (F5) of Sydney. Traffic to and from the F3 would continue to use Pennant Hills Road as the National Highway link until such time as a direct link is provided. However, the RTA is currently investigating options for links to the F3 and has committed to a design, subject to funding, to construct a link by the time the proposal opens. Further, the additional traffic forecasts predict that the WSO would result in relatively minor impacts on Pennant Hills Road.

Support the NSW Government's Metropolitan Strategies for Land Use, Transport and the Environment

- Metropolitan Strategies

There are a number of relevant government strategies and policies to provide guidance for developments and objectives to be achieved in land use, transport and the environment. Of particular relevance to the proposal is *Shaping Our Cities*, which in turn is supported by *Action for Transport, Action for Air* and *Shaping Western Sydney*. *Integrating Land Use and Transport* has

been recently developed as part of the series of policies, guidelines and research supporting *Shaping Our Cities*. Whilst this policy is still in draft form, the aims have been designed to achieve the following:

- help achieve the aims of the government's air quality management plan, *Action for Air*;
- enhance the viability of investment in new public transport under the NSW transport plan, *Action for Transport 2010*;
- help achieve a range of social, environmental and economic goals including equity, neighbourhood amenity and lower road congestion; and
- support the NSW Government's commitment to the National Greenhouse Strategy.

The proposal, whilst pre-dating the release of the draft policy, could be considered broadly consistent with a range of the principles outlined in the guidelines Improving Transport Choice, subject to the adoption of a number of recommendations put forward by the Department as Conditions of Approval. Of particular relevance are principles to link public transport with land use strategies, connect streets, improve pedestrian access, improve cycle access, improve road management and implement good urban design.

- Whole of Government Integrated Action Agreement

In addition to existing government policy documents, a Whole of Government Integrated Action Agreement was developed specifically for the proposal addressing issues of air quality, road and land use planning to be fully integrated in the planning and development of the WSO. A resultant "Action Package" was prepared out of concern that insufficient emphasis had been placed on integrated urban planning principles in the content and presentation of WSO plans to that time. The Action Package outlined a series of commitments of the involved parties (the Department of Planning (then the Department of Urban Affairs and Planning), RTA, EPA and DoT) in relation to planning for the development of western Sydney and how this could be integrated with the development of the WSO.

Fundamental to the Action Package was the focus on the potential uses of the WSO. The actions and commitments were aimed at ensuring the WSO would be used by a wide range of transport modes and not solely as a private vehicle route. This is shown in the key commitments of the RTA specifically for the WSO which emphasise strategies for public and freight transport. These are stated below, briefly indicating how each is fulfilled within the context of the proposal, and discussed in more detail in Appendix C with a copy of the Agreement.

- Ensure WSO planning and corridor acquisition includes provision for lanes, lay-bys and interchanges for buses linked with M2 Motorway busway planning

The WSO road corridor as proposed in the EIS includes a 15 m wide median retained for future provision of public transport, with the RTA committing to providing bus facilities on the motorway, east from Richmond Road to the M2 (though not necessarily within the median) from opening of the proposal to traffic. No specific bus interchanges were proposed.

- Identify interchanges suitable for development between WSO and CityRail network, at locations such as Glenfield, Rooty Hill, Quakers Hill (with DoT)

Interchanges with the CityRail network were not specifically addressed in the proposal. Whilst there is potential for some links between existing rail stations and the proposal, it appears that the interchanges included have not been specifically incorporated to service these facilities.

- Provide adequate entry/exit facilities for buses along WSO, including bus lay-bys with safe pedestrian access and waiting areas

Specific entry and exit facilities for buses were not addressed in the proposal, however the RTA has committed to providing "on-motorway" facilities for bus services to commence from opening of the proposal to traffic.

- Schedule provision of bus lanes, transit lanes and specific freight facilities or lanes as required

The need to schedule provision for bus lanes, transit lane and freight facilities was not included though provision of the median for future public transport was incorporated into the proposal. The Department has recommended that construction of dedicated bus lanes should be triggered once a combination of congestion and predicted patronage factors are met. The RTA identified potential truckstop locations along the route, however the provision of freight facilities or transit lanes was not addressed.

- Consider the possibility of innovative tolling regimes for the National Highway Link north of M4 that (relative to private car use) encourage use of the Link by high occupancy and freight and commercial vehicles

The proposal stated use of electronic tolling systems though details are yet to be determined. The Department has recommended monitoring of freight use and the consideration of innovative tolling measures as a means of encouraging freight use of the proposal.

- Locate interchanges with WSO to give preference to needs of industrial estates (eg Prestons, Wetherill Park, Glendenning), major freight routes and existing major arterial roads.

Interchanges have been provided at key locations along the proposed Western Sydney Orbital route to service existing industrial areas, including Bernera Road, The Horsley Drive, M4, Sunnyholt Road and Norwest Boulevard and at major arterial roads crossed. Overall, the proposal has included interchange access, which would cater for existing and proposed employment areas in the Baulkham Hills, Blacktown, Fairfield and Liverpool local government areas.

In strengthening the commitments of the Action Package, the Department recommends that the proponent undertake a proactive approach to the provision of public transport infrastructure in consultation with DoT and to prepare a freight enhancement strategy. Such measures would strengthen the justification for the proposal and ensure that public transport, freight and other transport opportunities are maximised. These issues are discussed in detail in Sections 5.4 and 5.6 respectively.

Improve the Efficiency of Freight Movement and Commercial Travel

A commitment by the RTA in the Whole of Government Action Package was to develop a Road Freight Strategy for NSW and metropolitan Sydney. A draft strategy has been prepared however the strategy has not been finalised and the timing to do so is unknown.

In general, the EIS did not provide strong evidence that the WSO would provide a major freight route. In particular, it did not identify the major origins and destinations of freight traffic into, out of and within the Sydney region.

Additional modelling of heavy vehicle movements was undertaken by the RTA (MWT, 2002) which showed that the proposal could potentially draw heavy vehicles from the surrounding road network such as Woodville Road, Hume Highway, Cumberland Highway and some traffic from the Parramatta/Seven Hills area. The study also found that heavy vehicles could make up between 14% and 25% of annual daily traffic in 2016. The additional assessment provides a much higher level of confidence that the proposal would meet its objectives as an important freight route improving travel times and efficiency with relevant flow on effects for Western Sydney.

To ensure that these benefits are realised, the Department recommends that measures be put in place to encourage use of the proposal by freight including monitoring of freight usage and consideration of alternative tolling regimes as a traffic management tool. These issues are discussed in more detail in Section 5.6.

Improve Access to Employment and Other Opportunities (by private and public transport)

The Department's policy Shaping Western Sydney covers the key planning areas of work, environment, housing and access within the western Sydney region and identifies the target outcomes for this region as:

- public transport that is accessible throughout Western Sydney;
- to define transit corridors that provide public and private transport links to major activity areas within the region; and
- major employment areas that have excellent access to the major road and rail network for freight movement.

The RTA stated that the proposal would be consistent with this policy document as it would allow for a public transport route within the WSO alignment as well as the location of ramps that would service the Central-Western Sydney Employment Area and other industrial areas. The EIS stated that there is a substantial imbalance in the location of employment between the western and eastern parts of Sydney, with the eastern part providing approximately 50% of the city's jobs but only a third of the population. Despite this, the EIS states that the number of jobs in western Sydney is growing faster than other parts of Sydney and this trend is expected to continue with the government policy of decentralising State and Commonwealth government departments.

The RTA has stated that approximately 50% of employed residents of Western Sydney travel out of the Western Sydney region to work. The WSO would provide better access to planned and existing industrial parks and other employment opportunities as well as those employment opportunities.

The Department considers that the objective of improving access to employment and other opportunities could be used to partially justify the proposal. The construction phase would provide direct and indirect employment opportunities and proposed linkages to existing and proposed future industrial and employment centres would increase with the opening of the proposal, be that by private or public transport. Public transport access to business and industrial centres, such as Norwest Business Park, between and beyond the Richmond Road to M2 section would be increased through the implementation of public transport initiatives as recommended by the Department in Conditions of Approval 36, 37, 39 and 41.

Support Economic Development in Western Sydney

The RTA estimates that the proposal would have value-added benefits to the region in excess of $260 million and household expenditure $44 million higher than they would otherwise be if the WSO were not built. Those regions expected to benefit most from the proposal would be Penrith, Fairfield, Blacktown, Baulkham Hills and Liverpool, though flow on effects may also be realised in Campbelltown and the Central Coast. Further, the RTA considers that almost all industries would be expected to gain from the reduction in road transport costs, despite the anticipated tolls, which would follow from construction of proposal, though obviously the greatest benefits would be to those industries which are relatively intensive users of road transport or have the greatest capacity to expand in response to lower costs. Further evidence of the benefits of the proposal are identified by the RTA referring to benefit cost ratio of over 5 for the WSO when considering road user costs and environmental externalities such as noise and air pollution and reduction in greenhouse gas emissions.

The RTA's justification report further states that a business task force has estimated much higher benefits again, some 24,000 jobs over an eight (8) year period and an additional $3 billion to the regional economy.

The Department considers that significant regional economic benefits are likely to result from the proposal. The RTA has placed emphasis on the reduction of transport costs by freight usage of the WSO and therefore the Department considers that encouragement of freight usage and maintaining an acceptable level of service along the corridor is fundamental to the economic benefits on which the proposal is partly justified. To this end, the implementation of high standard public transport initiatives and measures to encourage freight usage as discussed previously are considered by the Department to be important means to manage traffic demand and maximise the level of service provided by the WSO.

Improve Local Environments in Western Sydney

The EIS considered the local regional environmental issues arising from the development of the WSO. In general, the RTA found that the proposal has the potential to impact on the amenity of residential communities in the vicinity of the proposal. However, communities located around the Cumberland Highway were expected to benefit from noise reductions and improvements in air quality due to the diversion of traffic, especially trucks, from local roads to the WSO.

The proposal is predicted to lead to an improvement in regional air quality based on relief of traffic congestion resulting in more efficient travel, including fuel usage and decrease in greenhouse gas emissions. Notwithstanding, this is premised on maintaining or reducing the existing level of private vehicle usage in conjunction with improving freight transport efficiency. This can then be related back to the Department's recommended public transport initiatives as well as encouraging use of the WSO by freight transport.

5.2.5 Conclusion

The Department has considered the proposal against it strategic objectives. Additional studies subsequent to the EIS undertaken by the RTA have better articulated and quantified the benefits and hence substantiation of the proposal's justification. In particular, additional studies on traffic and freight usage and economics have better identified the potential benefits of the proposal. The additional traffic assessment is included in Appendix E.

However, the Department considers that to ensure that the identified benefits are realised and maintained in the long term, a pro-active approach would be essential in the critical areas of public transport and freight. With respect to public transport, the Whole of Government Integrated Action Package envisaged a series of works as part of the WSO. The Department has recommended a number of conditions addressing the integration of public transport and maximisation of freight which would provide the Department with sufficient confidence that the objectives of the proposal and hence its overall justification could be supported.

5.3 Alignment Near Cecil Hills

5.3.1 Background

The residential suburb of Cecil Hills is located to the south of Elizabeth Drive, on the eastern side of the proposed WSO. Cecil Hills is a relatively new residential area that has undergone substantial recent urban development. Almost all lots in Cecil Hills have now been developed.

It is understood that prior to 1998, the RTA favoured the outer western alignment as it easily linked with Elizabeth Drive and routes to the then proposed Second Sydney Airport at Badgerys Creek. The RTA has also stated that it was initially envisaged that the Cecil Hills development area would include areas further to the west, limiting the consideration of eastern alignments.

In 1998 the RTA published the Initial Design Proposal Report (RTA, 1998) which outlined the preferred route for the entire WSO. The uncertainties surrounding the timeframes for construction of Second Sydney Airport at Badgerys Creek and the confirmation of the boundary of the Cecil Hills development area enabled the comparative consideration of an eastern alignment and a western alignment. The report referred to the eastern alignment as the favoured option and the western alignment was referred to as the "alternate scheme". The report stated that the eastern alignment rated better than the western alignment against a number of proposal objectives including regional accessibility, public spaces, road function and cost effectiveness. As the eastern option was the most direct route of the three (3), it also had the lowest construction costs and lowest travel times.

The EIS summarised the options assessment process, outlining how the three main road alignments (western, central and eastern) had been developed in the vicinity of Cecil Hills (refer to Figure 5.1). The central alignment as described in the EIS was similar to the western alignment as described in the Initial Design Proposal Report. The EIS estimated that the capital cost of the eastern alignment would be $208.1 million, the central alignment $230.5 million and the western alignment $241.4 million.

Primarily on the basis of reduced capital and user costs, the EIS adopted the eastern alignment as the RTA preferred route. To minimise impacts of severance in the Regional Parklands, the design included a pedestrian bridge just south of Elizabeth Drive, a pedestrian underpass further south adjacent to Cecil Hills and a large land bridge just south of the underpass as shown in Figure 5.2.

5.3.2 Key Issues Raised in Relation to EIS

A total of 76 representations, the most number of representations for any issue, were received from individuals primarily objecting to the proposed eastern alignment near Cecil Hills and recommending that the western alignment be adopted. A number of the representations were form letters from residents in Cecil Hills. The objections raised included perceived impacts with the high visibility of the

proposal, potential impacts to property values, concerns over noise and air pollution impacts and impacts to the surrounding environment.

The Department also raised concerns that the proposed eastern alignment would have significant impacts on the open space corridor that had not been suitably assessed in the EIS.

5.3.3 Additional Investigations

Following the receipt of the representations and to address the concerns raised, the RTA amended the proposal as described in the Representations Report and Preferred Activity Report by moving the proposed alignment in the vicinity of Cecil Hills up to 400m west as shown in Figure 5.2. The Minister for Roads Hon. Carl Scully MP publicly announced the amended alignment on 14 November 2001.

The modified alignment included changes to the proposed crossings of the WSO providing access to either side of the open space corridor. It was stated that the reduced size of the cuttings in the modified alignment necessitated the deletion of the previously proposed land bridge. Two (2) pedestrian overpasses and an underpass remain in this section providing access across the WSO.

The RTA in the Representations Report and the Preferred Activity Report assessed the potential environmental impact of the modified alignment past Cecil Hills. The assessment found that:

- the WSO would be partially screened by a large hill when viewed from Cecil Hills;
- houses affected by traffic noise during day time (in 2016) would be reduced from 68 to 33 and during night time from 68 to 42;
- air quality would be improved; and,
- impacts on farm dams in the area would be reduced.

The RTA indicated that noise barriers generally 1 m high (but up to 3 m) would be sufficient to reduce traffic noise levels in Cecil Hills to below EPA criteria levels.

In addition, the Department commissioned the preparation of cross sections to visualise the viewsheds from those residents most likely to be affected by the modified proposal, taking into account the topography between those residents and the WSO. These cross sections and the plan indicating the views shown are provided as Figures 5.2 and Figure 5.3 (a) – (e).

The Minister for Planning the Hon. Andrew Refshauge MP met with the Local member for Liverpool the Hon. Paul Lynch MP and representatives of the Cecil Hills community on 24 January 2002. Key issues raised by the residents included expectations that the alignment of the Orbital was always going to be much further to the west and that residents of Cecil Hills bought there properties on that assumption, noise and visual impacts and impacts on property values.

Following the meeting, the Department undertook further discussions with the RTA to assess whether there were any further opportunities to reduce the impacts on Cecil Hills. As indicated above, consideration of the outer western alignment would be considered problematic given the significant strategic implications. The Department's assessment therefore focussed on refinements to the current alignment. This included consideration of minor realignment options further westwards, screening of the proposal using earth mounds and vegetation, and strategies for the future uses of the Regional Parklands. Further details are discussed below.

5.3.4 Consideration of Key Issues Raised in Relation to the Modified Alignment

Strategic Issues

After public release of the modification (Preferred Activity Report), the Department received a further 67 representations from Cecil Hills residents objecting to the modified alignment. Key concerns included

- that the modification to the alignment near Cecil Hills should be further to the west;
- that the 400 metres was the maximum separation;
- that for some sections of the Cecil Hills community there was no change from the EIS; and
- that it did not adequately address previously raised issues such as visual, noise and air pollution impacts.

As stated previously, the Department is aware that prior to 1998 (*ie*. when the Initial Design Proposal Report was exhibited), an alignment further west was preferred by the RTA and that some residents may have purchased properties prior to this on the assumption that it would remain the preferred option. The Department considers that it would not seem appropriate that the Government be bound by preliminary information, which then becomes fixed and unchangeable. If this were to occur, then infrastructure development could not be developed in an open and transparent manner as details would have to be determined and fixed before being released to the public. This would limit the intent and benefits of the environmental impact assessment process.

As indicated above, the western alignment was preferred by the RTA prior to release of the Overview Report in 1998. The basis of this support was the location of the then proposed Second Sydney Airport and the unclear nature of the then undetermined western extent of Cecil Hills. With the decision to not proceed with the Second Sydney Airport and decisions made on Cecil Hills, the Department considers that the western alignment would no longer be appropriate from a strategic perspective. It would be about 1.25 km longer and have an additional cost of between $20M and $30M. This additional length would result in a significant increase in total vehicle kilometres travelled (vkt) and associated regional air quality impacts.

The community has reacted to this issue indicating that an additional 1.25 km would represent less than 5% of the total length of a 40 km WSO. Similarly the additional $30M has been raised by the community as insignificant with respect to the total cost of over $1.25 billion. In general, this argument is somewhat limited as it fails to recognise that the Orbital does not serve a single purpose of getting traffic across its entire length. The percentage of traffic travelling all 40 km of the WSO would be less than 2%. As indicated in Section 5.6, it primarily services a number of linkages across western Sydney and is actually a series of road links. For example, a substantial volume of traffic would potentially use just the Hoxton Park Road to Elizabeth Drive section. The deviation would represent a significant additional detour and cost relative to the current preferred option. A western alignment could also place pressure in the long term on expanding the residential area across to it.

Impacts of the Modified Alignment

Noise

With respect to noise, the assessment indicates that, with barriers at a minimum of 1 m (up to 3 m near Elizabeth Drive), EPA noise criteria could be met. The Department believes that with the inclusion of noise mitigation measures such as mounding and noise barriers to manage construction

and operation noise, impacts on Cecil Hills would not be significant. The Department recommends that the commitment to meet EPA noise criteria for Cecil Hill residents be specifically made in the Conditions of Approval. This requirement is specified in Recommended Condition of Approval No. 91.

Visual

Given the subjective nature of visual impacts, the Department commissioned Conceptual Animations Pty Ltd to prepare cross-sections to identify lines of sight from Cecil Hills to the WSO. A range of locations at the western extent of the Cecil Hills residential area was selected. Generally, the cross sections indicate that spurs from the main ridgeline would intercept views of the proposal, though some direct views would be possible to major drainage lines (bridge crossing) and those residents located closest to the proposal in the central section of Cecil Hills towards the WSO on embankment. Figure 5.2 shows where the WSO would be visible from Cecil Hills without treatment.

Overall, the Department believes that any further movement westwards, but east of the main ridge would have limited overall benefits and is likely to have result in greater visual impacts for larger areas of Cecil Hills due to the steep topography. Significant benefits would only be realised by relocating the alignment west of the ridgeline, however, the strategic issues identified and considered in selecting the alignment would be compromised, including increased distance and associated environmental impacts.

Further discussions with the RTA following the meeting between the Minister and the Local Member confirmed that minor realignments further west would in fact increase the visual impacts and could have implications for constructability of the proposal particularly with crossing the Sydney Water Supply Pipeline. It would also lead to potential impacts on endangered ecological communities on the northern side of Elizabeth Drive.

Whilst there are significant obstacles to adjust the alignment to minimise visual impacts, these could be minimised through appropriate and comprehensive landscape treatments. These treatments could include vegetation screening and additional mounding on embankments to screen the roadway and vehicles from view that could also achieve additional benefits in terms of noise mitigation.

The Department is cognisant that some Cecil Hills residents are said to have purchased land prior to the EIS alignment being selected and for its rural type views. Measures to reduce the visual impacts of the WSO on Cecil Hills need to be considered in respect of the overall impacts on the Regional Parkland in this area. To this end, the Department recommends that the RTA prepare in consultation with the relevant Community Liaison Group and Liverpool City Council an overall strategy considering urban design and landscape features to minimise the impacts of the WSO on residents in Cecil Hills. The strategy should include measures to minimise visual impacts, design of noise barriers, access requirements and the consideration of community and/or recreation facility offsets. The strategy should be integrated with future planning strategies for the Regional Parklands. This requirement is reflected in recommended Condition of Approval No. 61.

Other Issues

The revised air quality assessment indicates that the proposal would not lead to exceedance of relevant EPA air quality goals in Cecil Hills. Whilst the Department is cognisant of community concerns regarding property impacts and potential perceived devaluation as a result of the WSO, it is not the role of the Department to engage in issues of indirect impacts on property value, particularly

where environmental impacts have been addressed and are considered to be acceptable. The Department notes that it is not RTA policy to compensate landholders for indirect impacts due to proximity of new roads.

The Department has residual concerns that the proposal could have significant impacts on the Regional Parklands west of Cecil Hills, in particular, the deletion of the land bridge in the modified alignment and impacts on the connectivity and character of the road in the corridor. Stringent landscape design in the area would be required to minimise impacts. To maximise the access across the WSO at Cecil Hills, the Department recommends the inclusion of Condition of Approval No. 62 requiring that the pedestrian/cycleway access points across the WSO in this location shall be designed to be a minimum 20m wide unless otherwise agreed to by the Director-General as a result of the strategy in Condition of Approval No. 61.

5.3.5 Conclusion

Whilst mindful of the concerns of the residents of Cecil Hills in relation to the modified WSO alignment, an alignment further to west would lead to higher construction costs as well as resulting in significantly higher road user costs and associated regional air quality impacts. The proposed western deviation also needs to be considered in the context of its function in providing local links and not necessarily in the context of the full 40 km proposal. In this regard, the additional costs and length are considered far more significant.

From a statutory perspective, the Department must focus on an assessment of the RTA's submission and whether or not the impacts would be acceptable. In considering all issues, the Department concludes that the modified alignment past Cecil Hills provides a reasonable compromise in minimising the impacts on residential areas as well as meeting the strategic objectives for the alignment in this area. The Department considers that, with appropriate mitigation measures and the Department believes that the residual impacts would be acceptable.

5.4 Public Transport Issues

5.4.1 Background

Region

The EIS indicated that Western Sydney is characterised by a low and declining usage of public transport services, such as rail and bus for journey to work and other trips. This is in part attributable to the low provision of public transport service in the area and the development of low density residential and employment areas, which are not easily serviced by public transport.

The NSW Government proposed in 1998 that the public transport 'imbalance' in Western Sydney would be addressed through a number of new services as outlined in the document *Action for Transport 2010*. The list of measures included a number of dedicated bus transitways linking residential areas with main centres in Western Sydney. The proposed Liverpool to Parramatta bus transitway (LPT) would be the first such bus transitway built and is due to open in 2003.

The LPT would run parallel and to the east of the WSO for part of its proposed route. It would connect with the Blacktown to Wetherill Park transitway that would also in part run parallel with the WSO. At its closest point, the WSO is within approximately 4 km west of the LPT alignment.

Public Transport Facilities on the WSO

The EIS does not propose any specific provision for public transport services on the WSO. The EIS stated that the ability of the WSO to facilitate public transport was limited due to:

- the dispersed nature of existing trips and low density of landuse;
- limited access to the WSO creating a poor environment for collections and distribution;
- limited demand for cross regional services in the area; and
- proximity to the Liverpool to Parramatta and Blacktown to Wetherill Park Transitways.

Notwithstanding, the EIS referred to commitments made in the Whole of Government Integrated Action Agreement for the WSO which envisaged it as a 'transport corridor'. The resulting Action Package included commitments to the development of public transport opportunities on the WSO in particular and in Western Sydney in general including the following:

- ensure WSO planning and corridor acquisition includes provision for lanes, lay-bys and interchanges for buses, consistent with M2 Motorway bus planning;
- develop *Sydney Region Road-based Public Transport Strategy* to guide investment in bus priority facilities and related measures;
- provide adequate entry/exit facilities for buses along WSO, including lay-bys with safe pedestrian access and waiting areas; and
- schedule provision of bus lanes, transit lanes and specific freight facilities or lanes as required.

The Proponent has stated that in accordance with the Action Package, the WSO had been designed with a 15 m wide median that could accommodate a dedicated transit facility in the form of a busway, light or heavy rail services. The EIS envisaged that the provision of such WSO services would be subject to establishing a demand for such services.

Existing Bus Services

The EIS stated that the WSO would not inhibit existing bus services on roads surrounding the WSO due to the large number of access points across the proposal. The EIS also stated that the WSO should lead to the relief of congestion on surrounding roads, potentially improving existing and future services both in terms of reliability and travel times.

5.4.2 Key Issues Raised

The key issues raised in representations included:

- additional commitments to public transport facilities on the WSO were required above that of providing a median;
- potential links and relationships between the WSO and existing and proposed public transport infrastructure needed to be considered;
- impact of the toll on public transport using the WSO required investigation;
- priority should be given to public transport facilities in Western Sydney rather than the construction of the WSO motorway;
- concerns that the design of the WSO would not accommodate future public transport facilities easily, particularly heavy rail; and
- consideration of commitments made in the "Whole of Government Package" regarding wider transport choice, managed traffic impacts and moderated travel demand.

5.4.3 Additional Investigations

A number of representations, including the Department's, raised concerns that whilst the design of the WSO did include a 15 m wide median that could be used for public transport facilities, the RTA had not proposed the actual provision of facilities for public transport services. Representations from the EPA and the Department referred the RTA to the commitments made in the Whole of Government Integrated Action Agreement on the WSO and suggested that, at the least, dedicated bus lanes could be considered as part of the WSO design.

The RTA commissioned consultants PPK to conduct a bus demand study for the WSO which was included in the Representations Report. The key findings of the study suggested that provision of a cross-regional dedicated bus service along the WSO between Prestons and Richmond Road based on predicted demand at time of WSO opening did not seem justified due to low predicted patronage. The study suggested that the close proximity of the WSO to the proposed transitways in this area dampened potential demand.

The study predicted that demand for bus services on the WSO would be higher for the section between Richmond Road and the M2. The predicted demand was sufficient to justify the provision of bus services potentially connecting with services on the M2. It was suggested that bus service facilities initially be provided at the kerbside of the WSO and should future demand and levels of service, then dedicated lanes similar to that on the M2, east of Windsor Road be provided.

As a result of the study, the RTA modified the WSO design in the Representations Report to accommodate bus station locations, initially at the kerbside and in the future within the median, in the vicinity of intersections and overpasses at Richmond Road, Quakers Road, Sunnyholt Road, Norwest Boulevard and Old Windsor Road. To accommodate the bus stations in the median, changes to the design included slight widening of the WSO corridor to allow for a 21 m wide median in these areas. Following the study the RTA has agreed to funding the construction of kerbside bus facilities such as covered bus stops, walkway accesses etc to accommodate any bus services between the M2 and Richmond Road.

In response to concerns from representations that the median could be used for the provision of additional traffic lanes rather than future public transport services, the RTA has committed in the Representations Report to ensuring, by way of a project deed, that the median can only be used for public transport facilities.

5.4.4 Consideration of Key Issues

Public Transport Alternatives

As with the provision of most road projects, the potential negative impacts on existing and potential future public transport usage must be considered. For this proposal, whilst the existing public transport usage in the surrounding area is low, the future potential would be higher, particularly considering the extent of potential additional development that may occur. As indicated in the Whole of Government Integrated Action Agreement and through the objectives for the proposal in the EIS, the WSO needs to be considered a 'transport' corridor, the term 'transport' encompassing both private and public transport usage. Even though a toll would provide some control on private vehicle usage, this proposal has the potential to impact on potential public transport opportunities along this corridor. In this regard, its very construction could induce redirected and additional traffic.

In order that the "transport" objectives of the corridor are maintained, the Department considers that an early and pro-active approach for provision of public transport facilities would be required. It is acknowledged that requirements for specific additional public transport facilities are generally outside of the responsibility of the RTA and are more appropriately coordinated by the DoT. However, given the integral nature of public transport to the justification of the proposal, it is considered that the proposal as approved must include the provision of transport infrastructure (both public and private) given the strong relationship to its strategic justification.

The Department has recommended a number of Conditions of Approval to ensure that WSO is designed to accommodate future public transport services. These conditions have been endorsed by the DoT and are discussed below.

Induced Demand

The provision of a major new road such as the WSO has the potential to induce additional traffic demand both from those using existing roads and in terms of new motorists. Significant induced demand could reduce the benefits of the infrastructure through impacts on capacity and could impact on the patronage and viability of alternative existing and future transport modes.

Recent advice from the RTA indicates that induced demand has the potential to be considerable. As previously stated, the justification for the WSO relates to its integrated transport abilities. Induced demand where it relates to additional motorists or higher car ownership levels therefore has the potential reduce the viability of public transport options on the WSO and surrounds, potentially in contravention of the projects' objectives. It is considered that public transport measures recommended by the Department, providing for alternative and efficient services, would reduce the potential for induced demand.

Provision for Public Transport within the Corridor

The Whole of Government Integrated Action Agreement for the Western Sydney Orbital is a strong, cross-government commitment to a package of public transport measures related specifically to the proposal. For this proposal, there seem to be a number of factors that would justify the public transport components as part of the proposal being included, such as:

- the Whole of Government approach to public transport factors on the WSO;
- consistency with approach on the M2 which is also a private tollway;
- it is best integrated with the design of the proposal and more cost effective than being an "add on" later;
- nature of surrounding land use, particularly in the south, which is in the process of undergoing rapid development and therefore is at a high risk of establishing long term patterns of minimal public transport use;
- lack of current public transport usage and poor existing mode splits to public transport in Western Sydney; and
- to address the situation such that - if it is not provided, there would be no demand.

Maximum efficiency for bus services along the WSO could be provided by the construction of dedicated bus lanes within the 15 m public transport median. Whilst the Department accepts that recent studies for the RTA indicate that patronage at the opening of the proposal in 2006 does not at this stage appear to justify the immediate construction of dedicated bus lanes, access to and the

standard of public transport opportunities should be equitable to all potential users. Current bus patronage levels on the M2 justify the operation of dedicated bus lanes east of Windsor Road. These essentially provide bus priority along the M2 without the interaction of other traffic and have proved popular for commuters.

The Department considers that it would be appropriate that a trigger is specified to require the construction and operation of dedicated bus lanes. This trigger would relate to volume/capacity ratios reaching or exceeding Level of Service D during morning or afternoon peak periods for any section between Richmond Road and the M2, and stated preference surveys indicating potential patronage levels equivalent to or higher than those achieved at the M2 east of Windsor Road during the first 12 months of operations. At this time, bus lanes and facilities should be installed between Richmond Road and the M2. This requirement is specified in recommended Condition of Approval No. 41.

To further ensure that the objectives of the proposal are met for the entire WSO, the Department recommends the inclusion of Condition of Approval No. 42 requiring the Proponent to review the demand for dedicated public transport services on all sections of the WSO five (5) years after its opening to traffic and then every subsequent ten (10) years for up to 30 years after opening and provide such information to the DoT.

To allow for the on-motorway bus facilities (stops, access paths etc) from commencement of operations, the Department recommends the inclusion of Conditions of Approval Nos. 36, 37 and 39. These conditions require the RTA to liaise with the Department of Transport to determine specific infrastructure requirements to accommodate bus services, to build those required for on-motorway bus services and to ensure that the final design does not preclude inclusion of other public transport infrastructure requirements in the future.

The DoT has endorsed the approach by the Department in the recommended conditions.

Integration with Public Transport

A number of representations raised concerns that the EIS had not addressed the interaction of the WSO with existing and proposed public transport services including the railway lines such as the Richmond Railway line, the proposed Epping to Mungerie Park rail line and proposed bus transitways including the Liverpool to Parramatta and Blacktown to Castle Hill Transitways. The concerns raised were that there had been no assessment of how the WSO could provide connections with existing and future public transport services. Other concerns were that the impacts of the WSO in terms of nearby existing and proposed public transport services, particularly the Liverpool to Parramatta bus transitway had not been sufficiently assessed.

In response to the concerns raised, the Representations Report indicated that the WSO would be an access controlled motorway that would be physically separated from adjacent urban development where possible, limiting potential linkages and stations to railway lines and/or bus transitways. The RTA suggested that the bus transitway networks were designed as a system with station nodes approximately 800 m apart and serving a primarily 'walk-up' catchment from the residential and employment areas around the transitways. Notwithstanding these limitations, the proposal has been modified to include bus stations between the M2 and Richmond Road at junctions for potential bus transitways in this area. The RTA also suggested that the WSO would provide limited potential for connections with the rail lines it crossed.

The RTA suggested that the WSO would not have significant negative impacts on the patronage of bus transitways in close proximity to the WSO including the Liverpool to Parramatta Transitway. It was stated that the transitways would be sufficiently separated from the WSO to reduce any direct patronage impacts. The RTA also suggested that the transitways were servicing different markets ie. connections to high density employment areas such as Parramatta, Blacktown and Liverpool than the WSO, which was in part improving connections between, lower density areas. The Department accepts the RTA's assertion that the WSO would cater for a different 'market' to the surrounding existing and proposed public transport facilities limiting potential links and interaction.

The RTA has also stated in the Representations Report that the WSO would not impact on existing local bus routes as grade separated interchanges and crossings are provided at all roads that are used by buses. However, the Department is concerned that the EIS or Representations Report did not assess the impacts of the construction of the proposal on bus services particularly school buses. Recommended Condition of Approval No. 38 requires that the Proponent consult with affected schools prior to construction commencement to ensure that disruption to school bus services is minimised.

Toll

Although demand for dedicated public transport services on the WSO appears to be low, a number of existing local and sub-regional regular bus services surrounding the proposed alignment could benefit from diverting part of their route to the WSO. The Department requested clarification as to whether public transport services wishing to utilise the WSO for part of their journey would be required to pay the toll. The Department also requested an assessment of the impact of the toll on these potential services should they not be exempt.

The RTA confirmed in the Representations Report that public transport services using the WSO would be required to pay the toll. The RTA suggested that should dedicated public transport lanes be provided on the WSO then legitimate services on these lanes would be exempt from the toll. The Representations Report did not include discussion of the impacts of the toll on the usage of the WSO by public transport services.

Despite the predictions that there would low usage of the WSO by existing and future public transport services, the Department is concerned that the imposition of a toll could further reduce the potential attractiveness of the route. As stated previously the Department considers the WSO as an important "transport corridor". The Department is aware that bus services have been exempted from any toll on the Eastern Distributor and Cross City Tunnel. For equity reasons and to ensure that the maximum public transport usage is made of the WSO the Department recommends the inclusion of Condition of Approval No. 45 exempting all buses providing scheduled public transport services from payment of the toll.

Design

Rail Infrastructure Corporation (RIC) appointed consultants PPK to review the design of the WSO to assess the suitability of the WSO to accommodate heavy rail services. The review found that the WSO median would generally be sufficient to accommodate heavy rail services subject to widening to a maximum of 23 m around station locations. It was also found that the horizontal and vertical alignments were generally suitable for passenger heavy rail subject to minor changes although significant changes would be required to accommodate freight rail services that can operate with a

maximum 1% vertical gradient. Some analysis of potential station locations was undertaken for the section between the M5 and Richmond Road.

The RTA, however, suggested that there would be a number of additional design complexities to consider for the provision of heavy rail facilities within the corridor including:

- connections to the Main Southern railway lines at the southern end of the proposal (made difficult by the complex interchange and flood prone land);
- substantial vertical grades near Elizabeth Drive and the added complexity of underground water trunk carriers making tunnel options difficult; and
- requirements to redesign bridges and sections of the WSO to accommodate heavy rail obstacle limitations (due to proposed bridge pylons in the middle of the median and tight horizontal curves in sections).

It was suggested that due to the high cost of designing the WSO to accommodate heavy rail services, the low potential demand for such high capacity services and the lack of commitment from rail authorities to the potential use of the corridor for heavy rail, the median should not be designed to accommodate such services. The RTA's conclusion in relation to the unsuitability of heavy rail was subsequently endorsed in a letter from the Director-General of the Department of Transport to the Chief Executive of the RTA dated 18 December 2001. The letter suggested that bus related public transport or potentially light rail would be a more economically justifiable use of the median than heavy rail that was referred to as an unsuitable use.

The Department concurs with the advice from the Director-General of the Department of Transport and has recommended the inclusion of Condition of Approval No. 36 requiring the RTA to design the WSO to allow for simple retrofitting of dedicated bus lanes or light rail services.

5.4.5 Conclusion

In accordance with the Whole of Government Integrated Action Agreement, the Department considers that the justification for the WSO is fundamentally linked to it being considered as a "transport corridor" catering for private vehicle, freight and public transport services. This consideration is consistent with the justification and objectives of the proposal, which include:

- the need to support the NSW Government's metropolitan strategies for land use, transport and the environment; and
- improve access to employment and other opportunities (by private and public transport).

Whilst, the Department is cognisant of the low forecast demand for public transport services on the WSO at time of opening, recognises that non-provision of public transport services could only exacerbate the situation. In this regard, the Department has recommended a number of supplementary and integral public transport facilities, and post-operational monitoring and review strategies. Implementation of these facilities and outcomes from the monitoring and review strategies could be co-ordinated by the Department of Transport.

The Department considers that with such supplementary measures, the proposal could meet its broader transport objectives and in particular the intent of the Whole of Government Integrated Action Agreement.

5.5 Design Considerations

5.5.1 Background

Introduction

The WSO proposal as described in the EIS is for an approximately 40 km dual carriageway motorway incorporating a 15 m median, which could provide for future public transport or additional traffic lanes. The EIS included a concept design for the proposal that would be refined in detail by the successful contractor. Key design features of the proposal include:

- a new road corridor between the M4 and Great Western Highway including a 3 to 9 m embankment between Prestons and Cecil Park;
- parallel alignment along the length of Wallgrove Road;
- extension of existing road and alignment along the unformed section of Philip Parkway corridor to Richmond Road; and
- use of the Castlereagh Freeway road reserve from Richmond Road to the M2.

The EIS indicated that earthworks volume estimates for the proposal were balanced (ie cut volumes are roughly equivalent to fill requirements).

Design Parameters

The design speed adopted for the WSO in the EIS ranges from 110 km/h in the south to 100 km/h east of Richmond Road. Horizontal curve radii are equal or greater than 600 m with shallow crests at 110 km/h and 460 m for 100 km/h design speed. Vertical grades not greater than 4% were used.

Horizontal and Vertical Alignment

Vertical and horizontal alignments were designed using the criteria outlined above to allow for a high speed freeway. The horizontal alignment for the section north of the Great Western Highway was largely pre-determined by the existing road corridors. Elsewhere, the horizontal alignment was determined through an assessment of available land, property and environmental impacts. Further discussion on the alternatives considered to the route alignment is contained in Section 6.4. Areas where specific issues relating to horizontal and vertical alignment are key features include Wallgrove Road, Plumpton Ridge and Cecil Hills.

Interchange Design

Fifteen (15) interchanges were incorporated into the design considered in the EIS. Criteria considered in design of the interchanges are outlined in the EIS, which further stated that the proposed interchanges with the M5/F5 and M4 required the most complex designs to provide transition between motorways. The preferred design detailed in the EIS included a "Y" style interchange with the M5 Motorway, Hume Highway (F5) and Camden Valley Way.

The M4/WSO interchange would be the first intersection of two (2) motorways in NSW. The preferred option in the EIS was a grade-separated roundabout, approximately 600 m in length with separate bridge to link Wallgrove Road across the M4 and removal of the existing Wallgrove Road to M4 ramps.

Floodplain Crossing Options

Four (4) options including various combinations of embankment and viaduct were considered for the Maxwells, Cabramatta and Hinchinbrook Creeks floodplain in the EIS. The preferred option was predominantly embankment based with bridges and viaducts over the creeks.

5.5.2 Key Issues Raised in Representations

A number of representations were received regarding the design of the WSO. These included generic questions as well as more specific recommendations for alignment improvement. In general, the issues raised were:

- concerns regarding the scale and design of M4 and F5/M5 interchanges;
- need for additional interchanges and on/off ramps;
- concerns in regard to the overall scale of the proposed interchanges including the need to consider vertical walls;
- concerns that the proposed two traffic lanes in each direction would be insufficient;
- concerns regarding the proposed alignment; and
- concerns regarding the impacts of the floodplain crossings.

5.5.3 Consideration of Key Issues

Additional Investigations

In response to the concerns raised, the RTA reviewed the concept design and made a number of proposed design modifications including:

- relocating the WSO ramps at Elizabeth Drive closer to the proposal alignment, including the use of vertical retaining walls to reduce the footprint;
- reconfiguration of the WSO/M4 interchange to a 4 level structure with the M4 at grade, the WSO over the M4, one level of interchange ramps over the WSO and one level of interchange ramps in tunnel under the M4; and
- retention of ramps connecting Wallgrove Road and the M4.

Following the preparation of the Representations Report and the modifications to the concept design, the Department commissioned consultants Arup to undertake an independent peer review of the road and interchange design for the WSO.

Table 5.1 summarises the key findings of this review. The results are discussed in more detail in subsequent sections of this chapter and a full copy of the report is provided in Appendix D. In general, the Department considers that the modified proposal as outlined in the Representations Report and the Preferred Activity Report would represent an overall improvement in the design in the EIS and would reduce potential environmental impacts. Notwithstanding, the Department believes that the impacts of the design could be further reduced subject to the recommendations summarised in Table 5.1.

The Department recommends the inclusion of Condition of Approval No. 30 requiring the RTA to consider the recommendations of the Arup report and to demonstrate how these have been specifically considered in detailed design.

Table 5.1 Summary of Design Review Recommendations

Location	Design Consideration
M5 to WSO ramp WSO to M5 ramp	◆ reduce ramp design speed from 90 km/h to 80 km/h
Old Wallgrove Road	◆ inconsistent treatment of exits. Consider revising layout to avoid loops (dependent on WSO/M4 interchange review)
Bernera Road	◆ consider passing Bernera Road above rather than under the bypass to reduce fill volume ◆ review ramp layout on western side to minimise footprint
M4 interchange	◆ consider reducing design speed from 80 km/h to 75 km/h ◆ consider reconstructing Wallgrove Road diamond interchange as a closed diamond with ramps close to M4 ◆ minimise M4 westbound off ramp ◆ merge M4 eastbound to WSO northbound and M4 westbound to WSO northbound before crossing
Richmond Road	◆ Consider revisions to ramp layout to reduce length and footprint
Norwest Boulevard	◆ Consider reducing on ramp design from 75 km/h to 60 km/h
Fill Imbalance	◆ Consider extending viaducts (eg Ch 1700 – 4500) ◆ Review profile, particularly where WSO passes over local roads

Proposed Design Speed

The WSO would form part of the National Highway, which has a minimum design speed of 100 km/h, though 110 km/h is desirable where additional cost or environmental impacts are not significant. Arup found that the proposed signposted speed for the WSO of 100 km/h would be reasonable and consistent with the following:

- minimum design speed for National Highways;
- the likely higher operating speeds in the section between the M5 and Richmond Road due to the open nature of terrain;
- the vertical design; and
- the topography, particularly from the M5 to Richmond Road where few savings (environmental or economic) would be made in reducing the design speed.

Interchanges

Motorway to Motorway Connections

All motorway to motorway connections (ie M5/WSO, M4/WSO, M2/WSO) were designed to allow for traffic movements between 80 and 100 km/h. All other intersections including on and off ramps were generally designed for at least 80 km/h with 60 km/h speed environments at the intersections. In reviewing the motorway to motorway connections, Arup recommended consideration of a reduction in the ramp design speeds for all connections with the exception of the F5 to WSO direct through routes for which the RTA suggested speed of 100 km/h was considered appropriate. These are shown in Table 5.2, and discussed in more detail in sections on specific interchanges.

Table 5.2 Motorway to Motorway Ramp Design Speeds

Interchange/Ramp	Minimum Radius in RTA Design	Design Speed Adopted by RTA	Arup Suggested Design Speed
F5 to WSO (National Highway)	R720 m	100	100
WSO to F5 (National Highway)	R600 m	100	100
M5 to WSO	R400 m	95	80
WSO to M5	R340 m	90	80
WSO/M4 - All ramps	R240 m	80	75

The Department believes that the adoption of the Arup design suggestions could result in safer connections as well as reducing the overall footprint of the proposal.

M5/WSO Interchange

The Department along with several other representations raised concerns about the scale of the proposed M5/F5 interchange with the WSO. Clarification of alternative designs considered was requested from the Proponent.

It is noted in the Arup design review that the RTA proposed design speeds for the M5/WSO connection were 90 km/h and 95 km/h. Arup noted that these design speeds result in curve radii within the R300 to R440 band which RTA guidelines recommend should only be used in exception circumstances for design speeds greater than 70 km/h. Records show that curves within this band are deceptive to drivers on higher speed roads, appearing that they can be safely travelled at higher speeds than is possible and can result in a safety problem. Subsequently, Arup recommended consideration of a reduction in the design speed to 80 km/h for these connecting ramps which would result in tighter curve radii, which are less deceptive to motorists. The design review also found that if the ramp design speed was reduced, further benefits such as reduced ramp length, embankment requirements and hence reduced construction costs may be achievable.

The Department endorses the recommendations made by Arup and believes that a reconfigured design of the ramps connecting the M5 to the WSO needs to be considered with the aim of addressing the safety concerns raised and to minimise the scale and potential impacts of the intersection. The Department therefore recommends the inclusion of Condition of Approval No. 31requiring the RTA to investigate alternative design options for the links between M5 and the WSO and submit the preferred design for the approval of the Director-General.

M4/WSO Interchange

A number of representations raised concerns in regard to the scale of the EIS design for the M4/WSO interchange. It was suggested that alternative designs that minimised the scale and footprint of the interchange needed to be considered.

The proposed M4/WSO interchange was modified following the exhibition of the EIS from the proposed grade separated roundabout to a four (4) level, fully grade separated interchange including three (3) underground tunnel sections. The tunnels effectively provide underground on/off ramps between the M4 eastbound to WSO southbound M4 eastbound to WSO northbound and M4 westbound to WSO northbound. The tunnels would be between 150 and 400 m long. The RTA suggested that the modification was justified on the basis of improved traffic capacity and safety performance as well as providing a more logical directional movement for road users at the interchange. This modification would also allow for retention of all movements between the Great

Western Highway and the M4 via Wallgrove Road, which were not possible with the previous design. The Representations Report detailed additional environmental benefits of the modified interchange including:

- a reduction in overall height;
- minimisation of road embankment within the M4 road corridor and placement of the overpasses on pier/viaduct, minimising impacts of views through the interchange, in particular westwards towards the Blue Mountains; and
- reductions to the footprint, due to minimisation of embankments and use of pier/viaduct.

In their review, Arup (2002) concluded that there do not appear to be any other options which achieve the design speed requirements, grade separation and maintain full access to Wallgrove Road but which would significantly reduce the footprint or lower costs. However refinements to the interchange were recommended including:

- reduce connecting ramp design speeds from 80 km/h to 75 km/h which would reduce the footprint;
- consider moving the half diamond interchange ramps at the M4/Wallgrove Road closer to the M4;
- reduce the length of the M4 westbound off-ramp; and
- merge the M4 eastbound to WSO northbound and M4 westbound to WSO northbound ramps before the cross over.

Although the Department notes that the modified proposal has a similar scale it is apparent from the Arup review that other alternative options to significantly reduce the scale of the proposal have not been found. The Department believes that a high capacity grade separated interchange between the M4 and WSO is justified to meet the travel speed and capacity objectives of both roads. With appropriate landscaping and the consideration of the recommendations of Arup, the Department believes that the impacts can be adequately mitigated.

Other Interchanges/On and Off Ramps

A number of representations suggested that additional interchanges and additional on and off ramps needed to be considered. Suggestions included an interchange at Woodstock Avenue and additional on/off ramps at Elizabeth Drive, Quakers Hill Parkway, Norwest Boulevard and Great Western Highway. Other representations were received which suggested that certain interchanges were located in the "wrong places" and that the design and/or footprint of particular interchanges were excessive.

The Proposal considered in the EIS included 15 interchanges with mixed diamond, half diamond and roundabout interchanges proposed. The modified proposal as outlined in the Representations Report and Preferred Activity Report included 16 grade-separated interchanges in response to issues raised in representations. The additional interchange proposed is for south facing ramps at Woodstock Avenue. This modification has allowed the south facing ramps at Power Street to be deleted so that that interchange only includes north-facing ramps.

Additional on/off ramps included in the modified Proposal were:

- northbound on-ramp from Elizabeth Drive/Wallgrove Road to WSO; and
- retain west-facing ramps from Wallgrove Road to the M4 (as a result of WSO/M4 interchange reconfiguration).

The RTA argued that additional on-off ramps would not be required based on traffic modelling undertaken though a review of demand would be undertaken and the need for additional on and off ramps considered.

Scale of Other Proposed Intersections and Vertical Walls

A number of representations raised concerns about the scale and impacts of the proposed intersections (other than the M5 and M4 addressed earlier) and the need to consider vertical walls or other such measures to reduce the footprint and impacts. Concerns were raised including the Elizabeth Drive interchange and Norwest Boulevard.

In response to the concerns raised, the RTA included a number of minor refinements to intersections through the provision of vertical walls and other methods to reduce the scale and impacts of the proposal. The modifications included the relocation of the WSO southbound off ramp to Elizabeth Drive westwards to reduce the footprint of the WSO thereby minimising the landtake requirements and impacts on bushland within the Western Sydney Regional Park. This modification also includes the use of vertical retaining walls to minimise the slope batter encroaching into the park.

In response to the representations the westbound on-ramp from Norwest Boulevard to the WSO has been lowered and moved slightly north to reduce impacts on nearby residents. The RTA has suggested that further refinements may be possible to reduce impacts further during the detailed design process.

Arup made a number of recommendations where interchange designs could be further modified to minimise the WSO footprint. Whilst these would not require significant modification to the interchanges proposed, reductions in landtake, ramp requirements and subsequently fill requirements would be reduced which could provide environmental benefits which would otherwise not be achieved. These recommendations are summarised in Table 5.1 above. The Department also recommends the inclusion of Condition of Approval No. 34 requiring the RTA to consider the inclusion of additional vertical retaining walls or other measures where there are surrounding environmental sensitivities.

Number of Traffic Lanes on WSO

A number of representations were received which raised concerns that two (2) lanes in each direction on the WSO would be insufficient to cater for current and future demand. The majority of these representations suggested that three (3) lanes in each direction would be more appropriate.

In response, the RTA indicated that traffic modelling suggested that two (2) lanes in each direction would be sufficient to accommodate predicted traffic levels in the short to medium term. The RTA suggested that should the demand arise then the median could be used for additional traffic lanes in the future.

The Department is aware that additional traffic modelling by the RTA indicates that predicted traffic levels on the WSO would be higher than previously expected. It is estimated that sections of the WSO would be at capacity by the year 2021 with two (2) lanes in each direction.

Whilst the Department recognises the predicted capacity constraints of the WSO into the future, it does not, at this stage, support the use of the median for additional traffic lanes without a reasonable

consideration of public transport needs (refer to Section 5.4). The Department therefore recommends the inclusion of Condition of Approval No. 0 requiring the proposal be constructed and operated to accommodate a maximum of two through traffic lanes in each direction only.

Proposed Alignment

A number of representations raised concerns in regard to the proposed alignment of sections of the WSO. Concerns included the non-use of the Wallgrove Road alignment between Elizabeth Drive and the M4 and suggestions for alternative alignments in the vicinity of Oakhurst/Eastern Creek, Cecil Hills and Casula.

Wallgrove Road Alignment

The Department and the NPWS raised concerns regarding the amount of landtake required from the Western Sydney Regional Park. It is noted in the Representations Report that the WSO was aligned as closely as possible to Wallgrove Road in order to minimise severance of the parklands and linkages with other open space areas.

The RTA states in the Representations Report that the Wallgrove Road alignment was not used due to its unsuitable vertical alignment and too narrow a road reserve for a high speed motorway. The RTA also contended that construction of the WSO on the existing Wallgrove Road alignment would require a similar footprint or landtake to that which is proposed as a local access road would have to be constructed to allow safe access to existing local residential and commercial properties. In addition, given that a toll is proposed for the WSO, a non-tolled option would need to be provided, particularly for local residents.

In reviewing the alignment, Arup suggested it is not impossible to overcome issues of horizontal and vertical alignment along Wallgrove Road such that the road corridor could be used in constructing the WSO. Notwithstanding, the benefits to be gained from doing this would be limited given that a local (non-tolled) access road would need to be constructed for local property access. Landtake requirements and the Proposal footprint would therefore not be reduced to any significant degree. The Department therefore concurs that the design approach taken in the vicinity of Wallgrove Road would be appropriate.

Oakhurst/Eastern Creek

A few representations suggested that sections of the Philip Parkway could be avoided if the WSO veered east after Woodstock Avenue following Eastern Creek and connecting with the M2 west of Quakers Hill Parkway.

In response, the RTA stated that an alignment following Eastern Creek would have considerable environmental impacts and would have to be constructed on flood liable land. The RTA contended that using the existing Philip Parkway corridor, which has been reserved for the purpose of an arterial road, was the best option. The Department concurs with the RTA.

Cecil Hills

A significant number of representations were received from residents of Cecil Hills concerned with the proximity of the proposal to residences, noise, air quality and visual impacts. Following consideration of these concerns, the RTA has modified the proposal to move the alignment up to 400

m westward in this location. The alignment in the vicinity of Cecil Hills is discussed in more detail in Section 5.3 of this report.

Casula

A few representations suggested that impacts on residential properties in Casula could be avoided if the proposal was aligned along the Prestons side of the M5.

The RTA responded stating that such an alignment would require the realignment of the M5 and would also mean that the WSO would be constructed through flood prone land and land which has been recently developed for residential purposes. To reduce the impacts on Casula the WSO off-ramp to Camden Valley Way has been moved further to the west.

The Department concurs with the RTA's conclusion. Notwithstanding, the Department recommends the RTA considers alternative designs for the links between the M5 and WSO which have the potential to reduce impacts on the Casula area. This is included in Condition of Approval No. 31.

Floodplain Crossing Options

The Department and other representations raised concerns that insufficient consideration had been given to the flooding and other environmental impacts of the proposed design across the Maxwells, Hinchinbrook and Cabramatta Creeks floodplain. Concerns included flooding impacts and detention, property damages, impacts on threatened and riparian vegetation, visual impacts and access across the Western Sydney Orbital. The Department suggested that a cost effectiveness assessment was required for alternative crossings of the floodplain.

Subsequent to the Representations Report the Department has been made aware that the embankment option through the floodplain would require a significant amount of fill. The amount of fill required in this section is now estimated to be approximately 1.6 million cubic metres between Prestons and Hoxton Park.

In response to the concerns, a hydrology report (Bewsher Consulting, 2001) was commissioned by the RTA and identifies recommended bridge and culvert sizes to minimise the impacts of flooding (refer to Section 5.12) in the area. Recommended bridge spans for Maxwells, Cabramatta and Hinchinbrook Creeks are 600 m, 275 m and 165 m respectively and with other smaller bridges for tributary crossings combines to almost 1.2 km of viaduct in the area. The report also recommends at least three (3) flood detention basins to accommodate lost floodplain storage as a result of the WSO.

Whilst the Department considers that the hydrology report addresses some of the questions raised, at this stage, further information would be required at the detailed design stage with regard to actual flooding impacts. Furthermore, the level of certainty that bridging and detention basins suggested could confidently mitigate the impacts of such a large embankment during the 100y ARI critical storm event is not clear at this stage. Overall, the Department remains particularly concerned with the impacts of flooding and spoil requirements. Without further detailed information regarding flooding impacts and mitigation measures, the Department is not satisfied that the mixed embankment and viaduct option preferred by the RTA is necessarily the most appropriate when taking into consideration both environmental and economic issues.

The Department advocates an outcome-focussed, holistic approach to determining the most appropriate design for the WSO through the floodplain. The Department therefore recommends the

inclusion of Condition of Approval No. 32 requiring that the RTA investigate alternative design options across the floodplain from Camden Valley Way to Cowpasture Road and nominate a preferred design for the approval of the Director-General. In determining a preferred design, the Condition requires consideration of all relevant aspects such as flooding, existing and future landuse, impacts on flora and fauna, visual impacts, vehicular and pedestrian access. A cost-benefit analysis as part of the comparison and selection of a preferred design is an integral part of the recommended condition.

5.5.4 Conclusion

The modified design as described in the Representations Report has reduced the scale and impacts of the proposal from that in the EIS. The proposed modifications to the M4 interchange, Wallgrove Road and Elizabeth Drive are considered appropriate, providing improved safety and reduced environmental impacts.

The Department's peer review of the proposal found that there were no fundamental flaws with the concept design based on recognised guidelines, policy, best practice, constructability and operational considerations, although safety improvements and environmental benefits could be gained through further refinement during the detailed design process. Specific recommendations have been made in relation to the M5 and the M4 interchanges for the consideration of the RTA.

Notwithstanding, the Department considers that the issues of flood mitigation, impacts on riparian and other vegetation and fill importation in the Maxwells/Cabramatta/Hinchinbrook Creeks floodplain requires further evaluation at the detailed design stage.

5.6 Regional Traffic and Transport including Freight

5.6.1 Background

The WSO linking the F5 to the M2 is proposed to become part of the National Highway system in Australia. Currently the Cumberland Highway, passing through Liverpool, Fairfield, Wentworthville, Carlingford and Pennant Hills (as Pennant Hills Road) provides the interim National Highway linking the F5 to the F3 Freeway.

The EIS estimated that the WSO would carry up to 41,800 vehicles per day in 2006 depending on the section, increasing to up to 47,300 vehicles per day in 2016. Estimated impacts on surrounding State and Regional roads indicated that the greatest reductions in traffic flows were on those roads that closely parallel the WSO such as Cowpasture Road, Wallgrove Road, Rooty Hill Road South and North, sections of Richmond Road, sections of Old Windsor Road and Abbott Road. The Cumberland Highway was forecast have some minor decreases in traffic levels (up to 5% in some areas) but overall found to not benefit significantly as a result of the WSO. Connecting roads to the WSO such as M5 Motorway, Camden Valley Way, Elizabeth Drive, The Horsley Drive, Great Western Highway and the Norwest Boulevard were all predicted in the EIS to have increased traffic levels as a result of the WSO.

The EIS also predicted travel time savings between a number of employment centres as a result of the proposal. Travel time savings were also predicted for vehicles using existing State and Regional routes due to the reductions in traffic as a result of the proposal.

The EIS also included a discussion of the impacts on freight movements. As previously discussed in Section 5.2, a key objective and justification for the WSO was the potential benefits to freight movements both for intra-state and intra-regional journeys and for those journeys with origins and destinations within Western Sydney. The EIS assessment suggested that, based on high heavy vehicle counts on surrounding roads and the locations of existing and proposed employment areas in Western Sydney, the WSO should be an attractive route for heavy vehicle freight movements. These proportions of heavy vehicles would be below those currently recorded on a number of surrounding State and Regional roads.

5.6.2 Key Issues Raised

A considerable number of representations including local Councils, community groups and individuals as well as the Department raised concerns in regard to traffic and transport related issues associated with the proposal. The key issues raised in representations included:

- concerns about the validity of the traffic modelling;
- concerns over the actual benefits of the WSO to other routes;
- concerns about impacts to adjacent regional and local roads and the need for upgrades;
- specific concerns that a link to the F3 was not being considered as part of the proposal and in combination impacts on Pennant Hills had not addressed;
- concerns over the actual predicted usage by freight vehicles;
- concerns with regard to potential toll diversions; and
- impacts of induced traffic not adequately addressed.

5.6.3 Additional Traffic Assessment

In response to the large number of concerns raised regarding the validity, age and completeness of the traffic and transport assessment in the EIS, the RTA commissioned consultants Masson Wilson and Twiney (MWT) to review the traffic assessment. The review included a quantitative assessment of the proposal's potential benefits to freight and revisions of traffic estimates on the WSO and surrounding roads. The report titled 'Western Sydney Orbital - Traffic Report' (MWT, 2002) was finalised subsequent to the Representations Report and Preferred Activity Report and is reproduced in Appendix E of this report and the key findings are briefly discussed below.

Freight

The MWT assessment included an intercept postcard survey of freight. The survey of heavy vehicles was undertaken on key northern and south-western entry points to the Sydney road network and at key intersections on roads surrounding the proposed alignment of the WSO. The key objective of the survey was to identify heavy vehicle movement patterns in and out of Sydney and around the area to be serviced by the WSO. The postcard survey information was supplemented by traffic counts and input into the traffic modelling to determine estimated traffic flows.

The results of the survey indicated that there was a high level of heavy vehicles measured on the outskirts of Sydney that had origins or destinations in Western Sydney. The traffic counts indicated that a number of the roads in close proximity to the WSO carried high volumes of heavy vehicles and proportions of 10-20% of the total traffic stream on these routes.

When this data was translated into the updated traffic estimates for the WSO it indicated that heavy vehicle volumes and proportions of vehicles would be substantially higher than those levels predicted

in the EIS (refer below). The proportions of heavy vehicles as a percentage of total AADT flows on the WSO in the year 2016 were estimated at between 14% and 25% depending on the section. The highest predicted heavy vehicle proportions were the sections of the WSO between Cowpasture Road and the M4 junctions and from Norwest Boulevard to the M2.

Traffic Volumes on WSO

The MWT assessment included revised traffic modelling for volumes on the WSO. The modelling was based on most recent Census data; updated traffic counts; updated landuse, population and employment estimates; data from the freight postcard survey and some different network modelling assumptions. The resulting estimates for traffic volumes on the WSO indicate substantial increases in forecast traffic volumes compared to the EIS estimates. Table F.1 in Appendix F indicates predicted morning peak hour traffic estimates on the WSO. The volumes in Table F.1 in Appendix F are up to 46% higher for traffic in the northbound/eastbound direction than those predicted in the EIS and up to 250% higher for traffic in the southbound/westbound direction.

If the morning peak hour levels predicted in Table F.1 in Appendix F in the year 2016 were realised, there would be a number of sections of the WSO with mid-block Level of Service (LoS) at D and E (ie. approaching capacity). Similar estimates for the afternoon peak period show that some sections of the WSO could be LoS F (ie. capacity exceeded).

Similarly, the average annual daily traffic (AADT) estimates shown in Table F.2 in Appendix F indicate large increases in the predicted volumes of traffic using the WSO in the year 2016 compared to those predicted in the EIS. The combined predicted volumes range from 18,550 AADT to 72,007 AADT for the various sections of the WSO. The heavy vehicle estimated volumes and proportion of total vehicle flows are also much higher than the EIS predictions.

The RTA has noted that the revised traffic volumes forecast on the WSO would in some cases be above the non-tolled traffic volumes used for the purpose of the noise and air quality assessments. The RTA has therefore revised the noise and air quality forecasts related to operations on the proposal. Noise issues are discussed in Section 5.11 and air quality issues in Section 6.3.

Impacts on Surrounds

The assessment by MWT also included revised forecasting of traffic volumes on those surrounding roads modelled in the EIS, with and without the WSO for the morning and afternoon peaks and for AADT volumes. The predictions generated for the year 2016 indicated a similar trend to that predicted in the EIS ie. reductions to roads surrounding and generally running parallel to the WSO, and increases in traffic for roads connecting to the WSO. The actual changes to these roads in percentage terms in many cases are larger than those predicted in the EIS.

The key changes to surrounding roads during the morning and evening peak times are summarised in Tables F.3 and F.4 in Appendix F. These indicate that the largest reductions to surrounding roads are for those roads which the WSO would largely parallel such as Cowpasture Rd, Wallgrove Rd, Richmond Rd east of Symonds Rd and Prospect Arterial. The largest predicted increases are at Norwest Boulevard where the Norwest Boulevard south would be constructed as part of the WSO and on sections of the M4, M5 and Pennant Hills Roads. Increases in the M5 at Georges River Bridge of between 8% and 15% are predicted as a result of the WSO in the morning and evening peak hours. Similarly, increases in traffic volumes on the M4 west of Wallgrove Road are predicted

although slight decreases would occur in traffic volumes at the further east station of the M4 west of the Cumberland Highway.

The increases in traffic volumes predicted would generally not have a significant impact on the LoS. The M5 at Georges River Bridge is an eight (8) lane road with sufficient capacity to accommodate the additional traffic volumes.

Travel Time Savings

The MWT assessment investigated potential travel time savings between example origins and destinations both on existing routes and on the WSO. The assessment found that between Prestons and West Baulkham Hills a motorist using the WSO in 2016 would save 67 minutes from the normal predominantly Cumberland Highway route without the WSO taking 105 minute journey. Undertaking the same journey using the existing Cumberland Highway would also result in a travel time saving of 10 minutes as a result of the WSO.

A motorist travelling between Prestons and Wentworthville utilising the WSO and M4 would save 29 minutes in 2016. A saving of 13 minutes was predicted for journeys between Prestons and Eastern Creek as a result of the WSO.

5.6.4 Consideration of Key Issues

Route Purpose/Strategic Traffic Benefits

The Department believes that the traffic and transport analysis by MWT addressed a number of the concerns about the traffic modelling predictions in the EIS and in particular the benefits of the WSO. The assessment has shown that the WSO would be an attractive route for a far larger number of light and heavy vehicles than that predicted in the EIS. MWT predicted that the WSO would be an attractive route for local, regional and intrastate trips.

MWT predict that the WSO would be a route that fills in a number of 'gaps' in the Western Sydney road network providing an alternative route to a number of existing indirect routes. For example north of Blacktown, there is currently no direct east-west link. The area is served by a series of radial roads such as Richmond, Sunnyholt and Old Windsor Roads connected by an irregular series of cross routes. The WSO would provide a direct link across the north of Blacktown linking these key roads and supporting longer distance movements in the region.

This 'good fit' of the WSO is shown by statistics for the aggregate network performance in Sydney predicted in 2016 by MWT. The WSO is predicted to only increase total vehicle kilometres travelled (vkt) across the network by 0.21%. However, the WSO is predicted to have more dramatic benefits in terms of total vehicle hours of travel, reducing across the network by 3.15% and average speeds, which are predicted to increase by 3.46%.

Overall, the Department supports these potential strategic traffic benefits.

F3 Link/Pennant Hills Road

As stated previously, the WSO is proposed to become the National Highway route through Western Sydney replacing the Cumberland Highway. However, the WSO would terminate at its northern extreme at the western extent of the M2 Motorway at Baulkham Hills. Pennant Hills Road currently

provides the link between the M2 Motorway and the F3 Freeway, and would continue to perform this function during and after construction of the WSO. The WSO would not complete the National Highway link between the F5 and the F3.

A number of representations from individuals, local Councils and community groups raised concerns that the WSO was being proposed without any National Highway link between the M2 and F3. Some concerns were also raised that the without the link between the M2 and F3, the WSO would create too much pressure on Pennant Hills Road particularly during peak times and the use of local roads for 'rat runs' by motorists wishing to avoid the congestion.

The RTA indicates in the Representations Report that it understands the need for a route to the F3 which bypasses Pennant Hills Road in order to ease congestion on that road in the medium to long term. However, the traffic modelling shows that the WSO would not have a significant change on traffic volumes on Pennant Hills Road up to 6% increase (refer above). The Representations Report also indicates that "only modest increases or insignificant changes'" are predicted on the local roads around Pennant Hills Road indicating a low increase in any predicted 'rat running'. It is stated that whether the WSO proceeds or not, Pennant Hills Road would continue to have capacity constraints and high congestion levels.

A study, jointly funded by the RTA and Commonwealth Department of Transport and Regional Services is currently being undertaken to identify and evaluate possible National Highway route options linking the WSO/M2 to the F3. Current timetabling of this proposal anticipates that all approvals would be obtained and construction would commence on the WSO/F3 link at around the time the WSO would be opened to traffic (in 2006).

Despite the predictions that the WSO is unlikely to have significant detrimental impacts on traffic volumes on Pennant Hills Road, the Department is mindful of concerns raised regarding the existing capacity problems on the road. The Department is also concerned about potential 'rat running' created by traffic pressures on Pennant Hills Road. The Department has therefore recommended the inclusion of Conditions No. 97, 98 and 99 requiring monitoring of the local and regional road network surrounding the WSO during construction and after the opening to traffic to assess the actual impacts. Should this monitoring indicate exceedances in traffic volumes above those predicted after the WSO opens, recommended Condition of Approval No. 99 requires the Proponent to prepare and implement traffic management measures in consultation with the local communities and Councils.

The Department believes that with this monitoring and the commitments by the RTA to investigate route options for a National Highway link between the WSO/M2 and F3 replacing Pennant Hills Road, the impacts of the WSO should be relatively minor and are likely to be short term.

Freight

As identified above the supplementary assessment by Masson Wilson Twiney found that the usage of the WSO by heavy vehicles was predicted to be much greater than that predicted in the EIS (up to 250% more heavy vehicles). MWT predict that the WSO, as part of the Orbital road network around Sydney, would have significant benefits to the movement of people and goods. The WSO would provide more efficient links for the rapidly growing Western Sydney region and connect to existing key freight infrastructure at Sydney Airport and Port Botany.

The assessment indicates that heavy vehicle traffic would be drawn off the surrounding road network such as Cowpasture Road, Wallgrove Road, Rooty Hill Road South, Prospect Arterial, Woodville

Road, Cumberland Highway and onto the WSO. The analysis indicates that the WSO would provide an efficient link for the longer distance movement of freight in Sydney, as well as reducing potential conflicts related to access requirements of heavy vehicles mixing with local traffic on existing roads.

The Department considers that the WSO would be an important transport route in Western Sydney. The WSO has the potential to improve the efficiency of local, regional and intra-state freight movements with positive flow on benefits for businesses in Western Sydney, assisting in meeting the key objectives of the proposal as an integrated transport corridor.

To ensure that the benefits to freight would be realised, the Department recommends the inclusion of Condition of Approval No. 43 requiring the Proponent to monitor heavy vehicle use on the WSO at least 12 months after its opening to traffic. If this monitoring indicates heavy vehicle use below that predicted the recommended condition requires the Proponent to develop a freight enhancement strategy including the option of reducing toll levels for heavy vehicles, to increase usage. The Department believes that with the inclusion of this condition, the benefits of the WSO for the efficient movement of freight should be realised.

Effects on Nearby Roads

Similar to the Pennant Hills Road issue, a number of representations raised concerns that the WSO would have detrimental impacts on nearby local, regional and state roads and require upgrades. The MWT assessment of traffic impacts as a result of the WSO includes a thorough reassessment of the traffic volumes on the surrounding road network. The assessment generally indicated that the WSO would reduce traffic volumes on surrounding roads in the year 2016.

Increases in traffic volumes are generally on major State roads, freeways or those roads connecting to interchange points on the WSO. The Department notes that in parallel with the proposed construction of the WSO the Proponent is proposing to upgrade a number of connecting roads in the vicinity of the WSO to allow sufficient traffic capacity. The road upgrades include:

- Beech Road, south of the proposed off ramp from the M5;
- Bernera Road, south of the WSO interchange;
- Jedda and Joadja Roads, north of the WSO interchange;
- McIver Avenue, Hoxton Park; and
- Power Street, west of the WSO interchange.

The RTA also stated that it is considering upgrading the following State roads in conjunction with the provision of the WSO:

- The Horsley Drive from the WSO to Ferrers Road;
- Sunnyholt Road, Malvern Road to James Cook Drive;
- Rooty Hill Road North, north of Luxford Road; and
- Richmond Road, west of the WSO interchange to north of Bells Creek.

The Department believes that with these proposed upgrades to surrounding roads and the monitoring programme recommended for inclusion in Conditions of Approval Nos. 97, 98 and 99 the traffic impacts of the WSO on the surrounding road network should be minimal.

Toll Diversions

Parramatta, Blacktown and Camden Councils raised concerns that the proposed toll on the WSO would reduce the volumes and therefore the benefits of the WSO to the surrounding road network. It was suggested that the Proponent include a comparison between the 'toll' and 'no toll' traffic levels.

The MWT assessment included an analysis of toll diversions on the WSO. The assessment predicted in the morning peak hour in 2016 that toll diversions would range from 12% to 23%. Generally, the assessment found that toll diversions, as a percentage, were predicted to be higher on sections of the WSO where total traffic volumes would be lower. The assessment also predicted that without the toll a number of sections of the WSO would be close to capacity in 2016, possibly necessitating the need for a third traffic lane in each direction. It was suggested that an untolled WSO had the potential to impact on the objectives of the WSO to moderate traffic demand.

Induced Traffic

There are two (2) types of induced traffic. The first is where existing traffic is attracted to a new or upgraded road from existing routes due to improvements in travel times or speeds. The second type of induced traffic is where trip patterns change through the making of additional trips or changes in travel mode choice as a result of an upgrade or new road. The second type of induced traffic is of particular concern as it has the potential to increase vkt and resulting affects to the natural environment in terms of air pollution and noise as well as affecting existing or proposed public transport services.

The Department and the EPA raised concerns that the EIS had not sufficiently addressed the issue of induced traffic and its potential impacts to the environmental benefits predicted for the proposed WSO. Recent advice to the RTA indicates that induced traffic as a result of the WSO is likely to be high and recommends that further assessment of induced traffic based on current best practice be undertaken.

Whilst the Department is concerned that the EIS may have underestimated the potential induced traffic effects of the WSO, it believes that the recommended conditions requiring the Proponent to maximise the public transport facilities and potential benefits as part of the WSO, and the proposed toll would moderate potential induced traffic.

5.6.5 Conclusion

The Department believes that the RTA has sufficiently demonstrated that the proposal would be an important link regional traffic in Western Sydney. The assessment predicts a well-patronised route for both heavy and light vehicles and suggests benefits to local, regional and intra-state trip making.

The assessment also predicts that the WSO would generally reduce traffic volumes on the surrounding road network. Where increases are predicted as a result of the WSO, the Levels of Service on these roads would not be significantly affected. In conjunction with the WSO, the RTA is proposing to upgrade a number of connecting roads to ensure sufficient capacity to cope with predicted traffic flows.

The Department has proposed a number of monitoring conditions specifically directed at heavy vehicle numbers and traffic volumes on the surrounding road network after the opening of the WSO. Should this monitoring indicate significant changes in volumes from those estimated by modelling,

the RTA would be required to identify means of increasing freight usage on the WSO and decreasing the impacts of traffic on local and regional roads through local traffic management measures.

5.7 Staging

5.7.1 Background

The EIS indicated that the WSO would likely be constructed and opened in stages. It was stated that any construction or operational staging regime for the WSO would be based on funding and priority needs, in detail related to:

- major land development proposals such as the ADI site, Prestons Industrial Estate etc;
- support for public transport initiatives such as relieving congestion on routes to be used by bus transitways;
- relief of traffic congestion on nearby roads; and
- support for freight routes.

The EIS further indicated that progressive opening of the WSO would mean that some temporary connections to existing roads and intersection upgrades would be required. It was stated that any construction and operation staging scenarios could not be determined until details such as the construction funding regime had been determined for the proposal.

The Proponent committed to a full impact assessment of any proposed operational staging scenario in the EIS.

5.7.2 Key Issues Raised

A number of representations including local Councils, the NRMA, the State Chamber of Commerce and the Department raised issues in regard to the proposed staging of construction and operation. The key issues raised in representations included:

- clarification of construction staging that would be undertaken;
- suggestion that stages which provide the greatest traffic benefit should be constructed first; and
- concerns that the environmental impacts of construction and operation staging were not assessed.

5.7.3 Consideration of Key Issues

<u>Operation</u>

The Department raised concerns about the potential operation staging scenarios and the need to conduct impact assessment of staging in order for the worst case impacts of the proposal. In particular, the Department identified that staged opening of the WSO could have significant (albeit short-term) environmental impacts including traffic and transport, spoil management, noise and air quality.

The RTA prepared a draft assessment of a potential staging scenario for the northern section of the WSO only. That assessment confirmed that the impacts of any staging scenario in that section particularly on proposed 'end point' intersections and impacts on the surrounding connecting roads were likely to be significant. The draft assessment indicated that traffic implications were sufficiently

severe to result in capacity problems for these intersections and surrounding roads, and the need for major upgrades to intersections to accommodate the additional flows.

Following the review of the draft assessment, the Department raised additional concerns with the Proponent that the impacts of staging of operations across the entire proposal had not been adequately resolved. It was suggested that the draft assessment be reviewed to consider a worst case staging scenario for the entire proposal and not just focussed on traffic and intersections.

The Representations Report submitted with the request for the Minister's approval removed any assessment of impacts of operational staging scenarios. The Proponent suggested that the most recent engineering advice was that it was unlikely that any successful contractor would want to open the proposal in stages partly due to ease of construction and the likely cost and complexity of any staging scenario. The Proponent states in the Representations Report, that the successful construction contractor may wish to stage the opening and would therefore need to complete the required environmental impact assessments.

At this stage, the implications of any staged opening of the proposal remain unknown and are likely to be significant. It is therefore not possible to recommend that the proposal be approved even conceptually with any staging of opening. Recommended Condition of Approval No. 28 therefore requires that the WSO be opened as a complete project.

Construction

The Representations Report also suggests that the proposal would not be constructed in stages ie. construction would commence across the entire proposal. The report further states that if the successful construction consortia wished to stage the construction of the WSO then they would be required to undertake any appropriate impact assessment and obtain any approvals required. The report stated that consultation with local Councils and key Government agencies would occur during any assessment of construction staging.

The Department believes that it is highly likely that the WSO would be constructed with some staging, due to the scale of the proposal and the construction costs. Nonetheless, the Department believes that the impacts of construction staging can be minimised through the application of appropriate mitigation measures.

The Department recommends the inclusion of conditions requiring a two-staged approach to the environmental management of the construction of the proposal. The first stage of the approach involves the production of plans and strategies requiring a holistic overview of the construction environmental management tasks including the requirement for a Construction Framework Environmental Management Plan. The Department recommends that this overview approach be undertaken for a number of key environmental aspects including urban design/landscaping, traffic and transport management and water quality, erosion and sediment control.

The second stage involves the consideration of management measures for specific sections or work sites associated with the construction of the proposal. The recommended measures include Construction Method Statements and specific plans and measures for the full range of potential environmental impacts during construction.

The Department believes that with the incorporation of these recommended conditions the impacts of any proposed staging of construction could be managed acceptably.

5.7.4 Conclusion

The Department is concerned that any staged opening of the WSO may result in significant environmental impacts such as those on intersections, road networks and the amenity of the surrounding area. Any staged opening scenario would therefore require at least a modification with a transparent impact assessment and consultation phase prior to the Minister's consideration.

5.8 Toll

5.8.1 Background

The proposed WSO would be part of the National Highway network, the responsibility for which rests with the Commonwealth Government. The EIS stated that private funding would be required to meet the costs of the WSO. It is understood that the Commonwealth would provide $350 million of the costs and approximately $900 million would be required from the private sector.

Private sector funding of the WSO would necessitate imposing a toll. The EIS indicated that the toll would be collected through a fully automated electronic toll collection system. The collection points were not finalised in the EIS but would either be mounted on overbridges, or purpose-built gantries between intersections or on gantries at all on and off ramps.

An indicative toll levied at a rate of 25c per km to a maximum charge of $5.00 (year 2001 dollars) exclusive of the GST was identified in the EIS. It was further stated that the actual toll levy would be set at a rate determined by the successful contractor in consultation with Government. The EIS (p 25.21) suggested that the same toll rate would be levied on all types of vehicles using the WSO to encourage freight usage. However, other references in the EIS suggest that the proposed electronic tolling would allow for differential tolling regimes based, among other things, on the type of vehicle.

5.8.2 Key Issues Raised

A large number of individuals, Councils, community groups and Government agencies raised issues raised in their representations related to the proposed imposition of a toll and the impacts that that toll would have. In summary the issues included:

- objection to the toll imposition;
- concern that the toll would increase traffic on local roads; and
- impacts of the toll on freight and public transport services should be clarified.

5.8.3 Consideration of Key Issues

<u>Toll Imposition</u>

A number of representations including local Councils and community groups objected to the proposed imposition of the toll. The representations suggested that it was inequitable that predominantly Western Sydney residents would be forced to bear the costs of the WSO through the toll. It was stated that as the need for the proposal had been identified it should be fully funded by Government. Some representations also identified the inequity that the WSO would be the first section of the National Highway Route to apply a toll.

The Proponent recognised that the WSO would be the first section of the National Highway Route to be tolled. The RTA reiterated the position described in the EIS that the Commonwealth Government could only be partially fund the proposal and therefore private sector finances would be required. Therefore without private sector involvement, the proposal would not be delivered in the foreseeable future.

The Representations Report provided additional information outlining indicative toll charges for each section of the WSO based on a 25c per km and is shown in Table 5.3.

Table 5.3 Indicative Toll Rates based on 25c/km

Segment	Toll Charge $*
F5/M5 to Bernera Road	$0.80
Bernera Road to Cowpasture Road	$0.60
Cowpasture Road to Elizabeth Drive	$1.20
Elizabeth Drive to The Horsley Drive	$1.00
The Horsley Drive to Old Wallgrove Road	$1.00
Old Wallgrove Road to M4	$0.30
M4 to Power Street	$1.30
Power Street to Richmond Road	$0.60
Richmond Road to Sunnyholt Road	$1.60
Sunnyholt Road to Norwest Boulevard	$0.50
Old Windsor Road to M2	$0.40
F5/M5 to M2	Capped at $5.00

* Rounded to the nearest 10c and in 2001 dollars.

The Department acknowledges concerns raised in the representations about the equity of toll imposition. However, given the limited commitments of Commonwealth Government to funding of the WSO, only a private toll road would have the ability to deliver the infrastructure in the short term. A toll would also reduce potential impacts of induced traffic resulting from the WSO.

Impacts on Local Roads

Concerns were raised that a toll would increase traffic on local roads from that which would otherwise be achieved without a toll. Other concerns were also raised that the provision of the WSO would prevent required improvements and upgrades of local roads.

In response, the RTA recognised that a toll on the WSO would reduce usage when compared to a "no toll" scenario and therefore traffic diversions from other surrounding roads would also be reduced. However, compared to the 'no WSO case', recent traffic modelling indicated that with a 'tolled WSO' there would be a number of reductions in flows for surrounding roads (refer to Section 5.6 for further discussion).

Although the WSO would provide relief to a number of routes, some roads would still need to be upgraded due to future land use development and normal growth in traffic flows.

Impacts on Freight and Public Transport

Concerns were raised by the Department and in other representations that the impact of the toll on freight usage of the WSO had not been adequately assessed. The Department suggested that

strategies to encourage the maximum use of the proposal by freight should be considered to ensure consistency with the proposal's objectives.

In response, the RTA indicated that the additional cost of the toll on freight vehicles would be more than offset by potential travel time and operating cost savings. The RTA commissioned an additional assessment of WSO usage by freight 'Traffic Report – Western Sydney Orbital' (MWT, 2002) the finding of which are summarised in Section 5.6 of this report and included in Appendix E. This report predicts that heavy vehicle proportions on the WSO would generally be in the vicinity of 15-20% of total vehicle flows with the toll. This proportion is similar to heavy vehicle proportions on nearby arterial roads and is much higher than heavy vehicle levels on the WSO predicted in the EIS. The assessment also indicates a number of substantial travel time savings between key destinations as a result of the WSO. The RTA argues that this suggests that the WSO would be an attractive route for heavy vehicles and that travel time savings and greater reliability on travelling times would improve business competitiveness in the area.

Based on this assessment and additional information provided by the Proponent, the Department is satisfied that the imposition of a toll would not be a significant disincentive to freight traffic utilising the WSO. Despite inconsistencies in the EIS and Representations Report, the Proponent has indicated that the successful contractor for the construction and operation of the WSO may wish to charge higher toll rates for heavy vehicles. Provided that the levels of heavy vehicle use on the WSO are sufficiently high to meet the freight and economic objectives of the proposal, the Department is not significantly concerned about the actual toll rate charged from a freight usage perspective. The Department believes that the appropriate benchmark for heavy vehicle usage is the additional traffic assessment (ie. 'Traffic Report – Western Sydney Orbital' (MWT, 2002)) and therefore recommends the inclusion of Condition of Approval No. 43 requiring the Proponent to monitor the heavy vehicle usage on the WSO. Should the monitoring indicate heavy vehicle usage below that predicted in MWT (2002), then the Proponent would be required to prepare a strategy to enhance freight usage, including the explicit consideration of reducing tolls.

The Department also raised concerns that a toll would act as a deterrent to existing and potential future bus services. The Department believes that in order to achieve the proposal's stated objectives of an integrated transport corridor, these services should not be required to pay a toll. The Department therefore recommends the inclusion of Condition of Approval No. 45 requiring that all bus services (including school buses) providing a scheduled service be exempt from the toll.

Similarly, to avoid any deterrent of the toll to cyclists or emergency service vehicles wishing to use the WSO, the Department has recommended the inclusion of Condition of Approval No. 46 exempting cyclists and emergency service vehicles responding to an emergency.

5.8.4 Conclusion

The Department accepts that the restrictions on Commonwealth Government funding commitments to the proposal mean that without a toll, the WSO could not otherwise be constructed at least in the short term, if at all. To maximise the benefits of the proposal and to ensure that the toll is equitable to users, the Department has recommended several conditions requiring that buses, cyclists and emergency service vehicles be exempt from the toll. A related requirement is to monitor heavy vehicle usage on the WSO after operations begin and implement an enhancement strategy should heavy vehicle usage rates be below those estimated.

5.9 Spoil and Imported Fill

5.9.1 Background

The EIS stated that the WSO was designed so that material excavated from cuts would be approximately equal to material required for fill areas. Although it was suggested that there would generally be a balance between cut and fill, the EIS stated that any additional material required would either be obtained from the excess material resulting from the construction of the proposal in other areas, or from quarries within the local region. Material would be transported along the WSO corridor where possible to reduce impacts on roads and adjacent land uses.

5.9.2 Additional Investigations

Further design work by the Proponent since the Representations Report on the modified design has now indicated a significant fill imbalance (approximately 2.4 million m^3) for the proposal. This fill material would have to be imported from a large source or several sources, none of which have yet been identified by the Proponent.

The areas where significant fill requirements (over 100,000m3 net) are located are shown in Table 5.4.

Table 5.4 Areas with Significant Net Fill Requirements (over 100,000 m3)

From Chainage	To Chainage	Approximate Location	Fill Requirement (m^3)
0	6040	Between M5/F5 Intersection and Hoxton Park Aerodrome	1,624,381
8630	9150	Vicinity of Cecil Hills	157,554
9370	9900	From slightly south of Cecil Hills to 600m south of Elizabeth Drive	471,590
10500	11000	Just south of Elizabeth Drive to 400m north of Elizabeth Drive	154,763
12630	13410	From 200m south of Abbotsbury Drive to 300m north of Saxony Road, Horsley Park	107,031
13650	15300	From the Sydney International Equestrian Centre to Redmayne Road	401,384
16530	18020	From Austral Bricks to Intersection near Waste Management Services	506,834
19050	22150	WSO/M4 Intersection to 300m south of Eastern Road	1,251,118
22640	24600	Aquilina Reserve Blacktown Olympic Venue to Woodstock Avenue	443,841
27100	27800	From 200 m south of Richmond Road to 500m north-east of Richmond Road.	316,780
28950	30100	From Symonds Road to 200m east of Quakers Hill Parkway.	227,307
31220	32250	From 400m west of Richmond Railway line to 600m east of Richmond Railway line.	245,857
36200	36600	From 100m east of Norwest Boulevard to 500m east of Norwest Boulevard.	136,065

Table 5.4 indicates that there would be a number of areas with significant fill requirements. The main fill requirements would be for 1.6 million m^3 of fill across the southern floodplain and 1.2 million m^3 over the M4 interchange north to Eastern Road.

5.9.3 Key Issues

Following the Proponents re-calculation of cut and fill quantities the Department raised concerns about the transport and environmental impacts primarily related to the importation of fill.

5.9.4 Consideration of Key Issues

In response to the concerns raised, the Proponent has suggested that the detailed design prepared by the successful contractor is likely to reduce any imbalance to reduce the construction costs of the proposal. Recent investigations into flooding and hydrology have suggested that the bridge sizes across the southern floodplain would need to be increased from the design in the Representations Report which the Proponent indicates is also likely to reduce the amount of imported fill required.

Despite the advice from the Proponent, 2.4 million m3 of imported material is a substantial amount and if transported by road would require 300,000 truck loads or 600,000 truck movements. Assuming that all of the imported fill is required during a 24 month period during construction when the majority of earthworks are occurring the daily number of trucks would be approximately 600 or 1200 daily movements. The Department also understands that if any cut material is deemed unsuitable then the amount of fill material to be imported may increase. Further discussion of construction traffic issues is contained in Section 6.2.

In the absence of information on fill sources, transportation routes and potential impacts, the Department has recommended that the Proponent consider the option of transporting at least some imported fill by rail. Investigations by the Department as part of the Parramatta Rail Link assessment have indicated that the externality impacts such as road user costs of transporting fill/spoil by road on the general road network may be substantial.

The Department believes that where volumes of fill and spoil are sufficient, rail transport has been found to be a cost-effective alternative option. An advantage of rail transport is that the externality impacts of road transport such as road damage and costs to road users are minimised. The two main areas where fill is required are in close proximity to main railway lines. The Main Southern Line is in close proximity to the southern floodplain section and the Main Western Line is in close proximity to the M4 interchange to Eastern Road fill area. Particularly in relation to the Main Western Line there appears to be vacant areas of land close to the proposal where a rail siding could be established. To ensure that these matters are adequately considered by the Proponent, Recommended Condition of Approval No. 177 requires that the Proponent investigate the cost effectiveness of rail based spoil options. The Department has also required the Proponent to demonstrate that the externality costs of truck-based importation of fill are explicitly considered in the ranking and rating of tenders by determining a weighting criteria, as specified in Recommended Condition of Approval No.179.

To ensure that spoil is appropriately managed, the Department's Recommended Condition of Approval No. 178 requires the Proponent to prepare a Spoil and Fill Material Management Sub Plan in consultation with the EPA and relevant Council(s). This Sub Plan would be prepared prior to excavation and would identify how spoil and/or fill material would be sought, handled, stockpiled, reused and the volumes of spoil and/or fill material to be transported to each site and transport mode

breakdowns. It would include an assessment of road versus rail-based spoil transport options and identify all material transport routes to be used to and from the Proposal. The Sub Plan would also assess the cumulative impacts associated with spoil management with regard to other Projects.

Where the spoil or fill material transport on public roads is determined to be unavoidable, the Proponent would be restricted to regional, State roads or freeways/tollways and access points for spoil/fill material transport would also be limited as specified in Recommended Condition of Approval No. 180.

5.9.5 Conclusion

The movement of a large amount of cut and fill material is an inevitable consequence of a large road construction proposal exacerbated by the flat grades required by a high speed freeway. However, the Department is concerned that the large quantities of imported fill predicted to be required for construction of the proposal has the potentially significant impacts. It is therefore recommended that the Proponent explicitly look at means of minimising these impacts on the road network through the transport of imported fill by rail.

5.10 Flora and Fauna

5.10.1 Background

Terrestrial Flora and Fauna

Terrestrial and aquatic flora and fauna studies were undertaken for the EIS in some cases in 1995. Prior to exhibition of the EIS, the Proponent updated these studies, including peer reviews. Approximately 196 fauna and 310 flora species were recorded during surveys undertaken for the northern section of the Proposal.

A Species Impact Statement considered the potential impacts of the proposal on five (5) endangered ecological communities, seven (7) threatened flora species and (1) threatened fauna species. Concurrence was sought from the Director General of the National Parks and Wildlife Service (NPWS) in relation to the proposal and SIS and was granted on 14 August 2001 subject to a number of conditions (refer to Appendix A).

Aquatic Flora and Fauna

Aquatic flora and fauna studies were undertaken of creek crossings and other permanent waterbodies along the proposal. These identified common native macrophyte species and that aquatic fauna was dominated by exotic fish species. A large farm dam near Cecil Park showed the highest abundance, diversity and biomass of the waterbodies surveyed. No threatened aquatic fauna species listed in the Fisheries Management Amendment Act 1997 were recorded. However, the large catfish (*Tandanus tandanus*) which is considered potentially threatened was recorded.

5.10.2 Key Issues

More than 80 representations were received highlighting issues of concern regarding the ecological studies and the resulting impacts on flora and fauna as a result of the proposal. Key concerns included:

- key references missing and age of studies;
- impacts on threatened flora and fauna species and endangered ecological communities;
- 8 part tests not prepared for all relevant species and additions to listings in TSC Act subsequent to EIS preparation;
- realignment/reducing area of impact;
- consider impacts of ancillary infrastructure;
- impacts on creek and river crossings, including Hinchinbrook Creek (farm dam); and
- efficacy of management measures.

5.10.3 NPWS Concurrence Report

The Director-General of the NPWS granted concurrence to the proposal subject to a number of conditions on 14 August 2001. The concurrence report prepared by NPWS (NPWS, 2001 - refer Appendix A) contains an assessment of the proposal in terms of its impacts on threatened species. The NPWS concluded that:

"*as best as can be determined … the impacts of the proposed Western Sydney Orbital are not avoidable. Some of the impacts ….. potentially compromise the recovery of species and ecological communities listed under the* Threatened Species Conservation Act 1995*.*

However, the conclusion reached has been that the benefits of the proposal justify the impacts that will occur."

The key elements of the Conditions of Concurrence are as follows:

- no ancillary infrastructure or other works to be (or allowed to be) carried out in areas identified as habitat for endangered ecological communities or threatened species;
- a habitat compensation package to be negotiated prior to commencement of clearing for construction;
- threatened species habitat or endangered ecological communities to be traversed (or within 50 m of ancillary infrastructure) to be surveyed and fenced for protection;
- species translocation feasibility assessment to be undertaken for four (4) flora and one (1) fauna species;
- RTA to contribute financially to development of recovery plans and implementation for threatened species and endangered ecological communities affected; and
- NPWS review of relevant sections of Environmental Management Plan.

The RTA would be required to comply with all Conditions of Concurrence issued by the NPWS for the proposal as reflected in Recommended Condition of Approval No. 51.

5.10.4 Consideration of Key Issues Raised in Representations

<u>Missing References and Age of Studies</u>

Working Paper No. 11 consolidated the various terrestrial and aquatic, flora and fauna assessments, background reports and updates to previous documents. The Department noted that several key documents were not provided in the working paper. Significantly, the results of the missing reports, in particular the baseline terrestrial flora and fauna study of the southern section of the proposal undertaken by Gunninah Ecological Consultants (referred to as 1995), was relied upon in subsequent peer reviews, including the assessment of impacts on microchiropteran bats. This document

provided the baseline information for the southern section of the proposal from which all other updates/assessments of the area were based. Other reports not provided included the 8 part tests of significance upon which the SIS is based (referred to as CFFIS, 1998a). Further, the conclusions reached in various reports provided do not accord with those reached in others which creates difficulties understanding the full impacts of the proposal.

The Department requested copies of reports to allow a full assessment of the potential impacts of the proposal to be undertaken. The Proponent advised that a copy of the Gunninah (1995) report could not be found, despite it being referenced by numerous consultants used on the proposal. As such this assessment has been undertaken relying on information provided in the EIS, Working Paper No. 11, the SIS and advice from the NPWS.

Additionally, the age of the documents was raised in numerous representations as it was considered that the studies did not accurately reflect the current ecological environment. Original investigations of terrestrial flora and fauna were undertaken in 1995 and 1996 (Gunninah Ecological Services, 1995; 1996). These were subsequently updated in March 1998 (CFFIS, 1998b) and April 1999 (LesryK, 1999) respectively. Aquatic ecology investigations were undertaken in March (Rooney & Associates, 1999) and April 1999 (The Ecology Lab, 1999).

The Proponent prepared a number of supplementary ecological reports which are included in the Representations Report. These are:

- Supplementary Ecological Considerations Pertaining to Fauna Issues (Lesryk Environmental Consultants, 2001);
- Flora Addendum to the Representations Report (Cumberland Flora and Fauna Interpretive Services, 2001);
- Aquatic Fauna and Habitat Assessment (W.S. Rooney and Associates Pty Ltd, 2001); and
- Compensatory Habitat Matrix and Figures (Cumberland Flora and Fauna Interpretive Services, 2001).

Little additional survey work was undertaken in preparing these documents, instead information from previous studies was relied upon and 8 part tests of newly listed species incorporated. Notwithstanding, the Department is concerned with the missing information regarding survey effort and results of initial microchiropteran bat surveys. To this end, the Department recommends that additional surveys of microchiropteran bats, in particular bat roost sites, outside of the construction footprint but within the road corridor be undertaken prior to the commencement of construction. The recommended Condition of Approval No. 47 requires that if any roosts are identified, these must not be affected during construction or operation of the proposal.

Scope of Species Impact Statement

The Department, NPWS and Liverpool City Council subsequently identified the need for 8 part tests for additional species not previously considered, a new endangered ecological community and key threatening processes which required consideration. In response, the RTA noted that Shale Gravel Transition Forest and Moist Shale Woodland were not specifically targeted in the SIS but were considered as sub-units of Cumberland Plain Woodland as this vegetation association had not been revised at that time. Notwithstanding, further delineation of the community was undertaken by the Proponent and it is stated in the Representations Report that Shale Gravel Transition Forest is known to occur at 7 sites along the proposal and Moist Shale Woodland at 2 sites. The RTA prepared an 8 part test for Cooks River/Castlereagh Ironbark Forest, which found that the proposal would not have

a significant effect on this ecological community. Further, it is stated in the Representations Report that Freshwater Wetland communities were considered as a component of the Sydney Coastal River Flat Forest and no further assessment was undertaken.

The Department also requested additional 8 part tests for those species identified in the SIS as having a medium to high likelihood of occurring in the area as well as the Barking Owl and Glossy Black Cockatoo. Eight part tests were prepared for the Barking Owl, Glossy Black Cockatoo and Grey-headed Flying Fox as part of the additional fauna assessment and concluded that the proposal would not disturb, remove, modify or fragment any habitats critical to the life cycle of these species. The RTA response stated that 8 part tests had been undertaken for microchiropteran bats in 1996 (Gunninah, 1996) which found that the proposal would not have a significant effect on any of these species nor their habitats.

Key Threatening Processes

Two (2) key threatening processes have been recently added to the Schedules of the TSC Act. These are:

- loss of biodiversity as a result of loss and/or degradation of habitat following clearing and fragmentation of native vegetation; and
- high frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition.

The NPWS requested that the impacts of these processes be considered. This consideration was provided by the RTA in the flora addendum to the Representations Report (CFFIS, 2001) and identified measures to redress the impact and prevent loss of biodiversity. The Department is satisfied that these processes have been considered to the satisfaction of NPWS such that concurrence could be issued.

In general, the approval to the assessment of threatened species has been complicated doe to the age of documents, missing information, updates of species lists and the significant extent of the proposal. The Department must inevitably rely primarily on advice from NPWS no the extent of impacts and the level of acceptability. The NPWS, having issued concurrence indicates to the Department an acceptance of such impacts and that the statutory requirements have been adequately addressed.

Site Specific Concerns

Several representations raised concerns regarding the impact of the proposal on threatened species and endangered ecological communities at specific locations along the route. Concerns included the use of a planned "green corridor" and impacts on locations at Rooty Hill, Cecil Hills and Colebee Scrub.

- Green Corridor

Two (2) representations suggested that the area between Leppington and Deans Park was planned as a green corridor across Western Sydney and that the importance of this area to threatened species was not recognised. In response, the RTA noted that the proposal was consistent with one of the original purposes of the corridor being the reservation of land to accommodate major urban infrastructure. Notwithstanding, the RTA has fulfilled its responsibilities in considering the potential

impacts of the proposal on threatened species and endangered ecological communities, including additional assessments of species and communities listed subsequent to the exhibition of the EIS. The Department considers that the impacts of the proposal through this area have been assessed and subject to additional bat roost surveys that the residual impacts can be managed with mitigation measures.

- Colebee Scrub/Durwood Reserve

Concern was raised in representations regarding the impacts of the proposal on Cumberland Plain Woodland, *Dillwynia tenuifolia* and *Grevillea juniperina* subsp. *juniperina* in this location. In response, the RTA has stated that the Proposal has been designed in this area to minimise impacts and that the remaining area is being considered as part of the compensatory habitat package. This area is also known to have indigenous heritage significance. The Department considers that the potential impacts through this area are unavoidable and that the proposal has been designed to minimise these impacts, subject to the findings of additional archaeological and cultural investigations and refinements during detailed design.

Realignment/Reducing the Area of Impact

The NPWS and a number of other representations identified the need to review the design criteria adopted for the proposal, such as the design speed limit and greater use of vertical walls as a means to further minimise the impacts of the proposal on threatened species and endangered ecological communities. Key areas of concern identified were Elizabeth Drive, Dean Park and M5 Interchange. The Department commissioned Arup (2002) to review the proposed concept design and advise where modifications could be made to reduce impacts. The results of this investigation are discussed in Section 5.5. Arup identified a number of locations where minor modifications may reduce the footprint of the proposal. The Department considers that these areas should be investigated further and has recommended Condition of Approval No. 32 which requires the Proponent to review the design taking into account Arup's recommendations.

Impacts of Ancillary Infrastructure

To date, the locations of ancillary infrastructure (such as detention and sedimentation basins, cycleway, construction compounds) have not been defined by the Proponent and therefore assessment of the ecological (and other) impact at these locations has not been addressed. The Department and others requested detailed information regarding the locations and impacts, however the Proponent has deferred locating and assessing this infrastructure to the contractor at the detailed design stage.

Whilst the Department is aware that the likely locations of the required infrastructure could change as the proposal develops, it is considered inappropriate that all assessment of the associated impacts are deferred until detailed design and after approval has been issued to the proposal. To this end, the Department recommends the inclusion of Condition of Approval No. 223, which, among other criteria, allows location of infrastructure only in areas of low conservation significance for flora and fauna.

Aquatic Ecology and Watercourse Crossings

A number of representations raised general concerns regarding impacts on creek and river crossings. Additional representations were received from residents of Cecil Hills concerned with impacts on

Hinchinbrook Creek farm dam. In particular, concern regarding fish passage and recommending the use of bridge crossings rather than culverts. In addition to those creeks identified in the EIS, the proposal has been modified to incorporate a bridge over Angus Creek in place of the box culvert originally proposed. The RTA has stated that minor creeks not offering permanent aquatic habitat for fish and invertebrates would be piped, however pipes would be designed to allow fish passage.

Residents of Cecil Hills raised concern regarding the potential impacts of the proposal on the large farm dam at the head of Hinchinbrook Creek and to the west of Cecil Hills residential area however, these were generally related to a preference for an alignment located further to the west. The representations noted the ecological diversity of the dam, the habitat for the freshwater catfish and migratory birds. In response, the Proponent has moved the alignment up to 400 m west of that shown in the EIS, which the Department considers, would address this issue.

The Department has received advice from the Department of Land and Water Conservation that the use of pipes and culverts at watercourse crossing is not supported due to impacts on creek beds and banks as well as impacts on fish passage. Additional aquatic ecology investigations (Rooney & Associates, 2001) undertaken by the Proponent recommended bridges over Maxwells, Cabramatta, Hinchinbrook, Reedy, Eastern, Breakfast, Lalor and Toongabbie creeks. The Proponent states in the Representations Reports that minor creeks not providing permanent habitat for fish and invertebrates would be piped though pipes would be designed to allow fish passage where necessary. Further, the Proponent commits to determining bridge spans on a case by case basis and to design bridges to allow light to aquatic habitat.

The Department considers that both permanent and ephemeral watercourses have equal significance and a lack of permanent water or aquatic habitat should not be a means by which to determine the need for bridging structures. To this end, the Department recommends that all watercourses with a defined bed and bank channel should be bridged or arched, irrespective of whether the watercourse is permanent or ephemeral. Further, the Department recommends that no piers supporting bridge structures shall be located within the watercourse and that bridge or arch abutments shall be constructed at appropriate distances from creek banks to facilitate fauna movement. These recommendations are reflected in Condition of Approval Nos 138 and 139.

Compensatory Habitat

A number of representations raised issues regarding compensatory habitat including the amount, location and value as well as querying the use of compensatory habitat as a management tool. The Proponent's responded that compensatory habitat is valid management tool as it provides conservation certainty to areas which would otherwise be under threat from development. A range of sites including those listed in the SIS has been developed into a compensatory habitat package which is under negotiation with the NPWS.

The issue of compensatory habitat is the responsibility of the NPWS in accordance with the conditions of concurrence, which require that the package be negotiated and agreed to by the NPWS prior to the commencement of clearing for construction. Compliance with this and all other conditions of concurrence is reflected in Condition of Approval Nos 48 and 51.

Species Translocation

Representations were received raising the issue of translocation of threatened species. The Proponent has committed to investigation of species translocation as a management tool for the

WSO. This is confirmed in the Conditions of Concurrence issued by the NPWS which require the Proponent to investigate the feasibility of translocation for *Pimelea spicata*, *Dillwynia tenuifolia*, *Pultenaea pedunculata*, *Grevillea juniperina* subsp. *juniperina* and *Meridolum corneovirens*.

5.10.5 Conclusion

The Department considers that, with the exception of threatened microchiropteran bat species, the RTA has considered the impacts of the proposal on flora and fauna, threatened species and endangered ecological communities. In general, the Department concurs with the Proponent and the NPWS, that the potential impacts of the proposal have been minimised and that the residual impacts are unavoidable. The development and implementation of an appropriate package of offset measures would be expected to minimise further impacts on threatened species and endangered ecological communities near the proposal.

Notwithstanding the above and the concurrence of the NPWS, the Department is not satisfied from the information provided, that the impacts on microchiropteran bat species have been have been addressed to determine that a significant effect would not occur. To this end, the Department additional surveys to focus on identification of microchiropteran bat roost sites within the road corridor but outside of the proposal footprint such that effective management measures can be implemented if any sites are present.

5.11 Noise and Vibration

5.11.1 Background

Two different consultants prepared the noise and vibration assessment in the EIS. Renzo Tonin and Associates prepared the assessment for the southern section of the proposal from the M5 to Elizabeth Drive and Wilkinson Murray for the northern section of the proposal from Elizabeth Drive to the M2. This has resulted in major discrepancies and inconsistencies in the EIS noise assessment. As a result, the Proponent commissioned new studies as part of the Representations Report.

5.11.2 Key Issues Raised

A number of representations including the EPA, local Councils, community groups, individuals and the Department raised issues and concerns with regard to noise and vibration assessment in the EIS including:

- concerns of the validity of the noise assessment including the landuse assumptions used, the representativeness of noise monitoring locations and inconsistencies in modelling;
- the need for a more comprehensive construction noise and vibration assessment;
- the need for further assessment of traffic noise impacts on surrounding landuses;
- avoidance of using surrounding open space as a noise buffer; and
- the need to use appropriate criteria for noise mitigation particularly near Wallgrove road and based on realistic traffic speeds.

5.11.3 Additional Assessments

In response to a number of concerns raised in the representations, Renzo Tonin and Associates completed, on behalf of the Proponent, an additional assessment of noise impacts. This assessment is included in Appendix 9 of the Representations Report. The assessment included a more

comprehensive construction noise assessment and a road traffic noise assessment providing a consistent methodology across the total proposal. The assessment used more realistic and up to date information about landuses surrounding the proposal.

Construction

Construction of the proposal is predicted to take approximately four years and may be staged along the entire 40 km of the WSO. The main noise generating construction activities would be during major earthworks and the construction of bridges or culverts. The assessment recommended that proposed standard construction hours of 7.00am to 6.00pm Monday to Friday, 7.00am to 1.00pm Saturday or 8.00am to 1.00pm if work is audible at residences, and no work on Sundays or public holidays to minimise the noise impacts.

The additional noise assessment predicted construction noise impacts at noise catchment areas and other sensitive landuses based on a combination of construction machinery. Some significant impacts were predicted with the long-term goals predicted to be exceeded by up to 28dB(A) at some locations without mitigation. Those receptors closest to the proposed corridor would be worst affected by construction noise.

The additional assessment investigated noise control measures to minimise construction noise impacts including temporary barriers, acoustic enclosures, silencing and alternative processes such as using electric motors rather than diesel or petrol powered machinery. The assessment found that in general, temporary noise barriers would have the widest application and could reduce noise levels at receptors by approximately 10dB(A).

The assessment confirmed that certain equipment, such as vibratory rollers and pile driving at bridges have the potential to cause vibration disturbance. However, it was suggested that the distance between such works and sensitive receptors was generally sufficient to reduce vibration annoyance and eliminate the chance for vibration damage.

The assessment confirmed that no blasting was anticipated during construction. It was stated that if blasting were required it would need to be in accordance with EPA requirements.

Operation

Background noise monitoring conducted as part of the EIS in the vicinity of the proposal was used to determine noise catchment areas (NCAs) for traffic noise impact assessment. This approach was undertaken in recognition of the proposal's length and has been accepted by the EPA. The NCAs were selected for areas with generally similar characteristics in terms of geography and proximity to the proposal and to enable a meaningful summary of the total noise impacts.

Relevant criteria from the NSW Government's *Environmental Criteria for Road Traffic Noise* (ECRTN) were used to estimate potential impacts on surrounding existing and future landuses. The base criteria levels from the ECRTN are LAeq, 15hr – 55dB(A) and LAeq, 9hr – 50dB(A). The assessment stated that noise mitigation had already been incorporated into the road design through the proposed use of open-graded asphaltic concrete as the pavement surface for the road carriageway.

The assessment found that without mitigation, a significant number of residences within each NCA would be affected by traffic noise above the traffic noise criteria levels. The assessment

subsequently included an assessment of noise barriers that would be required to reduce traffic noise to criteria levels for the year 2016. This assessment is summarised in Appendix G.

Of the total 62 NCAs, nominal barrier heights would need to be greater than 4 m in 12 NCAs. Generally noise barriers above 4 m are not desirable from an urban design standing and are often undesirable for nearby residents. The report suggests that where a small number of residences would be affected by road traffic noise above criteria levels architectural treatment at the building may be a more cost effective approach to mitigation than noise barriers.

In response to the concerns about barriers above 4 m, the Proponent prepared an indicative cost effectiveness analysis for appropriate mitigation measures. The assessment followed guidelines in Practice Note IV in the RTA's *Environmental Noise Management Manual*. The most cost effective barrier is determined to be the 'Assessed Barrier' and is influenced by the cost per additional dB(A) per residence versus the cost of architectural treatments. Appendix G summarises the suggested treatments for the 12 NCAs identified and suggests that generally a mixture of barrier heights up to 6.5 m in height combined with architectural treatments would be the preferred approach. The report states that the final noise mitigation solution would need to be determined during the detailed design stage and in consultation with residents.

Based on the noise impact and cost effectiveness assessments the Proponent indicates that an estimated 31% of the west/north side and 28% of the east/south side of the proposal would require barriers. Other sections of the proposal are estimate to require no barriers either due to no sensitive receivers above criteria levels or a preference for architectural treatment due to few impacted houses. The Proponent estimates that 210 existing houses would likely receive architectural treatment as a result of the proposal. Of those parts of the proposal where barriers are predicted to be required, Table 5.5 indicates the barrier heights.

Table 5.5 Predicted Noise Barrier Heights on Western Sydney Orbital

Noise Barrier Height (m)	West/North Side of WSO		East/South Side of WSO	
	Total Length (m)	% of Total	Total Length (m)	% of Total
0.1 – 2	385	3.1	5,100	45.6
2.1 – 3	6,006	49.0	1,050	9.4
3.1 – 4	4,040	33.0	5,025	45.0
4.1 – 5	1,030	8.4	0	0
5.1 – 6	800	6.5	0	0
Total	**12,261**	**100**	**11,175**	**100**

The additional noise assessment also found that, at a number of schools, the external traffic noise criteria would be exceeded without mitigation including Hoxton Park Catholic School, Horsley Park Public School, Eastern Creek Public School, Seven Hills North Public School, Marion Primary School, Plumpton Primary School, St Francis of Assissi Catholic Primary, Quakers Hills Public, New Tribes Bible College and Holy Family High. Exceedances of internal schoolroom criteria with windows closed were anticipated at Horsley Park Public School, Seven Hills North Public School, Marion Primary School and New Tribes Bible College without mitigation measures. The assessment found that the Hoxton Park Christian Life Centre, Horsley Park Catholic Church and Rooty Hill Presbyterian Church would be predicted to experience noise levels in excess of the traffic noise criteria without mitigation.

In response to concerns that it was inappropriate that parks and reserves had been considered as buffer zones for traffic noise in the EIS, the assessment included an evaluation of these areas in terms of impacts, area affected and use of the area. The appropriate daytime criteria were 60 dB(A) for active use areas and 55dB(A) for passive use areas. The assessment found that the parks and reserves to be impacted by the WSO would be Liverpool Showground, Hoxton Park Recreation Reserve, Serbian Cultural Club, Western Sydney Regional Park, Sydney International Equestrian Centre, Pinegrove Memorial Park (Lawn Cemetery), a Reserve (south of Meurants), Valentine Park, Lady Penhryn Reserve, Edna Street Reserve, Troubador Park, Sierra Reserve and Col Sutton Park. It was stated that generally, these facilities were located amongst residences and therefore any noise barriers constructed would reduce these impacts.

The assessment recommended that the final choice for noise mitigation measures be subject to community consultation, local council consultation, urban design and EPA advice during the detailed design stage.

Subject to the issues discussed below in this section, the Department is generally satisfied that the additional noise assessment has addressed the previously major concerns about the validity and inaccuracies within the EIS assessment.

Additional Traffic Volumes

As stated in Section 5.6 predicted traffic volumes on the WSO and surrounding roads were reassessed subsequent to the Representations Report by the Proponent. Significantly higher traffic volumes to those predicted in the EIS were forecast and the Department requested additional noise impact assessment. Subsequent information received from the Proponent indicates that the forecast increase in traffic volumes would increase noise levels by up to 3 dB(A) as a worst case but generally less than 2 dB(A) for most locations adjacent to the proposal.

5.11.4 Consideration of Key Issues

Construction

The Representations Report predicts that a large number of residences, schools, places of worship and open areas would be impacted by construction noise. The proposal's construction would require an Environment Protection Licence from the EPA, which would contain specific requirements in relation to appropriate construction noise levels and specific mitigation measures.

The Department is concerned that the assessment shows that whilst construction noise impacts may be temporary, they are likely to be significant unless appropriately managed. Recent experience on other major urban road projects show that construction noise can be a significant concern to the community. The Department therefore recommends that a detailed Construction Noise and Vibration Management Sub Plan as part of the Framework Construction EMP for noise management across the entire proposal and that Construction Noise Impact Statements be prepared to specifically address noise impacts at each of the major construction sites. These Sub Plans and Statements, required by the Department's recommended Conditions of Approval No. 73 and 76 provide detailed requirements for the consideration of construction activities and processes likely to result in noise impacts including notification and community consultation protocols.

Although it is likely that the Proponent would be unable to meet the construction noise goals as specified in the Environmental Noise Control Manual for many construction activities, advice from the

EPA has suggested that the goals should be used by the Proponent as a noise objective to ensure that all reasonable and feasible measures have been applied. The Department therefore recommends the inclusion of Condition of Approval No. 75 requiring that the objective of the L10 noise level measured over a period of not less than 15 minutes not exceed the background LA90 noise level by more than 5 dB(A) at any residence or other noise sensitive receiver.

The Proponent has been unable to identify when or where construction works outside of 'normal construction hours' may be required. The Department therefore recommends the inclusion of Condition of Approval No. 74 requiring that all construction activities are undertaken between standard construction hours of 7.00 am to 6.00 pm Monday to Friday, 7.00 am to 1.00 pm Saturday or 8.00 am to 1.00 pm if work is audible at residences, and no work on Sundays or public holidays unless agreed to by the EPA. Recommended Condition of Approval No. 79 limits extremely noisy or impulsive or tonal noise generating activities such as rock breaking, rock hammering and sheet piling to between 8.00 am and 12.00 pm Monday to Saturday and 2.00 pm and 5.00 pm Monday to Friday.

To ensure that construction noise impacts are effectively managed during construction, the Department's recommended Condition of Approval No. 78 requires the Proponent to monitor construction noise impacts and, where exceedances are noted, implement best available mitigation measures to the satisfaction of the EPA. To further minimise noise impacts of pile driving, the Department recommends the inclusion of Condition of Approval No. 82 requiring the use of bored piles in preference to driven piles in close proximity to sensitive receptors.

To specifically reduce the impacts of construction on schools and places of worship, the Department recommends the inclusion of Condition of Approval No. 83 requiring the Proponent to consult with affected schools to reduce impacts on any timetabled examination periods. Recommended Condition of Approval No. 84 requiring that noise mitigation measures for construction and operational noise be selected in consultation with affected schools and places of worship.

The EIS and additional noise and vibration assessment identifies that vibration impacts are unlikely to be significant. The Department's recommended Condition of Approval No. 85 sets appropriate limits for vibration to ensure that the potential for structural damage and unacceptable human exposure is minimised.

To ensure that vibration impacts are minimised the Department has also recommended in Condition of Approval No. 86 that actual equipment such as vibratory compactors and rock breakers be tested on site to determine acceptable buffer distances to commercial and residential occupancies. Should it be necessary to use vibratory compactors or rock breakers within the defined buffer zone, building condition surveys of all buildings and structures within this area need to be undertaken, as specified in recommended Condition of Approval No. 87. Recommended Condition of Approval No. 88 requires the Proponent to establish a management procedure to specifically deal with any vibration complaints received.

Although the EIS and Representations Report has indicated that blasting is unlikely during construction works the Department has recommended the inclusion of Condition of Approval No. 89 to only allow blasting following EPA approval.

Operation Stage

General

The Representations Report indicated that traffic noise increases resulting from the WSO are likely to be widespread along the proposal corridor and significant unless sufficiently mitigated. As a general requirement, the Department recommends the inclusion of Condition of Approval No 90 requiring the Proponent to prepare a detailed Operational Noise Management Sub Plan to identify in detail appropriate mitigation measures for all potentially affected sensitive receptors.

To ensure that noise affected receptors are effectively ameliorated against road noise impacts after operations begin, the Department recommends the inclusion of Condition of Approval No. 96 requiring the Proponent to undertake operational noise monitoring. Should the assessment indicate a clear trend in traffic noise levels on the Proposal and surrounding roads which exceed Operational Noise Management Sub Plan defined noise design goals, the condition requires that the Proponent implement further mitigation measures where reasonable and feasible.

Application of Noise Criteria

The assessment of noise in the Representations Report stated that in all locations, the traffic noise impacts and recommended mitigation measures had been determined in accordance with the NSW Government's Environmental Criteria for Road Traffic Noise Category 1 (new freeway or arterial road corridor). However, the Department is concerned by previous suggestions by the Proponent that where the proposal parallels Wallgrove Road they would apply the less stringent Category 3 (redevelopment of existing freeway/arterial road). This approach has not been accepted by the Department nor the EPA on the basis that the proposal is a substantial new road and cannot be considered merely as an upgrade to Wallgrove Road. The Department therefore recommends the inclusion of Condition of Approval No. 93 requiring that Category 1 criteria is applied.

The Department also believes that the impact of road grade variations on vehicle noise emissions and actual proposed signposted speeds need to be considered in the determination of noise mitigation measures and has therefore recommended the inclusion of Condition of Approval No. 92.

Residential Areas

Representations were received from the Cecil Hills community; residents of Erin Place, Casula; Sporing Avenue, Kings Langley; Ferrers Road, Horsley Park; Pine Road, Casula; and Dean Park all concerned about the impact of increased traffic noise as a result of the proposal. In response the RTA stated that noise attenuation measures such as noise barriers and/or treatment at houses would be installed in all locations along the route where it was predicted that the traffic noise criteria would be exceeded, provided it was reasonable and feasible to do so.

As stated previously, the additional noise assessment summarised in Appendix G has outlined barrier heights for NCAs to achieve the criteria levels. Where barrier heights over 4 m would otherwise be required to meet the criteria levels, the Proponent has undertaken a cost effectiveness assessment to determine a suggested treatment. This assessment indicates that in some cases, noise barriers would be constructed above 4 m and or architectural treatments would be undertaken at affected residences. The Department accepts this approach as it has been appropriately applied on a number of recent road projects such as the M5 East and Eastern Distributor and requires measures to be prepared in consultation with the EPA and residents as part of the Operational Noise Management

Sub Plan detailed in recommended Condition of Approval No. 90. The EPA in their representations to the Department on the Representations Report has endorsed this general approach.

Issues related to the impacts on the Cecil Hills community are further discussed in Section 5.3.

Schools and Places of Worship

Concern was raised that a number of schools and places of worship were not included in the noise assessment including Horsley Park Primary School, Marion Primary School, Seven Hills North Public School, Hoxton Park High School, Hinchinbrook Public School, Proposed Prestons Public School (Dalmeny Drive) and Horsley Park Catholic Church.

The additional noise and vibration assessment undertaken for the Representations Report included a more comprehensive assessment of noise impacts than that included in the EIS and detailed the noise impact on the above named schools and places of worship. The assessment showed that with the installation of barriers and or architectural treatment, the relevant traffic noise criteria levels would be met. The RTA has committed to installing noise mitigation measures to ensure that road traffic noise criteria are met wherever reasonable and feasible. As discussed in the construction section, Recommended Condition of Approval No. 84 requires the Proponent to consult with affected schools and places of worship to ensure that mitigation measures are in place to meet both construction and operation impacts.

Open Space

A number of representations stated that there was an inadequate assessment of recreational parks and reserves. The additional noise assessment assessed the impact of the WSO for parks and recreational areas and found that generally, the criteria for road traffic noise would not be exceeded. The Proponent has suggested that where criteria would otherwise be exceeded mitigation measures would be considered although in most cases likely noise attenuation measures for residential areas would mitigate noise in parks and reserves below criteria levels.

Future Landuses

The proposal would traverse some areas that are rapidly changing and developing in terms of residential landuses some of which would be in close proximity to the WSO. The Department had concerns that the noise assessment had not reflected realistic current and future landuses. The additional noise assessment has provided an updated analysis based on more realistic existing and future landuses.

The Department is also concerned that the additional noise assessment suggested that developers of vacant land in close proximity to the WSO would be responsible for all future traffic noise mitigation. The Department believes that the Proponent should bear some responsibility for noise mitigation for vacant land adjacent to the proposal that is zoned for noise sensitive activities. To ensure that the noise mitigation measures adequately accommodate future development, the Department recommends the inclusion of Condition of Approval No. 95 requiring that the Proponent install noise mitigation measures for all existing noise sensitive vacant land including land zoned for residential purposes consistent with the RTA's Environmental Noise Management Manual (2001).

Truckstop Locations

The Representations Report details a number of locations for truckstops allowing for temporary layovers. A brief noise assessment of truckstops is included in the Representations Report however; not all of the locations appear to have been assessed. The Department therefore recommends the inclusion of Condition of Approval No. 94 requiring the Proponent to fully detail the noise impacts and mitigation measures of the final truckstop locations to the satisfaction of the EPA and Director-General.

5.11.5 Conclusion

The revised noise and vibration assessment, including analysis of noise barrier heights required to meet traffic noise levels, indicates that the construction and traffic noise impacts of the proposal would be significant without the application of appropriate mitigation measures. During construction, it would be problematic to meet EPA goals, even with mitigation. There would however, be no night time activities so that the community would be given some respite. Approximately 90% of potential noise barriers along the WSO would be below 4 m. The Proponent has also undertaken a cost effectiveness assessment of treatments in these 12 NCAs and found that in some cases noise barriers above 4m would be the best option and/or the application of architectural treatments. The final treatments would be determined in consultation with the EPA and nearby landowners with the general objective to meet the traffic noise criteria.

Following feedback from the RTA the Department has recommended a comprehensive set of recommended Conditions of Approval to ensure that the construction and operational noise impacts would be minimised.

5.12 Flooding and Hydrology

5.12.1 Background

The EIS stated that much of the southern section of the proposal is located within the Cabramatta Creek catchment, which includes Maxwells and Hinchinbrook Creeks. The proposed corridor also crosses three (3) major creeks and numerous ephemeral channels in the southern section. A small area north of the Sydney Water Supply Canal is within the Ropes/South Creek catchment. The northern section of the proposal is located in the Eastern Creek floodplain, which is flat and surrounded by gently rolling hills, and Toongabbie Creek catchment which is relatively undulating. The proposal would cross Eastern and Breakfast Creeks immediately upstream of their confluence.

The EIS stated that the proposal would be designed such that cross drainage works would prevent flooding of the proposed road corridor during the 100y ARI flood event, to maintain flood levels on adjacent watercourses at existing levels and prevent any adverse impacts on catchments. The assessments undertaken in the EIS were largely qualitative with no detailed flood modelling of impacts.

The following impacts on existing hydrology and flooding were identified in the EIS as a result of the proposal:

- increased catchment run-off and upstream water levels;
- altered hydrological characteristics within adjacent creek systems and the surrounding area;

- loss of floodplain storage and conveyance capacity, and constriction of the floodplains at some locations;
- possible diversion of upstream creek flows around the proposed road corridor at locations where the proposal is in cut and combining discharges into a single creek system (to be determined during detailed design); and
- erosion and scour potential due to increased flood velocities.

The EIS also stated that the WSO flood management strategy would be developed to be consistent with Liverpool City Council's current strategies, including relevant detention basins in the Hinchinbrook, Cabramatta and Maxwells Creek catchments.

Design components identified in the EIS to minimise the proposal's impact on hydrology and flooding, included bridges and culverts. Where the road passes over existing creeks, drainage channels and floodways, the crossings would be designed to have no significant effect on flood levels. The EIS also stated that constructed wetlands would include on-site detention to ensure that peak flood flows downstream were equivalent to pre-development levels.

5.12.2 Key Issues Raised

The DLWC, local councils and the Department raised a number of flooding and hydrology related concerns including:

- concerns regarding the impacts of the proposal on all current flood prone areas and any additional areas;
- design related concerns and a lack of identified flood mitigation measures including the loss of floodplain storage and the need for additional flood storage in the Maxwells, Cabramatta and Hinchinbrook Creek catchments ;
- concern whether flood investigations considered future development; and
- clarification of the bridges/embankments to be used.

5.12.3 Additional Investigations

The Proponent has identified that there are two (2) key floodplain catchments affected by the proposal. These are the Cabramatta Creek catchment in the south and the Eastern Creek catchment north of Elizabeth Drive. The focus of additional studies considered the flooding and hydrological impacts of the proposal on these catchments and design measures required to minimise impacts.

Hydraulic Modelling at Crossings of Eastern Creek and Toongabbie Creek

In response to issues raised, the RTA prepared a supplementary hydraulic study of Eastern and Toongabbie Creeks (SKM, 2001a).

The assessment found that with a 95 m long bridge over Eastern Creek, two (2) residences in the vicinity would be flooded in a 100y ARI flood event, with and without the WSO, although the flood level would increase slightly with the WSO. Nine (9) structures, including four (4) houses, four (4) sheds and a council depot, would be inundated without the WSO and ten (10) during the PMF with the WSO. The modelling included longer spans of the bridge to 115 m and 135 m and found that the WSO would not impact on any additional structures than would otherwise be inundated without the WSO.

Modelling of Toongabbie Creek with a 90 m waterway opening indicated that flood levels would be increased by 0.08 m for the 100y ARI flood event in the Sierra Place retarding basin and upstream of the WSO. These increases were attributed to loss of storage capacity due to bridge abutments within the retarding basin. It was considered that this would not have a significant impact on the basin's capacity to attenuate downstream flood peaks. The crossing would also not significantly raise upstream flood levels although levels were not quantified. The modelling showed that a 160 m crossing would reduce afflux to 0.03 m in the 100y ARI flood event. The analysis of Model Farms Creek found that the proposal would have no impact on the existing culvert crossing for Model Farms Creek over the M2 Motorway.

Western Sydney Orbital Cabramatta Creek 2D Flood Model – Sizing of Bridges, Culverts and Basins

The objectives of this study were to:

- provide background to the current flood problems in the Cabramatta Creek catchment;
- describe the potential implications of the WSO on flooding regimes in the area; and
- to provide concept design sizes for waterway openings for cross drainage structures and compensatory detention basins to ensure that the WSO would be constructed to the desired standard to safeguard it from flooding and to ensure that the WSO would not exacerbate the existing flood problems within the catchment.

The report included a description of the development and calibration of the model and provided preliminary details of bridges, culverts and basin sizes required. The modelling was based on significantly larger waterway openings to that in the EIS including at Maxwells Creek (155 m), Cabramatta Creek (275 m) and Hinchinbrook Creek (600 m). Large detention basins were also modelled west of the M5/F5/WSO interchange (Basin 18, total storage volume 405,000 m^3), on the northern side of Cabramatta Creek and east of the proposal (Basin 22, total storage volume 336,000 m^3), and at Government Road, east of the proposal (total storage 205,000 m^3). Locations of detention basins and waterway openings are shown on 5.4 and 5.5.

The Proponent has liaised with Liverpool City Council regarding the need to mitigate the impacts of the WSO and integrating this with Council's flood management strategy for future development. Basins 18 and 22 were included in Council's strategy and only a proportion of each storage areas is required as offset for the proposal. The Government Road basin would be required solely to offset the impacts of the proposal.

The study found that some unacceptable residual flooding impacts might occur despite the inclusion of significant bridges across the floodplain. It was considered that these impacts would be localised and could be addressed through refinement of structure sizes and without major changes to the design concept during detailed design.

Impacts of Western Sydney Orbital Road on Flooding in Cabramatta Creek System

The purpose of this report (Lyall & Associates, 2002) was to address concerns raised by the DLWC regarding impacts of the proposal on flooding impacts in the Cabramatta Creek catchment and to provide a more interpretive and less technical discussion of the findings of the Bewsher (2002) study. The recommendations were:

- zero allowable afflux for the Cabramatta Creek and Maxwells Creek floodplains downstream of the proposed detention basins, due to existing urbanisation and flood sensitivity;

- zero allowable afflux upstream of detention basins in flood sensitive areas adjacent to the proposal where above floor flooding of urban or industrial properties would be experienced in the 100y ARI flood event;
- allowable afflux up to 0.15 m in situations where land is inundated but buildings are not flooded in the 100y ARI flood.

The Department concurs with the first two (2) criteria specified above but is concerned that the third criteria may not be appropriate. Further discussion of appropriate criteria levels for flooding is discussed below.

The report also states that flexibility in the allowed afflux could be permitted upstream of detention basins subject to demonstrating that flood damages and flood risk to present and future occupiers of the floodplain would not be increased.

To assist in the application of these criteria with respect to existing and future potential land use, the land zonings have been superimposed over the flooding impacts (afflux) for the 2h 100y ARI and 9h 100y ARI and are shown in Figures 5.6 (a)+(b) and 5.7 (a)+(b). Modelling of the concept design shows that some localised areas show significant increased afflux which, the report suggests would need to be reduced to acceptable levels in the detailed design stage. These areas are located at:

- chainages 4650 and 4950 (south of Cowpasture Road on western side of proposal);
- at bridge abutments for the 275 m and upstream of the opening between Bernera and Wilson Roads;
- between chainages 1900 and 2500; and
- a residential area east of the M5 at Prestons which would be subject to backwater flooding from the detention basin west of the proposal.

5.12.4 Consideration of Key Issues

General

The additional investigations undertaken by the Proponent has demonstrated a greater understanding of flooding impacts of the proposal than that provided in the EIS. However, the hydraulic modelling to date still identifies potential concerns such as flood impacts on nearby sensitive landuses. The Department therefore recommends the inclusion of Condition of Approval No. 134 requiring a detailed Flooding and Drainage Management Sub Plan prior to construction. The Sub Plan must be in accordance with the 'Floodplain Management Manual', based on the objective of not increasing inundation levels or durations at sensitive landuses during a 100y ARI flood event and prepared to the satisfaction of the DLWC. Further discussion of specific flooding issues is contained below.

Cabramatta Creek Catchment

The proposed route south from Cowpasture Road crosses an extensive floodplain. The area has been and will be subject to ongoing rapid development and the Department is cognisant that this would need to be considered in assessing the impacts of the proposal on current and future development in the area.

The concept design for the proposal through this section indicates that the majority would be constructed on embankment up to nine (9) metres high. This embankment has been estimated to

require 1.6 million m^3 of fill and approximately 160,000 m^3 of flood conveyance storage would be lost through construction of the embankment. Additional options were considered in the EIS including a full viaduct, which would have minimal impact floodplain storage and conveyance capacity, though this option was not selected due to the additional costs.

As stated earlier, supplementary information was provided in reports prepared by Bewsher/WBM (2002) and Lyall & Associates (2002) indicating that the proposal on primarily embankment with three (3) detention basins could be designed such that impacts on existing and future residential areas could be potentially minimised. Whilst this information has provided significantly greater detail in terms of the predicted impacts of the proposal, there remain a number of areas recently developed or zoned for development that could be subject to afflux (increase in flood level) up to 0.5 m. The reports consider that these potential impacts could be overcome with further refinement of the design including increased size or number of waterway openings and/or detention basins, or use of other structural and non-structural methods such as bunds, levees and land purchase. Although it is understood that these issues would need to be resolved, the Proponent has deferred further refinement until the detailed design stage.

Notwithstanding the additional investigations undertaken to address the Department and DLWC's concerns, the Department notes that the further consideration of these issues has focussed on designing the preferred embankment option such that it meets the range of afflux criteria identified previously. No consideration has been given to alternative floodplain crossings that could achieve the same or better results in terms of flood conveyance and reduced environmental impacts through this area. For example the comparison of options considered in the EIS clearly stated that the full viaduct option would have the least hydraulic impact on the existing flood regime and that the problems associated with floodplain storage and conveyance capacity loss would be virtually eliminated.

The Department believes that a design approach needs to be prepared for the area considering the holistic benefits and costs of alternative techniques. Additional costs, which the Department considers would need to be considered in undertaking a detailed comparison of the available options include costs for fill importation, land acquisition (for both detention basins or where affected land is purchased) and detention basin construction. Further, the assessment would also need to take into account the significantly longer bridge lengths, which would be incorporated into the mixed embankment/viaduct option. To this end, the Department recommends the inclusion of Condition of Approval No. 32 which requires the investigation of alternative design treatments to address potential flooding issues and environmental impacts, the preferred design requiring the approval of the Director-General. Further discussion of design issues is provided in Section 5.5.

Eastern Creek and Toongabbie Creek

The Department recognises that substantial additional assessment of the proposal's impacts on flooding has been undertaken for Eastern and Toongabbie Creeks subsequent to the EIS. Generally, the Department is satisfied that the issues of flooding have now been addressed and can be managed to minimise impacts. Notwithstanding, minor issues remain unresolved which it is believed can be resolved through the implementation of a Flooding and Drainage Management Sub Plan as specified in Recommended Condition of Approval No. 134. The objective is to not increase inundation levels or times during a 100y ARI flood event in areas sensitive to flooding.

Waterway Crossings

Numerous crossings of smaller watercourses would be necessary as part of the proposal. The Proponent has stated that pipes would only be used at minor creeks identified as not offering permanent aquatic habitat for fish and invertebrates, though pipes would be designed to allow fish passage where necessary. It is also stated that concrete based culverts would not be used along the route except where existing culverts are to be extended. The Proponent has proposed that all crossings where the waterway width is 6 m wide or greater would be bridged.

In general, the Department and DLWC do not concur with this approach as it is considered that ephemeral watercourses should be considered as of equal importance to permanent watercourses both hydrologically and ecologically. As such, it is considered inappropriate to cross minor creeks by piping or culverts without further ecological investigations. Equally, the Department considers that there should be no disturbance to the bed of any watercourse crossing during either construction or operation. The Department recommends the inclusion of Conditions of Approval Nos. 135 to 139 to protect creek beds and banks during both construction and operation. These include the need to bridge all watercourses displaying a defined bed and bank, consultation with the DLWC and NSW Fisheries prior to construction regarding appropriate timing, preventing earthen platforms or bridge piers in watercourses and maintaining sufficient access for fauna crossing between bridge abutments and creek banks.

5.12.5 Conclusion

The Department acknowledges that a significant amount of additional work has been undertaken subsequent to the EIS to identify the likely flood impacts of the proposal and to identify measures that would minimise these such that any residual impacts are acceptable in accordance with the Floodplain Management Manual. The results of the studies indicate that in principle flooding impacts as a result of the proposal can be minimised. To ensure that any residual flooding issues are addressed in the detailed design stage the Department recommends a number of conditions to meet the necessary criteria.

The Department remains concerned that the approach taken by the Proponent to identify an acceptable outcome in terms of flooding impacts through the southern area floodplain appears to have been based on a clear preference of the Proponent for a design based on areas of embankment. No consideration of other options such as viaduct has been made which focus on achieving the same or better outcome for the environment. The Department has therefore recommended a condition requiring a design approach for this area investigating the holistic impacts prior to construction.

5.13 Indigenous Heritage

5.13.1 Background

Indigenous heritage assessments were undertaken of the proposed road corridor to determine the archaeological and cultural significance and potential impacts of the WSO construction and operation. Separate assessments were undertaken of the sections between Prestons and Cecil Park (Helen Brayshaw Heritage Consultants, 1999) and Cecil Park to West Baulkham Hills (Robynne Mills Archaeological and Heritage Services, undated).

Prestons to Cecil Park

The EIS stated that seven (7) open sites, eight (8) isolated finds and three (3) potential archaeological deposits (PADs) would be impacted during construction. All open sites and isolated finds to be impacted were assessed as having low archaeological potential. All PADs were assessed as having high archaeological potential. Brayshaw, (1999) considered that most sites to be affected during construction were small and in poor physical condition. The Darug people, when consulted during the EIS investigations stated there were no sites of cultural or spiritual significance within the corridor from Prestons to Cecil Park, nor did they have any contemporary interest in the area.

Cecil Park to West Baulkham Hills

The EIS stated that a total of 19 sites were recorded in the section between Cecil Park and West Baulkham Hills, including 13 open sites, a possible stone procurement site (Plumpton Ridge) and six (6) possible scarred trees. Five (5) of the open sites were considered to include areas of PAD. Mills indicated that the possible scarred trees could not be confirmed as being of Aboriginal origin and were considered to have low archaeological significance.

The EIS stated that most of the sites within the corridor would be destroyed during construction of the Proposal. Three (3) open sites were located on the corridor boundary and were assessed as likely to be at least partially impacted. Four (4) of the possible scarred trees were similarly thought to be located on the road corridor boundary. Mills recommended that consents to destroy be obtained for eight (8) sites.

Plumpton Ridge

The EIS identifies Plumpton Ridge as an area of silcrete outcropping used in the past by Aboriginal people for tool manufacture and has been identified from earlier investigations as an area of high scientific (archaeological) significance. Deerubbin LALC and the Darug Tribal Aboriginal Corporation have identified the area as having high cultural significance.

Sub-surface testing was undertaken during the EIS investigations due to the sensitivity and to identify evidence of cultural and heritage significance within the impact zone of the proposal. Two (2) transects were investigated. PT1, which crossed an area of silcrete-bearing ridge gravels, was assessed as having high archaeological significance though, due to the highly disturbed surroundings and continuing disturbance, conservation was not considered a viable option. Application for Consent to Destroy from the NPWS was recommended for this site with a comprehensive salvage excavation. The second transect was considered to be of low significance due to its disturbed context and lack of potential information to be retrieved. Consent to Destroy was recommended for this site.

5.13.2 Key Issues Raised in Representations

A number of representations were received regarding the indigenous heritage values of the WSO road corridor. These included general questions regarding the assessments undertaken, concerns regarding specific sites and queries or suggestions for management of the site. They were as follows:

- concerns regarding the adequacy of assessments undertaken and discrepancies observed;
- concerns regarding impact on Plumpton Ridge and Blacktown Native Institute site;

- query of recommendations for site PT1;
- impact on indigenous heritage at Cecil Hills;
- requests for additional information, including additional community consultation and assessment of Toongabbie Creek indigenous heritage values; and
- recommendations that Aboriginal community be involved in site management.

5.13.3 Consideration of Key Issues

Adequacy of Assessments

Several representations were received concerning the level of assessment undertaken, issues arising from separate consideration of the southern and northern sections, and discrepancies between the information in the EIS and Working Paper No. 7. Clarification was also sought as to the agreement of the local Aboriginal community to the recommendations made.

In response to some of the issues raised in the representations, the RTA prepared an addendum to the EIS (Robynne Mills Archaeological and Heritage Services, 2001). The study was prepared to consolidate the indigenous heritage reports prepared for the EIS and reconnaissance of sites identified to determine changes over time and clarify the significance of Plumpton Ridge. The report was included in Appendix 8A of the Representations Report.

The Department has reviewed the information provided and is satisfied that the compilation of previous assessments provides an overall picture of the information available to date, the sites that would be affected by the proposal and management options for sites that would not be impacted based on the investigations to date. Similarly, the Department is satisfied that the modifications to the proposal are not expected to impact upon any additional sites of indigenous heritage. Notwithstanding, the concern remains that ancillary infrastructure locations have not been determined, nor the potential impacts of these on indigenous heritage assessed. Further, no sub-surface testing has been undertaken of potential archaeological deposits identified in the original investigations and therefore the potential significance of these sites remains unknown, in particular Plumpton Ridge (refer to section below). To ensure that appropriate assessment and consideration of these issues is undertaken the Department recommends the inclusion of Conditions of Approval Nos. 27 and 173.

The Department is aware that the RTA has submitted and had approved, applications for Preliminary Research Permits to the NPWS for all areas requiring sub-surface excavation, with the exception of Plumpton Ridge, and that work has commenced in these areas.

Plumpton Ridge

Representations received raised the potential impacts on Plumpton Ridge and concerns regarding the recommendation for the area identified at PT1 in the EIS. Plumpton Ridge has been identified previously in various investigations as a silcrete quarry and source of raw material for stone artefacts distributed across the Cumberland Plain (AMBS, 1999).

The EIS stated that PT1 was found to be highly disturbed yet with high archaeological significance and the potential to yield further scientific and contextual information. Application for Consent to Destroy with comprehensive excavation was recommended for this site.

The Department and NPWS raised concerns that the recommendation to obtain Consent to Destroy with salvage excavations for PT1 had been based on limited survey which was acknowledged by the RTA's consultant. Whilst destruction may be unavoidable, alignment modifications, research potential or other limited conservation measures may be available with the consideration of additional information, which could achieve a more beneficial outcome.

The RTA has now committed to undertaking additional investigations in this and other locations along the proposed route, however the Department remains concerned that the opportunity to make minor modifications to the proposal would be lost if high archaeological or cultural significance is identified during these investigations. To this end, the Department recommends the inclusion of Condition of Approval No. 27 which requires an assessment of possible route re-alignment alternatives or other measures if investigations at Plumpton Ridge (or other areas of potential archaeological deposit) reveal high Aboriginal heritage significance.

Other Specific Locations of Concern

A number of representations raised issues concerning the indigenous heritage values of other specific locations along the proposed route. These include the Native Institute and Toongabbie Creek. The RTA has stated in the Representations Report that there would be no impacts on the Native Institute and that this site would be fenced off from work areas during construction. Condition of Approval No. 176 requires the erection of temporary fencing around sites during construction.

The NPWS requested an assessment of Toongabbie Creek to determine the presence of indigenous heritage sites. In response, the RTA has stated that test excavations would be conducted for all sites potentially affected by the proposal prior to construction. The RTA has obtained Preliminary Research Permits for most PADs and has commenced further investigations along the proposed alignment, including Toongabbie Creek in consultation with the NPWS and Deerubbin and Gandangara Local Aboriginal Land Councils.

Numerous representations were received from Cecil Hills residents regarding the impacts of the proposal on the indigenous heritage of the area, however, these were generally tied to a preference for an alignment located further west of Cecil Hills. In response to concerns raised, the RTA has moved the alignment up to 400 m west of that shown in the EIS. Environmental Planning (2001) prepared an assessment of the potential impacts of the proposed modifications to the proposal as outlined in the Representations Report and Preferred Activity Report. This assessment found one (1) scarred tree possibly of Aboriginal/European origin and four (4) areas of PAD, including one PAD recorded in previous investigations. No impact on the possible scarred tree was anticipated though all areas of PAD would be affected during construction. Among others, it was recommended that sub-surface testing be undertaken at all PADs prior to construction commencement.

A range of conditions is recommended to ensure that Aboriginal heritage issues are appropriately addressed at all stages of proposal construction. Recommended Condition of Approval 157 requires additional investigations to be undertaken and minor alignments made where possible to minimise impacts on Aboriginal heritage. Recommended management measures during construction include having representatives of the local Aboriginal land councils on site during initial site ground clearing, fencing of archaeologically sensitive areas not to be affected, training of construction crews and hold points where additional sites are identified. These are outlined in recommended Conditions of Approval Nos. 159 to 162 respectively.

Aboriginal Community Consultation

Various representations raised a lack of consultation with the relevant Aboriginal community groups as an issue. In response, the Proponent stated that the Deerubbin and Gandangara Local Aboriginal Land Councils had participated in fieldwork and the Gandangara LALC provided an assessment of the consultants' management recommendations in the southern section. A representative from Deerubbin LALC accompanied field surveys north of Elizabeth Drive, however the LALC chose not to provide formal correspondence for this section. Darug Tribal Aboriginal Corporation also participated in surveys of the northern section. The RTA stated that the recommendations of the Aboriginal groups were taken into account in formulating recommended management measures.

The Department considers that consultation with the Aboriginal community during the EIS was appropriate, however this would need to be continued throughout the sub-surface investigations, detailed design and construction phases of the proposal. Various recommended Conditions of Approval include consultation with the Aboriginal community during future investigations and environmental management during construction.

5.13.4 Conclusion

Plumpton Ridge would appear to be the most significant indigenous heritage location along the route despite the fact that the area is substantially disturbed. Impacts due to the proposal are accepted as being unavoidable and that total conservation is not considered a viable option. However, further sub-surface investigations and consultation with the local Aboriginal communities is required to determine the archaeological and cultural significance of the area and means to mitigate the impacts as far as possible.

The Department considers that areas of PAD, including Plumpton Ridge and other key locations require further investigation prior to the commencement of construction. This may result in minor alignment modifications to the proposal or other measures of benefits to sites affected. Overall, it is considered that the residual impacts on areas of indigenous heritage are manageable subject to conditions as recommended.

5.14 Pedestrians and Cyclists

5.14.1 Background

The EIS stated that 35 pedestrian and cyclist crossing points would be incorporated into the proposal, predominantly located at interchange locations along the route, however several non-vehicular crossover points to and from open space areas were included as follows:

- a land bridge, an overpass and underpass within the Sydney Regional Environmental Plan No. 31 Regional Parklands;
- underpasses at the Sydney Water Supply Pipeline, Lady Penhryn Park, Pearce Reserve; and
- an overpass at Florence Street, Glendenning.

The objective of the cycleway/pedestrian access was to ensure that the facilities incorporated plans for existing and future development around the proposal. The EIS committed to the provision of both an on-motorway cycleway and an off-motorway cycleway/pedestrian path.

The EIS stated that the on-motorway route would cater for experienced (commuter) cyclists with the off-motorway route catering primarily for non-experienced or recreational cyclists. The EIS also stated that the on-motorway route would be contained with the 2.5 m road shoulder that would also serve as a breakdown lane for vehicles. Further, it was stated that the Proponent would investigate the issue of grade separation to minimise fast car/slow cycle conflicts at interchanges at the detailed design stage.

The route and environmental impact assessment for the off motorway route was deferred in the EIS to the detailed design phase. The preferred option for the off-motorway cycleway described in the EIS would generally be within the corridor, and where it is outside the corridor would follow recreational/open space areas or local roads. It would be a dual use pathway catering for both cyclists and pedestrians.

5.14.2 Key Issues Raised

Key issues raised in representations included:

- concern that access points were not considered where the proposal severs local roads or pedestrian desire lines;
- requests for pedestrian crossover points at specific locations;
- a request for clarification of whether both on and off carriageway cycleway access would be provided;
- concerns that cyclists should be exempt from paying the toll;
- a request for additional cycleway/pedestrian pathway entry and exit points at recreational and employment areas;
- that the cycleway should be grade separated at all intersections;
- issues concerning pedestrian access across the motorway at Prestons, Maxwells Creek and Kings Langley; and
- impacts on local and regional open space connections at Maxwells Creek, Cabramatta Creek, Hoxton Par Airport, SREP 31 - Regional Parklands, Horsley Park, Eastern Creek and Dean Park.

5.14.3 Consideration of Key Issues

Additional Investigations

The Department commissioned the Urban Design Advisory Service (UDAS) to provide the Department with an independent assessment of the urban design and access components of the proposal (UDAS, 2002). UDAS reviewed the Representations Report in light of the issues identified above and concluded that a number of issues required further resolution. These were:

- the strategic approach to pedestrian or cyclist access across the proposal was limited;
- impacts on the SREP 31 - Regional Parklands west of Cecil Hills required further assessment;
- severance and closure of local roads between Kurrajong Road and Cowpasture Road; and
- severance caused by local road closure in the Glendenning area.

A copy of the report, including recommendations made by UDAS, is provided in Appendix H.

Cycleway Purpose

Representations to the EIS raised concern regarding potential conflict between pedestrians and cyclists on the off-motorway cycleway/pedestrian path, particularly at points where the cycleway is on structure at road and creek crossings. The Department also requested that the Proponent provide more details of the proposed alignment for the cycleway/pedestrian path.

Subsequent to the Representations Report, the Minister for Roads announced on the 14 November 2001 that a concept design had been prepared for the off-motorway cycleway/pedestrian path which would include grade separated crossings at all intersections. The proposed route would generally follow the road corridor from Prestons to Quakers Hill Parkway, incorporating a number of crossings of the proposal based on existing residential development and access to open space. At Dean Park, the route deviates from the road reserve to follow the edge of open space and behind private residences to Quakers Hill Parkway. From Quakers Hill Parkway, the proposed cycleway/pedestrian path would remain within the road reserve but away from the motorway corridor, again following fence lines to the M2 connection. The Proponent has stated that detail regarding the cycleway/pedestrian path would be finalised during the detailed design phase.

The Department is highly supportive of the RTA's commitment to a grade separated cycleway/pedestrian path facility. The Proponent suggested that the off-motorway cycleway would abrogate the requirement to cater for the on-motorway cycleway. From a review of the initial concept design of the off-motorway cycleway the Department accepts that the proposed facility would more than likely remove the need for the on-motorway cycleway. However, until such time that a more detailed analysis is undertaken it would be problematic to explicitly require its removal.

The Department considers that it is important that the design of any cycleway/pedestrian path be prepared in accordance with an overall cycleway strategy which considers the needs of experienced and recreational cyclists and other factors such as linkages to existing and future planned cycleway networks, ancillary facilities, signage and linemarking. This would need to be prepared in consultation with relevant stakeholders including Bicycle NSW, relevant Councils and bicycle user groups. This requirement is reflected in Recommended Conditions of Approval No. 109. Various guidelines are applicable to the design and construction of bicycle paths and are based on the proposed function of the pathway. In order to ensure that the pedestrian/cycleway is constructed to the appropriate standards and addresses other operational issues, the Department recommends Condition of Approval No. 110.

Cycleway Toll

Two representations suggested that on-carriageway cyclists should be exempt from the toll. The Department considers that imposition of a toll on cyclists is not warranted and to this end has recommended Condition of Approval No. 46, which exempts cyclists and emergency vehicles from paying a toll.

Strategic Approach for Pedestrian/Cyclist Crossings

The Department considers that there needs to be a more strategic approach to pedestrian or cyclist access across the proposal. Pedestrian crossing locations at this stage appear to have been selected based on where the concept design best allows, rather than on an analysis of pedestrian and cyclist access requirements. To this end, the Department recommends that the Proponent prepare a Pedestrian Access Strategy to identify pedestrian access requirements across the

Proposal. This requirement is reflected in Recommended Condition of Approval No. 112. Recognising that the pedestrian access points should also be designed to incorporate cycle access the Department also recommends that this Strategy be consistent and linked to the Cycleway Strategy required by Recommended Condition of Approval No. 109.

Camden Valley Way to Cowpasture Road

The assessment recognised that the Proposal could divide and create a barrier within the Prestons Urban Development Program area containing the Yarrunga commercial and retail area. Further, it could potentially sever access to community and recreational facilities in the suburbs of Hinchinbrook and Hoxton Park. This severance would also be exacerbated by the proposed closure of local roads that function as important existing and future local pedestrian access routes. In particular Wilsons, Illaroo and Ash Roads were identified as important to maintain permeability across the Proposal and reduce severance impacts. There were also concerns regarding the lack of consideration given to pedestrian access at the Bernera Road interchange to facilitate pedestrian movement at this point.

Recognising that this area has been earmarked for future growth, the Department is of the opinion that consideration of future land uses and access requirements needs to be further addressed. This requirement is reflected in Recommended Condition of Approval No. 114.

Issues in regard to access across the proposal in the vicinity of SREP 31 – Regional Parklands are addressed in Section 5.16.

Rooty Hill/Glendenning

Numerous existing trafficable and unformed roads would be severed by the proposal between Eastern Road, Rooty Hill and Richmond Road, Glendenning. More particularly the proposal could provide a significant barrier for pedestrian access to Aquilina Reserve and the industrial lands on the northern side of the Main Western Railway Line from Rooty Hill Railway station.

The Representations Report states that a pedestrian/cycle path would be constructed across the proposal at Florence Street though access would be prevented between Simms Road and Ainsley Avenue linking Oakhurst and Glendenning. The surrounding residential areas are well established and include a number of schools or other educational facilities, a community centre and sporting fields. The requirements relating to this section of the proposal are reflected in Recommended Condition of Approval No. 115.

The Department is concerned that Florence Street could potentially become the only pedestrian link between Lamb Street and Richmond Road, a distance of approximately 1.25 km. Whilst the Department is cognisant that this area has been developed with knowledge of the road reserve, it is considered that the proposal could have a potentially significant effect on community function and make access to various facilities on either side problematic. This issue further emphasises the need for an overall pedestrian access strategy as required in Recommended Condition of Approval No. 112.

5.14.4 Conclusion

The Department sees the proposed grade separated off-motorway cycleway/pedestrian path as a significant benefit. Notwithstanding, the Department has recommended the preparation of an overall cycleway strategy to ensure that the cycleway/pedestrian path is considered in consultation with

relevant stakeholders and in accordance with relevant standards and be integrated with any existing or future cycleway networks.

The proposal includes a number of pedestrian access points across the proposal, many of which are appropriate. However, it is considered that the connections proposed to fulfil obvious pedestrian or cyclist access requirements require strengthening in some locations. Similarly, initial assessment would suggest additional crossing points would be desirable in some areas. The Department has recommended the preparation of a Pedestrian Access Strategy to take into account a number of factors to determine the most appropriate locations for access points across the proposal.

5.15 Strategic Planning and Land Use Impacts

5.15.1 Background

Strategic Planning

The EIS reviewed all the strategic planning documents relevant to Western Sydney since the County of Cumberland Scheme to demonstrate the evolution of the decision for the proposal and concluded that the WSO would be an essential element of an overall transport system in Western Sydney and would have the following significant strategic benefits:

- support for a vital and growing region of Sydney;
- support for existing and future forms of private, commercial, freight and public transport;
- provide access to developing industrial areas and employment zones; and
- relieve traffic congestion on other roads that support public transport.

Urban Development Program

The Urban Development Program (UDP) for the Greater Metropolitan Region of Sydney which was introduced in 1981, involves the identification, scheduling and implementation of development of new urban residential areas on greenfield sites. The EIS stated that in the current five (5) year program (1998-1999 to 2002-2003) a total of 36,545 residential lots are forecast to be developed with approximately 82% expected to be created in the Local Government areas of Liverpool, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield and Penrith.

Land Use

Volumes 2 and 3 of the EIS described the zoning and use of existing land between Camden Valley Way and the M2 within 1 km of the proposed route. The permissibility of the proposal is also addressed. Future opportunities for development were identified for a number of sites within the 1 km radius of the proposal.

5.15.2 Key Issues Raised in Representations

A number of representations from Local Councils, Australian Conservation Foundation, Greater Western Sydney Economic Board, WSROC, NRMA and Interlink Roads were received regarding planning and land use considerations. The issues raised were:

Strategic Planning Context

- land use assessment was out of date and did not accurately identify the current and future development of Western Sydney, including residential and employment areas and also the correct planning framework;
- the proposal has not adequately addressed the strategic planning context as it only considers land use as a band within 1km of the proposal;
- impact on future land use has not been adequately addressed;
- statements that the proposal would lead to more urban development seem in conflict with statements that suggest the proposal would result in a more compact city;
- the proposal does not relate to any planning strategies for Greater Metropolitan Sydney; and
- the proposal should be used in the first step to developing Sydney as a multi centred city.

Impact on Specific Land Uses

- relationship of the proposal with Badgerys Creek Airport;
- access issues relating to specific industrial, commercial and rural lands;
- severance of Landcom land in the vicinity of the Hoxton Park Aerodrome;
- impacts on Hoxton Park Aerodrome;
- the development of isolated lands for example between Wallgrove Road and the proposal; and
- impact on Cecil Hills and Casula Residential Areas.

Issues relating to the impact on Cecil Hills residential area are discussed in more detail in Section 5.3.

5.15.3 Additional Investigations

In response to the concerns raised regarding out of date information in the EIS, the Proponent commissioned a review of land use, zoning control and new planning instruments, which is included in Appendix 4 of the Representations Report. The Assessment provides an update of the zoning and land use within 1 km of the proposal as of April 2001. The report states that the major impact associated with the change in land use since the EIS investigations would be increased noise in residential areas. The report further stated that the proposal is not expected to detrimentally impact on industrial areas. A number of additional future urban release areas and land suitable for development was identified in this review.

5.15.4 Consideration of Key Issues

General

From a strategic planning and land use perspective, the proposal needs to be considered in light of its potential contribution to growth and improved accessibility in Western Sydney. The EIS generally described the strategic planning directions for Western Sydney and acknowledged the role of the proposal in *Action for Transport 2010*. However, no detailed assessment to demonstrate how the proposal has been integrated with the urban context or future directions for Western Sydney has been undertaken. Further, the land use assessment was constrained to a 1 km radius of the proposal limiting the ability to assess linkages or land use impacts in a broader context.

The Department has undertaken a more detailed assessment of the strategic role of the proposal and the land use impacts. In undertaking this assessment the Department has taken into account the:

Whole of Government Integrated Action Agreement for the proposal (as discussed in Section 5.2); the Metropolitan Development Program (MDP) (which was developed in 2001 as an amalgamation of the UDP and the MUDP); relevant policy documents such as *Action for Transport 2010*; and all relevant EPIs and existing or draft masterplans.

In considering the urban release areas that form part of the MDP, the Department has included an assessment of the land, identified by the Minister for Planning in a recent announcement, that warrants further investigation and land brought forward for rezoning and servicing. All lands identified are within the broad regional catchment of the proposal. These lands and the relationship to the Proposal are identified in Figure 5.8.

Strategic Planning Role

Generally, the Department believes that the proposal meets its broad strategic planning objectives. It is the Department's opinion that the proposal would be a significant infrastructure element within Western Sydney, providing a high level of accessibility to local and regional transport systems, supporting the existing and future economic and social growth within Western Sydney, while improving the movement of freight.

Notwithstanding, the Department is concerned that the opportunities to improve public transport in the region have not been explored in sufficient detail. A strategic planning objective of the proposal as stated by the EIS is to increase public transport accessibility particularly to new and emerging development areas. This issue has been discussed in more detail in Section 5.4, however the following issues were noted.

Integration with the Metropolitan Development Program

A number of representations to the EIS raised concern regarding the severance impacts and the need to take into consideration future development between Cowpasture Road and Elizabeth Drive. This area contains the Southern Hoxton Park Urban Release Area, residential zoned land owned by Landcom, the existing Hoxton Park Aerodrome and the residential areas of Cecil Hills and Green Valley.

Liverpool City Council has recently placed on exhibition the draft masterplan for the Southern Hoxton Park Aerodrome Precinct 3a. The road layout at Precinct 3a takes into consideration the Proposal and identified a defined bus route to and through the proposed suburb. The draft masterplan recognises that in the longer term this bus route would connect proposed employment land on the aerodrome site and onto Green Valley by using an agreed crossing over/under the Proposal.

The Department is aware that discussions had been held between the Proponent and Liverpool City Council regarding access options across the proposal. Two (2) options have been considered by the Proponent and Liverpool City Council including provision of a road under the proposal at existing creek crossing at chainage 6800 or construction of a bridge across the cut at chainage 6500. The Proponent has stated that due to current vertical design constraints, a road under the Proposal in the vicinity of Hoxton Park Aerodrome would not be possible but a bridge option could be investigated further. It is believed that the bridge may cost in the order of $1 to $1.5 million. The Department is concerned that future development in the area might be constrained if Council was required to levy the cost of the bridge from Section 94 contributions.

The Department believes that adequate access points across the proposal are required for both existing and future land uses and is concerned that if this issue is not resolved during detailed design the opportunity to provide this future link may be lost or become prohibitively expensive. To this end the Department recommends the inclusion of Condition of Approval No. 35 requiring the Proponent consult with Liverpool City Council and bus operators to ensure that the Proposal is designed to allow for future connections across the proposal in relation to any proposed development in the Hoxton Park aerodrome area.

The proposed Liverpool to Parramatta Transitway includes a bus stop at the intersection of Hoxton Park Road and Banks Road. As identified in Figure 5.8 an opportunity exists to connect the transitway across the proposal to provide access to the Yarrunga Urban Release Area and Edmondson Park Investigation Area, which form part of the MDP. To this end the Department recommends that the Proponent investigate during the detailed design process, in consultation with DoT, interchanges with the potential future extension of this transitway to Edmondson Park and interchanges with the proposed transitways from Blacktown to Castle Hill and Parramatta to Mungerie Park. This requirement is reflected in Recommended Condition of Approval No. 37.

Overall, the Department is satisfied that the Proposal has been designed to accommodate the growth in existing and future identified employment and residential areas. However, in light of the recent announcement by the Minister for Planning to investigate additional land as part of the MDP at Marsden Park and Schofields Aerodrome, further information was requested from the Proponent as to the impact of this future development on the level of service of the proposed Richmond Road interchange. The Proponent advised that the intersections at the interchange would operate at LoS C or better in the peak periods in 2016 and that bay lengths are adequate indicating a large amount of spare capacity. The Department accepts that the interchange would have the capacity to accommodate future development and the capacity of the arterial road network would need to be investigated in detail as part of the structure plan for the large scale urban release.

Land Use Impacts

The direct land use impacts along the length of the route would result in land acquisition, amenity impacts, increased traffic on some local roads and changes to the overall character of areas. These impacts are addressed in more detail in the relevant sections of this report.

Development Activity along the Proposal

Due to the increased regional accessibility created by the proposal, areas along the route are likely to experience pressure for change and redevelopment within the short to medium term which have not been assessed by the EIS or the Representations Report. The Department concurs with the Proponent that the future land use along the route would be controlled by the provisions of the *Environmental Planning and Assessment Act 1979*. It is beyond the scope of this report to undertake that assessment on behalf of the Proponent.

Hoxton Park Aerodrome

Four (4) representations to the EIS raised concern regarding the impact of the proposal on Hoxton Park Aerodrome. Specifically these representations expressed concern over the heritage listing of the airport, the impacts on operational requirements, future access requirements and the visual integrity of the site.

In response to the issues raised in representations to the EIS, the design was modified to improve access and minimise the impacts on the operational requirements of the Aerodrome. The design was altered to elevate the proposal over Cowpasture Road and the access point to the Aerodrome from Cowpasture Road was changed.

Section 6 of the Representations Report states that the modified design has considered the obstacle limitation surface (OLS) at Hoxton Park Aerodrome. To ensure that the detailed design meets the OLS requirements of the Aerodrome and minimises risks during construction and operation the Department recommends that the Proponent prepare procedures in consultation with Hoxton Park Aerodrome Management and to the satisfaction of the CASA. This requirement is reflected in Recommended Condition of Approval No. 215.

The Representations Report concludes that the landscape character of the precinct around Hoxton Park Airport would be little changed or affected by the insertion of the proposal. Recommended Condition of Approval No. 60 requires the Proponent to prepare an urban design and landscape framework plan to address visual impacts of the entire proposal which would ensure appropriate management measures are implemented to protect the visual integrity of the heritage items.

Valspar Corporation

Two (2) representations were received regarding the impact of the Power Street Interchange on the adjacent Valspar Corporation Property at Glendenning. Issues raised included impact on emergency operations, utilities, access traffic flow and material handling and noise impacts.

The Representations Report states that negotiations would be held with Valspar Corporation during the detailed design phase to resolve these issues where possible. The Department recommends that these negotiations be completed prior to construction. This requirement is reflected in Condition of Approval No. 172.

Austral Bricks Property

Two representations were received to the EIS expressing concern regarding the proposed access arrangements and the impacts on the Austral Bricks property. In response to these representations, the proposal has been realigned approximately 40 m to the west and the vertical alignment regraded with an overall increase in height of approximately two (2) m at the apex over the access road. This eliminates the need to provide a local bridge over the water supply pipelines so that an improved access can be provided to the Austral Bricks property. The Department concurs with this assessment.

Land Between Wallgrove Road and the Proposal

The distance between the proposal and Wallgrove Road varies from the common boundary to about 140 m just north Redmayne Road. The Department recognises that the future use of this severed land would need to be considered in light of SREP 31 and its eventual landowners. This issue is further addressed in Section 5.16.

Access to industrial, commercial and rural properties

Three (3) representations were received on the EIS relating to specific impacts on particular industrial, commercial and rural properties. The Proponent argues in the Representations Report

that the impact of land acquisition at Lot 2 Wallgrove Road and industrial land at Jedda Road has been minimised to the greatest extent practicable. The Department concurs with this assessment recognising that the proposal has been moved as close as possible to Wallgrove Road and the design of the alignment at Jedda Road minimises impacts on threatened species at Prestons and in the vicinity of Sule College. Land acquisition would be undertaken in accordance with *RTA Land Acquisition Policy*.

Relationship of the Proposal with Badgerys Creek Airport

The Representations Report states that the proposal has been designed to allow for any future development of the Badgerys Creek Airport Lands but is not dependent on that development. Should the Airport be developed, the Proponent has indicated in the Representations Report that access could be provided via the proposal and Elizabeth Drive. The Proponent further states that Elizabeth Drive interchange may have to be slightly modified to increase capacity.

5.15.5 Conclusion

The Department is generally satisfied that strategic planning objectives would be achieved by the proposal through the provision of a high capacity and accessible road within the region.

The Department considers that the specific land use impacts raised in the Representations are adequately addressed by the modifications to the EIS and generally represent a reduced impact. Implementation of the recommended conditions of approval would ensure that the proposal complies with strategic and land use planning objectives for the area and its public transport commitments as stated in the EIS.

5.16 Sydney Regional Environmental Plan 31 (SREP 31) – Regional Parklands

5.16.1 Background

The Proposal alignment passes through land identified in Sydney Regional Environmental Plan No. 31 (SREP 31) - Regional Parklands as regional open space. SREP 31 was gazetted on the 8 June 2001. The SREP 31 - Regional Parklands include over 5,400 hectares of land creating a 'corridor of green' stretching 26 km through Western Sydney from Quakers Hills in the north to Leppington in the south. More than 90% of the SREP 31 - Regional Parklands are in public ownership and the remainder of the land has been identified for future acquisition. The extent of the regional parklands is shown in Figure 5.9.

The SREP 31 - Regional Parklands contains Eastern Creek, Prospect, Horsley Park and Hoxton Park open space corridors, contains the Olympic venues for baseball and softball at Aquilina Reserve, Blacktown and the shooting venue at Cecil Park and Western Sydney Regional Park (WSRP). The WSRP is bounded by Wallgrove Road to the west, Cowpasture Road to the east, The Horsley Drive to the north and Elizabeth Drive to the south. The WSRP currently includes the Sydney International Equestrian Centre (SIEC) and Fairfield City Farm within its boundary. The WSRP is owned and managed by the NPWS. This park was gazetted on 15 May 1998 in accordance with the provisions of the *National Parks and Wildlife Act 1974*. The *Western Sydney Regional Park Revocation Act 2001* was assented to on the 17 July 2001, which revoked 18.2 ha of land from the WSRP to accommodate the Proposal adjacent to the western boundary.

5.16.2 Key Issues Raised in Representations

The Department, the Western Sydney Regional Organisation of Councils (WSROC), NPWS and Fairfield City Council raised the following issues:

- the impact on pedestrian access and recreational opportunities have not been sufficiently considered;
- measures should be implemented to minimise additional stormwater entering the parklands;
- further access for pedestrians and cyclists to the parklands is needed;
- the proposal would impact on views from the parklands; and
- the proposal would alienate areas of the parklands and sever linkages with other areas of open space and the proposal should be aligned closer to Wallgrove Road to avoid severance of the parklands.

The Department, WSROC, NPWS and Fairfield City Council raised the following issues relating to the impact on WSRP including SIEC:

- the EIS did not adequately assess the impacts of the Proposal on the WSRP;
- further information needed about the pedestrian underpass to the WSRP that would double as a drainage channel;
- the loss of part of the WSRP should be compensated through the acquisition of additional greenspace in Western Sydney;
- the Proposal would impact on the visual amenity of the WSRP. A specific landscape management plan should be prepared for this site;
- two access points to the SIEC should be maintained;
- the Proposal would result in loss of facilities, front entry, parking areas, roads and paths within the SIEC and buffer zones;
- construction should not impact on the operation of the Centre;
- design alternatives should be considered to reduce the impact on the SIEC;
- new signage should be provided to the SIEC; and
- measures should be implemented to avoid additional stormwater runoff entering the site.

OCA raised the following issues relating to the impact on Blacktown Olympic Centre:

- relocation of the Eastern Road reserve boundary should be considered to avoid the loss of car parking area;
- landscaping is required to replace the buffer zones and provide sound and light barriers;
- new signage should be provided;
- measures should be implemented to avoid additional stormwater entering the site;
- construction should not impact on operation; and
- safety and security.

5.16.3 Consideration of Key Issues

<u>General</u>

The aims of SREP 31 are to promote recreation, biodiversity, heritage conservation and landscape protection as the primary roles for the SREP 31 - Regional Parklands. The Proposal would have a direct impact on Aquilina Reserve, WSRP and the SIEC. Clause 12(2) of SREP 31 identifies matters to be considered by the determining authority when determining an activity under Part 5 of the

Environmental Planning and Assessment Act 1979. These matters are identified in more detail in Development Control Plan No. 1 and are provided in Appendix I. Whilst the Department is not technically a determining authority, the matters for consideration have been taken into account.

Land Acquisition

The Representations Report states that acquisition of land would be in accordance with the RTA's *Land Acquisition Policy*. Issues relating to land acquisition of the remaining SREP 31 - Regional Parklands including WSRP are discussed in more detail in Section 6.6 of this report.

Severed Land

Representations to the EIS raised issues regarding the severance of land between the proposal and Wallgrove Road and the Phillip Parkway corridor. The severed land forms part of the SREP 31 Regional Park lands. The Proponent has advised that the distance between the proposal and Wallgrove Road varies from the common boundary to about 140 m just north Redmayne Road.

Some representations suggested that to avoid this severance the proposal should follow the Wallgrove Road alignment. The Department recognises that the proposal is generally as close as possible to Wallgrove Road. While the land capability and accessibility impacts of these severed parcels were not assessed within the EIS or Representations Report the Department recognises that the future use of this severed land would need to be considered in light of SREP 31 and its eventual landowners.

Local Access

The EIS stated that vehicular, pedestrian and cycle access to sections of SREP 31 land would be provided where local streets pass under or over the proposed road corridor. However, the Department notes that the Representations Report states that there would be 12 road closures as a result of the proposal, five (5) of which are in the vicinity of the Regional Parklands. It is the Department's opinion that in the majority of the areas where road closures are proposed the roads do not provide direct access into SREP 31 - Regional Parklands or else alternative access is available.

Notwithstanding, the recommendations regarding vehicular access, the Department has requested the Proponent to prepare a detailed pedestrian access strategy for links across the Proposal in recommended Condition of Approvals No. 112. This issue is discussed in more detail in Section 5.14.

Drainage

Works adjacent to the SREP 31 - Regional Parklands have the potential to change the overland flow of water in the area and may lead to management issues if major stormwater events are not catered for by appropriate drainage structures. NPWS has expressed particular concern regarding flooding or water retardation in the Prestons area and downslope erosion, sedimentation and pollution from the Proposal adjacent to Elizabeth Drive/Wallgrove Road intersection near the WSRP. To ensure an adequate level of assessment is provided during the detailed design stage the Department requires the Proponent to prepare a detailed Flood and Drainage Management Sub Plan as part of recommended Condition of Approval No. 134.

Sedimentation and Erosion Control

The proposal has the potential to cause or accelerate erosion along the entire SREP 31 - Regional Parklands if inappropriate measures are not in place. It is noted that the Proponent has not made available details on the location of erosion and sedimentation controls in the SREP 31 - Regional Parklands and accordingly recommended Condition of Approval No. 128 sets specific criteria for sedimentation and erosion controls including the need to adhere to all conditions of concurrence set by NPWS.

Flora and Fauna

NPWS has assessed the impact of the whole Proposal on identified endangered ecological communities and threatened flora and fauna as part of the concurrence report. Concurrence has been provided conditional on a number of measures being implemented to reduce the impact of the activity. These issues are discussed in more detail in Section 5.10 of this report.

In 1996, the Department commissioned a study to provide landscaping/ environmental advice on measures to reduce the impacts on the SREP 31 - Regional Parklands. Although there have been changes to the proposal since this report, the key recommendations are relevant and are discussed below.

The 1996 report identified the Reedy Creek and Ropes Creek corridors and the Prospect Reservoir pipeline as being significant corridors for fauna movement between the SREP 31 - Regional Parklands and land to the west. More recently, Liverpool City Council has also identified within a draft masterplan for the area an east west corridor at Cabramatta Creek, which drains to Hinchinbrook Creek near Cecil Park. It is the Department's opinion that the Proposal has provided opportunities for fauna movement at these areas with bridges over watercourses. Recommended Condition of Approval No. 137 requires that bridges be designed to ensure sufficient space is available for fauna movement. Additionally, management measures would need to be identified in detail in Landscape Management Plans and Flora and Fauna Sub Plans required by the recommended conditions.

The 1996 report assumes that the volume of traffic using Wallgrove Road would drop significantly as a result of the proposal. The report therefore suggested opportunities for treatment of Wallgrove Road to reduce the fragmentation across wildlife corridors created by both road reserves being sited so close together and to improve pedestrian and cycle links in the area. The Department recommends that the Proponent address this issue in the Landscape Management Sub Plan and the Pedestrian Access Strategy outlined previously.

Aboriginal Heritage

To ensure that an appropriate level of assessment is undertaken for Aboriginal Heritage impacts within SREP 31 - Regional Parklands the Department recommends that the Proponent prepare a Indigenous Heritage Management Sub Plan prior to construction as specified in recommended Condition of Approval No. 156.

Visual and Urban Design

The Department recognises that the Proposal would have a visual impact on particular sections of the proposal including WSRP and the SREP 31 - Regional Parklands. While it is recognised that the

visual impact needs to be managed, the Department recognises that locating the proposal close to Wallgrove Road has significantly reduced this impact. A detailed assessment of visual quality, landscape character and urban design aspects of the Proposal is undertaken in Section 6.7 of this report.

A key aim of SREP 31 is to enhance the ability of the Regional Parklands to meet the needs for high quality open space, a range of recreational opportunities and a visual and physical break between areas of urban development. Recognising the values of the SREP 31 - Regional Parklands and WSRP, the Department requires the Proponent to prepare specific construction and operational Landscape Management Sub Plans for the entire SREP 31 - Regional Parklands to ensure that mitigation, management and monitoring of the works preserve these key values. These plans require details such as landscaping species, weed management, safety and security, noise mitigation, stormwater and drainage controls and potential linkages. This plan would also detail progressive rehabilitation of the site and final rehabilitation measures. This requirement is reflected in recommended Condition of Approval No. 69.

Impact on Western Sydney Regional Park (WSRP)

The NPWS is a determining authority for the Proposal under Section 8(6A) of the *National Parks and Wildlife Act 1974, which* requires the Proponent to seek approval to undertake works in the WSRP. NPWS submitted its draft determination report, which considers the impact of the proposal, to the Department for consideration on the 17 January 2002.

The report suggests that approval could be granted to the proposal subject to a number of conditions related to the management of environmental impacts on the WSRP. In arriving at its decision, NPWS considered the impacts on aboriginal heritage, flora and fauna, visual impact, safety and security, noise impacts, drainage and stormwater control within the WSRP and as a result of the upgrade of the WSRP access road. The Department generally concurs with NPWS assessment and its findings and has utilised the draft report in developing the recommended Conditions of Approval including Nos. 69 and 108.

Impact on Blacktown Olympic Centre (Aquilina Reserve)

One (1) representation was received regarding the impact on the Blacktown Olympic Centre which raised the following issues: impact on car parking, need for landscaping, replacement of signage, avoidance of additional stormwater entering the site, operation impacts, safety and security.

The Representations Report states that no car parking facilities would be lost on the eastern side of the road reserve and access would be retained from Eastern Road.

As the Proponent has not provided specific detail on landscaping, drainage, erosion and sedimentation control, operation impacts during construction and safety and security the Department requires more detailed assessment and identification of management measures to minimise impacts. These issues are discussed in more detail under relevant sections of this report.

The Department has expressed concern about the lack of specifics regarding linkages across the Proposal particularly in locations of significant recreation facilities. To this end, the Department has recommended the inclusion of Conditions of Approval No. 112 to ensure this issue is addressed prior to construction.

5.16.4 Conclusion

The assessment highlights potential impacts on the SREP 31 - Regional Parklands including land severance, accessibility, visual impact and drainage. The Department believes that with the inclusion of specific and more general recommended conditions of approval the impacts on SREP 31 – Regional Parklands as a result of the proposal would be minimised.

6 CONSIDERATION OF OTHER ISSUES

This Section of the Report provides the Department's assessment of the other environmental impacts of the modified proposal based on an examination of the EIS, issues raised in representations during the exhibition period and the Proponent's response to these issues in its Representations Report and during further consultation with the Department. The Department's assessment of the key environmental issues and site specific impacts is addressed in Section 5 of this Report.

The Proponent has also provided the Department with an assessment of all issues raised in representations in the Representations Report. This assessment has been reviewed by the Department and where required further assessment as been undertaken and discussed. It is therefore important that this Section be read in conjunction with the Proponent's Representations Report to understand how all issues raised in representations have been addressed.

6.1 Community Consultation

6.1.1 Background

The EIS stated that the consultation process for the proposal has been carried out over a six (6) year period commencing in 1993 and can be broken into three (3) phases:

- Phase 1: consultation carried out between 1993 and July 1998 during the route identification stage;
- Phase 2: consultation carried out in 1998 following the release of the *Initial Design Proposal*; and
- Phase 3: consultation in conjunction with the preparation and exhibition of the EIS.

The consultation strategy adopted in Phase 1 involved three (3) workshops focusing on the Liverpool to Hornsby Highway Strategy which was supplemented by newsletters and media advertisements inviting public comment. At the time of the study's release, the Government declared the Cumberland Highway as the interim National Highway and the newsletters and advertisements indicated that the preferred strategy for the National Highway link would include a route along Wallgrove Road.

Following this announcement, the route investigation study focussed on Prestons to Cecil Park and the Proponent held structured workshops to investigate various options and identify the preferred option. Upon completion of these studies a newsletter was released informing the public of the release of the Western Sydney Orbital and Elizabeth Drive Draft Overview Report and commencement of the environmental assessment process. An outcome of this process was the formation of the Authority Consultative Committee. The EIS recognised that during Phase 1, no detailed consultation process had been undertaken for the Cecil Park to West Baulkham Hills section of the proposal.

The EIS stated that Phase 2 included public exhibition of the Initial Design Proposal, at libraries, local council offices and other venues. At the same time, the community involvement program was launched by the NSW Minister for Transport and the NSW Minister for Roads in July 1998 and an information brochure distributed to 200,000 households. Advertisements were also placed in local and metropolitan newspapers and a telephone hotline was established. The Overview Report Booklet and Have Your Say Questionnaire were distributed to interested persons.

In the Prestons to Cecil Park section, three (3) community briefing sessions and a regional workshop were held to provide residents with the opportunity of raising concerns and discussing the development of the proposed road corridor. One of the community briefing sessions was held with local councillors and council staff. The regional workshop involved representatives from State agencies, local government and the community.

In the Cecil Park to Baulkham Hills section of the corridor, nine (9) community briefing sessions and six (6) Council presentations were conducted.

Phase 3 involved finalisation of conceptual design details for various sections of the proposed road corridor with relevant authorities and key stakeholders. Particular regard was paid to Prestons, Cecil Park and Eastern Creek areas. The EIS was then exhibited.

6.1.2 Key Issues

There were a substantial number of representations indicating that the level of community consultation was not sufficient. A large number of these were from residents of Cecil Hills; Erin Place, Casula; Ridgeview Avenue, Oakhurst and Kings Langley with one (1) additional representation indicating that residents living outside of Sydney were not given the opportunity to comment. Some suggestions for improved community consultation were to establish a community consultative group and a regular newsletter.

6.1.3 Additional Investigations

The Representations Report provides detail of the consultation undertaken during the EIS exhibition period. The EIS placed on exhibition and the exhibition period was publicised in local and metropolitan newspapers, at 15 exhibition display points, on the RTA web site and distribution of over 200,000 brochures. All affected property owners were sent a copy of the EIS summary booklet and a staffed 1800 telephone line was available during the exhibition period. Eleven (11) community information sessions were held during the exhibition period.

The Representations Report also lists the meetings conducted with Government Agencies since the exhibition of the EIS.

6.1.4 Consideration of Key Issues

The Department is concerned about aspects of the Proponent's community consultation process, including an inconsistent approach to consultation across the route since 1993 and more recently in the time lag between the request for approval and the exhibition of the Preferred Activity Report (PAR). The Department also notes that the PAR was not exhibited at all of the same locations as the EIS and that communities such as Cecil Hills, Casula, Oakhurst and Kings Langley were not specifically consulted regarding modifications to the proposal and any response to their issues raised on the EIS. The Department notes that recent changes to internal RTA procedures would ensure that in future the PAR is prepared and exhibited at the same time as the request for the Minister's approval and that all people making representations would receive a copy.

In order to ensure that community information and consultation is conducted in a consistent and comprehensive manner prior to and during construction (particularly in consideration of the extended duration and linear nature of impacts) the Department recommends that a detailed Community Involvement Plan overseen by an Independent Community Liaison Representative be prepared for

the entire route. More specifically the Community Involvement Plan would need to detail the notification of activities, the set up of the project website and the establishment of Community Liaison Groups along the route.

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 could make proactive recommendations 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 Recommended Conditions of Approval are met in a transparent environment conducive to the timely resolution of arising issues. These requirements are reflected in Recommended Conditions of Approval Nos. 12 to 15.

The Department also recommends the inclusion of Conditions of Approval Nos. 16 and 17 requiring the establishment of three (3) display centres along the proposal corridor. Appropriately managed, the display centres would be an important information source for the community. The conditions require that the Independent Community Liaison Representative is available during scheduled times at the display centres to discuss elements of the proposal with interested community members.

Complaints Procedures

The Department recommends that the Proponent establishes a toll free complaints telephone number, which would enable any member of the public to reach a person who can arrange appropriate response action. This requirement is reflected in Recommended Conditions of Approval Nos. 8 and 9. The complaint resolution process recommended by the Department is given in Figure 6.1. This process would provide for the timely resolution of complaints and is strengthened by provisions for independent dispute resolution.

6.1.5 Conclusion

Impacts on the community surrounding such a large scale linear proposal such as the WSO would be inevitable. Effective community consultation and involvement prior to and during construction ensures that those affected can be prepared and have input into the nature of these impacts. The Department has therefore recommended a number of conditions requiring the Proponent to undertake extensive consultation including a comprehensive Community Involvement Plan, the establishment of Community Liaison Groups, an Independent Community Liaison Representative, the establishment of Display Centres and Complaints Procedures.

6.2 Construction Traffic Impacts

6.2.1 Background

The EIS stated that construction traffic would consist of:

- traffic carrying workers to and from the site;
- heavy vehicles carrying construction materials to the site or spoil or rubbish from the site;
- construction plant on its own rubber tyres or delivered by specialised transport vehicles.

It was stated that the use of local roads by construction traffic would be minimised by the construction of temporary haul roads along the route alignment within the proposal corridor. The EIS also stated

that there would be some disruption to traffic on existing roads, particularly those roads proposed to have intersections with the proposal or those crossing the proposal. It was suggested that with the development of appropriate traffic management plans and disturbance of major roads limited to non-peak periods impacts would be minimised.

The EIS did not quantify the construction traffic impacts in terms of vehicle numbers, proposed access points or the impacts on surrounding roads. It was predicted that a maximum of 600 workers would be employed during construction of the proposal.

6.2.2 Key Issues Raised in Representations

The Department, Blacktown City Council, WSROC and the operators of the M5 and M4 raised issues in regard to potential construction traffic impacts including:

- further consideration of total construction traffic impacts;
- implications for busy roads including motorways; and
- consideration of construction staging.

6.2.3 Consideration of Key Issues

General

The Representations Report did not provide any further details on construction traffic or the potential impacts. Further details were deferred to the successful construction contractor including the development of detailed Traffic Management Plans.

The Department remains concerned that the large scale of the proposal means that construction traffic impacts may be significant. As a general strategy, it is recommended that Conditions of Approval Nos. 100 requiring a Framework Traffic Management Plan and 101 requiring specific Traffic Management Plans (TMPs) for each construction site are included. The conditions require a comprehensive assessment and nomination of management measures to minimise construction traffic impacts. The TMP must be prepared in consultation with local Councils and address any proposed impacts of staged construction. Specific issues to be addressed are as discussed below.

Impacts on Surrounding Roads and Motorways

The construction of the proposal has the potential to cause traffic impacts due both to the additional traffic volume generated by the proposal and at roads, which cross or interchange with the proposal. It is unlikely that the level of traffic generated by the construction of the proposal, other than the movement of fill and spoil discussed below, would significantly impact on the capacity of surrounding main roads. The TMP process should identify any potential capacity issues. To further minimise potential impacts, recommended Condition of Approval No. 81 limits the entry and departure of heavy vehicles from construction sites to the standard construction hours.

The Department also recommends the inclusion of Conditions of Approval Nos. 105 and 106 requiring the Proponent to undertake road dilapidation reports and monitor impacts during construction on local roads. The Conditions require the Proponent to adequately compensate Councils for any damage resulting from the proposal construction.

The Department recognises that any temporary part or full road closures on major roads crossing the WSO such as the M5 and M4 as a result of construction works has the potential to cause significant impacts. It is difficult for the Department to provide any input into these potential impacts as the Proponent has deferred the issue to the detailed design stage. The Proponent has stated that construction would be undertaken so as to minimise the impacts and works would generally be undertaken outside of peak times *ie* outside of 6.00 am to 10.00 am and 3.00 pm to 7.00 pm Monday to Friday. However, the noise and other implications of these works outside of peak hours are unknown and the Department has restricted the Proponent to standard construction hours unless otherwise agreed by the EPA. The TMPs required as part of recommended Condition of Approval No. 101 includes the consideration of impacts to surrounding roads including road closures and delay or detours and requires consultation with motorway operators for the M5, M4 and M2.

Impacts of Fill Transport

The EIS and Representations Report suggested that the construction of the proposal would involve a close balance between cut and fill quantities. Recent advice from the Proponent suggests that an imbalance now exists and that up to 2.4 million m3 of fill may need to be imported during construction works. Significant fill volumes are required on the southern floodplain between Camden Valley Way and Cowpasture Road and for the section from the M4 to the Main Western Railway line crossing.

If the total amount of imported fill was carried by a mixture of 50:50 truck / truck and dog and the average load carried was approximately 8 m3 (industry standard) then a total of 300,000 truck loads or 600,000 truck movements would be generated. Assuming that all of the imported fill is required during a 24 month period during construction when the majority of earthworks are occurring the daily number of trucks would be approximately 600 or 1200 daily movements. Although these movements would be averaged over the construction phase and a number of sites, they could potentially result in significant impacts on the surrounding road network and roads surrounding the fill source. Further discussion of fill importation issues is discussed in Section 5.9 of this report.

To minimise the impacts of imported fill and spoil movement on local roads surrounding the WSO the Department recommends the inclusion of Condition of Approval No. 180 restricting access and exit points for these trucks to construction sites and the main state and regional roads.

Access

Careful management of construction would be required to minimise the impacts on access. The Proponent has stated that access to properties would be maintained during construction wherever possible. To ensure that access is maintained during construction and operation to all properties the Department recommends the inclusion of Condition of Approval No. 107. Recommended Condition of Approval No. 108 requires that access to the WSRP is also maintained throughout construction.

6.2.4 Conclusion

The impacts of construction traffic have been largely deferred by the Proponent for consideration in the detailed design stage. To minimise any significant impacts the Department proposes the inclusion of a number of conditions requiring the preparation of detailed management measures be put in place and approved prior to substantial construction. In particular, with the significant import of fill material required, the Department recommends that the RTA closely and comprehensively investigates the option of heavy rail in the movement of fill. The Department has identified that the

main Southern and Western railway lines are in close proximity to areas of the WSO which require the most fill providing potential opportunities.

6.3 Air Quality

6.3.1 Background

Similar to a number of other environmental issues, the assessment of air quality in the EIS was found to be based on out of date monitoring, requiring reassessment to eliminate any discrepancies and errors and the identification of appropriate standards. Therefore, the Proponent commissioned a supplementary study as part of the Representations Report discussed below.

6.3.2 Key Issues Raised

Apart from the concerns made in relation to the validity of the documentation overall the key issues raised primarily by individuals, the EPA and NSW Health in relation to air quality included:

- dust mitigation measures;
- impacts associated with fumes and odours;
- concerns over localised emissions during operation;
- health impacts during operation; and
- regional air quality impacts and inconsistency with 'Action for Air'.

6.3.3 Additional Investigations

Air Quality Assessment Western Sydney Orbital – Representations Report, July 2001

An additional assessment was undertaken by Holmes Air Sciences (2001) and documented within the Representations Report. Updated addenda to this report have also been prepared subsequently in response to the revised traffic estimates. The report assessed the impacts of construction and operation on air quality, consolidating and updating the air quality assessment reports prepared for the EIS.

Construction

The additional study noted that the only significant construction stage air quality impact as a result of the proposal would be the potential for short term dust impacts generated by earthworks. There would also be emissions from petrol and diesel powered construction plant and equipment although these are not predicted to be significant.

The amount of dust generated would depend on the soil characteristics, wind conditions, type of construction and management being performed. Major sources of dust would be from wind erosion and the operation of bulldozers, excavators and scrapers. The study determined that there would be the potential for 500 kg of dust to be generated over a 200 m section of roadway, during a 10 hour working day. The study stated that the maximum acceptable increase over existing dust deposition would be 2 g/m2/month.

The study outlined a number of standard construction mitigation measures to reduce dust migrating from site including spraying exposed surfaces with water, covering all trucks, stabilisation of

stockpiles, maintenance of machinery and the preparation of an Air Quality Management Plan which would be applied to minimise impacts.

Operation

Air quality monitoring and modelling was also undertaken as part of the additional study and concluded:

- the NSW EPA's carbon monoxide one-hour or eight-hour goals would not be expected to be exceeded at nearby receptors;
- the historical PM_{10} annual and 24-hour maximum air quality goals would not be predicted to be exceeded at nearby receptors. However the short term goal proposed by the National Environment Protection Council of Australia and adopted by the NSW EPA may be exceeded at the kerb under worst-case conditions;
- NSW EPA's goals for nitrogen dioxide would not be exceeded at 10 m from the road;
- predicted concentrations of benzene (and other pollutants) are not at levels which should pose health effects; and
- there are a number of side roads which are predicted to experience increases in ground-level concentrations of pollutant.

The EPA is their response to the Representations Report generally endorsed the approach taken to the revised air quality modelling.

Regional Air Quality

The study also looked at the effect of the proposed WSO on emissions into the Sydney airshed. It was determined that across the Sydney airshed, emissions would be reduced as a result of the WSO with the exception of NO_x. The air quality emissions were revised subsequent to the Representations Report consistent with the revised traffic forecast. The assessment found that there would generally still be a net decrease in emissions as shown in Table 6.1.

Table 6.1 Total Annual Motor Vehicle Emissions from the Sydney Network 2006 and 2016 with and without the proposed Western Sydney Orbital (Tonnes x 1000) based on Revised Traffic Data

Emission	Without Orbital	With Orbital	Percentage Difference
2006			
CO_2	9629	9453	1.8% decrease
CO	357.64	356.91	0.2% decrease
NO_x	64.49	64.79	0.5% increase
HC	25.58	25.48	0.4% decrease
PM_{10}	3.90	3.85	1.3% decrease
2016			
CO_2	11583	11299	2.4% decrease
CO	370.38	369.26	0.3% decrease
NO_x	70.52	70.73	0.3% increase
HC	26.54	26.40	0.5% decrease
PM_{10}	4.40	4.33	1.7% decrease

6.3.4 Consideration of Key Issues

Construction

Dust Management

A number of representations were made by Fairfield City Council, Blacktown City Council, the EPA and NSW Health in regards to concerns about dust control during construction, including dust suppression methods and spoil transport, and the monitoring of dust and air quality.

In response to concerns raised, the Proponent indicated that dust mitigation measures would be addressed in detail in an Air Quality Management Plan. The Department endorses the Proponent's commitment and notes that the effectiveness of dust mitigation measures is dependent on diligent monitoring and maintenance. To this end, the Department's Recommended Condition of Approval No. 117 would require the preparation of a detailed Dust Management Sub Plan. This Sub Plan would detail the implementation and management of measures and procedures to ensure that the total dust deposition from the proposal is limited to no more than 2 g/m^2/month. The Department also recommends that:

- the Proponent undertake a regular dust monitoring program;
- trucks carrying dust generating loads are covered;
- wheel wash facilities are used so dirt is not tracked onto public roads; and
- no open incineration be permitted.

These requirements are specified in Recommended Conditions of Approval Nos. 119 through 121 and 123 respectively. The Department also recommends that when conditions are excessively dusty and dust emissions cannot be maintained within the specified goal, all dust generating activities cease until dust suppression can be adequately carried out. This recommendation is reflected in Recommended Condition of Approval No. 122.

Dust Sensitive Industries

The additional air quality assessment identified dust sensitive industries in close proximity to construction areas. These included food preparation/processing industries, manufacturing and processing industries, pharmaceuticals and spray painting. These industries could potentially be impacted by dust during construction if appropriate management was not undertaken. Recommended Condition of Approval No. 118 requires the Proponent to consult with dust sensitive industries and implement negotiated mitigative measures to minimise impacts.

Fumes and Odours

Concern was raised by some individual representations about the impacts associated with fumes and odours during construction. In response, the Representations Report stated that impacts associated with any fumes and odours as a result of construction, including exhaust emissions, are likely to be very short-term and are not likely to result in significant health impacts. The Department accepts that with appropriate management and maintenance, impacts from fumes and odours during construction would not be significant. If there are any issues of problems raised during construction in regards to fumes and odours, there would be provision to contact the Independent Community Liaison Representative, as specified in Recommended Condition of Approval No. 15 or through the complaints procedures as specified in Recommended Conditions of Approval Nos. 8 and 9.

Operation

Localised Emissions

There was a general concern raised by a number of individual representations in close proximity to the proposal about increased pollution and reduced air quality. In response, the Representations Report stated that, air quality goals are unlikely to be exceeded for any location greater than 10 m from the edge of road carriageways.

Poorly maintained smoky vehicles have been shown to be major contributors to localised air quality problems and the Department has recommended that prior to the opening of the proposal to traffic, measures for greater smoky vehicle enforcement in areas surrounding the proposal be investigated by the Proponent. This is reflected in Recommended Condition of Approval No. 124.

Health Impacts

The NSW Health Department raised concerns that the increased localised emissions could result in increased health impacts particularly for vulnerable recipients. As stated above, the RTA recognised that there would be localised decreases in air quality as a result of the proposal but that emissions were estimated to meet goals. The air quality gaols have been set at 'conservative' levels based on known health impacts. The Department notes that there are no 'safe' levels for the emissions of hydrocarbons including known carcinogens such as benzene.

As the predicted emissions would meet relevant air quality goals and the regional air shed would be improved as part of the proposal the incremental localised increases in emissions are considered acceptable.

Regional Air Quality

The EPA was concerned that the WSO would lead to increased regional emissions, which would be inconsistent with *Action for Air*. As stated above, the revised air quality assessment found that, with the exception of nitrogen oxides (NO_x), emissions into the Sydney airshed would be reduced as a result of the proposal. Despite predicted increases in vehicle kilometres travelled across the Sydney road network as a result of the proposal, reductions in emissions are predicted due to more efficient traffic movements on the WSO and less congestion in surrounding roads. However, the Department notes that this assessment did not include induced traffic, which has been discussed in more detail in Section 5.4 and 5.6.

6.3.5 Conclusion

Dust emissions during construction have the potential to cause a nuisance impact and may be more significant at dust sensitive industries. The Department has recommended several conditions to ensure dust issues are appropriately managed to mitigate impacts.

During operations, it is predicted that key air quality parameters, including CO, CO_2, NO_x and PM_{10} would all be below relevant air quality goals in surrounding areas to the WSO. Due to more efficient vehicle movements as a result of the proposal, emissions to the total Sydney airshed apart from NO_x are expected to decrease.

6.4 Alternative Alignment/Options

6.4.1 Background

Corridor Investigations

The EIS provides a history of corridor and alignment alternatives for the proposal dating from 1993. The outcome of the initial investigations was the nomination of the Cumberland Highway as the interim National Highway with provision for a new corridor to be developed in the medium term. The corridor options were investigated for the new National Highway route and the preferred corridor along Wallgrove Road was selected. The preferred corridor and route were selected for the following expected advantages:

- it was able to support developing industrial land at Prestons;
- interchanges at Bernera Road and/or Cowpasture Road could be constructed allowing access to the local road network;
- impacts on existing residential areas, including minimal severance were fewer; and
- significant traffic and economic benefits would arise due to the shorter length.

Alignment Considerations

Six alignments were considered between the M5 interchange and Bernera Road as shown on Figure 10.2 of the EIS. The preferred option was considered to have the least detrimental effects on existing and future residential subdivisions west of Maxwells Creek and to the operation and further development of Sule College.

Three (3) alignments were considered between Cowpasture Road and Elizabeth Drive which shared a common alignment south of McIver Avenue and north of Ropes Creek, however the central sections branch to form the eastern, central and western alignments as shown on Figure 10.3 of the EIS. The eastern option was selected as the preferred option for further consideration in the EIS (refer to Section 5.3 for further discussion).

Alignment options for the northern section of the proposal were relatively well defined due to existing road corridors such as the Phillip Parkway (partially constructed) and the Castlereagh Freeway (possible future). Consequently, the proposed alignment was chosen as it would have the least environmental impact.

6.4.2 Key Issues Raised

A number of representations were received raising issues regarding alternative alignments including:

- consideration of strategic options including further assessment of public transport options;
- alternative alignments past Cecil Hills;
- greater use of existing Cowpasture Road/Wallgrove Road alignment; and
- no consideration of the "do nothing" or "do minimal".

6.4.3 Consideration of Key Issues

Strategic Options

The request for public transport alternatives (improving existing or new) was raised by a number of representations, predominantly from the local community. Such requests are commonly raised in response to an EIS for a major road. However, the Department's *Guideline for the Preparation of an EIS for Roads and Related Facilities* indicates that it is not the role of a proposal EIS to undertake a strategic environmental assessment of transport plans or policies. The assessment must focus on the merits of the proposal as submitted for approval. Notwithstanding, the Whole of Government Integrated Action Package outlines numerous commitments for the provision of public transport facilities as part of a transport corridor.

The Proponent, in designing the proposal, has to some degree considered potential future public transport by incorporating a 15 m wide corridor which may be used for additional road capacity, or dedicated public transport (either busways, light or heavy rail). The Department's consideration of public transport aspects of the proposal is discussed in detail in Section 5.4 of this report.

Alignment Near Cecil Hills

A large number of representations from the local community were raised regarding the proposed alignment west of Cecil Hills. Residents were concerned about the proximity of the proposal to the residential area and queried the decision for the eastern alignment over either the central or western alignments.

In response, the Proponent has moved the alignment up to 400 m further west from that considered in the EIS and away from the nearest residences. Assessments of noise, air quality, heritage, flora and fauna, and aquatic ecology impacts were undertaken for the realignment. These found that:

- noise exceedances would generally be lower and affect fewer residences; and
- local air quality for residential areas would be improved.

These issues are considered in further detail in Section 5.3 of this report. However, in general, the Department concurs with the Proponent's decision to realign the proposal in this location and that the impacts on the local community are anticipated to be reduced when compared with the alignment considered in the EIS.

Cowpasture Road/Wallgrove Road

The Department and some community representatives queried why the new road reserve was chosen and that greater use was not made of Wallgrove Road in the alignment.

In response, the RTA has stated that Wallgrove Road was not considered as part of the proposal for the following reasons:

- unsuitable vertical alignment for a high speed motorway (110 kph) along its length;
- total reconstruction/upgrade of the road would be necessary;
- the road reserve was considered too narrow for a motorway standard road;
- use of Wallgrove Road would require additional property acquisition and make noise mitigation more difficult;

- a non-toll alternative to the WSO would be maintained by not using Wallgrove Road; and
- use of the existing Wallgrove Road alignment would necessitate construction of an access road for existing properties and as such two separate road reserves would be required in any case.

Whilst it would appear that the factors for not using the Wallgrove Road alignment could be overcome, the Department accepts that there would be little benefit in doing so given that gains in terms of road reserve width, impacts on adjacent properties and construction footprint would be appear to be negligible. To this end, the Department supports the RTA's decision to construct the proposal in a new road reserve. These issues are discussed further in Section 5.5 of this Report.

Do Nothing or Do Minimal

The Department and Nature Conservation Council queried why the 'do nothing' or 'do minimal' options were not considered in the EIS. The Proponent states in the Representations Report that the do nothing option was considered but it was concluded that there would be significant employment, equity and opportunity costs if the proposal did not proceed. However, whilst a number of conclusions as to the impact of not proceeding with the proposal were identified, little evidence was provided to support the claims. Further, no assessment of a "do minimal option" was undertaken such as upgrades to the interim National Highway route or a lower design standard route through the preferred road corridor. However, the Department considers that the 'do nothing' or 'do minimal' options would not achieve the benefits of the proposal in terms employment and accessibility in Western Sydney and public transport benefits. These issues are discussed further in Section 5.2 of this Report.

6.4.4 Conclusion

Consideration of alternative alignments and other options undertaken by the Proponent is considered by the Department to have been somewhat limited. These include the "do minimal option", alternative structural and non-structural options such as demand management and traffic management, alternative design standards (ie other than motorway standard), consideration of construction alternatives and material types/sources. Notwithstanding, the Department considers that the proposed corridor would meet the objectives of the proposal and that the alignment selected has sought to minimise the potential environmental impacts.

6.5 Non-Indigenous Heritage

6.5.1 Background

The EIS and accompanying Working Paper Seven (7) detailed the expected impact that the proposal would have on non-indigenous heritage within the WSO Corridor and proposed mitigation options. Thirteen (13) heritage sites were identified within the proposed corridor between Prestons and West Baulkham Hills. The Pearce Family Cemetery, located adjacent to the proposal on Seven Hills Road at Seven Hills and the Native Institute at Rooty Hill are listed on the State Heritage Register. The EIS states that these sites are outside the road corridor and would not be affected by construction or operation.

The EIS identified the following potential impacts on heritage items during construction and operation of the proposal:

- potential impacts on the Woodstave Pipeline subject to determining its location and depth;
- removal of a standing structure, cisterns and dairy east of Seven Hills Road prior to construction;
- removal of a timber barn and chicken sheds east of Breakfast Creek;
- removal of house foundations and a well near Church Street, Rooty Hill;
- destruction of a contact site south of Meurants Lane;
- removal of possible non-indigenous burial site east of Symonds Road; and
- removal of foundations of a WWII RAAF base.

The necessary Section 140 excavation permits as required under the *Heritage Act 1977* would be sought from the NSW Heritage Council.

6.5.2 Key Issues Raised in Representations

Key issues raised include:

- concerns regarding the adequacy of assessments undertaken and the need for supplementary assessment;
- no non indigenous assessments of southern section;
- clarification of direct impacts on heritage sites listed in environmental planning instruments (EPIs) and affect on the application of SEPP 4;
- concern regarding potential impacts on Pearce's Cemetery, Hoxton Park Airport and Sydney Water heritage sites; and
- concern regarding management measures proposed.

6.5.3 Consideration of Key Issues

Supplementary Investigations

Several representations were received concerned with the level of assessment undertaken, conclusions made, lack of assessment between Prestons and Cecil Park, impact on newly listed heritage items and the impact of changes made to the route. In response to issues raised in the representations, the Proponent prepared a heritage assessment of the southern section of the proposal (Mills, July 2001). Five (5) heritage items were identified including the Upper Canal System: Cecil Hills Tunnel, part of the Sydney Water Supply Tunnel, which is listed on the State Heritage Register and Hoxton Park Airport which was being considered for inclusion on the Register of National Estate.

A supplementary assessment was prepared to consider the impacts of modifications to the proposal considered in the EIS on non-indigenous heritage items. It was found that generally, the proposed modifications would have no impact on archaeological sites or heritage items (Casey and Lowe, 2001). However, modifications in the Regional Parklands south of the Elizabeth Drive interchange would have an impact on the Upper Canal System: Cecil Hills Tunnel which would require a Section 60 approval under the *Heritage Act 1977* for this item. The report recommended:

- further archaeological assessments be undertaken on the identified sites to understand the constraints of the sites and their heritage significance; and
- site B5 (remains of 20th century house) be identified and protected during construction.

The Section 60 application was submitted and an approval issued on 17 August 2001 to partially encase the Cecil Hills tunnel shaft. The Department is unaware of any other State Heritage items

that are expected to be affected by the proposal and as such no further Section 60 approvals would be required.

The Department considers that the supplementary assessments undertaken have addressed concerns regarding the lack of assessment undertaken in the southern section of the proposal and that likely impacts of the entire proposal on heritage items have been identified. Further, the Department considers that destruction of some items of low significance is unavoidable, however conservation of remaining sites is possible and residual impacts are manageable. In order to ensure that appropriate conservation planning and measures are put in place, the Department recommends the inclusion of Conditions of Approval 163 to 166.

Environmental Planning Instrument Listed Items and Application of State Environmental Planning Policy No. 4

The Department requested clarification as to whether there would be any direct impacts on heritage items listed on any EPIs and if this would affect the application of SEPP 4 to the proposal and hence would not be subject of this approval process under Part 5 of the EP&A Act. In response, the Proponent stated that it would lodge Crown Development Applications with the relevant councils following determination of the proposal to address those parts of the proposal that are not covered by SEPP 4.

Impacts on Specific Items

Pearce's Cemetery

Five (5) representations were received raising concern over the impact of the proposal on Pearce's Cemetery, including potential damage to graves and vaults during construction, visual impacts and ongoing management. The Representations Report stated that ground penetrating radar would be undertaken by the Proponent to ensure that a 10 m setback from the grave closest to the proposal is maintained. Subsequently it was recommended that hand and machine excavation would be more appropriate due to greater accuracy (Godden Mackay Logan, 2001). The Department concurs with this finding of a Plan of Management (including landscaping), as reflected in recommended Condition of Approval No. 167.

Sydney Water Heritage Items

Comments were received regarding Sydney Water heritage items including the Cecil Hills Water Supply Tunnel, and the mitigation measures to be implemented. The Representations Report stated that the Cecil Hills Tunnel is now owned and maintained by the Sydney Catchment Authority. Part of the Upper Canal System is listed on the State Heritage Register, Liverpool LEP, Sydney Catchment Authority Conservation and Heritage Register and Register of the National Trust. The Cecil Hills Tunnel vent house is the only item listed on the State Heritage Register that would be affected by the proposal. The Department recommends Condition of Approval 164, which requires preparation of a plan of management for those sections of the Cecil Hills Water Supply Tunnel, affected by the Proposal.

Hoxton Park Airport

Four (4) representations raised the current consideration for listing of Hoxton Park Airport on the Register of the National Estate and the implications of this for the proposal. As this site is

Commonwealth-owned land, any approval issued under Division 4 Part 5 of the EP&A Act does not apply to Hoxton Park Airport. The Representations Report states that the appropriate approval process under Commonwealth legislation and land acquisition are the subject of discussions with Environment Australia.

Part 4 Approvals

It is unclear from the heritage items identified in the EIS if any require council (Part 4) approval to affect. Only the Upper Canal: Cecil Hills Tunnel identified in the modifications report as likely to be affected is listed on the Liverpool City Council Heritage LEP.

Management Measures

Concern was raised, and clarification sought, over the management measures to be implemented for various heritage items. The Department has recommended preparation of plans of management for all historically significant items and areas potentially affected by the proposal as specified in Recommended Condition of Approval No. 168.

6.5.4 Conclusion

The Department is satisfied that with the appropriate monitoring and conditions as outlined, impacts on heritage buildings and items near the proposal could be satisfactorily managed. Conditions 163 to 171 are recommended which require various conservation measures to be developed and implemented prior to and through the construction phase.

6.6 Property Acquisition

6.6.1 Background

The proposed WSO route passes through predominantly residential, rural residential and open space zoned land. The EIS stated that 149 private properties and 113 government/council/institutional properties would be affected by the proposal and require full or partial acquisition.

Twenty three (23) buildings would be likely to be affected in the area between Prestons and Cecil Park. The EIS stated that much of the road corridor between Cecil Park and West Baulkham Hills is reserved for the purposes of a road minimising the impacts on structures. Generally, the RTA owns land in this section, though the Department and NPWS own the SREP 31 - Regional Parklands. Some land acquisition would be required south of the Philip Parkway, near Symonds Road and at Norwest Boulevard to accommodate on and off ramps. The EIS also stated that land might need to be acquired at other interchanges though these locations were not specified.

It is stated that property acquisition would be in accordance with the RTA's *Land Acquisition Policy Statement*.

6.6.2 Key Issues Raised

A small number of representations were received about the issue of property acquisition, including:

- concerns regarding severance and alienation of land which was part of the Western Sydney Regional Park;

- concern regarding loss of facilities, access, parking, roads etc at Sydney International Equestrian Centre;
- concern that the land requirements has increased without adequate notice or reason;
- concern that the proposal would impact on development of industrial lands resulting in financial loss to industrial developers; and
- adequate compensation should be provided to affected landholders.

6.6.3 Consideration of Key Issues

Property Acquisition

Several private landholders raised concerns about the proposed WSO route, its impacts on properties and the issue of compensation. Of greatest concern were changes to the alignment that had occurred over the history of the proposal resulting in greater than anticipated impacts on the affected properties. The Representations Report states that additional land would be required from the Quarantine Station at Wallgrove Road however, 16 properties previously identified for full or part acquisition would not be required in light of the proposed modifications.

It is stated in the Representations Report that the full extent of property acquisition would be identified during the detailed design phase. Notwithstanding, it is the Proponent's view that the alignment has been designed to minimise the impacts on properties wherever possible and that consultation with each of the affected landholders has been undertaken and would continue throughout the detailed design phase. Land acquisition would be in accordance with the RTA Land Acquisition Policy, however it is not the Proponent's policy to compensate landowners for indirect impacts due to the proposal.

The Department notes that a number of representations sought compensation because of the change in alignment from that previously presented. In principle, this approach would not be appropriate, as any preliminary alignments are only presented to the public in good faith. It would therefore not seem appropriate that this becomes fixed and unchangeable, given its preliminary nature. If this were to occur, infrastructure development could not occur in an open way, as any details would have to be resolved before there was any public exposure. Although the Department acknowledges the concerns, the alignment as exhibited in the EIS or modified by the Proponent must form the basis of its assessment.

The Department accepts that the proposed alignment would generally minimise impacts of land acquisition from private property owners and endorses the approach to land acquisition. The Department believes that it is important that affected land owners are consulted with at the earliest possible stage to minimise the impacts of total or partial acquisition and therefore recommends the inclusion of Condition of Approval No. 174. Recommended Conditions of Approval Nos. 173, 175 and 176 requires the Proponent to ensure that damage to properties during construction are minimised and fully rectified at no cost to the property owner.

Discussion of SREP 31 - Regional Parklands and WSRP impacts are discussed in Section 5.16 of this Report.

6.6.4 Conclusion

The Department believes that the proposal, using established road reserves, generally minimises the impacts on land acquisition. The Department recommends a number of conditions of approval for

privately owned land acquisition or temporary leasing over the construction period. These include land acquisition in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991*, advanced notification of acquisition and/or access requirements and rectification of damage to property as a result of direct or indirect impacts.

6.7 Visual Impacts, Landscaping and Urban Design

6.7.1 Background

Visual Impacts

The visual assessment undertaken in the EIS utilised a matrix system that considers visual character, effect and sensitivity of an area. The southern section of the proposal (Prestons to Cecil Park) is characterised by a variety of landuses ranging from market gardens in the south to light industry and new residential release areas extending into the SREP 31 - Regional Parklands at the northern end. Landscape character between Elizabeth Drive and the M4 Interchange includes predominantly recreational (Western Sydney Regional Park and Sydney International Equestrian Centre), rural residential and some industry. North of the M4 Interchange is largely residential with some industrial areas along the existing section of the Phillip Parkway. However the remaining sections of the corridor are substantially developed.

Visual impacts of the proposal were categorised as high, medium or low. The visual impacts of tolling structures and other auxiliary infrastructure were not assessed as the location and appearance of these would be determined at detailed design stage.

Landscaping and Urban Design

The EIS states that three (3) basic landscape treatments would be used for the proposal. Whilst treatments would generally be restricted to the road corridor areas, including the verge, interchanges, cut slopes, fill embankments and medians, it may also be appropriate for treatments to extend beyond the road corridor to link indigenous plant communities and open space corridors in certain locations.

The EIS outlines a number of urban design principles for specific design components such as significant interchanges, bridges, drainage and water quality control, noise reduction measures, embankments and cuttings, vegetation and wildlife habitat, transport connections and road structures.

6.7.2 Key Issues Raised in Representations

Key issues raised in representations included the following:

- natural light and shading loss as a result of the proposal embankment and associated infrastructure such as noise barriers;
- impacts of headlights and streetlighting;
- urban design not specific to the Proposal;
- scale of the Proposal/M4 intersection and regional views; and
- scope of the visual assessment.

6.7.3 Consideration of Key Issues

Additional Investigations

The Department engaged the Urban Design Advisory Service (UDAS) to provide an independent assessment of the visual impacts, landscaping and urban design components of the proposal. The UDAS identified the following as outstanding issues.

- Inconsistencies between urban design principles and landscape design treatments;
- visual impacts on Cecil Hills Residents and the Regional Open Space Corridor;
- visual impact of the elevated road on embankment between Kurrajong Road and Cowpasture Road;
- design of Access points to Western Sydney Regional Parklands;
- inadequate open space links at major creek crossings;
- impacts of fill embankment within the Breakfast Creek/Eastern Creek Corridor.

Specific issues relating to Cecil Hills are discussed in section 5.2 and issues relating to SREP 31 - Regional Parklands and access points to Western Sydney Regional Park are provided in section 5.16.

General

Comparison of the urban design strategies/landscape treatments proposed for the southern and northern sections of the proposal identified inconsistencies between treatments proposed. In response to concerns raised by the Department, the RTA commissioned Jackson Teece Chesterman Willis (JTCW) to prepare consistent urban design guidelines for the entire proposal to be issued as part of the contract tender.

UDAS reviewed the urban design guidelines and concluded that, overall, the design philosophy and principles applied to the Proposal would be appropriate. Given the conceptual nature of the proposal, it is not possible for the detailed design and landscaping of the built elements to be finalised at this stage. To this end, the Department recommends Condition of Approval No. 59, which requires the Proponent to prepare a detailed Framework Urban Design and Landscaping Plan for the entire project. Urban Design and Landscape Plans are required as part of Construction Method Statements for specific sections and elements of the project. Recommended Condition of Approval No. 60 requires these plans to be consistent with the philosophy and principles identified as part of the Framework Urban Design and Landscape Plan.

The Department recommends Condition of Approval No. 70 to ensure sufficient time for landscaping to become established and achieve objectives to minimise the visual intrusion. The condition requires that all works are monitored and maintained for three (3) years from opening of the project and all landscaping within the road reserve shall be maintained for the life of the project.

Visual Assessment

Overall, the visual assessment of permanent structures did not consider a sufficiently broad range of factors to develop management guidelines. For example, it did not consider the need to mitigate against the impact of the road dividing contiguous vegetation communities. In this instance, diverse species plantings more closely reflecting the original vegetation may be more appropriate than the recommendation for single species planting. It also did not consider the opportunities to revegetate

surrounding land, where opportunities exist through council or government-owned land or other contributions that could be made off-site to reduce the visual impact. In general, it is considered that the JTCW urban design guidelines provide a comprehensive approach to landscape design for the proposal, including resolution of bridge design and innovative noise wall structures. General requirements to consider and adopt appropriate measures are incorporated into Recommended Condition of Approval No. 59.

Construction sites would be visually intrusive whilst in use and have a short-term impact on residents and users of particular land areas. In order to minimise the visual impact of construction the Department requires that the Proponent prepare Landscape Sub Plans, recommended Condition of Approval No. 60 as part of the Construction Methods Statements for each construction site to the satisfaction of the Director General. These plans require the Proponent to identify ways to progressively rehabilitate the sites to minimise the period of impact. In addition, the Department has applied a number of general conditions to ensure that visual impact is minimised during construction. These conditions relate to restricted advertising (Recommended Condition of Approval No. 66) and to minimise visual spill of night lighting on adjoining land uses (Recommended Condition of Approval No. 67).

M4 Intersection

The M4 interchange design assessed in the EIS would have significant impact on views and the visual character of the locality as well as impacts on significant vegetation. Concern was particularly raised regarding the impact on views from the SREP 31 - Regional Parklands, views from the M4 at Wonderland and the view west to the Blue Mountains from the M4. Proposed modifications to the proposal incorporates a four (4) level, grade separated interchange with ramps on a series of piers. The Department recognises that this is a motorway to motorway intersection and that inevitably such a structure would be visually dominant. Maintaining the existing uninterrupted views in this instance would not be possible. Notwithstanding, the modified proposal provides a significantly improved outcome from the design assessed in the EIS as embankments within the M4 corridor have been minimised generally maintaining views to the west. This view would be disrupted by piers of various overpasses though this is a significant improvement from the EIS where the carriageways of the M4 provided the only openings through the embankments. The Department considers that the modifications are a significant improvement from the EIS design and require the Framework Urban Design and Landscape Plan to identify measures to mitigate residual impacts further where possible.

Elizabeth Drive

The degree of severance to the Parklands where the Proposal crosses Elizabeth Drive was not sufficiently considered in the EIS. This is the only point at which the two (2) sections of the Regional Parklands intersect. The proposal would create a barrier to movement for fauna, pedestrians and cyclists and views. The visual assessment and landscape plan do not identify the need to provide a physical link between the two corridor sections. Monoculture planting in this area is not considered appropriate given the surrounds. Landscaping issues should be considered in a strategy developed to identify appropriate options for this location. To ensure that these issues are addressed in the detailed design of the Proposal the Department recommends that Urban Design and Landscape Sub Plans and the Pedestrian Access Strategy recommended as Conditions of Approval Nos. 60 and 112.

Natural Light, Shadowing and Light Disturbance

A number of representations were received from Casula residents regarding the impact of the design of the proposal on natural light and shadowing, including noise barriers, on their residences. The Proponent has indicated that these issues would be resolved during detailed design in implementing the noise management strategy and developing detailed landscaping plans. The Department considers it appropriate that these issues be resolved with landholders during the detailed design phase, taking into account the noise management strategy and landscape management plans to be prepared. The Department recommends Condition of Approval No 65, which requires the Proponent to develop these strategies in consultation with affected landowners.

Disturbance from traffic headlights and street lighting was also raised. The Proponent indicated that the road design, including noise barriers, landscaping and embankments would eliminate the visual impact of traffic headlights. The Proponent has indicated that street lighting would be restricted to interchanges and along the off-motorway cycleway, however the effects of lighting along the cycleway have not been considered in any detail. This is of particular concern given that the cycleway would be located close to property boundaries along much of its length. This issue is considered in more detail in Section 5.14. The Department recommends Conditions of Approval Nos. 67 and 109, which require all lighting to be consistent with relevant standards and issues of lighting the cycleway near residences to be addressed in the cycleway strategy.

Open Space Links at Creek Crossings

UDAS raised the issue of amenity of access at major creek crossings. Particular concerns related to there being no bridge or pedestrian connection at Maxwells Creek; the low level crossing of Reedy Creek with a short bridge impacting on the creek views and amenity, cumulative impacts of the M2 and the proposal on Toongabbie Creek; and embankments and culverts at Lady Penhryn Park and Pearce Reserve.

The Representations report subsequently modified the design to address these issues. UDAS has also recommended improving the open space link at Lady Penhryn Park by requiring longer separated bridges for access, view and safety. The Department concurs with this issue which is specified recommended Condition of Approval No. 63.

The EIS proposed to cross the Eastern and Breakfast Creek floodplain at a low level and in part at grade. UDAS identified that this would result in reduced amenity and possible partial severance of the potential north-south open space links across the creek lines, and degradation of the landscape and visual quality including loss of views and existing trees. These issues could be partially overcome by raising the WSO over Symonds Road and Quakers Hill Parkway. However, subsequent discussions with the Proponent indicated that to raise the height of the proposal over Eastern Creek would require significant additional fill and the larger embankments would also impact on areas of endangered ecological communities. Notwithstanding, it is the Department's view that a single bridge structure spanning both Eastern and Breakfast Creeks without any embankment between the watercourses would address the issues of view and pedestrian access. To this end, the Department recommends Condition of Approval No. 64.

6.7.4 Conclusion

Overall, the Department considers that the modifications proposed in the Representations Report and in information provided subsequent to the Representations Report represent a significant reduction of

visual impacts than those proposed in the EIS. The assessment undertaken by the Department has concluded that the design and landscape principles and philosophy prepared for the proposal are generally appropriate. While it is recognised that the construction activities would have short-term impacts, the overall long-term impacts would need to be assessed in more detail as part of the development of the Urban Design and Landscape Strategy for the Proposal. It is considered that the outstanding issues raised by the Department can be adequately resolved through implementation of the recommended conditions of approval.

6.8 Social Impacts

6.8.1 Background

Potential social impacts of the WSO would be in the form of both social benefits and adverse social impacts. The key social benefits of the proposal would include:

- creation of up to 600 direct jobs and a number of indirect jobs over a four year construction period;
- and increased accessibility for industrial and commercial operations in western Sydney through improving efficiency and reducing the costs of moving freight; and
- increased traffic efficiency, reduced fuel consumption and improved traffic and pedestrian safety.

There would also be temporary, short-term impacts on the general amenity of the local community surrounding the proposal, users of the surrounding roads and pedestrian networks. Many impacts of the proposal such as noise, air quality, and visual impacts may lead to indirect social impacts of the surrounding residential environment.

The EIS recognised the potential also exists for severing the catchment area of some communities including facilities such as schools and services. However, the EIS stated that all existing major road connections across the proposed road corridor would be maintained as part of the project and therefore the impacts on local access and severance issues would be minimised.

Mitigation measures stated in the EIS included an extensive community consultation program, land acquisition, landscaping works for screening purposes, maintenance of the local road network, maintenance of existing accessways or construction of temporary accessways, and the provision of pedestrian walkways and cycleways to link communities on either side of the proposal. The EIS concluded that with the mitigation measures the proposal would result in long term net social benefits.

6.8.2 Key Issues

The NSW Health Department and a number of individuals raised the following concerns:

- severance and loss of access between communities; and
- the adequacy of impact assessment on amenity.

6.8.3 Consideration of Key Issues

Severance

The NSW Health Department and a number of residents raised concerns over the assessment of the impacts on the division of communities. In response, the Proponent in the Representations Report acknowledges that the proposal has the potential to sever the catchment areas of some community facilities and services but restates that all major road connections including the provision of pedestrian and cyclist access would be provided. Pedestrian and cyclist accessibility has also been enhanced through the Minister for Roads announcement of the construction of a fully grade separated off motorway bicycle and pedestrian route which would include links to local roads and paths. The RTA stated that the northern section of the proposal would be constructed through an already established road corridor and that communities on either side of the corridor should have developed based on a road eventually being constructed through it.

Whilst the Department recognises that the maintenance of main roads across the corridor and the additional pedestrian and cyclist accesses provided would reduce impacts there does not appear to have been any strategy by the Proponent to provide access based on key attractions such as schools or recreational facilities. To minimise these potential severance impacts across the corridor the Department recommends the inclusion of Condition of Approval No. 109 requiring the preparation of a cycleway strategy and No. 112 requiring the preparation of a pedestrian access strategy for the proposal prior to construction. These issues are further discussed in Section 5.14.

Amenity

A number of individual representations raised concerns about the impacts on the amenity of their areas including visual and noise impacts. In general, most of the issues raised related to specific construction issues such as noise, dust, access etc and the issues have been dealt with in the appropriate sections of this report.

The Department has also identified a number of more broadly applicable recommendations to reduce construction impacts including:

- that construction work is not undertaken at night;
- comprehensive construction noise and vibration and air quality monitoring throughout construction works;
- the implementation of an extensive communication strategy including notifications, briefings, community liaison groups and a 24-hour complaints telephone number; and
- the appointment of Independent Community Liaison Representatives to liaise with the community and with the EMR when unacceptable impacts are noted.

The Department believes that with the implementation of these conditions, impacts on the surrounding communities' amenity would be minimised.

6.8.4 Conclusion

Social impacts in the form of severance and changes to the character and amenity are an unfortunate but inevitable result of such a large linear infrastructure proposal. These impacts would be somewhat balanced by the overall regional benefits of the proposal in terms of construction employment and investment and the accessibility and traffic efficiency benefits during operations. To ensure that the

adverse impacts are minimised the Department has proposed a number of conditions requiring the preparation of bicycle and pedestrian access strategies prior to construction and specific conditions to minimise the visual, noise and air quality impacts on surrounding communities.

6.9 Economic Impacts

6.9.1 Background

A road user cost-benefit analysis was undertaken for the EIS in accordance with the RTA's *Economic Analysis Manual*. The costs included land acquisition, capital costs, operating and maintenance costs. The benefits used were travel time savings, vehicle operating cost savings and lower accident costs. The analysis estimated that the road user benefit cost ratio for the proposal at a 7% discount rate would be 2.2:1 (ie. benefits would outweigh costs by 2.2 times).

The EIS also stated that the construction of the WSO would also create both direct (up to 600 jobs) and indirect employment benefits for the local and regional economies. Broader operational economic benefits of the proposal would include reduced costs of production for industry, greater commercial and industrial activity and a higher investment that would flow on to many sectors of the economy beyond the area that the road directly traverses.

6.9.2 Key Issues

The EPA and the Department raised concerns in regard to EIS economic assessment including:

- assessment had not been prepared in accordance with Department or NSW Treasury guidelines requiring full cost-benefit analysis including consideration of environmental externalities; and
- sensitivity of results needed to be tested with the removal of infra-marginal travel time savings and based on staged construction.

6.9.3 Consideration of Key Issues

Economic Assessment of Externalities

The Department raised fundamental concerns in regard to the economic assessment in the EIS in that it had not assessed all costs and benefits (including externalities) in accordance with the NSW Treasury *Guidelines for Economic Appraisal 1999* and the Department's *Draft EIS Manual – Economic Effects and Evaluation in Environmental Impact Assessment 1997.* In response, the RTA prepared an additional cost-benefit analysis incorporating environmental benefits and costs. Externality costs and benefits including traffic noise impacts, air pollution impacts and the cost of changes in the emission of greenhouse gases were included in the revised cost benefit analysis.

The report suggested that whilst there would be some externality costs in terms of short and long term noise impacts on housing prices, these would be more than offset by air quality benefits and in particular reduced greenhouse gas emissions. The assessment found that based on the Commonwealth Bureau of Transport and Communication Economics (BTCE) estimates in 1996 of the value per tonne of carbon dioxide, the WSO would result in substantial externality greenhouse gas benefits due to reduced regional air emissions (refer to Section 6.3 for further discussion). The benefit was estimated at over $60 million per year from the year 2016.

The revised cost benefit analysis determined that on a net basis, all the externality impacts are expected to be beneficial. The total benefit generated by the proposal would increase by about 10% with the inclusion of externality impacts.

With the revised traffic assessment (refer to Section 5.6), the overall cost-benefit ratio for the proposal was estimated at 5.4:1 (ie. benefits outweigh costs by 5.4 times, substantially higher than that estimated in the EIS. Discounted travel time savings account for almost 90% of all benefits accrued as a result of the proposal.

The EPA raised concerns that the revised cost benefit analysis had not considered all externality impacts of the proposal such as visual, flora and fauna impacts etc. Whilst the Department generally concurs with the concerns of the EPA, it considers that due to the size of the benefit/cost ratio, inclusion of such externalities are not likely to reduce the ratio to below one (ie. costs outweighing benefits). Further, with the implementation of recommended mitigation measures encapsulated in other sections of this report, the long term negative impacts would be minimised.

Sensitivity Assessment

Traffic modelling of the impacts of a large new road infrastructure proposal such as the WSO estimate the impacts on the entire road network. For a large road network, the cumulative result of small improvements in travel times savings across the network can result in substantial benefits. However, there are arguments that small travel time savings (ie. savings of less than 5 minutes) are not actually realised and in economic terms would be considered as 'infra-marginal' and should not be included in the assessment. The Department suggested that the sensitivity of the removal of these 'infra-marginal' benefits should be tested.

In response, the RTA undertook a brief sensitivity of travel time savings in the Representations Report, which found that reductions in travel time savings of approximately 50% would result in substantial reductions to the benefit cost ratio.

In response to concerns by the Department that the cost benefit analysis in the EIS was based on benefits being realised through a staged opening of the proposal, the RTA assessed in the Representations Report the sensitivity of not including any benefits until 2007. The assessment found that only a minor reduction in the benefit cost ratio would result.

6.9.4 Conclusion

The Department believes that the benefits of the proposal are likely to substantially outweigh the costs even taking into account externalities and the elimination of small travel time savings. With the inclusion of the recommended conditions of approval related to issues such as public transport provision and numerous mitigation measures, the benefits to the whole of society as a result of the proposal would be maximised.

6.10 Water Quality, Erosion and Sediment Control

6.10.1 Background

The proposal as assessed in the EIS would cross seven (7) major creeklines, numerous ephemeral streams and various farm dams. The EIS states that existing water quality of these watercourses is

affected by upstream land use practices, which have contributed to increased nutrient, suspended solid and bacterial levels entering the systems.

The EIS identified the major risk to water quality during construction of the proposal would occur during earthworks resulting in suspended sediment and associated pollutants being washed into downstream watercourses. A number of potential operational impacts were identified including introduction of litter, suspended solids, metals, oils and other hydrocarbon-based compounds, and introduction of pollutants from road accidents and spills.

Erosion impacts could be high in some areas, particularly at construction sites adjacent to creeks and other waterways. Temporary and permanent stormwater detention basins (including stormwater wetlands) were proposed as part of the proposal to capture run-off from construction sites, excavated ground and road runoff during operation and to provide water quality treatment prior to discharge to nearby watercourses. Stormwater interceptors have also been proposed.

Mitigation measures proposed include preparation of a water control strategy, separate water systems for catchment and road run-off, installation of water quality ponds, incident (spill) management structures, hay bales and filter strips, and gross pollutant traps.

6.10.2 Key Issues Raised

The key issues raised included:

- that the EIS lacked sufficient detail to assess the impacts on water quality
- the potential impacts of erosion and sedimentation of waterways, particularly during construction;
- details of mitigation measures and sedimentation basins are required; and
- general stormwater management.

6.10.3 Consideration of Key Issues

Six (6) representations raised concerns about the level of detail provided in assessing the impacts of the proposal and the monitoring proposed. In response, the Proponent stated in the Representations Report that baseline water quality monitoring was being undertaken and that a monitoring program would be prepared during detailed design. Water quality impact assessment was largely qualitative, with no attempt to quantify the potential impacts. Similarly, the EIS included a range of water quality control measures that could be considered but commitment to specific measures or locations of these, including sedimentation basins has been deferred to the detailed design stage. This is considered in further detail in Section 6.16.

Whilst this approach is generally not considered best practice, the Department considers that given the RTA's experience in road construction, impacts of construction and operation of the proposal on the water quality of nearby watercourses would be manageable. Due to the lack of certainty in locations for sediment controls, the Department recommends the inclusion of Condition of Approval No. 128 which sets criteria to be met in selecting locations for sediment basins and other soil and erosion controls. A range of other conditions is proposed regarding management of surface water and disposal from construction sites.

6.11 Groundwater and Contamination

6.11.1 Background

No assessment of impacts on groundwater or potentially contaminated areas was made in the EIS for the section of the proposal from Prestons to Cecil Park. The EIS for the Section from Cecil Park to West Baulkham Hills stated that limited information on groundwater levels was available, however near surface groundwater was expected between Abbotsbury Drive and the Great Western Highway based on past experience where water was encountered at 1.5 m below the surface.

6.11.2 Key Issues Raised

Key issues raised in representations were:

- concerns that the EIS does not contain any assessment of potentially contaminated land;
- that further investigations are required to identify areas of potential groundwater contamination and measures proposed to manage any contaminated groundwater; and
- that the EIS should more closely investigate impacts on groundwater and salinity.

6.11.3 Consideration of Key Issues

Additional Investigations

Groundwater Salinity

A groundwater salinity study was undertaken by Davies Geotechnical Pty Ltd (2001) and included in the Representations Report. The study concluded that there is potential to encounter saline groundwater in rock cuttings for the proposal though no groundwater testing was undertaken to support this.

Sediment or other contaminants entering and deteriorating groundwater quality and saline groundwater entering surface waters were identified as the most likely impacts due to road construction. Potential contaminating land uses adjacent to the proposal included piggeries, poultry farming and heavy industry. These could contaminate groundwater through infiltration and seepage, emerging in rock cuttings to contaminate surface waters. Any perched watertables in the area would pose a risk of contamination.

No assessment was made of locations along the proposal where salinity may be encountered in road cuttings, quantities of groundwater intercepted as cutting seepage or salinity levels of groundwater seepage into the cuts.

Contamination

Environmental & Earth Sciences was commissioned by the RTA to undertake a contamination assessment of the Western Sydney Orbital route to identify sites for targeted contamination testing (Environmental & Earth Sciences, 2001a). Of the 266 sites investigated, 29 were categorised as having a medium or high risk of contamination based on current or previous land use. The investigations identified areas of illegal waste dumping along the route where classification of waste would be required prior to disposal to landfill. Areas containing potentially unexploded ordnance (UXO) were identified between Elizabeth Drive and Richmond Road on sites used as World War 2

training camps. It was recommended that these locations be investigated and cleared of any UXO by qualified personnel prior to construction commencement. A number of areas were also identified where residual pesticides, herbicides and other chemicals were likely to be present in the soil as a result of past and present market gardening. However, this was considered suitable for use in landscaping, as it was unlikely to have any potential adverse effect on human health or environment.

An additional assessment (Environmental & Earth Sciences, 2001b) was undertaken to reassess those 29 sites identified previously as medium or high risk and to consolidate previous investigations. Overall, 158 sites were found to have no issues concerning contamination. The remaining 108 sites were classified as having low risk, including the 29 previously identified as high or medium risk. Low risk sites were generally due to location of small fill stockpiles located in either residential, park/open space or farmland, market gardening or low risk industrial or commercial operations.

Groundwater Quality

It would appear that limited groundwater data, including groundwater salinity, are available for the area near the proposal. The Department considers that there is a need for pre-construction investigations to establish the likelihood of encountering groundwater during construction in tunnel locations and areas of significant cuts. A range of conditions (Nos. 192 to 198) are recommended by the Department to identify locations where groundwater may be encountered, areas of potentially high salinity levels and means of managing and monitoring these.

Contamination

It is considered that areas of contamination affected along the route are unlikely to be significant and that any potential areas of contamination could be managed with the implementation of appropriate mitigation measures. To this end, the Department recommends inclusion of Condition of Approval No. 184, which requires preparation of a Contamination Investigation Report. Condition of Approval No. 185 requires preparation of a Remedial Action Plan(s) if remediation is necessary. If previously unidentified contamination is encountered, Recommended Condition of Approval No. 186 requires that the Proponent cease work in the vicinity until further assessment and appropriate measures are implemented.

Contaminated Water Contingency Plan

One representation requested that a Contingency Plan be prepared for the disposal of contaminated water generated by an emergency. The Proponent states in the Representations Report that a contingency report would be prepared as part of the Construction EMP. The Department considers that a Contingency Plan would be appropriate for the construction and operation phases of the proposal. This is specified in Condition of Approval No. 190 and 125.

6.12 Greenhouse Gases

6.12.1 Background

The EIS stated that the Proponent is committed to ensuring that its environmental goals and policies are consistent with those outlined in the 1992 *Intergovernmental Agreement on the Environment,* which includes requirements to manage greenhouse gas emissions. The EIS stated that the Proponent has been involved in developing and implementing several strategic initiatives to address

the issue of road transport related greenhouse gas emissions, including the *National Greenhouse Response Strategy* and the *RTA Greenhouse Reduction Plan*.

The EIS stated that there would be significant fuel savings resulting from the Proposal due to a high standard road surface and constant travel speeds of greater than 80 km/h over the majority of the route. This would result in better traffic flow hence better fuel consumption, thereby reducing overall greenhouse gas emissions.

6.12.2 Key Issues

Key issues were raised by the Australian Conservation Foundation, the Department, CAMWEST and the Campbelltown and Districts Commuter Association and included:

- concern regarding the impact of the Proposal on greenhouse gas emissions;
- a full greenhouse statement is required in accordance with Commonwealth policy;
- initiatives to reduce greenhouse gas emissions have not been identified; and
- encourages dependency on oil companies, multinationals and dwindling oil-based products.

6.12.3 Additional Investigations

In response to the issues raised in representations to the EIS, a supplementary air quality assessment was undertaken in July 2001 and included a Greenhouse Gas Emissions Statement. This report and statement is provided in Appendix 10 of the Representations Report.

The supplementary report provided an estimate for the fuel used in the construction phase of the proposal and the fuel saved at various stages over the life of the proposal as a result of the greater fuel efficiency of cars in the region using the WSO. These results are provided in Table 6.2 below.

Table 6.2 Greenhouse Emissions

Stage of the Proposal	Fuel used/saved	CO_2 emitted/saved
Construction Phase	70 Mt used	190 Mt emitted
2006 with WSO built	133 Mt saved	359 Mt saved
2016 with WSO built	152 Mt saved	414 Mt saved

The Representations Report states that this shows a net saving in 2006 of 63 million litres of fuel and 169 million tonnes of greenhouse emissions compared to the no build case.

The regional air quality assessment indicates that there would be a reduction in greenhouse gas contributor carbon dioxide as a result of the proposal across the entire Sydney network. It is predicted that a 1.8% a reduction in CO_2 emissions in 2006 and 2.4% reduction by 2016 would result. The predicted reduction occurs despite a predicted increase in total vehicle kilometres travelled in Sydney as a result of the proposal which is more than offset by the decreased travel time and associated emissions under these conditions. This issue is discussed further in Section 6.2.

6.12.4 Consideration of Key Issues

The EIS stated that there would be significant fuel savings resulting from the proposal due to the reduced traffic congestion and improved efficiencies to the road network. This is estimated to be around 63 million litres in the first year of opening to around 152 million litres per year by 2016. In

order to ensure that the Proponent reduces energy expended during construction as far as practicable the Department recommends the inclusion of Condition of Approval No. 199 that contractors be assessed in accordance with criteria developed in consultation with SEDA favouring the use of cleaner fuel sources. Recommended Condition of Approval No. 200 requires that the Proponent to ensure that energy efficient work practices are developed.

Government policy requires that 'green power' shall be purchased for the supply of at least 6% of all the energy requirements for the construction of Government projects. Whilst recognising this standard policy the Department believes that as a large portion of energy used in construction would be gasoline based fuel sources which could not be sourced from 'green power' electricity providers. The Department believes that a more realistic and achievable goal for this proposal, which would meet the Government policy minimum requirements, is to include Recommended Condition of Approval No. 202 requiring the Proponent to purchase 'green power' for the supply of at least 50% of the electrical energy requirements during construction.

6.12.5 Conclusion

The Department notes that the projected benefits of the proposal in relation to greenhouse gases are entirely dependent on the traffic modelling, which is inherently dependent on assumptions about traffic reductions on the surrounding road network including the minimisation of induced traffic. As indicated in Sections 5.4, 5.6 and 6.2 these traffic reductions and hence greenhouse benefits are highly reliant on the traffic and public transport recommendations that are detailed in this report.

Nonetheless, the Department believes that with the implementation of the recommended conditions described above the short-term greenhouse gas impacts during construction would be minimised and the long-term greenhouse gas benefits maximised.

6.13 Cumulative Impacts

Cumulative impacts may arise from the interaction of the construction and operation of the WSO with other significant proposals and activities planned for the Western Sydney region and Sydney overall. The EIS stated that overall the proposal is expected to largely result in positive cumulative environmental impacts. The Representations Report determined that the adverse impacts were minor and outweighed by the beneficial impacts of the modifications.

Construction

During construction, the proposal would result in short term impacts of noise and vibration, dust and visual and amenity impacts, which would require careful management. Specific management measures in relation to these issues are discussed in Sections 5.11, 6.3 and 6.7.

The movement of imported fill required as part of the proposal has the potential for significant cumulative impacts on the road network particularly when considered with large spoil movement projects such as the Parramatta Rail Link, Cross City Tunnel and the South Windsor Flood Relief Route. To minimise the impacts of fill transport as a result of the proposal the Department recommends the inclusion Recommended Conditions of Approval Nos. 177 to 179 requiring the consideration of fill movement from rail. These conditions require consideration of other spoil generating projects and any synergies in the transport of material.

Operations

The WSO has the potential to be a significant influence on the structure of strategic and landuse planning in Western Sydney. The Department has briefly assessed the proposal in relation to the current urban release program in Section 5.15 and found that they are broadly consistent and that the WSO would benefit these areas. To ensure that these strategic/landuse planning benefits are maximised the Department recommends a number of public transport initiatives as discussed in Section 5.4.

The cumulative impacts of operations are assessed based on the whole proposal opening at the same time. The cumulative impacts of any stage opening are unknown and may be significant. As such the Department has recommended the inclusion of Condition of Approval No. 28.

The proposal is predicted to have benefits in terms of linkages and accessibility to employment and improved freight transportation. The proposal is also generally predicted to result in reductions to traffic levels in the surrounding road network with the associated improvements to safety and amenity. To ensure that these benefits to freight and surrounding road network are realised the Department recommends the inclusion of monitoring conditions and strategies to maximise benefits.

The revised air quality assessment undertaken as part of the Representations Report indicates that the proposal would lead to an improvement in regional air quality and resulting greenhouse emissions.

6.14 Utilities and Services

6.14.1 Background

The EIS stated that existing utilities and services within the proposed road corridor are:

- electricity, including transmission lines, pilot cables, distribution lines, street lighting, substations, works depots and a regional office;
- gas pipelines including the Sydney-Moomba high pressure gas pipeline, the Sydney-Newcastle Oil and Gas pipeline and the Eastern Gas Pipeline;
- water and sewage pipelines including Sydney Water mains, the Sydney Water Upper Nepean Water Supply Scheme Sydney Water, sewer mains and reticulation lines; and
- telecommunication lines.

The EIS identified measures to manage the impacts on these services. More precise impacts and proposed actions would be identified during the detailed design stage. The EIS stated that this would be undertaken in consultation with the relevant service authorities.

6.14.2 Key Issues

The key issues raised by Sydney Water and Integral Energy, included:

- impact on Sydney Water properties including sewer and water mains; and
- impact on electrical infrastructure such as transmission lines.

6.14.3 Additional Investigations

A Utility Management Guide, included as Appendix 15 of the Representations Report, was prepared to provide preliminary detail of the location of utilities and the extent of works to be undertaken where the Proposal and associated works could impact upon existing utilities.

Consideration of Key Issues

General

The Representations Report states that further utility works would be identified throughout the detailed design and construction phase of the proposal. It suggests that it would be beneficial if services could be co-located along the Proposal, reducing environmental impacts and minimising the area required. The Department therefore recommends that detailed design be undertaken in consultation with relevant authorities, as specified in Recommended Condition of Approval No. 203, to enable this potential co-location to occur.

The Department notes that the relocation and protection of utilities would need to be completed in consultation with relevant service providers and require careful management to ensure that service disruptions are minimised. The Department's Recommended Condition of Approval No. 205 requires the Proponent to identify all affected utilities and determine requirements for diversion, protection and/or support in consultation with service providers and prior to the commencement of construction. The Department recommends that any works required be carried out to the satisfaction of, and at no expense to the relevant service providers. This recommendation is reflected in Recommended Condition of Approval No. 207. To ensure that service disruption impacts on surrounding residences and businesses are minimised, the Department's Recommended Condition of Approval No. 208 requires the Proponent to advise residents and business owners of any service disruptions during construction.

Sydney Water

Sydney Water raised concerns over the significant extent and scale of impacts of the Proposal on its water and sewer mains. Recognising the extent of the impact, the Department requires the Proponent to engage a suitably qualified person acceptable to Sydney Water to ensure that designs for construction or relocation are consistent with Sydney Water requirements, as detailed in Recommended Condition of Approval No. 206. The Department also requires the Proponent to prepare a contingency plan for instances where bulk water supply may be interrupted and that the Proponent bear all costs of restoration works. This is reflected in Recommended Condition of Approval No. 209. Further, construction over sewer access chambers shall be avoided wherever possible as reflected in Recommended Condition of Approval No. 210.

Electrical Infrastructure

Concerns were raised by Integral Energy regarding the impact on electrical infrastructure including concern regarding the level of impact assessment on and requirements for relocation of overhead tower structures. In response, the Representations Report states that sections of the proposal would be raised above ground level, and as a result some 132 kV transmission lines crossing the road reserve would also need to be raised or else significantly relocated. The Department is concerned that the Proponent has not recognised or adequately assessed the visual impacts resulting from increasing the height or relocating the transmission lines. To ensure that adequate assessment is

undertaken, the Department's Recommended Condition of Approval No. 204 requires the Proponent to identify where new electricity towers could be located and existing towers would need to be raised. The condition also requires the Proponent conduct a visual assessment of each affected tower and investigate the cost effectiveness of alternate strategies such as undergrounding the transmission lines to the satisfaction of the Director-General.

6.15 Hazards and Safety

6.15.1 Background

Separate risk assessments were undertaken for the southern and northern sections of the proposal. A qualitative assessment was undertaken for the southern section, which identified the following construction and operational hazards:

- impacts on obstacle limitation surface and bird hazards at Hoxton Airport;
- hazardous chemicals and fuel storage during construction;
- slope instability; and
- risks of dangerous goods transport.

A more detailed risk assessment was undertaken for the northern section which estimated (albeit incorrectly) and assessed the individual fatality risk associated with road transport of hazardous goods. Although it was concluded in the EIS that the proposal would probably result in a net risk reduction when compared to the existing road network, a comparative risk analysis was not undertaken.

6.15.2 Key Issues Raised in Representations

A number of representations raised concerns about the hazards and risks associated with the proposal including:

- concerns regarding adequacy of assessments and inconsistency between methodologies adopted;
- requests for further assessment of construction phase risks;
- need for a contingency plan to manage contaminated water; and
- a comparative risk assessment to demonstrate the net risk reduction and a comparison of societal risk.

6.15.3 Consideration of Key Issues

Adequacy of Risk Assessments

The Department raised issues of assessment adequacy, consistency and compliance with recognised policies and guidelines. In response, the RTA submitted a Revised Assessment of Hazard and Risk Issues (SKM, 2001b) included in the Representations Report.

The revised assessment considered individual fatality risk but did not quantify injury risk (such as heat radiation, explosion overpressure or toxic exposure) or risk of property damage or accident propagation. Although the individual fatality risk criteria adopted by the Department would be exceeded at some locations along the proposed route, these criteria are normally only applied to new fixed industrial developments. Furthermore, the risks would appear to lie within limits considered

tolerable for existing industrial facilities. Although a comparative risk assessment has not been provided, the Department considers it is not unreasonable to expect that there would be a reduction in overall risks based on other studies reviewed.

In conclusion, although the risks are likely to be within tolerable limits, it is still appropriate to assess the need for risk mitigation measures in the vicinity of sensitive land uses (eg. schools, waterways etc), more highly populated areas along the route and at major intersections. Such an assessment would firstly require identification of the major risk contributors together with their relative contributions to the cumulative risks. The Department's recommended Conditions of Approval Nos. 212, 214 and 216 require the Proponent to hold a risk management workshop to identify and rank potential construction and operational hazards and risk mitigation measures, to prepare a Hazard and Risk Management Sub Plan and procedures dealing with construction stage impacts. The report of the workshop is to provide assurance that relevant risk mitigation measures would be identified and implemented.

Specific Hazards and Risks

Slope Instability

The RTA identified in the EIS that there are potential issues of slope instability in the vicinity of Elizabeth Drive due to the soil type and geotechnical characteristics of the area. The potential issue of slope instability in this area is further exacerbated, as significant cuts would be required to the north and south of Elizabeth Drive. The Department recommends the inclusion of Condition of Approval No. 213, which requires the Proponent to undertake a geotechnical study in this area to determine the potential impacts. These investigations may also trigger additional measures to mitigate environmental impact, which would be need to be incorporated into the sedimentation and erosion controls as part of the Soil and Water Quality Management Sub Plan required in Recommended Condition of Approval No. 126.

Hoxton Park Airport

The proximity of the proposal to Hoxton Park Airport raises additional potential hazards related to the operation of the airport and the required Obstacle Limitation Surface (OLS). To meet the Airport operators concerns regarding their OLS, the Proponent's modified the proposal so that Cowpasture Road would pass under the WSO. The Department's Recommended Condition of Approval No. 215 requires the preparation of procedures for construction and operation stage risk impacts near the airport to ensure that the OLS requirements are met. The procedures must be prepared in consultation with the airport management and to the satisfaction of the Civil Aviation Safety Authority.

M4/WSO Interchange

Modifications to the proposal at the WSO/M4 interchange to reduce visual impacts include three (3) off and on ramp tunnels of between approximately 150 m and 400 m long. The potential risks associated with the operation of the tunnels were assessed in a supplementary assessment by SKM (2002b). The report suggested that the potential risks of the release of dangerous goods and a potential explosion within a tunnel would increase the chance of death or injury for motorists in the tunnel. A similar event occurring outside of the tunnel would likely result in substances being dispersed more quickly, reducing the risk of injury. The report suggested that the location of the tunnels on bends would also increase the potential for the loss of control of a vehicle and increasing risks.

The report identified an alternative above ground route, which bypasses the tunnel sections by using the existing Wallgrove Road interchange and Great Western Highway, both designated B-double routes, for all movements to and from the proposal. Although the report stated that this route poses a higher risk of collision due to at-grade intersections and proximity to areas of human activity, the consequences of an incident would be less than an incident in the tunnel.

On the grounds of "avoiding avoidable risk" and the findings of this report, the Department considers that the transport of dangerous goods through the tunnels at the M4 interchange should be prohibited. This is consistent with prohibition of dangerous goods transport in other similar tunnels in the Sydney Metropolitan Area (refer to Schedule 2 of the Road Transport (Safety and Traffic Management) (Road Rules) Regulation 1999). Further, the tunnels are proposed as single lane only, which could potentially limit emergency access and egress. This recommendation is stated in Condition of Approval No. 219.

Fuel Storage

Diesel fuel is not classified as a dangerous good, as defined under the *Dangerous Goods Act 1975*, and under normal storage conditions fire if one should occur at a nearby fuel storage area. To this end, the Department recommends inclusion of Condition of Approval No. 218, which gives locational criteria for diesel storage and standards for construction of storage areas.

Safety and Security

To minimise the impact of crime such as vandalism, illegal dumping and to ensure during operation that policies and procedures are in place to manage security and crime, the Department recommends the inclusion of Condition of Approval No. 211.

6.15.4 Conclusion

Unavoidable increases in risks would occur during construction and operation of the proposal particularly in areas currently remote from major roads where dangerous goods are transported. The assessment of risks and hazards has generally found that the risks would be within tolerable levels. The Department has recommended a number of conditions to further minimise risks during construction and operation.

6.16 Location of Construction and Ancillary Facilities

6.16.1 Background

The EIS provided details on the activities to be undertaken within construction sites and indicated that the sites would be located within the proposed road reserve or in a nearby site appropriately zoned for such activities. It was indicated in the EIS that the construction sites would be located in areas which do not contain threatened or regionally significant vegetation. However, the EIS did not provide any indicative or proposed locations for ancillary construction infrastructure including construction compounds, batch plants, cycleway facilities, and sedimentation and detention basins.

The EIS proposed that all equipment, facilities and temporary services be removed on completion of the WSO and sites rehabilitated as part of the landscaping strategy.

6.16.2 Key Issues

The Department, NPWS and Liverpool City Council requested further details on the locations of construction and ancillary infrastructure and raised the following issues:

- associated impacts with the location and size of embankments, water quality controls, construction areas, batching plants and stockpile sites should be identified; and
- if details of the infrastructure can not be provided, criteria for assessing these facilities should be identified.

6.16.3 Consideration of Key Issues

The Representations Report stated that the precise location and size of construction and ancillary infrastructure, including water controls, stockpiles etc could not be determined until the detailed design stage of the proposal. In response to concerns raised to the EIS, the Representations Report stated that the ancillary infrastructure would be excluded from locations where there would be impact on any species or communities listed under the TSC Act, as identified in Recommended Condition of Approval No. 223.

Subsequent information from the Proponent indicated that the off motorway cycleway would also cater for pedestrians and would be almost entirely within the road reserve, however this could be subject to change as this aspect of the proposal develops. The pedestrian/cycleway is discussed further in Section 5.14. An indicative location for a construction compound has also been identified by the RTA at a site north-east of the proposed WSO/M4 interchange. It is understood the RTA is preparing a separate REF for this site.

The scale of the proposal and infrastructure required raises concerns about the total environmental impacts of all construction and ancillary facilities along the route. In response, the Department requires an Ancillary Infrastructure Impact Assessment (AIIA) to address the environmental impacts of all ancillary facilities associated with the Proposal. The AIIA would be required to address the need for construction compounds, concrete or asphalt batch plants, noise mitigation, service centres, toll facilities/gantries, off motorway cycleway facilities, sedimentation basins, flood detention basins/construction wetlands and variable message/speed limit signs. This requirement is reflected in Recommended Condition of Approval No. 20.

Because of the scale of the proposal and the large amount of ancillary infrastructure required, the Department remains concerned that these assessments have been deferred to the detailed design stage. In the absence of more detailed information the Proponent provided a list of criteria for locating ancillary infrastructure. The Department has reviewed this information and developed specific lists of criteria to be applied in siting for sediment and erosion controls and sedimentation basins, detention basins and constructed wetlands, and construction compounds and other ancillary facilities. These criteria are reflected in Recommended Conditions of Approval Nos. 128, 146 and 223 respectively.

7 CONCLUSION AND RECOMMENDATIONS

Conclusion

The need and justification of the WSO has been primarily based on the desire to provide an efficient National Highway link between the F5 and F3, providing wider transport choices and to facilitate freight movement to, from and within Western Sydney and thereby enhancing the economic development of Western Sydney.

It has been demonstrated that the WSO would be an attractive route for private vehicles and heavy vehicles carrying freight by providing a motorway standard, integrated transport corridor. The proposal is predicted to result in reductions in traffic on surrounding roads and improvements in regional air quality.

However, for a sustainable outcome to be achieved, a precautionary and integrated Whole of Government approach is required. The benefits of the proposal need to be considered as broader than short-term traffic relief of the Cumberland Highway and other north-south arterial routes through western Sydney. The Department considers that as long as public transport facilities are provided early and integrated into the WSO at an early stage, the broad based concerns about lack of a dedicated public transport options would be addressed to a level commensurate with community expectations.

In order to achieve the desired long term and strategic outcomes, the Department has placed significant emphasis on the early provision and integration of public transport opportunities within the WSO corridor and the need to promote the proposal as the primary freight corridor through western Sydney. The Department's assessment has concluded that the proposal, if supplemented by the recommended public transport and freight enhancement conditions, would be of benefit to the community and that all residual impacts could be appropriately managed.

Key environmental impact issues in relation to the proposal are considered to be flora and fauna, noise and vibration, potential flooding, Indigenous heritage and pedestrian and cyclist access. Each of these issues are discussed in detail in Chapter 5 of this report and where appropriate Recommended Conditions of Approval have been included.

Recommendations

It is recommended that, should the proposal proceed, it would be essential for extensive and comprehensive conditions to be imposed to minimise adverse impacts and to ensure, to the greatest extent practicable, its long-term benefits. The plans and reports as required in the Recommended Conditions of Approval are shown schematically in Appendix J. Section 8 of this Report lists all the recommended conditions of any approval, the key ones include:

- the investigation of infrastructure required for the establishment of any regular bus services;
- design of the project to accommodate the future provision of public transport facilities;
- monitoring of public transport demand, bus usage and level of service to determine the need for dedicated bus lanes and facilities in the future for at least a 12 km section of the WSO between Richmond Road and the M2;
- the investigation of bus priority measures on surrounding roads impacted by the WSO;
- the monitoring of heavy vehicle numbers and the preparation of a freight enhancement strategy to encourage higher freight usage of the WSO if heavy vehicle levels are below those predicted;

- opening of the WSO as a complete project between the M5 and M2;
- the investigation of alternative design treatments to address potential flooding issues between Camden Valley Way and Cowpasture Road;
- construction to accommodate a maximum of 4 traffic lanes;
- review of the concept design to minimise the proposal footprint, particularly at interchanges, and impacts on environmentally sensitive locations;
- preparation of a Community Involvement Plan and an independent Community Liaison Representative with the ability to address community concerns regarding construction impacts;
- the establishment of community liaison groups and a 24 hour complaint phone system during construction;
- the preparation of strategies for cyclists and pedestrians to ensure maximum accessibility along and across the proposal;
- preparation of detailed urban design and landscaping plans for the proposal including specific plans for the SREP 31 – Regional Parklands areas;
- monitoring of the local and regional road network to provide a base line for measuring significant change as a result of the proposal; and
- a number of construction related environmental management measures to minimise impacts.

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9 RECOMMENDED CONDITIONS OF APPROVAL

This Section provides the Department's Recommended Conditions of Approval for the Project under Section 115B(2) of the EP&A Act. These are based on the Department's assessment of the EIS, the representations made to the RTA and supplementary information and advice provided.

It is noted that the EIS and Representations Report contain extensive information on procedures and mitigation strategies to be implemented to ameliorate impacts of the Project. The recommended conditions of approval should therefore be implemented in conjunction with those procedures and mitigation measures specified in the EIS and the Representations Report. Where there is an inconsistency with the recommendations in the EIS or Representations Report, the Recommended Conditions will prevail.

The following acronyms and abbreviations are used in this section:

AGL	Australian Gas and Light Company
AIIA	Ancillary Infrastructure Impact Assessment
ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Average Recurrence Interval
ARMCANZ	Agriculture and Resources Management Council of Australia and New Zealand
ASS	Acid Sulfate Soils
ASSMC	Acid Sulfate Soils Management Council
CASA	Civil Aviation Safety Authority
CFEMP	Construction Framework Environmental Management Plan
CLG	Community Liaison Group(s)
CMS	Construction Method Statements
CNVMP	Construction Noise and Vibration Management Plan
CPI	Consumer Price Index
Department, the	Department of Planning
Director-General, the	Director-General of the Department of Planning or delegate
Director-General's Report	the report of the Director-General of the Department of Planning dated February 2002
DLWC	Department of Land and Water Conservation, NSW
DoP	Department of Planning
DoT	Department of Transport
EIS	*The Western Sydney Orbital Environmental Impact Statement* prepared for the RTA by Sinclair Knight Merz and PPK Environment and Infrastructure Pty Ltd, dated October 2000
EMP	Environmental Management Plan
EMR	Environmental Management Representative
EP& A Act	*Environmental Planning and Assessment Act 1979*
EPA	NSW Environment Protection Authority
ICLR	Independent Community Liaison Representative
L_{Aeq} 9hour	Equivalent continuous (constant) sound level over 9 hour period from 10pm to 7am
L_{Aeq} 15 hour	Equivalent continuous (constant) sound level over 15 hour period from 7am to 10pm
m	Metre
mm	Millimetre
Minister, the	Minister for Planning
NPWS	National Parks and Wildlife Service, NSW
NSW	New South Wales

OEMP	Operational Environmental Management Plan
PAD	Potential Archaeological Deposit
Proponent	Roads and Traffic Authority
Relevant Councils	Any one or more of the following Councils as applicable: Liverpool City Council, Fairfield City Council, Blacktown City Council and Baulkham Hills Shire Council.
Representations Report	*The Western Sydney Orbital Representations Report'* prepared by RTA Operations for the RTA and dated 17 September 2001
RIC	Rail Infrastructure Corporation
RTA	Roads and Traffic Authority
SCA	Sydney Catchment Authority
SEPP	State Environmental Planning Policy
SIEC	Sydney International Equestrian Centre
SREP	Sydney Regional Environmental Plan
STA	State Transit Authority
Substantial Construction	Does not include survey, acquisitions, fencing, test drilling/test excavations, building/road dilapidation surveys, minor surveys, minor clearing except where endangered ecological communities or threatened flora or fauna species would be impacted, establishment of site compounds in generally cleared, highly disturbed or non environmentally sensitive areas, minor access roads, minor adjustments to services/utilities, noise mitigation measures and other minimal environmental/community impact activities.
SWC	Sydney Water Corporation
SWMP	Stormwater Management Plan
TMP	Traffic Management Plan
Vs	Versus
WSRP	Western Sydney Regional Park

General

1. The Project shall be carried out in accordance with:

   (a) the Project contained in the Environmental Impact Statement (EIS), and as modified by the Representations Report;
   (b) all identified Sub Plans, safeguards and mitigation measures identified in the EIS and Representations Report;
   (c) the Director-General's Report;
   (d) the Conditions of Concurrence granted by the NPWS; and
   (e) the conditions of approval granted by the Minister.

   Despite the above, in the event of any inconsistency with the Project as described in the EIS and/or Representations Report, the conditions of approval granted by the Minister and Conditions of Concurrence by the NPWS shall prevail.

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

   It shall be the ultimate responsibility of the Proponent to ensure compliance with all conditions of approval granted by the Minister.

Staging of Specific Construction Works

2. Nothing in these conditions shall be interpreted as preventing compliance with any Condition of Approval for a separate section of the Project where the appropriate documentation/approvals have been obtained for a specific construction work site or section but not necessarily the entire project.

> *Note:*
> *The intention of this Condition is to enable construction project work to proceed without having first obtained approvals relating to other work sites, sections or stages of construction work provided that there is no significant interaction between the work sites, sections or stages or significant adverse cumulative impacts.*

Compliance

General

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

Pre-Construction Compliance Report

4. At least one month prior to commencement of substantial construction (or within such period as otherwise agreed by the Director-General), the Proponent shall submit to the Director-General a compliance report detailing compliance with all relevant conditions that apply prior to commencement of substantial construction and shall address:

   (a) the dates of submissions of the various studies and/or requirements of various relevant conditions, and their approval and terms of approval; and
   (b) action taken and/or proposed to implement the recommendations made in terms of approvals and/or studies.

Pre-Operation Compliance Report

5. At least one month prior to the opening to traffic on the Project, the Proponent shall submit to the Director-General a compliance report detailing compliance with all relevant conditions that apply prior to commencement of operation and shall include:

   (a) results of environmental monitoring required under this Approval including interpretation and discussion by a suitably qualified person;
   (b) a record of all complaints and the action taken to mitigate all such complaints;
   (c) recommendations in regard to compliance issues; and
   (d) action taken and/or proposed to implement the recommendations made in terms of approvals and/or studies.

The period of one month referred to in this condition above may be altered as agreed by the Director-General.

Project Commencement

6. The Proponent shall notify the Director-General and all relevant authorities in writing of the Project commencement both in terms of construction and operation at least 1 weeks prior to the relevant commencement date.

Dispute Resolution

7. The Proponent shall endeavour, as far as possible, to resolve any dispute between relevant public authorities arising out of the implementation of the conditions of this approval. Should this not be possible, the matter shall be referred firstly to the chief executives and directors of the agencies involved. If the matter cannot be resolved then it shall be referred to the Minister for resolution. The Minister's determination of the disagreement shall be final and binding on all parties.

Complaints Procedures

8. Prior to the commencement of construction, the Proponent shall institute, publicise and list with a telephone company a 24 hour toll-free complaints contact telephone number, which would enable any member of the general public to reach a person who can arrange appropriate response action to the complaint within two hours during all times construction is being undertaken.

9. The Proponent shall record details of all complaints received during construction and ensure that at least a verbal response on what action is to be undertaken is provided to the complainant within 2 hours when Project construction works are being undertaken (unless the complainant agrees otherwise) and a detailed written response within seven (7) calendar days. Information on all complaints received and response times shall be made available to the EMR daily and on request to the Director-General and relevant government agencies. The Proponent shall nominate an appropriate person(s) to receive, log, track and respond to complaints within the specified timeframe in accordance with Condition No. 8. The name and contact details of this person(s) shall be provided to the relevant Council(s) and the Director-General upon appointment or upon any changes to that appointment, but at least one week prior to the commencement of substantial construction.

Advertisement of Activities

10. Prior to the commencement of construction, and then at three (3)-monthly intervals, the Proponent shall advertise in relevant local newspapers, the nature of the works proposed for the forthcoming three months, the areas in which these works are proposed to occur, the hours of operation and a contact telephone number.

    The Proponent shall ensure that the local community and businesses are kept informed (by appropriate means such as: local newsletters, leaflets, newspaper advertisements, and community noticeboards, etc.) of the progress of the Project, including any traffic disruptions and controls, construction of temporary detours and work required outside the nominated working hours, including noisy works, prior to such works being undertaken.

11. The Proponent shall establish a Project internet site prior to the commencement of construction and maintain the internet site until 12 months after opening of the Project to traffic. This internet site shall contain monthly updates of work progress, consultation activities and planned work schedule, including but not limited to:

    (a) a description of relevant approval authorities and their areas of responsibility;
    (b) a list of environmental management reports that are publicly available and the executive summaries of those reports;
    (c) minutes of community liaison group meetings;
    (d) contact names and phone numbers of the Project communications staff; and
    (e) 24 hour toll-free complaints contact telephone number.

    Updates of work progress, construction activities and planned work schedule shall be provided more frequently where significant changes in the noise impacts are expected.

Communication and Consultation

Community Involvement Plan

12. The Proponent shall prepare a Community Involvement Plan for the construction period, which would be in place prior to commencement of construction. The Community Involvement Plan shall set out the community communications and consultation procedures and protocols for the Project, which shall comply with the obligations under the approval from the Minister, other approvals, licences and permits. The Community Involvement Plan shall also include but not necessarily be limited to:

    (a) details of the communication protocols and procedures and consultation team appointed to manage and implement the Plan during the consultation period including qualifications and experience;
    (b) details of how the Plan would address the complexities of the timing and staging of different activities across the Project including cumulative impacts;
    (c) details of the role of the Independent Community Liaison Representative (ICLR) and demonstration of how the independence of this representative will be maintained;
    (d) a crisis and issues management plan identifying the range of consultation activities to be undertaken to minimise community reaction to construction activities;
    (e) maintenance and updating of the established stakeholder database with identification of the local community likely to be affected by the Project, including identification of residences, businesses and other sensitive land uses and the specific communication needs of this community (ie. language translation, disabled access etc);
    (f) procedures for the establishment and functioning of the Community Liaison Groups in accordance with Condition No. 13;
    (g) procedures for informing users of the affected road network of planned traffic arrangements including temporary traffic switches;
    (h) procedures for informing the local community of planned investigation and construction operations;
    (i) provisions for dealing with complaints (particularly night time) and response requirements as specified in Condition No. 9. This should include the respective protocols for the EMR, ICLR, Contractors, and any other relevant stakeholders in handling complaints and independent dispute resolution;

(j) provision for the Proponent's attendance and participation in all groups and public meetings forming part of the Community Involvement Plan; and
(k) the provision of training for all employees and sub-contractors on the requirements of the Community Involvement Plan.

Community Liaison Groups

13. Four (4) Community Liaison Groups (CLG) or as otherwise agreed by the Director-General shall be formed prior to the commencement of construction of that section of the Project. The purpose of the CLGs is to discuss detailed design issues and methods for minimising the impact on the local community during the construction stage. All CLGs shall include the Environmental Management Representative, representatives from the RTA, the contractor, relevant local community groups, and Councils unless otherwise agreed by the Director-General.

    Issues for discussion shall include, but not be limited to, flora and fauna protection; noise control measures; access arrangements, air and water quality; public transport impacts and opportunities; landscaping requirements and any other issues relevant to the impact of the implementation of the project on the community.

    The Group may make comments and recommendations about the design and implementation of the Project, which shall be considered by the Proponent. In the event of any dispute between the Group and the Proponent, the Proponent's decision shall be considered as final so long as it is not inconsistent with these conditions.

    Unless otherwise agreed to by the Director-General the CLGs shall be maintained for at least 12 months after the opening to traffic on the Project.

14. The Proponent shall:

    (a) establish appropriate representative CLGs, having considered the Guidelines for the Establishment of the Community Liaison Groups (see Attachment 1);
    (b) nominate a chair to be approved by the Director–General;
    (c) allow the Group to make comments and recommendations about the implementation of the development and environmental management plans, monitor compliance with conditions of this approval and other matters relevant to the operation of the development during the term of the approval;
    (d) ensure that the Group has access to the necessary plans and information for such purposes; and
    (e) consider the recommendations and comments of each Group and provide a response to each Group and the Director-General.

    The Proponent shall as applicable review the need, relevance, effectiveness and membership of the CLGs at 6 monthly intervals or at other times as agreed by the Director-General. Following this review and if justified the Proponent shall seek the approval of Director-General to disestablish any CLG. The Proponent shall bear all costs associated with the establishment and ongoing function of the Group.

Independent Community Liaison Representative

15. The Director-General shall approve the appointment of the person(s) nominated by the Proponent to serve as the Independent Community Liaison Representative (ICLR), for the duration of the construction period. In considering the appointment the Director-General shall take into account the qualifications of the ICLR particularly their experience in facilitation, mediation and dispute resolution.

    The role of the ICLR will include but not be limited to:

    (a) confirm and monitor that the Proponent meets all the communication and consultation obligations outlined in the approved Community Involvement Plan and as they arise during the course of the Project;
    (b) attend as a facilitator local community liaison group meetings;
    (c) be available for direct contact from the community during all hours that construction works are undertaken and/or that the Display Centres are open as specified in Condition No. 16;
    (d) draw to the attention of the EMR and the Proponent all community complaints and issues; and
    (e) assist the Proponent to mediate the resolution of dispute that can not be resolved by the EMR or the Proponent in consultation with the community.

    The Proponent shall bear the cost of employment of the ICLR.

Display Centres

16. Three (3) display centres or as otherwise agreed to by the Director-General shall be established no later than three (3) months prior to substantial construction of any discrete section of the Project, staffed and maintained at least until commencement of operation of the Project. The display centres shall be open between 10:00 am and 6:00 pm Monday to Friday and 10:00 am to 1:00 pm on Saturdays. Up-to-date photographs, diagrams, samples and other suitable material shall be provided at each display centre, covering at least:

    (a) noise and retaining wall locations, details and finishes;
    (b) landscape concept, cross section treatments, perspective views and details;
    (c) bridges;
    (d) overall architectural and landscape design theme; and
    (e) temporary works affecting businesses, residences, pedestrians and public transport users.

    A dedicated Personal Computer internet access point to the internet site shall be provided in each display centre. A phone line shall be provided allowing direct contact from any display centre to the centre where the ICLR is based.

17. Prior to the opening of the display centres, the Proponent shall prepare a schedule that ensures that the ICLR(s) is available for discussion for a defined and advertised period at each of the display centres referred to in Condition No. 16. The CLGs shall be advised and the schedule advertised in local newspapers prior to the opening of the display centres and prior to any changes to the schedule.

Environmental Management

Environmental Management Representative

18. Prior to the commencement of construction, the Director- General shall approve the appointment of the person nominated to serve as the Environmental Management Representative (EMR). In considering the appointment, the Director- General shall take into account:

    (a) the qualifications and experience of the EMR including demonstration of general compliance with the principles of AS/NZS ISO 14012:1996 Guidelines for Environmental Auditing : Qualification Criteria for Environmental Auditors;
    (b) the role and responsibility of the EMR; and
    (c) the authority and independence of the EMR including details of the Proponent's internal reporting structure.

    The EMR shall have responsibility for:

    (a) considering and advising on matters specified in the conditions of approval and compliance with such;
    (b) certifying the environmental/community impacts as minor for all activities defined by the Proponent as not constituting substantial construction;
    (c) reviewing and approving the Proponent's induction and training program for all persons involved in the construction activities and monitor implementation;
    (d) periodically monitoring the Proponent's environmental activities to evaluate the implementation, effectiveness and level of compliance of on-site construction activities with the EMP and associated plans and procedures, including carrying out site inspections at least fortnightly;
    (e) reporting monthly to the Director-General;
    (f) recording and providing a written report to the Proponent of non-conformances with the EMP and require the Proponent to undertake mitigation measures to avoid or minimise any adverse impacts on the environment or report required changes to the EMP;
    (g) directing the Proponent to stop work immediately where considered necessary, if in the view of the EMR an unacceptable impact on the environment is likely to occur, or require other reasonable steps such as the authorisation of hold points to be taken to avoid or minimise any adverse impacts;
    (h) reviewing corrective and preventative actions to ensure the implementation of recommendations made from the audits and site inspections;
    (i) reviewing minor revisions to the EMP and CMS;
    (j) providing reports to the Department on matters relevant to the carrying out of the EMR role as necessary including notifying the Director-General of any stop work notices; and
    (k) endorse the Operational EMP in accordance with Condition of Approval No. 26.

    The EMR shall immediately advise the Proponent and the Director-General concurrently of any major issues resulting from the construction of the Project that have not been dealt with expediently or adequately by the Proponent.

    The EMR shall be available during construction activities at the site and be present on-site during any critical construction activities as defined in the relevant Environmental Management Plan (EMP) or Construction Method Statements (CMSs).

Environmental Management System

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

Ancillary Infrastructure Impact Assessment

20. At least two (2) months prior to substantial construction of any discrete section of the Project the Proponent shall complete an Ancillary Infrastructure Impact Assessment (AIIA). The AIIA shall be updated as detailed design for each section is completed. The AIIA shall address the environmental impacts of all ancillary facilities associated with the Project including but not limited to:

    (a) construction compound(s);
    (b) concrete or asphalt batch plant(s);
    (c) noise mitigation;
    (d) service centre(s);
    (e) toll facilities/gantries;
    (f) off motorway cycleway facilities;
    (g) sedimentation basins;
    (h) flood detention basins/constructed wetlands; and
    (i) variable message/speed limit signs.

    The findings of the AIIA in relation to recommended mitigation or safeguard measures shall be incorporated into the reports required in accordance with Condition Nos. 21 and 22.

    The AIIA shall also assess the additional impacts on any endangered ecological communities and threatened flora and fauna species and shall incorporate findings into negotiations with the NPWS on mitigation measures, including compensatory habitat as appropriate.

    The AIIA shall be prepared in consultation with DLWC, EPA, NPWS, local Councils and the CLGs. The AIIA shall require the approval of the Director-General and shall be made publicly available.

Construction Framework Environmental Management Plan

21. Prior to the commencement of substantial construction, a Construction Framework Environmental Management Plan (CFEMP) shall be prepared, following consultation with the EPA, DLWC, NPWS, Department of Transport relevant councils and all relevant utility/service providers. The Construction Framework EMP shall be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted best practice management Sub Plans.

The Construction Framework EMP shall require approval by the Director-General prior to the commencement of substantial construction or within such time as otherwise agreed to by the Director-General. The Construction Framework EMP shall be certified by the EMR as being in accordance with the Conditions of Approval and all undertakings made in the EIS and Representations Report, prior to seeking approval of the Director-General.

The Construction Framework EMP shall include:

(a) reference and proposed timeframes for all the Sub Plans required under this Approval;
(b) the role of the EMR;
(c) details of the community communication and consultation process and identification of the role of the ICLR;
(d) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the Construction Framework EMP;
(e) a matrix of Construction Method Statements (CMS) required to construct the Project, including an assessment of the predicted level of risk and potential level of public interest posed by each CMS and indicative timeframes for completion; and
(f) propose a response timeframe for all CMS to be approved by the Director-General.

The Construction Framework EMP shall be made publicly available.

Construction Method Statements

22. The Proponent shall prepare in consultation with the relevant government agencies and the CLGs, Construction Method Statements (CMS) for all construction methods and/or major construction work sites to be utilised during construction in accordance with the Framework Construction EMP required by Condition No. 21. The Director-General shall nominate the CMSs that will require approval by the Director-General. Those CMSs not requiring the approval of the Director-General shall require the certification of the EMR as being in accordance with the Conditions of Approval and all undertakings made in the EIS and Representations Report. Any CMS to be approved by the Director-General shall be submitted to the Department following certification by the EMR no less than one (1) month prior to the proposed commencement of the relevant construction activities.

23. Each CMS shall include, but not be limited to:

(a) construction activities and processes associated with the relevant construction site(s), including staging and timing of the proposed works;
(b) length (time) of construction;
(c) specific hours of operation for all key elements including off-site movements;
(d) cover specific environmental management objectives and strategies for the main environmental impacts and include, but not be limited to: noise and vibration; air quality; flora and fauna, riparian management, water quality; erosion and sedimentation; access and traffic including public transport; property acquisition and/or adjustments; heritage and archaeology; groundwater; acid sulfate soils; spoil stockpiling and disposal; waste/resource management; weed management; flooding and stormwater control; geotechnical issues; visual screening, landscaping and rehabilitation; hazards and risks; energy use, resource use and recycling; and utilities; and
(e) address, but not be limited to:
    (i) identification of the statutory and other obligations which the Proponent is required to

fulfil during Project construction, including all approvals and consultations/agreements required from other authorities and stakeholders, and key legislation and policies which control the Proponent's construction of the Project;

(ii) measures to avoid and/or control the occurrence of environmental impacts;

(iii) measures (where practicable and cost effective) to provide positive environmental offsets to unavoidable environmental impacts;

(iv) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the CMS;

(v) site specific environmental management techniques and processes for all construction in respect of permanent and/or temporary works;

(vi) site specific monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental management of the Project, including performance criteria, tests, and protocols (eg. frequency and location);

(vii) identification of affected residents and consultation/notification requirements;

(viii) locational details of important elements such as temporary noise barriers; sedimentation basins and facilities; detention basins and/or constructed wetland; portable offices and amenities; truck, plant and materials storage; access locations; provision of site hoardings etc;

(ix) environmental management instructions for all complex environmental control processes which do not follow common practice or where the absence of such instructions could be potentially detrimental to the environment;

(x) steps the Proponent intends to take to ensure that all Plans and Sub Plans are being complied with;

(xi) the provision of safe pedestrian and cyclist access to at least the same standard that existed prior to commencement, without due inconvenience to pedestrians and cyclists for periods longer than 24 hours during the construction stage;

(xii) safety, security and crime management measures;

(xiii) consultation requirements with relevant government agencies; and

(xiv) community communication, consultation and notification strategy (including local community, businesses, relevant government agencies, and all relevant Councils), and complaint handling procedures.

Specific requirements of the main environmental system elements referred to in (d) shall be as required under the conditions of this approval and/or as required under any licence or approval. All CMSs shall be made publicly available.

Environmental Monitoring – Construction

24. The Proponent shall submit to the Director-General a report(s) in respect of the environmental performance of the construction works and compliance with the Construction Framework EMP, all relevant CMSs and any other relevant conditions of this approval. The reports shall be prepared six months after the start of substantial construction and thereafter at six monthly intervals or at other such periods as requested by the Director-General to ensure adequate environmental performance over the duration of the construction works. The report(s) shall include, but not be limited to, information on:

(a) applications for consents, licences and approvals, and responses from relevant authorities;

(b) implementation and effectiveness of environmental controls and conditions relating to the work undertaken;

(c) identification of construction impact predictions made in the EIS and any supplementary

studies and details of the extent to which actual impacts reflected the predictions;
(d) details and analysis of results of environmental monitoring;
(e) number and details of any complaints, including summary of main areas of complaint, action taken, response given and intended strategies to reduce complaints of a similar nature; and
(f) any other matter relating to the compliance by the Proponent with the conditions of this approval or as requested by the Director-General.

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

25. The Proponent shall ensure that it has an internal audit system and that internal audits are undertaken and endorsed by the EMR every three (3) months to ensure compliance with the EMP, the conditions of approval and all other relevant licences and approvals. Each audit must be completed within 6 weeks of the end of the 3 month period and be made available to the Director-General upon request.

Operational Environmental Management Plan

26. An Operational Environmental Management Plan (OEMP) shall be prepared and approved by the Director-General prior to the opening of the Project to traffic. The Plan shall be prepared in consultation with the EPA, DLWC, NPWS, Department of Transport, relevant Councils and any other relevant government agency nominated by the Director-General. The Plan shall be prepared in accordance with the conditions of this approval, all relevant Acts and Regulations and accepted best practice management Sub Plans.

The OEMP shall be endorsed as being in accordance with the conditions of approval by the EMR prior to seeking approval of the Director-General.

The OEMP shall address at least the following issues:

(a) identification of the statutory and other obligations which the Proponent is required to fulfil, including all licences/approvals and consultations/agreements required from authorities and other stakeholders, and key legislation and policies which control the Proponent's operation of the Project;
(b) sampling strategies and protocols to ensure the quality of the monitoring program, including the specific requirements of DLWC, EPA and NPWS;
(c) monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental performance of the Project during its operation, including a description of potential site impacts, performance criteria, specific tests and monitoring requirements, protocols (eg. frequency and location) and procedures to follow;
(d) steps the Proponent intends to take to ensure compliance with all plans and procedures;
(e) consultation requirements, including relevant government agencies, the local community and Councils, and complaints handling procedures; and
(f) strategies for the main environmental impacts including, but not limited to: noise; water quality; erosion and sedimentation; access and traffic; groundwater; settlement; waste/resource management/removal/disposal; hydrology and flooding; visual screening, landscaping and rehabilitation; hazards and risks; and energy use, resource use and recycling.

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

The OEMP shall be made publicly available.

All sampling strategies and protocols undertaken as part of the Operational EMP shall include a quality assurance/quality control plan and shall be approved by the relevant regulatory agencies to ensure the effectiveness and quality of the monitoring program. Only accredited laboratories can be used for laboratory analysis.

Note:
The Director-General shall provide a response to the Operational EMP within one (1) month of receipt of all relevant information from the Proponent assuming receipt of adequate and sufficient information. If a request is made by the Director-General for additional information, the period of time that elapses between the date on which the Proponent receives the request and the date on which the additional information is provided to the Director-General, shall not be taken into account in the one (1) month period referred to above.

Environmental Impact Audit Report

27. An Environmental Impact Audit Report shall be submitted to the Director-General, 12 months, 2 and 7 years from the Project opening to traffic or as otherwise agreed to by the Director-General. The Environmental Impact Audit Report shall be prepared by an independent person(s) or organisation approved by the Director-General and paid for by the Proponent. The Report shall assess the key impact predictions made in the EIS and any supplementary studies and detail the extent to which actual impacts reflect the predictions during the first 12 months of operation and any other periods as required. The Report shall provide details on actual versus predicted impacts for all key issues identified in the EIS. The suitability of implemented mitigation measures and safeguards shall also be assessed. The Report shall also assess compliance with the Operational EMP.

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

    The Report shall be made publicly available.

Major Project Design Issues

28. The Project shall be opened to traffic as a complete Project between the M5 and the M2 operating as described in the Representations Report.

29. The Project shall be constructed and operated to accommodate a maximum of four (4) through traffic lanes (two through lanes in each direction).

30. The Proponent shall ensure that the recommendations contained within the 'Road and Interchange Design Review' (Arup, January 2002) conducted for the Department are made available to tenderers and the Proponent shall demonstrate how such recommendations have been specifically considered during the detailed design process. A summary of these considerations shall be included as part of the AIIA detailed in Condition No. 20.

31. During the detailed design process, the Proponent shall investigate alternative designs and alignments for the M5 to Project ramp westbound and the Project to M5 eastbound with an objective of minimising the footprint, bulk and scale. In assessing alternative designs the Proponent shall consider the recommendations in the 'Road and Interchange Design Review' (Arup, January 2002) referred to in Condition No. 30 and issues in relation to design speeds, safety, visual impacts, noise impacts, flooding, landtake, access and impacts on flora and fauna. The proposed final design shall be completed within 12 months of the date of this approval unless otherwise agreed by the Director-General. The study shall be prepared in consultation with NPWS, DLWC, Liverpool Council and the Director-General.

32. Prior to construction the Proponent shall investigate alternative design treatments to address potential flooding issues and environmental impacts for the section of the Project between Camden Valley Way and Cowpasture Road.

    The assessment as a minimum shall include:

    (a) results of consultation with EPA, DLWC, NPWS, and relevant Councils;
    (b) changes to hydraulic and hydrological regimes including any additional areas inundated, inundation times, inundation depths, number of properties impacted and damage estimates;
    (c) review of current and future landuses in consultation with the Department and relevant Councils;
    (d) impacts on vegetated areas including riparian zones and any endangered ecological communities and/or threatened flora and fauna;
    (e) visual impacts;
    (f) severance including relative vehicular and pedestrian access between existing and future development on both sides of the Project; and
    (g) a cost benefit assessment prepared in accordance with the Department's Draft Guideline 'Economic Effects and Evaluation in Environmental Impact Assessment' and include the relative costs related to any flooding impacts, spoil acquisition and transport costs, costs of landtake for any detention basins and environmental costs associated with alternative designs.

    The primary objective of the alternative design treatment shall be to minimise increases in afflux as a result of the Project and to minimise environmental impacts.

    The assessment shall nominate a preferred design which shall require the approval of the Director-General.

33. If archaeological and anthropological investigations in the vicinity of the Plumpton Ridge area or other PADs reveal that these sites have a high Aboriginal heritage significance and would be significantly impacted by the Project, the Proponent shall in consultation with relevant Aboriginal communities, NPWS and the Department of Aboriginal Affairs prepare an assessment of possible route re-alignment alternatives or other appropriate measures. These investigations shall be complete within six (6) months from the date of this approval unless otherwise agreed by

the Director-General and the findings of any report require the approval of the Director-General.

34. Prior to construction the Proponent shall conduct an investigation into the feasibility, impact and cost effectiveness of using vertical walls or other treatments to minimise the footprint of the Project in the vicinity of adjacent endangered ecological communities, threatened flora locations, Aboriginal heritage areas and non-indigenous heritage sites. The investigation shall be prepared in consultation with NPWS and the Director-General.

35. The Proponent shall consult with Liverpool City Council and bus operators to ensure that the Project is designed to the satisfaction of the Director-General to allow for future connections across the Project in relation to any proposed development in the Hoxton Park aerodrome area or surrounds between chainage 5500 and 7500 as shown in Sheets 3 and 4 from the Representations Report.

Public Transport Enhancement Measures

Pre-construction Stage

36. The Proponent shall, in consultation with the DoT, design the Project to accommodate the future provision of public transport facilities. Consideration shall include but not be limited to, the requirements for bus and light rail stops/stations, bridge crossings, vertical and horizontal clearances and alignments, and pedestrian and bicycle access such that retrofitting for dedicated public transport use is not precluded in the future.

37. During the detailed design process, the Proponent shall investigate in consultation with the Department of Transport, infrastructure required for the establishment of any regular bus services on the Project between Richmond Road and the M2, and for interchanges with other public transport services which intersect the Project such as the proposed Parramatta-Mungerie Park Transitway, the proposed Blacktown-Castle Hill Transitway and the potential future extension of the Liverpool to Parramatta Transitway to Edmondson Park.

38. The Proponent shall consult all affected schools in relation to all practicable measures to be taken to avoid undue disruption from altered school bus services during construction.

Construction Stage

39. In accordance with the findings in Condition No. 37, the Proponent shall consult with the Department of Transport and if required by the Department of Transport arrange for the provision of all relevant infrastructure to ensure that bus services can operate on the Project between Richmond Road and the M2 immediately after opening. Provision of infrastructure shall include but not be limited to covered bus stops, safe bus set-down areas, timetable information facilities, bicycle and pedestrian access facilities, lighting and, if required, car parking provisions and bicycle lockers.

40. At least six months prior to the opening to traffic on the WSO the Proponent shall identify, in consultation with potentially affected bus companies, relevant Councils, the CLGs and Department of Transport any roads or intersections surrounding and across the Project where the predicted level of traffic as a result of the Project would affect existing bus services. The investigation shall identify any required bus measures including the consideration of bus priority measures to minimise impacts. The investigation shall be reviewed 12 months following the

opening of the Project to traffic.

Operation Stage

41. The Proponent shall install as soon as practicable, in consultation with the Department of Transport, dedicated bus lanes and facilities including but not limited to covered bus stops, pedestrian access and bicycle facilities, lighting and, if required, car parking provisions and bicycle storage between Richmond Road and the M2 should the following occur:

    - Predicted or measured midblock volume/capacity ratios reach or exceed Level of Service D during the morning or afternoon peak period for any section between Richmond Road and the M2; and
    - Stated preference surveys indicate potential patronage levels equivalent to or higher than those achieved at the M2 east of Windsor Road during the M2s first 12 months of operations. Preference surveys shall be undertaken prior to substantial construction in consultation with the Department of Transport.

42. Five (5) years after the opening of the Project to traffic and every ten (10) years subsequently up to 25 years, the Proponent shall review the potential demand for dedicated public transport services on the Project to the satisfaction of the Department of Transport and shall implement any such measures as agreed between the Proponent and the Department of Transport.

Freight

43. Twelve (12) months after the opening to traffic on the Project, the Proponent shall prepare a report on the use of the Project by heavy vehicles. Should the report indicate a usage rates generally inconsistent with those predicted at opening in the report titled 'Western Sydney Orbital – Traffic Report' (Masson Wilson and Twiney, January 2002) the Proponent shall prepare a freight enhancement strategy to encourage higher usage on the Project. The strategy shall include but not be limited to investigations into:
    (a) the cost effectiveness and feasibility of innovative tolling including at least the option of reducing the toll for heavy vehicles to encourage heavy vehicle use of the Project;
    (b) advertising and promotional methods to encourage use; and
    (c) methods to discourage heavy vehicle use on alternative routes such as the Cumberland Highway.

    The review of heavy vehicle usage, reporting and any recommended strategies shall be prepared to the satisfaction of the Director-General and shall be reviewed on a two (2) yearly basis to 25 years after opening to traffic on the Project. The Proponent shall comply with any request of the Director-General in relation to the outcomes of the study.

Tolling

44. A tolling system shall be implemented which:

    (a) is compatible with the existing standard for electronic tolling adopted throughout Sydney and Australia; and
    (b) makes adequate provision for casual users.

45. All buses (including school buses) providing scheduled public passenger transport services shall be exempt from all Project tolls.

46. Emergency service vehicles responding to emergencies and bicycles shall be exempt from all Project tolls.

Flora and Fauna

Pre-Construction

47. Prior to construction commencement, the Proponent shall undertake targeted surveys for microchiropteran bats, in particular the Greater Broad-nosed Bat (*Scoteanax ruepellii*), Eastern Freetail Bat (*Mormopterus norfolkensis*) and the Grey-headed Flying Fox (*Pteropus poliocephalus*) along the proposed alignment. In particular, surveys shall focus on the identification of roost sites outside of the Project footprint but within the Project reserve. Survey methodology, timing and effort shall be in consultation with the Director-General and NPWS. The Proponent shall not remove any threatened bat roost sites outside of the Project footprint but within the Project reserve.

48. The Proponent shall ensure that a compensatory habitat package is negotiated prior to construction and complies with the conditions of concurrence issued by the NPWS. The compensatory habitat package shall be approved by the NPWS Manager of Conservation Programs and Planning Division, Central Directorate. The compensatory habitat package shall be based on the criteria outlined in Section 2.3.7 of the NPWS concurrence issued on 14 September 2001 and any additional finding as identified in Condition No. 20.

49. As part of the Framework Construction EMP, the Proponent shall prepare a detailed Flora and Fauna Management Sub Plan in consultation with the NPWS. The Sub Plan shall be prepared prior to construction and shall identify requirements for seed collection, strategies for minimising vegetation clearance and protection of vegetated areas outside the direct impact zone, controlling impacts due to spills, spread of debris and refuse, movement and storage of materials and equipment, vegetation and soil clearing for construction, revegetation of cleared areas, weed control including aquatic species and handling of any fauna.

50. A part of the Flora and Fauna Management Sub Plan referred to in Condition No. 49, the Proponent shall prepare a detailed threatened Species Management Procedure(s) to the satisfaction of the NPWS and the Director-General. The Procedures shall be prepared prior to commencement of construction activities and shall identify requirements for minimising habitat disturbance, appropriate remediation of degraded habitat, monitoring procedures, training of construction personnel, etc.

Construction

51. The Proponent shall undertake all works as part of the Project in accordance with the conditions stated in Section 9 of the Concurrence Report issued by the Director-General of the NPWS on 14 September 2001.

Endangered or Threatened Species

52. Endangered ecological communities and threatened species habitat located adjacent to the Project footprint and that may otherwise be impacted upon by the construction of the Project shall be fenced and access to these areas prohibited. The fencing shall be installed concurrent with or immediately following the pegging of the limit of clearing and shall be in advance of any substantial clearing of the road footprint. The fencing shall be clearly visible to machinery operators. The fencing shall remain in place delineating the limit of clearing until construction completion. All employees and contractors shall be made aware of any sensitive areas in relation to endangered ecological communities and/or threatened species.

53. A qualified ecologist shall be consulted on the location of individual rare or threatened plants or communities or the Cumberland Land Snail (*Meridolum corneovirens)*, to ensure minimal disturbance to native vegetation, to provide direction on methods for relocation and/or replacement plantings, and to initiate and undertake rehabilitation works as soon as practicable.

54. If, during the course of construction, the Proponent becomes aware of the presence of any threatened species which are likely to be significantly affected and are not recognised in an existing concurrence from NPWS for the Project under the *Threatened Species Conservation Act 1995*, or listed under the *Fisheries Management Amendment Act 1997*, the Proponent shall immediately consult with the NPWS and/or NSW Fisheries as appropriate. Following this consultation, the Proponent shall meet all requirements as directed by the Director-General prior to recommencement of any works likely to affect any threatened species.

Vegetation

55. The clearing of vegetation shall be limited to areas that need to be used for construction of the Project. Cleared vegetation must be reused or recycled to the greatest extent practicable. No burning of cleared vegetation shall be permitted. Reuse options include removing millable logs, recovering fence posts, and mulching and chipping unusable vegetation waste for on-site use such as landscaping. All reasonable measures to use any surplus vegetation shall be undertaken including donation to community groups, distribution to the local community, etc.

56. Landscaping and revegetation shall utilise seed of locally native flora species or suitable tubestock grown from seed of locally native species to the satisfaction of a qualified ecologist or bushland regeneration officer.

57. Temporary revegetation shall be undertaken to stabilise disturbed areas. Progressive permanent revegetation shall be undertaken to stabilise completed works and allow adopted landscaping themes to be developed.

58. If permanent wetlands are constructed, macrophyte or water plant growth shall be undertaken within them, in accordance with the DLWC Constructed Wetlands Manual.

Visual Impacts, Landscaping and Urban Design

Pre-Construction

59. The Proponent shall prepare an Urban Design and Landscape Sub Plan as part of the Framework Construction EMP to the satisfaction of the Director-General. The Plan shall be

prepared by a suitably qualified urban designer/landscape architect. The Plan shall present an integrated urban design for the Project, applying all design principles established in the EIS and associated documents. The Plan shall identify the key principles including but not limited to:

(a) built elements including bridges and other structures, retaining walls, noise walls and toll infrastructure;
(b) motorway and road furniture including safety barriers, kerbs, paving, signage, lighting, medians, emergency phones and breakdown facilities;
(c) pedestrian and cycle elements including footpaths and paving, pedestrian crossings and fixtures (i.e. tree guards, seating, lighting, fencing and signage);
(d) public transport facilities;
(e) open space links;
(f) a schedule of species to be used in landscaping; and
(g) landscape elements including proposed treatments, finishes and materials of exposed surfaces (including colour specifications and samples).

The plan shall be prepared in accordance with relevant environmental planning instruments including Sydney Regional Environmental Plan No. 31, any Plans of Management and masterplans.

60. As part of the preparation of Construction Method Statements as specified in Condition No. 22 and in accordance with the principles defined as a result of Condition No. 59 Urban Design and Landscape Plans (including cycleways) shall be prepared in consultation with relevant Councils and the Director-General and generally in accordance with any findings in Condition Nos. 109 and 112.

The Plan shall include, but not be limited to:

(a) sections and perspective sketches;
(b) methodology of landscaping works;
(c) built elements including bridges and other structures, retaining walls, noise walls and toll infrastructure;
(d) motorway and road furniture including safety barriers, kerbs, paving, signage, lighting, medians, emergency phones and breakdown facilities;
(e) pedestrian and cycle elements including footpaths and paving, pedestrian crossings and fixtures (i.e. tree guards, seating, lighting, fencing and signage);
(f) public transport facilities;
(g) open space links;
(h) landscape elements including proposed treatments, finishes and materials of exposed surfaces (including colour specifications and samples);
(i) timing and staging of works, methodology, monitoring and maintenance; and
(j) location and identification of existing and proposed vegetation including use of locally native species and target survival rates for plantings.

The Plan(s) shall consist of a report with accompanying annotated plans, sections and perspective sketches, photomontages and other illustrative material at a scale and level of detail which is adequate to convey the Project.

Specific Design Requirements

61. Prior to substantial construction and in accordance with Condition Nos. 59 and 60 the Proponent shall prepare an Urban Design and Landscape Strategy for the Regional Parklands area affected by the project between chainage 7500 as shown in Sheet 4 of the Representations Report and Elizabeth Drive. The Strategy shall be prepared in consultation with the Department, Greening Australia, Liverpool City Council and the CLG representing the area and shall require the approval of the Director-General.

    The Strategy shall include but no be limited to:

    a) measures to minimise the visual impacts of the Project to residents of Cecil Hills including tree planting or other landscape measures in accordance with Condition No. 56;
    b) consideration of noise barriers;
    c) appropriate access across the Project including the consideration of width, length and treatment for any overpasses, underpasses in accordance with Condition No. 112; and
    d) the consideration of community offsets related to the provision of the Project if reasonable and feasible.

    Any recommendations outlined in the Strategy shall be implemented in accordance with any requirements of the Director-General.

62. Unless otherwise agreed by the Director-General in accordance with Condition No. 61, the Proponent shall ensure that proposed pedestrian/cycleway access points across the Project between chainage 7500 and 10000 (as shown in Sheet 4 of the Representations Report) shall be designed to be a minimum of 20 metres wide.

63. Bridge structures shall be designed to span the open space link at Lady Penhryn Park, Kings Langley so that a minimum 10 metres span width on either side of the watercourse exists.

64. The Proponent shall construct bridges across both Eastern and Breakfast Creeks without any fill or embankment on land between the creeks.

65. The Proponent shall consult with landholders in Erin Place, Casula and the EPA with regards to mitigation of impacts on natural light and shadowing of properties as a result of the Project. Consultation shall include, but not necessarily be limited to, the development of the noise management strategy (with regard to design of noise barriers) and preparation of detailed landscape and urban design management plans to the satisfaction of the Director-General and in accordance with Condition Nos. 59 and 90.

66. No commercial advertising except for direction purposes during construction shall be permitted within the road reserve for the Project during construction or when in operation.

67. All lighting for the motorway and off-motorway cycleway shall be designed, installed and operated as a minimum in accordance with the requirements of AS1158-Road Lighting and AS4282-Control of the Obtrusive Effects of Outdoor Lighting.

Landscaping

68. Prior to construction commencement, weed mapping of the road reserve shall be undertaken by a qualified ecologist or bushland regeneration officer. Topsoil stockpiled from locations where significant weed infestation is identified shall not be used in landscaping or rehabilitation unless it is sterilised or treated using accepted methods as specified by the ecologist or bushland regeneration officer.

69. Specific construction and operational landscape management sub-plans shall be prepared to the satisfaction of NPWS and the Director-General for the section of the Project adjacent to the Regional Parklands as defined in Sydney Regional Environmental Plan No. 31 including the Western Sydney Regional Park (WSRP) and the Sydney International Equestrian Centre, as part of the Urban Design and Landscape Plan(s) as specified in Condition No. 60. The sub-plans shall include mitigation, management and monitoring of the following as appropriate, but not be limited to:

    (a) landscaping sympathetic to the naturally occurring vegetation;
    (b) weed management to minimise potential impacts on the Regional Parklands or WSRP;
    (c) security and safety of WSRP visitors;
    (d) noise mitigation requirements;
    (e) incorporation of stormwater and drainage controls consistent with existing infrastructure and future planning for the Regional Parklands or WSRP;
    (f) potential linkages with current and future cycleway networks in the area; and
    (g) progressive rehabilitation measures to minimise impacts.

70. All landscaping works shall be monitored and maintained by a suitably qualified landscape specialist at the Proponent's expense for a period of not less than three years. The Proponent shall implement any required remediative measures to maintain landscaping works to a high standard. Any landscaping within the road reserve shall be maintained by the Proponent for the life of the Project.

Noise and Vibration

Pre-Construction

71. The Proponent shall complete additional background noise monitoring to the satisfaction of the Director-General following consultation with the EPA to be used in the development of the Construction Noise Impact Statements required by Condition No. 76.

Construction

72. Open-graded asphaltic concrete shall be used on the main carriageways unless otherwise agreed by the EPA through the Construction Noise and Vibration Management Sub Plan as required in Condition of Approval No.73.

Construction Noise and Vibration Management Sub Plan

73. A detailed Construction Noise and Vibration Management Sub Plan (CNVMP) shall be prepared as part of the Construction Framework EMP in consultation with the EPA, other relevant government agencies, Councils and the CLGs. The Sub Plan shall provide details of general

noise and vibration control measures to be undertaken during the construction stage. The Sub Plan shall provide the framework for construction noise and vibration management. Detailed analysis and assessment of potential impacts and mitigation measures shall be undertaken for each specific construction site through the Construction Noise Impact Statements required in Condition of Approval No. 76. The Sub Plan shall include, but not be limited to:

(a) identification of each work area, site compound and construction depot;
(b) identification of general activities that will be carried out and associated noise sources for each work area, site compound and construction depot;
(c) identification of the appropriate construction noise objective for the Project with regard to the requirements of Condition No. 75;
(d) identification of appropriate construction vibration objectives with regard to the requirements of Condition No. 85;
(e) establishment of procedures for the assessment of noise and vibration impacts from each work site with regard to the requirements of Condition No. 76;
(f) details of overall management methods and procedures that will be implemented to control noise and vibration from the construction stage of the Project;
(g) a pro-active and reactive strategy for dealing with complaints including compliance with the construction noise and vibration goals, particularly with regard to verbal and written responses;
(h) noise and vibration monitoring, reporting and response procedures;
(i) internal audits of compliance of all plant and equipment;
(j) construction timetabling, in particular works outside standard hours, to minimise noise impacts;
(k) procedures for notifying residents of construction activities likely to affect their noise and vibration amenity; and
(l) contingency plans to be implemented in the event of non-compliances and/or noise complaints.

Construction Hours

74. All construction activities, including transportation of fill and spoil, shall be restricted to the hours of 7:00 am to 6:00 pm (Monday to Friday); 8:00 am to 1:00 pm (Saturday) and at no time on Sundays and public holidays.

Works outside these hours that may be permitted include:

(a) any works which do not cause noise emissions to be audible at any nearby residential property;
(b) the delivery of materials which is required outside these hours as requested by Police or other authorities for safety reasons;
(c) emergency work to avoid the loss of lives, property and/or to prevent environmental harm; and
(d) any other work as agreed by the EPA through the Construction Noise and Vibration Management Sub Plan process.

In relation to points (b) and (d) above local residents should be informed of the timing and duration at least 48 hours prior to commencement of the work.

Construction Noise Guidelines

75. The construction noise objective for the Project is to manage noise from construction activities to the L_{10} level measured over a period of not less than 15 minutes not exceeding the background L_{A90} noise level by more than 5dB(A) at any residence or other noise sensitive receiver. The Proponent shall ensure that all reasonable and feasible noise mitigation and management measures are implemented with the aim to achieve the construction noise objective to the satisfaction of the EPA. Any potential activities that may cause noise emissions that exceed the objective shall be identified and managed in accordance with the specific Construction Noise Impact Statements in Condition No. 76.

    For the purposes of the noise objective for this Condition, 5dB(A) must be added to the measured level if the noise from the activity is substantially tonal or impulsive in nature in accordance with Chapter 4 of the *NSW Industrial Noise Policy.*

Construction Noise Impact Statements

76. Specific Construction Noise Impact Statements shall be prepared in consultation with relevant government agencies, relevant Councils and CLGs for specific stages of construction consistent with the Construction Noise and Vibration Management Sub Plan and the relevant CMS and shall specifically address each of the major construction sites. The statements shall include:

    (a) a description of the proposed processes and activities;
    (b) identification of all potentially affected noise sensitive receivers including residences, schools, commercial premises and noise sensitive equipment;
    (c) determination of appropriate noise and vibration objectives for each identified noise sensitive receiver;
    (d) assessment of potential noise from the proposed construction methods including noise from construction vehicles and noise impacts from required traffic diversions;
    (e) examination of all reasonable and feasible noise mitigation measures including the use of alternative methods where potential noise levels exceed the relevant guideline levels;
    (f) consideration of where reasonable and feasible, erection of operational stage noise mitigation measures prior to construction commencement;
    (g) description and commitment to work practices which limit noise;
    (h) description of specific noise mitigation treatments and time restrictions including respite periods, duration, and frequency;
    (i) justification for any activities outside the normal hours specified in Condition No. 74;
    (j) extent of noise monitoring;
    (k) internal noise audit systems including recording of daily hours of construction, progressive impact assessments as the work proceeds, conducting informal checks by the EMR, providing active and continuous communication links to relevant Councils, residents etc;
    (l) community consultation and notification;
    (m) assessment and examination of potential reasonable and feasible offsite mitigation measures for traffic noise; and,
    (n) additional noise mitigation measures as successfully negotiated with affected residents and other sensitive receptors.

    With respect to (e) above, the Proponent shall consider the use of a range of structural and non-structural measures during construction including barriers, acoustic treatment of residences,

scheduling of construction activities to minimise impacts and temporary relocation of affected residents.

Construction Noise Management

77. The Proponent shall where reasonable and feasible apply best practice innovative noise mitigation measures including:

    (a) maximising the offset distance between noisy plant items and nearby noise sensitive receivers;
    (b) avoiding the co-incidence of noisy plant working simultaneously close together and adjacent to sensitive receivers;
    (c) orienting equipment away from sensitive areas;
    (d) carrying out loading and unloading away from noise sensitive areas; and
    (e) selecting site access points and roads as far as possible away from sensitive receivers.

78. Construction noise levels shall be monitored to verify compliance with the goals developed in the Construction Noise Impact Statements. Should monitoring indicate significant exceedances of these goals, the Proponent shall consult with the EPA and implement best available additional mitigation measures to the satisfaction of the EPA.

79. The Proponent shall ensure that rock breaking, rock hammering, sheet piling and any other activities which result in impulsive or tonal noise generation are only scheduled between the following hours unless otherwise agreed to by the EPA through the Construction Noise and Vibration Management Sub Plan process:

    (a) 8 am to 12 pm (noon), Monday to Saturday; and
    (b) 2 pm to 5 pm Monday to Friday.

    Where these activities are undertaken for a continuous three (3) hour periods and are audible to noise sensitive receptors, a minimum respite period of at least one hour shall be scheduled before activities re-commence.

80. The Proponent shall investigate and apply all reasonable and feasible noise source controls to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks. Examples of appropriate noise source are provided in Section 5 of the RTA Environmental Noise Management Manual.

81. The Proponent shall ensure that all entry and departure of heavy vehicles to and from the site are restricted to the construction hours as specified in Condition No. 74.

82. The Proponent shall ensure that wherever practical and where sensitive noise receptors may be affected, piling activities are completed using bored piles. If driven piles are required they shall only be installed as agreed by the Director-General in consultation with the EPA.

Schools and Institutions

83. The Proponent shall consult with affected educational institutions and ensure that noise generating construction works in the vicinity of affected buildings are not timetabled during examination periods, unless other arrangements acceptable to the affected institutions are made at no cost to the affected institutions.

84. As part of the CNVMP, relevant schools, relevant Councils and landowners shall be consulted in relation to the provision of a satisfactory combination of noise mitigation measures at Sule College, New Tribes Bible College, Horsley Park Public School, Seven Hills North Public School, Marion Primary School, Hoxton Park Catholic School, Hoxton Park Christian Life Centre, Horsley Park Catholic Church and Rooty Hill Presbyterian Church where exceedances of EPA noise criteria are predicted. The mitigation measures shall be installed prior to construction to mitigate against both construction and operational noise. Where feasible and reasonable all costs shall be borne by the Proponent.

Vibration Criteria

85. Vibration resulting from construction of the Project shall be limited to:

    (a) For structural damage vibration - German Standard DIN 4150; and
    (b) For human exposure to vibration – the evaluation criteria presented in British Standard BS 6472 for low probability of adverse comment unless otherwise agreed by the Director-General in consultation with the EPA through the Construction Noise and Vibration Management Sub Plan.

Vibration Management

86. Vibration testing of actual equipment such as vibratory compactors and rock breakers shall be carried out on site to determine acceptable buffer distances to commercial and residential occupancies to avoid structural damage. The methods for testing and buffer zones shall be detailed in the Noise and Vibration Construction Management Plan. Should it be necessary to use vibratory compactors or rock breakers within the buffer zone, building condition surveys of all buildings and structures within this area shall be undertaken before and after use of this type of equipment.

87. The Proponent shall advise all property owners of buildings to be surveyed, as defined in Condition No. 86, what the survey will entail and the process for making a claim regarding property damage within a reasonable time prior to the commencement of the surveys. A copy of the survey(s) shall be given to the affected owner. A register of all properties surveyed shall be maintained by the Proponent and provided to the Director-General upon request.

88. A management procedure shall be implemented to deal with vibration complaints. This shall be detailed in the Noise and Vibration Construction Management Sub Plan. Each complaint shall be investigated and where vibration levels are established as exceeding the set limits, appropriate amelioration measures shall be put in place to mitigate future occurrences.

Blasting

89. Blasting shall not be permitted as part of the construction of the Project unless otherwise approved by the EPA.

Operational Noise Management

90. A detailed Operational Noise Management Sub Plan shall be prepared as part of the Operational EMP, to the satisfaction of the Director-General. The Sub Plan shall provide details of noise control measures to be undertaken during the operation stages, sufficient to address the technical requirements of the EPA, and generally in accordance with the NSW Government's Environmental Criteria for Road Traffic Noise and the RTA's Environmental Noise Management Manual. The Sub Plan shall include, but not be limited to:

    (a) identification of the appropriate operational noise criteria;
    (b) predicted noise levels at all affected residential, recreational, commercial and industrial land uses;
    (c) location, type and timing of erection of permanent noise barriers and/or other noise mitigation measures demonstrating best practice;
    (d) specific physical and managerial measures for controlling noise;
    (e) noise monitoring, reporting and response procedures including the monitoring on surrounding roads which experience significantly increased traffic volumes as a result of the Project; and
    (f) the urban design issues relating to noise control measures.

91. The Proponent shall install all necessary noise mitigation measures in the vicinity of residences at Cecil Hills to reduce predicted traffic noise levels to not exceed the levels as specified in NSW's Environmental Criteria for Road Traffic Noise.

92. Noise mitigation measures determined in Condition No. 90 shall be based on noise levels including consideration of road grade variations and actual proposed signposted speeds on the Project.

93. In determining noise mitigation measures Category 1 (new freeway or arterial road corridor) criteria from the EPA's Environmental Criteria for Road Traffic Noise shall be applied unless otherwise agreed by the EPA.

94. Prior to the opening to traffic on the Project, the Proponent shall undertake noise impact assessments for the 'truckstop' locations and install any relevant mitigation measures to the satisfaction of the EPA and Director-General. The results of this assessment shall be incorporated into the Operational Noise Management Sub Plan.

95. The Proponent shall install appropriate noise mitigation for all existing noise sensitive vacant land adjacent to the Project to allow noise sensitive development in accordance with Practice Note II of the RTA Environmental Noise Management Manual.

96. Monitoring of operational noise shall be undertaken in accordance with the Operational Noise Management Sub Plan and Practice Note VII of the RTA's Environmental Noise Management Manual. The Proponent shall, in consultation with the EPA, assess the adequacy of the traffic noise mitigation measures within 6 months to one year of opening the Project with regard to the

criteria specified in the Operational Noise Management Sub Plan. Should the assessment indicate a clear trend in traffic noise levels on the Project and surrounding roads which exceed Operational Noise Management Sub Plan defined noise design goals as approved by the EPA, the Proponent shall implement further reasonable and feasible mitigation measures in consultation with affected landowners and/or occupiers including but not limited to consideration of inclusion of noise barriers and the acoustic treatment of buildings.

Regional Traffic

Construction

97. The Proponent shall ensure adequate monitoring of the local and regional road network is conducted prior to the opening of the Project to provide an appropriate base line for measuring significant changes resulting from the construction and/or operation of the Project. Key impact prediction shall include traffic volumes on approach and departure routes, major roads and local streets and impacts on bus services and travel times. The Proponent shall consult with and take into account comments from relevant Council(s) and bus operators regarding the methodology and timing of the study.

98. As part of the TMP identified in Condition No. 101, the Proponent shall work with the relevant local councils to ensure that traffic impacts within the regional road network affected by the Project are consistent with the predictions made and managed in consultation with the relevant local council(s).

Operation

99. The Proponent shall, as part of its impact verification required under Condition No. 27, monitor traffic changes on all regional and local roads/streets predicted to have increases in traffic as a result of the Project. Monitoring shall be undertaken at 6, 12 and 18 months after opening. Should monitoring indicate intrusion of these roads/streets substantially above that predicted by additional traffic modelling in 'Western Sydney Orbital – Traffic Report' (Masson Wilson and Twiney, January 2002) as a result of the operation of the Project, the Proponent shall prepare and implement traffic management measures to mitigate the impacts of intrusive traffic in the affected areas following consultation with relevant Councils, local communities and with the agreement of the relevant local Council Traffic Management Committee.

Construction Stage Traffic Impacts

Pre construction Stage

100. The Proponent shall prepare a Framework Traffic Management Plan as part of the Construction Framework EMP for overall traffic arrangements during the construction period. The Plan shall include, with respect to the Project as a whole:

(a) cumulative impacts of multiple construction sites;
(b) measures to manage traffic flows through and surrounding the Project, including regulatory and direction signposting, line marking and variable message signs; and
(c) identify any regulatory measures to improve the efficiency of traffic conditions.

The Plan shall take into account both local and regional traffic impacts and shall at all stages give priority to public transport, bicycles and pedestrian movements. The Plan shall be prepared by an experienced traffic/transport planner in consultation with the Department of Transport and approved by the RTA (Transport Management Centre) prior to construction commencement.

101. The Proponent shall prepare individual Traffic Management Plans (TMPs) for each construction site in accordance with the Framework Construction Traffic Management Plan required by Condition No. 100, and in consultation with relevant local councils and other relevant transport agencies, prior to commencement of substantial construction affecting that area. The individual TMPs shall be incorporated into the relevant Construction Method Statements required under Condition No. 22. The individual TMPs shall include, but not be limited to:

(a) impacts on all existing traffic (including pedestrians, public transport services, cyclists and disabled persons), including the staging of construction works to minimise road closures and delay or detours to traffic;
(b) access to construction sites and site compounds, including minimising the disruption from construction vehicles entering and leaving construction sites and site compounds;
(c) any changes to existing number and width of traffic lanes;
(d) maximum and average truck volumes and expected hourly distribution;
(e) truck ingress and egress routes;
(f) entry/exit locations to construction sites;
(g) nature of loads and materials;
(h) temporary traffic arrangements, including the identification and promotion of alternative routes;
(i) no heavy vehicle queuing on public roads unless otherwise agreed by the relevant Council(s);
(j) provision of barriers between working and trafficked areas;
(k) the impact on pedestrian and bicycle facilities, including measures to ensure safe pedestrian and cycle routes and access at all times, and the provision of alternative facilities and locations for pedestrians and cyclists;
(l) the provision of safe and convenient access to all bus stops and measures to mitigate impacts on any affected bus routes;
(m) signposting;
(n) stormwater drainage;
(o) methods for implementing the TMP;
(p) access to side streets;
(q) access to adjoining properties, which would be maintained at all times wherever practicable;
(r) road or lane closures;
(s) the use of cranes on public roads;
(t) deliveries to construction sites and site compounds;
(u) a response plan which sets out the proposed response to any traffic, construction or other incident; and
(v) appropriate review and amendment mechanisms.

The TMP shall be certified by an experienced traffic/transport planner who shall be engaged throughout the construction stage on a needs basis to advise on implementation issues and amendments and as a key liaison contact for the relevant local Councils.

Construction Management

102. The Proponent shall ensure that all businesses affected by altered traffic arrangements are consulted at least 10 days prior to affectation and shall endeavour where reasonable and feasible to maintain critical access at all times.

103. The Proponent shall investigate the provision of bus pick-up and drop-offs from a central location(s) for each shift and car-pooling mechanisms to minimise worker traffic generation and parking requirements during construction. The Proponent shall incorporate any recommendations from this investigation into the relevant TMPs.

104. For the duration of the Project, the construction sites, site compounds and surrounding work areas shall be maintained in a generally clean and tidy condition.

Local Traffic and Access

Pre-Construction

105. A road dilapidation report shall be prepared for all non-arterial roads likely to be used by construction traffic prior to commencement of construction and after construction is complete. A copy of the report shall be provided to relevant Councils. Any damage resulting from the construction of the Project, aside from that resulting from normal wear and tear shall be repaired at the cost of the Proponent.

106. The Proponent shall consult with relevant Councils to develop management techniques for construction traffic on local roads, prior to commencement of construction. The Proponent shall monitor the use of local roads by construction heavy vehicle traffic in consultation with relevant Councils and shall consult with relevant Councils to develop measures to minimise and/or restrict use of local roads by heavy vehicle traffic if so required.

Note:
Nothing in Conditions 105 or Condition 106 shall be taken as restricting the Proponent from negotiating an alternative payment for damage to local roads with relevant Councils, subject to the agreement of relevant Councils.

Construction

107. The Proponent shall ensure that access to all properties is maintained during construction and following opening of the Project to traffic. The Proponent shall ensure that any access affected by the Project is reinstated to an equivalent standard or that adequate compensation is negotiated with the relevant landowner(s).

108. Access to the Western Sydney Regional Park shall be maintained throughout construction of the Project. Temporary access arrangements shall be determined in consultation with and to the satisfaction of the NPWS and the Sydney International Equestrian Centre.

Pedestrians and Cyclists

Cycleways

109. A safe, high quality, contiguous and aesthetically pleasing cyclist/pedestrian path(s) shall be provided for inexperienced and recreational and commuter cyclists and for pedestrians for the length of the Project. Details of the provisions for cyclists shall be developed through the preparation of a detailed Cycleway Strategy which shall be prepared in consultation with Bicycle NSW, relevant Councils, relevant bicycle user groups, CLGs and be generally cognisant of the Pedestrian Access Strategy required under Condition No. 112.

    The Cycleway Strategy shall also address:

    (a) a detailed description of the proposed design including all connections to surrounding roads, streets and paths;
    (b) lighting where appropriate;
    (c) safety and security;
    (d) linemarking and signage to separate cyclists from pedestrians in accordance with signposting directions from the RTA in relation to all shared paths;
    (e) signage for services such as drinking water fountains, toilets and shops;
    (f) provision of bicycle lockers at public transport stop/stations;
    (g) maintenance; and
    (h) consideration of existing and future planned cycle networks, roads and paths and potential linkages.

    The Cycleway Strategy shall be submitted to the Director-General and require the approval of the Minister for Planning within an appropriate timeframe to ensure that the approved cycleway is opened to cyclists no later than the opening of the Project to traffic.

110. All cycleway elements resulting from the Cycleway Strategy required under Condition 109, shall be designed and constructed in accordance with Austroads Guide to Traffic Engineering Practice Part 14 – Bicycles. The cycleway shall also, where relevant:

    (a) be grade separated from all roads that cross the Project;
    (b) designed so that the pavement is above the highest flood level of a 1 in 2 year ARI;
    (c) bridges shall be provided over all watercourses and for each bridge the deck surface shall be at least one (1) metre above the existing bank levels of the watercourse; and,
    (d) demonstrate adherence to all conditions of concurrence set by NPWS,

    unless otherwise specified in the approved Cycleway Strategy.

111. The off-motorway cycleway shall be fully installed and opened to bicycles/pedestrians no later than the opening of the Project to traffic.

Pedestrian Access

112. The Proponent shall prepare a Pedestrian Access Strategy to identify the pedestrian access requirements across the Project generally consistent with Condition No. 109 and shall include, but not be limited to the following:

(a) key pedestrian origins and destinations adjacent to the route of the Project such as:
    (i) residential and commercial/industrial development ;
    (ii) public facilities such as educational, community and recreational facilities;
    (iii) public transport nodes;
(b) the appropriateness of existing pedestrian access points across the Project to cater for demand;
(c) the need for additional access points across the Project;
(d) appropriate urban design of access points, pathways, landscaping, lighting and signage; and
(e) safety and security issues.

The strategy shall be prepared in consultation with relevant local councils, CLGs, NPWS, Olympic Co-ordination Authority, NSW Police and other relevant agencies. The strategy shall be submitted to the Director-General for approval at least one (1) month prior to commencement of substantial construction. Recommendations of the strategy shall be installed, implemented and open to pedestrians no later than the opening of the Project to traffic.

113. The design of all interchanges with the Project shall incorporate pedestrian access including the provisions of footpaths, crossing points etc to the satisfaction of the Director-General and in consultation with local Councils.

114. The Project between Camden Valley Way and Cowpasture Road shall be designed consistent with any findings as a result of Condition No. 32 and including:

(a) retaining existing local street links for pedestrian access, including Illaroo Road, Wilson Road and Ash Road reservations and allow for future local roads;
(b) providing visual connections under/through the Project; and
(c) improving pedestrian access at Bernera Road interchange.

115. Grade separated pedestrian/bicycle access shall be maintained across the Project within the following road reserves:

(a) Mavis Street, Rooty Hill (incorporating Angus Creek crossing and access to Aquilina Reserve);
(b) Simms Road and Ainsley Avenue, Glendenning; and
(c) Redmayne Road, Horsley Park.

Road Safety Audit

116. The Proponent shall undertake a Road Safety Audit during detailed design of the Project and prior to opening.

Air Quality

Pre-Construction

117. A detailed Dust Management Sub Plan shall be prepared in consultation with the EPA and incorporated into the Construction Framework EMP. This Sub Plan shall detail the implementation and management of measures and procedures to ensure that dust emissions from the Project are either prevented or minimised. This Sub Plan shall include, but not be limited to:

    (a) identification of potential sources of dust deposition;
    (b) monitoring (by sampling and obtaining results by analysis);
    (c) details of mitigation measures to be implemented during normal operations and during periods of extreme climatic conditions where high level dust episodes are likely to occur;
    (d) establishment of a protocol for handling dust complaints that includes recording, reporting and acting on complaints;
    (e) a reactive management program detailing how and when operations are to be modified to minimise the potential for dust emissions, should emission levels exceed the criteria; and
    (f) progressive revegetation strategy for exposed surfaces in accordance with Conditions.

    The maximum acceptable increase over existing dust deposition is 2 g/m^2/month. Monitoring shall be carried out during the construction phase of the Project to assess compliance with goals for dust concentration and deposition rates.

118. Prior to construction commencing, dust sensitive industries shall be identified, appropriately consulted and mitigative measures put into place.

Construction

119. The Proponent shall undertake a regular dust monitoring program at all locations in close proximity to the public in accordance with the Dust Management Sub Plan.

120. The Proponent shall ensure that trucks entering and leaving all construction sites that are carrying loads of potential dust generating material are covered and appropriately sealed.

121. To ensure that any vehicles which leave construction site(s) do not track materials on public roads the Proponent shall construct and maintain wheel wash facilities or equivalent to be utilised by all departing trucks and machinery which have been used in unsealed areas.

122. Water sprays and tankers shall be used to minimise the amount of dust generated, especially on hot, dry, windy days. When conditions are excessively dusty and the dust emissions from operations cannot be maintained within the dust goal specified in Condition No. 117, then all dust generating activities shall cease until dust suppression can be adequately carried out.

123. In accordance with the Protection of Environment Operations (Control of Burning) Regulation 2000, no open burning or incineration shall be permitted at any construction sites.

Operations

124. Prior to the opening of the Project to traffic, the Proponent shall investigate, in consultation with the EPA the measures for smoky vehicle enforcement in areas surrounding the Project, taking into consideration cost effectiveness. Any measures implemented as a result of investigation recommendations shall be in accordance with the Smoky Vehicle Enforcement Program.

Water Quality, Erosion and Sediment Control

Soil and Water Quality Management Plan(s)

125. As part of the Construction Method Statements and Operational EMPs, detailed Soil and Water Quality Management Plan(s) shall be prepared in consultation with the EPA, DLWC, NSW Fisheries, relevant Catchment Management Trusts, Sydney Water, Sydney Catchment Authority and relevant Councils. The Plan(s) shall be prepared in accordance with the Department of Housing's guideline Managing Urban Stormwater - Soils and Construction 1998, the RTA's Guidelines for the Control of Erosion and Sedimentation in Roadworks and where appropriate, DLWC's Constructed Wetlands Manual. The Plan(s) shall be prepared prior to construction or operation as appropriate. The Soil and Water Quality Management Plan(s) shall contain, but not be limited to:

(a) management of the cumulative impacts of the development on the quality and quantity of surface and groundwater, including stormwater in storage, sedimentation dams and flooding impacts;
(b) details of short and long term measures to be employed to minimise soil erosion and the discharge of sediment to land and/or waters including the exact locations and capacities of sedimentation basins;
(c) identification of all potential sources of water pollution and a detailed description of the remedial action to be taken or management systems to be implemented to minimise emissions of these pollutants from all sources within the subject site;
(d) detailed description of water quality monitoring to be undertaken during the pre-construction, construction and operation stages of the Project including base line monitoring, identification of locations where monitoring would be carried out and procedures for analysing the degree of contamination of potentially contaminated water;
(e) measures to handle and dispose of stormwater, effluent and contaminated water and soil including incident management structures;
(f) a process for the disposal of water from sedimentation basins and constructed wetlands developed in consultation with the EPA;
(g) measures for the use of water reclaimed or recycled on-site; and
(h) contingency plans to be implemented in the event of fuel spills or turbid water discharge from the site.

126. The Soil and Water Quality Management Plan(s) shall incorporate detailed erosion and sedimentation controls including a strategy to manage the extent of exposed ground surface during construction and progressive site rehabilitation requirements. The Plan shall be prepared to the satisfaction of DLWC and in consultation with the EPA, local Councils and NSW Fisheries and sufficient to address the technical requirements for obtaining the relevant EPA Licence.

Construction

127. The Proponent shall ensure that all appropriate soil and erosion and sediment control works are completed and in place prior to commencement of any works that may have the potential to generate soil erosion or sediment. Erosion and sediment protection measures shall also be in place before the commencement of any stockpiling activity. These controls shall be maintained until all ground surfaces are stabilised and revegetated.

128. The Proponent shall only construct sedimentation and erosion controls and sedimentation basins under this approval in those locations that satisfy the following criteria:

(a) sites to be located within the road reserve unless otherwise approved by the Director-General;
(b) sites to be located with ready access to access tracks;
(c) sites shall not be constructed over water or sewer pipelines unless otherwise agreed to by SWC and/or SCA;
(d) sites for sedimentation basins to be separated from nearest residences by at least 100m where practicable and where it can be demonstrated that there will be no adverse impacts on noise, visual and air quality, health and safety;
(e) sedimentation basins are not to be located within 100m of waterways unless adequate controls are implemented to protect water quality in case of overflows or otherwise agreed to by the DLWC;
(f) sites are not to involve the utilisation or modification of any existing wetlands or waterways;
(g) sites are to have low conservation significance for flora, fauna or heritage and they are not to require any clearing of native vegetation beyond that which must be cleared for the Project in any case;
(h) sites for sedimentation basins are to have a low risk of contamination and be free of existing utilities and services;
(i) all conditions of concurrence set by NPWS shall be adhered to;
(j) if land is leased to enable construction of a temporary sediment basin, it shall be restored following construction to a level equal or better than the original condition; and
(k) sedimentation basins on private land shall be fenced to minimise safety risks.

129. All surface water flows from construction sites shall be detained through appropriate measures to ensure that there is no exacerbation of existing flooding to the satisfaction of DLWC. The Proponent shall consult with the relevant Councils on appropriate and specific measures to be implemented at various locations.

130. No disposal of water from sedimentation basins or constructed wetlands shall be allowed to the sewer system without prior agreement from Sydney Water.

131. All water collected during construction which is likely to be contaminated shall be tested, treated, handled and disposed of to the satisfaction of the EPA.

132. Topsoil shall be stripped and stockpiled. All stockpiles shall be protected from surface flows. They shall be located away from drainage lines and upstream of sediment basins.

133. An appropriately qualified soil conservationist shall be consulted on a regular basis in accordance with Construction Method Statements during construction of the Project to undertake inspections of temporary and permanent erosion and sedimentation control devices to ensure

that the most appropriate controls are being implemented and that they are being maintained in an efficient condition at all times and meet the requirements of any relevant approval/licence condition(s).

Flooding and Hydrology

General

134. The Proponent shall develop a detailed Flooding and Drainage Management Sub Plan for the Project as part of the Construction Framework EMP to the satisfaction of DLWC and in consultation with Local Councils. The Sub Plan shall be in accordance with the measures identified in the "Floodplain Management Manual: the management of flood liable land" dated January 2001 (or its latest edition) and the requirements of Australian Rainfall and Runoff (1987). The objective of the Sub Plan shall be to not increase inundation levels or durations during a 100 year ARI flood event in any areas sensitive to flooding.

135. All drainage lines (whether permanent or ephemeral) crossed by the Project and/or any on/off ramps and/or the proposed cycleway exhibiting a defined bed and bank channel shall be through the provision of a bridge unless otherwise agreed to by the Director-General following consultation with the DLWC.

    Prior to seeking any agreement by the Director-General, the Proponent shall provide evidence of the consultation with DLWC and shall explicitly identify where there are disputes. For any crossings under dispute the Proponent shall provide detailed information to the Director-General on the nature of the dispute.

136. The Proponent shall consult with DLWC and NSW Fisheries in relation to the design and timing of all watercourse crossings including size and installation method of crossing prior to construction. Where reasonable and feasible, all bridges shall be designed to have a minimum of 2m clearance from the natural ground surface unless otherwise agreed by DLWC. The Proponent shall also investigate in consultation with DLWC and NSW Fisheries measures to ensure that adequate light and moisture is maintained to facilitate growth of native vegetation underneath bridges. Box culverts shall be preferred to pipe culverts, where practical.

137. The Proponent shall design bridge abutments at a sufficient distance from the edges of watercourse banks to allow for fauna movement and for vegetation linkages to the satisfaction of the NPWS and DLWC.

138. The Project shall be designed such that there are no bridge piers in watercourses unless otherwise agreed by the Director-General following consultation with the DLWC.

139. In undertaking bridge design and construction, the Proponent shall ensure where practicable that: no earthen platforms for driving pylons are constructed in permanent or ephemeral watercourses; and all embankments are located away from the edge of waterways unless otherwise agreed by NSW Fisheries.

140. If during the detailed design stage it is proposed that any construction and operational noise barriers would include a gap between the bottom of the noise barrier and the ground surface and/or components of the barrier are hinged for flooding purposes if agreed to by DLWC, the Proponent shall ensure that all noise and safety implications are investigated.

141. During the detailed design the Proponent shall ensure that flood mitigation measures associated with the Project in the vicinity of Cabramatta, Hinchinbrook and Maxwells Creeks are consistent with the Floodplain Management Manual (January, 2001) and any flood mitigation strategy adopted by Liverpool City Council and/or other relevant Councils (and other relevant authorities). The design shall be undertaken in consultation with Liverpool City Council, DLWC, Landcom and any private land developers.

Drainage Design

142. Cross drainage of the Project shall be designed to ensure that there is no exacerbation of existing flooding to the satisfaction of DLWC and consultation with relevant local Councils.

143. All temporary or permanent drainage works as part of the Project in the vicinity of the Western Sydney Regional Park shall be designed so that resizing or redesign of any existing or proposed drainage facilities in the Park is not required unless otherwise agreed to by NPWS.

Detention Facilities

144. Stormwater detention basins and stormwater interceptors shall be designed to contain the 100 ARI critical duration storm event.

145. The outlet of the detention facility shall be designed to ensure the development does not alter the natural hydrology of the catchment for all events up to the 100 year ARI flood event.

146. The Proponent shall only construct detention basins/constructed wetlands associated with the Project in those locations that satisfy the following criteria:

(a) sites to be located within the road reserve unless otherwise approved by the Director-General;
(b) sites to be located with ready access to access tracks unless otherwise approved by the Director-General;
(c) sites to be located off-line unless agreed to by DLWC;
(d) sites are not to be constructed over water supply or sewer pipelines without the prior agreement of SWC or SCA;
(e) sites for flood detention basins to be separated from the nearest residences by at least 100m and for constructed wetlands by at least 200m where practicable unless it can be demonstrated that there will be no adverse impacts on noise, visual, air quality impacts, health, safety and mosquito levels;
(f) detention basins and constructed wetlands are to be offline and not to be located within 50m of waterways unless adequate controls are implemented to the satisfaction of DLWC and the EPA to protect water quality in case of overflows;
(g) sites are to have low conservation significance for flora, fauna or heritage;
(h) sites for detention basins and constructed wetlands are to have a low risk of contamination and be free of existing utilities and services;
(i) all conditions of concurrence set by NPWS shall be adhered to; and
(j) detention basins and constructed wetlands shall be fenced to minimise safety risks.

147. The design of any detention basins or constructed wetlands is to be in accordance with NSW Dam Safety Committee standards.

Stormwater

148. As part of the Construction Method Statements, Stormwater Management Plan(s) (SWMP) shall be prepared in consultation with the EPA, relevant Councils, Catchment Management Trusts and DLWC prior to the commencement of construction. The SWMP shall be prepared in accordance with the principles and practices set out in "Managing Urban Stormwater, Soils and Construction: (1998") prepared by Department of Housing and RTA's "Guidelines for the Control of Erosion and Sedimentation." The SWMP shall be prepared so as not to exacerbate existing flood conditions. . The SWMP shall address the impacts of stormwater from the Project and as a minimum provide:

(a) details of mitigation measures and sedimentation basins which are required;
(b) details of the impact of the Project on waterways from stormwater;
(c) a de-watering procedure;
(d) where reasonable and feasible separate water systems in the proposed drainage system, one for run-off from the roadway areas and the other for run-off from catchments adjacent to the road; and
(e) how the issue of insufficient space for stormwater quantity and quality facilities within the road reserve will be addressed.

149. Where practicable, the Proponent, shall in consultation with DLWC, ensure that discharge of stormwater (for both construction and operational phases) is prevented from draining into areas of existing native vegetation.

Operation Stage Control Measures

150. All operational stormwater and wastewater systems of the Project including stormwater drainage, erosion, sedimentation and water pollution control systems and facilities of the Project shall be located, designed, constructed, operated and maintained to meet the requirements of the relevant authorities including the EPA, NSW Fisheries, DLWC, SWC and relevant Councils. All facilities including wetland filters, grass filter strips, gross pollutant traps and sedimentation basins shall be inspected regularly and maintained in a functional condition for the life of the Project.

151. Stormwater control measures for the operational phase of the Project shall be installed and utilised within the road reserve prior to construction commencing.

152. Road stormwater shall be treated through gross pollutant traps, stormwater interceptors, constructed stormwater wetlands and/or detention basins. Gross pollutant traps shall be constructed at discharge locations where it is not possible to construct water quality ponds. Gross pollutant traps shall be designed to operate during a 1 year ARI flood event and shall provide for control of coarse sediments and collection of trash and litter. The design of gross pollutant traps shall incorporate adequate by-pass mechanisms to manage events greater than the 1 year ARI flood event.

153. All stormwater and pollution detention systems shall be located outside of, or protected from, existing or future flood hazard areas, to ensure that collected pollutants do not come into contact

with floodwaters.

Spill Management

154. The Proponent shall provide appropriate detention systems for containment of spills and materials arising from accidents that are consistent with the RTA's *Code of Practice for Water Management – Road Development and Management* in consultation with the EPA.

155. In the event of a spill, the Proponent shall ensure that all material spilled is removed as soon as practicable and at least within 24 hours.

Indigenous Heritage

Indigenous Heritage and Archaeology Management Sub Plan

156. As part of the Construction Framework EMP, the Proponent shall prepare and Implement an Indigenous Heritage and Archaeology Management Sub Plan in consultation with the relevant Local Aboriginal Land Councils, relevant Aboriginal communities, National Parks and Wildlife Service and relevant Councils to manage archaeological resources located within the area impacted by construction activities. The Sub Plan shall include:

(a) an assessment of the significance of effects on archaeological items and Aboriginal heritage features, including demolition, relocation, removal, damage and physical intrusion into conservation areas;
(b) details of the archaeological investigations to be undertaken;
(c) management measures for all identified features and excavated materials;
(d) a Contingency Protocol to be implemented in the event of discovery of relics including provision for significance assessment, consideration of management options and, where destruction or removal is proposed, application be made for appropriate NPWS permits and documentation and recording be undertaken for archival purposes;
(e) a conservation management strategy; and
(f) an independent conflict resolution process.

Pre-Construction

157. The Proponent shall undertake additional Aboriginal Heritage investigations to the satisfaction of NPWS prior to construction and incorporate the findings into the Indigenous Heritage and Archaeology Management Sub Plan. The investigations shall include:

(a) consultation with the relevant Aboriginal communities including Deerubbin and Gandangarra Local Aboriginal Land Councils, the Darug Tribal Aboriginal Corporation and the Darug Custodian Aboriginal Corporation;
(b) identification and assessment of places of cultural significance shall be undertaken in consultation with the relevant Aboriginal groups;
(c) statements of heritage significance for cultural and archaeological sites;
(d) review of management options shall be undertaken for all sites as presented in the EIS;
(e) preparation of preliminary research permit applications for all areas of Potential Archaeological Deposit (PAD);
(f) sub-surface identification and testing of all PADs by an archaeologist and representatives of the Aboriginal Community;

(g) NPWS shall be provided with a regional contextual database identifying sites of archaeological and cultural significance;
(h) where required Consents to Destroy to be lodged under Section 90 of the National Parks and Wildlife Act 1974; and
(i) research involving extensive testing programs, shall be conducted at Plumpton Ridge.

158. Where sites of high scientific and/or Aboriginal community significance are within the impact area and avoidance is not possible, the RTA shall consider in consultation with the NPWS and the Aboriginal community, measures such as the establishment of additional conservation areas, undertaking Aboriginal heritage community projects (for example, setting aside a Keeping Place for artefacts or funding Aboriginal heritage conservation projects) or ethnographic studies/Aboriginal heritage/Aboriginal archaeological studies.

Construction

159. A suitably qualified archaeologist, the Deerubbin and Gandangara Local Aboriginal Land Councils, the Darug Custodian Aboriginal Corporation and the Darug Tribal Aboriginal Corporation Incorporated shall be on-site during initial ground clearing and preliminary works in the vicinity of known or potential archaeological sites.

160. During construction, temporary protective fencing shall be placed around sites considered to be archaeologically sensitive and for which Consent to Destroy Permits have not been obtained. Protective fencing shall also be provided during the construction phase to sites located outside the immediate boundary of the Project but in close proximity to the construction works.

Construction Management

161. The Proponent shall ensure that all employees and sub contractors are appropriately trained on the obligations for Aboriginal Heritage conservation. The Aboriginal community and a qualified archaeologist shall be involved in this training process.

Unexpected Items

162. If during the course of construction the Proponent becomes aware of any items of Aboriginal archaeology, all work likely to affect the site(s) shall cease immediately and the relevant authorities, including the NPWS, the relevant Local Aboriginal Land Council(s) and the relevant Aboriginal groups shall be consulted to determine an appropriate course of action prior to the re-commencement of work at that site. Appropriate supporting documentation would need to accompany any application for required permit/consent(s). The relevant Local Aboriginal Land Council(s) and the relevant Aboriginal groups shall also be consulted about management of the deposits before construction re-commences.

Non-Indigenous Heritage

Non-Indigenous Heritage and Archaeology Management Sub Plan

163. As part of the Construction Framework EMP, the Proponent shall prepare and Implement a Non-Indigenous Heritage and Archaeology Management Sub Plan in consultation with the NSW Heritage Office and relevant Councils to manage heritage items and archaeological resources located within the area impacted by construction activities. The Sub Plan shall include:

    (a) identification of all heritage properties including all those listed in the EIS and the Representations Report plus any additional heritage properties as required by relevant Councils and the Heritage Office at the time of construction commencement;
    (b) an assessment of the significance of effects on heritage items including demolition, relocation, removal, damage and physical intrusion into conservation areas;
    (c) management measures for all identified features; and
    (d) a conservation management strategy where necessary.

164. A Plan of Management shall be prepared in consultation with Sydney Water, the Sydney Catchment Authority, the NSW Heritage Office, the National Trust, the Australian Heritage Commission, heritage representatives from Liverpool and Fairfield City Councils and the Department for the section of the Cecil Hills Water Supply Tunnel and the Woodstave Pipeline affected by the Project. The findings of the Plan of Management shall be incorporated into the Non-Indigenous Heritage and Archaeology management Sub Plan.

Pre-Construction

165. The following tasks shall be undertaken prior to construction commencing:

    (a) statements of significance shall be developed for each site impacted by the Proposal;
    (b) statements of Heritage Impact shall be developed for each site;
    (c) management and archaeological monitoring strategies shall be developed for impacted sites; and
    (d) necessary permits and approvals shall be obtained from the NSW Heritage Office.

166. Known heritage items for which approval to impact has not been obtained shall be protected from being disturbed during construction by the erection of protective fencing or flagging of the site.

Individual Items

167. Prior to construction in the vicinity of the Pearce's Cemetery the Proponent shall conduct preliminary archaeological investigations including hand and machine trenching to substantiate any evidence of human burials outside of the cemetery boundary. The investigations shall be supervised by an appropriately qualified archaeologist. During construction in the vicinity of Pearce's Cemetery a minimum 10m setback from the closest grave or the State Heritage Register boundary, whichever is the greater shall be maintained for construction works. A Plan of Management including landscaping shall be undertaken for this site and reviewed by the NSW Heritage Office, prior to any works on the Project in the vicinity of this item. The site shall be fenced during the construction period to ensure that construction does not encroach into this area. Access to the cemetery shall be maintained. The findings of the Plan of Management shall

be incorporated into the Non-Indigenous Heritage and Archaeology management Sub Plan.

168. Plans of Management shall be prepared for all historically significant items and areas potentially affected by the Project prior to construction including Meurants Cottage, the Timber Barn site, Rooty Hill and the wooden building thought to be the remains of Coleman's Inn. Any Plans of Management shall be prepared in consultation with the NSW Heritage Office. The findings of the Plans of Management shall be incorporated into the Non-Indigenous Heritage and Archaeology management Sub Plan.

169. At least three months prior to construction commencement, an advertisement to be approved by NSW Heritage Office shall be placed in the local and Sydney newspapers for a period of three weeks to locate any living relatives who may be able to confirm whether site Project-E-15 is in fact a burial site. Should it be confirmed that this is a burial site then the site shall be removed, restored and relocated with the approval from the Heritage Council of NSW. This process shall also be undertaken in consultation with relatives, The Department of Health, the Coroner and Local Council.

Construction Management

170. The Proponent shall ensure that all employees and subcontractors are appropriately trained on the obligations for heritage conservation under the NSW Heritage Act.

Unexpected Items

171. Should any historical relics be unexpectedly discovered in areas of the site not subject to an excavation permit, then all excavation or disturbance to the area is to stop immediately and the Heritage Council of NSW shall be informed in accordance with Section 146 of the Heritage Act 1977.

Property Acquisition

Pre-Construction

172. The Proponent shall identify all properties to be affected by land acquisition and complete negotiations with landholders prior to construction commencement and in accordance with the RTA's Land Acquisition Policy. Where a mutually acceptable arrangement cannot be made using this method, the Proponent shall ensure that the acquisition of any land shall be in a responsive and sensitive manner and in accordance with the Land Acquisition (Just Terms Compensation) Act 1991. The Proponent shall consult affected landowners prior to and during the property acquisition process in accordance with the requirements of Condition No. 174.

173. Prior to the commencement of construction, the Proponent shall consult all affected landowners regarding any practicable and cost-effective measures to minimise impacts which may be beneficially implemented prior to the commencement of construction or within such time as agreed with the relevant landowner.

174. The Proponent shall notify the owner of any property that is to be adjusted, acquired or from which an easement is to be obtained. This notice shall contain sufficient details to identify the land of interest being adjusted/acquired and is to include dimensions, location with respect to boundaries and any other information necessary to enable the identification of the land in

relation to the development. This notification shall be given in adequate advanced time prior to access for construction purposes.

Construction

175. Any damage to buildings, structures, lawns, trees, sheds, gardens etc. as a result of any direct or indirect construction activity which can be reasonably connected with construction activities as certified by an independent building surveyor or structural engineer (as appropriate) shall be fully rectified by the Proponent at no cost to the owner(s). Construction activities undertaken within private property shall be sympathetic to the specific needs of individual property owners particularly in terms of requirements for temporary facilities such as fencing, access to footpaths/ driveways/garages etc.

176. The Proponent shall ensure that the demolition of any structures is carried out only by specialist employees and/or contractors who hold any necessary licences to carry out such works.

Spoil, Fill Material and Waste Management

Spoil and Fill Material

177. Prior to the commencement of substantial construction where large volumes of imported fill are required, a detailed cost effectiveness study investigating the viability of importing fill by train shall be undertaken. The study shall include but not be limited to detailed consideration of rail opportunities on the Main Southern Line, Main Western Line and the Richmond Line and interfaces with the Project alignment. The study shall require the approval of the Director-General and the Proponent shall implement any such measures as required by the Director-General.

178. As part of the Construction Framework EMP, the Proponent shall prepare a Spoil and Fill Material Management Sub Plan in consultation with the EPA and relevant Council(s). This Sub Plan shall be prepared to the satisfaction of the Director-General. The Sub Plan shall identify how spoil and/or fill material would be sought, handled, stockpiled, reused including details of disposal/reuse sites and the volumes of spoil and/or fill material to be transported to each site and transport mode breakdowns. The Sub Plan shall include an assessment of road vs rail based spoil transport options and identify all material transport routes to be used to and from the Project. The Sub Plan shall be prepared in consultation with the EPA and Council before the commencement of construction at relevant sites and address issues of dust mitigation, drainage, disturbance and contaminated material (including procedures for dealing with the unanticipated discovery of contaminated material during the course of construction), noise and local amenity. The Sub Plan shall also assess the cumulative impacts associated with spoil management with regard to other Projects such as the South Windsor Flood Relief Route, Lane Cove Tunnel, Parramatta Rail Link, Port Botany expansion proposals. The Proponent shall ensure that this Sub Plan is fully integrated with the Traffic Management Plans.

179. As part of the formal tender evaluation process, the Proponent shall demonstrate to the satisfaction of the Director-General that the externality costs of truck-based importation of fill has been explicitly considered in the weighted comparative ranking and rating of tenders on the issue of cost. For the purposes of quantifying and comparing externality costs under this condition, the Proponent shall consider a ranking hierarchy from best to worst in accordance with the following:

(a) heavy rail transport;
(b) road based fill transport by Freeways or Tollways;
(c) road based fill transport by state roads (with the exception of Freeways or Tollways);
(d) road based fill transport by regional roads; and
(e) road based fill transport by local roads.

180. Notwithstanding the outcomes of Condition Nos. 177 to 179, the transport of spoil and/or fill material shall be limited to movements within the road reserve wherever possible. Where the transport of spoil or fill material on public roads is required the Proponent shall only use regional, state roads or freeways/tollways unless no other reasonable alternatives exist. Unless agreed to by the Director-General access points to and from the Project for spoil and/or fill material transport shall be limited to:

(a) Camden Valley Way;
(b) Beech Road;
(c) Hoxton Park Road;
(d) Cowpasture Road;
(e) Elizabeth Drive;
(f) Saxony Road;
(g) The Horsley Drive;
(h) Wallgrove Road;
(i) Great Western Highway;
(j) Woodstock Avenue;
(k) Power Street;
(l) Rooty Hill Road;
(m) Richmond Road;
(n) Sunnyholt Road;
(o) Old Windsor Road; and
(p) M2 Motorway.

181. The Proponent shall ensure that all clean and/or treated spoil shall be reused or recycled where possible. In particular the EMR shall endorse that:

(a) use of spoil generated from construction activities is maximised in preference to any import of fill; and
(b) where reasonable and feasible all clean excavated natural material is either reused on the Project or otherwise made available for reuse elsewhere in preference to disposal to landfill.

Waste Management and Recycling

182. As part of the Construction Framework EMP and as relevant, a detailed Waste Management and Reuse Sub Plan shall be prepared in consultation with the EPA. The Sub Plan shall address the management of wastes during the construction and operation stages respectively. It shall specify specific waste management measures to be followed during the construction period by the construction contractor. It shall be consistent with the *Waste Avoidance and Resource Recovery Act 2001,* and the EPA's *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes*, and shall identify requirements for waste avoidance, reduction, reuse and recycling. The Sub Plan shall provide details of requirements for:

(a) handling;
(b) stockpiling;
(c) disposal of wastes: specifically contaminated soil or water, concrete, demolition material, cleared vegetation, oils, grease, lubricants, sanitary wastes, timber, glass, metal, etc.; and
(d) identifying any site for final disposal of any material and any remedial works required at the disposal site before accepting the material.

This Sub Plan shall include but not be limited to:

(i) methods of management of all waste generated as part of the Project;
(ii) an outline of comprehensive plans of action for key waste streams;
(iii) implementation of the waste hierarchy by seeking to avoid waste generation as a priority, the reuse, recycling or reprocessing of waste and, as a last resort, disposal of waste;
(iv) arrangements for waste which cannot be re-used, recycled or reprocessed to be disposed of at a licensed waste disposal facility;
(v) procedures for separating excavation and demolition waste and for identifying destinations for the material;
(vi) procedures for classifying waste in accordance with the EPA's Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes;
(vii) installation of segregated bins for recyclable materials and provision for material to be reused or recycled wherever possible;
(viii) except where a sewer is available, the discharge of sewerage from site amenities to holding tanks for removal by tankers;
(ix) the provision of rubbish skips at all construction sites and site compounds and their regular removal or emptying;
(x) ensuring that local roads affected by construction remain intact to reduce the need for new paving materials;
(xi) erecting signs within construction sites and site compounds encouraging employees to reduce, re-use, or recycle wherever possible;
(xii) the disposal of chemical, fuel and lubricant containers and solid and liquid wastes in accordance with the requirements of the EPA;
(xiii) appropriate induction and training of all employees and sub-contractors in the waste hierarchy and the requirements of this Waste Management and Reuse Sub Plan;
(xiv) undertaking regular audits of waste management; and
(xv) keeping of a waste management register of all significant waste collected from construction sites and site compounds for disposal, including amounts, date and time and details and locations of disposal.

As part of the Sub Plan, an Action Plan shall be prepared to promote the use of recycled materials, including construction and landscape materials. The Plan shall detail how the Project gives consideration and support to the Government's *Waste Reduction and Purchasing Policy*. The Plan shall also include details on measures to implement energy conservation best practice.

183. Any waste material that is unable to be reused, reprocessed or recycled shall be disposed at a landfill licensed by the EPA to receive that type of waste. The Waste Management and Reuse Sub Plan shall be framed using the waste minimisation hierarchy principles of avoid-reduce-reuse-recycle-dispose. This shall also include the demand for water.

Contamination

184. A detailed assessment of potentially contaminated land and the remediation required shall be undertaken having regard to the principles of SEPP55 and in accordance with the (1998) Managing Land Contamination: Planning Guidelines and guidelines made or approved by the EPA under Section 105 of the *Contaminated Lands Management Act* prior to construction. The results of this investigation shall be incorporated into a Contamination Investigation Report to determine the nature, extent and degree of contamination. The Report shall detail the results of site investigations and the assessment of potential risks posed by contaminants to health and the environment and indicate whether remediation is required. The Report shall be prepared to the satisfaction of an EPA accredited site auditor.

185. Should the Contamination Investigation Report required by Condition No. 184 indicate that remediation is necessary to reduce or remove risks posed by contaminants in particular locations, then the Proponent shall remediate the land in accordance with a Remedial Action Plan which shall be incorporated into the relevant CMS(s) required by Condition No. 22. The Plan(s) shall be prepared in consultation with relevant Council(s) and to the satisfaction of an EPA accredited site auditor.

186. In the event of discovery of previously unidentified area(s) of potentially contaminated material, the Proponent shall cease work in the vicinity of the discovery and not commence work until the extent of contamination has been assessed and if necessary a Remedial Action Plan has been prepared and implemented in accordance with Condition No. 185.

187. Disposal of any contaminated material shall only be to a landfill approved by the EPA to accept that type of waste.

188. Dilution of contaminated spoil with clean material shall not be undertaken.

189. The Proponent shall ensure that the cost of treatment of any contaminated spoil on-site for reuse is investigated, and if cost effective, implemented to the satisfaction of an EPA accredited contaminated site auditor, prior to commencement of spoil disposal.

190. A contingency plan for the management of contaminated water generated by an emergency situation shall be developed as part of the Project CEMP.

Acid Sulfate Soils

191. An Acid Sulfate Soil (ASS) Contingency Sub Plan shall be developed prior to the commencement of construction and incorporated into the Construction Framework EMP. This shall include mitigation measures for the unexpected discovery of actual or potential acid sulfate soils during construction. It shall be prepared to the satisfaction of the DLWC and in consultation with the EPA. The ASS Contingency Plan shall be prepared in accordance with the Acid Sulfate Soils Manual (ASSMC, 1998).

Groundwater

Groundwater Management Sub Plan

192. A detailed Groundwater Management Sub Plan shall be prepared to meet the requirements of DLWC and the EPA and incorporated into the Construction Framework and Operational EMPs. The Sub Plan shall cover the complete Project and shall provide details of groundwater control measures to be undertaken during both the construction and operation stages respectively and include but not be limited to:

(a) handling, treatment and disposal of contaminated groundwater;
(b) treatment strategies appropriate to predicted levels of salinity and quantities of seepage water;
(c) pre-construction and construction monitoring in accordance with the NSW EPA *Contaminated Sites: Sampling Design Guidelines* (NSW Environment Protection Authority 1995) to identify elevated concentrations of contaminants; and
(d) auditing.

Pre-Construction

193. Groundwater studies to determine quality, quantity and hydrological characteristics shall be undertaken for any proposed tunnel locations and significant cuts. This shall include targeted field investigations involving drilling, groundwater monitoring, bore installation, soil and groundwater sampling and analysis, and data interpretation. The investigations and monitoring shall be undertaken by a suitably experienced hydrogeologist or geotechnical engineer.

194. In accordance with Condition No. 193 investigations into groundwater salinity shall be undertaken at all locations identified as potentially containing high salinity levels and areas in close proximity to sensitive watercourses. Further investigations for the groundwater salinity issues shall include, at a minimum:

(a) boreholes to 5m below the proposed base of cuts, in all cuts deeper than 5m;
(b) installation of groundwater sampling and monitoring wells in the boreholes;
(c) sampling of the groundwater for salinity and general groundwater chemistry;
(d) regular monitoring of the groundwater levels; and
(e) assessment of the results of the testing and monitoring by an experienced hydrogeologist.

195. The Proponent shall establish parameters for any potential salinity increases as a result of the Project at nearby watercourses in accordance with guidelines specified in ANZECC and ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

196. Prior to any major earthworks, the Proponent shall develop methods and procedures to monitor changes in the groundwater table due to modifications of the terrain, loss of vegetation, impacts on any existing bores and shall include measures to safeguard and/or mitigate impacts. The procedures to monitor changes in the groundwater table would be implemented prior to major earthworks, 12 months and two years after the opening of the Project to traffic. If changes in the groundwater are detected and determined to be a result of the above impacts, further testing shall be carried out and appropriate measures taken. The Proponent shall comply with all requirements of DLWC.

Construction

197. Fortnightly groundwater monitoring shall take place for the duration of construction at a minimum at all locations monitored during pre-construction studies. This shall also include the collection of data on salinity levels in nearby surface waters potential affected by construction works.

198. Licensable groundwater works shall only be undertaken by drilling contractors who hold a current Driller's Licence issued by DLWC with appropriate endorsement for the nature of the work required.

Greenhouse Gases

Construction Stage

199. The Proponent shall develop in consultation with the Sustainable Energy Development Authority criteria for assessment of potential contractors in the formal tender evaluation process encouraging the use of alternative cleaner fuel sources for construction equipment and vehicles.

200. The Proponent shall promote the reduction of greenhouse gases by adopting energy efficient work practices including, but not limited to:

(a) developing and implementing procedures to minimise energy waste;
(b) conducting awareness programs as part of induction for all site personnel regarding energy conservation methods; and
(c) conducting regular energy audits during the Project to identify and address energy wastage.

201. No rainforest timbers shall be used in any construction activities.

Sustainable Energy

202. Green power shall be purchased for the supply of at least 50% of the electrical energy requirements for the construction of the Project.

Utilities and Services

Pre-Construction

203. During the detailed design process the Proponent shall consult with relevant utility and service authorities to determine potential co-location opportunities for services with the construction of the Project.

204. The Proponent shall identify all locations where as a result of the Project new locations for electricity towers are required and existing towers need to be raised. The Proponent shall conduct a visual impact assessment at each location and investigate the cost effectiveness of alternative strategies such as the undergrounding of these power lines. The findings of these investigations shall be input to the Ancillary Infrastructure Impact Assessment as detailed in Condition No. 20.

205. Prior to the commencement of construction the Proponent shall identify the services potentially affected by construction activities including the Sydney-Moomba high pressure gas pipeline, to determine requirements for diversion, protection and/or support. This shall be undertaken in consultation with the relevant service provider(s) and based on any recommendations from Condition of Approval No. 212.

206. An appropriately qualified person acceptable to Sydney Water shall be commissioned to design, or review the design for water and sewer mains to be constructed and/or relocated as a result of the road construction. The design shall demonstrate compliance with Sydney Water's Design Manual as a guide and consult with Sydney Water throughout the process.

Construction

207. Any alterations to utilities and services shall be carried out to the satisfaction of the relevant service provider(s), and unless otherwise agreed to, at no cost to the service/utility provider(s).

Note:
Nothing in Condition No. 207 shall be taken as requiring the Proponent to meet the cost of any alterations should any prior agreements or protocols be in place between the Proponent and service provider(s) for such alterations.

208. The Proponent shall ensure that disruption to services resulting from the Project are minimised and shall be responsible for advising local residents and businesses affected prior to any disruption of service.

209. If any interruption of bulk water supply along the pipelines are anticipated during construction work, relevant authorities shall be informed as early as possible so that contingency plans can be developed. The Proponent shall bear all costs of disruptions, contingency plans and/or alterations unless otherwise agreed to be the relevant authorities.

210. The Proponent shall avoid sewer access chambers unless otherwise agreed to by Sydney Water. Any sewer access chamber affected shall be restored and ready access shall be facilitated for maintenance work by Sydney Water. No new or relocated access chambers shall be located within the Project carriageways.

Safety and Security

211. The Proponent shall prepare and implement a Security and Crime Management Strategy with aims to prevent unauthorised public ingress to the Project and to minimise the potential for crime in the vicinity of Project infrastructure (eg vandalism, loitering, illegal dumping etc). The Strategy shall be generally in accordance with the principles outlined in the joint DoP and Police Service publication *Crime Prevention and the Assessment of Development Applications*, and be developed in consultation with the NSW Police Service, relevant councils and CLGs. The Strategy shall include, but not necessarily be limited to:

    (a) details of security arrangements to prevent unauthorised access to the Project, including physical exclusion measures, detection devices and management mechanisms;
    (b) policies and procedures for addressing security issues, should they arise;
    (c) specific design features of the Project intended to discourage the incidence of crime at and in the immediate vicinity of Project access points;

(d) lighting considerations, including light intensity, direction and hours of operation at and in the immediate vicinity of Project access points, paths to bus stops and at public transport stops/stations and the off-motorway cycleway with the aim of minimising areas that may encourage crime;
(e) policies and procedures for the management and removal of graffiti, amelioration of vandalism, should it occur at or on any component of the Project; and
(f) policies and procedures for the management and removal of illegal or inappropriate bill-posting and illegally dumped materials, should it occur at or on any component of the Project.

The Security and Crime Management Strategy shall be incorporated into the Operational EMP. After opening, the Proponent shall audit the Strategy in accordance with the requirements of Condition No. 27.

Hazards and Risks

Pre-Construction

212. Prior to construction commencement, the Proponent shall hold a risk management workshop to identify the potential construction and operational hazards, to assess the risks, to nominate any necessary risk mitigation measures. In particular the workshop shall assess: (i) the need for risk mitigation measures in the vicinity of sensitive land uses (eg. Schools, waterways etc.), the urbanised areas along the route and at major intersections; and (ii) the location and design of the earth bunds proposed for stormwater containment.

Participants at the workshop shall include, but not be limited to, the RTA, Department, SWC, SCA, DLWC, EPA, Telstra, RIC, Integral Energy, TransGrid, AGL and Duke Energy. An independent person qualified in risk management shall chair the workshop.

The Proponent shall prepare and submit prior to the commencement of substantial construction for the approval of the Director-General a report detailing the outcomes of the workshop. In particular, the report of the workshop shall demonstrate for the approval of the Director-General that all necessary risk mitigation measures would be provided.

The outcomes of the workshop shall be used in the development of the Hazards and Risk Management Sub Plan required under Condition of Approval No. 214.

213. The Proponent shall undertake a geotechnical study during detailed design and prior to the commencement of construction to determine the potential impacts as a result of or to the Project. The study will include the area in the vicinity of Elizabeth Drive where medium to very high risk of slope instability occurs. The results of the study shall be used in the development of the Soil and Water Quality Management Plan(s) required in Condition of Approval No. 125. Mitigation measures required to minimise the potential impacts of slope instability shall be designed in consultation with the DLWC, NPWS and EPA and to the satisfaction of the Director-General.

214. A Hazards and Risk Management Sub Plan shall be prepared as part of the Construction Framework EMP. The Sub Plan shall include, but not be limited to:

(a) the provision of adequate emergency procedures and equipment for the response to and management of any environmental pollution events;

(b) a program for training of all staff;
(c) a protocol for notifying the appropriate authorities in the case of an emergency;
(d) procedures to ensure compliance with all legislative and industry standard requirements for safe handling and storage of hazardous substances; and
(e) undertaking hazardous activities such as washing out of concrete delivery vehicles, washing down of construction plant etc. only at appropriate locations that have appropriate environmental protection controls.

215. Prior to the commencement of construction or operation in the vicinity of Hoxton Park Airport the Proponent must prepare procedures dealing with the construction and operation stage impacts in the vicinity of Hoxton Park Airport. These Procedures must be prepared in consultation with the Hoxton Park Airport management and to the satisfaction of the Civil Aviation Safety Authority and AirServices Australia. The construction stage procedures shall be incorporated into the relevant Construction Method Statement and must be submitted for approval at least 1 month prior to the commencement of construction or operation, as appropriate. The Procedures must address, as relevant to the particular stage, but are not limited to:

(a) construction stage working hours; obstacle limitation surfaces; temporary navigation aids; Airport security requirements; lighting; bird hazards (including temporary and permanent waterbodies) access to and from the Airport; transport of dangerous goods; Motorway height and toll gantries; and
(b) flood mitigation, stormwater control and dust management.

The Procedures must, in relation to matters specified in (b), be prepared in consultation with the EPA and DLWC.

216. In accordance with the outcomes of the risk management workshop in Condition No. 212 and the findings of the Sub-Plan, the Proponent must prepare procedures dealing with the construction stage impacts in the vicinity of utilities and services, determine the need for specific risk assessments and to approve the design of any protective structures required. These procedures must be prepared to the satisfaction of the relevant authority as nominated above and in consultation with the Ministry of Energy and Utilities as appropriate prior to construction and incorporated into the Construction Method Statements.

Construction Hazards

217. The Proponent shall not store significant quantities of Dangerous Goods (as per the Australian Dangerous Goods Code and the Dangerous Goods Act and Regulations) at any location associated with the Project, unless required for refuelling of vehicles etc in accordance with Condition No. 218. The Proponent shall consult with WorkCover NSW to ensure all Dangerous Goods are stored in an appropriate manner.

218. Diesel fuel or other fuel requirements shall be located within appropriately located and constructed bunds. Fuel storage and refuelling locations shall be in accordance with the requirements for ancillary infrastructure identified in Condition of Approval No. 223 and the following:

(a) refuelling areas shall be constructed of concrete and covered where possible;
(b) shall comply with *AS 1940-1993 The Storage and Handling of Flammable and Combustible Liquids*;

(c) walls and floors of the bund shall be constructed of reinforced concrete, including a collection sump; and
(d) bund volume shall be sufficient to contain at least 110% of the largest container to be stored.

Operational Hazards

219. The Proponent shall not permit any vehicle carrying a quantity of goods defined as dangerous under the Australian Dangerous Goods Code, to enter any tunnels forming part of the Project. Prior to the opening of the Project to traffic, the Proponent shall provide a strategy to the Director-General detailing how this condition shall be managed and enforced.

220. For the first five years of operation, the Proponent shall undertake an annual Hazard Review of the Project and hazardous incidents that have occurred during the preceding twelve-month period, with the first Review to be undertaken no later than twelve months after the opening of the Project to traffic. A report outlining the results of the Hazard Review, and any proposed additional safety measures to be implemented in response to the findings of the Review, shall be submitted to the Director-General within one month of completion of the Review. The Proponent shall meet the Director-General's requirements in relation to the findings of the Review, within such time as the Director-General may agree. The Proponent shall undertake further Hazard Review if directed by the Director-General following any major incident on the Project.

221. The Project carriageways, not including the pedestrian/cycleway, shall be appropriately fenced at all times to prevent access by the general community. Particular attention shall be paid to areas of open space or community land use such as the SREP No. 31 – Regional Parklands, including the Western Sydney Regional Park and SIEC. Locked gates shall be provided at suitable locations to allow for emergency service access in consultation with the NSW Police Service, NSW Fire Brigade and State Emergency Services.

222. Emergency telephones shall be provided at 2km intervals along the road.

Location of Construction Compounds and Ancillary Facilities

223. The Proponent shall only construct construction compounds or any other ancillary facilities such as batching plants, Service Centre(s), toll gantries etc and not addressed in Condition Nos. 128 and 146 under this approval in those locations that satisfy the following criteria:

(a) sites to be located within the road reserve wherever possible;
(b) sites to be located with ready access to the local road network;
(c) sites on relatively level land;
(d) sites to be separated from nearest residences by at least 100m where practicable unless it can be demonstrated that there will be no adverse impacts on noise, visual and air quality impacts;
(e) sites are not to be located within 100m of waterways unless adequate erosion and sediment controls are implemented to protect water quality;
(f) sites above the 100 ARI flood level unless otherwise agreed to by DLWC;
(g) sites are to be excluded from areas that would have an impact on any endangered ecological communities or threatened flora and fauna
(h) all conditions of concurrence set by NPWS shall be adhered to.

ATTACHMENT 1

Guidelines for the Establishment of the Community Liaison Group

The proponent shall consider the following when establishing a Community Liaison Group:

1. At its first meeting, the Group shall consider its interrelationship with any existing community liaison/ consultative groups of adjoining or interrelated developments.

2. Representatives from relevant government agencies or other individuals may be invited to attend meetings as required by the Chair.

3. Where determined necessary by the Chair, an independent note taker would be provided by the Chair at the expense of the Proponent.

4. The Proponent shall, at its own expense:

- nominate two (2) representatives to attend all meetings of the Committee;
- provide to the Group regular information on the progress of work and monitoring results;
  - promptly provide to the Group such other information as the Chair of the Group may reasonably request concerning the environmental performance of the development;
- provide access for site inspections by the Group; and
- provide meeting facilities for the Group, and take minutes of Group meetings. These minutes, once endorsed by the Chair, shall be available for public inspection at Council within 14 days of the meeting.

Where reasonably required the Proponent shall engage consultants to interpret technical information and tasks of a similar nature for the benefit of the CLG.