PROPOSED BANGOR BYPASS

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

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FOREWORD

The Roads and Traffic Authority (RTA) propose to construct a four-lane limited access road bypassing the township of Bangor. The proposal includes the construction of an East-West Link between the Woronora Bridge and Old Illawarra Road and a North-South Link from Alfords Point Road to New Illawarra Road, parallel to Old Illawarra Road, in the Sutherland Shire Local Government Area.

The proposal is subject to Division 4, Part 5 of the *Environmental Planning and Assessment (EP&A) Act 1979 (EP&A Act)*. As such, the approval of the Minister for Planning is required for the proposal. 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 EP&A Act which requires that the Minister obtain a report from the Director-General of the Department of Planning prior to making a decision.

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

Whist supporting the broad objectives of the proposal, the Department's assessment concludes that such objectives would be severely compromised unless the North-South Link (at least its northern section) is constructed at the same time as the East-West Link. The Department has been advised that funding is not available at this time for that purpose. I recommend that the RTA seek funding for the construction of that link at the earliest opportunity.

The Report concludes that the potential environmental impacts associated with the works can be mitigated to an acceptable level by adopting the management measures referred to in this Report and embodied in the Recommended Conditions of Approval.

Sue Holliday
Director-General

EXECUTIVE SUMMARY

The Proposal

The Roads and Traffic Authority (RTA) propose to construct a four-lane limited access road, known as the Bangor Bypass, comprising two sections:

- the East-West Link between the western approaches of the Woronora Bridge in the east, and Old Illawarra Road in the west (approximately 3.5 kilometres in length); and,
- the North-South Link between Alfords Point Road and New Illawarra Road (approximately 2.6 kilometres in length).

Improvements to Menai Road are also part of the proposal. A locality plan of the proposal, which is located in Sutherland Shire Local Government Area, is given in Figure 1. Plans of the modified proposal are given in Figures 2 a – e.

The Representations Report indicates that construction of the North-South Link would follow construction of the East-West Link. Construction of the East-West Link would take approximately two years.

The Bangor Bypass is being funded by the State Government and is expected to have a capital cost of $115 Million.

EIS Exhibition and Approval Process

The RTA as Proponent determined that the proposal has the potential to result in significant environmental impacts and accordingly prepared an Environmental Impact Statement (EIS) and a Species Impact Statement (SIS). As the RTA is both the Proponent and a determining authority for the proposal, and an EIS was prepared, the proposal is subject to assessment under Division 4, Part 5 of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) and the approval of the Minister for Planning is required before it can be determined by the Minister for Roads.

An Environmental Impact Statement (EIS) for the proposal was publicly exhibited between 25 February 2002 and 19 April 2002. The Proponent received 778 representations to the EIS. A significant majority of representations supported the proposal. Local traffic congestion and accessibility, road noise impacts, pedestrian and cyclist safety, emergency access and alignment alternatives were primary issues of concern.

The RTA sought the approval of the Minister on 19 July 2002 after obtaining the concurrence of the Director-General of National Parks and Wildlife Service (NPWS) for the SIS as required under the EP&A Act. At this time a Preferred Activity Report (PAR) detailing modifications made to the EIS proposal in response to issues raised in representations and further design work was publicly released.

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. This Report considers the issues raised in all representations received, including those after the exhibition period.

Project Objectives

The primary objectives of the proposal as stated in the EIS are to:

- support initiatives identified in *Action for Transport 2010* and *Action for Air* including development of the strategic road network between southern Sydney and Bankstown and a cross-regional bus route between Miranda and Bankstown via Menai;
- provide improved performance of the arterial road network to provide for through traffic movements in the study area;
- provide improved conditions for road based public transport for both local and cross-regional services;
- provide improved conditions for all other road users including pedestrians, cyclists and to complement the development of an integrated bicycle and pedestrian network as identified by Sutherland Shire Council;
- improve urban amenity and local community cohesion within the study area, including support for the role of the Menai Town Centre precinct, and to ensure amenity of existing land use is protected and where possible enhanced, throughout project construction and operation;
- ensure key environmental sensitivities within the study area and broader catchment, including threatened flora species and vegetation communities and water quality, are protected throughout project construction and operation; and,
- provide value for money in terms of road user benefits and broader economic considerations.

Proposed Modifications and Response by the Public

Based on the representations to the EIS and further technical studies, the Proponent has made a number of modifications to the proposal. The key modifications include:
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- relocation of the East-West Link further to the south towards the centre of the road corridor;
- lowering of the vertical alignment and constructing a bridge at Akuna Avenue with entry and exit ramps to the east;
- provision of a 4.4 metre underpass at Shackel Road and relocating the proposed left in - left out access to west. The underpass and left in – left out access would not be connected;
- provision of a 3 metre underpass at Anzac Road and left in – left out access with a drop down median. Local Area Traffic Management Measures would be implemented north of Dandarbong Avenue;
- relocation of the North-South Link to the west of the Old Illawarra Road corridor and provision of an underpass at Old Illawarra Road. This would allow access from Marsden Road, Lawson Place, Australia Road and David Road to Old Illawarra Road to be maintained;
- provision of left in – left out access from Barry Road to the North-South Link;
- realignment of the northern arm of the North-South Link further towards the east;
- provision of a seagull intersection on the western side of the North-South Link (to the south of the East-West Link) for access to the approved Gandangara subdivision; and,
- relocation of the intersection of the North-South Link with New Illawarra Road further south with access to Old Illawarra Road.

The modifications were presented to the public through a Preferred Activity Report (PAR) which was released in July 2002. The Department received 77 representations on the PAR, 53 of which were form letters. Three petitions were also received. Key concerns raised in relation to the modified activity were:

- the need to relocate the northern arm of the North-South Link even further to the east;
- the potential for traffic to exit the East-West Link and use Anzac Road as a shortcut;
- the proximity of noise barriers to residences; and,
- the closure of Barden Road at Australia Road and the loss of property access.

The Department considers that, individually and cumulatively, the modifications would reduce the environmental impact of the proposal as described in the EIS. It is also considered that the modifications have had a reasonable level of public involvement as evident by the level of representations received, discussions with community representatives and media articles.

Need and Justification

The Department accepts that there are major traffic congestion problems along Menai Road and that there appears to be strong and adequate justification for improvements. However, with predicted traffic volumes in the order of 15,000 to 33,000 vehicles per day, conditions along Menai Road would be certainly improved with the Bypass, but possibly not to the degree that Menai Road would operate as a "local" road, as may be the expectation of the local community. The Bypass would also result in the loss of urban bushland and introduce noise impacts on a new community which would most likely require treatment to individual homes.

Notwithstanding these limitations, the strength of the Bypass to address key local issues has been a compelling factor in the assessment, particularly where the key advantages of the Bypass, such as improving community cohesion, accessibility and evacuation during bushfires are difficult to assess. The fact that some 75% of representations expressed direct support for the project is also a major consideration.

However, for the Department to accept the benefits of the Bypass, it must be satisfied that the proposal would achieve its stated objectives and, in particular, meet community expectations. In this regard, the Department has identified a number of critical issues that are fundamental to this outcome. Provided these measures are addressed, the Department considers that the Bypass proposal would provide an appropriate balance between environmental impacts and project outcomes and can be supported.

One issue of particular note is the proposed staging of the Bypass. The Department's assessment concludes that any staging is likely to significantly dilute the overall key benefits, particularly with respect to improved traffic conditions along Menai Road. Similar concerns were raised in a number of public representations including a submission from Sutherland Shire Council.

The RTA has indicated that constructing the North-South Link concurrently with the East-West Link would not be possible as funding is only available for construction of the East-West Link. From the Department's assessment perspective, the availability of funding is problematic and is not something that it can prescriptively specify or condition. The Department therefore can only recommend (rather than specifying as a Condition) that the RTA seek funding for concurrent construction of the North-South Link.

However it has been recommended as a Condition of Approval, that if funding cannot be made available concurrently, that as a minimum, construction of at least the northern section of the North-South Link commence within 12 months of the opening of the East-West Link and be completed and opened to traffic within 18 months of its construction commencement.

Environmental Impact Assessment

Regional Traffic

The traffic assessment indicates that the proposal would attract some 11, 000 additional vehicles per day into the study area and increase the total network vehicle kilometres travelled by around 5 million per annum. While the proposal would improve travel times and reduce traffic volumes on Menai Road, it is noted that Menai Road would still carry traffic volumes of around 17, 000 to 33, 000 vehicles per day. To ensure that the benefits of reduced traffic on Menai Road are realised to the greatest extent possible, it is recommended that traffic using Menai Road is monitored and, if necessary, traffic management measures implemented to ensure that the proportion of through traffic using Menai Road is minimised. Limiting truck usage on Menai and Old Illawarra Roads is also recommended to enhance the amenity of surrounding residences.

Local Traffic and Access

While the EIS proposal limited local access, the RTA have modified the proposal with the aim of retaining existing local access. In particular, the separation of the North-South Link from Old Illawarra Road ensures that existing local access to and from Barden Ridge would be maintained.

Notwithstanding, the community has raised concern over a number of potential local accessibility and congestion issues. A particular concern was raised in representations about the potential for increased traffic on Anzac Road resulting from through traffic using the proposed underpass to exit the East-West Link. To improve the amenity and safety of local roads the Department recommends the development of Local Area Traffic Management measures in consultation with Sutherland Shire Council and the affected community.

A number of residents around Carter Road also noted concern over the potential for the proposed bus and pedestrian overbridge connecting Australia and Carter Roads to be opened to local traffic. The Department notes that the RTA has not proposed to change the current arrangement which allows for pedestrian and bus access only. A decision on whether local traffic should be able to use this link is considered outside the scope of this assessment and would be a matter for Sutherland Shire Council to determine.

Community Severance and Amenity

The EIS indicates that the communities of Bangor and Menai are severed by Menai Road, resulting in adverse impacts on local amenity, community function and accessibility. While the Department acknowledges that residents surrounding Menai Road would benefit from reductions in traffic volume, the proposal would introduce new impacts on residences severed by the East-West Link and, to a lesser degree along the North-South Link. The proposed underpasses and overpasses would maximise local vehicular access opportunities, but pedestrian and cyclist connectivity would require careful management. The Department also notes that improving conditions for pedestrians and cyclists is a one of the primary objectives of the proposal. The provision of a pedestrian crossing at the intersection of the Gandangara subdivision access road with the North-South Link and investigation into the potential to provide six pedestrian and cyclist links as part of the proposal is recommended.

Flora and Fauna Impacts

The RTA has indicated that the proposal would require the clearing of 19 hectares of vegetation, including stands of the threatened *Melaleuca deanei* and the endangered Shale Sandstone Transition Forest. Five threatened fauna species are also known to be occur in the study area. It is therefore critical that impacts on threatened species are minimised and that a compensatory habitat package is negotiated. The Department has recommended that the extent of clearing be minimised to the greatest extent practicable (within maximum amounts specified) and the implementation of specific management strategies for threatened flora and fauna including fencing of conserved plants, propagation of directly affected stands and targeted pre-clearing surveys for threatened fauna.

Road Noise

The RTA have indicated that the proposal would result in road noise emissions that exceed EPA criteria at some residences even with the proposed noise barriers of 2 to 4.5 metres in height. While the Department notes that the proposed modifications including relocating the East-West Link to a more southerly alignment, lowering of the road in the vicinity of Akuna Avenue and the use of open graded asphalt would reduce noise emissions, an estimated 105 residences would still experience noise levels which would warrant further mitigation. This could include increasing the height of noise barriers and acoustic treatment of individual dwellings in consultation with affected residents in these cases. Appropriate Conditions of Approval are recommended in that regard.

Design Alternatives

The Department commissioned an independent engineering peer review of the road and interchange design in the context of determining the most appropriate balance between cost, traffic performance and environmental impact. Based on the findings of this review, the Department has recommended that the RTA investigate the following design and alignment alternatives in consultation with Sutherland Shire Council and NPWS:

- reducing the vertical design speed of the East-West Link to 80 km/hr so that the road surface more closely follow existing ground levels;
- use of alternative treatments to the proposed fill batters on the East-West and North-South Links, such as retaining walls or engineered fills, particularly in environmentally sensitive locations;
- shifting the North-South Link further to the east between chainage 400 and 850 and/or reducing the median width; and,
- alternative designs for the proposed junction of the North-South Link with New and Old Illawarra Roads to improve safety and capacity characteristics.

Improvements to Menai Road

The RTA would need to carefully manage traffic volumes on Menai Road to ensure that the connectivity and amenity improvements are captured to the greatest extent possible. The RTA would be required to prepare a detailed Urban Design Strategy and Implementation Plan for the Menai Road Corridor in consultation with Sutherland Shire Council and the local community. This Plan would identify improvements to Menai Road to be provided as part of the proposal.

Other Issues

Other issues of relevance to the proposal are assessed in Sections 5 and 6 of this Report. The key ones include visual impacts, urban design and landscaping, water quality, erosion and sedimentation control and communication and consultation strategies. The assessment concludes that all such impacts can be managed and, subject to the Recommended Conditions, would not result in long term impacts or irreversible effects.

Conclusions

The need and justification of the Bangor Bypass has been based on concerns about current traffic congestion on Menai Road and associated adverse impacts on residential amenity and public transport. The Department notes strong community support for the proposal. Whist it is acknowledged that the communities of Menai and Bangor would benefit from the proposal, the communities surrounding the East-West Link and, to a lessor degree the North-South Link, would experience new, and in some locations, significant noise and visual impacts which would need to be carefully managed. The construction of the proposal has the potential to alleviate some of the significant traffic congestion in the area, but is predicted to induce up to 11, 000 additional vehicles per day into the study area and increases in total vehicle kilometres travelled.

For a sustainable outcome to be achieved, a precautionary approach is required. The Department's assessment has concluded that the North-South Link should be opened concurrently with the East-West Link in order for the proposal to fully achieve its objectives. However, the Department has been advised by the RTA that funding has not been allocated at this time for that purpose. The Department is not in a position, nor is it appropriate for it to make funding decisions on behalf of the Government. However, to ensure that commitments in the Representations Report about construction of the North-South Link "following" the East-West Link are fulfilled, the Department recommends that as a minimum, construction of at least the northern section of the North-South Link commence within 12 months of the opening of the East-West Link and be completed and opened to traffic within 18 months of its construction commencement.

The Department has also concluded that comprehensive monitoring of traffic conditions and, if warranted, the implementation of traffic management measures would be required to ensure that the retention of through traffic on Menai Road is minimised. To offset the flora and fauna and noise impacts associated with the proposal, the implementation of stringent mitigation strategies are also required.

Recommendations

It is recommended that should the proposal proceed, it would be essential for extensive and comprehensive conditions to be imposed so as to ensure, to the greatest extent practicable, its long-term benefits. Section 8 of this Report lists all the recommended conditions of any approval. The key requirements include:

- commencement of construction of at least the northern section of the North-South Link within 12 months of opening of the East-West Link;
- monitoring of traffic using Menai Road and, if necessary, the implementation of management measures to ensure that the proportion of through traffic using this route is minimised;
- limiting truck use on Menai Road and Old Illawarra Road;
- development of Local Area Traffic Management Measures for the area around Anzac Road in consultation with Sutherland Shire Council and the affected community;

- provision of a pedestrian crossing at the intersection of the Gandangara subdivision access road with the North-South Link and investigation into the potential to provide six pedestrian and cyclist links to enhance connectivity and accessibility in areas severed by the proposal;
- development of an Urban Design Strategy and Implementation Plan for improvements to Menai Road;
- comprehensive flora and fauna mitigation strategies including limits to the extent of clearing works and the implementation of specific management strategies for threatened flora and fauna including fencing of conserved plants, propagation of directly affected stands and targeted pre-clearing surveys for threatened fauna;
- consideration of alternative noise mitigation strategies including increasing the heights of barriers and acoustic treatments to individual residences in cases where EPA criteria are exceeded;
- investigation of design and alignment alternatives to reduce the environmental impacts associated with the proposal, in particular, the extent of clearing, noise and visual impacts;
- appointment of an Independent Community Liaison Representative to address community concerns regarding construction impacts and preparation of a comprehensive Community Involvement Plan; and,
- the preparation of Construction and Operational Environmental Management Plans including detailed Sub Plans for key impact issues.

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GLOSSARY AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
AADV	Annual Average Daily Vehicles
Acid Sulfate Soils (ASS)	Naturally acid clays, mud and other sediments usually found in swamps and estuaries. These may become extremely acidic when drained and exposed to oxygen, and may produce acidic leachate and runoff which can pollute receiving waters and liberate toxins
Ambient Noise	The background noise at a point being a composite of sounds from near and far
ANZECC	Australian and New Zealand Environment and Conservation Council
ARI	Average Recurrence Interval
Council	Sutherland Shire Council
Department, the	Department of Planning
Director-General	Director-General of the Department of Planning
DLWC	Department of Land and Water Conservation
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environment Protection Authority (NSW)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPIP Act	*Environmental Protection (Impact of Proposals) Act 1974* (Commonwealth)
Interchange	A grade separation of two or more roads with one or more interconnecting carriageways
LALC	Local Aboriginal Land Council
Level of Services (LOS)	An indicator of performance of the road network
Median	A strip of road not normally intended for use by traffic, which separates carriageways for traffic in opposite directions
NPWS	National Parks and Wildlife Service
PAD	Potential Archaeological Deposit
RTA	Roads and Traffic Authority
Shoulder	The portion of the carriageway beyond the traffic lanes adjacent to the land flush with the surface of the pavement
SIS	Species Impact Statement
TSC Act	*Threatened Species Conservation Act 1995*

1 INTRODUCTION

1.1 Nature of the Proposal

The Roads and Traffic Authority (RTA) propose to construct a four-lane limited access road, known as the Bangor Bypass, comprising two sections:

- the East-West Link between the western approaches of the Woronora Bridge in the east, and Old Illawarra Road in the west (approximately 3.5 kilometres in length); and,
- the North-South Link between Alfords Point Road and New Illawarra Road (approximately 2.6 kilometres in length).

The Representations Report indicates that construction of the North-South Link would follow construction of the East-West Link. Improvements to Menai Road are also part of the proposal. A locality plan of the proposal, which is located in Sutherland Shire Local Government Area, is given in Figure 1. Plans of the modified proposal are given in Figures 2 a – e.

The capital cost of the proposal is estimated at approximately $115 million and it is being funded by the State Government.

1.2 EIS Exhibition and Approval Process

The Proponent determined that the proposal has the potential to result in significant environmental impacts and accordingly prepared an Environmental Impact Statement (EIS). As the RTA is both the Proponent and a determining authority for the proposal, and an EIS was prepared, the proposal is subject to assessment under Division 4, Part 5 of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) and the approval of the Minister for Planning is required.

An Environmental Impact Statement (EIS) for the proposal was publicly exhibited between 25 February 2002 and 19 April 2002. The Proponent received 778 representations to the EIS. While a significant majority of representations noted support for the proposal, local traffic congestion and accessibility, road noise impacts, pedestrian and cyclist safety, emergency access and alignment alternatives were primary issues of concern.

With reference to Section 5A of the EP&A Act it was concluded that the proposal has the potential to have a significant effect on threatened species, populations or ecological communities. As a result, a Species Impact Statement (SIS) was required in accordance with Division 2, Part 6 of the *Threatened Species Conservation Act 1995* (TSC Act). In accordance with Section 112C(1) of the EP&A Act concurrence of the Director-General of the National Parks and Wildlife Service (NPWS) was granted subject to a number of conditions on 16 July 2002. A copy of the Concurrence Report including the Conditions of Concurrence is contained in Appendix A.

The Environment Protection Biodiversity Conservation Act (1999) (EPBC) commenced on 16 July 2000. One of the key functions of the EPBC Act includes the introduction of a new assessment and approvals system for actions that have a significant impact on matters of national environmental significance (NES). Should an action be determined to be likely to significantly affect NES matters (referred to as 'Controlled Actions'), an approval from the Commonwealth through its agency, Environment Australia, is required. In order to determine whether a project requires an approval from the Commonwealth, an applicant is required to submit a 'Referral' application to Environment Australia for consideration.

On 2 September 2002, Environment Australia determined that the proposal was a 'controlled action' due to the likelihood that the proposal would have a significant impact on nationally listed threatened species and communities. The RTA provided Environment Australia with new information on proposed mitigation measures and requested that this decision be revoked under Section 78 of the EPBC Act. On 24th September 2002, Environment Australia revoked the decision that the proposal was a controlled action subject to a number of conditions. Therefore no further assessment under the EPBC Act is required.

1.3 Request for the Approval of the Minister for Planning

In accordance with Section 115B of the EP&A Act, the RTA sought the approval of the Minister for Planning by way of letter dated 19 July 2002. The request for approval was accompanied by a Representations Report which presented the RTA's response to the issues raised in representations to the EIS exhibition.

1.4 Release of the Preferred Activity Report

The Proponent has prepared a Preferred Activity Report (PAR) detailing modifications made to the EIS proposal. The PAR was released to the public in July 2002. A brochure detailing the modifications was sent to surrounding residents and locations where the PAR could be viewed were advertised in local newspapers.

1.5 Purpose of this Report

The purpose of this Report is to review the Environmental Impact Statement (EIS) for the proposal, the issues raised in representations to the public exhibition, 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. This Report documents the outcome of an independent environmental impact assessment by the Department accounting for all issues raised in representations to the EIS.

2 DISCUSSION OF PROPOSAL AS DESCRIBED IN THE EIS

This Section of the Report provides a description of the proposal as described in the EIS. Its purpose is to provide an overview of the information presented in the EIS. Information presented in this Section does not necessarily represent the views of the Department. Section 4 of this Report 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 Introduction

The proposal involves the construction of a four-lane limited access road, known as the Bangor Bypass, comprising two sections:

- the East-West Link between the western approaches of the Woronora Bridge in the east, and Old Illawarra Road in the west (approximately 3.5 kilometre in length); and,
- the North-South Link between Alfords Point Road and New Illawarra Road (approximately 2.6 kilometres in length).

Improvements to Menai Road are also part of the proposal.

The Environmental Impact Statement (EIS) indicates that, depending upon funding availability, the project may need to be constructed in stages. Stage 1 would include construction of the East-West Link with an interim intersection at Old Illawarra Road. Stage 2 would include the construction of the North-South Link including relocating the intersection of Old Illawarra Road and the East-West Link. Construction of Stage 1 is expected to commence in late 2002. The EIS concludes that timing of the construction of stage 2 would be dependent on the ongoing performance of the Old Illawarra Road/Menai Road Intersection. The following sections provide details of the key elements of the proposal.

2.2 Carriageway Design

The proposal has been designed to comply with all relevant RTA design criteria. Table 1 outlines the key design features of the proposal.

Table 1 - Key Design Features of the EIS Proposal

East-West Link	
Traffic Lane Width	3.5 m (two eastbound and two westbound);
Shoulder Width	2 m
Median	5.5 m
Verge/drainage Reservation.	1.5 m
Minimum Radius of Horizontal Curves	450 m
Maximum Radius of Horizontal Curves	5000m
Maximum Gradient	8.7%
North-South Link	
Traffic Lanes	3.5 m (two northbound and two southbound)
Shoulder Width	2 m
Median	7.6 m north of East-West Link intersection 1.6 m south of East-West Link intersection
Verge/drainage Reservation.	1.5 m

Service Road	6.0 m wide on eastern side of carriageway, south of Barden Road
Minimum Radius of Horizontal Curves	792.5 m
Maximum Radius of Horizontal Curves	1000 m
Maximum Gradient	8.7%
Maximum Batter Slope	1:4

Pavement for both Links would consist of a composite of an asphalt surface and base underlain by a lean-mix concrete sub-base and select material zone.

2.3 Cut and Fill Requirements

Based on the results of geotechnical investigations undertaken for the concept design, the EIS indicates that a total of 150 000m^3 would be excavated from the East-West Link and 100, 000 m^3 from the North-South Link. The total fill required would be 180 000 m^3 for the East-West Link and 53 000m^3 for the North-South Link. Several geotechnical faults have been recognised along the proposed alignment of the carriageway and the need for shotcrete, bolting techniques and similar treatments has been identified, and would be undertaken during construction.

2.4 Menai Road Improvements

Menai Road would be re-configured as a local road with provision for public transport, cyclists and pedestrians. Improvement works would be finalised under detailed design, and may include:

- landscaping and urban design treatments;
- improved pedestrian facilities along and across Menai Road;
- improved bus facilities including bus/transit lanes and bus priority measures at selected intersections; and,
- improved off-road cyclist and pedestrian facilities.

2.5 Intersections and Access Arrangements

The intersection arrangements for both the East-West and North-South Links are as follows:

- **Akuna Avenue/East-West Link -** a four-lane signalised intersection including:
  - westbound – two right turn lanes, two through lanes and one dedicated left turn lane;
  - eastbound – one right turn lane, two through lanes and one left turn lane;
  - northbound – one right turn lane, one through lane and one left turn/through lane; and,
  - southbound – one right turn lane, two through lanes, one left turn slip lane.
- **Shackel Road/East-West Link –** an unsignalised T-junction with left in – left out access onto the Bypass. The northern section of Shackel Road would be closed, becoming a cul-de-sac.
- **Anzac Road/East-West Link -** an unsignalised T-junction with left in – left out access to the south of the Bypass. At Anzac Road (north) there would be no access to the Bypass.
- **East-West Link/North-South Link -** a signalised intersection allowing for:
  - southbound deceleration lane, protected left turn and associated acceleration lane;
  - northbound dual right turn lanes; and,
  - westbound protected left lane and acceleration lane.
- **New Illawarra Road/Bangor Bypass -** This intersection would be a signalised intersection with a:
  - southbound deceleration lane and protected left turn lane;
  - northbound right turn lane; and,
  - westbound protected left lane and acceleration lane.

- **Alfords Point Road/Menai Road/Old Illawarra Road/Bangor Bypass -** a signalised intersection allowing for:
  - southbound left and right turn lanes;
  - northbound left turn lane and dual right turn lanes;
  - eastbound protected left turn lane (existing) and associated acceleration lane and a right turn lane; and
  - westbound protected left turn lane and associated acceleration lane and dual right turn lanes (existing).
- **Australia Road- Carter Road Overpass/East-West Link -** the East-West Link would include an overpass that would link Australia Road and Carter Road that would cater for bus, pedestrian and cyclist movements. The Bypass would be in cut at this location and the bridge would be located close to existing ground level. The bridge would be 32 metres long and 13 metres wide.

2.6 Provision for Cyclists and Pedestrians

On-road cyclist facilities are provided through the incorporation of a two metre shoulder. Off-road pedestrian and cyclist facilities on Old Illawarra Road may be developed after consultation with relevant stakeholders. No pedestrian access would be provided on the Bypass. Signalised pedestrian crossing points would be provided at the following intersections:

- Akuna Avenue/Bangor Bypass;
- New Illawarra Road/Bangor Bypass;
- Menai Road/Alfords Point Road/North-South Link; and,
- East-West Link/North-South Link.

Pedestrian and cyclist access would also be provided at the Australia Road/Carter Road overbridge connecting Barden Ridge to Menai town centre and additional pedestrian crossings at a pedestrian overpass at Anzac Road.

2.7 Drainage and Water Quality Treatment

For both the East-West and North-South Links, guttering would be used where the road is in cut to direct pavement runoff to drainage pits and cross drainage structures. Where the road is in fill, kerbs would be used to direct pavement runoff to grass swales prior to it entering cross-drainage structures.

The details of water quality treatment devices, including spill containment devices to treat pavement runoff would be finalised during the detailed design phase for the proposal. These facilities would be designed to operate during a 100 year average recurrence interval event.

2.8 Other Features

Other design features of this proposal include:

- compensatory habitat utilised for the loss of key habitat;
- landscaping, including revegetation within and adjacent to proposed road corridor, would be carried out along the Bypass where possible;
- noise walls 2 to 6.5 metres high along sections of the proposal;
- lighting at the roadway intersections; and,
- signposting in accordance with RTA policy.

2.9 Property Acquisition

Properties owned by Sutherland Shire Council and one private individual would be totally acquired by the RTA. The remainder of the proposal is contained on land owned by State Government agencies.

2.10 Construction Issues

Construction of the East-West Link is expected to commence in late 2002 and be completed in 2004. A timeframe for the construction of the North-South Link is not given in the EIS. The RTA has identified the main construction tasks as follows:

- establishment of site compounds and facilities;
- implementation of erosion and sedimentation control measures;
- installation of boundary fencing to separate and secure the construction area from adjacent properties and local roads;
- clearing of areas to allow the commencement of earthworks and drainage construction;
- implementation of noise control measures;
- construction of cut and fill embankments;
- installation of cross drainage measures;
- construction of surface drainage, pavement and barrier kerbs;
- construction of local road and access road connections;
- miscellaneous works (ie. signposting, street lighting, pavement markings);
- landscaping and rehabilitation; and,
- clean up and restoration following completion of construction.

Construction works would be limited to the hours between 7:00am and 6:00pm Monday to Friday, and between 8:00am and 1:00pm on Saturdays, with no work on Sundays or public holidays without prior notice to residents.

The cost of the proposal was estimated in the EIS to cost $100 million.

3 SUMMARY OF REPRESENTATIONS

3.1 Summary of EIS Representations Received

A total of 778 representations received, 491 were identified as form letters.

Representations were received from the following parties:

State Government	2
Local Government	1
Educational Institutions	1
Business	1
Interest Groups	1
Individual	772

3.2 Identification of Key Issues Raised in Representations to the EIS

In its Representations Report, the Proponent included a summary of the issues raised in representations to the EIS, which categorised issues into 41 categories. The Department has undertaken an independent assessment of issues raised in representations and is satisfied that the RTA has identified all key issues for consideration. The Department's summary of representations and copies of eight form letters identified are given in Appendix B. Table 2 provides the Department's summary of the frequency of issues raised in representations.

Table 2 –Issues Identified in Representations

Broad Issue	Specific issue	Tally
Local Traffic and Access	♦ Local access/congestion – Barden Ridge	595
	♦ Local access/congestion – Bangor (north of East-West Link)	7
	♦ Local access/congestion –Bangor south west	26
	♦ Local access/congestion – Bangor south east (Akuna Road and surrounds)	5
	♦ Local access/congestion –Menai	108
	♦ Local access – Gandangarra and Landcom Developments	6
	♦ Old Illawarra Road	123
	♦ Australia/Carter Road & East-West Link	179
	♦ Anzac Road & East-West Link	32
	♦ Forestgrove Drive & East-West Link	11
	♦ Pedestrians/cyclists	36
	♦ Emergency access (bushfires/nuclear)	497
Project Need and Justification	♦ Object	123
	♦ Support	583
	♦ Policy/planning strategy	1
Alternatives	♦ Realignments north/south	469
	♦ Realignments east/west	38
	♦ Grade separation – North-South/East-West Link intersection	32
	♦ Need for grade separated interchanges	55
	♦ Menai road upgrade	5

Broad Issue	Specific issue	Tally
Operational Road Safety	♦ Road users	93
	♦ Pedestrian/cyclists	512
Operational Noise	♦ Road traffic noise impacts	569
	♦ Goals	25
	♦ Mitigation measures	5
Air Quality	♦ Construction (dust)	9
	♦ Operation (vehicle emissions)	437
EIA Process	♦ Consultation	61
	♦ EIS deficiencies/errors	88
Residential Amenity	♦ General	118
Roadway Design	♦ Proximity to property	91
	♦ Width of median	7
	♦ Lower bypass roadway level to facilitate overpasses	15
Economic Impacts	♦ Project cost	3
	♦ Business impacts	2
	♦ Property devaluation	50
	♦ Damage to structures	57
Flora and Fauna	♦ Land clearing/loss of native vegetation	35
	♦ Compensatory habitat	6
	♦ Impacts on threatened species	20
Visual Impacts	♦ General	18
	♦ Mitigation (noise barriers etc.)	40
Regional Traffic and Access	♦ Regional traffic (travel times, congestion, efficiency)	27
	♦ Freight/heavy vehicles	12
	♦ Public transport	5
Construction Noise and Vibration	♦ Construction noise impacts	10
	♦ Vibration impacts	25
	♦ Mitigation measures	5
Staging	♦ Simultaneous construction of both components	10
	♦ North south link first	13
	♦ General	10

Where concerns covered more than one broad issue or specific issue within a broad category these issues have been counted in both areas. For example, if a representations raised concerns about the visual impact of the proposed noise walls and the need to explore other noise mitigation options, these concerns were tallied under 'noise - mitigation measures' as well as under 'visual impacts – mitigation'.

The key issues raised in representations and the distribution of concerns is given in Figure 3. It is easily recognised that the main concerns raised in representations were local traffic and access in Barden Ridge, operational road noise, operational road safety, emergency access, alternative North-South realignments and operational air quality. A large percentage (75%) of representations supported the proposal.

3.3 Issue Summary

Local Traffic and Access

Concerns in relation to local congestion and access in Menai were raised in 108 (14%) representations, 85 of which were form letters. Whilst Menai residents were pleased with the reduced regional traffic on Menai Road, they were concerned about access and congestion elsewhere in their suburb. Specifically, issues regarding the proposed overpass at Australia Road/Carter Road were raised in 179 (23%) representations (99 of which were form letters). Representations focussed on whether the proposed overpass should be opened to all vehicle traffic, or should be restricted to bus only traffic and pedestrian and cyclist use. Generally, those residing on or near Carter Road suggested that the safety of residents would be jeopardised if all vehicles were allowed access to the overpass.

Concerns in regard to access to Barden Ridge were raised in 595 (77%) representations, 258 of which were form letters. Key concerns focussed on limited access to the local and regional destinations from Barden Ridge and safety considerations near schools and during emergencies. Representations regarding Barden Ridge generally suggested a more westerly construction of the North-South Link off the alignment of Old Illawarra Road, so as to retain this road as a local access road to the Menai town centre. Considerations of the impacts on Old Illawarra Road numbered 123 (25 of which were form letters). Respondents were concerned with the closure of Old Illawarra Road at its intersection with the East-West Link, limited access and noise and visual impacts during the construction and operation.

Present and future local access to the new subdivisions under development by the Gandangarra Aboriginal Land Council and Landcom to the west of the proposed North-South Link were raised in 6 representations. Seven representations raised concern over impacts on local access and traffic in Bangor north of the East-West Link. Five representations raised concerns regarding access to and from the south-east portion of Bangor in the area of Akuna Avenue. Residents of the south-west portion of Bangor also raised concerns in relation to physical and social isolation in 26 representations (9 of these were form letters). The potential for an intersection with East-West Link at Forestgrove Drive was also raised in 11 representations.

Pedestrian and cyclist access concerns were raised in 36 representations (12 of these were form letters). It was suggested that local pedestrians and cyclists required more grade-separated crossings where the Bypass crosses local streets.

Concerns were raised in 497 (64%) representations in relation to the need for improved emergency access due to the history of bushfires within the area and proximity of the Lucas Heights nuclear facility.

Project Need and Justification

Of the 778 representations, there were 583 (75%) that documented their in-principle, overall support for the proposal (427 were form letters). Those who specifically stated their objection to the proposal numbered 123 (65 of these were form letters). A majority of these respondents had reservations regarding specific design elements of the proposal, yet acknowledged the need and benefits of the proposal.

Alternatives

Realignment of the North-South Link was suggested in 469 (60%) representations (387 of which were form letters). Generally, Barden Ridge respondents proposed a more westerly alignment in order to

allow Old Illawarra Road to remain open. Conversely, Menai residents west of the North-South Link proposed a more easterly alignment to decrease the negative impacts. Both Barden Ridge and Menai residents recommended that the conservation of *Acacia pubescens* should not be a consideration in determining the alignment of the North-South Link.

Realignment of the East-West Link to the south was also suggested by 38 representations. Similar to the opinions of Menai and Barden Ridge residents, the residents on the northern side of the East West Link, adjacent to the road corridor, were also of the opinion that the interest of residents had been ignored in favour of conserving the *Melaleuca deanei* stand.

The need for over/underpasses, in place of the signalled intersections along the East-West Link, was raised in 55 (7%) representations (29 of which were form letters). Respondents who suggested grade separated intersections were of the opinion that signalled intersections failed to maximise the efficient flow of traffic and would contribute to noise and air pollution. It was suggested that to facilitate grade separated intersections, the bypass carriageway would need to be at a lower level, and hence the road cuttings would need to be deeper. In particular, 32 (4%) representations suggested that the intersection of the East-West Link and the North-South Link should be grade separated (20 of these were form letters). These representations suggested that the proposed T-intersection of the two bypasses would not properly cater for the expected traffic volumes.

The upgrade of Menai Road was recommended as an alternative proposal in five representations. Generally, these respondents noted that the local roadway framework was adequate, and concluded that the existing Menai Road surface needed only to be upgraded and its capacity expanded to four-lanes.

Operational Road Safety

Five Hundred and Twelve (66%) representations raised concerns in relation to pedestrian safety (430 of which were form letters). These concerns were generally in regard to the safety of local school children in suburbs surrounding the proposal. Ninety-three (12%) respondents cited traffic safety concerns (65 of these were form letters). Concerns were generally related to local traffic congestion and the capacity of local roads to cater for perceived increases in traffic volumes.

Operational Noise

Five Hundred and sixty-nine (73%) representations raised concerns in relation to the operational noise impacts they perceived as unacceptable (337 of which were form letters). Seventy-nine (10%) respondents suggested that the proposed noise mitigation measures were inadequate. Twenty-four respondents including Sutherland Shire Council suggested that there were deficiencies and errors in the noise impact assessment included in the EIS and therefore concluded that noise impacts required further assessment.

Air Quality

Concerns regarding operational air quality impacts were raised by 437 (56%) representations. Respondents suggested that the carriageway should be realigned further away from properties to decrease air quality impacts. Concerns with construction stage impacts on air quality were raised in nine representations. Respondents were concerned with the adequacy of dust mitigation measures.

Environmental Impact Assessment Process

Concerns were raised in 61 representations regarding community consultation (25 of which were form letters). Respondents suggested that the consultation undertaken was inadequate and that residents' opinions were effectively ignored. Eighty-eight (11%) respondents cited errors and deficiencies in the EIS (65 of these were form letters).

Residential Amenity

Residential amenity and quality of life concerns were raised in 118 (15%) representations. It was suggested that improved road design would mitigate the impacts of the proposal.

Roadway Design

Seven representations suggested that the median width was excessive. Ninety-one (12%) respondents also suggested that the roadway was too close to property boundaries (45 of which were form letters). Respondents suggested that the roadway be aligned further away from properties despite the resultant impacts on threatened species. It was suggested in 15 representations that the roadway level be lowered so as to decrease operational noise and visual impacts, and to facilitate grade separated vehicular, cyclist and pedestrian overpasses.

Economic Impacts

Concerns regarding project costs were raised in 3 representations. It was suggested that the funding would be better spent improving existing infrastructure. Local business impacts were raised in two representations. The Greater Menai Business Association (MBIA) was concerned that the local traffic impacts of the proposal would impact on relationships with customers and would increase travel times and costs. Property devaluation concerns were raised in 50 representations (25 of these form letters). It was suggested that alignment alternatives and design changes could decrease impacts on property values. Fifty-seven representations cited concerns regarding the potential costs of structural damage from vibration during construction (25 of which were form letters).

Flora and Fauna

Thirty-five representations noted concerns regarding with the alignment of the roadway and the extent of clearing required under the proposal. Compensatory habitat was recommended in six representations.

Visual Impacts

Forty representations (25 of which were form letters) cited concerns regarding the visual impact of the noise barriers in terms of height, proximity and materials used. Eighteen representations cited other concerns regarding visual impacts of the proposal particularly in relation to the use of cut and fill techniques. It was suggested that incorporating landscaping into the proposal would ameliorate the visual impacts.

Regional Traffic and Access

Regional access, congestion, travel times, efficiency and other concerns were cited in 27 representations. Respondents noted concerns over the ability of the proposal to address existing operational performance and traffic volume issues. Concerns regarding lack of public transport in the

area were raised in five representations. Twelve respondents raised concern with noise and safety impacts associated with regional heavy-traffic flows.

Construction Noise and Vibration

Ten representations raised concerns in regard to construction noise and 25 representations noted concern over vibration impacts. Respondents were generally concerned with the proximity of the roadway to residences and recommended that the roadway be aligned a greater distance from property to minimise impacts.

Staging

Twenty-three representations noted concern over the proposed staging scenario. Respondents were concerned with the prospect of congestion at the intersection of the East-West Link and Old Illawarra Road following completion of stage 1 and the time delay between construction of the two stages. It was suggested in 10 representations that the construction of the North-South Link should coincide with that of the East-West Link. Thirteen representations suggested that the construction of the North-South Link should precede the East-West Link.

4 MODIFICATIONS TO THE PROPOSAL FOLLOWING EIS EXHIBITION

This Section describes the proposal for which the RTA has sought approval from the Minister for Planning as described in its Representations Report. It includes the Department's comparative evaluation of these modifications.

4.1 Proposed Modifications Outlined in the PAR

The Proponent has made a number of modifications to the proposal following the exhibition of the EIS in response to the issues raised in representations and further design work. These modifications are summarised in the Representations Report as follows:

1. relocation of the East-West Link to the south and towards the centre of the road corridor (with the exception of a 50 m stretch in the vicinity of Australia and Carter Roads where the road would be realigned 3-5 metres to the south);
2. lowering the vertical alignment of the East-West Link and constructing a bridge at Akuna Avenue, with entry and exit ramps to the east;
3. provision of a 4.4 metre underpass at Shackel Road, and left in - left out access on the southern side of the proposal with a drop down median (restricted crossing);
4. provision of a 3 metre restricted height underpass at Anzac Road, and left in – left out access on the southern side of the proposal with a drop down median;
5. provision of a land bridge for bus only, pedestrian and cyclist access between Australia and Carter Roads;
6. provision of a 3 metre restricted height underpass at Old Illawarra Road under the East-West Link and on and off ramps to and from Old Illawarra Road to the East-West Link;
7. provision of access from the North-South Link to Barry Road, with left in left out access on the eastern side in place of the existing cul-de-sac at the end of Barry Road;
8. realign the northern arm of the North-South Link towards the east;
9. separation of the alignment of the southern arm of the North-South Link from Old Illawarra Road, providing two lanes (along each link);
10. allow for the future installation of an sea-gull intersection on the western side of the North-South Link (to the south of the East-West Link) for access to the approved subdivision to the west of the North-South Link;
11. relocate the intersection of the North-South Link with New Illawarra Road further south with access to Old Illawarra Road; and,
12. retain existing access to Old Illawarra from Marsden Road, Lawson Place, Australia Road and David Road

Plans of the modified proposal and the locations of the modifications outlined above are given in Figures 2 a – e.

4.2 Summary of Representations Made on the Preferred Activity Report

The Proponent modified the proposal following consideration of the representations received in relation to the EIS. The Proponent prepared a Preferred Activity Report (PAR) detailing these modifications which was released to the public in July 2002. The Department collected representations on the PAR until 25 October 2002. The Department received 77 representations on the PAR. Key issues raised in representations to the PAR are summarised in Table 3. This Table includes a breakdown of the concerns raised in five separate form letters submitted to the Department.

Table 3 - Issues Raised in Representations to the PAR

	Individual	Form letters	Form 1	Form 2	Form 3	Form 4	Form 5	Total
No of Representations	24	53	3	36	7	4	3	77
General								
Further consultation required	7							7
Flaws in PAR	4							4
Upgrade Menai Road to four lanes	1							1
Lack of detail on pedestrian access		3					✓	3
Concern over heavy vehicle traffic on Old Illawarra Road	1							1
Impacts on flora and fauna	1							1
North-South Link								
Suggest further realignment to the east	11	3	✓					14
Concern over design speed increase to 90km/hr	8	3	✓					11
Impact on property value	9							9
Noise and air quality impact on residences to the west	6	3	✓					9
Loss of vegetation	6							6
Object to realignment	5							5
Visual impact of noise barriers	5							5
Vibration related structural damage	5							5
Support realignment		3	✓					3
Need for grade separation of North-South/Menai intersection	3							3
Need for landscaping on western side	3							3
Need for North-South Link to be constructed concurrently first	2							2
Traffic congestion/need for additional capacity	1							1
Barden Road to be closed at Old Illawarra Road and property access maintained	1							1
Safety of intersection of North-South Link with Old and New Illawarra Roads	1							1
Anzac Road								
Object to underpass	6	47		✓	✓	✓		53
Concern over likely increase in local traffic	5	47		✓	✓	✓		52
Use of underpass as short-cut	5	47		✓	✓	✓		52
Residents in south need only one access	1	47		✓	✓	✓		48
Safety, particularly with regard to children	2	43		✓	✓			45
Visual impact of modification	4	39		✓			✓	43
Concern over existing local traffic volumes	2	36		✓				38
Reduction in property values		36		✓				36
Noise impact of modification	3	3					✓	6
Connect East-West Link to Forestgrove Road	3							3
Recommend bridge over bypass		3					✓	3
Concern over mitigation such as speed humps	2							2

	Individual	Form letters	Form 1	Form 2	Form 3	Form 4	Form 5	Total
Shackel Road								
Object to underpass	2							2
Concern over existing local traffic volumes	2							2
Concern over likely increase in local traffic	2							2
Visual impact	1							1

Out of the 77 representations to the PAR, 53 were form letters. The majority of representations noted concern over the realignment of the North-South Link and the inclusion of an underpass at Anzac Road in addition to the left in-left out proposed in the EIS. The major issues of concern in relation to these changes are as follows:

Realignment of the North-South Link:

- suggest further realignment to the east;
- concern over design speed increase to 90km/hr;
- impact on property value; and,
- noise and air quality impact on residences to the west.

Modifications to Access at Anzac Road

- object to provision of an underpass at this location;
- concern over likely increase in local traffic and the use of the underpass as a short-cut to the Menai Town Centre and nearby schools;
- safety, particularly with regard to children; and,
- visual impact of modification

Concerns in relation to these changes are addressed in Sections 5.3 and 5.6 of this Report. It is also noted that the RTA recommended changes to the modified access arrangements at Anzac and Shackel Roads which are discussed in Section 4.3 of this Report.

The Department also received the following three petitions:

1. objecting to the current realignment of the North-South link and recommending consideration of a more easterly alignment (72 signatories);
2. objecting to relocation of noise barriers in Goorgool Road closer to property boundaries during detailed design (17 names listed);
3. objecting to closure of Banden Road at Australia Road and the loss of property access (29 signatories).

4.3 Additional Design Modifications

In a letter dated 4 September 2002 the RTA advised the Department of a number of additional design modifications proposed following consultation with Sutherland Shire Council and further design work. Details of the proposed changes presented in this letter are given in Table 4.

Table 4 – Additional Design Modifications

Item	Proposed as part of Preferred Activity	Amendment	Assessment of Impact/ Benefit
Akuna Ave Overbridge		Eastbound off-ramp traffic has priority at Akuna Ave.	Maintains priority flow from the Bypass No additional impacts identified to that of the Representations Report
Shackel Road Underpass	4.4 m clearance and left in - left out connected to underpass	4.4 m clearance underpass. However, left in - left out will not be connected to underpass (Shackel Road south). Shared usage of underpass	Deletion of left in - left out removes opportunity for 'rat run' but maintains access for Shackel Road properties. No additional impacts identified to that of the Representations Report
Anzac Road Underpass	3.0 m underpass	Relocation of underpass to the west Shared usage of underpass	To enable 11 metre clearance over the high voltage electricity cable crossing the East-West Link to the east. Required curve would act to slow traffic down No additional impacts identified to that of the Representations Report
Anzac Road North		LATM measures proposed north of Dandarbong Ave.	Assists in maintaining local traffic conditions. No additional impacts identified
East – West and North-South Link intersection	As proposed in the Representations Report.	Utilisation of the carriageway of Barden Road as the westbound off ramp from the East-West Link Deletion of eastbound ramp onto Old Illawarra Road and replace with a left-hand turn facility to provide for traffic turning off Old Illawarra Road onto the North-South Link so that traffic can then use the East – West Link	Improves sight distances for traffic turning south onto the North- South Link Removal of ramp means a slight reduction in noise for adjacent residences. Improved visual impact No additional impacts identified to that of the Representations Report

The proposed changes to Shackel Road, Anzac Road and North-South/East-West Link intersection are illustrated in Figures 4 a - c.

4.4 Consideration of Key Modifications

The Department's assessment of the key issues relating to the modifications outlined in Section 4.1 and Table 4 is given in Table 5. The Department notes that a number of these modifications are inextricably linked despite being assessed separately in the Representations Report. Accordingly, the modifications which allow Old Illawarra Road to remain open to local traffic (Numbers 6, 9 and 12) are assessed together in this Table.

Table 5 indicates that, overall, the modifications would result in a net positive outcome over a range of environmental and planning issues. Key positive impacts would include:

- reductions in travel times associated with the construction of the bridge at Akuna Avenue in place of a signalised at-grade intersection;
- the maintenance of existing access from Shackel Road (south) to Menai;
- the maintenance of existing access from Anzac Road (south) to Menai;
- the separation of local traffic and through traffic and the maintenance of existing access associated with keeping Old Illawarra Road open for local traffic;
- reductions in travel times associated with the removal of signals from the North-South Link/New Illawarra Road intersection and the separation of through and local traffic that would result from providing access to and from Old Illawarra Road at this intersection; and,
- improved emergency access.

The key negative impacts would relate to:

- the increase in land severance from the Woronora River Corridor that would result from the relocation of the East-West Link to a more central, southern alignment;
- the increase in proposal footprint resulting from the realignment of the southern arm of the North-South Link to the west and the emergency access proposed to the west of Shackel Road;
- the visual impacts of the higher fill embankments required at Shackel and Anzac Roads and the intersection of the North-South and East-West Links, and the increased bulk and scale of the land bridge connecting Australia and Carter Roads; and,
- the potential for infiltration of traffic onto local streets via the left in –left out access to be provided from the East-West Link to Dilkara Circuit.

The impacts on flora and fauna are considered acceptable, subject to the Conditions of Concurrence issued by National Parks and Wildlife Service and the Recommended Conditions of Approval. These impacts are discussed in Section 5.4 of this Report. The visual impacts have been addressed by stringent landscaping and urban design requirements. This is discussed in detail in Section 5.8 of this Report. The potential for traffic infiltration from the East-West Link into local streets via the left in – left out linking the East-West Link to Dilkara Circuit would be limited by Local Area Traffic Management measures discussed in Section 5.3 of this Report.

Table 5 – Comparative Assessment of Impacts of the Modified Proposal

Description of Modification	Justification	Potential Impacts	Estimated Positive or Negative Potential Impact	Nature of Impact
Relocation of the East-West Link to the south and towards the centre of the road corridor (refer to Figures 2c - e)	The Representations Report indicates that this modification would move the proposal away from adjacent residences	Operational Noise	**+ve** due to increase in the distance between residences and proposal, however these residences would still experience significant new noise impacts	Minor Change
		Visual	**+ve** due to increased opportunities for landscaping and lowering of noise barriers	Minor Change
		Flora and Fauna	**-ve due to increase in land severed from the Woronora River Corridor**	**Major Change**
		Water Quality	**-ve** due to reduction in distance from Woronora River	Minor Change
Lowering the vertical alignment of the East-West Link and constructing a bridge at Akuna Avenue, with entry and exit ramps to the east. East bound off-ramp has priority over other movements. (refer to Figure 2e)	This would replace the proposed at-grade intersection. The Representations Report indicates that this modification would facilitate unimpeded movement of traffic.	Through Traffic	**+ve due to removal of proposed signalised intersection**	**New Major Change**
		Local Traffic	**+ve** due to improved safety from separation of local and through traffic **-ve** due to loss of access to and from the west of the East-West Link	Minor Change Minor Change
		Operational Noise	**+ve** due to lowering of the road and removal of the signalised intersection, however these residences would still experience significant impacts	Minor Change
		Flora and Fauna	**-ve** due to increased proposal foot print	Minor Change
		Visual	**+ve** due to lowering of the road **-ve** due to new bridge	Minor Change New Minor Change
		Air Quality	**+ve** due to removal of the signalised intersection	Minor Change

Description of Modification	Justification	Potential Impacts	Estimated Positive or Negative Potential Impact	Nature of Impact
Provision of a 4.4 metre underpass at Shackel Road, and an unconnected left in - left out access on the southern side of the proposal with a drop down median (refer to Figure 4c)	This would allow existing access from the south of Shackel Road to Menai to be maintained	Local Access	**+ve due to separation of through and local traffic and maintenance of existing access to Menai** **-ve** due to loss of access to the East-West Link	**Major Change** Minor Change
		Emergency Access	**+ve** due to provision for movements across the median	Minor Change
		Visual	**-ve due to increases in fill embankment heights**	**Major New Change**
		Flora and Fauna	**-ve due to increase in proposal footprint**	**Major New Change**
Provision of a 3 metre restricted height underpass at Anzac Road, and left in – left out access on the southern side of the proposal with a drop down median LATM measures north of Danarbong Ave (refer to Figure 4b)	This would replace the proposed left in-left out access on the southern side of the proposal and allow existing access from the southern end of Anzac Road to be maintained	Local Access	**+ve due to maintenance of existing access to Menai** **-ve due to potential for infiltration of traffic onto local streets**	**Major New Change** **New Major Change**
		Emergency Access	**+ve** due to provision for movements across the median	Minor Change
		Visual	**-ve due to increases in fill embankment heights**	**Major New Change**
Provision of a land bridge for bus only, pedestrian and cyclist access between Australia and Carter Road (refer to Figure 2c)	This would replace the proposed bus only overpass and allow for greater pedestrian access and landscaping opportunities	Local Traffic Pedestrians and Cyclists Operational Noise Visual	**+ve** due to provision for the local traffic in the future **+ve** due to additional capacity provided **+ve** due to additional local shielding provided by land bridge **-ve due to increased bulk and scale of proposed bridge** **+ve** due to enhanced landscaping opportunities	Minor Change Minor Change Minor Change **Major Change** Minor Change

Description of Modification	Justification	Potential Impacts	Estimated Positive or Negative Potential Impact	Nature of Impact
Allowing Old Illawarra Road to remain open to local Traffic by: ♦ providing a 3 metre restricted height underpass at Old Illawarra Road under the East-West Link with: - an 'off ramp' from the East-West Link to Old Illawarra Road using the Barden Road Carriageway; and, - a left turn facility from Old Illawarra Road to the North-South Link so that traffic can then use the East-West Link; ♦ separating the alignment of the southern arm of the North-South Link from Old Illawarra Road, providing two lanes; and, ♦ retaining existing access to Old Illawarra from Marsden Road, Lawson Place, Australia Road and David Road. (refer to Figure 2a - b and 4a)	This would allow Old Illawarra Road to remain open to local traffic while still providing for all proposed traffic movements	Through Traffic	**-ve** due to safety concerns from traffic merging from the North-South Link and Old Illawarra Road onto the East-West Link in close proximity	Minor Change
		Local Traffic	**+ve due to maintaining access from Barden Ridge to the Menai Town and allowing access to the East-West Link**	**Major New Change**
		Operational Noise	**+ve** due to increase in distance of the North-South Link from residences in Barden Ridge and cutting. **-ve** due to increases in height of the fill at the intersection of the East-West Link with the North-South Link and associated noise mitigation implications	Minor Change Minor Change
		Flora and Fauna	**-ve due to increases in proposal footprint**	**Major New Change**
		Visual Impact	**-ve due to increased height of fill embankments at the intersection of the East-West Link with the North-South Link** **+ve** due to increased landscaping opportunities and reductions in noise wall heights	**Major Change** Minor Change
		Emergency Access	**+ve due to increased accessibility**	**Major Change**

Description of Modification	Justification	Potential Impacts	Estimated Positive or Negative Potential Impact	Nature of Impact
Realign the northern arm of the North-South Link towards the east (refer to Figure 2b)	This change would relocate the alignment away from adjacent residences	Operational Noise	**+ve** due to increased distance of the proposal to residences and deeper cutting	Minor Change
		Flora and Fauna	**+ve** due to reduction in impacts on Shale Transition Forest to the west **-ve** due to relocation of impacts to vegetation on the eastern side of the proposal	Minor Change Minor Change
		Visual	**+ve** due to reduction in noise wall heights and enhanced landscaping opportunities	Minor Change
Allow for the future installation of a sea-gull intersection on the western side of the North-South Link (to the south of the East-West Link) (refer to Figure 2b)	To provide access to the approved subdivision to the west of the North-South Link	Through Traffic	**-ve** due to safety concerns posed by merging traffic	Minor Change
		Local Traffic	**+ve** due to provision for access to North-South Link **-ve** due to loss of access to Old Illawarra Road as per initial RTA proposal	Minor Change
Relocate the intersection of the North-South Link with New Illawarra Road further south with access to Old Illawarra Road (refer to Figure 2b)	To provide for local access and separate local traffic from through traffic	Through Traffic	**+ve due to removal of proposed signals and associated delays** **-ve** due to safety implications of merging local traffic	**Major Change** Minor Change
		Local Traffic	**+ve to access from Old Illawarra Road to the New Illawarra Road**	**Major Change**
		Operational Noise	**+ve** due to the removal of the signalised intersection	Minor Change
		Emergency Access	**+ve** due to increased accessibility	Minor Change

4.5 Conclusion

The Proponent has modified the proposal in response to issues raised in representations to the EIS and based on further detailed investigations. Overall, the Department considers that, individually and cumulatively, the modifications would reduce the impacts of the proposal. While it is noted that the flora and fauna and visual impacts discussed above would require careful management, the modified proposal would result in significant benefits, above and beyond those associated with the EIS proposal. In particular, it is noted that the modifications would ensure that existing local access is maintained, and on some cases improved. The Department concludes that the impacts of the modified proposal can be managed, subject to the Recommended Condition of Approval contained in Section 8 and discussed in Sections 5 and 6 of this Report.

5. ASSESSMENT OF KEY ISSUES RELATING TO THE MODIFIED PROPOSAL

This Section of the Report provides an assessment of the key environmental impacts of the modified proposal based on an examination of the EIS, issues raised in representations during the exhibition period and the RTA's response to those issues provided in its Representations Report and during further consultation with the Department.

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

5.1 Need and Justification/Alternatives

5.1.1 Background

The primary objectives of the proposal as stated in the EIS are to:

- support initiatives identified in *Action for Transport 2010* and *Action for Air* including development of the strategic road network between southern Sydney and Bankstown and a cross-regional bus route between Miranda and Bankstown via Menai;
- provide improved performance of the arterial road network to provide for through traffic movements in the study area;
- provide improved conditions for road based public transport for both local and cross-regional services;
- provide improved conditions for all other road users including pedestrians, cyclists and to complement the development of an integrated bicycle and pedestrian network as identified by Sutherland Shire Council;
- improve urban amenity and local community cohesion within the study area, including support for the role of the Menai Town Centre precinct, and to ensure amenity of existing land use is protected and where possible enhanced, throughout project construction and operation;
- ensure key environmental sensitivities within the study area and broader catchment, including threatened flora species and vegetation communities and water quality, are protected throughout project construction and operation; and,
- provide value for money in terms of road user benefits and broader economic considerations.

The proposal has been justified in the EIS on the basis that it best meets these objectives, which aim at ameliorating current impacts on the Menai area.

The EIS indicates that the Old Illawarra Road (south of Menai Road) is operating with little spare capacity and that Menai Road is operating at or over its theoretical capacity. The Menai Road/Anzac Avenue intersection currently has a poor level of service and the EIS concludes that the intersections with Old Illawarra Road, Carter Road, Allison Crescent, Yala Road and Akuna Road would operate unsatisfactorily over the coming years, deteriorating significantly by 2016. This results in poor travel times for private vehicles and bus services. In relation to road safety, the EIS indicates that the Menai Road/Anzac Avenue intersection has a poor accident history, with an accident rate 36% above average.

There are few facilities for pedestrians and cyclists. Land uses in the study area are predominantly residential and the EIS concludes that there is little potential for redevelopment or new residential development. There are five schools located within the study area. The EIS indicates that the Menai Town Centre which contains a substantial shopping complex, community and entertainment facilities and commercial premises, forms a hub of commercial and community activity.

The EIS concludes that:

- there is a strategic need for an improved arterial road linking southern Sydney to Bankstown through the study area;
- there is a requirement for additional capacity on the arterial road network in the study area both immediately and into the future; and,
- there is a current and growing need to enhance community amenity.

Having established the current problems and primary objectives, the EIS considers a number of alternative approaches including: the 'do-nothing' option, upgrading of Menai Road and East-West Link options with and without North-South Links. The EIS indicates that the proposal was selected as the preferred option because:

- the proposal is outlined in *Action for Transport 2010* and would facilitate the development of cross-regional bus routes from Miranda to Padstow via Menai;
- it would enhance provision for alternate forms of transport;
- it would improve long term traffic performance across the road network;
- it would allow for improvements to public transport, cyclist and pedestrians on Menai Road;
- it would improve residential amenity by reducing traffic on Menai Road; and,
- it has the highest cost benefit ratio of all the options considered.

While the EIS notes that the proposal would result in impacts on native vegetation and some increase in VKT across the road network, it concludes that the Bangor Bypass meets the majority of project objectives.

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

- worsening traffic conditions with resultant increases in travel times and accident rates;
- loss of amenity; and,
- failure to meet objectives of *Action for Transport 2010*.

5.1.2 Key Issues Raised

Of the 778 representations, there were 583 (75%) that documented their in-principle, overall support for the proposal (427 were form letters). Those who specifically stated their objection to the proposal numbered 123 (65 of these were form letters). The majority of these respondents had reservations regarding specific design elements of the proposal, yet acknowledged the need for and benefits of the proposal.

Some five individuals raised concerns about the need for the proposal indicating strong support for upgrading Menai Road to four lanes.

The EPA noted concern over the impact of the proposal on native vegetation, the economic assessment of the proposal and need to consider the total impacts in considering the 'do-nothing' base case. Particular concern was raised over the high weighting (approximately 80%) given to travel time savings in assessing the benefits of the proposal and the need to consider maintenance costs and induced traffic and associated congestion impacts.

The Department also raised issues regarding the need and justification for the proposal and in particular the comparative benefits of the option of upgrading Menai Road to four lanes.

5.1.3 Consideration of Key Issues

Existing Strategic Situation

The corridor for the proposal has been recognised on street directories, planning instruments etc., for some time, possibly since the early 1970s. However, some of the original strategic issues may no longer apply. For example, there was a long-term commitment for the development of West Menai and an associated extension of the Bangor Bypass west to Heathcote Road. This area is no longer proposed for development nor is it being considered at least in the next 15 year horizon.

The proposal is considered in *Action for Transport* as providing a potential regional road link between Sutherland and Liverpool. However, at this stage this may need to be reconsidered in that there may now be a potential stronger strategic desire for Sutherland to be more self-reliant with the related benefits of reduced car dependency and constraints on travel. Provision of this link would also depend on commitment to a major additional section of road (i.e. link to Heathcote Road), which has severe environmental and cost constraints. Such a link is not considered likely, at least in the medium to long-term.

Existing Local Issues

Based on information provided in the EIS and representations, it is clear that the greatest concern of the local community is the current traffic delays and disruptions for both through and local traffic. Arguably, delays to local traffic access, particularly access to Menai Town Centre, appear to be of most concern. Another concern is the level of community severance north and south of Menai Road. Other key issues relate to improved access to schools as well as the need for improved access during bushfires and other emergencies.

From a review of the traffic information, the Department accepts that traffic delay, congestion and disruptions are a problem, although perhaps not highly significant in comparison to many roads in the metropolitan area. Travel time surveys undertaken by the Department indicate an average travel speed of generally of around 20 to 30km/hr. With regard to current accident rates, information provided by the RTA indicates that in the last 4 years there has been a total accident rate of 0.86/MVKT. This compares to an average Sydney wide accident rate for urban arterials of 1.10/MVKT.

Comparative Assessment of Key Assessment Factors

Table 6 below provides an overview comparative assessment of a range of factors for the Bangor Bypass compared to the 'Do Nothing' option. For completeness the assessment also includes a comparison with the option of upgrading Menai Road to four lanes. This option was raised by the Department during the preparation of the EIS and in a number of representations of being of

particular interest and offering a potential and inexpensive alternative. A discussion on the issues raised in the Table follows the Table.

Table 6 - Comparative Assessment of Key Assessment Factors

Key Issue	Do- Nothing	Bangor Bypass	Upgrade Menai Road to 4 Lanes
Cost	Base	$115 Million	$ $20 Million[1]
Benefit Cost Ratio	Base	4.6	9.7
Construction Time	Base	3 – 6 years	< 12 months
Length	3.8 km	5.2 km	3.8 km
Travel Times 2016			
- **Local Traffic**	15 - 18 minutes	10- 13 Minutes	10 – 11 Minutes
- **Through Traffic**	15 - 18 minutes	6- 9 Minutes	10 – 11 Minutes
Non-Peak Travel Times[2]	3.8 Minutes	4.7 minutes	3.8 minutes
Network Accident Costs 2016	Base	+$1 Million/pa	Same as Base
Additional Vehicles in the Study Area/Day 2016	Base	+11000	+1000
VKTs	Base	+5 Million vehicles/pa	+3 Million vehicles/pa
Bus Travel Times[3]	15 to 18 Minutes	10-13 minutes	10-11 minutes
Community Severance			

Key Issue	Do- Nothing	Bangor Bypass	Upgrade Menai Road to 4 Lanes
- **New Communities Affected**	None	Three community sectors created. West and east of the North-South Link and south of the East-West Link. The East-West Link severs a smaller community south of Barden Road. New underpasses would provide some improvements. Severs a number of small residential pockets on the south side of the Bypass.	None
- **Existing Communities Affected**	Current situation retained and exacerbated with minor increase in traffic from 30,000/50,000 per day (2001) to 38,000/56,000 per day by 2016. The Menai Road corridor allows for future widening (i.e. no residents along entire length of Menai Road with street frontage to Menai Road)	Current situation along Menai Road significantly improved. Traffic volumes reduced from 30,000/50,000 per day (2001) to around 18,000/33,000 per day by 2016. The Menai Road corridor allows for future widening (i.e. no residents along entire length of Menai Road with street frontage to Menai Road)	Current situation retained and exacerbated with minor increase in traffic from 30,000/50,000 per day (2001) to 38,000/56,000 per day by 2016. The Menai Road corridor allows for future widening (i.e. no residents along entire length of Menai Road with street frontage to Menai Road). Additional money could be potentially spent to improve access across Menai Road.
Emergency Access	No Change	High standard alternative available even though E/W section adjacent to bushland. Existing access to Menai Road	Minor improvement with expanded capacity on Menai Road

Key Issue	Do- Nothing	Bangor Bypass	Upgrade Menai Road to 4 Lanes
		improved for locals with potentially more through traffic on the Bypass.	
Vegetation Loss	None	28 hectares including around 16 hectares of high quality undisturbed.	Possibly some street trees
Noise Impacts			
- **Newly Affected Residents**	None	Up to 105 homes with noise levels above EPA goals with barriers. This is not exposed in the EIS. Many more homes within the noise goals but with significantly higher background noise than before the Bypass	None
- **Existing Affected Residents Along Menai Road**	Continuation of existing poor situation for some 200 residents located along Menai Road.	No noise barriers but some improvements for some 200 residents located along Menai Road with reduced traffic volumes	Potentially significant improvements for some 200 residents located along Menai Road

1. EIS indicates $8 Million but the Representations Report and more recent information indicates this upgrade would cost $20M..
2. Based on travel at signposted speed. Not directly comparable with Peak Travel Times as taken from different start and finish points. Assumes Bypass (East – West of 3.6km @70 km/hr/North South 1.6 km @60km/hr).
3. Assumes buses use Menai Road.

The Table indicates that relative to the 'Do-Nothing' option and the upgrade of Menai Road, the Bypass provides a number of key advantages. The primary advantages relate to important local issues, including significantly improved travel times for local and through traffic, reduced community severance for communities north and south of Menai Road, reduced noise along Menai Road and an alternative high standard access during emergencies.

The upgrade of Menai Road to four lanes would appear to also offer a number of long-term strategic traffic benefits, including, reduced network accident costs, reduced travel length (particularly important in terms of off-peak use), reduced VKTs, and fewer vehicles drawn to the study area. It is would also be significantly cheaper than the Bypass and would have an outstanding benefit cost ratio, over two times that of Bypass. A comparative assessment of the Bypass with the 'do-nothing' and upgrading Menai Road to four lanes against project objectives is given in Appendix C. Despite these advantages, it is clear from a substantial majority of representations (over 75%) that the Bypass has a significant level of support and the upgrade option does not appear to be favoured by the majority of the local community.

5.1.4 Conclusions

The Department accepts that there are traffic congestion problems and community issues along Menai Road and that there appears to be justification for improvements.

Whilst the proposed Bypass would significantly address existing problems, it would, in comparison to the option of upgrading Menai Road, be expensive (around $115M), result in the loss of urban bushland and introduce noise impacts on a new community which would most likely require treatment to individual homes. There would also be new visual changes and short term impacts including high pollution risks from major construction works in close proximity to the Woronora River.

With the Bypass, and assuming (as predicted by the RTA) that up to 90% of through traffic use it, traffic volumes along Menai Road are still predicted to be in the order of 15,000 to 33,000. Thus whilst traffic and amenity conditions along Menai Road would be improved with the Bypass, it may not be to the degree that Menai Road would feel like a "local" road, as may be the expectation of the local community.

Notwithstanding these limitations, the strength of the Bypass to address key local issues is a compelling factor to consider, particularly where the key advantages of the Bypass, such as improving community cohesion, accessibility and evacuation during bushfires are more problematic to measure. It is notable that over 75% of representations indicated support for the Bypass. This is a significant response for any EIS.

Notwithstanding, for the Department to accept the benefits of the Bypass, discounting all other options (in particular the option of upgrading Menai Road to four lanes), it must be satisfied that the proposal would achieve its stated objectives and, in particular, meet community expectations.

In this regard, the Department has identified a number of critical issues that are fundamental to this outcome. These are listed below together with reference to where they are addressed in this Report:

- ensuring absolute maximum use of the Bypass by through traffic (refer to Section 5.3);
- addressing staging as early as possible to ensure impacts are not simply transferred to another community and to provide community certainty about delivery of the North-South Link (refer to Section 5.2);
- maximising opportunities for revitalisation of Menai Road as a local road including consideration of achieving a more public frontage to Menai Road (refer to Section 5.9);
- designing the East-West Link in a more sympathetic form consistent with its intended design speed and function (refer Section);
- limit truck use along Menai Road (refer to Section 5.3);
- further enhancement of pedestrian and cyclist links for communities with increased severance (refer to Section 6.5); and,
- minimising impacts on newly affected communities (i.e. so as not to simply transfer impacts from one community to another) in terms of stringent noise mitigation measures (refer to Section 5.5).

Provided these measures are comprehensively addressed, the Department considers that the Bypass proposal should provide an appropriate balance between environmental impacts and project outcomes and hance can be supported.

5.2 Staging

5.2.1 Background

The RTA propose to construct the proposal in stages. The East-West Link would be constructed as stage one with an interim intersection arrangement at the intersection with Old Illawarra Road. A concept plan of this interim arrangement is given in Figure 5. Stage two would include construction of the North-South Link. Construction of the East-West Link is expected to commence in late 2002. The RTA has indicated that construction of the North-South Link would follow that of the East-West Link with the timing of construction dependent largely on the ongoing performance of the Old Illawarra Road/Menai Road Intersection.

5.2.2 Key Issues Raised

Some 23 representations indicated concern about construction staging and expressed a strong preference for constructing the North-South Link first or, failing that, at least concurrent construction of the East-West Link and the North-South Link. There was a concern about the level of congestion on Old Illawarra Road and also whether there would be the same availability/commitment to funding once the East-West Link was constructed.

The Department also raised a number of concerns about the ability of the Bypass to achieve a number of its objectives if staged. In particular, the Department had concerns that the traffic delays encountered at the intersection of the East-West Link and the existing Old Illawarra Road may not entice a large proportion of through traffic to use the Link.

5.2.3 Consideration of Key Issues

Major Staging

At the Department's request, the RTA undertook additional traffic analysis using SCATES to more fully understand the traffic implications of a staged proposal.

Analysis of mid-block volume capacity ratios along Old Illawarra Road north of the East-West Link, indicates that upon opening of the East-West Link, without the North-South Link, the volume capacity ratios would exceed 1 in the northbound direction in the AM peak and in the southbound direction in the PM peak. This means that the intersection would operate above its capacity and traffic would experience significant delays. It is also likely to mean that significant volumes of traffic would potentially stay on Menai Road.

The supplementary traffic analysis also indicates that without the North-South Link the intersection of Alfords Point Road/Old Illawarra Road would operate at a Level of Service F. Again, this is considered problematic in terms of meeting the project objectives particularly considering the significant expenditure on the East-West Link.

The impacts of constructing only the East-West Link are compared to constructing the East-West Link at the same time as the northern arm of the North-South Link in Table 7.

Table 7 – Comparative Assessment of Staging Scenarios

	East-West Link Only	East-West Link + North-South Link (north of Barden Road)
Mid Block Volume Capacity Ratio	♦ Exceeds 1 (ie above capacity) in both north bound AM peak and also in south bound PM peak.	♦ satisfactory
Performance of Alfords Point/Old Illawarra Road Intersection or North-South Link/Alfords Point Road (2016)	♦ LOS F (PM) peak	♦ LOS B/C
Travel Times AM Peak	♦ 50% longer than the Base	♦ Base
Constructability	♦ Traffic disruption during construction of East-West Link and again during construction of North-South Link	♦ Relatively limited traffic disruption during construction.
Cost	♦ $70 Million	♦ $95 Million

The Department has also considered additional measures to discourage the use of Menai Road such as signal phasing at Menai Road/Old Illawarra Road. However considering that in the AM peak, Menai Road traffic is not critical to the operation of this intersection and that there is 4 lanes along Menai Road at least to Alison Crescent discouraging traffic to use Menai Road would appear problematic.

The Department considers that under a staged approach the major potential benefits of the Bypass may not be achieved, yet the local community would have borne arguably the greatest impacts from its construction. Such concerns were expressed in the majority of public representations which objected to the proposed staging scenario, in particular including the submission from Sutherland Shire Council.

Another concern with staging is the level of noise impacts and air quality on existing residents along Old Illawarra Road. These issues are addressed in more detail in Sections 5.5 and 6.8 of this Report.

The RTA has indicated that constructing the North-South Link concurrently with the East-West Link would not be possible, as at this stage, funding is only available for construction of the East-West Link.

The RTA's general recommendation "*that the North-South Link be constructed when monitoring of Old Illawarra/Menai Road intersection indicates that the intersection is at capacity*" would appear redundant as current forecasts already indicate that this intersection would operate at Levels of Service (LOS) F (i.e. at capacity) on opening of the East-West Link. Further the mid-block capacity of Old Illawarra Road would also be at LOS F.

However the issue of funding is more problematic. From the Department's assessment perspective, the availability of funding is not something that it can prescriptively specify or condition. It is not appropriate in this regard for the Department to determine funding priorities or allocation. The Department therefore can only recommend (rather than specifying as a Condition) that the RTA seek funding for concurrent construction of the North-South Link. However, given that the achievement of

the projects objectives already appears to have some limitations with the full project (as is discussed in Section 5.1), any further reduction of the benefits by constructing only the East-West Link would dilute the support for the project.

As a minimum it is therefore recommended as a Condition of Approval, that if funding cannot be made available concurrently, construction of at least the northern section of the North-South Link commence within 12 months of the opening of the East-West Link and be completed and opened to traffic within 18 months of construction commencement. This requirement is specified in Recommended Condition of Approval No. 24.

Minor Staging

The RTA have indicated that in order to commence works as early as possible, the staging of construction works within stage 1 and 2 discussed above may be required. The construction of the ramps at Akuna Avenue and a temporary access bridge between Australia and Carter Road have been identified as key construction priorities.

The Department notes that it would take some months to prepare the Construction Environmental Management Plan and all the Sub Plans relating to the whole proposal and required under the Recommended Conditions of Approval. The commencement of these initial works would be delayed if all pre-construction requirements for the entire East-West Link have to be met prior to construction commencement. To allow for these key works to commence in parallel with broader environmental management planning, the Department has concluded that discrete construction works can commence prior to finalising all pre-construction requirements provided that all community consultation and environmental requirements specific to the particular construction works have been met. This requirement is reflected in Recommended Condition of Approval No. 3 and in the provisions for approval of Construction Environmental Management Plans for discrete stages outlined in Recommended Condition of Approval No. 19.

5.3 Traffic and Access

5.3.1 Background

The key road in the study area is Menai Road which provides the main link from the Woronora River to Alfords Point Road and passes through the township of Bangor. Currently, Menai Road varies between 2, 3 and 4 lanes and currently carries around 30, 000 to 50, 000 cars per day, depending upon the section of roadway. The two and three lane sections of Menai Road are currently at capacity. In particular, the merging from 4 lanes to 2 lanes has been the source of significant peak hour congestion. Travel times along Menai Road have been estimated at below 30/km per hour. The other key road is Old Illawarra Road, a two lane road providing a north/south connection between Heathcote and Bankstown.

The proposal as described in the EIS provides a new East-West Link between the Woronora Bridge and Old Illawarra Road and an upgraded North-South Link along Old Illawarra Road from New Illawarra Road to Alfords Point Road.

Whilst traffic growth is estimated to generally stabilise, at around 56, 000 vehicles per day by 2016, the current poor situation would be exacerbated and delays would significantly increase.

The proposal is expected reduce travel times through the study area from a predicted 18 minutes by 2016 to around 8 minutes.

5.3.2 Key Issues Raised

In general, the representations indicated acceptance that there was a major traffic problem and that something had to be done. Key issues raised in representations included:

- the impact of the North-South Link on local access;
- need for grade separation of the intersection of the East-West Link with the North-South Link;
- the connection between Carter Road and Australia Road;
- access from Bangor South East (Dilkara/Dulin Close); and,
- access from the southern end of Shackel Road.

The Department raised a number of more strategic traffic concerns including the strategic justification of the corridor, the impact on Vehicle Kilometres Travelled (VKTs), limitations with meeting the key objectives of *Action for Transport*, regional traffic switching, limited travel time savings outside peak periods and increased network accident costs. The Department also raised concerns that the local traffic assessment used the NETANAL traffic program for detailing local intersection performance, whilst a usual, and more effective approach, would be to use a program such as SCATES.

5.3.3 Additional Investigations

In response to issues raised by the Department, the RTA prepared a supplementary traffic and economic study, which is included in the Representations Report. This essentially involved using SCATES to analyse the traffic and economic impacts of the proposal. The RTA has also proposed a number of modifications (refer to Section 4) to address a number of local traffic issues.

5.3.4 Consideration of Key Issues

Strategic Traffic Issues

Strategic Planning Justification

The East-West Link corridor has been identified since at least the early 1970's. At that time, a link between Sutherland and Heathcote Road was considered essential in terms of the land use intensification envisaged. In particular, it was predicted that a substantial residential subdivision of West Menai would take place. Since that time, the West Menai subdivision has been removed from the Urban Development Program. The desire for a commuter connection between Sutherland and Liverpool via Menai is also not considered consistent with regional containment principles nor with limiting discretionary travel. Overall, the original strategic planning justification for the east/west corridor is no longer considered to have the same significance as it had in the 1970's, however, the strategic justification for enhancing the existing north/south corridor remains and is supported.

Action For Transport

The Department considers that the proposal's ability to address a number of key objectives in *Action for Transport 2010* is limited. These objectives include reducing car dependency, getting more people on public transport, safeguarding the environment and giving the community value for money. This is discussed in Section 5.1 of this Report.

The Bypass is not expected to have a significant impact on reducing car dependency given the significant additional road capacity created. Similarly, the ability to get more people on public transport is limited. However this could be improved by concurrently developing a cross-regional bus service.

The RTA indicated that the proposal would improve network efficiency, facilitating public transport usage as a result of more reliable services with shorter travel times in peak periods, and improve fuel efficiency which would reduce emissions and thereby help improve air quality. The Department notes that part of the improvements to Menai Road outlined in the EIS included investigation in relation to the potential for incorporation of bus priority measures and transit lanes. To this end, Recommended Condition of Approval No. 35 requires that the Proponent consult the Department of Transport and bus service providers in investigating appropriate public transport infrastructure for Menai Road. The findings would be incorporated into an Urban Design Strategy and Implementation Plan for Menai Road, discussed in Section 5.9 of this Report.

Regional Traffic Switching/Impacts on VKTs

The traffic analysis indicates that building the proposal would attract some additional 11, 000 vehicles per day to the study area. This is because the capacity relief provided by the proposal would result in some regional switching of traffic. The impacts would be to attract more traffic into the study area and thereby reduce the overall net potential improvements of the proposal. The traffic modelling indicates that with the proposal (compared to without), traffic volumes on Tom Uglys and Captain Cook bridges would fall whilst traffic volumes on Alfords Point Bridge and Heathcote Road would rise.

The traffic switching, redistribution and longer travel lengths on the proposal (i.e. 5.2 km compared to 3.8 km for Menai Road) would also result in an increase to total network VKTs of around 5 million per annum. Whilst not easily determined through fixed trip table modelling, the additional capacity created by the Bypass is likely to result in a component of induced traffic. Thus, the above increase in traffic to the area and VKT increases is likely to be an underestimation.

Travel Time Savings

The proposal would result in significant travel-time savings, however this would primarily be for through traffic. Travel times across the study area would be up to 18 minutes without the proposal, compared to 6 minutes (east bound) and 8 minutes (westbound) with the proposal. Travel times for local traffic (ie along Menai Road) would be less substantial as the two lane sections of Menai Road would continue to carry traffic volumes of around 17, 000 to 33, 000 vehicles per day. Estimated peak travel times for local traffic including buses, with the proposal is predicted to be up to 13 minutes.

Outside of peak periods travel-time savings for traffic using the Bypass, relative to using Menai Road are not expected to be as substantial. This is because the proposal is about 30% longer than Menai Road. With congestion removed along Menai Road outside of peak periods, it is expected that more traffic is likely to use Menai Road than the model may have predicted. This is because the traffic model is based on a peak hour scenario and factored to a daily total.

To ensure that the proposal continues to achieve its full potential for attracting through traffic it is recommended that number plate surveys of traffic using Menai Road be monitored during and outside peak periods. Should the proportion of through traffic using the Bypass be less than predicted, it is recommended that the RTA undertake additional traffic management measures to

either reduce the attractiveness of Menai Road to through traffic or improve the desirability of the proposal. This requirement is specified in Recommended Condition of Approval No. 33.

Accidents and Accident Costs

Whist accident rates on Menai Road have generally been less than the State average for urban roads, the Department accepts that accident rates would decrease once the Bypass is constructed because of the reduced traffic volumes on Menai Road. Similarly, the Department also accepts that accident rates on the Bypass would be low.

Despite this, the cumulative impact on accidents across the road network with the Bypass would increase slightly. With the construction of the Bypass, the revised economic analysis undertaken by the RTA indicates that network accident costs would increase by around $1 million per annum compared to doing nothing. This would occur essentially as a result the increase in VKTs and the additional traffic attracted to the study area.

Heavy Vehicles

The Bypass would significantly reduce the numbers of heavy vehicles on Menai Road and has the potential to reduce heavy vehicle traffic on the section of Old Illawarra Road to be utilised as a local access road. There would also be an opportunity to limit large truck access on the eastern section of Menai Road and Old Illawarra Road south of Barry Road to the intersection with New Illawarra Road. It is therefore recommended that the RTA negotiate with Sutherland Shire Council to limit trucks along these sections of Menai Road and Old Illawarra Road to loads of less than 3 tonnes. This requirement is specified in Recommended Condition of Approval No. 34.

Local Traffic Issues

Separation of the Alignments of North-South Link and Old Illawarra Road

Over 120 representations raised concerns about the location of the North-South Link and the associated closure of Old Illawarra Road. A large number of these, while generally supportive of the proposal, requested that the North-South Link be moved further to the west so that Old Illawarra Road could be retained as a local service road.

As indicated in Section 4 of this Report, the RTA modified the proposal so that Old Illawarra Road would be retained as a local service road including all movements from five exit/entry points, with the exception of Barden Road. Connections from Old Illawarra Road to the East-West Link are also provided. The Department commends the Proponent's pro-active response to this significant community issue. The design of the Old Illawarra Road connection and the alignment of the North-South Link is discussed in Section 5.6.

Concern over the closure of Barden Road was raised in one representation on the PAR and a petition with 29 signatories. Residents of Boyd Place and Raine Place who currently access their back yards from Barden Road noted concern over the possibility of closing Barden Road to traffic at Australia Road, citing the need for continued property access from Barden Road. The Department notes that the East-West Link corridor encroaches into the Barden Road corridor at this location and the RTA have indicated that a pedestrian and cyclist link would be provided to connect Australia Road to Old Illawarra Road. It is noted that no properties front this section of Barden Road and no legal property access ways would be affected by closing this section of Barden Road.

Intersection of the East-West Link with the North-South Link

A large number of representations indicated concerns about the operation of the signalised intersection between the East-West Link and the North-South Link. Sutherland Shire Council in particular, requested that the RTA investigate the feasibility of a grade separated interchange.

The supplementary traffic analysis undertaken by the RTA indicates that a signalised intersection would operate at a satisfactory level of service (i.e. LOS C) even by 2016. The Department accepts the RTA's position that there is no justification at this stage for constructing a grade separated intersection considering the significant costs and impacts.

Connection Between Carter Road and Australia Road

This issue generated a significant number of representations. Residents were effectively divided between those that supported the connection (primarily those located south of the East-West Link) and those that didn't (primarily those located north of the East-West Link). Support for local access between Carter Road and Australia Road was on the basis of reducing the severance effect of the East-West Link and improving local connectivity, whilst those objecting indicated concerns about increased traffic congestion on local streets.

The proposed modifications to the North-South Link would provide an enhanced and safer access between Barden Ridge and Menai, via Illawarra Road. The proposed modifications also include a new bridge over the East-West Link connecting Carter and Australia Road. Under the proposal, this bridge would provide for bus, pedestrian and cyclist access only. It could also potentially provide a supplementary local traffic connection for Barden Ridge residents. Whether this connection should allow local traffic is a complex balance between accessibility and increased traffic on local streets. However, the final decision is a matter for Sutherland Shire Council. The RTA has not changed the current arrangement

Access from Bangor South East (Dilkara/Dulin Close)

Residents of Bangor, located to the south of the East-West Link including Dilkara Court and Dulin Close raised concerns about the significant impact of severance and the loss of accessibility to the rest of the Bangor community. Residents indicated that the proposed provision of a left in-left out access only to the Bypass would not be acceptable.

The RTA modified the proposal to include an underpass at Anzac Road in addition to the proposed left in – left out access (see Figure 4b). While the provision for an underpass at this location addressed the concerns raised in representation to the EIS, it is noted that 53 representations in relation to the PAR have objected to the inclusion of an underpass based on the likely increases in local traffic resulting from vehicles existing the East-West Link and proceeding to Menai Road via Anzac Road. The RTA have recommended the inclusion of Local Area Traffic Management (LATM) measures on streets north of Dandarbong Ave to ensure that infiltration of Bypass traffic into local streets is limited. The Department notes that without detailed local traffic impact assessment it is not possible to determine the location and type of required traffic calming devices at this stage. Therefore, the Department recommends that the Proponent develop and implement LATM measures for Anzac Road and surrounding streets in consultation with Emergency Services, Sutherland Shire Council and the affected community to restrict through traffic. This requirement is specified in Recommended Condition of Approval No. 37.

Access to Gandangara Land Council Subdivision

Both the Gandangara Land Council and Sutherland Shire Council raised concerns about access to an approved subdivision of 41 residential allotments located west of Old Illawarra Road and south of Hall Drive. It is understood that the RTA has given approval for a signalised intersection with Old Illawarra Road near Australia Road as an interim access from the subdivision to Old Illawarra Road. The Representations Report indicates that allowance for the future installation of a sea-gull style intersection has been incorporated into the design. This would provide for south bound traffic with storage between the north and southbound carriageways. Considering the volume of traffic this arrangement is considered acceptable. Notwithstanding, the Department recommends that this section is monitored and should unacceptable queuing or accidents arise, that a signalised intersection be provided. This requirement is specified in Recommended Condition of Approval No. 36.

Access from Shackel Road

The EIS proposed that local access from existing residents on the southern end of Shackel Road would be provided via a left in - left out access. In the PAR, the RTA proposed to modify the proposal by including an underpass at Shackel Road and relocating the left in - left out to the west (see Figure 4c). A number of residents of Shackel Road noted concern over the potential for through traffic to exit the East-West Link at the left in – left out and proceed through the underpass and up Shackel Road to the schools and Menai Road. The increased height of the road at this location was also of concern. The RTA noted concerns raised by the residents of Shackle Road and have now proposed that the left in –left out is not connected to the underpass. The left in – left out would only provide access to the undeveloped residential land. This modification is outlined in Table 4 in Section 4.3 of this Report. The Department notes that this modification would ensure that access for existing residents south of the East-West Link is maintained and that only local traffic uses Shackel Road. The visual impacts of the proposal are discussed in Section 5.8. The Department concludes that this modification would satisfactorily address the issues raised by the residents as it retains existing access and is considered appropriate.

Grade-Separation of Akuna Road/East-West Link Intersection

The EIS proposed an at-grade signalised intersection to provide for all traffic movements at this location. The RTA propose to modify the EIS proposal and construct a bridge at Akuna Avenue with entry and exit ramps to the east. The Representations Report concludes that this modification would facilitate unimpeded movement of traffic along the East-West Link and improve safety by separating local traffic from through traffic. While this modification would mean that local traffic from the Akuna Avenue area wishing to travel to and from the west would need to use Menai Road, it is noted that this is the route that existing traffic takes and that only small volumes of traffic would be involved. The Department concludes that this modification would result in a net positive traffic benefit.

5.4 Flora and Fauna

5.4.1 Background

The proposal passes through a vegetated road reservation corridor. The EIS identified four broad vegetation communities in the road corridor, cleared/disturbed lands with scattered trees, open woodland, heathland, and swamp forest. The road corridor is currently linked to the Woronora River and the Mill Creek/Barden Ridge vegetation corridors. The EIS concludes that the proposal would

not significantly compromise existing vegetation corridors, although there would be some reduction in corridors width.

Two threatened plant species, listed under the TSC Act, were recorded in the study area: *Acacia pubescens* and *Melaleuca deanei*. *Acacia pubescens* would not be directly impacted by the proposal, but may experience some indirect impacts. The proposal would require the clearing of approximately 0.5ha of land containing *Melaleuca deanei*.

Three threatened flora species *Persoonia hirsuta*, *Pterostylis saxicola* and *Caladenia tessellata* have the potential to occur in the study area on the basis of habitat requirements and associated species, however, these species were not recorded. One endangered ecological community, Shale Sandstone Transition Forest, was identified at two locations in the study area. The EIS identified that 1.6ha of this community would be removed under the proposal.

The EIS identified five threatened fauna species known to be present in the study area: *Ninox strenua*, Powerful Owl; *Scoteanax rueppellii*, Greater Broad-nosed Bat; *Mormopterus norfolkensis*, East Coast Freetail Bat; *Miniopterus schreibersii*, Large Bent-wing Bat; and *Pteropus poliocephalus*, Grey-headed Flying-Fox. A further five threatened species were considered likely to occur in the study area: *Cercartetus nanus*, Eastern Pygmy Possum; *Phascolarctos cinereus*, Koala; *Falsistrellus tasmaniensis*, Eastern False Pipistrelle; *Heleioporus australiacus*, Giant Burrowing Frog; and *Pseudophryne australis*, Red-crowned Toadlet.

Section 5A Assessments of Significance were prepared for all threatened biota that was known or considered likely to occur in the study area. These assessments concluded that the proposal is unlikely to have a significant effect on threatened species or their habitats, with the exception of *Melaleuca deanei*. A SIS was therefore prepared for this species and a number of mitigation measures were developed to minimise the impacts of the proposal on this and other threatened species impacted by the proposal. These measures included funding for threatened species management and the provision of compensatory habitat for the loss of key habitats for threatened species and ecological communities.

In accordance with the EP&A Act, the RTA sought the concurrence of the Director-General of NPWS in relation to the SIS. On 17th July 2002, the Director-General of NPWS granted concurrence to the proposal subject to a number of conditions. The Concurrence, Conditions of Concurrence and the Concurrence Report are contained in Appendix A.

5.4.2 Key Issues Raised

Thirty-five representations raised concerns regarding the clearing of flora and fauna. The majority of these respondents were concerned with the alignment of the roadway and the extent of clearing proposed.

Compensatory habitat was supported by six representations. However, Sutherland Shire Council identified errors and deficiencies with the extent and composition of the compensatory habitat package proposed in the SIS. The Department was also particularly concerned with regard to the locations of suitable sites, whether 'like for like' could be achieved and the long-term management of these sites.

The Department, NPWS and Sutherland Shire Council also raised a number of issues regarding the impacts of the proposal on threatened species. These included:

- the lack of assessment on the Woronora River habitat corridor;
- need to assess impacts from sedimentation basins, access roads and overshadowing effects;
- need for appropriate mitigation measures to minimise impact on the roosting/breeding habitat for Powerful Owl and threatened microchiropteran bat species; and,
- the status of an unidentified species of *Hibbertia* previously recorded in the study area.

5.4.3 Consideration of Key Issues

Assessment of the Species Impact Statement by NPWS

The EP&A Act requires that the Proponent obtain the concurrence of the Director-General of NPWS for the SIS prior to requesting the approval of the Minister for Planning. NPWS have completed an assessment of the SIS and the additional information provided in the Representations Report. The Director-General of NPWS concluded that the proposed mitigation measures would substantially reduce the impacts of the proposal subject to a range of Concurrence Conditions. The key elements of NPWS's Concurrence Conditions, which are included at Appendix A, are:

- investigation into modifications to the design of the proposal and alignment to further reduce the direct and/or indirect impacts on threatened species, populations and endangered communities or to improve the effectiveness of ameliorative measures;
- limiting clearing to the areas identified in the EIS and Representations Report;
- additional targeted surveys for:
  - Eastern Pygmy Possum;
  - Powerful Owl;
  - Large Bent-wing Bat;
  - Greater Broad-nosed Bat;
  - Eastern False Pipistrelle; and,
  - East Coast Freetail Bat;
- implementation of all mitigation measures outlined in the EIS, SIS and Representations Report;
- consultation in relation to design, location, construction and monitoring of mitigation measures;
- assessment of the feasibility of translocation for any individual *Melalauca deania* or other threatened species identified within the construction footprint;
- negotiation of a comprehensive compensatory habitat package within six months of the Minister's Approval; and,
- the preparation of a Flora and Fauna Management Sub Plan.

Assessment under the EPBC Act

The Environment Protection Biodiversity Conservation Act (1999) (EPBC) commenced on 16 July 2000. One of the key functions of the EPBC Act includes the introduction of a new assessment and approvals system for actions that have a significant impact on matters of national environmental significance (NES). Should an action be determined to be likely to significantly affect on NES matters (referred to as 'Controlled Actions'), an approval from the Commonwealth through its agency, Environment Australia, is required. In order to determine whether a project requires an approval from

the Commonwealth, an applicant is required to submit a 'Referral' application to Environment Australia for consideration.

On 2 September 2002, Environment Australia determined that the proposal was a 'controlled action' due to the likelihood that the proposal would have a significant impact on nationally listed threatened species and communities. The RTA provided Environment Australia with new information on proposed mitigation measures and requested that this decision be revoked under Section 78 of the EPBC Act. A copy of the additional information supplied to Environment Australia is given at Appendix D. On 24th September 2002, Environment Australia revoked the decision that the proposal was a controlled action subject to the following conditions:

- cuttings and seeds to be taken from those clumps of *Melaleuca deanei* directly affected by works, prior to construction commencing, for propagation by a suitability qualified plant nursery;
- propagated *Melaleuca deanei* to be replanted and maintained in suitable soil types/habitat within the proposal corridor (in addition to any other planting area agreed with NPWS);
- clumps of *Melaleuca deanei* directly affected by work to be translocated and maintained in suitable soil types/habitat within the corridor as far as practical;
- remaining Shale Sandstone Transition Forest within the proposal corridor is to be fenced off and managed so as to minimise risks of direct and indirect impacts from construction works, and as described in the new information provided (see Appendix D); and,
- at least 38 hectares of suitable compensatory habitat for the loss of Shale Sandstone Transition Forest to be acquired or otherwise set aside for conservation purposes, in consultation with NPWS and as described in the new information provided (see Appendix D).

These requirements are reflected in Recommended Conditions of Approval Nos. 49 and 50.

Extent of Vegetation Clearing Required

The Representations Report indicates that the EIS proposal would result in the loss of 21.4 hectares of vegetation (13.3 for the East-West Link and 8.1 for the North-South Link) and edge effects on a further 9.4 hectares of vegetation (3.1 for the East-West Link and 6.3 for the North-South Link). Calculations in relation to edge effects remain unchanged. The Representations Report concludes that the modified proposal would allow for the preservation of 2.4 hectares of vegetation which would have been cleared under the EIS proposal (2.3 for the East-West Link and 0.1 for the North-South Link), thereby reducing the footprint of the proposal. To ensure that the modified proposal does not impact on any more vegetation then that lost under the EIS proposal, Recommended Condition of Approval No. 48 requires that all works including sedimentation basins and access tracks are confined within the footprint assessed in the EIS and no more than 11 hectares of vegetation would be cleared for construction of the East-West Link and 8.04 for the construction of the North-South Link.

Notwithstanding the information presented in the Representations Report, the Department notes that the modified proposal footprint may extend into areas that were previously unaffected by the EIS proposal. This is documented in the Road Design Review conducted by Arup (see Appendix G) and addressed in Section 5.6 of this Report.

Impacts on Threatened Species

Based on the information provided in the EIS and Representations Report, the direct impacts of the proposal would be unavoidable. Some of these impacts, particularly those that would affect *Melaleuca deanei* and Shale Sandstone Transition Forest, would require careful management. Accordingly, the preparation of a detailed Flora and Fauna Management Plan is required to ensure that mitigation measures are effectively implemented. This requirement is reflected in Recommended Condition of Approval No. 47. It is critical that impacts on threatened species be minimised and that a compensatory habitat package is negotiated. The Department's Recommended Conditions of Approval Nos. 49 and 50 therefore require that vegetation clearing avoid endangered or threatened species where practicable as described in the EIS and Representations Report.

Mitigation measures to minimise the impact of the proposal on flora and fauna described in the Representations Report include:

- checking work areas (including tree hollows) before clearing vegetation for the presence of fauna. Any fauna found would be relocated to suitable nearby habitat;
- not disturbing animals during their breeding season; and,
- provision of compensatory habitat.

The Representations Report notes that changes to the road alignment were made to balance the impacts on *Melaleuca deanei* with impacts on local residents. The Representations Report also states that animals would not be disturbed during their breeding season, however the Department considers that this would be practically difficult and that careful observation for threatened fauna species before clearing and during construction would be more appropriate. To this end, pre-clearing surveys and surveys before each phase of construction are recommended for six species (Eastern Pygmy Possum, Powerful Owl, Large Bent-wing Bat, Greater Broad-nosed Bat, Eastern False Pipistrelle and East Coast Freetail Bat) in consultation with NPWS. Should any of these species be detected, the NPWS would be notified and appropriate mitigation measures would be implemented. Should any of these species be detected breeding then activities would cease in the vicinity of the roost until the roost is abandoned. This is reflected in Recommended Condition of Approval No. 53.

Additionally, the Department's Recommended Condition of Approval No. 51 requires that clearing works occur outside the breeding season of the Greater Broad-nosed Bat and the Powerful Owl, unless delays in clearing would result in an unreasonable delay to the proposal. Other mitigation measures to protect these species would be detailed in the Flora and Fauna Management Sub Plan.

Affect on Vegetation Corridors

The proposal would have direct and in direct impacts on the Woronora River and the Mill Creek/Barden Ridge vegetation corridors. The extent of clearing is discussed above. Negative impacts of the proposal on the adjoining vegetation corridors would also include noise impacts, weed invasion and potential erosion, sedimentation and water quality impacts. Noise and soil and water impacts are discussed in Sections 5.5 and 6.5 of this Report. Measures to manage impacts on surrounding vegetation including weed management strategies would be detailed in the Flora and Fauna Management Sub Plan required by Recommended Condition of Approval No. 47.

5.5 Noise and Vibration

5.5.1 Background

Construction Noise

The EIS indicates activities including earthworks, rock breaking and pile driving would generate significant noise impacts and concludes that both the short and long term goals would be exceeded at residences up to 500 metres from construction activities. The extent of impact likely is not detailed. While vibration levels from rock breakers and compacters are considered unlikely to exceed the 5 mm/s structural damage limit at residences, it is noted that this limit may be exceeded at distances 20 metres from piling operations. The EIS concludes that construction noise impacts would be mitigated by the preparation of a Construction Noise and Vibration Management Sub Plan which would consider:

- selection of plant and equipment on acoustic performance;
- the erection of noise barriers prior to road construction where reasonable and feasible;
- monitoring construction noise and vibration to ensure that best practice is implemented;
- preparation of dilapidation reports on sensitive structures within 30 metres of any rock breaking, piling or ground compaction; and,
- implementation of an information program to ensure that affected residents are notified of construction time frames.

Operational Noise

The EIS indicates that existing ambient noise levels in the study area are characterised by road traffic noise. The EIS adopts the following criteria for the proposal:

- East-West Link (new freeway or arterial road corridor):
  - $L_{Aeq15\ hour}$ 55 dB(A) (7:00 am to 10:00 pm); and,
  - $L_{Aeq9\ hour}$ 50 dB(A) (10:00 pm to 7:00 am).

- North-South Link (redevelopment of existing freeway or arterial road corridor):
  - $L_{Aeq15\ hour}$ 60 dB(A) (7:00 am to 10:00 pm); and,
  - $L_{Aeq9\ hour}$ 55 dB(A) (10:00 pm to 7:00 am).

The EIS assumes that both the East-West and North-South Links would be in place and does not take into account the cumulative impacts of noise from surrounding roads such as Menai Road and Old Illawarra Road. Even with these assumptions, exceedances of up to 15 dB(A) at residences along the new road alignments and along Old Illawarra Road are predicted. Noise levels at Lucus Heights Primary and High School and Bangor Primary School as assessed in the EIS would also exceed the relevant criteria (in the case of Lucus Heights by up to 9 dB(A)).

The EIS concludes that residences currently exposed to high volumes of traffic noise would not require mitigation in cases where predicted noise increases are within 2 dB(A) of existing levels. This conflicts with the EPA's *Environmental Criteria for Road Traffic Noise* which requires that all reasonable and feasible mitigation to reduce emissions to within the design criteria be investigated before reaching this conclusion.

In relation to Menai Road, the EIS predicts that road noise levels between Old Illawarra Road and Yala Road would reduce by 2 dB(A) and by up to 5 dB(A) east of Yala Road. With regard to staging, the EIS concludes that opening the East-West Link would result in high traffic noise levels on Old Illawarra Road until completion of the North-South Link when noise control measures would be implemented.

A range of mitigation measures are considered for other affected residences including: noise reducing road surfaces; treatment of individual dwellings (including boundary walls and double glazing); and the erection of road side barriers. The EIS indicates that the erection of roadside barriers up to 6.5 metres high would still result in exceedance of EPA goals (the magnitude is not specified) and concludes that additional noise control measures such as the use of a quieter road surface and treatment of individual dwellings would be considered during detailed design. Mitigation measures would be incorporated into an Operational Noise Management Sub Plan.

5.5.2 Key Issues Raised

Construction

Concern over noise impacts during the construction was raised in 10 representations. It was noted that impacts could be reduced if the alignment of the roadway were a greater distance away from property boundaries. Residents also raised concerns in relation to vibration during construction in 25 representations, particularly in relation to the depth of the proposed cuttings.

The EPA noted that likely construction impacts would be similar to those experienced during construction of surface sections of the M5 East project. The EPA recommended that special attention be given to:

- early installation of barriers;
- regular respite periods and sensitive scheduling of noisy activities with affected schools; and,
- alternatives to plant reversing alarms in conjunction with the site risk management and strategy.

The EPA also noted that a more comprehensive noise assessment should be undertaken once detailed design and construction staging was finalised and that best practice mitigation measures be implemented. The EPA's representations on the EIS and the Representations Report are given in Appendix E.

Operation

Concerns regarding operational noise impacts were raised in 569 (73%) representations (337 of these were form letters). Residents were concerned that noise levels in the Menai area would not only increase due to the Bypass, but also from traffic increases on local roads. Particular concern was noted over impacts on residences surrounding the intersection of the East-West and North-South Links

Seventy-nine representations noted reservations regarding the efficacy of the noise mitigation measures. Forty representations indicated that the noise barriers would have significant visual impacts (25 of these were form letters). It was suggested that mitigation could be improved through greater distances between the proposed noise walls and property boundaries, design changes in wall materials, decreased wall heights and through the use of vegetation in the reservations between the walls and property boundaries.

Twenty-four representations noted concern in relation to the impact assessment undertaken and the criteria adopted in the EIS. The EPA also recommended that individual residences for which barriers and road surface treatments would not be sufficient to meet the criteria be identified and that all reasonable and feasible noise mitigation to meet road noise criteria be considered. EPA concluded that a more comprehensive and technically rigorous assessment of road noise impacts needs to be undertaken during detailed design and that a combination of barriers, quieter road surface and acoustic treatment of residential dwellings be considered during the final road design.

The Department noted concern that the noise assessment did not consider the cumulative impacts of the proposal and surrounding roads such as Menai Road and Old Illawarra Road. The Department concluded that the significant impacts predicted required more detailed management consideration at this stage.

5.5.3 Additional Investigations

The Representations Report includes an assessment of the operational road noise impacts associated with the modified proposal. The assessment adopted the criteria for a new arterial road for the East-West Link west of Akuna Avenue, the North-South Link north of the intersection with the East-West Link and on the western side of the southern arm. The road noise criteria for redevelopment of an existing freeway or arterial road are used to assess impacts on residences located east of Akuna Avenue and on the western side of the southern arm of the North-South Link.

The Representations Report notes that a number of the proposed modifications (see Section 4 of this Report) would reduce noise levels including:

- lowering the East-West Link in the vicinity of Akuna Avenue;
- moving the East-West Link to a more southerly alignment; and,
- moving the northern section of the North-South Link towards the east.

It is also proposed to use open grade asphalt (a low noise surface) on both the East-West and North-South Links. The Representations Report indicates that previously conservative (high) traffic volumes were refined to represent more realistic traffic volumes. Noise contributions from existing roads are also factored into the analysis. The Representations Report notes that noise impacts along the East-West Link are generally 2 to 3 dB(A) lower for the modified proposal when compared to the EIS proposal. Reductions of 1 to 3 dB(A) along the the North-South Link and between 4 to 6 dB(A) in the vicinity of Akuna Avenue when compared to the EIS proposal are also predicted. The Representations Report proposes the erection of noise walls between 2 and 4.5 metres high along:

- the northern side of the East-West Link from Old Illawarra Road to the east of Ebony Row (between 2.5 to 3.5 metres in height);
- the western side of the North-South Link from just south of the intersection with the East-West Link to just north of the intersection with Menai Road (between 3 and 4.5 metres in height); and,
- the eastern side of the North-South Link from just north of Barry Road to south of Australia Road (between 3 and 3.5 metres in height).

The Representations Report concludes that the combination of the proposed design modifications, revised noise attenuation measures and the use of open graded asphalt would result in significant noise reductions when compared to the EIS proposal and reduces the number of residences exposed

to noise limits which exceed the relevant criteria. An estimated 105 residences would still experience marginal to significant exceedances.

A barrier sensitivity analysis was undertaken which concludes that a barrier height of 3.5 metres would generally provide the highest benefit value and that increasing barrier heights would not be effective. The Representations Report concludes that alternative noise attenuation measures such as acoustic treatment of individual dwellings would be considered during detailed design.

If construction of the proposal was staged, the Representations Report indicates that road noise levels experienced at residences along Old Illawarra Road would increase by 2 dB(A) following completion of the East-West Link.

Eleven representations in relation to the PAR noted concern over noise impact associated with the modifications, particularly in relation to the northern arm of the North-South Link and the provision of an underpass at Anzac Road.

5.5.4 Consideration of Key Issues

Peer Review of Noise Assessment

The Department commissioned Richard Heggie Associates to peer review the noise assessment undertaken in the EIS and Representations Report. Its report is included at Appendix F. This report:

- noted that the locations selected for ambient noise monitoring were appropriate but that construction noise from surrounding works contributed to the background levels at some locations;
- concluded that additional ambient monitoring would be required during detailed design, particularly at those locations affected by construction noise;
- to minimise construction noise impacts recommended the following:
  - the use of bored piles in place of driven piles where feasible;
  - use of larger numbers of construction plant in any given areas to minimise construction duration in any one area;
  - use of high performance engine exhaust mufflers on all equipment;
  - locating worksites away from residences wherever possible;
  - education of construction personnel in relation to noise minimisation; and,
  - using lower mass vibratory rollers and rock hammers close to residences to minimise vibration.
- Noted that the proposed realignments of the East-West and North-South Links coupled with the use of open grade asphalt (and deeper cuttings in the case of the East-West Link) is beneficial in reducing noise levels prior to mitigation;
- noted that compliance with the relevant criteria is achieved at all educational facilities, based on the revised mitigation measures;
- noted that although noise objectives are met at a relatively large number of residential locations, there are approximately 105 residences where noise levels would not meet the relevant criteria;
- noted that there are approximately 16 residential locations adjacent to the East-West Link where noise levels are expected to exceed the criteria by more than 2 dB(A) even with mitigation;
- noted that there are approximately 23 residences on the western side of the North-South Link where noise levels are expected to exceed the criteria by between 1 and 5 dB(A) even with mitigation;

- concluded that the ability to meet predicted noise levels was dependent on the allowable heights and extent of noise wall treatments;
- concluded that where the proposal dominates the noise environment then raising noise walls may cost effectively reduce noise impacts;
- concluded that where residences are highly exposed (for example where dwellings are situated at a high level overlooking the road) treatment to buildings should be considered; and,
- noted that the assessment is based on a speed of 70 km/h on the East-West and North-South Links and 50 km/h on Old Illawarra Road. Each increase in speed of 10 km/h would result in additional increases of 1 dB(A).

The findings of the Richard Heggie Associates report concur with the Department's assessment which is given below.

Background Noise Monitoring

The Department notes that Working Paper 3 of the EIS indicates that the noise environment was affected by construction noise at a number of monitoring locations. While the monitoring locations are appropriate, it is noted that some additional monitoring would be required to ensure that the appropriate construction noise limits can be identified and for use in a more detailed assessment of operational noise mitigation. This requirement is reflected in Department's Recommended Condition of Approval No. 61.

Construction Noise Impacts

The EIS indicates that construction noise levels would be significant and would not meet construction noise goals. The extent of impact is not clarified. While the EPA concurs with the construction noise mitigation measures outlined in the EIS, it recommends that the following additional mitigation measures be implemented:

- adherence to the EPA's recommended standard construction hours. Deliveries of materials to site should also be within these hours;
- use of portable enclosures around mobile and fixed plant where noise impacts are likely to be unacceptable;
- use of residential class mufflers for plant and equipment;
- use of dampened tips on rock breakers;
- scheduling of respite periods for rock hammering, sheet piling and other activities which result in impulsive or tonal noise generation;
- selection of plant and equipment based on noise emission levels;
- regular inspection of fixed plant to ensure that noise emissions do not deteriorate over time;
- use of spotters, closed circuit television monitors and 'smart' reversing alarms in place of traditional reversing alarms; and,
- prohibiting public address systems.

The Proponent is required to adhere to the EPA's standard construction hours under Recommended Condition of Approval No. 63. The entry and departure of heavy vehicles is specifically limited to standard construction hours by Recommended Condition of Approval No. 69. Prohibition of public address systems is not advisable for site safety requirements, but it is recommended that these systems be used only within standard construction hours and directed away from residences. This requirement is reflected in Recommended Condition of Approval No. 67. The scheduling of respite

periods for activities which result in impulsive or tonal noise generation is required by Recommended Condition of Approval No. 68. The implementation of the other additional mitigation measures recommended by the EPA and in the Peer Review is required under Recommended Condition of Approval No. 65. The EPA has also recommended that the Proponent develop construction noise goals based on the construction period exceeding 26 weeks in duration for the day, evening and night periods. This requirement is specified in Recommended Condition of Approval No. 64.

Given the likely construction noise goal exceedances, a precautionary approach to construction noise management is appropriate. The Department notes that the assessment included in the EIS is conceptual only and would need to be finalised during detailed design. It is therefore recommended that the Proponent prepare a detailed Construction Noise and Vibration Management Sub Plan. This Sub Plan, required by Recommended Condition of Approval No. 62, would detail proposed construction activities and processes (including noise impacts from road haulage and traffic diversions), assess the associated noise impacts and detail and commit to specific noise mitigation measures, respite periods and notification and consultation protocols.

To ensure that construction noise impacts are effectively managed, the Department's Recommended Condition of Approval No. 66 would require the Proponent to monitor construction noise impacts and, where exceedances are noted, implement additional mitigation measures to the satisfaction of the Director-General in consultation with the EPA. The Department also recommends that where practicable and in consultation with Sutherland Shire Council and affected landowners, the Proponent erect operational noise mitigation measures prior to the commencement of construction. This would assist in reducing construction noise impacts and is specified in Recommended Condition of Approval No. 71.

Night-Time Works

The EIS indicates that some construction work may be undertaken outside standard construction hours with prior approval from the EPA and notification of exposed residents, provided that unreasonable disturbance or nuisance does not occur. No details of works to be undertaken outside hours are provided. The Department considers that only those works that would result in significant adverse impacts if constructed during standard hours should be carried out in the evening and/or at night. To this end, the Proponent would be required to include a justification as to why any proposed night-time works are required in the Construction Noise and Vibration Management Sub Plan. The Department also recommends that scheduling of noisy activities after midnight and over consecutive nights in the same locality should be avoided. The EPA have indicated that night-time noise should be limited to no more than 5 dB(A) over background levels. This requirement is specified in Recommended Condition of Approval No. 64.

Construction Traffic Noise

Additional information suppled by the RTA proposes the construction of internal haul roads to shift material from cuts to fill embankments along the proposal. This would result in construction noise increases along the corridor in the order of 5 to 10 d B(A) above levels predicted in the EIS. The RTA concludes that the mitigation measures outlined in the EIS would be investigated. The Department notes that the use of internal haul roads would reduce impacts on surrounding streets and concludes that the mitigation strategies discussed above would work to minimise associated impacts.

Construction Vibration

While vibration levels from rock breakers and compacters are considered unlikely to exceed the 5 mm/s structural damage limits at residences, the EIS notes that this limit may be exceeded within 20 metres of piling operations. The EIS recommends the preparation of dilapidation surveys on residences within 30 metres of rock breaking, piling and/or ground compaction activities. The Department notes that the vibration assessment included in the EIS is conceptual only and that vibration in the vicinity of major cuts has the potential to result in stability impacts. To this end, the Department's Recommended Condition of Approval No. 28 requires that dilapidation surveys be completed on all structures within 50 metres of construction activities resulting in vibration.

The Department's Recommended Condition of Approval No. 73 sets limits for construction vibration to ensure that the potential for structural damage and unacceptable human exposure is minimised. The Department also recommends that vibratory compacters are not used closer than 30 metres from residential buildings. This requirement is specified in Recommended Condition of Approval No. 75. The Proponent would be required to monitor vibration levels during construction in accordance with the Construction Noise and Vibration Management Sub Plan. The Proponent would also be required to prepare a management procedure to deal with vibration complaints. Should exceedances of the limits be noted, the Proponent would also be required to develop appropriate amelioration measures to manage future impacts.

Operational Noise

Criteria

As discussed above, the Representations Report broadly adopts the road noise criteria recommended by the EPA. In their submission to the Representations Report, the EPA have noted that, while this approach is acceptable, there is a need for clearer identification of where the new freeway/arterial and the redevelopment of an existing freeway/arterial road criteria apply in the vicinity of the junction of the East-West and North-South Links. The Proponent would be required to clearly identify the applicable criteria as part of the Operational Noise Management Planning Process under Recommended Condition of Approval No. 76. In cases where current background noise levels exceed the relevant criteria and strategic and project specific mitigation measures have been shown not to be feasible and reasonable, then a 2 dBA increase in existing noise levels would be acceptable. Recommended Condition of Approval No. 77 requires that the proposal be designed to meet the design goals discussed above.

Noise Impacts and Management

A number of the proposed modifications, in particular the realignments and the deeper cuttings along the East-West Link, would reduce noise impacts. In spite of this, a large number of residences would still experience significant exceedances of the relevant criteria and increases relative to the existing noise environment. The numbers of affected residences are given in Table 8. Since the noise reductions resulting from the use of open graded asphalt have been factored into the noise assessment undertaken in the Representations Report, Recommended Condition of Approval No. 81 requires that the road surfaces of the proposal are sealed with open graded asphalt.

Table 8 - Estimated Numbers of Dwellings Exceeding the L_{Aeq} 55 dBA Baseline Target and Ambient Noise Levels

Level of Exceedance of the 55 dBA Target with Noise Barriers	Dwellings Exposed to <3 dBA	Dwellings Exposed to >3 dBA	Total Dwellings Above 55 dBA Target with Noise Barriers
East-West Link	45	28	73
North-South Link	18	14	32
Totals	63	42	**105**

Increase in Noise Levels Relative to Background with Noise Barriers	Dwellings Exposed to >3 dBA <10 dBA	Dwellings Exposed to >10 dBA	Total Dwellings with Increase in Noise >3 dBA with Noise Barriers
East-West Link	62	11	73
North-South Link	32	0	32
Totals	94	11	**105**

Note 1: Tables presents estimated number of dwellings based on the information contained in the Representations Report

Note 2: Numbers of affected properties in each category have possibly been over-estimated as the results of ambient noise monitoring were used to represent future-existing noise levels at each location, in the absence of the reported levels.

Note 3: In many cases, the exceedance above the 55 dBA baseline target is a result of noise contributions from existing roads. In these cases, an allowance of 2 dBA over ambient levels is appropriate.

The Peer Review Report (see Appendix F) indicates that noise emission increases are expected to be clearly noticeable and, in some cases, appear to be more than twice as loud and concludes that this magnitude of impact would result from not meeting the relevant criteria. The Department is concerned with the magnitude of impacts predicted, even with the proposed noise barriers of 3 to 4.5 metres in height. In particular, residences on the northern side of the East-West Link in Peringa Place, Perina Close, Paraka Close, Periwal Close, Shackel Road and Silverleaf Row would be the most impacted by the proposal.

A barrier sensitivity analysis was undertaken for the worst affected residences (listed above) as part of the Representations Report. This analysis concludes that a barrier height of 3.5 metres would generally provide the highest benefit and that increasing barrier heights would not be effective. Notwithstanding, the Peer Review Report indicates that in cases where the proposal dominates the noise environment (for example the worst affected central section of the East-West Link) then raising the height of the noise walls may effectively reduce noise levels further. The Department notes that a barrier sensitivity analysis has not been completed for the entire project and that the analysis completed to date placed a high weighting on visual impact versus noise impact mitigation. Road noise impacts were raised in 569 representations to the EIS, while the visual impacts of proposed noise barriers were raised in only 40 representations. Accordingly, the Department recommends that a barrier sensitivity analysis be completed for the entire project as part of the Operational Noise

Management Sub Plan to more accurately determine target barrier heights. This analysis, required by Recommended Condition of Approval No. 78, would consider the inclusion of Perspex panels within noise barriers to reduce visual and overshadowing impacts and the weighting applied to visual impacts and noise mitigation would be determined in close consultation with affected residents.

The Representations Report concludes that alternative noise attenuation measures, such as acoustic treatment of individual dwellings, would be considered during detailed design where road noise criteria are exceeded. Given the magnitude of predicted exceedances, the Department considers that the Proponent should install all necessary noise mitigation measures to ensure that the predicted road traffic noise levels do not exceed the relevant criteria. Noise mitigation measures should also be designed and implemented in consultation with affected landowners. This requirement is specified in Recommended Condition of Approval No. 79. While the Department notes that the realignments, use of open graded asphalt and noise barriers proposed represent best practice noise mitigation, in cases where implementation of these measures would still result in exceedances, the upgrade of building elements to preserve the internal amenity of affected residences may be warranted.

While it is assumed that the proposed would be signposted at 70 km/hr (as per the traffic assessment) it appears that the proposal has been designed for speeds of up to 90 to 100 km/hr. This issue is addressed in Section 5.6 of this Report. To ensure that appropriate noise mitigation strategies are developed during detailed design, it is recommended that these be based on noise levels determined considering road grade variations and the actual signposted speeds. This requirement is specified in Recommended Condition of Approval No. 80.

The Department's Recommended Condition of Approval No. 82 requires the Proponent to undertake operational noise monitoring to ensure that noise affected residences are effectively ameliorated against road noise impacts. Should monitoring indicate a clear trend in traffic noise levels on the proposal and surrounding streets that are higher than the criteria identified in the Operational Noise Management Sub Plan, the Proponent would be required to implement further mitigation measures in consultation with affected landowners. These measures may include additional noise barriers and acoustic treatment of buildings.

Future Development

The proposal traverses some areas which are zoned residential and areas that may potentially be developed for residential uses at some point in the future. In particular, the Department notes that land to south of the East-West Link in the vicinity of Shackel Road and to the west of the North South Link in the vicinity of the East-West Link are zoned residential but have yet to be developed. The EIS indicates that a number of recently approved dwellings surrounding the proposal have included noise control treatments and concludes that road noise would be considered in assessing development applications. The Department is concerned that the developers of vacant land would be responsible for all future noise mitigation. To ensure that the noise mitigation measures adequately accommodate future development, the Department recommends that the Proponent install noise mitigation measures for all existing vacant land which is zoned residential or identified for residential development in a draft Environmental Planning Instrument. This requirement is specified in Recommended Condition of Approval No. 77

Staging

The EIS and Representations Report propose to construct the East-West Link and open it to traffic prior to constructing the North-South Link. The North-South Link would be constructed at a later date, dependent on traffic performance. The Representations Report indicates that road noise levels experienced at residences along Old Illawarra Road would increase by 2 dB(A) following completion of the East-West Link. The impacts of this staging scenario are discussed in detail in Section 5.2.

5.6 Design Alternatives

5.6.1 Background

The EIS considers a number of design alternatives to the proposal including:

- different alignments within the existing road reservations for both the East-West and North–South Links;
- different configurations for intersections at a number of locations including the need for grade separation; and,
- various treatment options for the 'fill' area on the North-South Link in the vicinity of Barry Road.

The EIS concludes that the alignment and design of the preferred option has been determined following the avoid, minimise and mitigate strategy in terms of impacts on residential areas and surrounding bushland.

5.6.2 Key Issues Raised

Realignment of the North-South Link was suggested in 469 (60%) representations (387 of these were form letters). In most cases, Barden Ridge residents proposed a more westerly alignment to facilitate the retention of the existing Old Illawarra Road as a local arterial route to the Menai Town Centre, as well as improving the residential amenity of Old Illawarra Road residents. Conversely, residents of Menai living on the western side of the proposed North-South Link were of the opinion that the roadway should take a more easterly alignment than proposed in the EIS to increase the distance from the roadway.

Realignment of the East-West Link was also suggested by 38 representations. These respondents were of the opinion that a more southerly alignment of the East-West Link would increase the distance between the road and residences and therefore be more acceptable.

The need for grade separation at intersections and, in particular, the intersection of the East-West and North-South Links and the intersection of the North-South Link with Menai Road was also raised in representations. The capacity of these intersections and the need for grade separation is discussed in Section 5.3 of this Report.

In their representation, Sutherland Shire Council noted that narrowing the median, and consequently the whole road formation, would reduce earthworks volumes, reduce the proposal footprint, reduce costs and provide opportunities to change both the vertical and horizontal alignments of the road to better suit constraints.

5.6.3 Additional Investigations

As discussed in Section 4 of this Report, the Proponent proposed a number of modifications to the proposal to address issues raised in representations and issues resulting from design work completed since publication of the EIS. These changes include:

- realignment of sections of the East-West Link to the south by between 10 and 20 metres, including a reduction in median width from 5.5 metres to 2.5 metres ;
- inclusion of underpasses along the East-West Link at Old Illawarra Road, Anzac Road and Shackel Road. These result in increases in required fill volumes;
- allowing Akuna Avenue to pass over the East-West Link including increasing the depth of the cut in the vicinity of this intersection; and,
- realignment of the northern portion of the North-South Link to the east by around 8 metres.

The Representations Report indicates that design speeds are generally 80 km/hr for the East-West Link and 90 km/hr for the North-South Link.

The Department received 14 representations from residents noting concerns with regard to the proximity of the modified proposal to residences on the north-western side of the North-South Link. Residents also noted concern over the 90 km/hr design speed, impacts on residential amenity and potential decreases in property values. These representations recommended further realignment to the east. A petition with 72 signatures also recommended a more easterly alignment of the North-South Link. One representation also noted concern over safety issues posed by the intersection of the North-South Link with Old and New Illawarra Roads.

In their Concurrence Report (see Appendix D), NPWS noted that they were unable to independently assess the feasibility of modifying the design to reduce its footprint, given the lack of detail presented in the EIS and Representations Report. The NPWS therefore required the Proponent to consider modifying or refining the design and the alignment of the activity to further reduce the direct and/or indirect impacts on threatened species, populations and endangered ecological communities or to improve the effectiveness of ameliorative measures under a Condition of Concurrence. NPWS noted that this could include the re-design of interchanges/intersections, bridgeworks and batters and reductions in median widths.

5.6.4 Consideration of Key Issues

Peer Review of Road Design

The Department had concerns that the modified proposal (which would require the construction of significant fill embankments) is designed for speeds greater than the 70 km/hr. The Department therefore commissioned Arup to review the appropriateness of the road and interchange design in the context of determining the most appropriate balance between traffic performance and environmental impact. The Road Design Review Report prepared by Arup is included in Appendix G. This report compares the EIS proposal to the modified proposal, however, the additional modifications (detailed in Section 4.3 of this Report) are not assessed. The Department notes that these additional changes would not alter the bulk and scale of the proposal.

The key recommendations of the Arup Report are as follows:

- review the vertical geometry of the East-West Link, in particular, the potential advantages of reducing the vertical design speed from 90 – 105 km/h to about 80 km/h so that the road grade line more closely follows the existing levels. Advantages may include a reduction in overall earthworks, lower cost, and reduced environmental impact due to a reduced footprint, but would be subject to checks of the effects on noise exposure;
- consider the use of alternative treatments to the proposed 2H:1V fill batters, e.g. retaining walls or engineered fills, which would reduce the loss of vegetation and may be appropriate in environmentally sensitive areas. This applies to the west side of the North-South Link between Ch 800 and Ch 1050 where a retaining wall in the EIS appears to have been deleted. It also applies to sections of the East-West Link where the fill batters now extend considerably further into vegetation on the south side;
- consider rearranging the junction between the East-West Link and the North-South Link so that Old Illawarra Road passes above rather than under the East-West Link. This may allow a reduction in overall fill requirements, a reduction in footprint on the North-South Link in particular, and may also reduce noise exposure;
- consider shifting the North-South Link further to the east in the vicinity of Ch 400 and Ch 850 to reduce the noise and visual impacts on residences immediately to the west;
- the modified layout of the junction between the North-South Link and the Old and New Illawarra Roads should be reviewed for safety and capacity;
- with the reduced median width along most of the East-West Link, consideration should be given to the inclusion of a median barrier for traffic safety; and,
- review the staging of construction to ensure that capacity restrictions on the existing Old Illawarra Road will not result in significant limitations on usage of completed sections.

The findings of this Report generally concur with the Department's assessment which is given below.

Issues in relation to staging are discussed in Section 5.2 of this Report. Traffic congestion along the southern arm of the North-South Link is discussed in 5.3.

Loss of Vegetation and Residential Amenity

The Representations Report notes that 11 hectares of vegetation would be cleared for the construction of the East-West Link and 8.04 hectares for the construction of the North-South Link. The Representations Report concludes that modified proposal would allow for the preservation of 2.4 hectares of vegetation that would have been cleared under the EIS proposal (2.3 for the East-West Link and 0.1 for the North-South Link), thereby reducing the proposal's footprint. Notwithstanding, the Department notes that the Arup Report indicates that fill batters, particularly on the southern side of the East-West Link and on the north-western side of the North-South Link, extend beyond the EIS proposal footprint. To ensure that actual impacts on vegetation meet the commitments made in the Representations Report, the Department has recommended that all works including sedimentation basins and access tracks be confined within the footprint assessed in the EIS and no more than 11 hectares of vegetation be cleared for construction of the East-West Link and 8.04 for the construction of the North-South Link. This requirement is reflected in Recommended Condition of Approval No. 48.

To meet vegetation clearance limits the Department notes that the Proponent may need to investigate design alternatives to reduce the proposal's footprint. To this end, and to ensure that impacts on surrounding residences are minimised, the Department recommends that the Proponent investigate the following design and alignment alternatives in consultation with Sutherland Shire Council and the NPWS:

- reducing the vertical design speed of the East-West Link to 80 km/hr so that the road surface more closely follow existing ground levels;
- use of alternative treatments to the proposed fill batters on the East-West and North-South Links, such as retaining walls or engineered fills, particularly in environmentally sensitive locations;
- shifting the North-South Link further to the east between chainage 400 and 850 and/or reducing the median width; and,
- alternative designs for the proposed junction of the North-South Link with New and Old Illawarra Roads to improve safety and capacity characteristics.

In assessing these alternatives, the Proponent would be required to consider the recommendations of the Arup Report and issues in relation to safety, noise impacts, visual impacts, access and impacts on flora and fauna. These requirements are specified in Recommended Condition of Approval No. 26.

Intersection of North-South Link/East-West Link/ Old Illawarra Road

Under the EIS proposal, Old Illawarra Road was to be closed at its intersection with the East-West Link. The Department notes that the need for Old Illawarra Road to remain open and noise and amenity impacts at the intersection of the North-South Link/East-West Link/Old Illawarra Road were raised in 123 representations to the EIS. In response to local access concerns, the RTA modified the proposal to include an underpass at Old Illawarra Road (see Figure 4a). For more detail see Section 4 of this Report.

The ARUP Design Review Report noted that construction of the proposed Old Illawarra Road underpass would require that the intersection of the East-West and North-South Links be constructed on 4 metre high fill embankments. It also concluded that an overpass would reduce the proposal footprint and noise impacts at this location. In keeping with the findings of the design review, and following discussions with the RTA, the Department requested that the overpass option be further investigated.
The RTA noted that providing a link from the East-West Link to Old Illawarra Road would be problematic with an overpass option, given the limited sight distances. The RTA also indicated that noise impacts would require further mitigation and that an overpass option would be higher and therefore more visually prominent to surrounding residents, particularly those at the south eastern corner of the intersection. The RTA noted the concerns in relation to the size of the footprint of this intersection and undertook to construct retaining walls and stepped batters in place of the proposed batters. This commitment is reflected in Recommended Condition of Approval No.25.

Safety Audit

The Department notes that the ARUP Report recommends that safety audits be conducted on the following proposal elements:

- the layout of the junction between the North-South Link and New and Old Illawarra Roads;
- the layout of the North-South Link/East-West Link/Old Illawarra Road interchange; and,
- the reduced median widths along the East-West Link.

The Department's Recommended Condition of Approval No. 27 requires the Proponent undertake a safety audit of these proposal elements to ensure compliance with RTA's *Road Design Guide* and

Austroad's *Guide to Traffic Engineering Practice.* The investigation of alterative designs and alignments discussed above would need to consider the findings of the safety audit.

5.7 Pedestrian and Cyclist Access

5.7.1 Background

The EIS indicates that off-road cyclist facilities would be provided on both the East-West and North-South Links. On road facilities would also be provided via a two metre shoulder. Off-road pedestrian access would be provided on residential roads surrounding Menai Road with the aim of connecting residential areas across the East-West Link. Pedestrian access would not be available along the proposal. The EIS concludes that the details of pedestrian and cyclist facilities to be provided as part of the proposal would be finalised during detailed design in consultation with Sutherland Shire Council and the local community.

The EIS also notes that pedestrian crossing points would be provided at the following locations:

- intersection of Akuna Avenue/East-West Link;
- Australia/Carter Road overbridge;
- intersection of New Illawarra Road/North-South Link;
- intersection of Menai/Alford Point Road/North-South Link; and,
- intersection of the North-South/East-West Links

5.7.2 Key Issues Raised

Five hundred and twelve representations (66% of representations received) raised concerns with regard to pedestrian safety, particularly in relation to the numerous schools in the area. Concerns focused on perceived increases in local traffic resulting from the proposal and community severance caused by the East-West Link.

In its representation, Sutherland Shire Council recommended that the proposal incorporate the following pedestrian and cyclist links :

- from Hall Drive to Menai Town Centre via Barry Road;
- a connection from residential areas to the south of the East-West Link to the Menai Town Centre in the vicinity of Anzac Road; and,
- a connection from residential areas to the south of the East-West Link to schools and other facilities in the vicinity of Shackel Road.

5.7.3 Additional Investigations

The Representations Report indicates that the following modifications would result in improved accessibility for pedestrians and cyclists, relative to the EIS proposal:

- the bridge at Akuna Avenue;
- the underpasses at Anzac and Shackel Roads;
- the land bridge connecting Australia and Carter Roads; and,
- the separation of Old Illawarra Road from the North-South Link.

5.7.4 Consideration of Key Issues

The Department notes that neither the EIS nor the Representations Report commit to the construction of specific pedestrian and cyclist links. Given the severance impacts discussed in Sections 5.1 and 6.2 of this Report, the Department considers that the construction of pedestrian and cyclist links would alleviate some of the access issues posed by the proposal. The Department also notes that improving conditions for pedestrians and cyclists is a one of the primary objectives of the proposal. To this end, the Department recommends that the Proponent construct a pedestrian crossing at the intersection of the Gandangara LALC subdivision with the North South Link. This requirement is specified in Recommended Conditions of Approval No. 38.

The investigation into the potential for incorporating the following links into the proposal is also recommended:

- a link between the western end of Dilkara Circuit and Priest Road;
- a link between Elliot Road and Old Illawarra Road via Barry Road;
- an east-west link from Barry Road to Carter Road;
- a link between Shackel Road (south) and Menai Road;
- a link down the length of Anzac Road;
- a link between Lucas Heights School, New Illawarra Road to Old Illawarra Road, ending just north of Bradman Road; and,
- other links identified during consultation with SSC.

Recommended Condition of Approval No. 39 requires the Proponent to prepare a Pedestrian and Cyclist Network Investigation and Implementation Strategy on the above-mentioned links in consultation with Sutherland Shire Council and the local community.

Pedestrian and cyclist opportunities on Menai Road are discussed in Section 5.9 of this Report. The Pedestrian and Cyclist Network Investigation and Implementation Strategy would need to be fully integrated with Urban Design Strategy and Implementation Plan for Menai Road to ensure that accessibly is maximised.

5.8 Visual Impacts, Urban Design and Landscaping

5.8.1 Background

The EIS notes that the study area consists largely of undulating sandstone plateau adjoining the northern escarpment edge of the Woronora River. The areas surrounding the East-West Link are characterised by low density residential development centred on cul-de-sacs and pockets of woodland. The areas surrounding the North-South Link are characterised by Old Illawarra Road, which runs parallel to and to the east of the proposed Link, and parcels of low density residential and industrial development interspersed with pockets of vegetation.

The EIS indicates that the proposal would be highly visible from Woronora Heights and that residents of: Old Illawarra Road; Hall Drive; Elliot Road; Kilborn Place; Pyree Street; Dandarbong Avenue; Silverleaf Row and Derrilin Close, whose homes back onto or front onto the proposal would also be able to view the proposal. The EIS concludes that the proposal would have a moderate visual impact due to the substantially natural state of the corridors being developed and the significant loss in vegetation cover.

The EIS indicates that an Urban Design and Landscaping Plan would be developed in accordance with the following principles:

- minimise the impact of the road both physically and visually and ensure as far as possible that the proposal matches the existing landform;
- minimise the extent of the proposal foot print;
- retain, where possible, exposed rock surfaces on batters;
- provide diverse substrate for landscaping;
- ensure that the proposal is sympathetic and complementary to its adjoining surroundings;
- minimise ongoing maintenance by selecting materials that are adapted to the environmental constraints and robust to minimise weed invasion; and,
- use endemic seed stock collected prior to construction.

The EIS notes that structures such as bridges and retaining walls would be simple, unobtrusive elements designed so that they are in keeping with the existing urban landscape fabric. Lighting would be restricted to intersections. The EIS also notes that the visual impact of noise barriers could be reduced by setting them back from residential boundaries. A set of plans was included in the EIS which indicates screen planting to enhance surrounding woodland.

5.8.2 Key Issues Raised

Forty representations indicated that the noise barriers would have significant visual impacts (25 of these were form letters). These respondents were worried that the proximity, height and materials used in the noise barriers would provide poor aesthetic amenity for adjacent residences.

Other concerns in relation to the general visual amenity of the Menai area were raised in 18 representations. Residents noted concern in relation to the bulk and scale of fill embankments and their aesthetic implications. Representations also recommended the use of screen planting in the reserve between the roadway and the rear of properties to soften the visual impact of the development and improve the residential amenity of adjacent properties.

The Department noted concern that no visual perspectives were provided in the EIS, making it difficult for surrounding residents to visualise the magnitude of impact likely.

Issues with regard to the proposed improvements to Menai Road are discussed in Section 5.9 of this Report.

5.8.3 Additional Investigations

The Representations Report indicates that the following modifications (see Section 4 of this Report) would reduce the visual impacts associated with the Proposal:

- a reduction in noise wall heights;
- realignment of the northern arm of the North-South Link and the East-West Link away from residences; and,
- the deepening of the cuttings associated with the Akuna Avenue bridge.

The Representations Report concludes that the modified proposal would allow for greater landscaping opportunities.

Forty Nine representations on the Preferred Activity Report noted concern over the visual impacts associated with the modified proposal. Particular concern was raised over the impacts associated with the inclusion of an underpass at Anzac Road and the resultant increase in bulk and scale of fill embankments at this location.

5.8.4 Consideration of Key Issues

The Department commissioned Conceptual Animations to prepare cross sections of the EIS proposal and visual perspectives of the modified proposal. A full set of these cross sections and visual perspectives is included at Appendix H. A selection of these perspectives are given in Figures 6 a- b and 7a-c respectively. A still from a flyover of the East-West Link indicating changes to the topography in this section is also given in Figure 8.

The Department notes that the recommended changes to the bulk and scale of the proposal discussed in Section 5.6 of this Report are in keeping with the first two principles of the urban design concept outlined in the EIS. However, even with these changes the proposal would result in significant visual impacts on surrounding residences. As a result, the Department recommends that the Proponent prepare a detailed Urban Design and Landscape Plan in consultation with NPWS, DLWC, Sutherland Shire Council and the affected community. This Plan, required by Recommended Condition of Approval No. 56 would include:

- location and identification of existing and proposed vegetation;
- built elements including retaining walls, bridges and noise walls;
- underpasses considering lines of sight and the incorporation of median sky lighting and public art;
- motorway and road furniture including safety barriers, kerbs, paving, signage, medians, emergency phones and breakdown facilities;
- pedestrian and cycle elements including footpaths and paving, pedestrian crossings and fixtures (i.e. tree guards, seating, lighting, fencing and signage);
- landscape elements including proposed treatments, finishes and materials of exposed surfaces (including colour specifications and samples);
- progressive landscaping strategies;
- weed management;
- decommissioning of construction stage structures that are not part of the operational project;
- lighting; and,
- timing and staging of works, methodology, monitoring and maintenance.

The Proponent would be required to monitor and maintain all landscaping works for at least three years. This requirement is specified in Recommended Condition of Approval No. 57. The Proponent would also be required to ensure that no commercial advertising is erected in the road reserve and that all lighting is designed, installed and operated to control obtrusive effects. These requirements are specified in Recommended Conditions of Approval Nos. 58 and 59.

The Department notes that the lowering of noise wall heights may pose significant noise impacts and that the barrier sensitivity analysis included in the Representations Report weighted visual impacts over noise mitigation. This weighting was not reflected in representations to the EIS in which 40 representations noted concern over the visual impacts of noise walls compared to 569 representations which noted concern over road traffic noise impacts. The Department has therefore recommended that the barrier sensitivity analysis be completed for the entire project and use weightings determined in consultation with affected residents. This requirement is reflected in

Recommended Condition of Approval No. 78. In relation to the stepping back of noise walls from residences, the Department notes that the effectiveness noise mitigation may be lowered. The exact location of noise walls would be determined during detailed design in consultation with affected residents. It is recommended that the Proponent consider the inclusion of Perspex panels within noise barriers to reduce visual and overshadowing impacts. This issue is discussed further in Section 5.5 of this Report.

5.9 Improvements to Menai Road

5.9.1 Background

As discussed in Section 2 of this Report, improvements to Menai Road are part of the proposal and are considered by the Department as fundamental to achieving project objectives. The EIS includes a clear commitment by the RTA to enhance the condition and amenity of Menai Road prior to handover to Council. These improvement works include:

- improved signage and 'Gateway to Menai' treatments with a focus on highlighting the role of the Menai Town Centre Precinct;
- landscaping;
- improved pedestrian access along and across Menai Road;
- provision of transit and/or bus lanes and bus priority measures at selected intersections; and,
- improved provision for cyclists.

The EIS concludes that the details of the improvements would be based on an Urban Design Strategy for Menai Road to be developed in consultation with Sutherland Shire Council and the local community. The Representations Report also includes this list, however, no further details are provided.

5.9.2 Consideration of Key Issues

In order to provide more certainty in relation to the urban design outcomes of the proposed improvements to Menai Road, the Department commissioned Randles Hill Straatveit Architects Pty Ltd (RHSA) to prepare an urban design concept for Menai Road. A copy of the RHSA report is given in Appendix I. It is recommended that the RTA use the RHSA report as a guide in finalising the urban design strategy.

The RHSA Report outlines the following issues in relation to the existing environment surrounding Menai Road:

- virtually no active street frontage;
- dilapidated state of existing pedestrian bridges;
- large strips of vacant land;
- accessibility of Bangor Shopping Centre;
- schools stepped back from the street and hidden behind trees;
- dense bushland pockets and views; and,
- the lack of street presence associated with the Menai Town Centre.

The RHAS Report indicates that the Menai Road Corridor could be revitalised by a shared pedestrian and cyclist pathway and associated landscaping running down the northern side of Menai Road from Allison Road, across the bridge at Menai Park, and continuing down the southern side of Menai Road

to the Bridge at Akuna Avenue Oval. It is proposed that this pathway incorporate the following elements:

- new path incorporating new surface treatments, edges, retention as required;
- new approaches with generous, safe access for pedestrians and cyclists alike;
- new landscaping including trees and local species to improve comfort, security and access;
- an investigation of urban design measures to increase security and surveillance;
- new selected lamps and seats and other required urban design furnishings; and,
- integration of new path with all new crossings, retaining walls and embankments.

The following urban design concepts for five precincts along the Menai Road have also been put forward:

1. Bridge at Menai Park:

    - new or significantly upgraded bridge with new lighting, materials, etc.;
    - new approaches from both sides with easier, safer access for pedestrians and cyclists;
    - new bus stops with better shelter provision, integrated into the bridge access on each side;
    - an investigation of urban design measures to increase security and surveillance;
    - new shared bicycle/ pedestrian tracks as shown on plan;
    - a review of pedestrian ways to increase surveillance and potential use;
    - new landscaped project for the vacant lot on southern side of Menai Road; and,
    - new median strip planting.

2. Allison Crescent Roundabout:

    - new crossings, potentially to the east and north of the roundabout, subject to detailed traffic and pedestrian analysis;
    - new selected median strip planting, as shown on plan;
    - new landscape projects, with lighting, seats, trees, etc. subject to further analysis;
    - study of commercial or other uses potential; and,
    - integration with new shared bicycle/ pedestrian tracks as shown on plan.

3. Upgraded Crossing at Anzac Road:

    - upgraded crossing to be significant in its wider landscape context;
    - landscape/ shelter/ bus stop project to include lights, trees, etc.;
    - optimize use of street corner, supplement space with new wall project;
    - new street trees no both sides of the road to give protection to exposed footpaths;
    - assess retention along private edge on north side of road;
    - new landscape project on northern side, inc. regarding, surface, trees, seats, lights, etc.; and,
    - median strip planting.

4. New Crossing at Bangor Primary School:

    - replace or upgrade existing bridge, which is inaccessible and in poor repair;
    - alternatively replace with level crossing, incorporating traffic slowing measures;

- encourage an upgrade of shopping centre, study street alignment and active shopfront;
- new bus shelters, upgraded/ increased in scale, giving better protection;
- new shared bicycle/ pedestrian path, inc. retention, landscape, seats, lamps, etc.;
- new trees and access to existing car park; and,
- relocate crossing location to benefit commercial corner.

5. New Bridge at Akuna Avenue Oval:

- new landmark bridge, incorporating generous ramps for bicycle and pedestrian access;
- upgrade of park facilities and landscape, inc. trees, seats, lights etc.;
- new bus shelters, upgraded/ increased in scale, giving better protection; and,
- integration with new shared bicycle/ pedestrian path, inc. landscape, seats, lamps, etc.

Plans and cross sections of the urban design concept are included in the RHSA Report at Appendix I.

The Department generally supports the recommendations made in the RHSA urban design concept for Menai Road. To this end, Recommended Condition of Approval No. 60 requires the Proponent to prepare a detailed Urban Design Strategy and Implementation Plan for Menai Road in consultation with Sutherland Shire Council and the local community. The urban design improvements outlined in the RHSA Report shall be used as a guide by the Department in assessing the Strategy. To ensure that the recommended pedestrian/cyleways effectively connect to existing paths and those proposed to be constructed as part of the proposal, it is also recommended that this Plan be fully integrated with the Pedestrian and Cyclist Network Opportunities Investigation required by Recommended Condition of Approval No. 39 and discussed in Section 5.7 of this Report. The findings of the public transport investigation, required by Recommended Condition of Approval No. 35, would also be incorporated into this Strategy.

6. CONSIDERATION OF OTHER ISSUES

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

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

6.1 Communication and Consultation Strategies

6.1.1 Background

The EIS used data collected at a number of community forums held for Menai Engadine Traffic Study to determine key community concerns. The EIS indicates that, should approval be granted by the Minister, the Proponent would keep the community and stakeholders informed by implementing a Community Involvement Plan. This Plan would include:

- a community notification strategy for commencement and duration of construction activities;
- responsibilities for community involvement;
- complaints monitoring and management; and,
- dispute resolution procedures.

There are also a number of undertakings for further community consultation and/or notification in relation to specific impacts identified in the EIS including:

- the development of landscaping strategies;
- construction timetabling and likely noise impacts;
- pedestrian and cyclist facilities;
- traffic disruptions; and,
- dilapidation surveys

6.1.2 Key Issues Raised

Concerns were cited in 61 representations regarding community consultation (25 of these were form letters). Respondents suggested that the consultation undertaken was inadequate, and that residents' opinions were effectively ignored.

6.1.3 Additional Investigations

The Representations Report notes that an Information Centre was established for six weeks during the EIS exhibition period and that officers of the RTA attended a community meeting held during this period. The Representations Report also indicates that the community would be consulted in relation to:

- construction staging during construction of the East-West Link; and,
- operational noise mitigation options and measures.

6.1.4 Consideration of Key Issues

Communication and Consultation

The Department commends the RTA's commitment to preparing a Community Involvement Plan. In order to ensure that community notification and consultation is effective, the Department also recommends that the Proponent:

- advertise the nature of proposed works at three monthly intervals, including the area(s) where works would occur, hours of operation and a contact telephone number;
- establish an internet site to provide monthly updates on work process, consultation activities and planned work schedule;
- establish two Community Liaison Groups (one each for the North-South and East-West Links) to discuss project issues and methods for minimising impacts on the local community during the construction stage;
- nominate person(s) to be appointed by the Director-General to serve as the Independent Community Liaison Representative (ICLR). The role of the ICLR would be to monitor and confirm that the Proponent meets all communication and consultation obligations; and,
- establish a display centre where the community can view up to date photographs and plans outlining the noise and retaining wall locations, landscape concept and temporary works, access the website and discuss issues with the ICLR.

These requirements are reflected in Recommended Conditions of Approval Nos. 9 and 10 and 13 to 16. The Proponent would be required to set out community consultation and communication procedures and protocols for the proposal including the requirements outlined above in the Community Involvement Plan. This requirement is specified in Recommended Condition of Approval No. 11.

The Department considers that the establishment of Community Liaison Groups would not only help to provide information on construction activities, but create a forum through which the community can make pro-active recommendations on how the proposal could be better managed to alleviate community concerns. The appointment of an ICLR 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.

Complaints Procedures

The Department recommends that the Proponent establish and advertise a toll-free complaints telephone number, which would enable any member of the public to reach a person who can arrange an appropriate response. An initial response to complaints would be required within 2 hours of any night-time works and 24 hours during standard and non-construction periods. If necessary, a detailed response would be provided within 10 days. The Proponent would also be required to establish a mediation system including provision for independent dispute resolution to ensure that all complaints are satisfactorily resolved. These requirements are specified in Recommended Condition of Approval No. 8. This process would provide for the timely resolution of complaints and is strengthened by provisions for independent dispute resolution.

6.2 Community Severance

6.2.1 Background

The EIS indicates that the communities of Menai and Bangor are severed by Menai Road resulting in adverse impacts on local amenity, community function and accessibility. The EIS states that there is a current and growing need to enhance connectivity and urban amenity, particularly to the north and south of Menai Road by improving local access for vehicular, pedestrian and cyclist traffic. The enhanced connectivity of residential areas to the north and south of Menai Road is presented in the EIS as a strategic justification for the proposal. While funds for improvements to Menai Road have been incorporated in the proposal, details of the improvements are not given. This issue is discussed further in Section 5.9 of this Report.

The EIS does not discuss the severance impacts posed by the North-South and East-West Links and simply states that the proposal would be constructed in corridors reserved for this purpose.

6.2.2 Key Issues Raised

Community severance was the most frequently raised issue in representations. Residents to the south of the East-West Link raised particular concern over loss of access to adjacent suburbs and, in particular, the Menai Town Centre and schools. They requested that existing access be maintained and, if possible enhanced by the proposal. Particular concern was raised over the closure of Old Illawarra Road, Shackel Road and Anzac Road. Residents to the north of the East-West Link, particularly from Carter Road noted concern over the potential increased traffic on local streets.

6.2.3 Additional Investigations

The proposal presented in the EIS severed Shackel Road and Anzac Road and provided left in – left out access to the southern side of the East-West link and signalised the intersection of Akuna Avenue with the East-West Link. Given the concerns raised by residents using these roads to access schools and the Menai Town Centre, the Representations Report modified the proposal to include underpasses at Shackel Road and Anzac Road as well as the proposed left in –left out accesses to the bypass and a bridge at Akuna Avenue with ramps to the east. As discussed in Sections 4 and 5.3 of this Report, this would allow existing local access to be maintained.

The Representations Report modified the proposed bus-only overbridge connecting Australia and Carter Roads to a land bridge in response to access concerns raised in representations. The relocation of the southern arms of the North-South Link to the west of Old Illawarra Road and the provision of an underpass at the intersection of this road with ramps to the East-West Link also ensures that existing access is enhanced.

6.2.4 Consideration of Key Issues

While the Department notes that the proposal would reduce traffic volumes on Menai Road and therefore enhance community connectivity and amenity in this area, it also introduces new impacts on the residences severed by the East-West and North-South Links. Whilst new underpasses and overpasses would maximise local vehicular access opportunities, further mitigation and offsets are required to ensure that noise, air quality and visual impacts are effectively managed. The Proponent would also need to carefully manage connectivity and amenity improvements along the Menai Road corridor to ensure that these benefits are captured to the greatest extent possible.

Improvements to Menai Road are discussed in Section 5.9 of this Report. The Department has also recommended that traffic using Menai Road be monitored and if necessary management measures implemented to ensure that the proportion of through traffic using this route is minimised. This issue is discussed further in Section 5.3.

Noise and visual impact management measures are discussed in Sections 5.5 and 5.8. A number of new pedestrian and cyclist links are also recommended. These are discussed in Section 6.5. The Department also notes that existing local access and congestion could be affected during construction. Management measures to ensure that construction stage traffic impacts are minimised to the greatest extent possible are discussed in Section 6.3.

The Department considers that the community severance impacts associated with the proposal could be managed to acceptable levels subject to the management measures detailed above.

6.3 Construction Stage Traffic and Access

6.3.1 Background

The EIS indicates that the proposal would generate traffic during construction from the following sources:

- transport of equipment and plant to and from the construction site;
- transport of materials, including additional fill to the construction site;
- construction personnel vehicles; and,
- transport of waste/excess material from the site.

The EIS concludes that the type and number of required construction vehicles would be identified in a Construction Traffic Management Sub Plan prepared in accordance with the following principles:

- construction traffic to be confined, as far as practical, to the arterial road network;
- access between the arterial road network and the construction site to be limited to the following roads:
  - Akuna Avenue;
  - Barden Road;
  - Anazc Road; and,
  - Shackel Road.
- encourage construction personnel to use public transport, car pooling or mini buses to access the site;
- construction traffic movements to be scheduled as far as practical outside peak traffic times, particularly oversized vehicles; and,
- road dilapidation surveys are to be prepared for local roads used by construction traffic so that any construction related damage can be repaired by the Proponent.

The EIS notes that construction would be staged to minimise impacts on the surrounding road network. It also notes that in cases were work is required to 'tie in' the proposal with the existing road network construction outside standard hours may be required to minimise traffic disruption.

6.3.2 Issues Raised

Nine representations noted concern with the likely construction traffic impacts, particularly with regard to traffic congestion and property access.

Given the magnitude of earthworks and limitations of the existing road network, the Department requested more information in relation to the likely construction traffic impacts, focusing on key access points, congestion issues and need for temporary traffic controls.

6.3.3 Additional Investigations

Additional information in relation to construction traffic impacts was provided in the Representations Report and in correspondence from the RTA.

The Proponent indicates that spoil volumes increased for the modified proposal. Total cut and fill volumes are:

- East-West Link:
  - cut to fill – 200 000 m^3; and,
  - cut to stockpile – 20 000m^3 (to be used on the North-South Link);
- North-South Link:
  - cut to fill – 40 000 m^3;
  - import from East-West Link - 20 000 m^3; and,
  - import – 40 000 m^3.

It is proposed to construct internal haul roads to transport material from cut to fill. Trucks on internal haul roads would be limited to speeds of 25 km/hr. Access to and from the internal haul roads would be via arterial roads where possible. The transportation of spoil on public roads would be limited to the hours between 9:30 am and 3 pm, Monday to Friday. The Proponent notes that Old Illawarra Road would remain open to traffic for the duration of construction and that the installation of temporary traffic signals may be required at some intersections.

It is concluded that the dust, erosion and sedimentation controls and noise mitigation strategies outlined in the EIS and Representations Report would ensure that the impacts associated with construction traffic are effectively ameliorated. With regard to impacts on the existing road network, the Proponent notes that truck movements onto and off the site during construction of the East-West Link would total 45 220, with maximum daily truck movements of 680 or 2% of Annual Average Daily Traffic.

6.3.4 Consideration of Issues

Property Access

The Department notes that a number of representations raised concern in relation to property access during construction. Recommended Condition of Approval No. 43 requires that access to all properties be maintained throughout construction and once the proposal is open to traffic. Under this Condition, the Proponent would also be required to reinstate any legal access way affected during construction.

The Department notes that a number of roads are crossed by the East-West Link. To ensure that existing local access routes are maintained to the greatest extent possible, it is recommended that the proposed overpasses and underpasses be constructed as soon as practicable after the commencement of construction. This requirement is specified in Recommended Condition of Approval No. 46.

Dilapidation Report and Road Maintenance

The Department's Recommended Condition of Approval No. 40 requires the Proponent to prepare road dilapidation reports on all non-arterial roads likely to be used by construction traffic prior to the commencement of substantial construction and once construction is complete. The Proponent would be required to cover the costs of repairing any damage to local roads resulting from construction of the proposal, with the exception of that resulting from normal wear and tear.

Traffic Management

The Department notes that significant volumes of spoil and plant and equipment would be transported to, from and around the site during construction. Noise impacts, erosion and sedimentation, and dust generation associated with the construction and use of internal haul roads would require careful management. Measures to minimise these impacts are discussed in Sections 5.5, 6.5and 6.8 of this Report respectively. To ensure that the impacts associated with internal haul roads are minimised, the Department recommends that vehicles using these roads be limited to speeds of no more than 25 km/hr and that, where feasible, spoil excavated from cuts is used to construct adjacent fill embankments. These requirements are specified in Recommended Conditions of Approval Nos. 86 and 105.

The Department commends the Proponent's commitments to limiting the haulage of spoil to and from the site to between am and pm peaks and encouraging construction staff to utilise public transport and/or car pooling. These commitments are reflected in Recommended Condition of Approval Nos. 45 and 107. The Department recommends that the Proponent consult with Sutherland Shire Council to develop management techniques for construction traffic on local roads, develop measures to minimise the use of local roads by construction traffic and monitor the use of local roads by construction heavy vehicles. This requirement is reflected in Recommended Condition of Approval No. 41.

6.3.5 Conclusion

While the impacts on surrounding streets would be minimised by the use of internal haul roads, dust generation, noise emissions and the potential for erosion and sedimentation impacts have the potential to increase considerably. Notwithstanding, it is noted that the reductions in proposal footprint, bulk and scale recommended in Section 5.6 would reduce the volume of cut and fill required and therefore reduce associated haulage impacts. The Proponent has recommended a number of mitigation measures to reduce these impacts and impacts on surrounding streets. Additional measures, as discussed above, have also been recommended by the Department. The Department concludes that the preparation of a detailed Construction Traffic Management Sub Plan would ensure that these mitigation measures are effectively implemented. This Sub Plan, required by Recommended Condition of Approval No. 42, would be fully integrated with the Spoil and fill Management Sub Plan discussed in the next Section.

6.4 Spoil and Fill Management

6.4.1 Background

Based on the results of geotechnical investigations undertaken for the concept design, the EIS indicates that a total of 150 000m^3 would be excavated from the East-West Link and 100, 000 m^3 from the North South Link. The total fill required would be 180 000 m^3 for the East-West Link and 53 000m^3 for the North-South Link. The EIS notes that stockpile sites would be required and details a number of locational criteria to be used in selecting sites.

6.4.2 Issues Raised

The EPA recommended that spoil excavated from the site be used as fill where feasible and noted that the landfilling of surplus fill should be a last resort. The Department requested additional information in relation to the impacts and management of stockpile sites.

6.4.3 Additional Investigations

As discussed in Section 6.3 of this Report, the Proponent indicates that spoil volumes had increased for the modified proposal as follows:

- East-West Link:
  - cut to fill – 200 000 m^3; and,
  - cut to stockpile – 20 000m^3 (to be used on North-South Link);
- North-South Link:
  - cut to fill – 40 000 m^3;
  - import from East-West Link - 20 000 m^3; and,
  - import – 40 000 m^3.

These figures assume that only a small quantity of excavated material would be unsuitable for use as fill. About 20 000m^3 of material to be excavated from the East-West Link would need to be stockpiled for use in the construction of the North-South Link. The Proponent notes that long-term stockpiles (of up to 6 metres in height) would be seeded and surrounded on the downstream side by erosion and sedimentation controls. The Proponent indicates that a suitable stockpile site could be established on cleared land owned by the RTA to the north of the East-West Link and to the west of Old Illawarra Road, but does not commit to using this site.

6.4.4 Consideration of Issues

The Department accepts that locations for spoil stockpiling and the sources of imported fill material cannot be specified at this stage. Given the volume of material to be handled, the Department recommends that the Proponent prepare a Spoil and Fill Management Sub Plan to detail spoil management procedures including a contingency plan to be implemented in the case of the discovery of contaminated material. This Sub Plan, required by Recommended Condition of Approval No. 105, would also be fully integrated with the Construction Traffic Management Sub Plan discussed in Section 6.3 of this Report.

In keeping with recommendations of the EPA, Recommended Condition of Approval No. 106 requires all clean and treated spoil be reused or recycled where possible and cost-effective, in preference to importation. With regard to stockpiling sites, the Department notes that stockpiles, particularly those

established for extended periods of time, would need to be carefully located and managed to ensure associated dust, sedimentation and noise impacts were minimised. To this end, the Department recommends that stockpiling sites only be located in at sites that meet the following criteria:

- sites to be within the road reserve wherever possible;
- sites to access the local road network as determined in the Construction Traffic Management Sub Plan required by Condition 42;
- on relatively level land;
- sites to be separated from nearest residences by at least 100m unless it can be demonstrated that residents will not experience adverse impacts on noise, visual and air quality impacts;
- sites above the 100 ARI flood level unless otherwise agreed to by DLWC; and,
- sites are to have a low conservation significance for flora and fauna and heritage and are not to require any clearing of native vegetation beyond that which must be cleared for the project in any case.

These requirements are specified in Recommended Condition of Approval No. 113 and discussed in Section 6.13 of this Report.

6.5 Water Quality, Erosion and Sedimentation

6.5.1 Background

The proposal is located within the Georges River catchment and traverses a number of drainage lines which discharge into the Woronora River. The EIS notes the potential for water quality impacts to occur during construction as a result of sediment laden runoff entering waterways. A number of soils in the study area are subject to erosion.

The EIS describes erosion and sedimentation control measures to be implemented during construction to minimise impacts on water quality, including:

- limiting access to well defined haul roads;
- protection of vegetation not required to be cleared;
- storage of topsoil in protected stockpiles with temporary vegetation covering as required;
- land shaping to minimise slope lengths and gradients;
- temporary sediment trapping structures;
- diversion of clean water via cross drainage;
- construction procedures that minimise flow velocity;
- dust suppression measures;
- revegetation following earthworks; and,
- sedimentation basins to contain construction site runoff.

The details of these measures would be finalised in a Soil and Water Management Sub Plan. The EIS concludes that there would be a very low likelihood of encountering Acid Sulfate Soils.

During operation, pavement runoff would have the potential to pollute receiving waterways. Operational mitigation measures would collect and treat runoff from the road pavement prior to discharge. This would involve cross drainage and water quality treatment measures.

6.5.2 Key Issues Raised

Concerns in relation to water quality were raised in five representations. While respondents acknowledged that control devices were proposed in the EIS for the operation of the bypass, concerns were raised over the lack of detail.

The EPA recommended:

- comprehensive testing for the presence of Acid Sulfate Soils;
- treatment of water from the construction site to ensure minimum quality standards;
- monitoring of water leaving the site to assess the success of treatment;
- investigation of stormwater re-use strategies;
- that contingency plans be developed manage any contaminated water; and,
- appropriate chemical storage.

6.5.3 Additional Investigations

The Representations Report investigates water quality protection measures in more detail and indicates that:

- the operational cross-drainage system would be constructed in the initial construction stages to allow for better separation of runoff from disturbed and undisturbed areas;
- given the limited space, it is proposed to construct a large number of relatively small basins;
- basins would be located near the toe of road batters on each side of the cross drains and their exact locations would be developed during detailed design;
- a number of the construction basins would be retained as permanent basins;
- pavement drainage would be treated by the capture of gross solids and litter in gross pollutant traps; and,
- constructed wetlands would be established to remove some pollutants and contain a typical tanker volume under dry weather conditions.

The design of the cross-drainage system is discussed further in Section 6.6 of this Report.

6.5.4 Consideration of Key Issues

<u>Erosion and Sedimentation Control</u>

Given the extent of cut and fill areas required, dispersive soils and proximity to Woronora River, there is potential for significant erosion and sediment control issues during construction. The Department notes that the locations of erosion and sedimentation controls and, in particular, the required sedimentation basins have not been specified. The Representations Report indicates that sedimentation basins would be constructed within the proposal footprint assessed in the EIS. To ensure that erosion and sedimentation controls are effectively located the Department recommends that these facilities are constructed to meet the following criteria:

- sites to be located within the project footprint assessed in the EIS;
- sites to be located with ready access to access tracks;
- sites shall not be constructed over water or sewer pipelines unless otherwise agreed to by SWC;

- 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;
- sites are not to involve the utilisation or modification of any existing waterways;
- sites are to have low conservation significance for flora and fauna and they are not to require any clearing of native vegetation beyond that which must be cleared for the project in any case;
- 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;
- sedimentation basins on private land shall be fenced to minimise safety risks; and,
- all control are to be designed and constructed in accordance with the Department of Housing's Guideline *Managing Urban Stormwater – Soils and Construction*.

These requirements are specified in Recommended Condition of Approval No. 92.

The Department's Recommended Condition of Approval No. 91 requires the Proponent to ensure that appropriate erosion and sedimentation controls are in place prior to the commencement of works with potential to cause soil erosion or generate sediment and, in particular, prior to any stockpiling works.

During construction it is also recommended that an appropriately qualified soil conservationist undertake regular inspections of temporary and permanent erosion and sedimentation control devices to ensure that the most effective controls are being implemented and maintained. This requirement is specified in Recommended Condition of Approval No. 94. In addition, the Department's Recommended Condition of Approval No. 95 requires that construction stage erosion and sedimentation controls be maintained until revegetation has provided appropriate groundcover.

Contaminated Water

The EPA noted that all stormwater would require treatment prior to discharge. To ensure that the volume of contaminated water is minimised, the Department also recommends that the operational cross drainage system be installed and utilised as soon as possible after construction commencement. This commitment is reflected in Recommended Condition of Approval No. 93.

Spill Containment

The EPA noted concern over the lack of detail in relation to operational spill containment devices. The Department's Recommended Condition of Approval No. 97 requires that appropriate spill detention systems are incorporated into the proposal.

6.5.5 Conclusion

The Department recognises that the proximity of the proposal to sensitive waterbodies results in a potential for adverse water quality impacts. The Department concurs with the RTA's recommendation that a Soil and Water Management Sub Plan be prepared. Accordingly, the Department's Recommended Condition of Approval No. 90 requires that Sub Plans be prepared as part of the Construction and Operational EMPs. These Sub Plans would provide details of the exact locations and size of water quality control structures and also include pre-construction, construction and operational monitoring of water quality and the preparation of contingency plans to deal with spills and contaminated discharge. The Department notes that the effectiveness of water quality,

erosion and sedimentation measures is dependent on diligent monitoring and maintenance of control structures and concludes that the Recommended Conditions of Approval, if effectively implemented, would minimise the likely water quality impacts associated with the proposal.

6.6 Flooding and Hydrology

6.6.1 Background

The EIS indicates construction would occur at 66 AHD or higher, well above the Woronora River. The study area is not subject to flooding hazard, but the EIS indicates that parts of the construction area would be subject to seasonal waterlogging. The EIS concludes that the proposed cross-drainage design would ensure the local hydrological regime is not adversely affected as a result of the proposal.

6.6.2 Key Issues Raised

Nine representations noted concern over the lack of detail provided in the EIS in relation to the drainage design. In particular, concerns were raised in relation to the impacts of runoff on surrounding properties and the need for drainage easements to be identified.

Landcom recommended that the detailed drainage design of the North-South Link be finalised in consultation with them to ensure that the design of the road can be integrated with the design of their adjacent subdivision. The Department also noted that the design and location of the proposed noise walls would need to be considered during detailed drainage design.

6.6.3 Consideration of Key Issues

The Representations Report concludes that cross drains would be constructed in the initial stages of construction to allow for better separation of runoff from disturbed and undisturbed areas and that pavement drainage would be treated by the capture of litter and solids in gross pollutant traps.

The Department notes that no further details in relation to the magnitude of impacts on stormwater flows and flooding are given. The Department therefore requires that the RTA prepare a detailed Flooding and Drainage Management Sub Plan with the objective of not increasing inundation levels or durations during a 100 year ARI flood event in any areas. This requirement is reflected in Recommended Condition of Approval No. 98. The cross-drainage system would need to be designed to ensure that there would be no exacerbation of existing flooding or water logging to the satisfaction of DLWC and in consultation with Sutherland Shire Council and Landcom. This requirement is specified in Recommended Condition of Approval No. 100.

The Department notes that the Representations Report also indicates that the cross-drainage system would be established in the initial stages of construction and concludes that this would ensure that construction stage impacts on stormwater flows and flooding are minimised.

6.7 Economic Analysis

6.7.1 Background

The EIS includes a Road User Cost Benefit Analysis (RUCBA) for the following scenarios:

- the construction of the East-West Link as a single component; and

- the construction of the East-West Link and subsequent construction of the North-South Link.

This analysis considered the following main costs and benefits:

- capital costs including construction and property acquisition;
- ongoing maintenance costs;
- vehicle operating costs;
- travel time savings; and,
- accident savings.

Using this methodology, the Benefit Cost Ratio (BCR) over a 30 year period is calculated to be 5.5 for the East-West Link and 4.2 for the entire proposal. The EIS also includes an assessment which takes some environmental externalities into account. The EIS notes that the BCR increases from 4.2 to 4.4 when environmental externalities are taken into account and concludes that the broad economic performance of the proposal is positive.

6.7.2 Key Issues Raised

The EPA noted concern over the high weighting (approximately 80%) given to travel time savings in assessing the benefits of the proposal and the need to consider induced traffic and associated congestion impacts.

The Department noted concern in relation to the inclusion of inframarginal travel time savings (savings of less than 5 minutes) and requested that a sensitivity analysis be undertaken excluding inframarginal travel time savings. The Department also requested a comparative economic assessment of alternatives to the proposal.

6.7.3 Consideration of Key Issues

The Representations Report uses RUCBA to compare the following options:

- Option 1 - (4 Lane Menai Road) – Capital Cost $20 million;
- Option 2 - (6 Lane Menai Road) – Capital Cost $60 million;
- Option 3 - (East-West Link Only) – Capital Cost $70 million; and,
- Option 4 - (Bangor Bypass) – Capital Cost $115 million.

Based on these capital costs and the Netanal modelling conducted (including iterative SCATES inputs for Options 1 and 2) the key results of the RUCBA for a 30 year operational horizon and a 7% discount rate are summarised in Table 9 below.

Table 9 - Results of Revised RUCBA

Parameters	Option 1 (4 Lane Menai Rd)	Option 2 (6 Lane Menai Rd)	Option 3 (East-West Link)	Option 4 (Bangor Bypass)
First Year Rate of Return (FYRR)	60%	21%	28%	18%
Present Value of Costs ($M)	18	48	58	91
Present Value of Benefits ($M)	171	236	311	415
Net Present Value ($M)	153	189	252	324
Benefit Cost Ratio	9.7	5.0	5.3	4.6

It can be seen from the above table that the option of widening Menai Road to four lanes results in the highest BCR, which is more than twice that of the Bangor Bypass. The Representations Report recognises the different BCRs but suggests that Options 3 and 4, which offer higher Net Present Values (NPVs), should be seen as the longer term options. The Representations Report states:

> *"The Menai Road improvement options have a higher RUCBR because they involve a lower cost for the immediate realisable benefit. However, they do not provide a long term solution to the identified traffic problem. They are short term solutions providing immediate benefits but those benefits decline fairly quickly over a relatively short time and would necessitate additional expenditure in the future. This additional future expenditure is not reflected in the analysis."*

The Representations Report does not provide any further details on what is meant by short-term benefits and what additional expenditure would be required for Menai Road upgrades to provide long-term benefits. Given the lack of justification, the argument that significant weighting should be given to alternative proposals with the highest NPVs appears to be tenuous. BCRs have been used universally to date by the RTA as a realistic indicator of the proposals worth. Reverting to NPVs as the key indicator would always tend to favour high capital cost proposals at the expense of proposals which provide better value for money.

The Department therefore concludes that upgrading Menai Road to four lanes is the best option from an economic viewpoint, with a BCR more than double that of the Bypass proposal. This issue is discussed in the context of key environmental and social impacts and benefits in Section 5.1 of this Report.

6.8 Air Quality

6.8.1 Background

Construction

The EIS notes that around 500kg of dust per 10 hour day would be generated from earthworks associated with construction. This amount would be generated from operation of equipment and wind erosion assuming an exposed area of 200m by 30m (6000m^2). The total dust generated could be much higher on a hot, dry, windy day and/or if a greater area were exposed. Standard mitigation measures are described in the EIS, including minimising exposed ground, road watering, ceasing work during extreme wind conditions, management of topsoil stockpiles and covering material transported by construction vehicles. The EIS concludes that these measures would be detailed in a Dust Management Sub Plan.

Opportunities to reduce greenhouse gas emissions are identified in the EIS, such as use of energy efficient fuels, minimisation of clearing, life cycle analysis, and preparation of a Waste Avoidance Plan.

Operation

The EIS indicates that the current local air quality with respect to ozone, nitrogen oxides, sulphur dioxide, carbon monoxide and particulate matter are well below their respective air quality goals.

The EIS includes modelling of a series of possible roadway developments that are combined with the expected hourly traffic flow and compared with ambient air quality goals set by the EPA. Predicted

increases due to vehicle emissions remain below EPA goals. The EIS indicates that improvements in air quality along Menai Road would result from construction of the Bangor Bypass. This would be attributable to reduced traffic volumes.

The EIS provides a quantitative estimate of greenhouse emissions associated with the proposal showing small overall savings in greenhouse emissions compared with a "do-nothing" case.

The EIS notes that the RTA would continue to engage in strategies outlined in their *Greenhouse Reduction Plan*. The EIS indicates that the RTA would also contribute to:

- RTA programs that encourage better vehicle maintenance and fuel economy;
- the National Greenhouse Response Strategy;
- the State's vehicle emissions enforcement resources; and,
- the early implementation of more stringent Australian Design Rules.

6.8.2 Issues Raised

Concerns with construction stage impacts on air quality were raised in nine representations. Respondents were concerned with the adequacy of dust mitigation measures. and by the EPA.

Concerns regarding operational air quality impacts were raised by 437 (56%) representations. Respondents suggested that the carriageway should be realigned further away from properties to decrease air quality impacts.

The EPA suggested that the proposal was not consistent with the objectives of the State Government's *Action for Air*. Concerns regarding increased vehicle kilometres travelled are discussed in Section 5.3 of this Report.

6.8.3 Additional Investigations

Construction

Dust mitigation measures remain as described in the EIS. The Representations Report concludes that community would be consulted in relation to dust impacts during the construction phase.

Operation

As a result of modifications to the proposal, particularly realignments, air quality impacts were reviewed in the Representations Report. The Representations Report again concludes that air emissions would remain within criteria established by the EPA, and therefore that no mitigation measures are necessary.

6.8.4 Consideration of Issues

Dust Management

The Department notes that the potential exists for short-term impacts to occur as a result of dust generation during construction. The Department generally concurs with the mitigation measures outlined in the EIS. Notwithstanding, it is noted that the assessment included in the EIS assumed that only 6000m^2 of ground surface would be exposed at any time. It is therefore recommended that the

Proponent implement a progressive revegetation strategy during construction, with the goal of minimising exposed surfaces to 6000m^2. Progressive revegetation would also work to reduce the erosion and sediment issues discussed in Section 6.5 of this Report and the visual impacts discussed in Section 5.8.

The Department also recommends the implementation of the following mitigation measures:

- covering of construction vehicles;
- use of wheel washes to minimise tracking of dirt and mud on public roads;
- use of water sprays and tankers to minimise the amount of dust generated, especially on hot, dry, windy days;
- limiting truck speeds on internal haul roads to 25km/hr.

These requirements are specified in Recommended Conditions of Approval Nos. 84 to 86.

The Department notes that the effectiveness of the mitigation measures outlined in the EIS is dependent on diligent monitoring and maintenance. To this end, the Department's Condition of Approval No. 83 requires the preparation of a detailed Dust Management Sub Plan to set in place appropriate management procedures. As part of this Sub Plan, the Proponent would be required to prepare a reactive dust management procedure to be implemented if dust emissions exceed the relevant criteria.

Greenhouse

The Department commends the RTA's commitment to greenhouse gas reduction strategies described in the EIS, including encouraging cleaner fuel sources and promoting the reduction of greenhouse emissions. However, it is noted that future operational impacts more than offset the emissions created during construction and, therefore, that careful management would be required to ensure that the greenhouse minimisation strategies are effectively implemented during construction. To this end, the Department recommends that the Proponent:

- develop assessment criteria to be used in the formal construction tender process to encourage the use of alternative, cleaner fuels during construction;
- adopt energy efficient work practises; and,
- purchases green power for at least 50% of construction electrical requirements.

These requires are specified in Recommended Conditions of Approval Nos. 87 to 89.

Operational Air Quality Impacts

The Department notes that, based on modelling contained in the EIS working papers, the predicted levels of pollutants resulting from the operation of the proposal would be below the relevant criteria, and accordingly concludes that no significant adverse effects are expected to occur.

It is also noted that the EIS and Representations Report propose to construct the East-West Link and open this section to traffic prior to constructing the North-South Link. The air quality impacts of this staging scenario have not been assessed, although the increased traffic congestion would result in increases in vehicle emissions. The impacts of this staging scenario are discussed in detail in Section 5.2.

6.9 Physical Property Impacts

6.9.1 Background

The EIS notes that while a number of properties owned by State and Local Government authorities would require strip acquisition, only one privately owned residence, near the intersection of the North-South and East-West Links, would be acquired under the proposal. The EIS concludes that all land acquisition would be completed in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991.*

With regard to the likely impacts on properties, the EIS notes that construction vibration is unlikely to result in structural damage and indicates that dilapidation surveys would be carried out on properties within 30 metres of vibration generating activities. The EIS also notes that based on data collected from surrounding bores, groundwater could be encountered 9 metres below ground level.

6.9.2 Issues Raised

Twenty-three representations to the EIS noted concern over the likely construction vibration impacts, citing the proximity of the roadway and the depth of the proposed cuttings. Structural damage was also a concern raised in five representations to the PAR in relation to the northern arm of the North-South Link.

The Department noted that some cuts would extend below 9 metres and requested additional information in relation to likely groundwater inflows, associated settlement impacts and proposed management measures.

6.9.3 Consideration of Issues

To ensure that the potential for structural damage resulting from vibration is minimised, the Department recommends that dilapidation surveys be completed on all building within 50 metres of construction activities resulting in vibration and that vibratory rollers are not used within 30 metres of residences. Construction vibration impacts are discussed in more detail in Section 5.5 of this Report.

With regard to the potential for settlement impacts, the Department notes that while the Proponent acknowledges that some inflows would occur, the magnitude of these inflows, an assessment of the potential for associated ground settlement and proposed management measures have not been provided at this stage. The Department therefore considers that a precautionary management approach is warranted. To this end, the Department recommends that the Proponent prepare a detailed Groundwater Management Sub Plan in consultation with the EPA and DLWC. This Sub Plan, required by Recommended Condition of Approval No. 101, would include:

- identification of potential settlement impacts on the project and nearby structures;
- a description of groundwater quality, including the potential for contamination; and,
- groundwater inflow control, handling, treatment, and disposal.

The Proponent would also be required to complete dilapidation surveys on all buildings/structures within six times the maximum depth of cuts (when measured from any point in the cut) and provide property owners with a copy of the survey and advise them on the process for making a claim regarding property damage. These requirements are specified in Recommended Conditions of

Approval Nos. 28 and 29. Under Recommended Condition of Approval No. 32, the Proponent would be required to rectify any damage resulting from the proposal at no cost to the owner.

6.10 Heritage Impacts

6.10.1 Background

The EIS states that no Aboriginal archaeological sites or places of cultural significance are known to exist in the study area, as such concludes that it is unlikely that any impacts would result from the proposal. All personnel involved in construction of the proposal would be trained in their responsibilities regarding the discovery of unexpected archaeological material. The Gandangarra Local Aboriginal Land Council (LALC) has indicated its endorsement of the EIS findings.

The EIS indicates that a number of heritage items within the study area listed under the Sutherland Local Environmental Plan (LEP):

- the original Menai Road bridge across Woronora River;
- a house at 1 David Road, Menai;
- Shackles Estate Cottages Nos. 53, 205 and 219 – Woronora River frontages; and,
- a section of Old Illawarra Road at Lucas Heights.

The EIS concludes that none of these items would be directly affected by the proposal.

A previous field survey in the study area conducted by Navin in 1993 located one possible historical site, described as a sandstone structure, which was assessed as having "moderate local significance". Field survey undertaken for the EIS failed to locate this structure and the Representations Report concludes that it is likely that is structure has been destroyed.

6.10.2 Consideration of Issues

The Representations Report provides details on the heritage significance of sections of the Old Illawarra Road and 1 David Road. The Old Illawarra Road is considered to have moderate cultural significance at the State level, while 1 David Road is considered to have moderate local significance. The Department notes that the listed sections of Old Illawarra Road would not be directly impacted during construction, however, it is proposed that 1 David Road, which is owned by the RTA, be used as a construction site office.

The Department also notes that a sandstone structure, likely to be the structure described by Navin in 1993, was located by accident by officers of the Department during a site visit. Attempts by the Proponent to relocate this structure have failed to date. Accordingly, the Department recommends monitoring of clearing works in the vicinity of the sandstone structure located by Navin. Should the sandstone structure be located, a report on the site should be prepared in consultation with Sutherland Shire Council and the Heritage Office. This requirement is specified in Recommended Condition of Approval No. 102.

To ensure that the impacts on the items of significance discussed above are appropriately management, the Department recommends that the Proponent prepare a Heritage Management Sub Plan. Preparation of this Sub Plan is required by Recommended Condition of Approval No. 103. If during the course of construction any relics were uncovered the Proponent would be required to stop

work in the vicinity of the discovery and consult the relevant authority for their requirements, prior to recommencing works.

6.11 Hazard and Risk

6.11.1 Background

Construction

The EIS indicates that construction activities could pose some risk or hazard to humans and the biophysical environment including the operation of machinery, changes in road conditions and the storage and handling of substances such as fuels and bitumen.

The EIS states that the RTA would require that all relevant legislation and safety standards are complied with, and that construction workers would be required to have an understanding of the risk involved with the hazardous substances. The construction sites would be secured with fencing to prevent members of the public from entering. The EIS concludes that management plans would be prepared to ensure that potential hazards and risks are minimised.

Operation

The EIS notes that risk of spills resulting from traffic accidents is an environmental consideration and concludes that there is a low likelihood of spills due to high standard vertical and horizontal alignments, adequate shoulder widths and high standard signalised intersections. The EIS concludes that measures would be implemented to ensure risks from spills are minimised. Details of these measures were not provided in the EIS.

6.11.2 Issues Raised

Six representations indicated concerns regarding traffic accidents resulting in spills of hazardous material. The Department also noted concern in relation to spills, particularly given the sensitivity of the Georges River Catchment (identified in the EIS).

6.11.3 Additional Investigations

The Representations Report includes revised drainage details for operation. The proposal includes water quality protection measures that utilise gross pollutant traps to capture gross solids and litter and mini-constructed wetlands to remove runoff sediment, nutrients, hydrocarbons and heavy metals. Spill containment would be incorporated into the design of the constructed wetlands so that they are sufficient to fully contain a typical tanker volume under dry weather conditions.

6.11.4 Consideration of Issues

To ensure all hazards and risk are identified and appropriate reactive measures are in place, Recommended Condition of Approval No. 112 requires the Proponent to prepare and implement Hazards and Risk Management Sub Plans as part of the Construction and Operational EMPs.

Recommended Condition of Approval No. 97 requires the Proponent to provide appropriate detention basins for containment of spills and materials arising from accidents. It is noted that the sensitivity of the Georges River catchment warrants a precautionary approach to spill containment and, as such, that basins to contain spills in all weather conditions would be required. The Department also notes

that spill detention basins and their immediate surrounds would need to be maintained so they are free from dry material likely to lead to an escalation of a burning liquid fuel fire in the event of an accident. The maintenance of these basins would therefore need to be detailed in the Hazards and Risk Management Sub Plans.

The Department considers that the hazard and safety risks posed by the proposal, particularly protection of water quality, can be adequately managed provided that the mitigation measures detailed in the EIS, Representations Report and Recommended Conditions of Approval are effectively implemented.

6.12 Waste Management

6.12.1 Background

The EIS notes that the construction of the proposal would generate a range of solid and liquid wastes from various sources including:

- concrete;
- asphalt;
- cleared vegetation;
- soil and rock;
- oil and lubricants;
- tyres;
- metal and glass;
- litter and paper wastes; and,
- effluent from site facilities.

The EIS concludes that a Waste Avoidance Plan would be prepared for the proposal focusing on waste avoidance and recycling.

6.12.2 Issues Raised

In its representation to the EIS, the EPA noted the importance of waste avoidance and recommended the preparation of a Waste Management and Reuse Sub Plan.

6.12.3 Consideration of Issues

The Department notes that waste generation is an unavoidable consequence of the proposal. However, if waste is effectively managed, opportunities for reduction, re-use and recycling can be maximised. To this end, the Department's Recommended Condition of Approval No. 108 requires the Proponent to prepare a Waste Management and Reuse Sub Plan. This Sub Plan would identify how waste would be handled and disposed, based on the waste management hierarchy of reduce, re-use and recycle.

6.13 Location of Construction Facilities

6.13.1 Background

The EIS provides a broad definition and assessment of the likely worksites and facilities that would be required, information on where such facilities would be located and the associated impacts of

these facilities. It states that the number and exact type of worksites would be dependent on the detailed construction methodology and program that would be finalised during detailed design.

The EIS suggests that given the proximity of the proposal to urbanised areas and nearby supplies of construction material, the associated construction worksites would be relatively minor in scale and would only be required to support the day to day activities being undertaken on the construction site. It proposes that where possible, worksites would be located in areas that would ultimately become part of the road corridor, or in areas that are currently cleared and undeveloped.

It states that where land identified for use as a construction worksite is not already owned by the RTA and is not required to be acquired for the purposes of road construction, a lease arrangement would be reached with the landowner for the duration of the construction works. The EIS suggests that where additional or alternative sites are required to be developed as construction facilities, the priority would be to use land located in the road reserve and the following criteria would be used to select appropriate sites:

- located at least 200m from areas identified as containing *Melaleuca deanei, Acacia pubescens* and Shale Sandstone Transition Forest;
- located at least 50m from any residence or other sensitive receiver if there are likely to be noise effects;
- located on land that is already cleared or which will be required to be cleared for the construction of the road; and,
- located so as to minimise traffic impacts on the local road network.

However it is also noted that if it is not practical to locate such facilities in the areas identified by the criteria, they would be subject to a separate environmental assessment and approvals process.

The EIS also states that construction worksites would be fenced to prevent public access and mitigation measures implemented to prevent any adverse impacts. It proposes that the Construction EMP would detail measures such as temporary acoustic barriers, dust management procedures for stockpiles and erosion and sediment controls that would be implemented at the sites.

The EIS notes that the crushing and grinding of materials may be undertaken on-site and concludes that if these activities are required they would be assessed under a separate process.

6.13.2 Issues Raised

Sutherland Shire Council expressed concern at the lack of a comprehensive outline of construction facility design, location and impact within the EIS. Sutherland Shire Council suggested that the worksite selection criteria was inadequate and the EIS failed to consider the dust impacts for adjoining residents as a result of work compounds. The representation also stated that no indication of the size of buffer zones for worksites to adjoining vegetation had been provided.

The Department indicated that if crushing and grinding plants were required, the impacts would need to be assessed at this stage.

6.13.3 Consideration of Issues

The Department recognises the need for the RTA to maintain flexibility in determining the exact locations of construction facilities as the final locations would be dependent on the requirements of

the contractor selected to undertake the work. As such, the Department accepts that the approach undertaken by the RTA aims to retain the required flexibility while ensuring the impact of construction facilities is acceptable.

To ensure appropriate selection of construction sites and an acceptable level of impact, the RTA would be required to identify those sites it has selected for the location of construction facilities and demonstrate to the satisfaction of the Director-General that the following criteria have been effectively implemented as part of the Construction EMP:

- sites to be within the road reserve wherever possible;
- sites to access the local road network as determined in the Construction Traffic Management Sub Plan required by Condition 42;
- on relatively level land;
- sites to be separated from nearest residences by at least 100m unless it can be demonstrated that residents will not experience adverse impacts on noise, visual and air quality impacts;
- sites above the 100 ARI flood level unless otherwise agreed to by DLWC; and,
- sites are to have a low conservation significance for flora and fauna and heritage and are not to require any clearing of native vegetation beyond that which must be cleared for the project in any case.

These requirements are detailed in Recommended Condition of Approval No. 113.

Notwithstanding, it is noted that while the EIS indicates that on-site crushing and grinding plants may be developed during the construction of this proposal, the impacts associated with such plants have not been assessed in the EIS or the Representations Report. The Department notes that significant noise and dust impacts would be likely if such plants were to be developed. Given the proximity of the proposal to urban areas and lack of information in relation to impacts, the use of on-site crushing and grinding plants is not recommended.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The need and justification of the Bangor Bypass has been based on concerns about current traffic congestion on Menai Road and associated adverse impacts on residential amenity and public transport. Whist it is acknowledged that the communities of Menai and Bangor would benefit from the proposal, the communities surrounding the East-West Link and, to a lessor degree the North-South Link, would experience new, and in some locations, significant noise and visual impacts which would require careful and cautious management. The construction of the proposal has the potential to alleviate some of the significant traffic congestion in the area, but is predicted to induce up to 11, 000 additional vehicles per day into the study area and increases in total vehicle kilometres travelled.

For a sustainable outcome to be achieved, a precautionary approach is required. The Department's assessment has concluded that the North-South Link should be opened concurrently with the East-West Link in order for the proposal to fully achieve its objectives. However, the Department has been advised by the RTA that funding has not been allocated at this time for that purpose. The Department is not in a position, nor is it appropriate for it to make funding decisions on behalf of the Government. However, to ensure that commitments in the Representations Report about construction of the North-South Link "following" the East-West Link are fulfilled, the Department recommends that as a minimum, construction of at least the northern section of the North-South Link commence within 12 months of the opening of the East-West Link and be completed and opened to traffic within 18 months of its construction commencement.

The Department has also concluded that diligent monitoring of traffic conditions and, if warranted, the implementation of management measures would be required to ensure that the retention of through traffic on Menai Road is minimised. To offset the flora and fauna and noise impacts associated with the proposal, the implementation of stringent mitigation strategies are also required.

7.2 Recommendations

It is recommended that should the proposal proceed, it would be essential for extensive and comprehensive conditions to be imposed so as to ensure, to the greatest extent practicable, its long-term benefits. Section 5 of this Report lists all the recommended conditions of any approval. The key requirements include:

- construction of at least the northern section of the North-South Link within 12 months of opening of the East-West Link;
- monitoring of traffic using Menai Road and, if necessary, the implementation of management measures to ensure that the proportion of through traffic using this route is minimised;
- limiting truck use on Menai Road and Old Illawarra Road;
- development of Local Area Traffic Management Measures for the area around Anzac Road in consultation with Sutherland Shire Council and the affected community;
- provision of a pedestrian and cyclist link between the Gandangara subdivision and Old Illawarra Road and investigation into the potential to provide a further seven links to enhance connectivity and accessibility in areas severed by the proposal;
- development of an Urban Design Strategy and Implementation Plan for improvements to Menai Road;

- comprehensive flora and fauna mitigation strategies including limits to the extent of clearing works and the implementation of specific management strategies for threatened flora and fauna including fencing of conserved plants, propagation of directly affected stands and targeted pre-clearing surveys for threatened fauna;
- consideration of alternative noise mitigation strategies including increasing the heights of barriers and acoustic treatments to individual residences in cases where EPA criteria are exceeded;
- investigation of design and alignment alternatives to reduce the environmental impacts associated with the proposal, in particular, the extent of clearing, noise and visual impacts;
- appointment of an Independent Community Liaison Representative to address community concerns regarding construction impacts and preparation of a comprehensive Community Involvement Plan; and,
- the preparation of Construction and Operational Environmental Management Plans including detailed Sub Plans for the following key impact issues:
    - construction traffic management;
    - flora and fauna;
    - urban design and landscaping;
    - construction noise and vibration;
    - operational noise;
    - soil and water quality;
    - dust management;
    - flooding and drainage;
    - non-indigenous heritage;
    - spoil and fill management;
    - waste management and re-use; and,
    - hazards and risk.

8. 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 Department and supplementary information and advice provided.

It is noted that the EIS and Representations Report contain extensive information on Sub Plans and mitigation strategies to be implemented to ameliorate impacts of the proposal. The Recommended Conditions of Approval should therefore be implemented in conjunction with those Sub Plans 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 would prevail.

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Glossary and Abbreviations

ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Average Recurrence Interval
ASS	Acid Sulfate Soils
CLG	Community Liaison Group(s)
CMS	Construction Method Statements
Construction	Commencement of any physical works under this Approval
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 entitled 'Proposed Bangor Bypass,' November 2002
DLWC	Department of Land and Water Conservation, NSW
EIS	*The Bangor Bypass Environmental Impact Statement* prepared for the RTA by Connell Wagner, dated February 2002
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 a 9 hour period from 10pm to 7am
L_{Aeq} 15 hour	Equivalent continuous (constant) sound level over a 15 hour period from 7am to 10pm
LAeq (15 mins)	Equivalent sound pressure level over a 15 minute interval
LA1(1 minute)	Sound pressure level exceeded for 1 per cent of the time measured over a 1 minute interval
LA10 (15 mins)	Sound pressure level exceeded for 10 per cent of the time over a 15 minute period
Minister, the	Minister for Planning
NPWS	National Parks and Wildlife Service, NSW
OEMP	Operational Environmental Management Plan
PAD	Potential Archaeological Deposit
Proponent	Roads and Traffic Authority
Publicly available	Made available at the display centre on request
Reasonable and feasible	Consideration of best practice taking into account (as applicable): Benefit of proposed measures, technological and associated operational application in the NSW/Australian context. 'Feasible' relates to engineering considerations and what is practical to build. 'Reasonable' relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and nature and extent of potential improvements.
Representations Report	*The Bangor Bypass Representations Report'* prepared by RTA Operations for the RTA, dated July 2002
RTA	Roads and Traffic Authority
SSC	Sutherland Shire Council
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 and other minimal environmental/community impact activities.

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 and all additional information supplied by the RTA;
   (c) the Director-General's Report; and,

(d) the Conditions of Approval granted by the Minister.

In the event of any inconsistency with the project as described in the documents referred to above, the Conditions of Approval granted by the Minister 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.

Compliance

General

2. 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.

3. Where in any Condition of Approval any action cannot be done without the Proponent first having prepared any document or having obtained any approval (the "Pre-Condition"), that action may be done for a particular worksite, stage or preliminary works (the "Work") if the "Pre-Condition" has been satisfied for that Work.

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 a report detailing how all conditions to be addressed prior to substantial construction have been complied with. The project must not commence until the Proponent has been advised in writing that the Director-General has approved the Pre-Construction Compliance *Report*.

This Report shall provide the following information as a minimum:

(a) details demonstrating how the activities leading up to substantial construction have been addressed. Amongst other matters, these activities shall include:
    (i) nomination and approval of Environmental Management Representative;
    (ii) site surveying (assuming no clearance or site works are required),
    (iii) establishment of the complaints management system and Community Involvement Plan required under this approval;
    (iv) advertisement of activities;
    (v) design and safety investigations, flora and fauna management, urban design and landscaping, noise and vibration management, dust management, soil and water management and traffic and spoil management requirements;
    (vi) EMP preparation;

(vii) communications with Department of Planning and other relevant agencies; and,
(viii) compliance with all relevant Conditions of Approval.

(b) a timeframe indicating when each of the conditions were complied with. This may include dates of submissions of the various studies and/or approval dates;
(c) conditions placed on any approvals or licences issued by other agencies and actions taken (or proposed) to satisfy the requirements of approvals and/or studies; and,
(d) a plan indicating how the conditions which apply to the construction stage will be satisfied.

Note:
If construction is undertaken in discrete stages then a Pre-Construction Compliance Report will need to be prepared in accordance with Condition 4 for each stage

Pre-Operation Compliance Report

5. At least one month (or within such period as otherwise agreed by the Director-General) prior to commencement of operation of any part of the project, the Proponent shall submit a *Compliance Report* for approval of the Director-General. This report shall detail how all conditions that apply prior to commencement of operation have been complied with. The report shall provide the following information as a minimum:

(a) details demonstrating how each condition was satisfied during construction;
(b) a timeframe indicating when each condition was complied with. This may include dates of submissions of the various studies and/or requirements of various relevant conditions, approval dates, completion of any necessary works etc;
(c) summaries of major issues raised through the ongoing community consultation process and how these issues were addressed;
(d) summaries of major environmental issues, how they were managed, and lessons learned;
(e) Conditions placed on any approvals or licences issued by other agencies and action taken (or proposed) to satisfy the requirements of approvals and/or studies; and,
(f) a plan indicating how the Conditions which apply during the operation stage will be satisfied.

Note:
The Director-General shall provide a response within 1 month of receiving the Pre-Construction Compliance Report required by Condition 4 or the Pre-Operation Compliance Report required by Condition 5. The Director-General may request additional information if the report is considered incomplete. In such cases, the time 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 1 month period. The Director-General shall make any requests for additional information within 2 weeks of receipt of the Pre-Construction Compliance Report or the Pre-Operation Compliance Report from the Proponent.

Project Commencement

6. The Proponent shall notify the Director-General and all relevant authorities in writing at least 1 week prior to commencement of construction and operation. For the purposes of assessing compliance with these Conditions, the Proponent shall explicitly identity a date for construction and a date for substantial construction.

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 at that level, 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 Management System

8. The Proponent shall implement a system (supported by adequate resources) prior to the commencement of construction which ensures all complaints received during construction are recorded and managed as expeditiously as possible. Minimum requirements of the Complaints Management System include:

   (i) a 24 hour, toll free telephone number listed with a telephone company and advertised. This telephone number shall enable any member of the public to reach a person who can arrange appropriate responses to the complaint(s) being made;
   (ii) adequate resourcing including human resources, communication and transport etc.;
   (iii) an appropriate person(s) to receive, log, track and respond to complaints within the specified timeframe. The name and contact details of the nominated person(s) shall be provided to SSC, relevant authorities and the Director-General upon appointment or upon any changes to that appointment;
   (iv) details of all complaints received during construction are to be recorded and at least a verbal response on what action is proposed to be undertaken is required within two hours during any night-time works and 24 hours during standard hours or non-construction times;
   (v) a process for the provision of a more detailed response to the complainant within 10 days, if additional information exists (over and above that provided in the initial response);
   (vi) appropriate management structures to allow effective resolution of complaints; and,
   (vii) a mediation system to ensure that all complaints are satisfactorily addressed to the greatest extent practicable. Where external or independent mediation is required, the mediator is to be approved by the Director-General.

   Information on all complaints received, including the means by which they were addressed and whether resolution was reached with or without mediation, shall be included in the regular Environmental Monitoring Reports and shall be made available upon request.

Advertisement of Activities

9. 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: newsletters, leaflets, newspaper advertisements, 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, in particular noisy works, prior to such works being undertaken.

10. The Proponent shall establish a project internet site prior to the commencement of construction and maintain the internet site until 12 months after opening the project to traffic. This internet site shall contain monthly updates of work progress, consultation activities and a planned work schedule, including but not limited to:

    (a) a description of relevant approval authorities and their areas of responsibility;
    (b) a list of reports and plans that are publicly available under this Approval 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) the 24 hour toll-free complaints contact telephone number.

    Updates of work progress, construction activities and planned work schedules shall be provided more frequently where significant changes in noise impacts are expected.

Communication and Consultation

Community Involvement Plan

11. The Director-General may waive the specific requirements for consultation as specified in Conditions 12 through 15 for preliminary works provided that the Director-General is satisfied that appropriate community consultation has been undertaken and subject to the approval of a specific Consultation Plan for the preliminary works.

12. The Proponent shall prepare a Community Involvement Plan for the construction period to be set 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 Plan shall also include but not limited to:

    (a) details of the communication protocols and procedures and consultation team appointed to manage and implement the Plan during the construction period including qualifications and experience;
    (b) details of the role of the Independent Community Liaison Representative (ICLR) and demonstration of how the independence of this representative will be maintained;
    (c) a crisis and issues management plan identifying the range of consultation activities to be undertaken to minimise community reaction to construction activities;
    (d) the maintenance and updating of the established stakeholder database including:
        (i) identification of the local community likely to be affected by the project;
        (ii) identification of residences, businesses and other sensitive land uses; and,
        (iii) the specific communication needs of this community (ie. language translation, disabled access etc);
    (e) procedures for the establishment and functioning of the Community Liaison Groups in accordance with Condition No. 13;
    (f) procedures for informing users of the affected road network of planned traffic arrangements including temporary traffic switches;
    (g) procedures for informing the local community of planned investigation and construction activities;
    (h) provisions for dealing with complaints (particularly night time) and response requirements as

specified in Condition No. 8. This should include the respective protocols for the EMR, ICLR, Contractors, and any other relevant stakeholders in handling complaints and independent dispute resolution;

(i) provision for the Proponent's attendance and participation in all groups and public meetings forming part of the Community Involvement Plan; and

(j) the provision of training for all employees and sub-contractors on the requirements of the Community Involvement Plan.

Community Liaison Groups

13. Two Community Liaison Groups (CLGs) (one each for the North-South and East-West Links) shall be formed prior to the commencement of substantial construction. The purpose of the CLGs is to discuss project issues and methods for minimising impacts on the local community during construction. All CLGs shall include the EMR, representatives from the RTA, representative from the contractor(s), the ICLR, relevant local community groups, community representatives and SSC.

Issues for discussion may include: flora and fauna protection; noise control measures including barrier heights and locations; access arrangements; air and water quality; landscaping requirements; and any other issue relevant to the impact of the implementation of the project on the community.

The Proponent shall:

(a) consider the Guidelines for the Establishment of the CLGs (see Attachment 1);

(b) establish two Community Liaison Groups (CLG) (one each for the North-South and East-West Links) or as otherwise agreed by the Director-General prior to construction commencing. Each CLG shall include the Environmental Management Representative, representatives from the RTA, the contractor, relevant local community groups and SSC unless otherwise agreed by the Director-General;

(c) nominate a Chair to be approved by the Director-General;

(d) allow the CLGs to make comments and recommendations about the Construction EMP and monitor compliance with this approval and other matters relevant to construction. In the event of any dispute between the Group and the Proponent, the Proponent's decision shall be considered final so long as it is consistent with these Conditions;

(e) ensure that the CLGs have access to the necessary plans and information;

(f) consider the recommendations and comments of each CLG and provide a response to each CLG and the Director-General; and,

(g) unless otherwise agreed to by the Director-General the CLGs shall be maintained for at least 6 months after the opening the project to traffic.

The Proponent shall review the need, relevance, effectiveness and membership of the CLGs at 6 monthly intervals or at other times agreed by the Director-General. Following this review and, if justified, the Proponent shall seek the approval of the Director-General to dissolve any CLG. The Proponent shall bear all costs associated with the establishment and ongoing function of the CLGs.

Independent Community Liaison Representative

14. The Director-General shall approve the appointment of the person(s) nominated by the Proponent to serve as the Independent Community Liaison Representative (ICLR), at least one month prior to the commencement of construction. 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 ICLR shall serve for the duration of construction.

The role of the ICLR will include but not be limited to:

(a) monitor and confirm 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 CLG meetings;
(c) be available for direct contact from the community during all hours that construction works are undertaken and/or that the Display Centre is open as specified in Condition No. 15;
(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 disputes that can not be resolved by the EMR or the Proponent in consultation with the community.

The Proponent shall bear the cost of employing the ICLR.

Display Centre

15. A display centre shall be established no later than three (3) months prior to substantial construction and staffed and maintained at least until opening the project to traffic. The display centre 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 the display centre, covering at least:

    (a) noise and retaining wall locations, details and finishes;
    (b) landscape and urban design concepts, cross section treatments, perspective views and details; and,
    (c) temporary works affecting businesses, residences, pedestrians and public transport users.

    A dedicated personal computer at which members of the public can access the project internet site shall be provided in the display centre. A phone line shall also be provided allowing direct contact from the display centre to the ICLR.

16. Prior to opening the display centre, the Proponent shall prepare a schedule that ensures that the ICLR(s) is available for discussion for a defined and advertised period at the display centre referred to in Condition 15. The CLGs shall be advised of the schedule advertised in local newspapers prior to opening the display centre and prior to any changes to the schedule.

Environmental Management

Environmental Management Representative

17. Prior to the commencement of construction, the Director-General shall approve the appointment of the person nominated by the Proponent 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 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:

(i) considering and advising the Proponent on matters specified in the conditions of approval and compliance with such;
(ii) certifying the environmental/community impacts as minor for all activities defined by the Proponent as not constituting substantial construction;
(iii) endorsing the Construction EMP in accordance with Condition 19;
(iv) reviewing and approving the Proponent's induction and training program for all persons involved in the construction activities and monitor implementation;
(v) periodically monitoring the Proponent's environmental activities to evaluate the implementation, effectiveness and level of compliance of on-site construction activities with the Construction EMP and associated plans and procedures, including carrying out site inspections at least fortnightly;
(vi) reporting monthly to the Director-General;
(vii) recording and providing a written report to the Proponent of non-conformances with the Construction 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 Construction EMP;
(viii) directing the Proponent to stop work immediately, 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;
(ix) reviewing corrective and preventative actions to ensure the implementation of recommendations made from the audits and site inspections;
(x) reviewing minor revisions to the Construction EMP;
(xi) 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,
(xii) endorsing the Operational EMP in accordance with Condition 22.

The EMR shall immediately, and at the same time, advise the Proponent and the Director-General 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 identified in the Construction EMP.

Environmental Management System

18. The Proponent shall appoint construction and, where relevant, 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.

Construction Environmental Management Plan

19. Prior to the commencement of substantial construction, a Construction Environmental Management Plan (Construction EMP) shall be prepared, following consultation with the EPA, DLWC, NPWS, SSC and all relevant utility/service providers. The Construction EMP shall be prepared in accordance with the Conditions of this Approval, all relevant Acts and Regulations and accepted best practice.

    The Construction 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 EMP shall be endorsed 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.

    Where construction activities are undertaken in discrete stages, the Proponent may prepare a staging schedule to the satisfaction of the Director-General. Individual EMPs relating to specific stages of construction may then be prepared in accordance with the approved schedule.

    The Construction EMP shall:

    a) address construction activities associated with all key construction sites, including staging and timing of the proposed works;
    b) cover specific environmental management objectives and strategies for the main environmental system elements and include, but not be limited to: flora and fauna; noise and vibration; air quality; water; erosion and sedimentation; access and traffic; property acquisition and/or adjustments; heritage; groundwater; contaminated spoil, spoil stockpiling and disposal; waste/resource management; flooding and stormwater control; visual screening; landscaping and rehabilitation; hazards and risks; energy use, resource use and recycling; and utilities; and,
    c) address, but not be limited to:
        i) identification of the statutory and other obligations which the Proponent is required to fulfil during project construction including all approvals and consultations/agreements required from other authorities and stakeholders and key legislation and policies which control the Proponent's construction of the project;
        ii) construction activities and processes associated with the relevant construction site(s), including staging and timing of the proposed works;
        iii) length (time) of construction;
        iv) specific hours of operation for all key elements including off-site movements;
        v) locational details of important elements such as: temporary noise barriers; sedimentation basins and facilities; detention basins and/or constructed wetlands; portable offices and amenities; truck, plant and materials storage; access locations; provision of site hoardings etc;
        vi) definition of the role, responsibility, authority, accountability and reporting of personnel relevant to compliance with the EMP;
        vii) measures to avoid and/or control the occurrence of environmental impacts;
        viii) the role and responsibility of the EMR;
        ix) monitoring, inspection and test plans for all activities and environmental qualities which are important to the environmental management of the project, including performance criteria, specific tests, protocols (eg. frequency and location) and procedures to follow;

x) 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;
xi) the construction sub plans required under this approval;
xii) steps the Proponent intends to take to ensure that all plans and procedures are being complied with;
xiii) consultation requirements with relevant government agencies; and
xiv) community consultation and notification strategy (including local community, relevant government agencies and SSC), and complaint handling procedures.

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

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

Note:
The Director-General shall provide a response to the Construction 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 Monitoring – Construction

20. The Proponent shall submit to the Director-General reports in respect of the environmental performance of the construction works and compliance with the Construction EMP and any other relevant conditions of this approval. The Reports shall be prepared six months after the start of 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 Reports shall be submitted no later than one month after the six month period to which they apply and are to be certified by the EMR to confirm that all EMP requirements and Approval conditions have been complied with.

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) the number and details of any complaints, including a summary of main areas of complaint, action taken, response given and intended strategies to reduce complaints of a similar nature;
(f) the plan to be adopted for the project to ensure continued compliance over the coming six month period; and,

(g) any other matter relating to the compliance with the conditions of this approval or as requested by the Director-General.

The report(s) shall be provided to the EPA, DLWC and SSC, and any other relevant government agency nominated by the Director-General. The report(s) shall also be made publicly available.

21. 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

22. An Operational Environmental Management Plan (OEMP) shall be prepared and approved by the Director-General prior to opening of the project to traffic. The Plan shall be prepared in consultation with the EPA, DLWC, NPWS, SSC 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:

(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 specific requirements of DLWC, NPWS, relevant Australian Standards and relevant EPA Guidelines;
(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 managing the main environmental impacts including, but not limited to: noise; water quality; erosion and sedimentation; access and traffic; 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

23. An Environmental Impact Audit Report shall be submitted to the Director-General, 12 months and 2 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. 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 in relation to the operational phase of the project. The Proponent shall comply with all reasonable requirements of the Director-General, in consultation with the 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.

Staging

24. The Proponent shall commence construction of at least the northern section of the North-South Link (including the intersection of the North-South Link/Menai Road/Alfords Point Road) within 12 months of the opening of the East-West Link unless a traffic assesment indicates to the satisfaction of the Director-General that Old Illawarra Road and the intersection of Old Illawarra Road/Menai Road/Alfords Point Road is operating satisfactorily during peak periods with only the East-West Link. This section shall be completed and opened to traffic within 18 months of construction commencement unless otherwise agreed by the Director-General.

Road Design

25. The Proponent shall construct the intersection of the North-South Link/East-West Link/Old Illawarra Road in accordance with the Concept Plan given in Figure 5 of the Director-General's Report.

26. The Proponent shall investigate the following design and alignment alternatives in consultation with SSC and the NPWS and to the satisfaction of the Director-General within three months of the date of this Approval unless otherwise agreed by the Director-General:

    (a) reducing the vertical design speed of the East-West Link to 80 km/hr so that the road surface more closely follows existing ground levels;
    (b) the use of alternative treatments in proposed fill batters on the East-West and North-South Links such as retaining walls or engineered fills, particularly between chainages 1000 to 1500, 1550 to 1744, 1800 to 2200, 2350 to 2520 and 2680 to 2780 on the East-West Link and chainages 820 to 1060 on the North-South Link;
    (c) shifting the North-South Link a further 10 to 15 metres to the east between chainage 400 and 850 and/or reducing the median width;
    (d) alternatives to the proposed junction of the North-South Link with New and Old Illawarra Roads to improve safety and capacity characteristics.

    In assessing design alternatives the Proponent shall consider the recommendations of the Road Design Review completed by ARUP (dated September 2002) and issues in relation to safety (including the findings of the Safety Audit required under Condition 27), noise impacts, visual impacts, access and impacts on flora and fauna.

    Note:
    The objective of the investigation shall be to reduce the bulk and scale of the project and minimise impacts on surrounding residences and flora and fauna.

27. The Proponent shall undertake a Safety Audit of the following project elements to ensure compliance with RTA's *Road Design Guide* and Austroads' *Guide to Traffic Engineering Practice*:

    (a) the layout of the junction between the North-South Link and New and Old Illawarra Roads;
    (b) the layout of the North-South Link/East-West Link/Old Illawarra Road interchange; and,
    (c) the reduced median widths along the East-West Link.

Property Impacts

Pre-Construction

28. Subject to landowner agreement, building condition surveys shall be conducted on all buildings/structures within six times the maximum depth of a cut (measured from any point in the cut) and/or 50 metres of construction activities that cause vibration. The surveys shall be completed prior to the commencement of construction works that may affect building condition. Surveys need not be completed where a geotechnical and vibration analysis endorsed by a qualified geotechnical engineer concludes that these structures will not be affected.

29. The owners of all properties to be surveyed, as identified in Condition 28, are to be advised at least fourteen days prior to the commencement of surveys of the scope and methodology of the survey and the process for making a claim regarding property damage. A copy of the survey shall be given to each affected owner at least three weeks prior to the commencement of construction. A register of all properties surveyed shall be maintained by the Proponent and provided to the Director-General upon request.

30. 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*. Affected landowners shall be notified prior to and during the property acquisition process. This notice shall contain sufficient detail to identify the land or interest being acquired including dimensions and any other information necessary to enable identification of the land or interest being acquired. This notification shall be given prior to access for construction purposes. Where compensation is payable the Proponent shall pay for independent valuation and legal advice if so requested in accordance with the Act.

31. The Proponent shall consult on a regular basis with all directly affected landowners regarding any practical and cost-effective measures to minimise impacts which may be implemented prior to the commencement of construction affecting properties or within such time as agreed with the relevant landowner.

Construction

32. Any damage to buildings, structures, lawns, sheds, gardens, fencing, etc. as a result of any construction activity direct or indirect (including vibration and groundwater changes) shall be rectified at no cost to the owner(s).

Regional Traffic

33. The RTA shall conduct number plate surveys and vehicle counts to identify the proportion of through traffic using Menai Road versus the Bypass during peak and off-peak periods on 3 typical weekdays (conducted over a 3 week period) 6 months and 2 years after opening. The surveys will be conducted at the eastern ends of both the East-West Link and Menai Road, and on Alfords Point Road north of Menai Road and on Old Illawarra Road south of the East-West Link. Should the proportion of through traffic using the East-West Link be shown to be less than predicted in the Representations Report, the RTA shall prepare a report within 3 months for the approval of the Director-General that investigates all reasonable and feasible measures to achieve the stated proportion of through traffic. This shall include measures to make the Bypass more attractive to motorists and shall include a program for implementation. If required, the RTA shall also assist SSC in investigating measures to make Menai Road less attractive, and to implement any such reasonable and feasible measures. This requirement shall be raised in any negotiations with SSC in reclassification of Menai Road to local road status.

> *Note:*
> *The objective of this Condition is to ensure that the strategic justification for this project, particularly the major benefits to Menai Road, are achieved.*

34. The RTA shall through the process of reclassifying Menai Road and Old Illawarra Road to local status, advise SSC to limit truck use on Menai Road between Yala Road and Akuna Avenue and on Old Illawarra Road between Barry Road and the southern intersection with the North-South Link to vehicles of a maximum 3 tonnes, unless otherwise agreed by the Local Area Traffic Management Committee.

35. The RTA shall investigate in consultation with the Department of Transport and bus service providers, the public transport infrastructure to be provided on Menai Road as part of the project. The findings of this investigation would be incorporated into the Urban Design Strategy and Implementation Plan for Menai Road required under Condition 60.

Local Traffic

36. The RTA shall in consultation with the Gandangara Local Aboriginal land Council (LALC) and SSC monitor the performance of the seagull intersection of the Gandangara LALC subdivision and the North/South Link. Should unacceptable queue lengths or a pattern of accidents result, than the RTA shall install a signalised intersection.

37. Within 6 months of this Approval, the Proponent shall, in consultation with Emergency Services, SSC and the affected community, commence preparation of Local Area Traffic Management (LATM) measures for Anzac Road and surrounding streets. The preparation of the LATM shall include a comprehensive consultation process.

    The measures shall be installed at full cost to the Proponent as soon as practicable after opening the Bypass.

> *The key objective of the LATM measures shall be to restrict through traffic and ensure that alternative routes for traffic wishing to travel from the East-West Link up Anzac Road are relatively attractive.*

Pedestrians and Cyclists

38. The Proponent shall provide a pedestrian crossing at the intersection of the Gandangara Subdivision access road with the North-South Link in consultation with the Gandangara LALC and SSC. The link shall be constructed in accordance with Austroads *Guide to Traffic Engineering Practice - Bicycles*.

39. The Proponent shall complete a Pedestrian and Cyclist Network Investigation and Implementation Strategy in consultation with SSC and the local community and to the satisfaction of the Director-General within six months of the date of this Approval to identify pedestrian/cycleways that have a nexus to and are to be provided as part of this project. This Investigation shall include, but not be limited to:

    (a) a link between the western end of Dilkara Circuit and Priest Road;
    (b) a link between Elliot Road and Old Illawarra Road via Barry Road;
    (c) an east-west link from Barry Road to Carter Road;
    (d) a link between Shackel Road (south) and Menai Road;
    (e) a link down the length of Anzac Road;
    (f) a link between Lucas Heights School, New Illawarra Road to Old Illawarra Road, ending just north of Bradman Road; and,
    (g) other links identified during consultation with SSC.

    The Strategy shall include:

    (i) details of selected routes and connections to existing local and regional routes;
    (ii) timing and staging of all works and methodology for construction;
    (iii) methods to minimise the environmental impacts of construction and operation of the pedestrian/cycleways;
    (iv) details of lighting and safety and security;
    (v) details of landscaping works;

(vi) details of proposed implementation timeframes; and,
(vii) details of maintenance arrangements, responsibilities and where relevant funding requirements.

The pedestrian/cycleways to be provided shall be fully integrated with the Urban Design Strategy and Implementation Plan for Menai Road required under Condition 60 and be fully implemented within six months of opening the project to traffic.

Construction Traffic

Pre-Construction

40. A road dilapidation report shall be prepared for all non-arterial roads likely to be used by construction traffic prior to commencement of substantial construction and after construction is complete. A copy of the reports shall be provided to SSC. 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 in consultation with SSC.

41. The Proponent shall consult SSC to develop management techniques for construction traffic on local roads, prior to the commencement of substantial construction. The Proponent shall monitor the use of local roads by construction heavy vehicle traffic in consultation with SSC and shall consult with SSC to develop measures to minimise and/or restrict use of local roads by heavy vehicle traffic if so required.

Nothing in Conditions 40 or Condition 41 shall be taken as restricting the Proponent from negotiating an alternative payment for damage to local roads with SSC, subject to the agreement of SSC.

42. A detailed Construction Traffic Management Sub Plan shall be prepared as part of the Construction EMP in consultation with SSC where local roads are affected. The Sub Plan shall include, but not be limited to:

(a) identifying measures to minimise impacts on existing traffic (including pedestrians, vehicles, cyclists and disabled persons) including the staging of construction works to minimise lane closures during peak periods and delay to traffic;
(b) identifying access points for construction sites;
(c) delineating truck ingress and egress routes, entry and exit locations and the nature of loads;
(d) identifying temporary and interim traffic arrangements including intersection and property access;
(e) the provision of barriers between working and trafficked areas;
(f) preparation of response plan which sets out the proposed response to any traffic, construction or other incident; and,
(g) appropriate review and amendment mechanisms.

This Sub Plan shall be fully integrated with the Spoil and Fill Management Sub Plan required under Condition 105.

Construction Management

43. The Proponent shall ensure that legal access to all properties is maintained during construction and

following opening the project to traffic. The Proponent shall ensure that any legal access affected by the project is reinstated to an equivalent standard or that adequate compensation is negotiated with the relevant landowner(s).

44. 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.

45. 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 Construction Traffic Management Sub Plan required under Condition 42.

46. The Proponent shall construct and open the underpasses and overpasses to traffic as soon as practicable after construction commencement to ensure that impacts on existing local access arrangements are minimised.

Flora and Fauna

Pre-Construction

47. A detailed Flora and Fauna Management Sub Plan shall be prepared for construction and operation in consultation with the NPWS, SSC, and DLWC and incorporated in the relevant EMP. The Plan shall clearly show how the mitigation measures identified in the EIS and the Representations Report will be implemented during construction and operation. The Plan shall be prepared by an appropriately qualified and experienced ecologist and clearly incorporate 'best practice' management of native flora and fauna as described in Condition 13 of Section 9 of the Concurrence Report issued by the Director-General of the NPWS on 17th July 2002 . The Sub Plan shall include, but not be limited to:

    (a) the characteristics and location of the terrestrial and aquatic flora and fauna communities in the vicinity of the project;
    (b) the area of native vegetation clearing associated with the construction of the project;
    (c) procedures and timing for the clearance of vegetation and use of soil for construction including identification of requirements for seed collection;
    (d) detailed plans and maps of the construction footprint, areas to be cleared, important habitat areas, threatened species locations, and vegetation type and location;
    (e) design, location and construction of mitigation measures including where appropriate, nest boxes, salvaged trees containing hollows, glider and refuge poles, and any features associated with these mitigatory structures to encourage their use by fauna;
    (f) requirements to fence off and appropriately sign areas containing *Acacia pubescens* and *Melaleuca deanei* prior to construction;
    (g) strategies for minimising vegetation clearance within the worksite where possible and complete protection of vegetated areas outside the worksite;
    (h) re-use of top soil, cleared vegetation and leaf mulch including weed eradication;
    (i) replanting and rehabilitation of indigenous species, using materials that have been obtained from the site;
    (j) measures to use any surplus vegetation shall be identified including donation to community groups and distribution to the local community;
    (k) derivation of rehabilitation materials;

(l) strategies for temporary and progressive revegetation which include measures to reduce air quality impacts;
(m) a program for the active management and maintenance of all preserved, planted and rehabilitated vegetation (including aquatic vegetation) including watering regimes, fencing, replacement of vegetation that may have died and weed management; and,
(n) a program and methodology for reporting on the effectiveness of terrestrial and aquatic flora and fauna management measures against performance goals.

Construction

48. The Proponent shall ensure that no more than 11 hectares of vegetation communities/fauna habitat are cleared for the construction of the East-West Link and 8.04 hectares for the construction of the North-South Link. The final amount of clearing shall be verified by the EMR and approved by the Director-General.

49. The Proponent shall ensure that the clearing of vegetation does not directly affect stands of *Acacia pubescens* and, where practicable, avoid stands of *Melaleuca deanei* as described in the EIS and Representations Report. Conserved stands, replanted stands and translocated stands of this species shall be fenced off and marked with appropriate warning signage prior to construction commencing. These stands shall be managed in accordance with the requirements in Appendix D of the Director-General's Report so as to minimise risks of direct and indirect impacts from construction activities.

    Any stands of *Melaleuca deanei* that are directly affected shall be managed in consultation with NPWS and Environment Australia as follows:

    (a) cuttings and seeds shall be taken from these stands prior to the commencement of construction for propagation by a suitably qualified plant nursery;
    (b) propagated *Melaleuca deanei* will be replanted and maintained in suitable soil types/habitat within the project corridor (in addition to any other planted areas agreed to by NPWS); and,
    (c) the affected clumps of Melaleuca deanei shall be translocated and maintained in suitable soil types within the project corridor.

50. The Proponent shall ensure that the clearing of vegetation, where practicable, avoids stands of Shale/Sandstone Transition Forest. Conserved stands of Shale/Sandstone Transition Forest shall be fenced off and marked with appropriate warning signage prior to construction commencing. These stands shall be managed in accordance with the requirements in Appendix D of the Director-General's Report so as to minimise risks of direct and indirect impacts from construction activities.

    At least 38 hectares of suitable compensatory habitat for the loss of Shale/Sandstone Transition Forest shall be acquired or otherwise set aside for compensation purposes, in consultation with NPWS and Environment Australia.

51. Timing of all vegetation clearing works are to occur outside the breeding season of the Greater Broad-nosed Bat and the Powerful Owl unless otherwise agreed by the Director-General following consultation with NPWS.

52. 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.

53. Pre-clearing surveys and surveys before each phase of construction shall be conducted for the Eastern Pygmy Possum, Powerful Owl, Large Bent-wing Bat, Greater Broad-nosed Bat, Eastern False Pipistrelle and East Coast Freetail Bat in consultation with NPWS. Should any of these species be detected, appropriate mitigation and/or compensation measures shall be implemented as detailed in Section 9 of the Concurrence Report issued by the Director-General of the NPWS on 17 July 2002. Should any of these species be detected breeding, then activities should cease until the end of the respective breeding season.

54. The clearing of vegetation shall be limited to areas that need to be used for construction of the project. Cleared vegetation must be re-used or recycled to the greatest extent practicable. No burning of cleared vegetation shall be permitted. Re-use 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.

55. If permanent wetlands are constructed, macrophyte or water plant growth shall be undertaken within them, in accordance with the DLWC *Constructed Wetlands Manual*.

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Visual Impacts, Landscaping and Urban Design

Pre-Construction

56. The Proponent shall prepare an Urban Design and Landscape Plan prior to the commencement of substantial construction in consultation with NPWS, DLWC, SSC and the affected community and 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 concept for the project, applying all design principles established in the EIS and associated documents. The Plan shall identify the design and treatments for each element including but not limited to:

    (a) location and identification of existing and proposed vegetation;
    (b) built elements including retaining walls, bridges and noise walls;
    (c) underpasses considering lines of sight and the incorporation of appropriate lighting and public art;
    (d) motorway and road furniture including safety barriers, kerbs, paving, signage, medians, breakdown facilities and, if required, emergency phones;
    (e) pedestrian and cycle elements including footpaths and paving, pedestrian crossings and fixtures (i.e. tree guards, seating, lighting, fencing and signage);
    (f) landscape elements including proposed treatments, finishes and materials of exposed surfaces (including colour specifications and samples); and,
    (g) lighting.

    The Plan will also include:

    (h) sections and perspective sketches;
    (i) a schedule of species to be used in landscaping that includes the use of locally native

species and specifies target survival rates for plantings;

(j) Weed Management Action Plan meeting the requirements of NPWS and including but not limited to: scope of works, minimising physical disturbance, covering temporarily cleared surfaces with native vegetation mulch, revegetating cleared areas with local native plant species and regular removal of weeds and application of herbicide to newly establishing weed species;

(k) timing and staging of works, methodology, monitoring and maintenance;

(l) progressive landscape strategies incorporating other environmental controls such as erosion and sedimentation controls, dust mitigation, drainage (in accordance with Conditions 83 and 90); and,

(m) decommissioning of all construction stage structures that are not part of the operational project.

57. 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 unless transferred to SSC through the road classification process.

Specific Requirements

58. No commercial advertising shall be permitted within the road reserve for the project during construction or when in operation except for directional purposes.

59. All lighting for the project shall be designed, installed and operated in accordance with the requirements of AS1158-Road Lighting and AS4282-Control of the Obtrusive Effects of Outdoor Lighting.

Improvements to Menai Road

60. The Proponent shall prepare a detailed Urban Design Strategy and Implementation Plan for Menai Road in consultation with SSC and the local community and to the satisfaction of the Director-General within six months of the date of this Approval. The Urban Design Strategy and Implementation Plan shall include:

    (a) sections and perspective sketches;
    (b) location and identification of all existing and proposed works including vegetation, pedestrian/cycleways, road crossings and bridges;
    (c) public transport facilities;
    (d) finishes of proposed surfaces (including paved areas), colours, materials and specifications for all proposed structures;
    (e) management procedures for any required demolition works;
    (f) timing and staging of all works and methodology for construction;
    (g) road safety;
    (h) details of proposed implementation timeframes; and,
    (i) proposed responsibilities for implementation and maintenance.

    The Urban Design Strategy and Implementation Plan shall be fully integrated with the Pedestrian and Cyclist Network Investigation and Implementation Strategy required under Condition 39 and the outcomes of the public transport facilities investigation required by Condition 35. The Strategy

shall be fully implemented within six months of opening the Bypass to traffic.

Noise and Vibration

Pre-Construction

61. The Proponent shall complete additional background noise monitoring, in consultation with the EPA, to use in the development of the Construction Noise and Vibration Monitoring Sub Plan required by Condition 62 and the Operational Noise Management Sub Plan required by Condition 76.

Construction Noise and Vibration Management Sub Plan

62. A detailed Construction Noise and Vibration Management Sub Plan shall be prepared as part of the Construction EMP in consultation with, SSC and the CLGs. The Sub Plan shall provide details of noise and vibration controls to be undertaken during the construction. The Sub Plan shall include, but not be limited to:

    (a) identification of each work area, site compound and construction depot;
    (b) identification of the specific activities that will be carried out and associated noise sources for each work area, site compound and construction depot;
    (c) identification of all potentially affected noise sensitive receivers including residences, schools, commercial premises and noise sensitive equipment;
    (d) identification of the appropriate construction noise objective for the project with regard to the requirements of Condition No. 64;
    (e) identification of appropriate construction vibration objectives with regard to the requirements of Condition No. 73;
    (f) determination of appropriate noise and vibration objectives for each identified noise sensitive receiver, with regard to the requirements of Condition Nos. 64 and 73;
    (g) assessment of potential noise and vibration from the proposed construction methods including noise from construction vehicles and noise impacts from required traffic diversions;
    (h) detailed examination of all feasible noise mitigation measures including the use of alternative construction methods where potential noise levels exceed the relevant objectives;
    (i) consideration of erecting operational stage noise mitigation measures prior to construction commencement;
    (j) description of management methods and procedures that will be implemented to control noise and vibration during construction;
    (k) description of specific noise mitigation treatments and time restrictions including respite periods, duration, and frequency;
    (l) justification for any activities outside the normal hours specified in Condition No. 63;
    (m) assessment and examination of potential feasible off-site mitigation measures for traffic noise;
    (n) construction timetabling, in particular works outside standard hours, to minimise noise impacts;
    (o) a pro-active and reactive strategy for dealing with complaints including compliance with the construction noise and vibration objectives, particularly with regard to verbal and written responses;
    (p) noise and vibration monitoring, reporting and response procedures;
    (q) 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 SSC, residents etc;
    (r) procedures for notifying residents of construction activities that are likely to affect their noise

and vibration amenity;
(s) additional noise mitigation measures as successfully negotiated with affected residents and other sensitive receptors;
(t) contingency plans to be implemented in the event of non-compliances and/or noise complaints; and,
(u) education of construction personnel about noise minimisation.

With respect to (h) 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. The Proponent shall ensure that the mitigation measures referred to in Working Paper 3 of the EIS and in these Conditions are incorporated into the Sub Plan.

Construction Hours

63. All construction activities, 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 approved through the Construction Noise and Vibration Management Sub Plan process.

In relation to (d) above, local residents should be informed of the timing and duration of approved works at least 48 hours prior to commencement.

Construction Noise Guidelines

64. The construction noise objective for the project shall be to manage noise from construction activities as measured by a $L_{A10\ (15minute)}$ descriptor to not exceed 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 feasible noise mitigation and management measures are implemented with the aim to achieve the construction noise objective. Any potential activities that may cause noise emissions that exceed the objective shall be identified and managed in accordance with the Construction Noise and Vibration Management Sub Plan required by Condition 62.

For the purposes of the noise objective for this Condition, 5dB(A) must be added to the measured construction noise 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 Management

65. The Proponent shall apply all feasible noise and vibration mitigation measures including:

(a) maximising the offset distance between noisy plant items and nearby noise sensitive receivers;
(b) avoiding using noisy plant simultaneously and/or close together, adjacent to sensitive receivers;

(c) orienting equipment away from sensitive areas;
(d) carrying out loading and unloading away from noise sensitive areas;
(e) use of dampened tips on rock breakers;
(f) use of portable enclosures around mobile and fixed plant where noise impacts are likely to be unacceptable;
(g) using noise source controls to reduce noise from all plant and equipment including bulldozers, cranes, graders, excavators and trucks including the use of residential class mufflers. More examples of appropriate noise source controls are provided in Section 5 of the RTA Environmental Noise Management Manual;
(h) selection of plant and equipment based on noise emission levels;
(i) selecting site access points and roads as far as possible away from sensitive receivers; and,
(j) use of spotters, Closed Circuit Television Monitors and 'smart' reversing alarms in place of traditional reversing alarms

66. 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 implement best available additional mitigation measures to the satisfaction of the Director-General in consultation with the EPA.

67. The Proponent shall ensure that no public address systems are used at any construction sites outside standard working hours detailed in Condition 63 unless otherwise specified in the Construction Noise and Vibration Management Sub Plan. Any public address system shall be designed to minimise noise spillage off-site by incorporating best practice features and equipment such as directional speakers, volume control with background noise adjustments and locating and pointing speakers away from sensitive receivers.

68. 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 by the Director-General 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.

69. The Proponent shall ensure that all entry and departure of heavy vehicles to and from the site are restricted to the hours between 7:00 am and 6:00 pm, Monday to Friday, 8:00 am to 1:00 pm on Saturdays and at no times on Sundays and public holidays.

70. 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.

71. To minimise noise impacts during construction, the Proponent shall consult with SSC and affected landowners and where feasible, erect operational noise mitigation measures prior to the commencement of construction.

72. 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 important events such as examination periods, unless other arrangements acceptable to the affected institutions are made at no cost to the affected institutions.

Vibration Criteria

73. Vibration resulting from construction of the project shall be limited to:

    (a) for structural damage vibration - German Standard DIN 4150 Part 3 – Structural Vibration in Buildings. Effects on Structures; and,
    (b) for human exposure to vibration – the evaluation criteria presented in British Standard BS 6472-Guide to Evaluate Human Exposure to Vibration in Buildings (1Hz to 80 Hz) for low probability of adverse comment. These limits apply unless otherwise agreed by the Director-General in consultation with the EPA through the Construction Noise and Vibration Management Sub Plan.

Vibration Management

74. 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.

75. Vibratory compactors shall not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with Condition 73.

Operational Noise Management Sub Plan

76. 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 stage and 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) clearly identify appropriate operational noise criteria in accordance with Condition 77;
    (b) predictions of noise levels at all affected residential, recreational, commercial and industrial land uses;
    (c) the 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) consideration of reasonable and feasible noise mitigation measures (refer to Conditions 78, 79 and 81);
    (f) the urban design issues relating to noise control measures; and,
    (g) noise monitoring, reporting and response procedures including monitoring on surrounding roads which experience significantly increased traffic volumes as a result of the project.

Operational Noise Criteria

77. The sound pressure level due to road noise emissions when measured at one metre from the façade of a residential building or, if vacant, at any residential boundary (existing, zoned or in a

draft EPI at the time of this approval) or any other noise sensitive premises shall be designed to meet the operational noise criteria below:

(a) For new road sections as defined by the Director-General:

(h) $L_{Aeq15\ hour}$ 55 dB(A) (7:00 am to 10:00 pm); and,
(ii) $L_{Aeq9\ hour}$ 50 dB(A) (10:00 pm to 7:00 am).

(b) For redevelopment of existing arterial roads as defined by the Director-General:

(i) $L_{Aeq15\ hour}$ 60 dB(A) (7:00 am to 10:00 pm); and,
(ii) $L_{Aeq9\ hour}$ 55 dB(A) (10:00 pm to 7:00 am).

Final noise mitigation shall be subject to Conditions 78, 79 and 81

Operational Noise Management

78. As part of the Operational Noise Management Sub Plan, the Proponent shall complete a Barrier Sensitivity Analysis for the purpose of selecting and designing feasible and reasonable noise mitigation options in accordance with Practice Note IV of the RTA *Environmental Noise Management Manua*l for the entire project to determine target barrier heights. The weightings applied to visual impacts and noise mitigation along the project shall be determined in close consultation with the CLGs and affected residents. Consideration should also be given to the inclusion of Perspex panels within noise barriers to reduce visual and overshadowing impacts.

79. The Proponent shall install all reasonable and feasible noise mitigation measures to ensure that the predicted road traffic noise levels do not exceed the levels specified in Condition 77. Mitigation measures, including barriers at heights determined under Condition 78, and individual property treatments shall be designed and implemented in consultation with affected land owners.

80. The design of noise mitigation measures shall be based on predicted noise levels which have been formulated considering road grade variations and the signposted speeds on the project.

81. The Proponent shall ensure that the road surfaces of the project are sealed with open graded asphalt or other best practice low noise material.

Operational Monitoring

82. 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 noise design goals defined in the approved Operational Noise Management Sub Plan, the Proponent shall implement further reasonable and feasible mitigation measures in consultation with affected landowners and/or occupiers including consideration of inclusion of noise barriers and the acoustic treatment of buildings.

Air Quality

Pre-Construction

83. As part of the Construction EMP, a specific Dust Management Sub Plan shall be prepared. The Sub Plan shall provide details of all dust control measures to be implemented during the construction stage, including, but not be limited to:

    (a) identification of potential sources of dust;
    (b) dust management objectives in accordance with appropriate EPA guidelines
    (c) a monitoring program to assess compliance (by sampling and obtaining results by analysis) in accordance with Table 1;
    (d) details of mitigation measures to be implemented during normal operations
    (e) details of mitigation measures to be implemented during periods of extreme climatic conditions where high level dust episodes are likely to occur;
    (f) establishment of a protocol for handling dust complaints in accordance with the complaints management system required by Condition 8;
    (g) a reactive dust management procedure detailing how and when operations are to be modified to minimise the potential for dust emissions, should emission levels exceed the criteria;
    (h) progressive revegetation strategy for exposed surfaces in accordance with Conditions 56 and 90 with the aim of minimising exposed surfaces to 6000m^2; and,
    (i) a community consultation protocol.

Table 1 – Ambient Dust Monitoring

Pollutant	Units of Measure	Frequency	Method[1]
Dust deposition rate	g/m^2/month	Continuous	AM-19
TSP	μg/m^3	Continuous	AS3580.9.8-2001[2]
Pollutant	Units of Measure	Frequency	Method[1]
Siting	-	-	AM-1

[1] – NSW EPA, 2001, Approved Methods for Sampling and Analysis of Air Pollutants in New South Wales

[2] – Without size selective PM_{10} inlet

Construction

84. Construction vehicles using public roads shall be maintained and covered to prevent any loss of load, whether in the form of dust, liquid or soils. Construction vehicles shall be maintained and wheel wash facilities or equivalent shall be constructed at exits points of all unsealed construction sites/compounds to minimise tracking any mud, dirt or other material onto any street which is opened and accessible to the public. In the event of any spillage, the Proponent is required to remove the spilt material within 24 hours.

85. Water sprays and tankers shall be used to minimise the amount of dust generated, especially on hot, dry, windy days.

86. The Proponent shall ensure that trucks and other vehicles travelling on internal haul roads do not exceed 25km/hr.

Greenhouse Gases

Construction Stage

87. 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.

88. The EMR shall verify that no rainforest timbers are used in any construction activities.

Sustainable Energy

89. The EMR shall verify that green power is purchased for the supply of at least 50% of the electrical energy requirements for the construction of the project.

Water Quality, Erosion and Sediment Control

Soil and Water Quality Management Plan

90. As part of the Construction and Operational EMPs, detailed Soil and Water Management Sub Plans shall be prepared in consultation with the DLWC, NSW Fisheries, the Southern Sydney Catchment Board, Sydney Water and SSC. The Plans 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 Plans shall be prepared prior to construction or operation as appropriate. The Soil and Water Quality Management Sub Plans shall contain, but not be limited to:

    (a) management of the cumulative impacts of the development on the quality and quantity of surface, including stormwater in storage, sedimentation basins 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) detailed erosion and sedimentation controls including a strategy to manage the extent of exposed ground surface during construction in accordance with Conditions 56 and 83;
    (d) 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;
    (e) 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;
    (f) measures to handle, test, treat, re-use and dispose of stormwater, effluent and contaminated water and soil;
    (g) procedures for the re-use, treatment and disposal of water from sedimentation basins and constructed wetlands;

(h) measures for the use of water reclaimed or recycled on-site;
(i) contingency plans to be implemented in the event of fuel spills or turbid water discharge from the site; and,
(j) a program for reporting on the effectiveness of the sedimentation and erosion control system against performance goals.

Construction

91. The Proponent shall ensure that all appropriate soil and erosion and sediment control works are in place prior to commencement of any works with potential to cause soil erosion or generate sediment. Erosion and sediment protection measures shall also be in place before the commencement of any stockpiling activity.

92. The Proponent shall only construct sedimentation and erosion controls under this Approval in locations that satisfy the following criteria:

(a) sites to be located within the project footprint assessed in the EIS;
(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;
(d) 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;
(e) sites are not to involve the utilisation or modification of any existing waterways;
(f) sites are to have low conservation significance for flora and fauna and they are not to require any clearing of native vegetation beyond that which must be cleared for the project in any case;
(g) 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;
(h) sedimentation basins on private land shall be fenced to minimise safety risks; and,
(i) all controls are to be designed and constructed in accordance with the Department of Housing's Guideline *Managing Urban Stormwater – Soils and Construction*.

93. Permanent stormwater control measures for the operational phase of the project shall be installed and utilised as soon as possible after construction commencement.

94. During construction, an appropriately qualified soil conservationist shall be consulted regularly to undertake inspections of temporary and permanent erosion and sedimentation control devices to ensure that the most appropriate controls are being implemented and maintained in an efficient condition at all times and meet the requirements of any relevant approval or licence condition(s).

Operation Stage Control Measures

95. 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. Construction stage water quality structures shall be maintained for six months after construction or until revegetation has provided groundcover to at least 70% of the exposed ground surface (which ever is the shorter).

96. 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.

Spill Management

97. The Proponent shall provide detention systems for containment of spills and materials arising from accidents. The systems shall be consistent with the RTA's *Code of Practice for Water Management – Road Development and Management*.

In the event of a spill, the Proponent shall ensure that all material spilled is removed as soon as practicable and within at least 24 hours.

Flooding and Hydrology

Pre-Construction

98. The Proponent shall develop a detailed Flooding and Drainage Management Sub Plan for the project as part of the Construction EMP to the satisfaction of DLWC and in consultation with SSC. The Sub Plan shall be in accordance with the measures identified in DLWC's *Floodplain Management Manual: the management of flood liable land* dated January 2001 (or its latest edition). 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.

Construction

99. 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 SSC on appropriate and specific measures to be implemented.

Operational Drainage Design

100. The cross drainage system shall be designed to ensure that there is no exacerbation of existing flooding or water logging to the satisfaction of DLWC and in consultation with SSC and Landcom.

Groundwater

101. A detailed Groundwater Management Sub Plan shall be prepared as part of the Construction EMP in consultation with the DLWC. The Sub Plan shall include:

(a) identification of potential settlement impacts on the project and nearby structures;
(b) a description of groundwater quality, including the potential for contamination; and,
(c) groundwater inflow control, handling, treatment, and disposal.

Heritage

Further Investigation

102. The Proponent shall survey the area thought to contain the sandstone structure located by Navin in 1993. If the sandstone structure is located, the Proponent shall immediately advise the Director-General and the Heritage Office and shall prepare a Heritage Report of the structure in consultation with the Heritage Office and SSC. The Report shall determine the future management requirements for the structure.

Non-indigenous Heritage Management Sub Plan

103. The Proponent shall prepare a Non-indigenous Heritage Management Sub Plan, in consultation with the Heritage Council and SSC as part of the Construction EMP. This Sub Plan shall include:

(a) The findings of the investigation into the sandstone structure;
(b) details of any licences and approvals required; and,
(c) procedures to be implemented if previously unidentified items/areas are located during construction in accordance with Condition 104.

Unexpected Items

104. If during the course of construction the Proponent becomes aware of any heritage items or archaeological material, all work likely to affect the site(s) shall cease immediately and relevant authorities, including NPWS, NSW Heritage Council and the relevant Local Aboriginal Land Council, shall be consulted to determine an appropriate course of action prior to the recommencement of work at that site. Appropriate supporting documentation would need to accompany any application for required permit/consent(s).

Spoil and Fill Management

105. The Proponent shall prepare a Spoil and Fill Management Sub Plan and incorporate this Sub Plan into the Construction EMP. This Sub Plan shall include:

(a) mass diagrams showing the preferred transfer of cut material to fill areas;
(b) methods for managing temporary material stockpiles (of fill, topsoil, rock, etc.);
(c) methods for managing cut material that is not suitable for reuse on-site;
(d) how imported fill material will be sought, handled, stockpiled and placed;
(e) a contingency plan to be implemented in the case of unanticipated discovery of contaminated material during construction.

The Spoil and Fill Management Sub Plan shall be fully integrated with the Construction Stage Traffic Management Sub Plan required by Condition 42, the Waste Management and Re-use Sub Plan required by Condition 108, the Dust Management Sub Plan required by Condition 83 and the Soil and Water Management Sub Plan required by Condition 90.

106. All clean and/or treated spoil shall be re-used or recycled where possible and cost-effective to do so. The Proponent shall ensure that spoil generated from construction activities is maximised in preference to importing fill.

107. The haulage of spoil to and from the site shall be limited to the hours between 9:30 am and 3:00 pm, Monday to Friday, 8 am to 1 pm on Saturday and at no times on Sundays or public holidays.

Waste Management and Re-use

108. As part of the Construction EMP, a detailed Waste Management and Re-use Sub Plan shall be prepared. The Sub Plan 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 for management of all wastes generated by the project;
(ii) an outline of comprehensive plans of action for key waste streams;
(iii) implementation of the waste hierarchy, including the demand for water, 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) the provision of rubbish skips at all construction sites and site compounds and their regular removal or emptying and installation of segregated bins for recyclable materials and provision for material to be reused or recycled wherever possible;
(vii) except where a sewer is available, the discharge of sewerage from site amenities to holding tanks for removal by tankers;
(viii) ;
(ix) ensuring that local roads affected by construction remain intact to reduce the need for new paving materials;
(x) erecting signs within construction sites and site compounds encouraging employees to reduce, re-use, or recycle wherever possible;
(xi) the disposal of chemical, fuel and lubricant containers and solid and liquid wastes;
(xii) appropriate induction and training of all employees and sub-contractors in the waste hierarchy and the requirements of this Waste Management and Re-use Sub Plan;
(xiii) undertaking regular audits of waste management; and,
(xiv) 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.

109. Any waste material that is unable to be re-used, reprocessed or recycled shall be disposed at a landfill that can legally receive that waste.

Utilities and Services

110. The Proponent shall identify the services potentially affected by construction activities to determine requirements for diversion, protection and/or support. This shall be undertaken in consultation with the relevant service provider(s). 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).

111. The Proponent shall ensure that disruption to services resulting from the project are minimised and shall be responsible for ensuring that affected local residents and businesses are advised prior to any service disruption.

Hazards and Risks

112. As part of the Construction and Operational EMPs, the Proponent shall prepare and implement a Hazards and Risk Management Sub Plan. This Sub Plan shall include, but not be limited to the following:

(a) details of the hazards and risks associated with the project;
(b) procedures for storing and handling chemicals and fuel during construction to prevent spills;
(c) pro-active and reactive mitigation measures including contingency plans to be implemented in the event of a pollution incident;
(d) maintenance of detention basins and their immediate surrounds to ensure that they remain free from dry material likely to lead to an escalation of a burning liquid fuel fire from an accident; and,
(e) fencing to prevent unauthorised access.

Location of Construction Facilities

113. The Proponent shall only establish construction compounds, stockpiles or any other ancillary facilities under this Approval in locations that satisfy the following criteria:

(a) sites to be within the road reserve wherever possible;
(b) sites to access the local road network as determined in the Construction Traffic Management Sub Plan required by Condition 42;
(c) on relatively level land;
(d) sites to be separated from nearest residences by at least 100m unless it can be demonstrated that residents will not experience adverse impacts on noise, visual and air quality impacts;
(e) sites above the 100 ARI flood level unless otherwise agreed to by DLWC; and,
(f) sites are to have a low conservation significance for flora and fauna and heritage and are not to require any clearing of native vegetation beyond that which must be cleared for the project in any case.

ATTACHMENT 1

Guidelines for the Establishment of the Community Liaison Groups

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 to Group members within 14 days of the meeting.

5. Where reasonably required the Proponent shall engage consultants to interpret technical information and tasks of a similar nature for the benefit of the CLG.